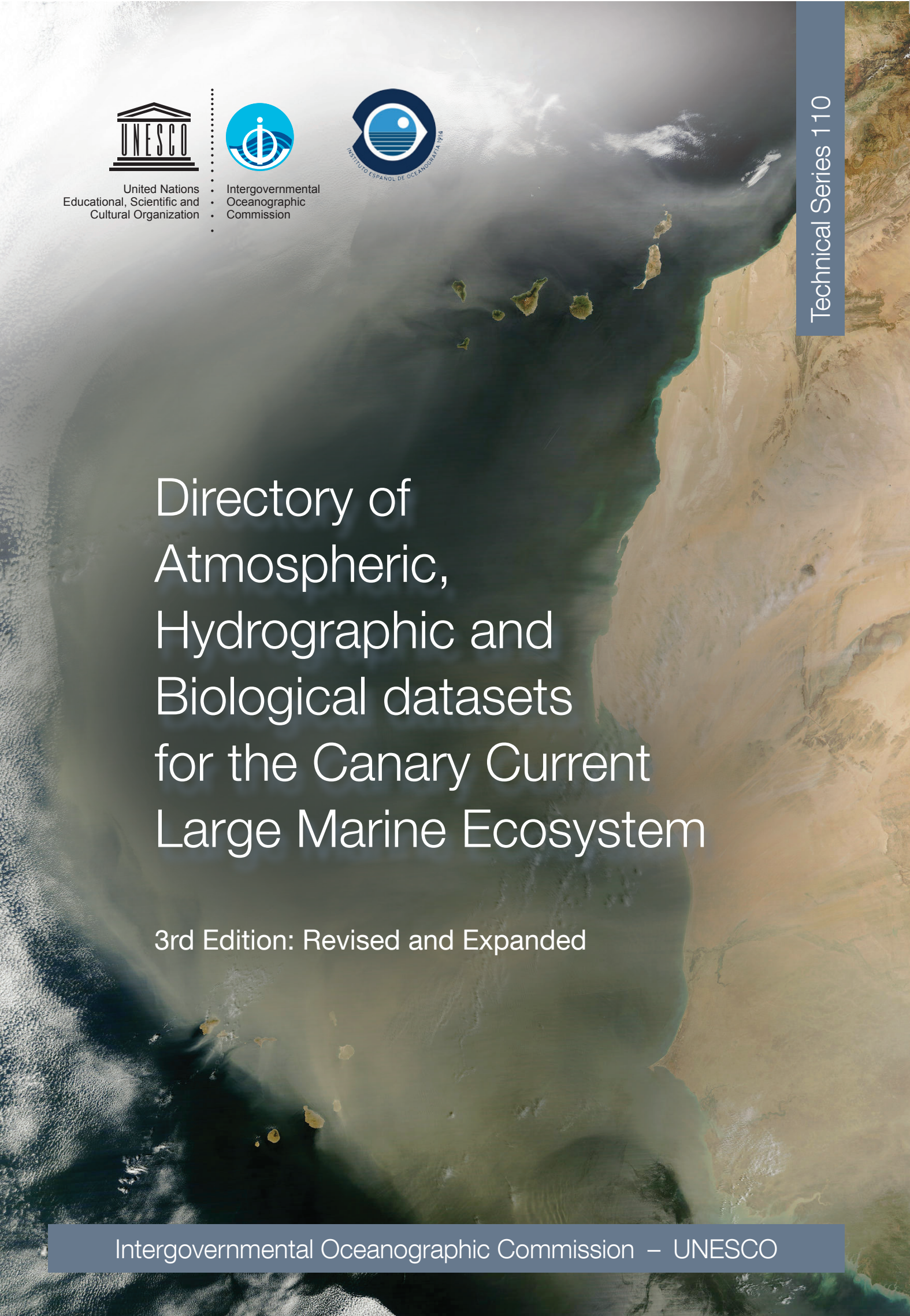

United Nations
Educational, Scientific and
Cultural Organization

Intergovernmental
Oceanographic
Commission

Technical Series 110

Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem

3rd Edition: Revised and Expanded

Intergovernmental Oceanographic Commission – UNESCO

Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO)

United Nations Educational, Scientific and Cultural Organization · Intergovernmental Oceanographic Commission

UNESCO's Intergovernmental Oceanographic Commission (IOC), established in 1960, promotes international cooperation and coordinates programmes in marine research, services, observation systems, hazard mitigation, and capacity development in order to understand and effectively manage the resources of the ocean and coastal areas. By applying this knowledge, the Commission aims to improve the governance, management, institutional capacity, and decision-making processes of its 148 Member States with respect to marine resources and climate variability and to foster sustainable development of the marine environment, in particular in developing countries. The Commission responds, as a competent international organization, to the requirements deriving from the United Nations Convention on the Law of the Sea (UNCLOS), the United Nations Conference on Environment and Development (UNCED), and other international instruments relevant to marine scientific research, related services and capacity-building.

Instituto Español de Oceanografía (IEO)

The Spanish Institute of Oceanography (IEO), founded in 1914, is a public research body attached to the Ministry of Economy and Competitiveness. The IEO is dedicated to marine science research, especially in relation to scientific knowledge of the ocean, sustainable marine living resources and fisheries, aquaculture and the marine environment. The IEO is committed to addressing the challenges facing the ocean for the benefit of society and is also an advisory institution on oceanographic research, ocean health and conservation and fish stock management for the Spanish Government. The IEO networks with the Spanish scientific community, as well as partner organizations in many countries; it also fosters a long-standing commitment to international cooperation with developing countries aimed to ensure the sustainable use of marine resources and the oceanographic research. The IEO represents Spain in most intergovernmental science and technology forums related to the ocean and its resources such as the Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO), the International Council for the Exploration of the Sea (ICES), the Mediterranean Science Commission (CIESM), and the Committee for the Eastern Central Atlantic Fisheries (CECAF) among others.

Spanish Agency for International Development Cooperation (AECID)

GOBIERNO DE ESPAÑA · cooperación española

AECID, the Spanish Agency for International Cooperation for Development, is a public entity under the Ministry of Foreign Affairs and Cooperation, in charge of the coordination of the Spanish policy on international cooperation for development, aimed to the reduction of poverty and the achievement of sustainable human development. Since its foundation in 1988, the Agency has established international alliances and strengthened Spain's relations with other countries and multilateral institutions such as the United Nations agencies. This work has contributed to the recognition of Spain as a reliable partner in the field of international cooperation, promotion of equitable and sustainable societies and respect for human dignity. It is also an AECID primary objective to promote and encourage the presence of Spanish experts in international organizations devoted to international cooperation such as UNESCO and other agencies in the United Nations.

Cover photo: Saharan Air Layer outbreak moving off of Africa into the North Atlantic on 2 March 2003, where vast amounts of Saharan dust can be seen as captured by the MODIS instrument aboard NASA's Terra satellite. Source: Jacques Descloitres, MODIS Rapid Response Team, NASA/GSFC © NASA.

Intergovernmental Oceanographic Commission
Technical Series 110

Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem

3rd Edition: Revised and Expanded

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Mª Teresa García-Santamaría
Jorge Luis Valdés

United Nations Educational, Scientific and Cultural Organization
Intergovernmental Oceanographic Commission

With the support of the Spanish Agency for International Development Cooperation (AECID)

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cooperación española

UNESCO 2017

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The authors are responsible for the choice and the presentation of the facts contained in this publication and for the opinions expressed therein, which are not necessarily those of UNESCO and do not commit the Organization.

Note that the inclusion of such datasets or products in this directory does not necessarily suggest that such data or product are recommended or endorsed by UNESCO.

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This is an updated and expanded version of the first edition:

Déniz-González, I.[1], Pascual-Alayón, P. J.[2], Chioua, J.[3], García-Santamaría, M. T.[2] and Valdés, J. L.[1] 2014. *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem*. IOC-UNESCO, Paris. IOC Technical Series, 110: 214 pp.

[1] Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO), Paris, France
[2] Instituto Español de Oceanografía (IEO), Santa Cruz de Tenerife, Spain
[3] Institut National de Recherche Halieutique (INRH), Tanger, Morocco
[4] Instituto Español de Oceanografía (IEO), Santander, Spain

The *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem* has been reviewed on a systematic and routine basis and the updates are available online at:

http://www.unesco.org/new/ioc_ts110

(IOC/2014/TS/110 Rev.0)

CLD 2461.17

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FOREWORD

The 2030 Agenda for Sustainable Development explicitly recognizes the importance of the ocean. Its Sustainable Development Goal 14 (SDG 14) calls on us to conserve and sustainably use the oceans, seas and marine resources. Ten targets of this ambitious goal are expected to bring tangible benefits by 2030 to developing countries, Small Island Developing States, and the global community as a whole.

Mindful of the tight self-imposed deadlines for achieving SDG 14, a high-level United Nations Ocean Conference to support the implementation of SDG 14 was held in New York from 5 to 9 June 2017. On this occasion, the Intergovernmental Oceanographic Commission (IOC) of UNESCO and its partners put forward a voluntary commitment of an International Decade of Ocean Science for Sustainable Development (2021-2030), which would provide Member States with a framework for coordinating and consolidating observations and research needed to achieve SDG 14. The IOC Assembly in June 2017 approved the proposal for such Decade.

Variations in the ocean dynamics occur as a result of climate change and variability in different ocean basins and regions of the world. As an example, research has identified significant knowledge gaps in relation to the Eastern Boundary Upwelling Systems (EBUS), which are continental margin areas with specific dynamics that result from global and regional physics. In these areas, the offshore movement of ocean surface waters due to the rotation movement of the planet together with the dominant trade winds leads to the upwelling of cold deep waters that are rich in nutrients, making these systems highly productive fishery areas, on which coastal countries depend for food.

In Western African countries, the proportion of animal protein obtained from fish is very high, exceeding 40 percent of the population's animal protein intake in some of the coastal countries. Variations in the upwelling regime may affect the productivity of this specific marine ecosystem and, consequently, could compromise the food security and the economy not only in the bordering countries but also around the world. Understanding the potential effects of climate change in the Canary Current Upwelling System is therefore of significant importance for the sustainable management of marine resources.

In recent years, IOC has implemented a project entitled "Enhancing oceanography capacities on Canary Current Large Marine Ecosystem (CCLME) Western Africa Countries". The "Directory of Atmospheric, Hydrographic and Biological Datasets for the Canary Current Large Marine Ecosystem. 3rd Edition: Revised and Expanded" and the CCLME Eco-GIS Viewer dynamic application, recently developed in the context of the project, are practical expressions of the collaborative efforts carried out by the active scientific community in the countries concerned.

Not only will this project inspire similar initiatives in other Large Marine Ecosystems; the information gathered and the networks built will also facilitate further scientific discussions and comparative studies within the region and beyond, with a focus on potential and actual effects of climate change in the four main EBUS around the world: Benguela, California, Canary, and Humboldt.

The Canary Current Large Marine Ecosystem project of IOC, made possible due to the generous contribution of Spain and the collaborative action of countries from the region, illustrates the IOC's continuous efforts in addressing UNESCO Global Priority Africa and the 2030 Agenda for Sustainable Development. An International Decade of Ocean Science for Sustainable Development would provide a unique opportunity to engage the ocean science community in achieving SDG 14 at the global, regional and local levels through further cooperation and useful activities such as the present Directory.

Vladimir Ryabinin
Executive Secretary of the IOC

ACKNOWLEDGEMENTS

The compilation of such complex directory of atmospheric, hydrographic and biological datasets in the Canary Current Large Marine Ecosystem would not be possible without the support of a donor. The Spanish Agency for International Development Cooperation (AECID) has funded generously the projects *Enhancing oceanography capacities on Western Africa countries* and *Enhancing oceanography capacities on CCLME Western Africa countries Phase II*, in which framework this document was elaborated, and now updated and expanded.

We would like to thank our partner in this project, the Instituto Español de Oceanografía (IEO), for the fruitful collaboration. We warmly thank IEO staff (especially, the IEO Centro Oceanográfico de Canarias) who have directly participated in the document search and in the completion and/or revision of many metadata sheets included in the Directory. Their input and comments have been very constructive. By alphabetical order, they were:

Luis Miguel Agudo
Javier Ariz Tellería
Irene Chamarro
Alicia Delgado de Molina Acevedo
Eugenio Fraile Nuez
María Jesús García Fernández
Eva García Isarch
Gonzalo González-Nuevo
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Luis José López Abellán
María Eugenia Quintero Pérez
Ana Ramos Martos
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Ignacio Sobrino
Elena Tel
Pedro Vélez Belchí

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Kandè Bangoura (Centre de Recherche Scientifique de Conakry Rogbanè – CERESCOR –, Guinea)
Mohamed Lamine Camara (Centre National des Sciences Halieutiques de Boussoura – CNSHB – Guinea)
Bambaye Cheikh Sid'El Mokhtar (Institut Mauritanien des Recherches Océanographiques et Pêches – IMROP –, Mauritania)
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Melchor Dávila Hernández (Instituto de Oceanografía y Cambio Global – IOCAG –, ULPGC, Spain)
Marta de Alfonso Alonso-Muñoyerro (Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado, Spain)
Satigui Diakité (CERESCOR, Guinea)
Anis Diallo (Centre de Recherches Oceanographiques de Dakar-Thiaroye – CRODT –, Senegal)
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Inês Dias Bernardes (Centre for Development Cooperation in Fisheries – CDCF –, Norway)
Tim R. Duffy (British Geological Survey, United Kindgdom)
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Marta González Carballo (Observatorio Ambiental Granadilla – OAG –, Spain)
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Bernat Puyol Montserrat (Instituto Geográfico Nacional – IGN –, Spain)
Katie Read (Cape Verde Atmospheric Observatory – CVAO –, National Centre for Atmospheric Science – NCAS –, Department of Chemistry, University of York, United Kingdom)
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Marc Schröder (Deutscher Wetterdienst – DWD –, Germany)
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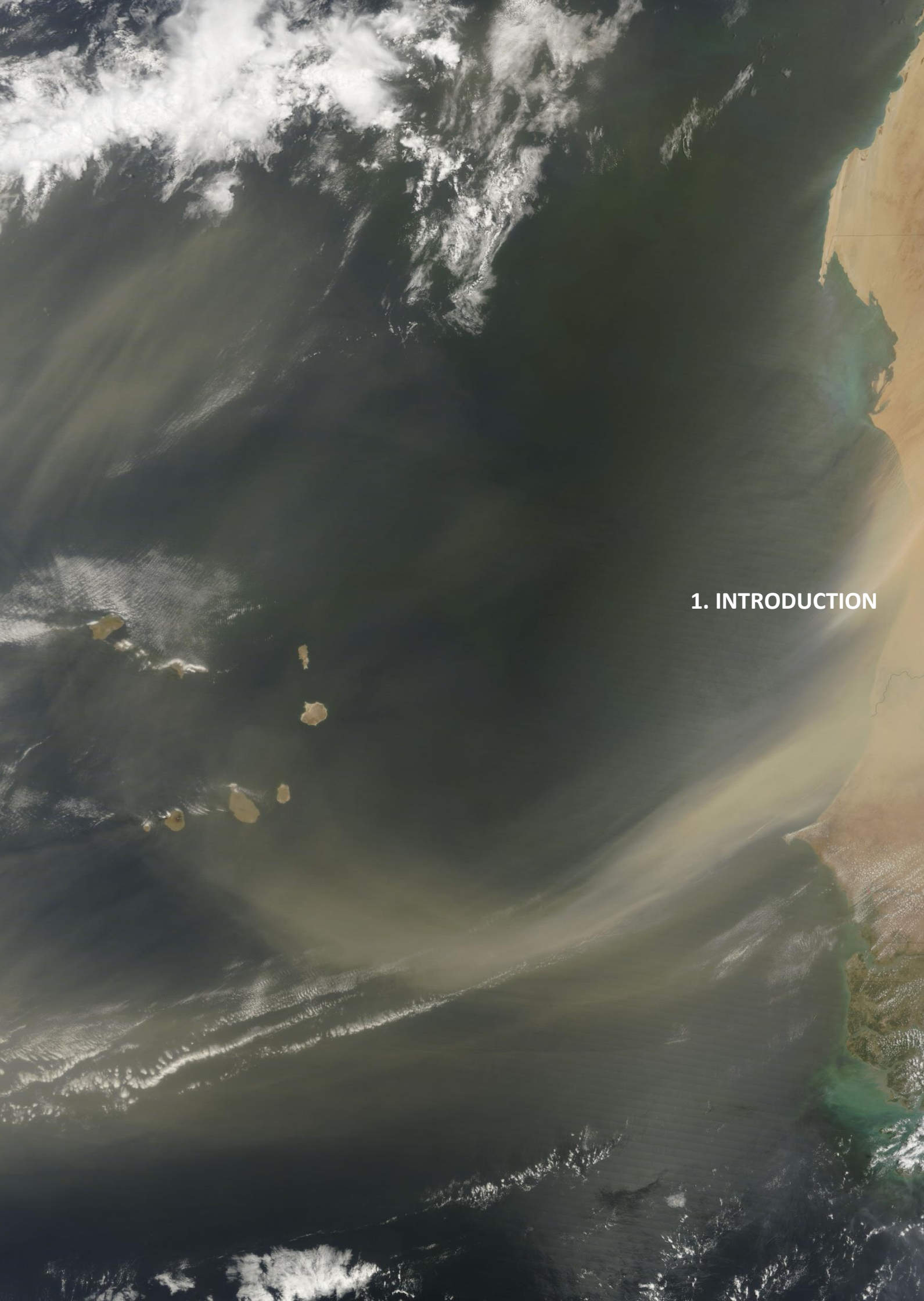
María Ascensión Viera Rodríguez (BCM Herbarium, ULPGC, Spain)

We thank all the collaborating institutions that have provided us *ad hoc* descriptive figures and tables about their datasets or databases to better illustrate the information contained in this directory. We also acknowledge the institutions that have open access figures and data available in their websites, which has facilitated us the task of recovering significant information and figures to complete the contents in many metadata sheets. Their generosity is important for scientists all around the world, and especially for those in developing countries.

We would like to recognize the implication of IOC staff that has accompanied us during all the process of conception and publication of the Directory. We would like to specially thank for their feedback to metadata sheets related to their activities to:
Thorkild Aarup (Tsunami Unit – Global Sea Level Observing System Secretariat, IOC-UNESCO, France)
Ward Appeltans (Ocean Biogeographic Information System – OBIS – Project Office, IOC Project Office for IODE, IOC-UNESCO, Belgium)
Albert Fischer (Ocean Observations and Services Section – GOOS Project Office – JCOMM, IOC-UNESCO, France)
Osamu Miyaki (Marine Policy and Regional Coordination Section, IOC-UNESCO, France)
Mika Odido (IOC Sub Commission for Africa and the Adjacent Island States, IOC-UNESCO, Kenya)

We express our sincere gratitude to Mika Odido (IOC-UNESCO) and Olvido Tello Antón (IEO) for their valuable advice following their peer review of the 2nd edition of the Directory, and to Cheik-Baye Braham (IMROP) and once again to Mika Odido for their valuable feedback following their peer review of the 3rd Edition of the Directory. We would also like to thank Henrik Enevoldsen (IOC-UNESCO) for his good comments and Salvatore Aricò (IOC-UNESCO) for his support.

Finally, we would like to thank every single person who has guided us and helped in identifying the right contact persons to reach our objective.



1. INTRODUCTION

MODIS/TERRA image showing Saharan sand blowing off the coasts of Mauritania, Senegal and The Gambia. Two dust plumes blow toward the southwest, one plume stretching possibly 150 kilometres off the coast, and the other plume forming an arc that reaches all the way to Cabo Verde. Thinner but larger plumes of dust hover over the Atlantic west and north of the island archipelago (22 June 2009). Source: NASA Earth Observatory. http://earthobservatory.nasa.gov/IOTD/view.php?id=39014 (accessed 10 May 2017). Image by Jeff Schmaltz, MODIS Rapid Response Team, Goddard Space Flight Centre.

1.1 Region description

The Canary Current Large Marine Ecosystem (CCLME) is a major upwelling region off the coast of northwest Africa. It extends southwards from Canary Islands (Spain) and the Atlantic coast of Morocco, Western Sahara, Mauritania, Senegal, Guinea-Bissau and The Gambia, but also Cabo Verde and the waters of Guinea are considered adjacent areas within the zone of influence of the CCLME (Fig. 1).

The CCLME is strongly influenced by the Canary Current, which flows along the African coast from north to south between 30°N-10°N and offshore to 20°W (Barton, 1998), being one of the world's major boundary current systems with cold water upwelling. It ranks 3rd in the world in terms of primary productivity after the Humboldt and Benguela LMEs and has the highest fisheries production of any African LME. Annual production ranges from 2 to 3 million tonnes (Heileman and Tanstad, 2008).

Upwelling regions are characterized by high natural variability in terms of production. In the biennium 2009-2010, Morocco and Senegal maintained their positions among the three major marine producers in Africa (FAO, 2012). In the biennium 2011-2012, Morocco was included in the ranking of the 18 countries that caught more than one million tonnes per year on average (FAO, 2014). Further, in the biennium 2013-2014, Morocco was ranked 17 among the 25 world major producers, with a net increase of fish catches in both years (FAO, 2016).

This LME has an area of about 1.086 million km^2 and contains 0.134% of the world's seamounts (Sea Aroud Us Project, 2017). There are 7 major estuaries and river systems draining into the LME including the Casamance, Senegal and Gambia. The CCLME is a vital food and economic resource not only for coastal populations bordering the LME, but also for much of West Africa and beyond.

1.2 Ocean observations

Several national governmental marine laboratories and agencies in the countries surrounding the CCLME area conduct observations, model operations and provide services to inform the industry, the public and other end users. The CCLME has also been a region where several countries offered international cooperation, e.g. France, Germany, Norway, Russia and Spain.

Environmental and biological data have been obtained from short and long-term studies in the region. The existing ocean observing systems have been developed and maintained to meet the needs of the bordering countries, including:

- Managing of fish stocks for sustainable exploitation;
- Preserving healthy marine ecosystems;
- Ensuring public health; and
- Safe and efficient navigation

However, the information gathered in the observation systems and research projects is very often dispersed and disaggregated, which makes it difficult both, to access and to share the data. The compilation of datasets to make them available for other relevant purposes and user groups is critical to maximise the utility of the observations beyond the specific purpose for which they have been originally designed. It is intended that this directory of environmental and biological datasets will enable researchers to identify and obtain the most appropriate data for their scientific studies in the CCLME.

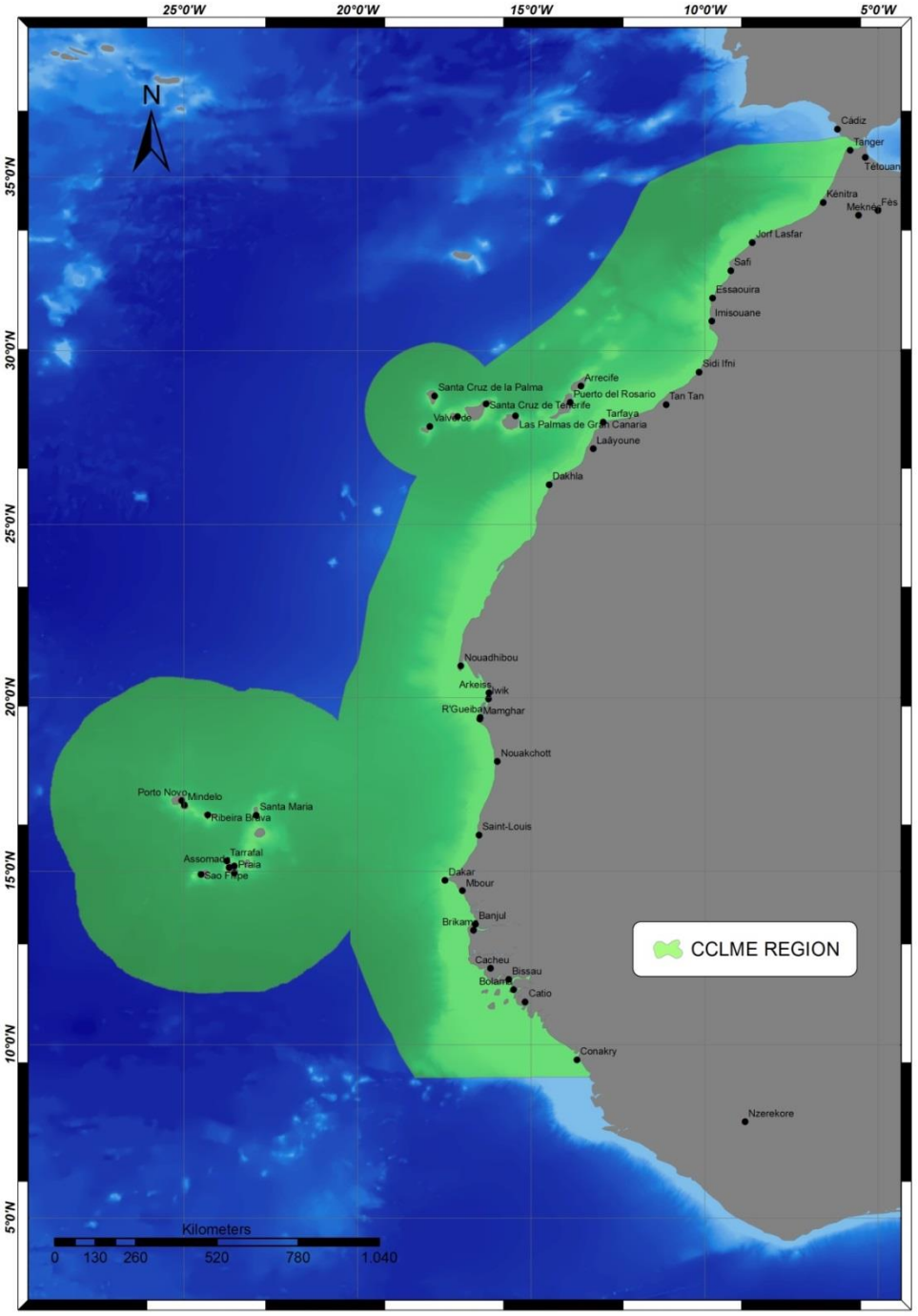


Figure 1. CCLME region including adjacent waters of Cabo Verde and Guinea, within the CCLME zone of influence. This LME limits in the North with the Iberian Coastal LME and in the South with Guinea Current LME.

Regional inventories have been produced in other regions as well, e.g. *A directory of hydrographic and atmospheric datasets for the North East Atlantic and UK shelf seas* (Clark et al., 2001). The current inventory is aligned within the framework for strategic actions included at the *2050 Africa's Integrated Maritime Strategy*, which Strategic Action XIV (Environmental and Biodiversity Monitoring) reads as follows: "The African Union, the Regional Economic Communities/Regional Mechanisms and Member States shall support such efforts which require inventory knowledge and

a full understanding of natural and artificial changes in Africa's Maritime Domain biodiversity" (African Union, 2012).

The combination of different sources and multidisciplinary data will permit to perform better science with higher resolution in models, more rapid delivery of products, and longer forecast horizons.

1.3 Data Sources and format

The majority of data listed in this directory come from direct measurements carried out by different research cruises or sampling programmes that are discrete in time and space. The Directory also includes remote sensing data, which give the synoptic and spatial coverage needed for models and forecasts. It also includes climatic indicators, such as the NAO index, which serve as an index of atmospheric conditions at a large spatial scale, or the upwelling index. Finally, the Directory links some existing environmental and biological databases with derived, interpolated or raw data, which can be explored and used as a proxy to study different ecosystem features.

It must be noted that the spatial coverage and resolution of the listed datasets in this directory varies considerably. Regarding the temporal coverage, it was decided to compile datasets from 1976 onwards.[1,2] Also, the methodologies used by the different countries (mostly in biological studies) differ, which must be taken into consideration by the users when calculating and comparing data extracted from different datasets.

The information is presented in metadata sheets. The compiled metadata elements are in accordance with 2007/2/EC INSPIRE Directive, but some information has been adapted to facilitate the readability of this outreach publication (e.g. the coordinates are expressed in ˚N, ˚S, ˚E and ˚W instead of +/- ˚N and +/- ˚E). As clarification, resource language is described with codes defined in the standard ISO 639-2: *Codes for the representation of names of languages-Part 2: alpha-3 code*, as indicated in 2007/2/EC INSPIRE Directive. In this directory, the following codes are used: "eng", "fre", "por", "rus" and "spa" for English, French, Portuguese, Russian and Spanish, respectively.

Keywords are provided from the general environmental multilingual thesaurus (GEMET) describing the relevant spatial data theme. Thesauruses where chosen from the INSPIRE Spatial Data Themes list.[3]

The descriptive metadata sheets have been filled using metadata provided by the originators or obtained from the analysis of datasets and reports to rescue and extract this information. To this end, a straightforward collaboration has been established with researchers and data managers in research and environmental data centres in the CCLME and other countries, which allow us to rescue and describe data that they have in their own archives. Nevertheless, the Directory does not claim to be exhaustive and it would need of further cooperation of the scientific community in the region to

[1] The campaigns undertaken in the coast of West Africa before 1976 are not included in this inventory. Please see the Chapter 8 this volume for further information.

[2] Many fisheries surveys have been carried out in the region since 1976, others than the ones listed in this volume. i.e. Collaboration was established with the Centre National des Sciences Halieutiques de Boussoura (CNSHB, Guinea). As many of these campaigns are inventoried or used in the Istam Trawlbase (e.g. the surveys carried out in the R/V *André Nizery* between 1985 and 1998, please see Chapter 7 this volume), efforts were focused in this publication in the more recent campaigns which are not included in the Istam Trawlbase up to this moment.

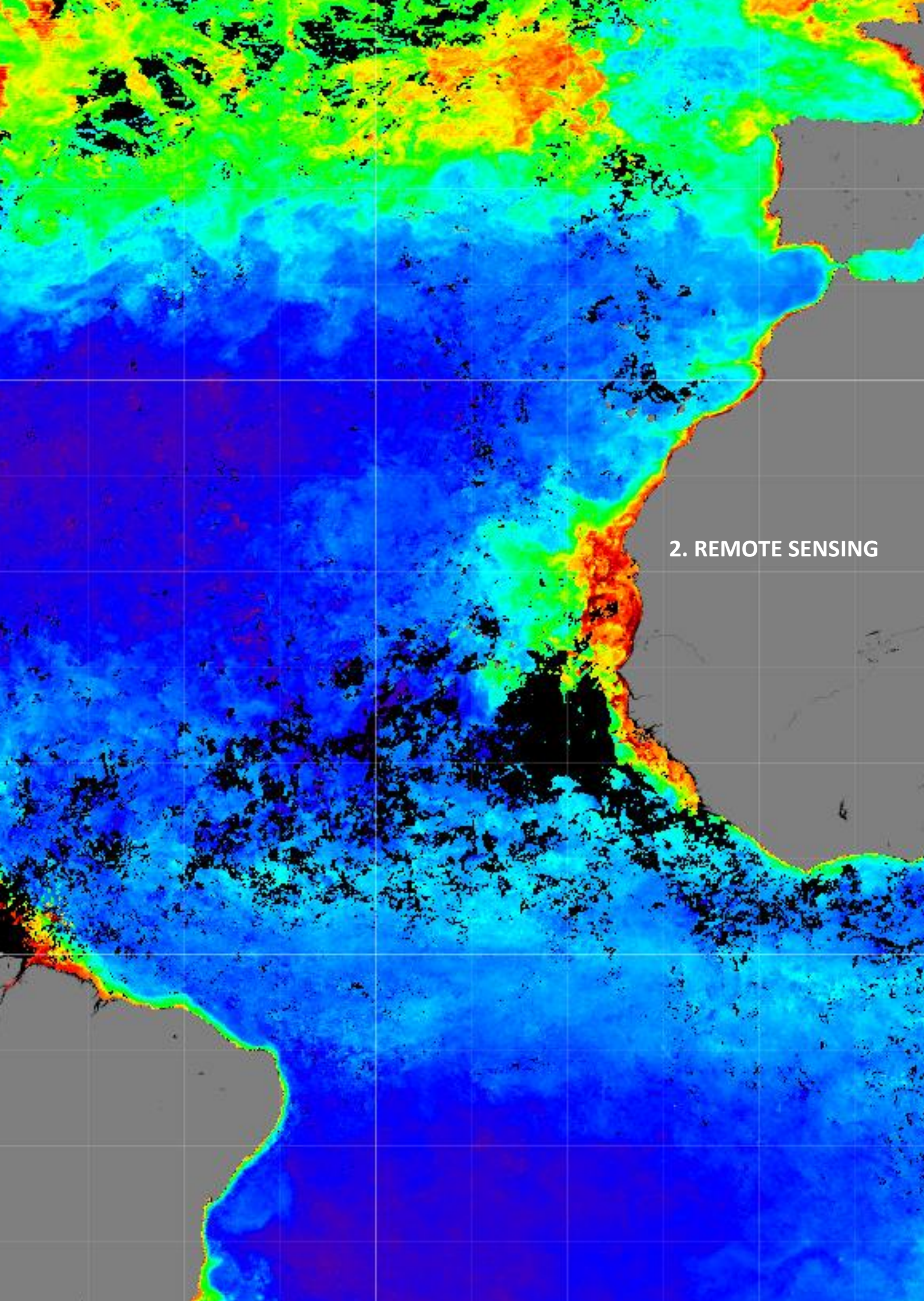
[3] INSPIRE Spatial Data Themes list available at: http://www.eionet.europa.eu/gemet/en/inspire_themes (accessed 10 May 2017).

expand and complete it in the future (the online version has been updated accordingly up to the current 3rd Edition, Revised and Expanded).

The data are presented in the following order:

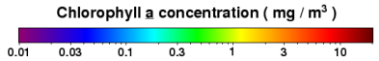
- Remote sensing sheets are organized taking into account the most important variable obtained for oceanographical studies: atmospheric data, hydrographic data, biological data and new satellites offering a wide variety of variables.
- Regarding the atmospheric data, the metadata sheets are in the following order: atmospheric observatories, measuring stations and indices.
- In the case of tide gauges, moorings and Argo buoys float, they are assembled in that order. The tide gauges are ordered by country as follows: Mauritania, Senegal, Cabo Verde and Spain. Within each country, they are ordered alphabetically by the name of the managing institution.
- The ocean observatories and ship based repeat hydrography are listed in that order. It should be taken into account that during several biological surveys, hydrographic data have been collected simultaneously. For further information, please verify the availability of hydrographic data in the metadata sheets contained in Chapter 6 on biological surveys.
- The biological surveys include: (i) international and national databases, and (ii) research surveys. The surveys have been grouped by countries in the following order: Morocco-Western Sahara, Mauritania, Senegal, The Gambia, Guinea-Bissau, Guinea, Cabo Verde, Spain and finally transboundary surveys. Within each country group, the sheets are displayed in chronological order.

The origin of each dataset is given in the respective sheet and potential users should contact these sources directly. The use of the data is limited to academic, research and educational uses only; and its use is not allowed for commercial purposes without a license from the owners. The use of the data must be properly acknowledged and should not infringe the rights of any third party.



2. REMOTE SENSING

MODIS/AQUA: monthly mean chlorophyll-a concentration (9 km grid resolution, May 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014a).



Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov/ (accessed 15 June 2017).

QuikSCAT/SeaWinds – Quick Scatterometer –
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), UNITED STATES OF AMERICA

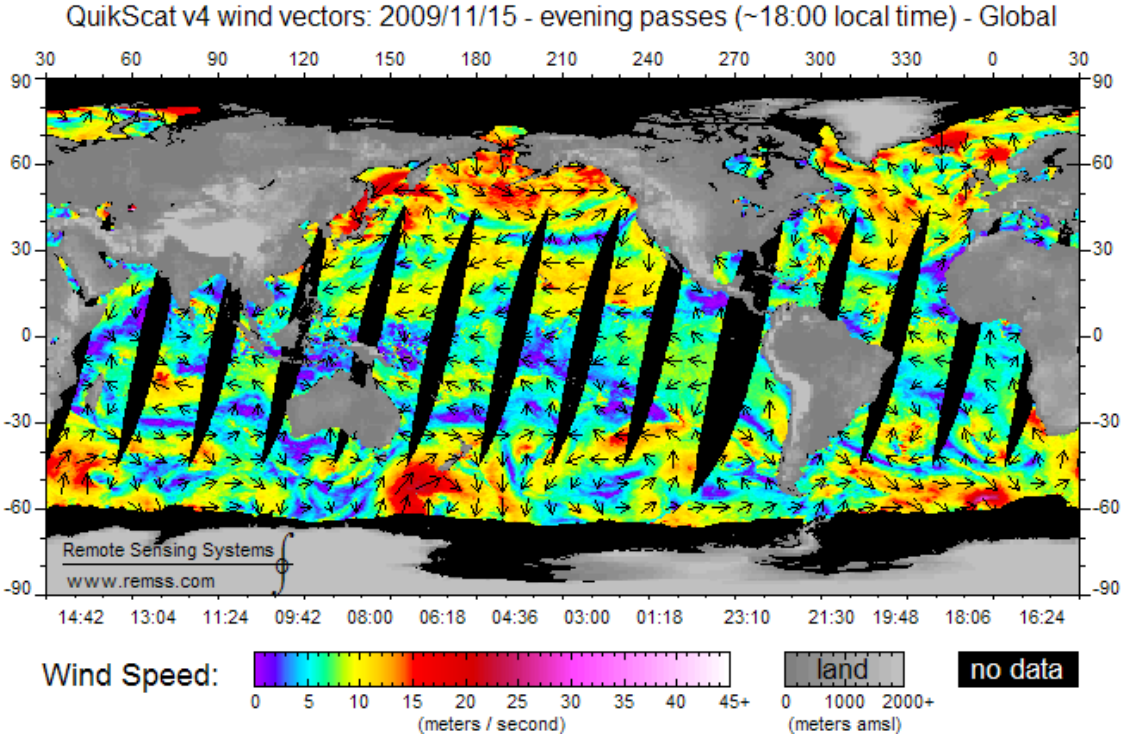


Figure 2. Example of 12 hours QuikSCAT global wind speed coverage. The revisit time is about 29 days. Source: Remote Sensing Systems. http://images.remss.com/qscat/scatterometer_data_daily.html (accessed 14 June 2017).

Resource abstract:
QuikSCAT (Quick Scatterometer) is an Earth observation satellite carrying the SeaWinds scatterometer. Its primary mission is to measure the surface wind speed and direction over the ice-free global oceans. Observations from QuikSCAT have a wide array of applications, and have contributed to climatological studies, weather forecasting, meteorology, oceanographic research, marine safety, commercial fishing, tracking large icebergs, and studies of land and sea ice, among others. This SeaWinds scatterometer is referred to as the QuikSCAT scatterometer to distinguish it from the nearly identical SeaWinds scatterometer flown on the ADEOS-2 satellite.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Wind speed and direction Sea ice coverage
Geographic location:	Global coverage
Spatial resolution:	QuikSCAT datasets are available at a resolution of 25 km grid for level 2 and 0.25° grid for level 3
Temporal extent:	1999-07 / 2009-11
Temporal resolution:	Daytime and nighttime for level 2 and daily for level 3
Depth range/resolution:	Surface
Conditions for access & use:	Data is provided free of charge but user registration is required in Remote Sensing Systems (RSS)
Limitations on public access:	No
Responsible organization:	NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) and Remote Sensing Systems (RSS), USA

Data via:	PO.DAAC: http://podaac.jpl.nasa.gov/datasetlist?ids=Platform:Sensor&values=QUIKSCAT:SEAWINDS Contact: podaac@podaac.jpl.nasa.gov RSS: ftp://ftp.remss.com/qscat/bmaps_v04 Contact: support@remss.com
Data format:	Digital, in HDF (Hierarchical Data Format)
References	Information about citation and acknowledgements in: https://podaac.jpl.nasa.gov/CitingPODAAC http://www.remss.com/missions/qscat When using data from RSS, please include the following statement in the acknowledgement section of your paper: "QuikScat (or SeaWinds) data are produced by Remote Sensing Systems and sponsored by the NASA Ocean Vector Winds Science Team. Data are available at www.remss.com."

Additional information:

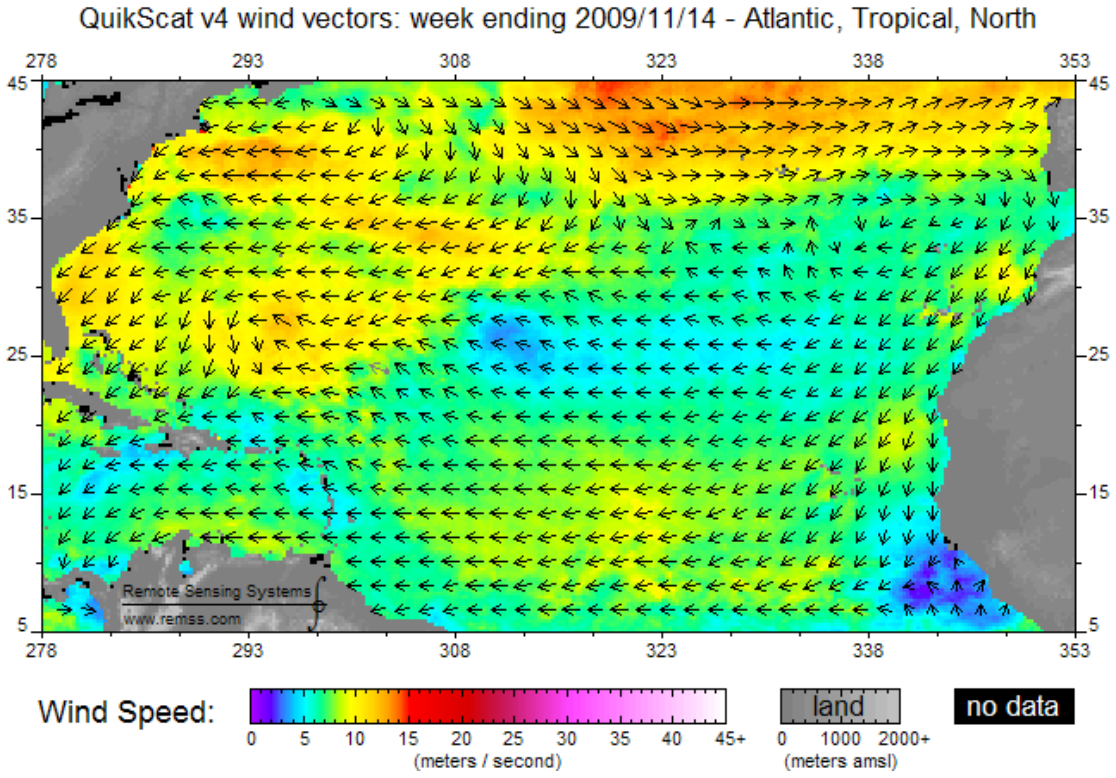


Figure 3. Example of QuikScat weekly sea wind speed and direction (week ending 14 November 2009). Source: RSS. http://images.remss.com/qscat/scatterometer_data_weekly.html (accessed 14 June 2017).

SSM/I – Special Sensor Microwave Imager – and SSMIS – Special Sensor Microwave Imager Sounder –

NATIONAL AERONAUTICS ANS SPACE ADMINISTRATION (NASA), USA

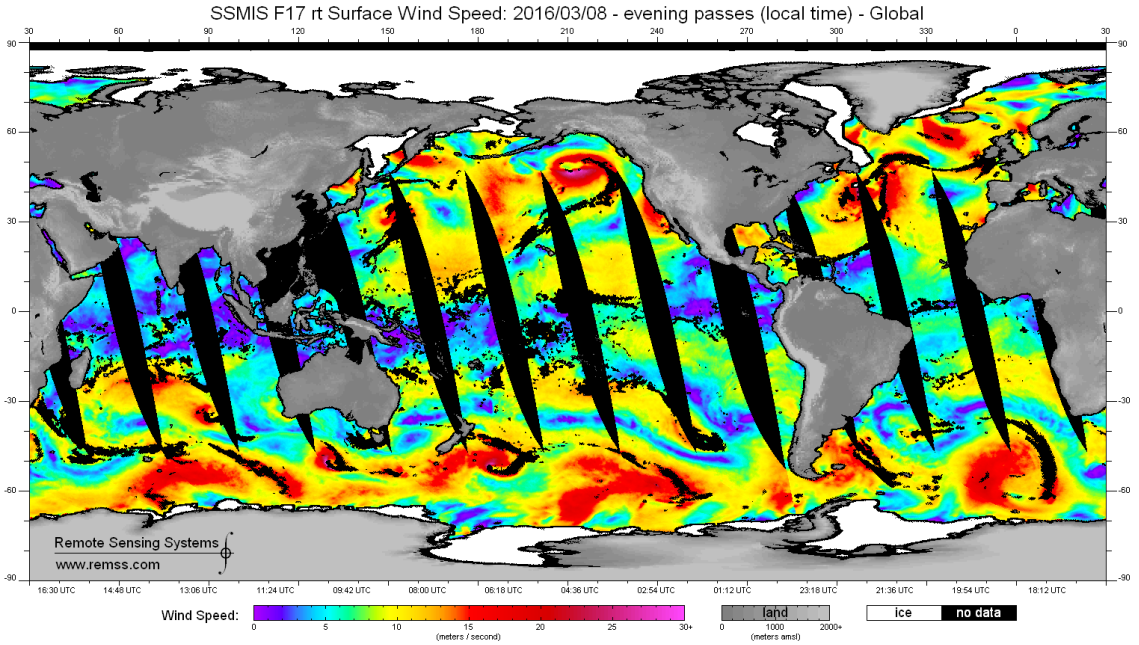


Figure 4. Example of SSMIS daily wind speed coverage. The revisit time is about 1 day. Source: RSS. http://images.remss.com/ssmi/ssmi_data_daily.html (accessed 14 June 2017).

Resource abstract:

SSM/I and SSMIS are satellite passive microwave radiometers that measure atmospheric, ocean and terrain microwave brightness temperatures incident upon a seven-port horn antenna. The SSMIS is the successor of the SSM/I. The SSM/I is a seven-channel, four-frequency sensor ranging from 19 GHz to 85.5 GHz, while SSMIS is a 24-channel with frequencies ranging from 19 GHz to 183 GHz. The primary mission of these instruments is to support Department of Defense operations. This series of instruments are carried onboard Defense Meteorological Satellite Program (DMSP) satellites, and are referred to by satellite number starting with F08. The first SSMIS sensor was launched aboard the DMSP F16 satellite.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Ocean surface wind speed Atmospheric water vapor Ocean cloud liquid water Rain rate
Geographic location:	Global coverage
Spatial resolution:	For SSM/I sensor, spatial resolution varies from 69 km x 43 km (along x cross) at 19.35 GHz to 15 km x 13 km at 85.5 GHz. For SSMIS sensor, spatial resolution varies from 73 km x 43 km at 19.35 GHz to 14 km x 13 km at 183 GHz. Gridded binary data files are available in 0.25° grid
Temporal extent:	F08 SSM/I: 1987-07 / 1991-12 F10 SSM/I: 1990-12 / 1997-11 F11 SSM/I: 1991-12 / 2000-05 F13 SSM/I: 1995-05 / 2009-11 F14 SSM/I: 1997-05 / 2008-08 F15 SSM/I: 1999-12 / present

	F16 SSMIS: 2003-10 / present F17 SSMIS: 2006-12 / present F18 SSMIS: 2009-10 / present
Temporal resolution:	Daily (both ascending and descending swaths) binary data files, and 3-days, weekly and monthly time-averaged data files
Depth range/resolution:	Surface
Conditions for access & use:	Data is provided free of charge but user registration is required in Remote Sensing Systems (RSS)
Limitations on public access:	No
Responsible organization:	NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), NOAA National Centers for Environmental Information (NCEI) and Remote Sensing Systems (RSS), USA
Data via:	PO.DAAC: podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=SSM%2FI podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=SSMIS Contact: podaac@podaac.jpl.nasa.gov NCEI: http://www.ncdc.noaa.gov/data-access/satellite-data Contact: ncei.sat.info@noaa.gov RSS: ftp://ftp.remss.com/ssmi Contact: support@remss.com
Data format:	Digital, in HDF (Hierarchical Data Format), binary format and netCDF
References:	Information about citation and acknowledgements in: https://podaac.jpl.nasa.gov/CitingPODAAC http://www.remss.com/missions/ssmi When using data from RSS, please include the following statement in the acknowledgement section of your paper: "SSM/I and SSMIS data are produced by Remote Sensing Systems and sponsored by the NASA Earth Science MEaSUREs Program and are available at www.remss.com."

Additional information:

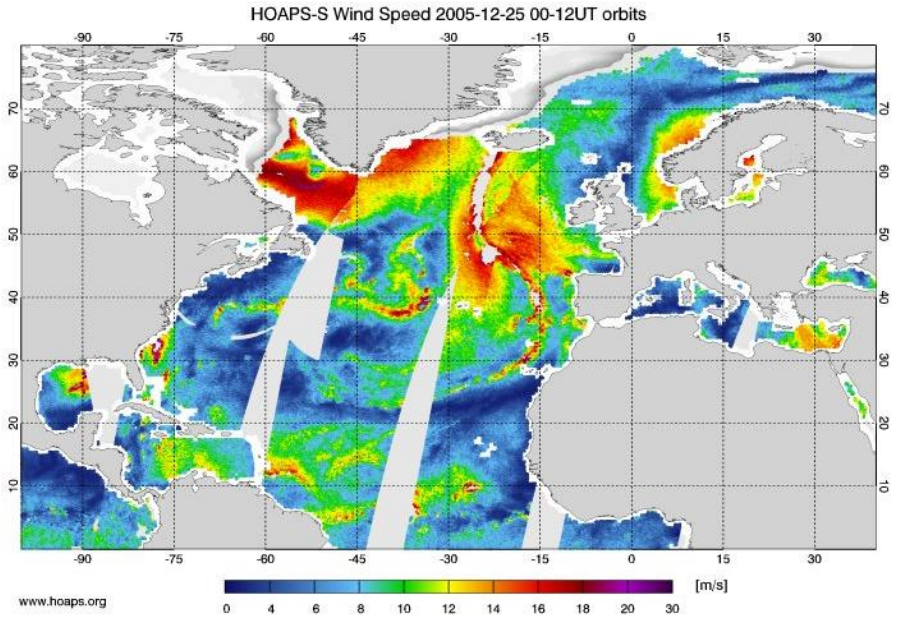


Figure 5. Example of Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data (HOAPS) wind speed (in m/s) on 25 December 2005 (Andersson et al., 2007, 2010; Fennig et al., 2012). Source: HOAPS-3. http://www.hoaps.zmaw.de (accessed 15 June 2017).

WINDSAT

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA

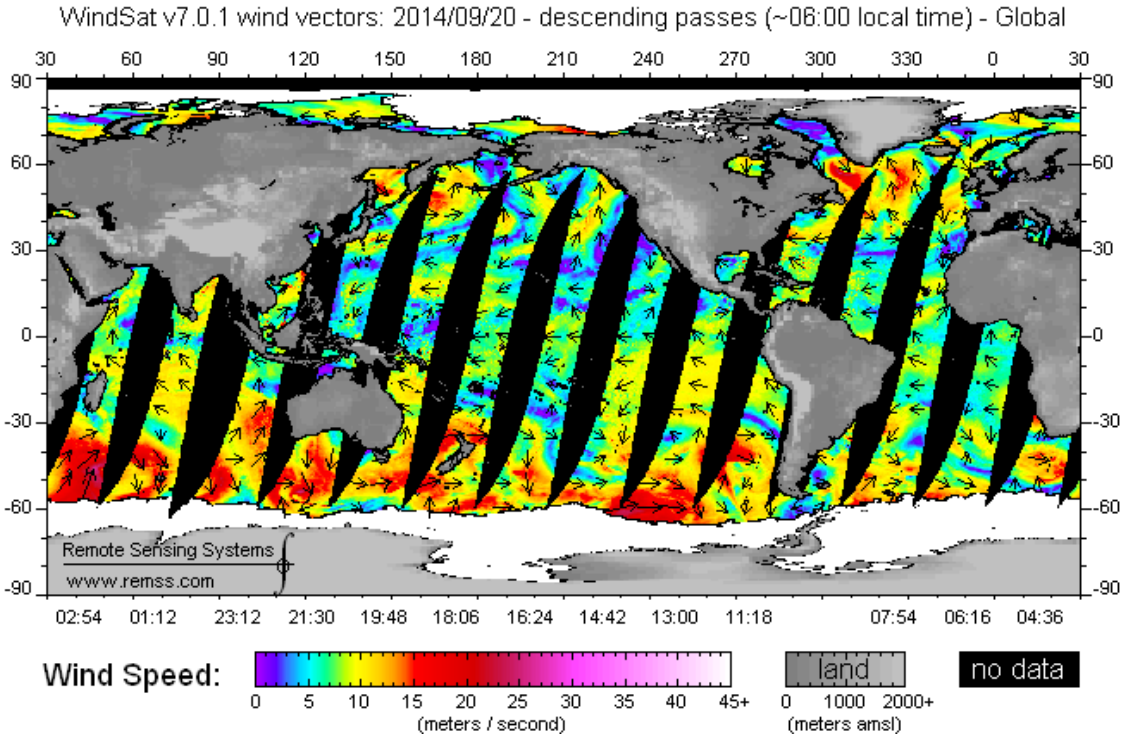


Figure 6. Example of WindSat daily wind speed coverage. Complete global coverage is provided every 8 days. Source: RSS. http://images.remss.com/wind/wind_vector_data_daily.html (accessed 15 June 2017).

Resource abstract:

WindSat is a satellite-based polarimetric microwave radiometer developed by the Naval Research Laboratory Remote Sensing Division and the Naval Center for Space Technology for the U.S. Navy and the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Integrated Program Office (IPO). WindSat is designed to demonstrate the capability of polarimetric microwave radiometry to measure the ocean surface wind vector from space. It was launched aboard the Coriolis satellite.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Ocean surface wind speed and direction Ocean cloud liquid water Rain rate Sea surface temperature (SST) Soil moisture Water vapor
Geographic location:	Global coverage
Spatial resolution:	WindSat level 2 datasets are available at a resolution of 25 km. For level 3, datasets are available in 0.25° grid
Temporal extent:	2003-01 / present
Temporal resolution:	Daily (both ascending and descending passes) for level 2 and 3 days, weekly and monthly for level 3
Depth range/resolution:	Surface
Conditions for access & use:	Data is provided free of charge but user registration is required in Remote Sensing Systems (RSS)

Limitations on public access:	No
Responsible organization:	NOAA National Oceanographic Data Center (NODC), NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) and Remote Sensing Systems (RSS), USA
Data via:	NODC: http://data.nodc.noaa.gov/thredds/catalog/ghrsst/L2P_GRIDDED/WSAT/REMSS/ Contact: NODC.Webmaster@noaa.gov PO.DAAC: http://podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=WindSat Contact: podaac@podaac.jpl.nasa.gov RSS: ftp://ftp.remss.com/windsat Contact: support@remss.com
Data format:	Digital, in HDF (Hierarchical Data Format), binary format and netCDF
References:	Information about citation and acknowledgements in: https://podaac.jpl.nasa.gov/CitingPODAAC http://www.remss.com/missions/windsat When using data from RSS, please include the following statement in the acknowledgement section of your paper: "WindSat data are produced by Remote Sensing Systems and sponsored by the NASA Earth Science MEaSUREs DISCOVER Project and the NASA Earth Science Physical Oceanography Program. RSS WindSat data are available at www.remss.com. "

Additional information:

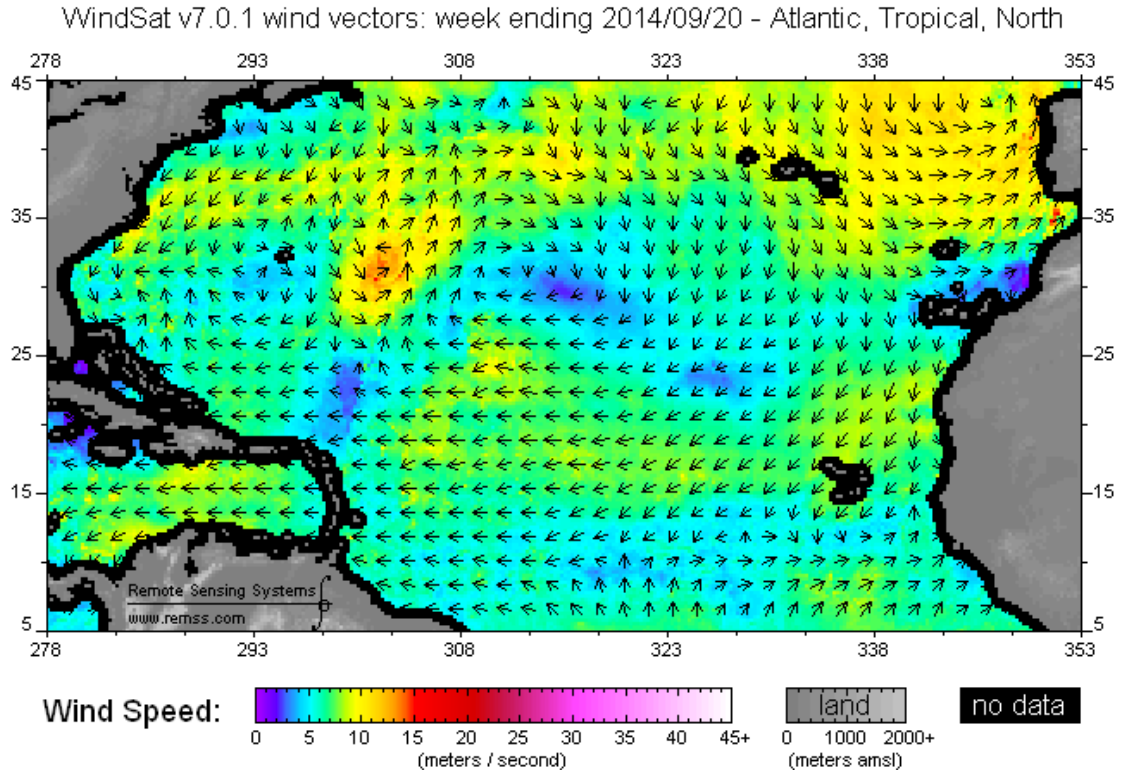


Figure 7. Example of WindSat weekly wind speed and direction (week ending 20 September 2014). Source: RSS. http://images.remss.com/wind/wind_vector_data_weekly.html (accessed 15 June 2017).

ASCAT – Advanced Scatterometer –
EUROPEAN SPACE AGENCY (ESA)
EUROPEAN ORGANISATION FOR THE EXPLOITATION OF METEOROLOGICAL SATELLITES (EUMETSAT)

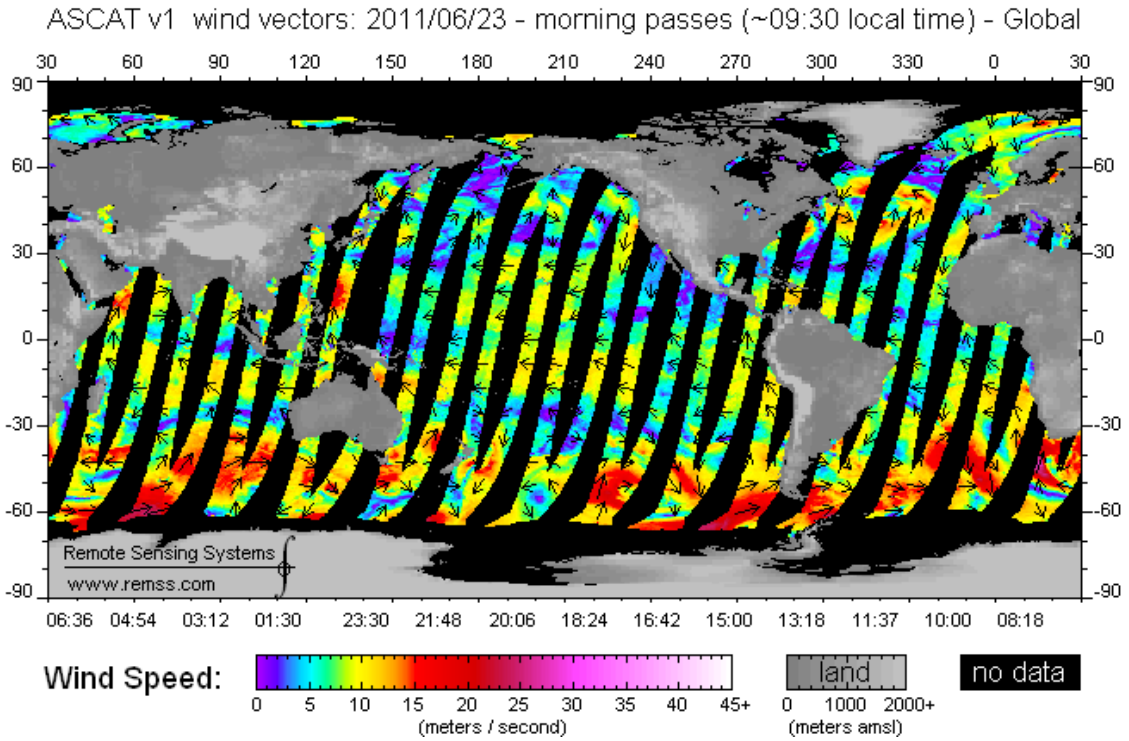


Figure 8. Example of 12 hours ASCAT global coverage. The revisit time is about 4 days. Source: RSS. http://images.remss.com/wind/wind_vector_data_daily_ascat.html (accessed 15 June 2017).

Resource abstract:
ESA and EUMETSAT launched the first C-band ASCAT in 2006 onboard Metop-A. ASCAT is a real aperture radar, operating at 5.255 GHz (C-band) and using vertically polarised antennas. It transmits a long pulse with Linear Frequency Modulation ("chirp"). The prime objective of ASCAT is to measure wind speed and direction over the oceans, but also to provide useful data in a variety of studies, including polar ice and tropical vegetation.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Wind speed and direction Soil moisture Ice coverage
Geographic location:	Global coverage
Spatial resolution:	ASCAT datasets are available at a resolution of 12.5 km and 25 km grid for level 2 and 0.125° and 0.25° grid for level 3
Temporal extent:	2009-03 / present
Temporal resolution:	Daytime and nighttime for level 2 and daily for level 3
Depth range/resolution:	Surface
Conditions for access & use:	Data is provided free of charge but user registration is required in EUMETSAT Data Centre, Copernicus Marine Environment Monitoring Service (CMEMS) and Remote Sensing Systems
Limitations on public access:	No
Responsible organization:	EUMETSAT Data Centre, Copernicus Marine Environment Monitoring Service (CMEMS), NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC) and Remote Sensing Systems (RSS)

Data via:

The EUMETSAT Data Centre:
http://www.eumetsat.int/website/home/Data/DataDelivery/EUMETSATDataCentre/index.html
Contact: ops@eumetsat.int

CMEMS: http://marine.copernicus.eu/web/69-interactive-catalogue.php?option=com_csw&view=details&product_id=WIND_GLO_WIND_L3_NRT_OBSERVATIONS_012_002
Contact: servicedesk.cmems@mercator-ocean.eu

PO.DAAC:
http://podaac.jpl.nasa.gov/datasetlist?ids=Sensor&values=ASCAT
Contact: podaac@podaac.jpl.nasa.gov

RSS: ftp://ftp.ssmi.com/ascat
Contact: support@remss.com

Data format: Digital, in HDF (Hierarchical Data Format), netCDF and BUFR

References: Information about citation and acknowledgements in:
https://earth.esa.int/pi/esa?type=file&table=aotarget&cmd=image&alias=TPMterms
https://podaac.jpl.nasa.gov/CitingPODAAC
http://www.remss.com/missions/ascat
When using data from RSS, please include the following statement in the acknowledgement section of your paper:
"C-2013 ASCAT data are produced by Remote Sensing Systems and sponsored by the NASA Ocean Vector Winds Science Team. Data are available at www.remss.com."

Additional information:

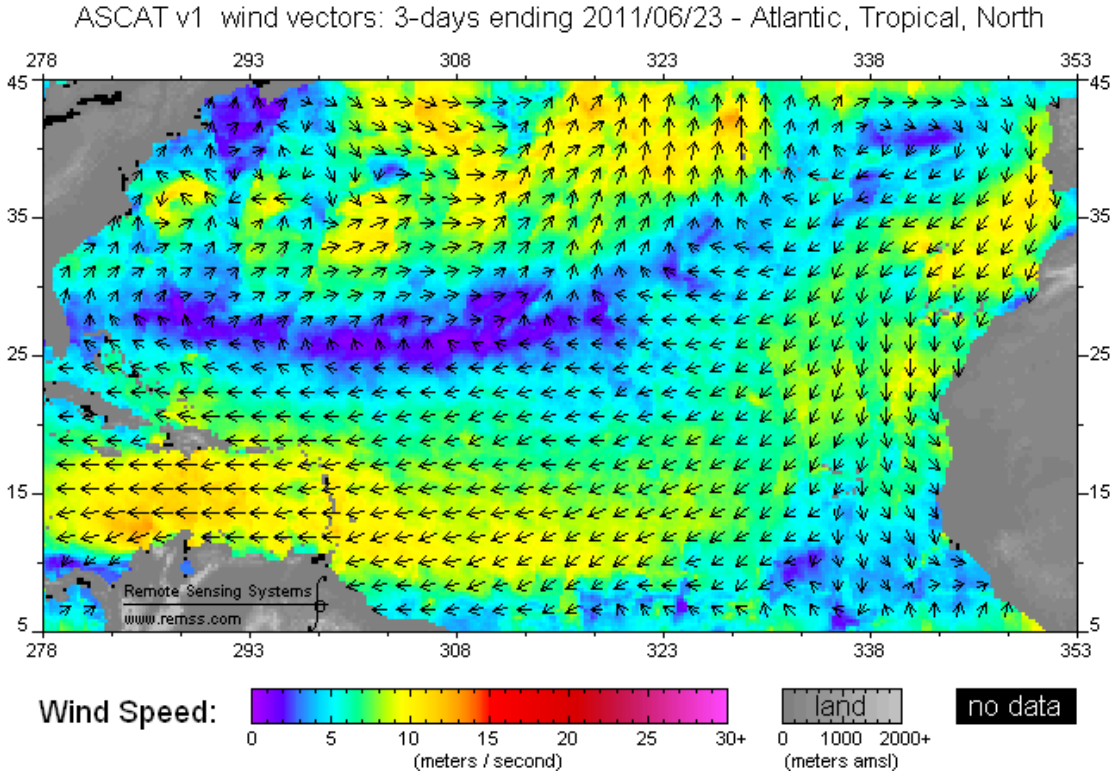


Figure 9. Example of ASCAT 3-day sea wind speed and direction (time period ending 23 June 2011). Source: RSS. http://images.remss.com/wind/wind_vector_data_3day_ascat.html (accessed 15 June 2017).

TOPEX/Poseidon

CENTRE NATIONAL D'ETUDES SPATIALES (CNES), FRANCE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

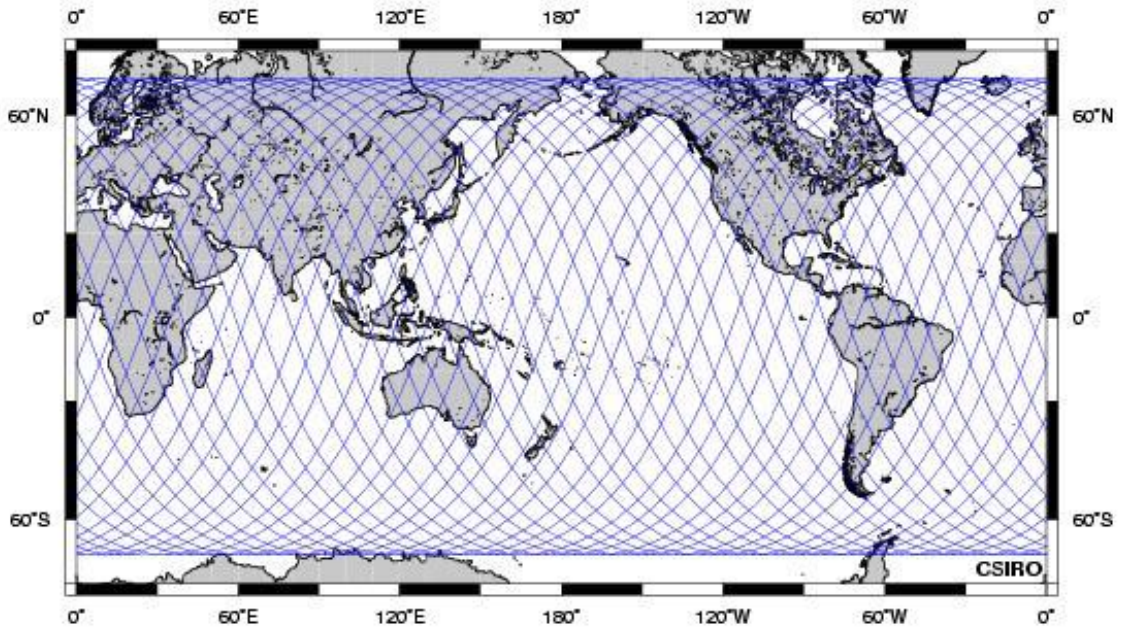


Figure 10. The ground track of the first three days of the 10-day cycle of TOPEX/Poseidon. Source: CSIRO. http://www.cmar.csiro.au (accessed 15 June 2017).

Resource abstract:

TOPEX/Poseidon was jointly conducted by the United States' National Aeronautics and Space Administration (NASA) and the French Space Agency, Centre National d'Etudes Spatiales (CNES), for studying the global circulation from space. The mission used the technique of satellite altimetry to make precise and accurate observations of sea level for several years.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	Coverage of 95% of ice-free oceans (66°N – 66°S)
Spatial resolution:	TOPEX/Poseidon datasets have a resolution of 11.2 km (along) x 5.1 km (across)
Temporal extent:	1992-09 / 2005-10
Temporal resolution:	TOPEX/Poseidon cycles
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC)
Data via:	PO.DAAC: ftp://podaac.jpl.nasa.gov/allData/topex/L2/ Contact: podaac@podaac.jpl.nasa.gov
Data format:	Digital, in HDF (Hierarchical Data Format)
References:	Information about citation and acknowledgements in: https://podaac.jpl.nasa.gov/CitingPODAAC

Additional information:

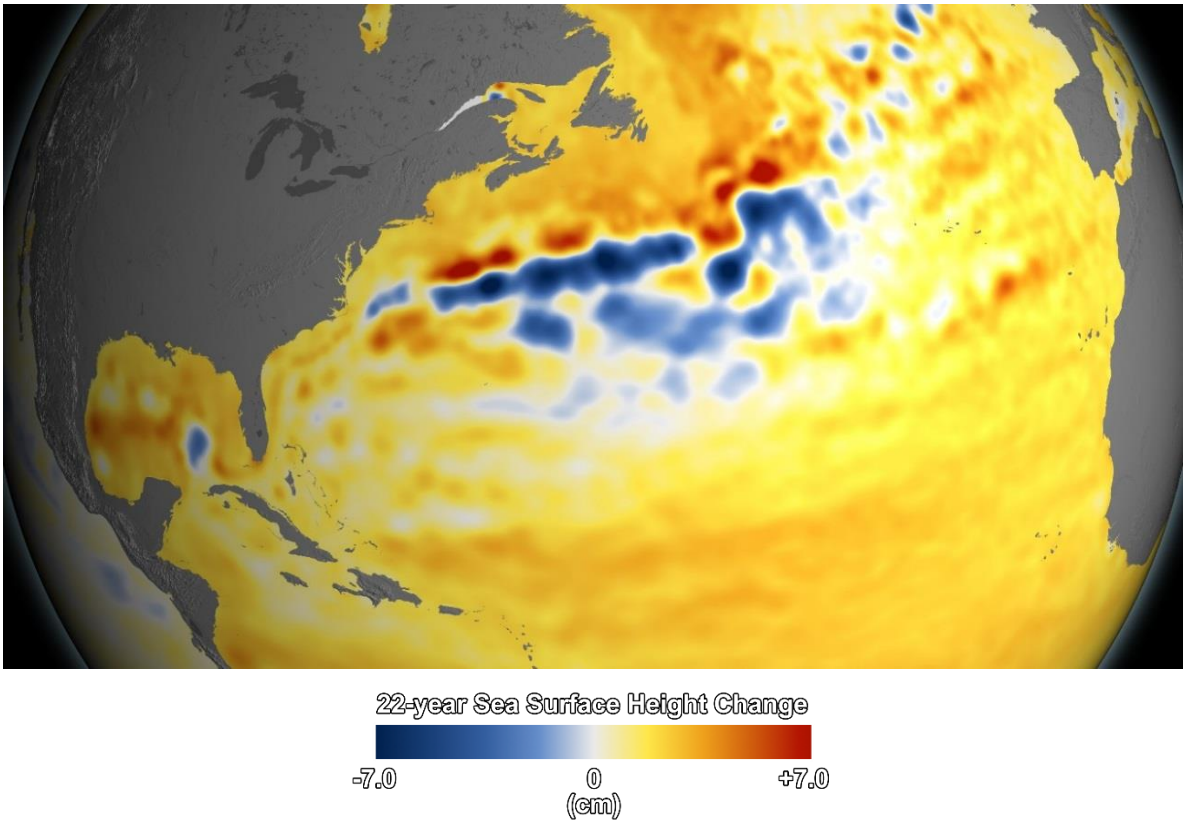


Figure 11. Example of total sea surface height change between 1992 and 2014, based on data collected from the TOPEX/Poseidon, Jason-1 and Jason-2 satellites. Source: NASA's Scientific Visualization Studio. http://svs.gsfc.nasa.gov/4345 (accessed 24 June 2017).

JASON

CENTRE NATIONAL D'ETUDES SPATIALES (CNES), FRANCE
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA
EUMETSAT

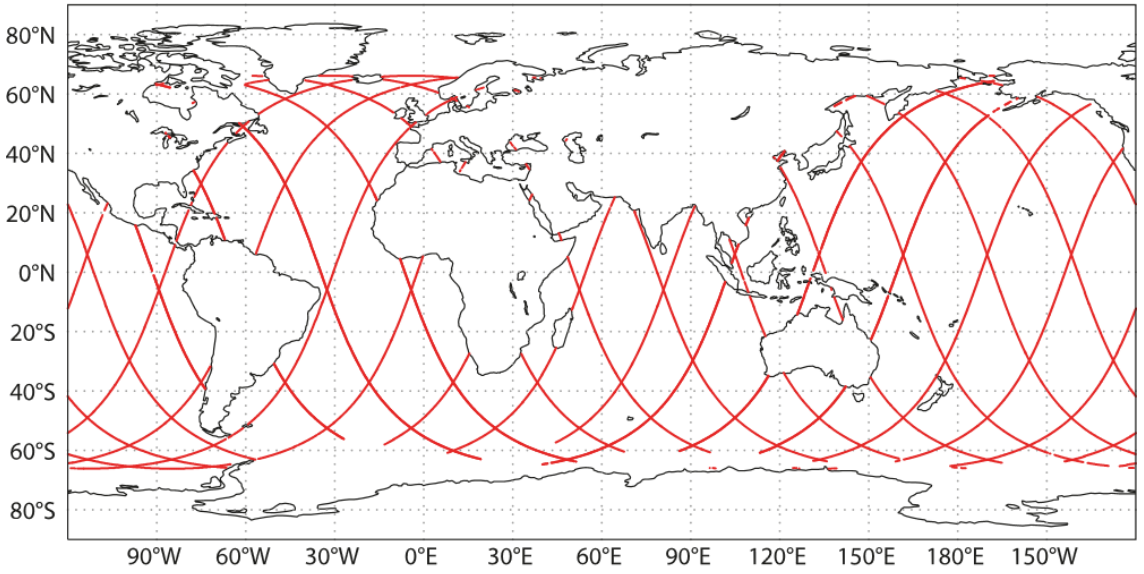


Figure 12. Example of Jason-3 coverage, showing the locations of ocean observations that have passed quality control. The revisit time is about 10 days (Abdalla and Zuo, 2016). Source: European Centre for Medium-Range Weather Forecasts (ECMWF). https://www.ecmwf.int/sites/default/files/elibrary/2016/16759-newsletter-no149-autumn-2016.pdf (accessed 15 June 2017).

Resource abstract:
Jason is a famillly of three altimetry satellites. The objective of the missions is to monitor global ocean circulation, study the ties between the ocean and the atmosphere, improve global climate forecasts and predictions, and monitor events such as El Niño Southern Oscillation (ENSO) and ocean eddies. It is the successor to the TOPEX/Poseidon mission, which measured ocean surface topography from 1992 through 2005.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level Wave height
Geographic location:	Coverage of 95% of ice-free oceans (66°N – 66°S)
Spatial resolution:	Jason datasets have a resolution of 11.2 km (along) x 5.1 km (across)
Temporal extent:	Jason-1: 2002-01 / 2013-06 Jason-2: 2008-06 / present Jason-3: 2016-02 / present
Temporal resolution:	10 days
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), NOAA National Centers for Environmental Information (NCEI) and the EUMETSAT Data Centre

Data via:	PO.DAAC: Jason-1: ftp://podaac-ftp.jpl.nasa.gov/allData/jason1/L2/ Jason-2: ftp://podaac-ftp.jpl.nasa.gov/allData/coastal_alt/L2/ALES/jason-2 Jason-3: ftp://podaac-ftp.jpl.nasa.gov/allData/jason3/preview/L2/GPS-OGDR Contact: podaac@podaac.jpl.nasa.gov NCEI: Jason-2: ftp://ftp.nodc.noaa.gov/pub/data.nodc/jason2/ Contact: NODC.Webmaster@noaa.gov The EUMETSAT Data Centre: http://www.eumetsat.int/website/home/Data/DataDelivery/EUMETSATDataCentre/index.html Contact: ops@eumetsat.int
Data format:	Digital, in netCDF and binary format
References:	Information about citation and acknowledgements in: https://podaac.jpl.nasa.gov/CitingPODAAC
Additional information:	

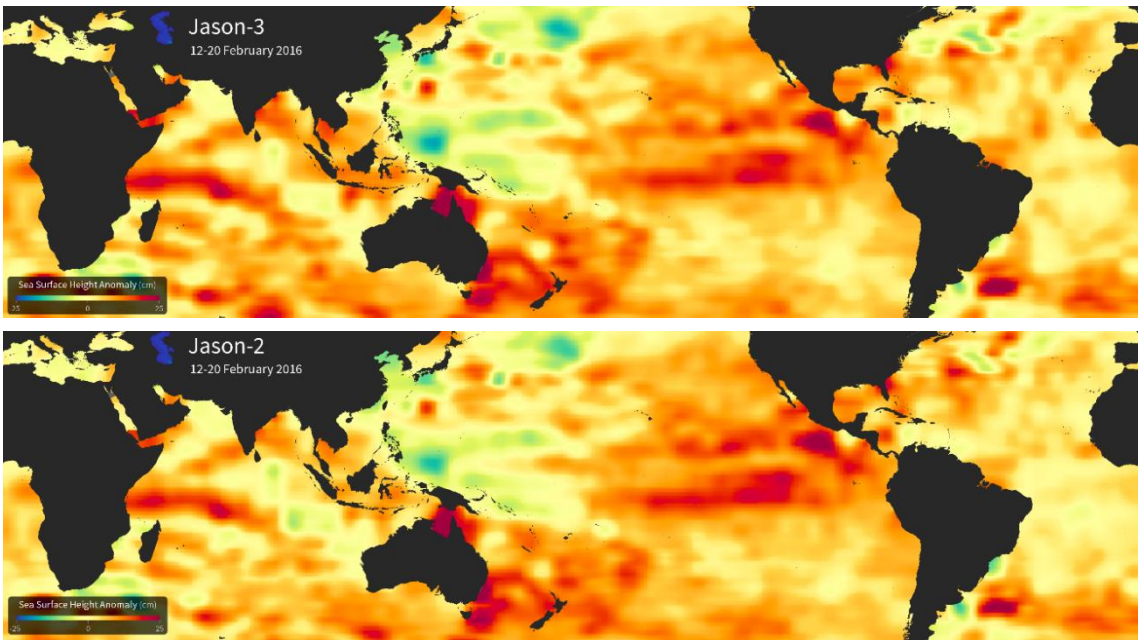


Figure 13. Example of Jason-2 and Jason-3 global sea surface height measurements, with colours adjusted. The data was collected once Jason-3 reached its operational orbit (1336 kilometres). Source: NASA/JPL - Caltech/Ocean Surface Topography Science Team http://svs.gsfc.nasa.gov/30762 (accessed 15 June 2017).

AVHRR – Advanced Very High Resolution Radiometer –
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA

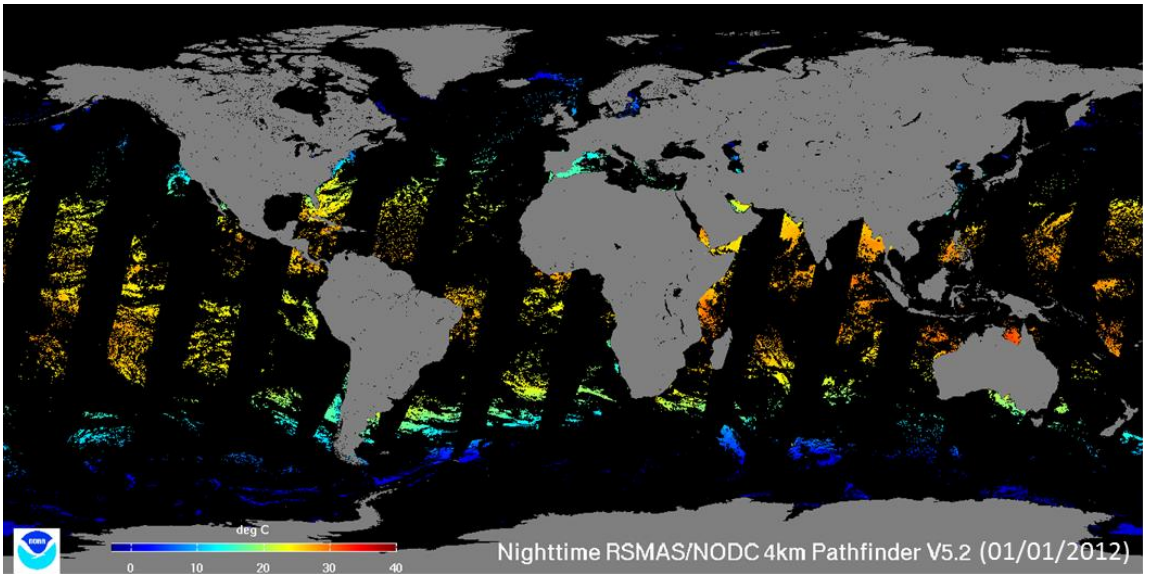


Figure 14. Example of AVHRR nighttime sea surface temperature coverage. Complete global coverage is provided daily. AVHRR Pathfinder Version 5.2 (PFV5.2) data are described in Casey et al. (2010). Source: NOAA.
ftp://ftp.nodc.noaa.gov/pub/data.nodc/pathfinder/Version5.2/browse_images/2012/declouded_sst/ (accessed 17 June 2017).

Resource abstract:
AVHRR is a broad-band, four (AVHRR/1 and AVHRR/2) or five channel (AVHRR/3) scanner, sensing in the visible, near-infrared, and thermal infrared portions of the electromagnetic spectrum. This sensor is carried on NOAA's Polar Orbiting Environmental Satellites (POES), beginning with TIROS-N in 1978. AVHRR data are acquired in three formats: High Resolution Picture Transmission (HRPT), Local Area Coverage (LAC) and Global Area Coverage (GAC).

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea surface temperature (SST) Sea ice coverage
Geographic location:	Global coverage
Spatial resolution:	AVHRR level 2 datasets are available at a resolution of 1.1 km. For level 3, datasets are available in 4.9 km and 18 km grid
Temporal extent:	1978 / present
Temporal resolution:	Daytime and nighttime for level 2 and daily, 5 day, 8 day, monthly and yearly for level 3
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	NOAA National Centers for Environmental Information (NCEI) and NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), USA
Data via:	4 km AVHRR Pathfinder Project: http://www.nodc.noaa.gov/SatelliteData/pathfinder4km/ http://data.nodc.noaa.gov/pathfinder/ Contact: NODC.Webmaster@noaa.gov

PO.DAAC: ftp://podaac-ftp.jpl.nasa.gov/allData/avhrr/L3/
Contact: podaac@podaac.jpl.nasa.gov

Data format: Digital, in netCDF and HDF

References: If you use Pathfinder 4 km data, please acknowledge the use of these data with the following statement: "These data were provided by GHRSST and the US National Oceanographic Data Center. This project was supported in part by a grant from the NOAA Climate Data Record (CDR) Program for satellites" and cite the following publication:

Casey, K. S., Brandon, T. B., Cornillon, P. and Evans, R. 2010. The Past, Present and Future of the AVHRR Pathfinder SST Program. In: *Oceanography from Space: Revisited.* Barale, V., Gower, J. F. R. and Alberotanza, L. (eds). Springer Science+Business Media B.V, pp. 323-341. doi:10.1007/978-90-481-8681-5_16

Information about citation and acknowledgements in: https://podaac.jpl.nasa.gov/CitingPODAAC

Additional information:

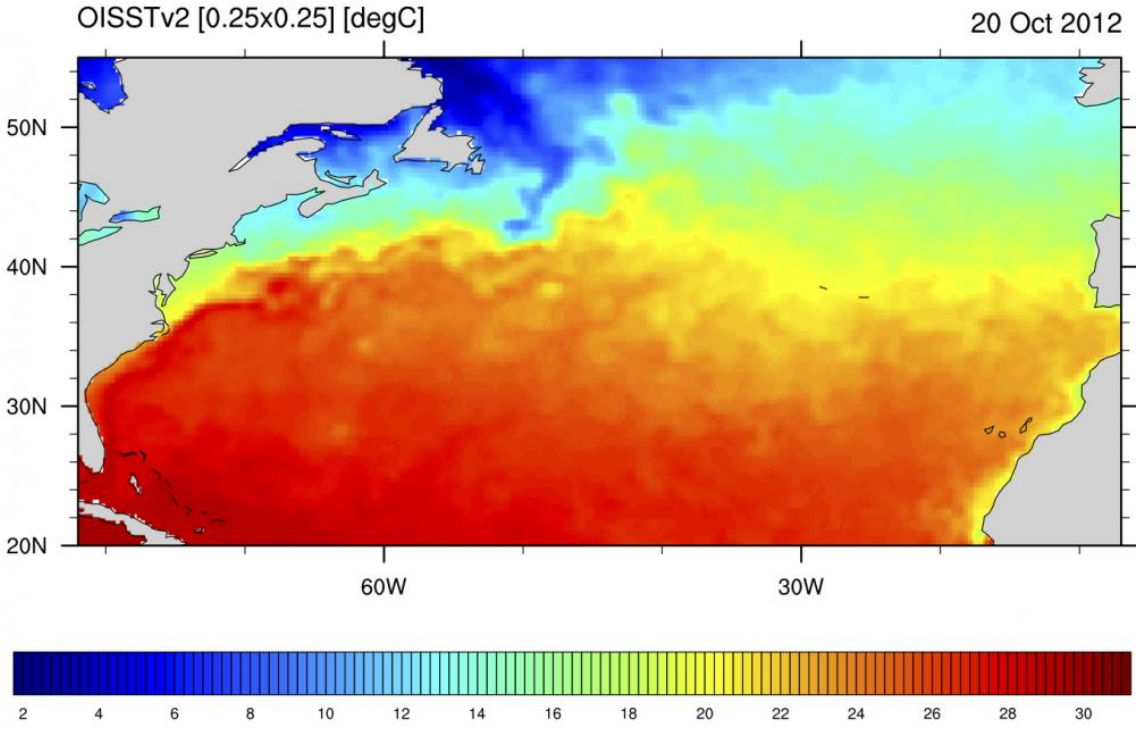


Figure 15. Example of SST (°C) in the North Atlantic on 0.25° grid (20 October 2012). This image shows the AVHRR-only version of OISSTv2 (Optimum Interpolation Sea Surface Temperature version 2, NOAA-NCDC). Source: National Center for Atmospheric Research, David Schneider. The Climate Data Guide: SST Data Sets: Overview & Comparison Table. https://climatedataguide.ucar.edu/climate-data/sst-data-sets-overview-comparison-table (accessed 17 June 2017).

AATSR – Advanced Along-Track Scanning Radiometer –
EUROPEAN SPACE AGENCY (ESA)

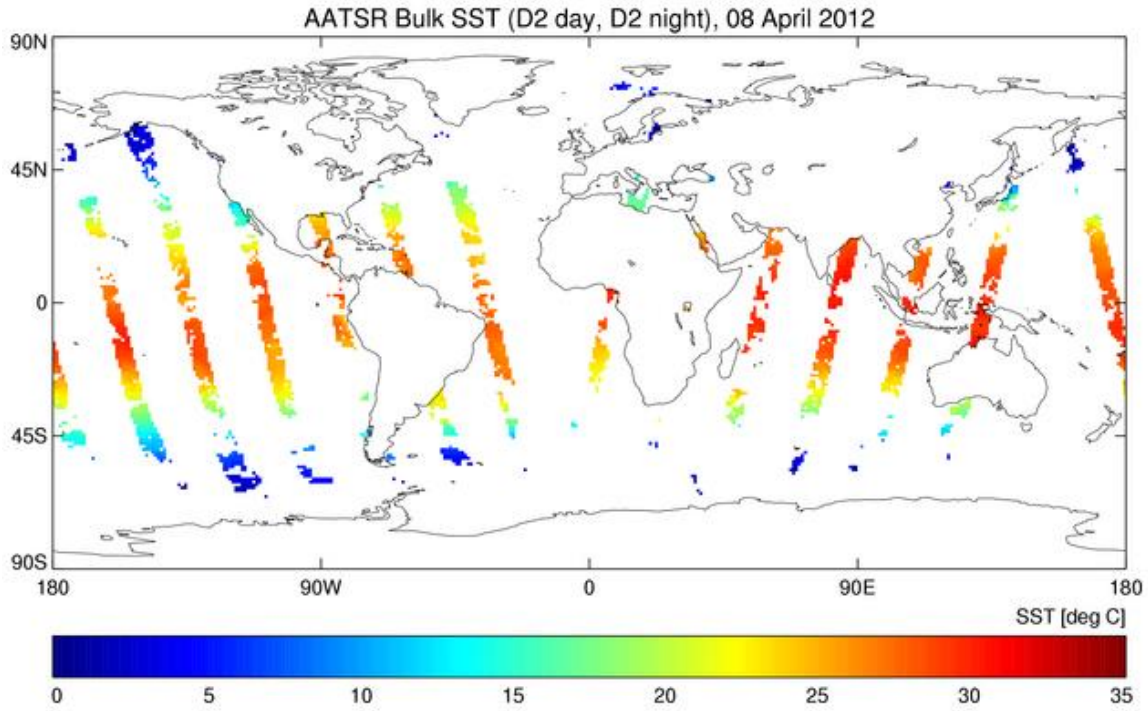


Figure 16. Daily sea surface temperature coverage by the AATSR. Complete global coverage is provided in 35 days. Source: Met Office.
http://research.metoffice.gov.uk/research/nwp/satellite/infrared/aatsr/main.html (accessed 17 June 2017). Contains public sector information licensed under the Open Government Licence v1.0.

Resource abstract:
AATSR is a multi-channel imaging radiometer on board the ENVISAT satellite, the most recent in a series of instruments designed primarily to measure global Sea Surface Temperature (SST), following on from ATSR-1 and ATSR-2 on board ERS-1 and ERS-2. AATSR data have a resolution of 1 km at nadir, and can measure Earth's surface temperature to a precision of 0.3 K.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea surface temperature (SST)
Geographic location:	Global coverage
Spatial resolution:	AATSR datasets are available at a resolution of 1 km grid for level 2 and in 10 or 30 arcmin grid for level 3
Temporal extent:	2002-04 / 2012-04
Temporal resolution:	Daily (with 35 days of revisit time) for level 2 and daily or monthly for level 3
Depth range/resolution:	Surface
Access and use conditions:	Data is provided free of charge upon registration in ESA portal (access via MERCI) for level 2 and for free access for level 3. Data access from Centre for Environmental Data Analysis (CEDA) requires registration as well
Limitations on public access:	No
Responsible organization:	European Space Agency (ESA) and Centre for Environmental Data Analysis (CEDA)
Data via:	ESA

Level 2: http://ats-merci-ds.eo.esa.int/merci
Level 3: http://envisat.esa.int/level3/aatsr/
Contact: https://earth.esa.int/web/guest/contact-us

CEDA
Level 2: http://browse.ceda.ac.uk/browse/neodc/aatsr_multimission
Contact: support@ceda.ac.uk

Data format: Digital, in netCDF format for level 2 and in HDF (Hierarchical Data Format) for level 3

References: Any publication whatsoever resulting from work carried out using ESA data shall contain the following sentence: "Data provided by the European Space Agency."

Additional information:

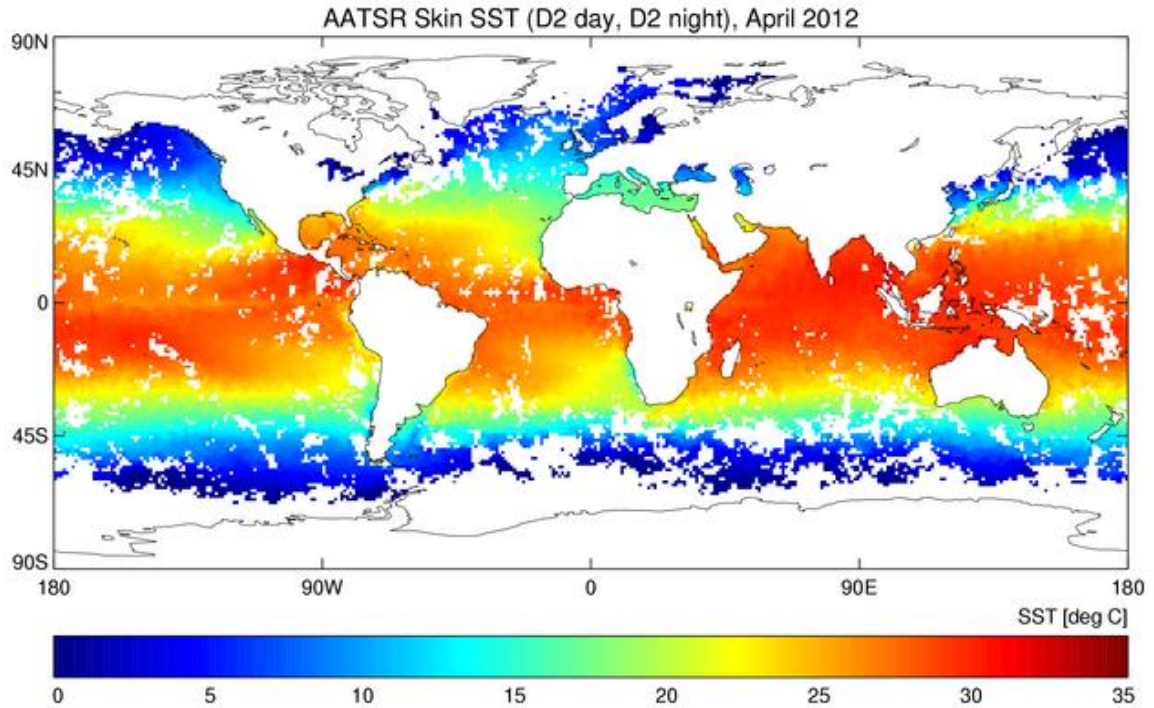


Figure 17. Example of AATSR monthly averaged skin SST 2-channel retrieval (April 2012). Source: Met Office. http://research.metoffice.gov.uk/research/nwp/satellite/infrared/aatsr/main.html (accessed 17 June 2017). Contains public sector information licensed under the Open Government Licence v1.0.

AMSR-E – Advanced Microwave Scanning Radiometer for NASA's Earth Observing System – *NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA*

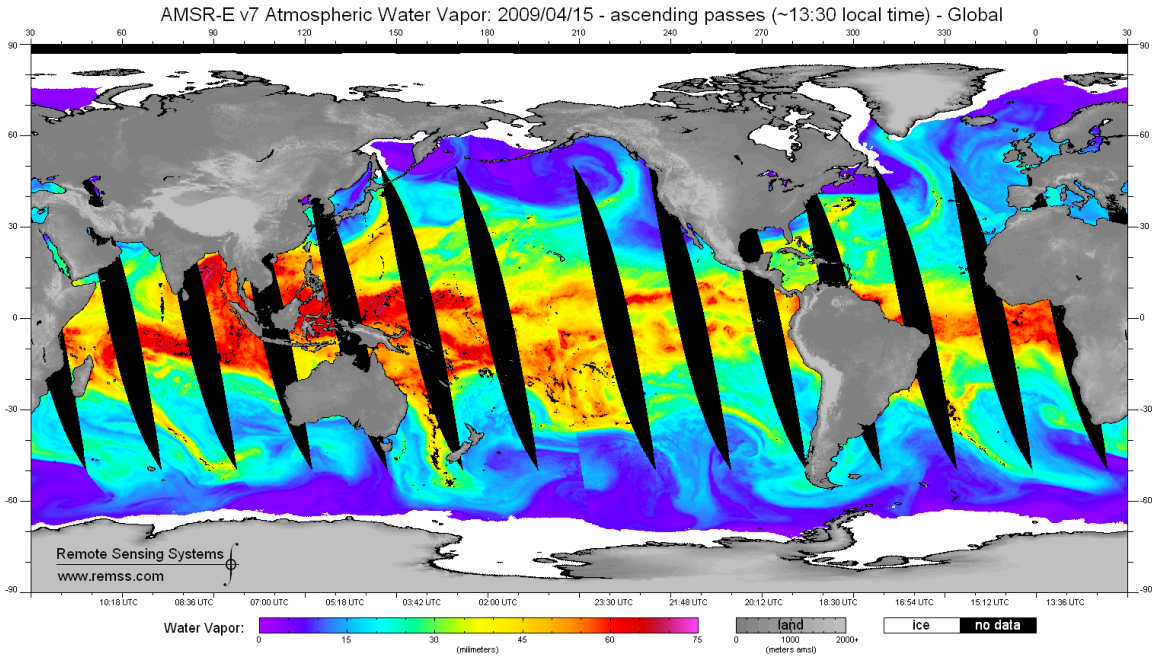


Figure 18. Example of AMSR-E v7 water vapour over ocean coverage. Complete global coverage is provided every 1-2 days. Source: RSS. http://images.remss.com/amsr/amsre_data_daily.html (accessed 17 June 2017).

Resource abstract:
AMSR-E is multifrequency, dual-polarized microwave radiometer operating at 6 frequencies ranging from 6.925 GHz to 89.0 GHz that detects faint microwave emissions from the Earth's surface and atmosphere. It is a modified version of AMSR that flew on ADEOS-II. JAXA provides the instrument for flight on board NASA's Earth Observing System (EOS) Aqua platform. AMSR-E is indispensable for Aqua's mission, which is dedicated to the observation of climate and hydrology.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Water vapor Cloud liquid water Precipitation Sea surface temperature (SST) Sea surface wind speed Sea ice coverage Snow water equivalent Soil moisture
Geographic location:	Global coverage
Spatial resolution:	Spatial resolution of the individual measurements varies from 5.4 km at 89 GHz to 56 km at 6.9 GHz for level 2 and 25 km for level 3
Temporal extent:	2002-06 / 2011-10
Temporal resolution:	Daily for level 2 and daily and monthly for level 3
Depth range/resolution:	Surface
Conditions for access & use:	Data is provided free of charge but user registration is required in GCOM-W1 Data Providing Service and Remote Sensing Systems (RSS)
Limitations on public access:	No

Responsible organization:	GCOM-W1 Data Providing Service, National Snow and Ice Data Center (NSIDC) and Remote Sensing Systems (RSS)
Data via:	GCOM-W1 Data Providing Service: https://gcom-w1.jaxa.jp/auth.html Contact: Z-gw1help@jaxa.jp NSIDC: ftp://sidads.colorado.edu/pub/DATASETS/ Contact: http://nsidc.org/about/contact.html RSS: ftp://ftp.ssmi.com/amsre Contact: support@remss.com
Data format:	Digital, in HDF (Hierarchical Data Format)
References:	Information about citation in: http://nsidc.org/about/use_copyright.html http://suzaku.eorc.jaxa.jp/GCOM_W/research/terms.html http://www.remss.com/missions/amsre When using data from RSS, please include the following statement in the acknowledgement section of your paper: "AMSR data are produced by Remote Sensing Systems and were sponsored by the NASA AMSR-E Science Team and the NASA Earth Science MEaSUREs Program. Data are available at www.remss.com. "
Additional information:	

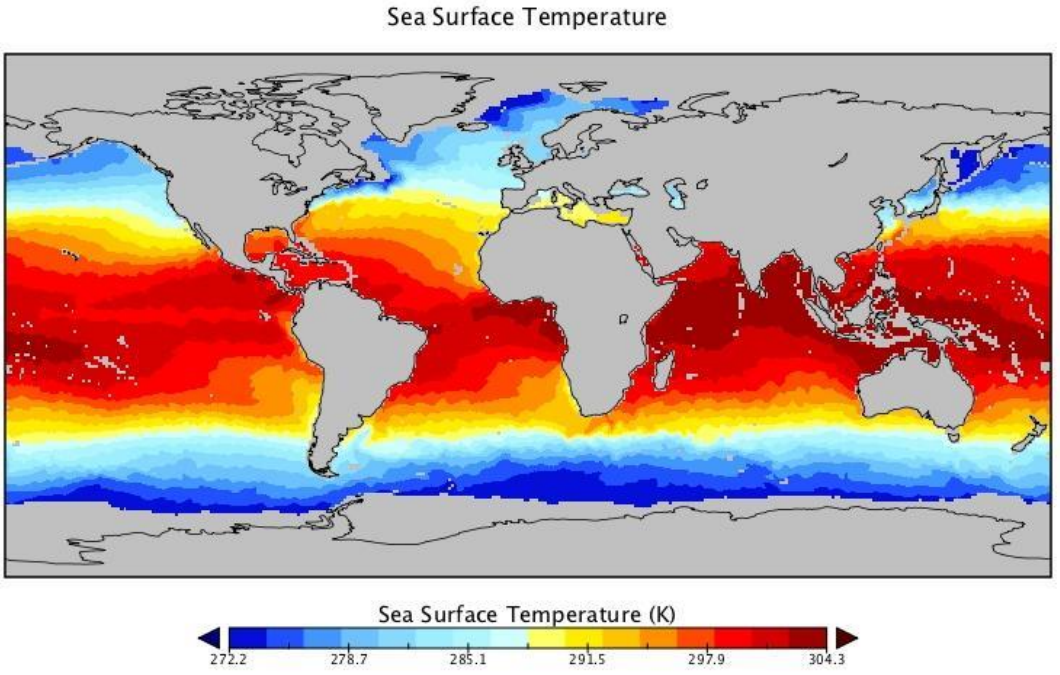


Figure 19. Example of AMSR-E monthly SST (April 2009) (Remote Sensing Systems, 2011). Source: http://podaac-www.jpl.nasa.gov/highlights/GriddedClimateVariables_2012_0913 (accessed 17 June 2017).

SMOS – Soil Moisture and Ocean Salinity –
EUROPEAN SPACE AGENCY (ESA)

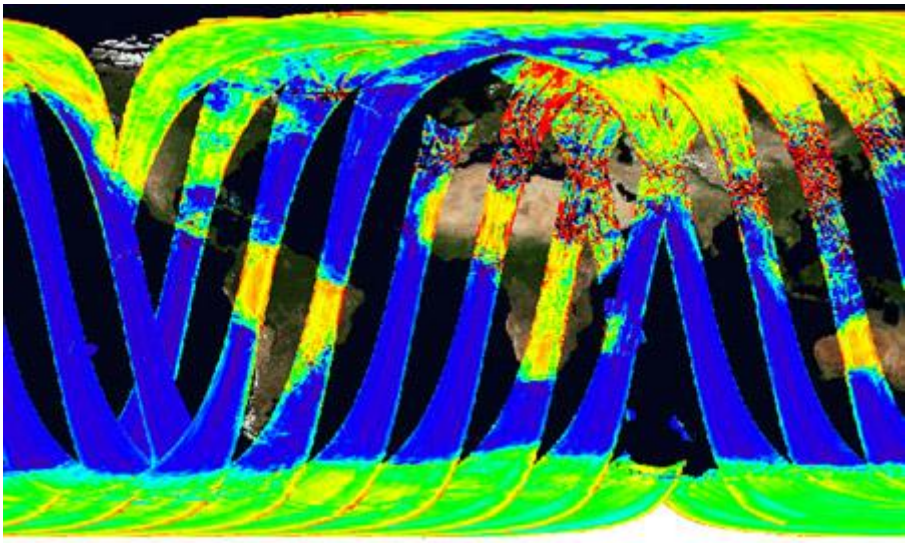


Figure 20. Example of SMOS daily coverage. Complete global coverage is provided every 3 days. This is the first data sent by the MIRAS instrument, acquired as part of the initial functional verification test since the instrument was switched on 17 November 2009. The image depicts non-calibrated brightness temperature values colour coded from blue (low) to red (high). Source: ESA. http://www.esa.int/spaceinimages/Images/2009/11/First_data_from_SMOS (accessed 17 June 2017).

Resource abstract:
SMOS is a radio telescope in orbit. It is Microwave Imaging Radiometer using Aperture Synthesis (MIRAS) radiometer picks up faint microwave emissions from Earth's surface to map levels of land soil moisture for hydrology studies and ocean salinity for enhanced understanding of ocean circulation.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea surface salinity (SSS) Soil moisture
Geographic location:	Global coverage
Spatial resolution:	SMOS level 2 datasets are available at a resolution of 43 km. For level 3, datasets are available in 25 km, 50 km, 100 km and 200 km grid
Temporal extent:	2010-01 / present
Temporal resolution:	Daily for level 2 and daily, 10 day and monthly, for level 3
Depth range/resolution:	Surface
Conditions for access & use:	Data is provided free of charge but a registration is required in the ESA portal and CATDS web page
Limitations on public access:	Yes
Responsible organization:	European Space Agency (ESA) and Centre Aval de Traitement de Données SMOS (CATDS)
Data via:	ESA Portal (level 2): http://smos-diss.eo.esa.int Contact: https://smos-ds-02.eo.esa.int/oads/access/contact/ CATDS web page (level 3): http://www.catds.fr/sipad/login.do Contact: contact@catds.fr

Data format: Digital, in HDF (Hierarchical Data Format) or netCDF

References: Any publication whatsoever resulting from work carried out using ESA data shall contain the following sentence: “Data provided by the European Space Agency.”

Additional information:

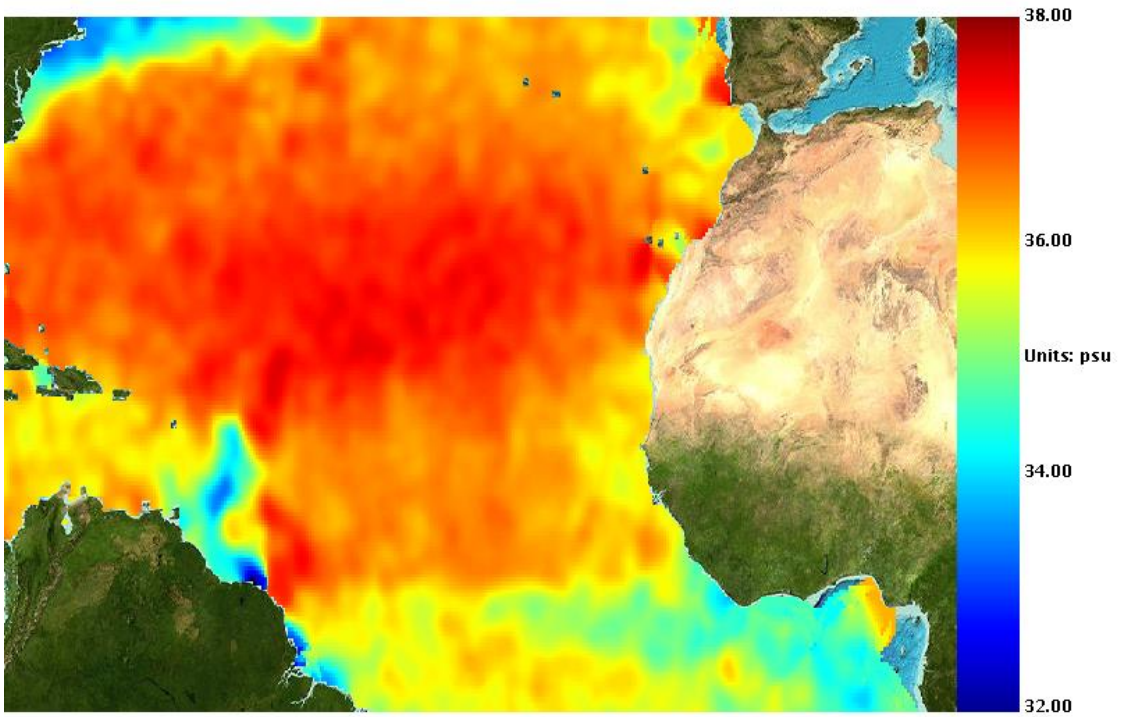


Figure 21. Example of 9-day SSS (1 to 9 April 2017). Source: Barcelona Expert Centre Godiva2 visualization tool. http://bec.icm.csic.es/ncWMS/index.html (accessed 25 June 2017).

AQUARIUS

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

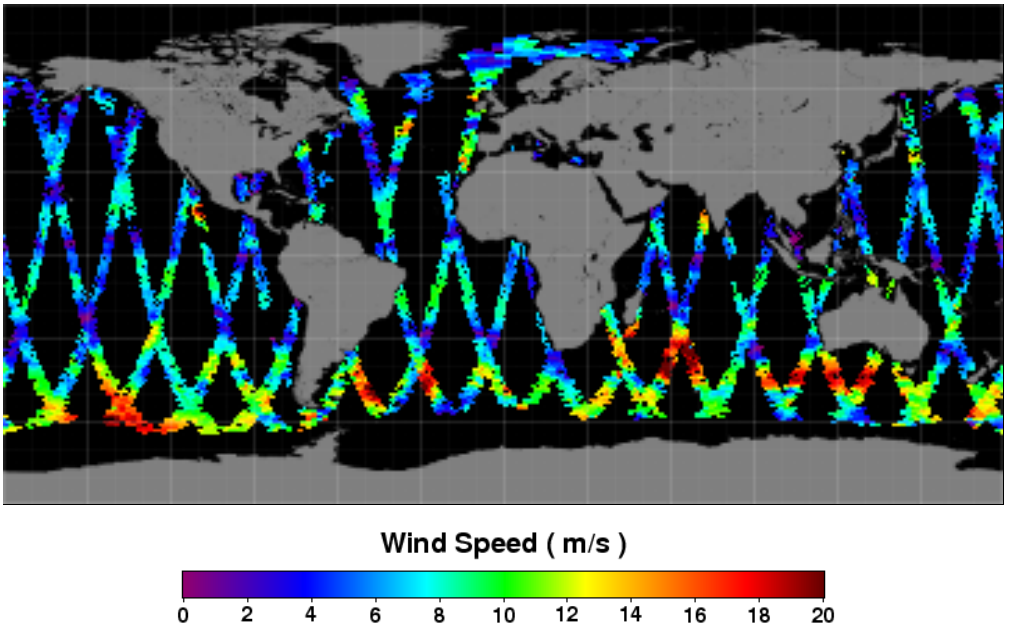


Figure 22. Example of Aquarius daily wind speed coverage, version 4 (6 June 2015) (NASA Aquarius project, 2015). Complete global coverage is provided every 7 days. Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

Resource abstract:

Aquarius is a NASA instrument aboard the Argentine SAC-D spacecraft. Its mission is to measure global sea surface salinity to better predict future climate conditions and to provide insight observations of variations in salinity and creating global ocean salinity distribution maps.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea surface salinity (SSS) Wind speed
Geographic location:	Global coverage
Spatial resolution:	Aquarius level 2 and 3 datasets are available at a resolution of 100 km
Temporal extent:	2011-07 / 2015-06-07
Temporal resolution:	Daily for level 2 and daily, 8 day, monthly, 3 months and yearly for level 3
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	NASA Ocean Biology Processing Group (OBPG, OceanColor Web) and NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), USA
Data via:	OceanColor Web: http://oceandata.sci.gsfc.nasa.gov/Aquarius/ Contact: webadmin@oceancolor.gsfc.nasa.gov PO.DAAC: http://podaac.jpl.nasa.gov/dataset/AQUARIUS_L3_SSS_SMI_DAILY_V4 Contact: podaac@podaac.jpl.nasa.gov

Data format: Digital, in HDF (Hierarchical Data Format)

References: Information about citation and acknowledgements in:
https://oceancolor.gsfc.nasa.gov/citations/
https://podaac.jpl.nasa.gov/CitingPODAAC

Additional information:

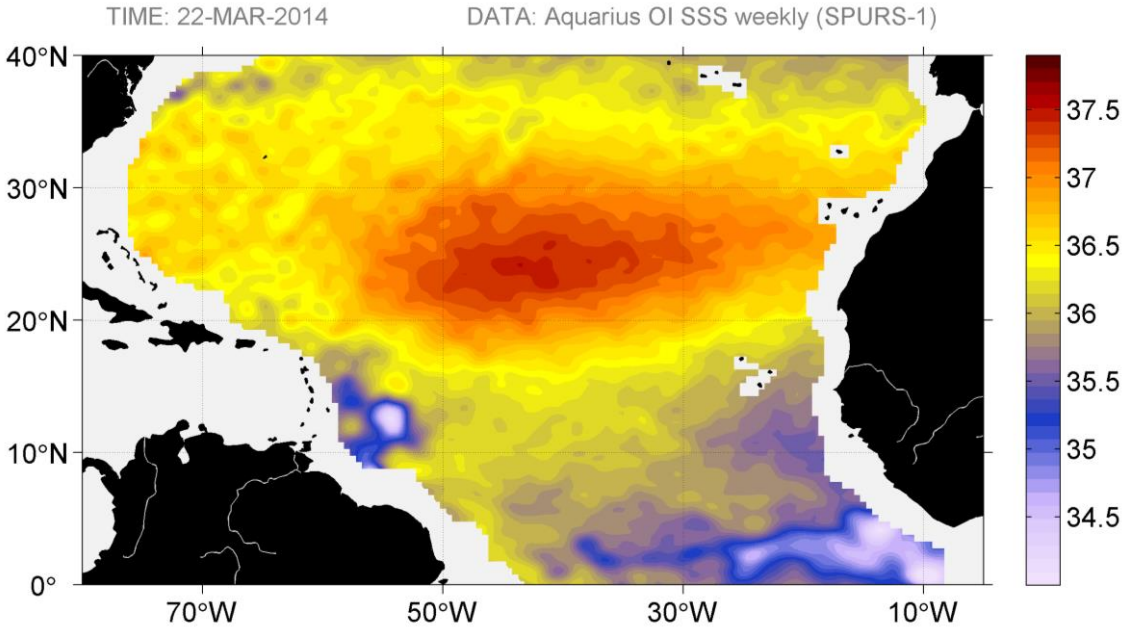


Figure 23. Aquarius sea surface salinity map (week starting on 19 March 2014) based in the Optimum Interpolation (OI) analysis (Melnichenko, 2014a,b). Source: International Pacific Research Center, University of Hawaii. http://iprc.soest.hawaii.edu/users/oleg/oisss/atl/ (accessed 17 June 2017).

CZCS – Coastal Zone Colour Scanner –
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

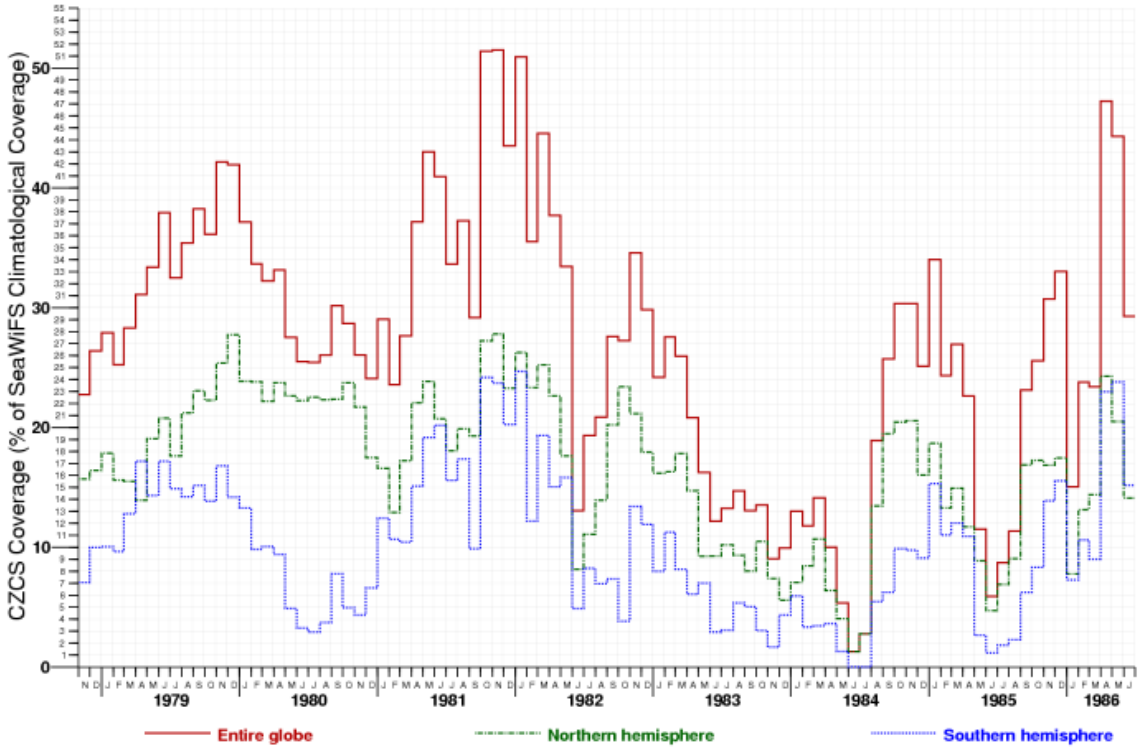


Figure 24. Timeline of the percentage of coverage obtained by CZCS, normalized against the representative monthly coverage from SeaWiFS. Source: OceanColor Web. https://oceancolor.gsfc.nasa.gov/data/czcs/datacollect/ (accessed 17 June 2017).

Resource abstract:
The Coastal Zone Color Scanner Experiment (CZCS) was the first instrument flown on a spacecraft devoted to the measurement of ocean color. CZCS had six spectral bands, four of which were used primarily for ocean color. Because CZCS shared power and data recorder storage with the other instruments on Nimbus-7, data collection was not uniform in time or space. It was originally estimated that the CZCS would only have a 10% duty cycle and was never intended to provide the kind of consistent, global sampling that we have become accustomed to with SeaWiFS and MODIS.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Chlorophyll a Diffuse attenuation coefficient at 490 nm
Geographic location:	Not uniform
Spatial resolution:	CZCS level 2 datasets are available at a resolution of 825 m. For level 3, datasets are available in 4.63 km and 9.26 km grid
Temporal extent:	1978-10 / 1986-06
Temporal resolution:	Daily for level 2 and daily, weekly (8 day), monthly and yearly for level 3
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	NASA Ocean Biology Processing Group (OBPG, OceanColor Web), USA
Data via:	OceanColor Web

Level 2: http://oceancolor.gsfc.nasa.gov/
Level 3: https://oceandata.sci.gsfc.nasa.gov/CZCS/
Contact: webadmin@oceancolor.gsfc.nasa.gov

Data format: Digital, in netCDF

References: Information about citation and acknowledgements in: https://oceancolor.gsfc.nasa.gov/citations/

Additional information:

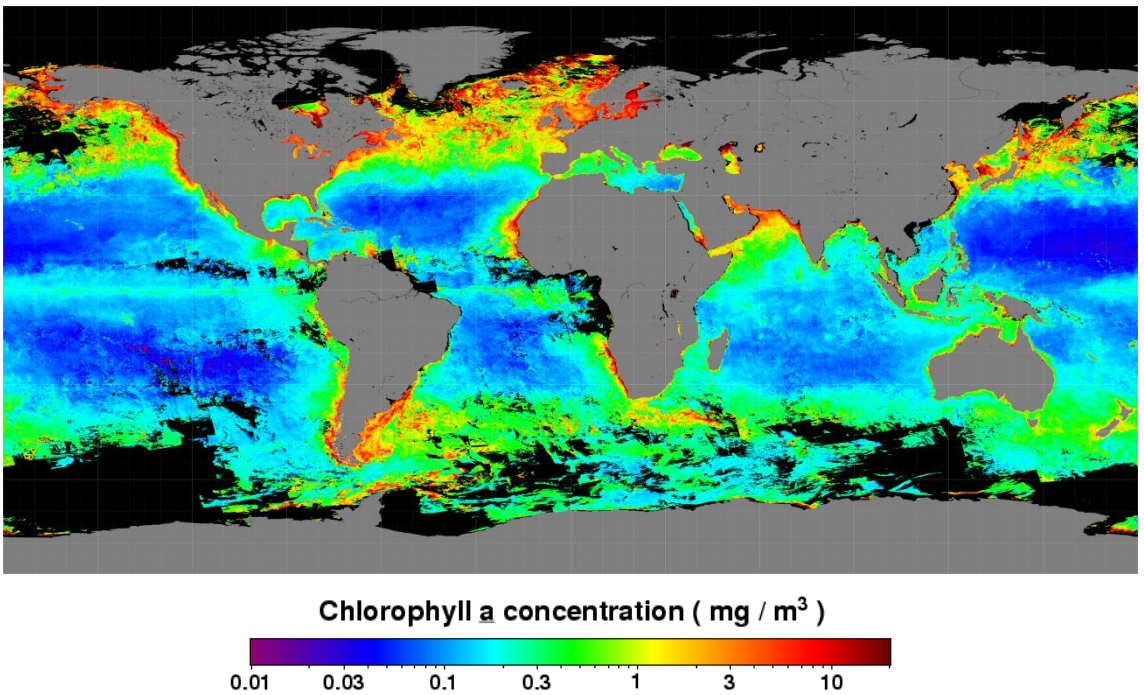


Figure 25. Example of CZCS annual composite chlorophyll a concentration on 9 km grid (1981) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014b). Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

SeaWIFS – Sea-Viewing Wide Field-of-View Sensor –
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

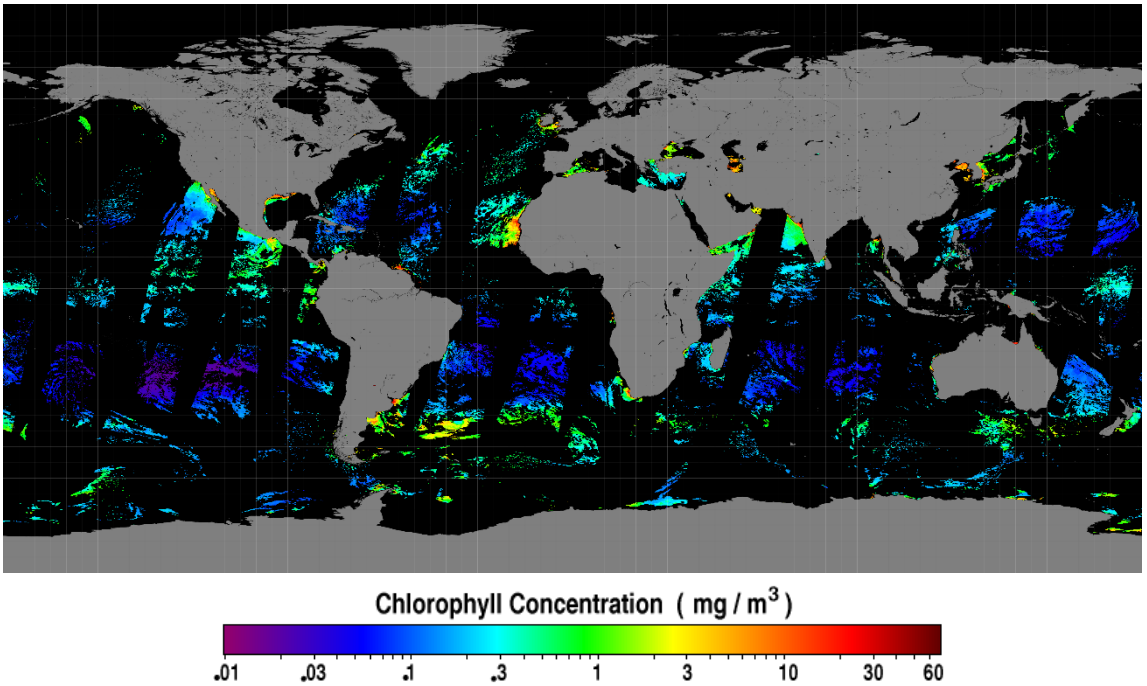


Figure 26. Example of SeaWIFS daily chlorophyll concentration (mg/m^3) global coverage on 9 km grid (1 March 2009) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014c). Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

Resource abstract:
SeaWiFS was the only scientific instrument on GeoEye's OrbView-2 (AKA SeaStar) satellite, designed to obtain global high-precision, moderate-resolution, multispectral visible observations of ocean radiance for research in biogeochemical processes, climate change, and oceanography, using 8 optical bands in the visible/near infrared regions of the spectrum.

Resource language:	eng	
Keyword values:	Environmental monitoring facilities	
Variables available:	*Observed variables*	*Derived variables*
	Chlorophyll a Normalized water-leaving radiance at 555 nm Diffuse attenuation coefficient at 490 nm Photosynthetically Active Radiation (PAR)	Particulate Inorganic Carbon (PIC) Particulate Organic Carbon (POC)
Geographic location:	Global coverage	
Spatial resolution:	SeaWIFS level 2 datasets are available in two resolutions: 1.1 km (LAC) and 4.5 km (GAC). For level 3, datasets are available in 4.63 km and 9.26 km grid	
Temporal extent:	1997-09 / 2010-12	
Temporal resolution:	Daily (for both daytime and nighttime passes) for level 2 and daily, weekly (8 day), monthly and annually for level 3	
Depth range/resolution:	Surface	
Conditions for access & use:	No conditions apply to access and use	
Limitations on public access:	No	

Responsible organization:	NASA Ocean Biology Processing Group (OBPG, OceanColor Web), USA
Data via:	OceanColor Web Level 2: http://oceancolor.gsfc.nasa.gov/ Level 3: https://oceandata.sci.gsfc.nasa.gov/SeaWiFS/ Contact: webadmin@oceancolor.gsfc.nasa.gov
Data format:	Digital, in HDF (Hierarchical Data Format) or netCDF
References:	Information about citation and acknowledgements in: https://oceancolor.gsfc.nasa.gov/citations/
Additional information:	

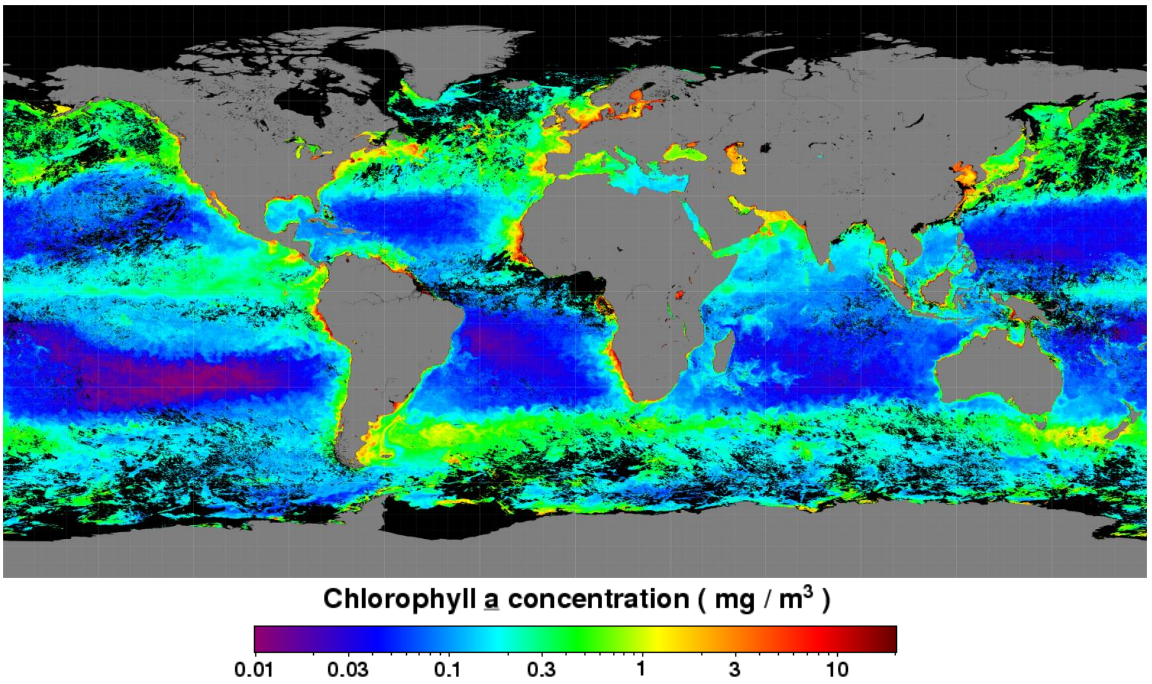


Figure 27. Example of SeaWIFS monthly averaged chlorophyll concentration on 9 km grid (March 2009) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014c). Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

VIIRS – Visible Infrared Imaging Radiometer Suite –
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA

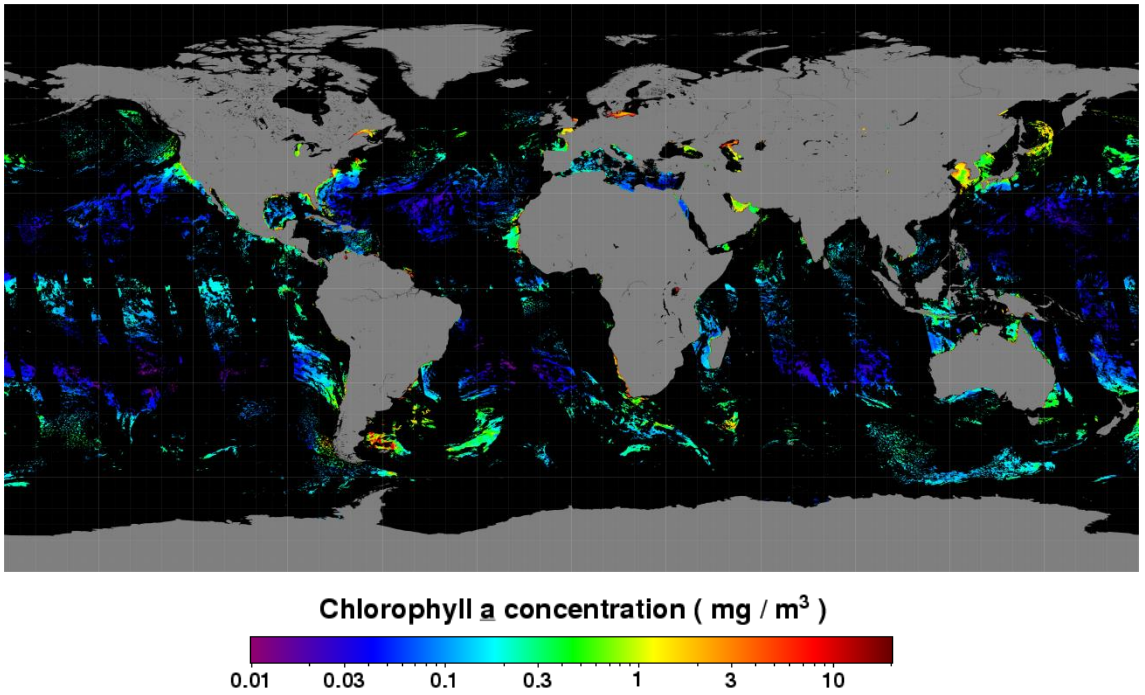


Figure 28. Example of VIIRS daily chlorophyll concentration global coverage on 4 km grid (28 October 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014d). Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

Resource abstract:
VIIRS, a scanning radiometer, collects visible and infrared imagery and radiometric measurements of the land, atmosphere, cryosphere, and oceans. VIIRS data is used to measure cloud and aerosol properties, ocean color, sea and land surface temperature, ice motion and temperature, fires, and Earth's albedo.

Resource language:	eng	
Keyword values:	Environmental monitoring facilities	
Variables available:	*Observed variables*	*Derived variables*
	Sea surface temperature (SST) Chlorophyll a Diffuse attenuation coefficient at 490 nm Photosynthetically Active Radiation (PAR)	Particulate Inorganic Carbon (PIC) Particulate Organic Carbon (POC)
Geographic location:	Global coverage	
Spatial resolution:	VIIRS level 2 datasets are available at a resolution of 750 m. For level 3, datasets are available in 4 km and 9 km grid	
Temporal extent:	2012-01 / present	
Temporal resolution:	Daily for level 2 and daily, 8 day, monthly, seasonally and yearly for level 3	
Depth range/resolution:	Surface	
Conditions for access & use:	No conditions apply to access and use	
Limitations on public access:	No	
Responsible organization:	NASA Ocean Biology Processing Group (OBPG, OceanColor Web) and NASA Physical Oceanography Distributed Active Archive Center (PO.DAAC), USA	

Data via:	OceanColor Web: http://oceandata.sci.gsfc.nasa.gov/VIIRS/ Contact: webadmin@oceancolor.gsfc.nasa.gov PO.DAAC web page: http://podaac.jpl.nasa.gov/dataset/VIIRS_NPP-NAVO-L2P-v1.0 Contact: podaac@podaac.jpl.nasa.gov
Data format:	Digital, in netCDF
References:	Information about citation and acknowledgements in: https://oceancolor.gsfc.nasa.gov/citations/ https://podaac.jpl.nasa.gov/CitingPODAAC
Additional information:	

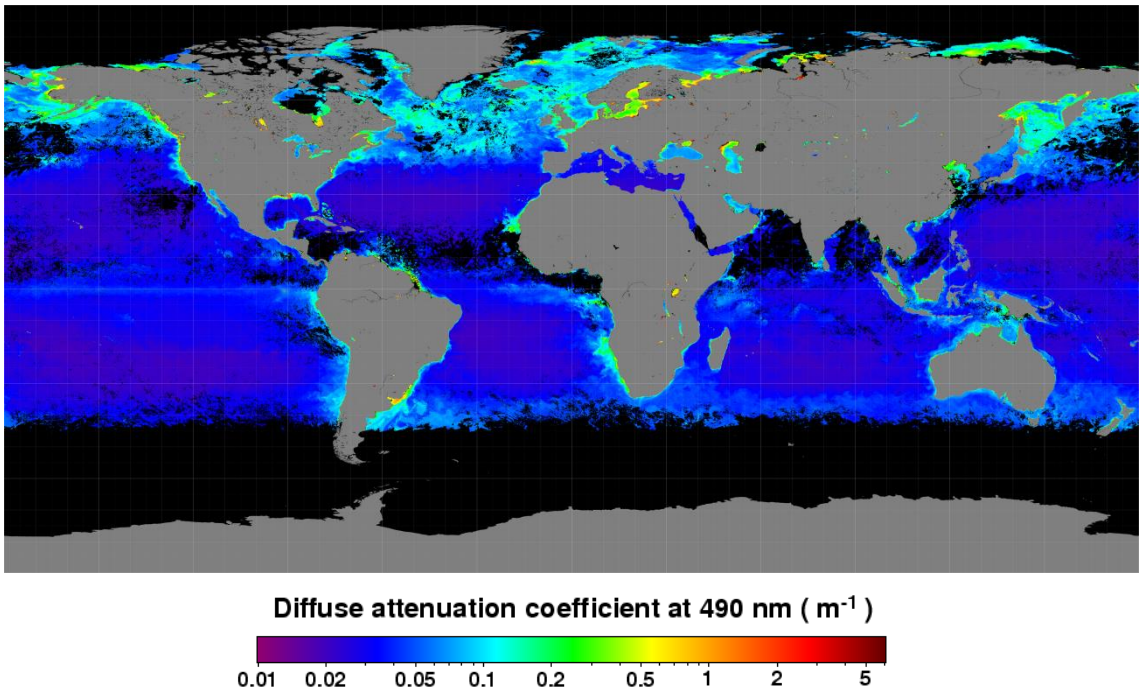


Figure 29. Example of VIIRS diffuse attenuation coefficient at 490 nm on 9 km grid (June 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014e). Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

MODIS – MODerate Resolution Imaging Spectroradiometer –
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), USA

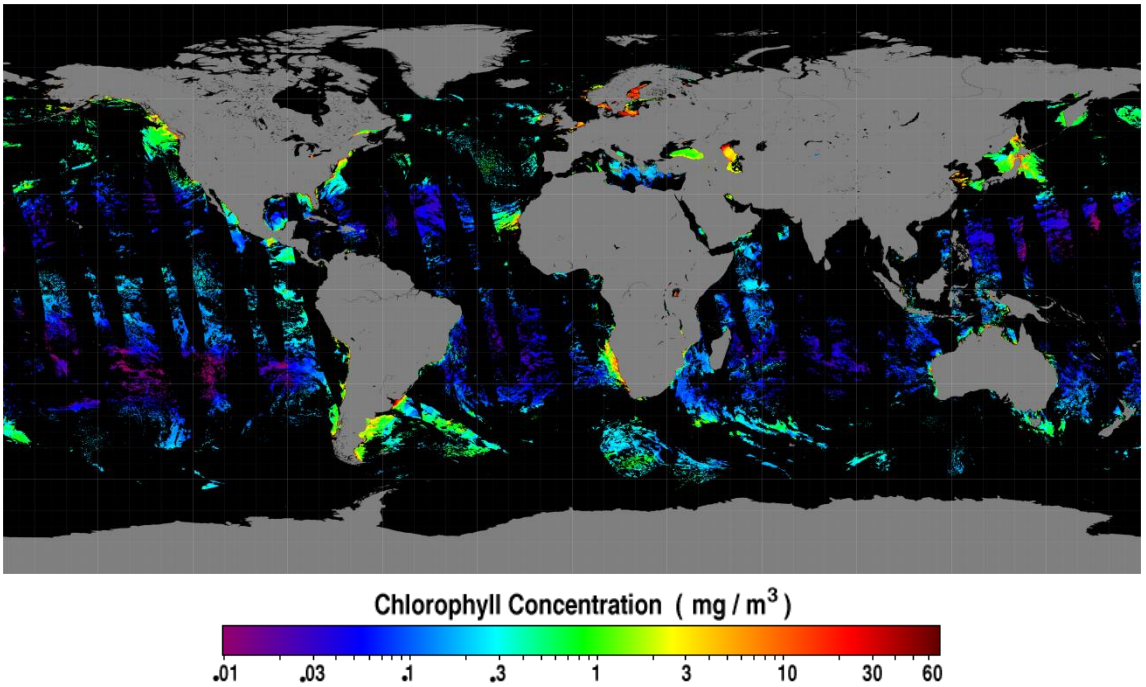


Figure 30. Example of MODIS/AQUA chlorophyll concentration daytime coverage on 4 km grid (1 April 2014) (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014a). Complete global coverage is provided in 1-2 days. Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

Resource abstract:
MODIS is a radiometer on board the NASA Terra and Aqua satellite platforms, launched in 1999 and 2002 respectively to study global dynamics of the Earth's atmosphere, land, ice and oceans. MODIS captures data in 36 spectral bands at varying spatial resolutions.

Resource language:	eng	
Keyword values:	Environmental monitoring facilities	
Variables available:	*Observed variables*	*Derived variables*
	Sea surface temperature (SST) Chlorophyll a Diffuse attenuation coefficient (KD) Colored dissolved organic matter (CDOM) Photosynthetically Active Radiation (PAR)	Particulate Inorganic Carbon (PIC) Particulate Organic Carbon (POC)
Geographic location:	Global coverage	
Spatial resolution:	MODIS level 2 datasets are available in different resolutions: 2 bands at 250 m, 5 bands at 500 m and 29 bands at 1 km. For level 3, datasets are available in 4.63 km and 9.26 km grid	
Temporal extent:	Terra: 2000-02 / present Aqua: 2002-06 / present	
Temporal resolution:	Daily (for both daytime and nighttime passes) for level 2 and daily, weekly (8 days), monthly, seasonally and annually for level 3	
Depth range/resolution:	Surface	
Conditions for access & use:	No conditions apply to access and use	

Limitations on public access:	No
Responsible organization:	NASA Ocean Biology Processing Group (OBPG, OceanColor Web), USA
Data via:	OceanColor Web Level 2: http://oceancolor.gsfc.nasa.gov/ Level 3: https://oceandata.sci.gsfc.nasa.gov/MODIS-Aqua/; https://oceandata.sci.gsfc.nasa.gov/MODIS-Terra/ Contact: webadmin@oceancolor.gsfc.nasa.gov
Data format:	Digital, in netCDF
References:	Information about citation and acknowledgements in: https://oceancolor.gsfc.nasa.gov/citations/
Additional information:	

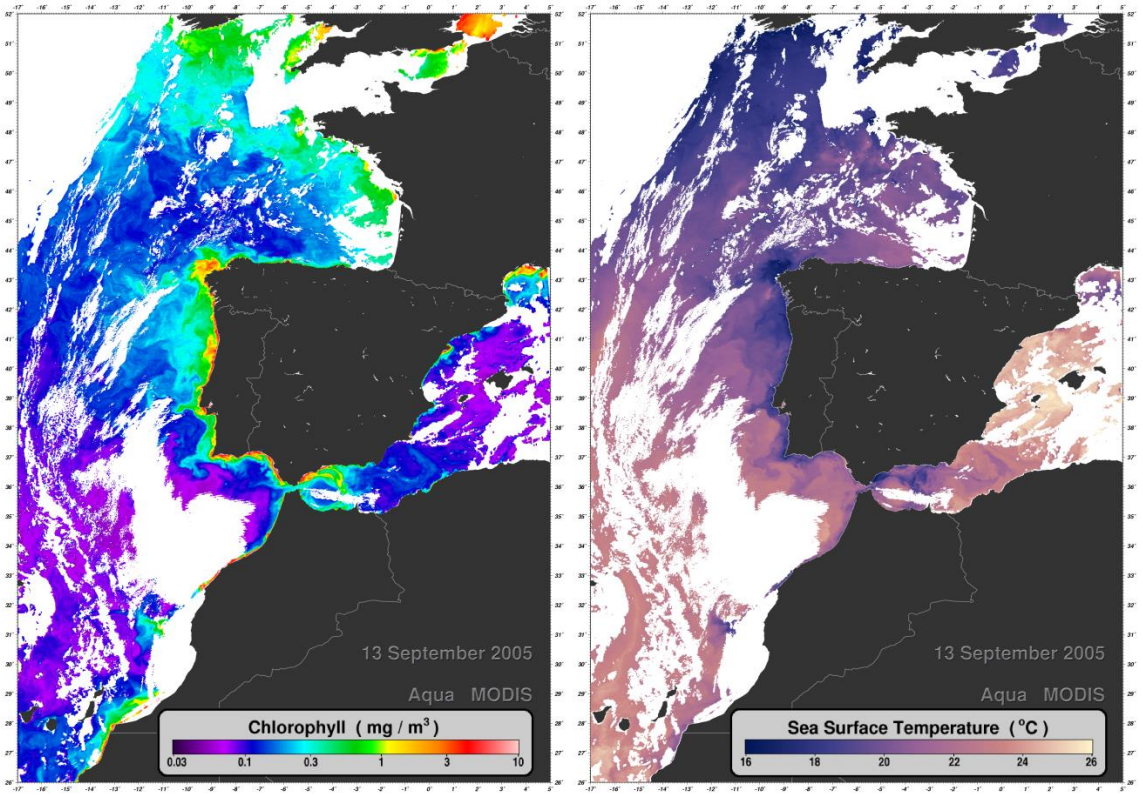


Figure 31. Example of MODIS daily synoptic chlorophyll concentration data in left panel, and SST data in the right panel (13 September 2005). Source: OceanColor Web. http://oceancolor.gsfc.nasa.gov (accessed 17 June 2017).

MERIS – MEdium Resolution Imaging Spectrometer –
EUROPEAN SPACE AGENCY (ESA)

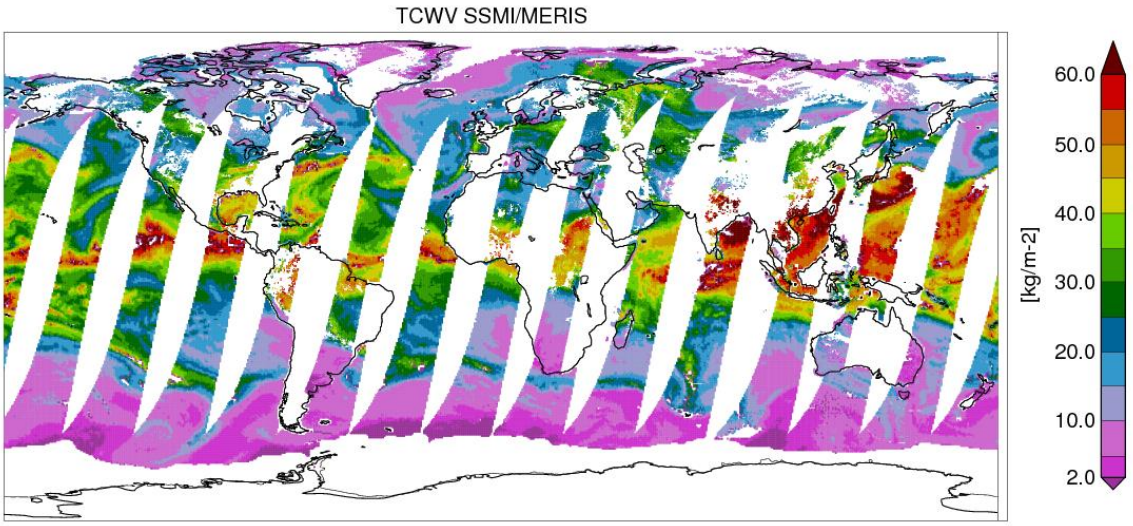


Figure 32. Daily composite of the combined product of total columnar water vapour (TCWV) from SSM/I and MERIS for the 15 July 2007, showing an example of SSM/I and MERIS daily coverage (land and ocean respectively) (Schröder et al., 2012; Lindstrot et al., 2014). To collect data for the entire planet 2-3 days are needed. Source: ESA DUE GlobVapour Project. http://www.globvapour.info/newsarchive.html (accessed 17 June 2017).

Resource abstract:
MERIS is a programmable, medium-spectral resolution, imaging spectrometer operating in the solar reflective spectral range for observing the color of ocean, and one of the main instruments on board the Envisat platform. It provides data from 15 spectral bands, and the spatial resolution is 300 m near nadir, with a swath width of 1165 km.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Chlorophyll a Dissolved organic matter Suspended solid matter
Geographic location:	Global coverage
Spatial resolution:	MERIS datasets are available in full resolution (FR) – 1 pixel = 260 m x 290 m – or reduced resolution (RR) – 1 pixel = 1.040 m x 1.160 m for level 2. For level 3, data are generated on a 4.6 km or 9 km resolution grid (ESA) and a 4 km or 9 km resolution (NASA)
Temporal extent:	2002-04 / 2012-04
Temporal resolution:	Daily (with 2-3 days of revisit time) for level 2 and daily or monthly for level 3
Depth range/resolution:	Surface
Conditions for access & use:	The ESA portal provides the data free of charge upon registration (access via MERCI) for level 2 and free access for level 3. Regarding Oceancolor Web, data are of free access
Limitations on public access:	No
Responsible organization:	European Space Agency (ESA) and NASA Ocean Biology Processing Group (OBPG, OceanColor Web)

Data via:	ESA Level 2: http://merisfrs-merci-ds.eo.esa.int/merci Level 3: http://earth.esa.int/level3/meris-level3/ Contact: https://earth.esa.int/web/guest/contact-us OceanColor Web Level 2: https://oceancolor.gsfc.nasa.gov Level 3: https://oceandata.sci.gsfc.nasa.gov/MERIS Contact: webadmin@oceancolor.gsfc.nasa.gov
Data format:	Digital, in HDF (Hierarchical Data Format) or netCDF format
References:	Any publication whatsoever resulting from work carried out using ESA data shall contain the following sentence: "Data provided by the European Space Agency." Information about citation and acknowledgements in: https://oceancolor.gsfc.nasa.gov/citations/
Additional information:	

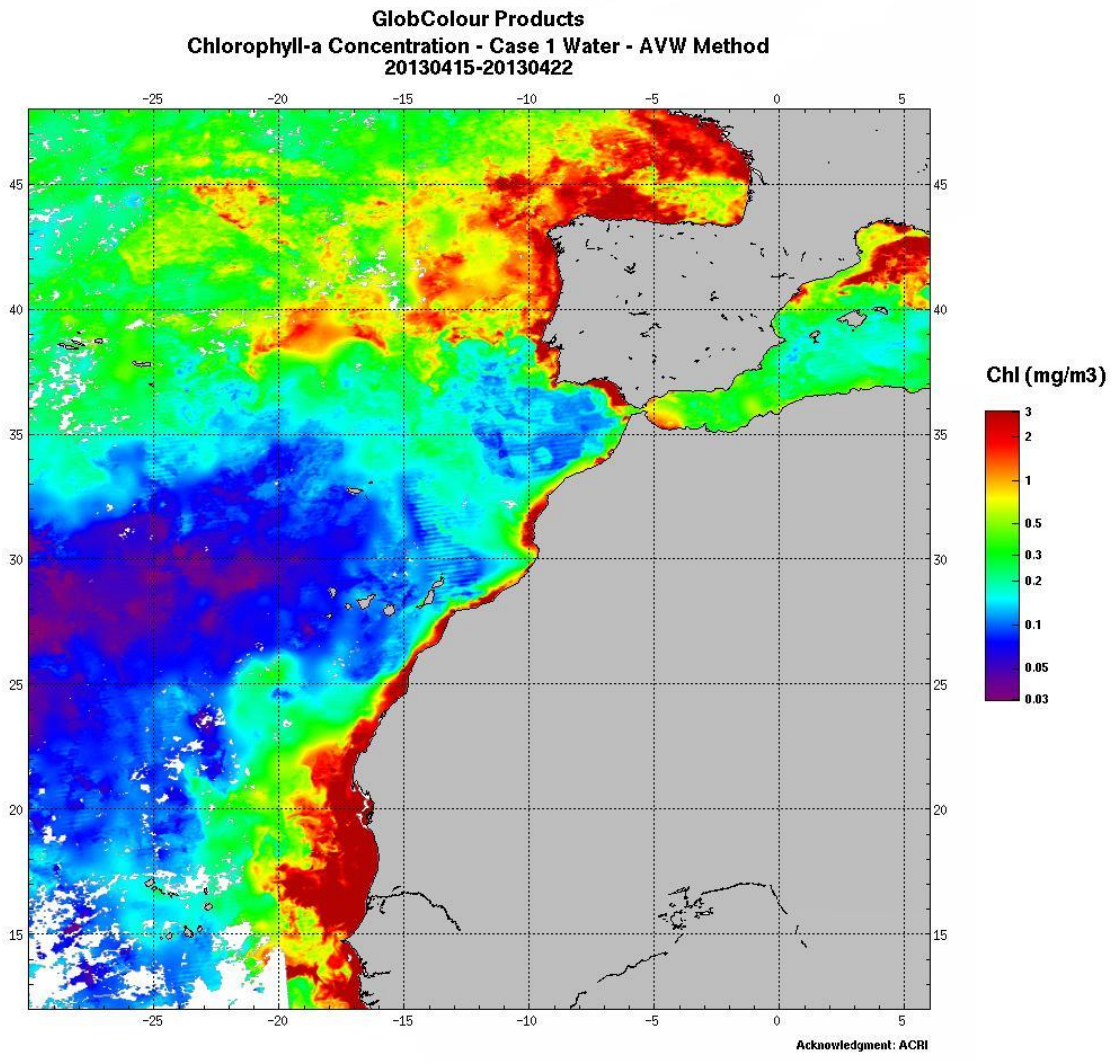


Figure 33. 8-days composite weighted averaged method (AVW) applied to merge the adjusted MODIS and SeaWiFS products with MERIS data (15-22 April 2013). Source: ESA DUE GlobColour Project. http://www.globcolour.info/gallery/ (accessed 17 June 2017).

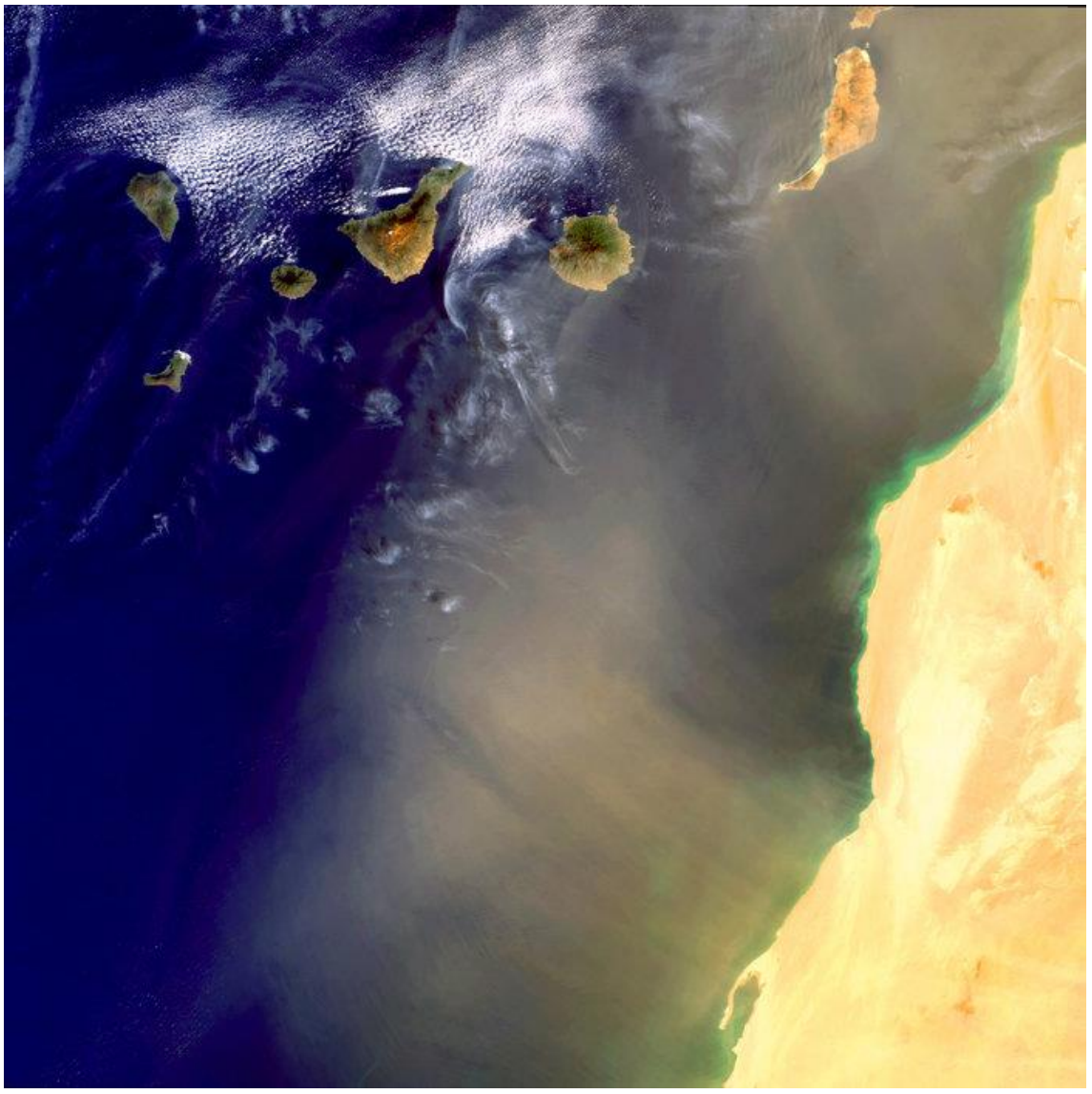
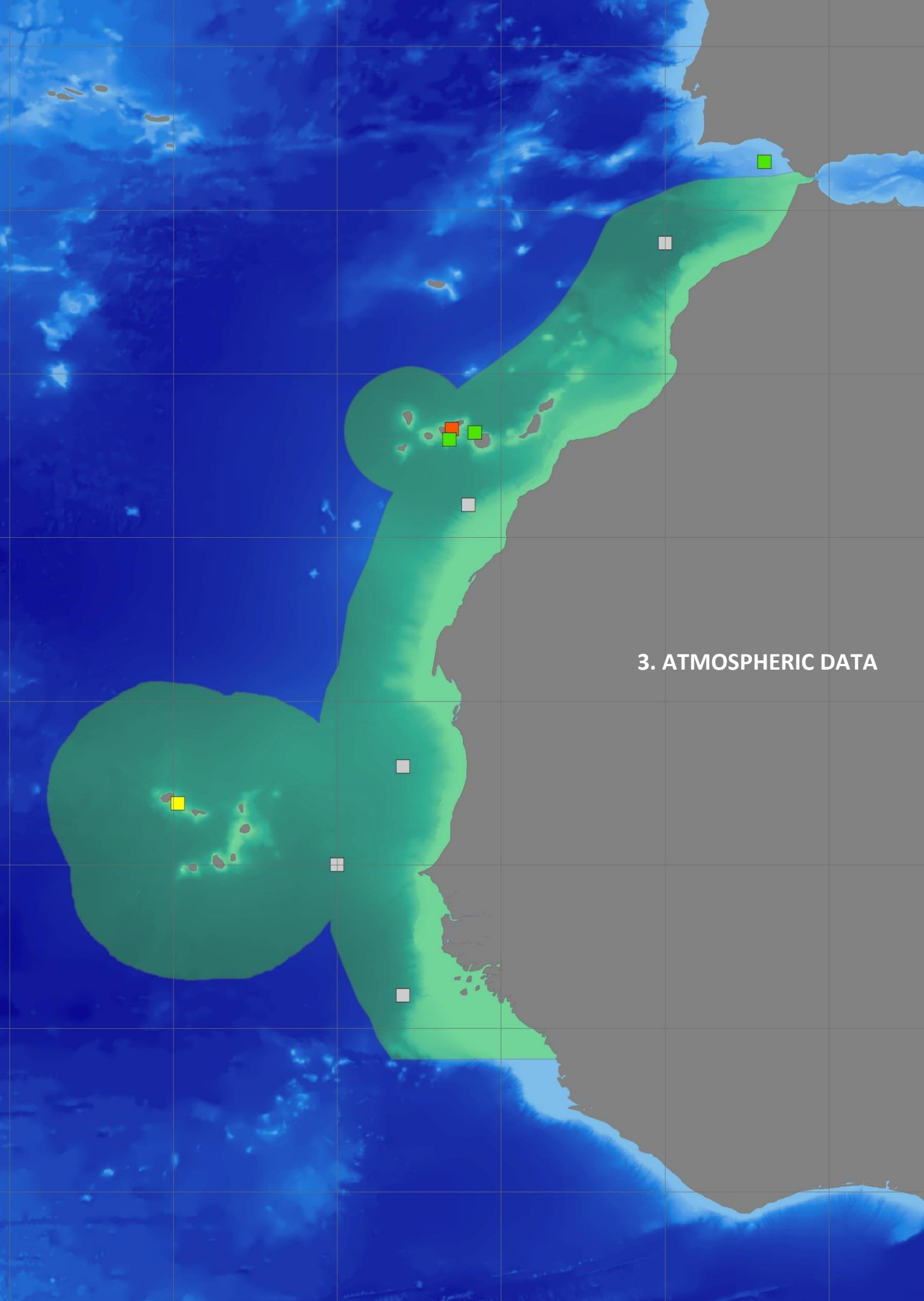


Figure 34. Example of MERIS 300-m resolution true color image. Desert dust is blown from the Western Sahara towards the Canary Islands (1 March 2003). Source: ESA. http://www.esa.int/ (accessed 17 June 2017).



3. ATMOSPHERIC DATA

Atmospheric data included in the CCLME area (green shaded area).
The yellow square shows the location of the Cape Verde Atmospheric Observatory.
The orange square indicates the location of the Izaña Atmospheric Observatory.
The green squares show the location of the Puertos del Estado's deep water buoys.
The grey squares stand for the reference points used by the IEO to calculate the Upwelling Index.

CAPE VERDE ATMOSPHERIC OBSERVATORY – CVAO –

INSTITUTO DE NACIONAL DE METEOROLOGIA E GEOFISICA (INMG), CABO VERDE
DEPARTMENT OF CHEMISTRY, UNIVERSITY OF YORK, UNITED KINGDOM
MAX-PLANC INSTITUTE FUR BIOGEOCHEMIE, GERMANY
TROPOS, LEIBNIZ-INSTITUT FUR TROPOSPHARENFORSCHUNG, GERMANY

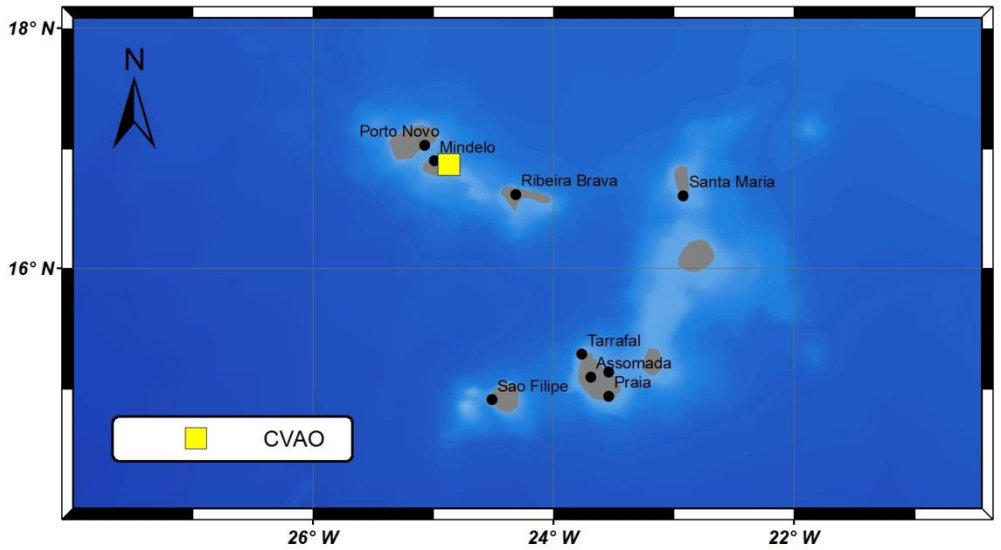


Figure 35. Location of the Cape Verde Atmospheric Observatory (CVAO) on the island of Sao Vicente, part of the Cape Verde archipelago off the west coast of Africa.

Resource abstract:

The Cape Verde Atmospheric Observatory is a Global Atmospheric Watch (GAW) Global Station (http://www.wmo.int/pages/prog/arep/gaw/GAW_Global_st.html, accessed 25 June 2017). Measurements of meteorological parameters, greenhouse gases, shorter-lived trace gases and aerosol composition (physical and chemical parameters) are made in the context of the clean marine boundary layer. One of the major objectives is to investigate air-sea interactions and processes, and coupled data obtained at the Cape Verde Ocean Observatory (CVOO), and the CVAO provides highly valuable information about these processes.

Resource language: eng

Keyword values: Environmental monitoring facilities; Atmospheric conditions; Meteorological geographical features

Variables available:

Observed variables
Temperature (7.5 m, 30 m)
Relative Humidity (7.5 m, 30 m)
Wind direction (7.5 m, 30 m)
Wind speed (7.5 m, 30 m)
Atmospheric pressure
Total radiation
Rainfall
Surface ozone
Carbon monoxide
Speciated C2-C8 NMHC
O-VOC (acetone, methanol, acetaldehyde)
Dimethyl sulfide
Short-lived halocarbons
Nitrogen oxide
Nitrogen dioxide

	Total gaseous mercury (TGM) Physical, size resolved aerosol Chemical characteristics of aerosol Greenhouse gases (CO_2, CH_4, N_2O)
Geographic location:	24.86752°W 16.86403°N
Spatial resolution:	Fixed-point measurements. Occasional aircraft experiments around Cabo Verde to 200 km from African coastline. Some ship data from the surrounding area also available from during the RHaMBLe campaign (Table 1)
Temporal extent:	2006-10-01 / present
Temporal resolution:	Variable depending on the instrument, at least hourly data available for above list of variables, in most cases higher time resolution data available
Depth range/resolution:	20-40 m a.s.l.
Conditions for access & use:	No costs for data use although data access is restricted to approved users (apply for access) for 2 years after collection. Acknowledgement or co-authorship required for publications
Limitations on public access:	Yes (login via web portal required)
Responsible organization:	University of York, York, United Kingdom
Data via:	British Atmospheric Data Centre (BADC): http://badc.nerc.ac.uk/home/index.html World Data Centre for Greenhouse Gases (WDCGG): http://ds.data.jma.go.jp/gmd/wdcgg/ Contact: katie.read@ncas.ac.uk Dr. Katie Read. Coordinator of Cape Verde Atmospheric Observatory, NCAS, University of York Contact: Lucy.carpenter@york.ac.uk Prof. Lucy Carpenter. Principal Investigator, University of York Contact: martin.heimann@bgc-jena.mpg.de Prof. Martin Heimann. Principal Investigator, MPI-Jena Contact: herrmann@tropos.de Prof. Hartmut Hermann. Principal investigator, Tropos, Leipzig
Data format:	Digital, available as ASCII (NASA Ames formatted) text files
References:	"Data is taken from the Cape Verde Atmospheric Observatory (CVAO), Sao Vicente, Republic of Cape Verde, www.ncas.ac.uk/index.php/en/cvao-home."

Additional information:

CVAO facilities on site can be used (air conditioned lab space, 30 m tower, space for containers -for a fee).

Additional information (e.g. information on instruments, real-time data, publication lists, etc.) can be found via the CVAO website: https://www.ncas.ac.uk/index.php/en/cvao-home (accessed 17 June 2017) or by contacting katie.read@ncas.ac.uk.

Access to the observatory is through the National Centre for Atmospheric Science (NCAS) Atmospheric Measurement Facility (AMF) please contact: katie.read@ncas.ac.uk.

Table 1. The table shows a summary of additional instrumentation and campaigns that have been held at the CVAO, with timescales and responsible institution. Source: CVAO.

Campaign Name and PI	Date	Institute, Country
SOLAS Aerosol filtration (Achterberg)	Apr 2007 - Nov 2008	NOC, Southampton, UK
MAX-DOAS (BrO, IO, OIO) (Platt)	Oct 2006 - present	Heidelberg, Germany
GHG monitoring (flask sampling) (Heimann, Kozlova)	Mar 2007 - present	MPI, Germany
Reactive Halogens in the Marine Boundary Layer experiment (RHaMBLe) + SOPRAN´(McFiggans)*	May - Jun 2007	Leeds, Leicester, UK, Irvine, USA, Germany
TROMPEX		
SOPRAN-Aerosol intensive (Müller)	Nov 2007 - Jan 2008	Leipzig, Germany
Passive air sampling, PCBs, POPs (Gioia)	Dec 2007 - July 2009	Lancaster, UK
SOPRAN Aerosol intensive (Müller)	Jun - Aug 2008	Leipzig, Germany
SOPRAN Aerosol intensive (Müller)	Dec 2008 - Feb 2009	Leipzig, Germany
SOPRAN (radiometer) (Fischer)	Mar 2009 - present	Hamburg, Germany
Seasonal Oxidant Study (SOS) + SOPRAN (Carpenter, Monks, Heard)*	Feb, May, Sep, Nov 2009	Leeds, UK, Irvine, USA, Germany
O3 Sondes (Von Glasow)	May 2009	Manchester, UK
O3 fluxes (Phillips)	Sep 2009 - present	CEH, UK
SOPRAN (halocarbon isotopes) (Bahlmann)	Nov 2009	Hamburg, Germany
Ship cruise SOPRAN: MAX-DOAS measurements alongside site longpath measurements (Platt)	May - June 2010	Heidelberg, Germany
O3 Sondes (Jenkins)	Summer 2010, Summer 2011	Howard, Washington, USA
POP's (Gioia)	Sept 2010	Lancaster, UK
DLR Falcon aircraft measurements, halogens in the MBL and upper troposphere, as well as methane and biomass burning plumes from Africa. Instrumentation/measurements: NO/NOy, PICARRO (CO_2, CH_4, H_2O), B_2-O_3, CO, SO_2, Aerosols, IT-MS (PAN, N_2O_5, $ClONO_2$), mini-DOAS (O_3, NO_2, BrO, IO) (Dorf)	Oct 2010	Heidelberg, Germany
MAX-DOAS/LP-DOAS (IO and BrO: 2 weeks of profile measurements at different heights at start and at end of campaign, Baia lightpath (similar to previous LP-DOAS), also ship cruise in parallel and at SAL) (Platt)	2010 - Jan 13	Heidelberg, Germany
Ionospheric Scintillation (Mitchell)	March 2011 - present	Bath, UK
Sun photometer and 2 radiometers (total of 4 now)	Jan 2012 - present	Hamburg, Germany
Aerosol filter sampling (Abouchami)	Feb 2012	MPI, Mainz, Germany
HALO aircraft flight, brominated, iodinated and chlorinated source gases and BrO. SF_6, N_2O, CH_4, CO_2, CO, nitrogen oxides, O_3, CH_2O, PAN, SO_2	Aug 2012	Frankfurt, and Heidelberg, Germany, UEA, UK, Bristol, UK
POPs (Bäckland)	2012 - 2015	Norwegian Institute for Air Research (NILU), Norway
Intermediate Frequency samples , effect of scintillation	Aug 2013	University of Newcastle, UK
Photodegradation of pesticides	Sep 2013	Lancaster Environment Centre, UK
ORC 3- Stephen Arnold Glyoxal, monoterpenes	May and Aug 2014	Leeds, UK
Mercury Speciation	Jan, Apr 2015	York, UK
LIF, NO	Jan, Apr 2015	York, UK, Laquila, Italy
ICE-D, bioaerosol, spectrometer	July - Aug 2015 (spectrometer 1 year Sept 2015 - 2016)	Leeds, Met Office, UK
Thermospheric wind	July 2015	NCAR
HAMBL-HONO	Nov - Dec 2015	Birmingham
Passive air to measure BFRs and musks	July - Dec 2015	Lancaster, UK
Sensors, O_3, CO, NOx, SO_2	Nov 15 - Nov 16	York, UK
STARS4ALL Photometer installation	Sep 2017 - Sep 2018	

*During both RHaMBLe and SOS the Leipzig group did an increased frequency of aerosol measurements.

IZAÑA ATMOSPHERIC OBSERVATORY – IZO –
AGENCIA ESTATAL DE METEOROLOGIA (AEMET), SPAIN

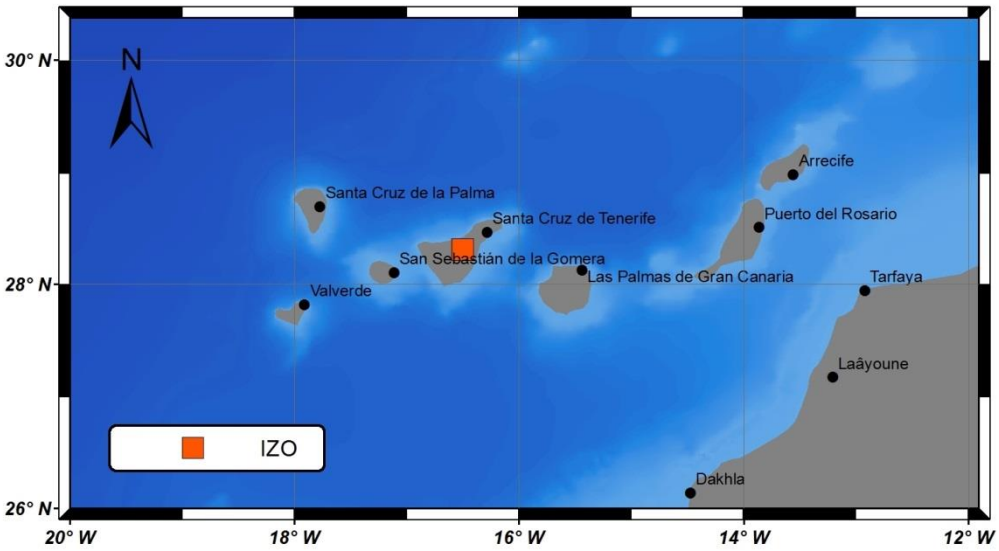


Figure 36. Location of the IZO in the island of Tenerife (Canary Islands).

Resource abstract:
The Izaña Atmospheric Observatory is located on the Island of Tenerife, Spain, roughly 300 km west of Africa. The meteorological observatory is situated on a mountain at 2373 m a.s.l., 15 km north-east of the volcano Teide (3718 m a.s.l.). The local wind field at the site is dominated by north-westerly winds. A predominant meteorological attribute of the Canary Islands region is the presence of the trade wind inversion that persists through most of the year and is well below the altitude of the station.

Resource language: spa

Keyword values: Environmental monitoring facilities; Atmospheric conditions; Meteorological geographical features

Variables available:
Observed variables
Light absorption coefficient, total aerosol
Light backscattering coefficient, total aerosol
Light scattering coefficient, total aerosol
Major chemical components (size fractionated)
Mass concentration (coarse) or Mass PM10
Mass concentration (size fractionated)
Mass concentration (total aerosol) or Mass TSP
Multiwavelength optical depth, total aerosol
Number concentration
Number size distribution, total aerosol
Vertical distribution of properties
Aerosol optical depth (AOD)
Angstrom exponent
Column aerosol size distribution
Aerosol extinction vertical profiles
CH_4
CO_2
N_2O
SF_6
CO
SO_2

	NO_x
	Aerological sounding
	Humidity
	Precipitation
	Trajectories
	Wind direction
	Wind speed
	Sunshine
	Surface ozone
	Total column ozone
	Vertical ozone profile
	Direct solar radiation (DNI)
	Global solar radiation (GHI)
	Diffuse radiation (DHI)
	Long-wave radiation (>3µm)
	Clouds observation
	UV Broadband
	UV Erythemally weighted
	UV Spectral
	Radio Nuclide (CO_2 [C-14])
	C_2H_6
	C_3H_8
	CH_2O
	$ClONO_2$
	CO
	COF_2
	H_2
	HCl
	HCN
	HF
	HNO_3
	i-C_4H_{10}
	i-C_5H_{12}
	n-C_4H_{10}
	n-C_5H_{12}
Geographic location:	16.4993833°W 28.3089833°N
Spatial resolution:	n/a
Temporal extent:	1984 / present Meteorology: 1916 / present
Temporal resolution:	n/a
Depth range/resolution:	2372.899 m.a.s.l.
Conditions for access & use:	Temporary restriction of two years in some variables
Limitations on public access:	Yes
Responsible organization:	Izaña Atmospheric Research Center (CIAI) from the Agencia Estatal de Meteorología (AEMET), Santa Cruz de Tenerife, Spain
Data via:	http://izana.aemet.es http://www.aemet.es Contact: ecuevasa@aemet.es Emilio Cuevas-Agullo. Head, Izaña Atmospheric Research Center, AEMET
Data format:	Digital (plain text)

Additional information:
At the Izaña Observatory clean air and clear sky conditions are prevailing around all the year. Firstly, it is located in the region below the descending branch of the Hadley cell, typically above a stable inversion layer. Secondly, it is situated on an island far away from any significant industrial activities. Consequently, it offers excellent conditions for in-situ measurements of trace gases and aerosols under “free troposphere” conditions and for atmospheric observations by remote sensing techniques. The environmental conditions and pristine skies are optimal for instrument calibration and validation activities. Due to its geographic location, it is most valuable for the investigation of dust transport from Africa to the North Atlantic, and large-scale transport from the tropics to higher latitudes.

PUERTOS DEL ESTADO'S DEEP WATER BUOY NETWORK

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

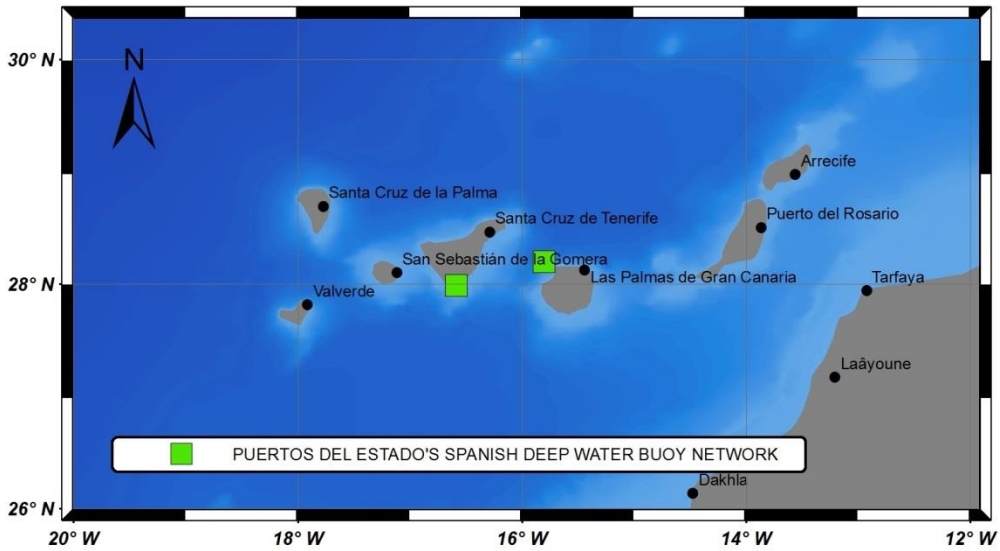


Figure 37. Puertos del Estado's Spanish deep water buoy network sites in the Canary Islands.

Resource abstract:

Puertos del Estado's deep water buoy network is a Spanish national buoy network with 15 measuring stations (2 in the Canary Islands) moored at deep water (between 400 m and 2000 m). These stations provide met-ocean parameters transmitted in real time by satellite and being available through Puertos del Estado's web page (http://www.puertos.es, accessed 18 June 2017) and through Copernicus Marine Environment Monitoring Service (CMEMS, http://marine.copernicus.eu, accessed 18 June 2017).

Resource language:	eng, spa
Keyword values:	Environmental monitoring facilities; Oceanographic geographical features
Variables available:	*Observed variables* Waves (height, period and direction) Atmospheric pressure Wind speed and direction Air temperature Current Sea temperature Salinity
Geographic location:	16.58°W – 04.42°E 28.00°N – 43.73°N
Spatial resolution:	n/a
Temporal extent:	1996 / present
Temporal resolution:	Hourly data
Depth range/resolution:	Between 3.5 m and 3 m a.s.l.
Conditions for access & use:	Open access. In any use of the data, Puertos del Estado should be acknowledged as the owner
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx

CMEMS: http://marine.copernicus.eu
Contact: mar@puertos.es
Marta de Alfonso. Networks Development Manager, Physical Oceanography Group, Puertos del Estado

Data format: Digital, in ASCII and netCDF

References: "These data come from Puertos del Estado's Spanish Deep Water Buoy Network, a multipurpose network for the marine environment monitoring."

Additional information:

Two of these stations are in the CCLME region:

- Gran Canaria (WMO: 13130). 15.80°W - 28.20°N
Mooring Depth: 780 m
Temporal extent: 1997-06-20 / present
Type of sensor: Directional Oce-Met

- Tenerife (WMO: 13131). 16.58°W - 27.99°N
Mooring Depth: 710 m
Temporal extent: 1998-04-01 / present
Type of sensor: Directional Oce-Met

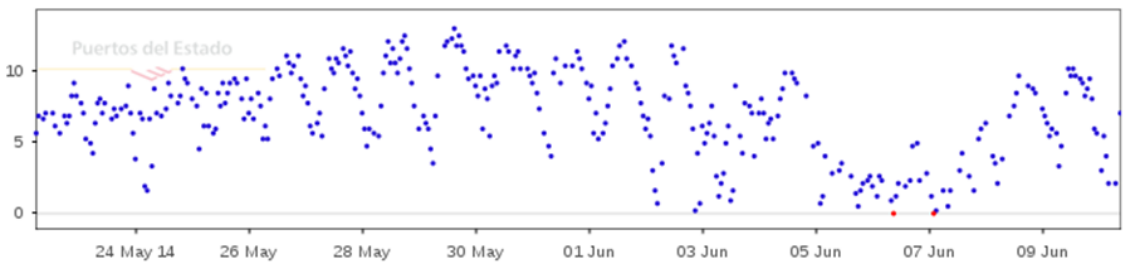


Figure 38. Wind speed (knots) observed at Tenerife Sur buoy (coverage period: 24 May 2014 – 9 June 2014). Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 18 June 2017).

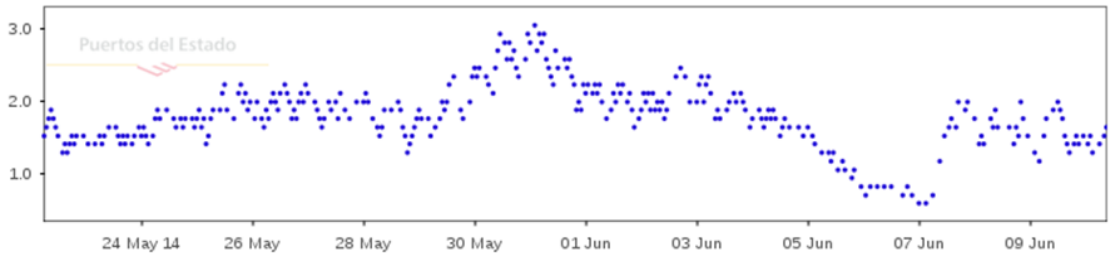


Figure 39. Significant wave height (m) observed at Gran Canaria buoy (coverage period: 24 May 2014 – 9 June 2014). Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 18 June 2017).

NORTH ATLANTIC OSCILLATION – NAO –

CLIMATE PREDICTION CENTER, NATIONAL WEATHER CENTER, NOAA, UNITED STATES OF AMERICA

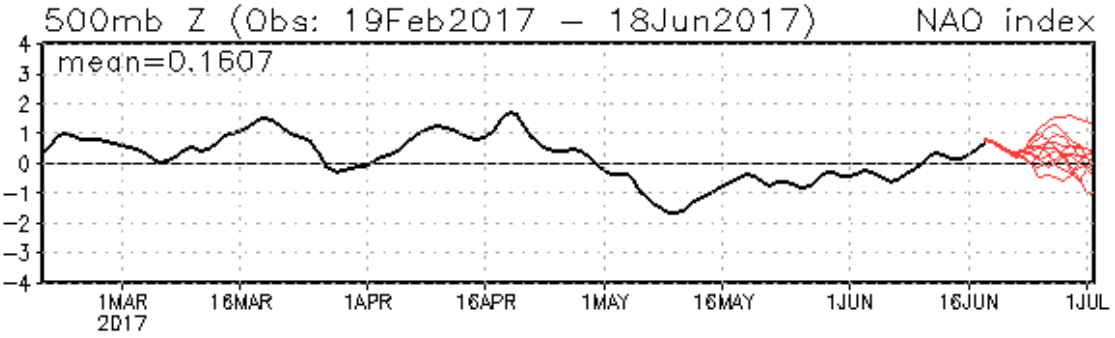


Figure 40. Observed NAO index (black line) plus forecasted NAO indices from each of the 11 MRF (Medium Range Forecast) ensemble members starting from the last day of the observations (red lines). Source: NWS/NOAA.
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/new.nao.shtml (accessed 19 June 2017).

Resource abstract:

The NAO is a measure of the strength of the westerlies across the North Atlantic. It is the difference in pressure between Ponta Delgada on the Azores and Stykkisholmur in Iceland. The NAO consists of a north-south dipole of anomalies, with one center located over Greenland and the other center of opposite sign spanning the central latitudes of the North Atlantic between 35°N and 40°N.

Daily and monthly NAO indices are calculated. The daily NAO index corresponds to the NAO patterns, which vary from one month to the next. Each daily value has been standardized by the standard deviation of the monthly NAO index from 1950 to 2000 interpolated to the day in question. Monthly NAO indices are standardized by the 1981-2010 climatology.

Resource language:	eng	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Pressure	Daily NAO index Monthly NAO index
Geographic location:	North Atlantic Ocean	
Spatial resolution:	n/a	
Temporal extent:	1950 / present	
Temporal resolution:	Daily	
Depth range/resolution:	Surface	
Conditions for access & use:	The information on National Weather Service (NWS) web pages are in the public domain, unless specifically noted otherwise, and may be used without charge for any lawful purpose	
Limitations on public access:	No	
Responsible organization:	National Weather Service, NOAA, Silver Spring, USA	
Data via:	Daily NAO: ftp://ftp.cpc.ncep.noaa.gov/cwlinks/ Monthly NAO: All monthly means in graphical format: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/month_nao_index.shtml	

JFM Seasonal mean in graphical format:
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/JFM_season_nao_index.shtml

Tabular ASCII format:
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.ascii.table

ASCII format:
http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/norm.nao.monthly.b5001.current.ascii

Data format: Digital (ASCII format and graphics)

Additional information:

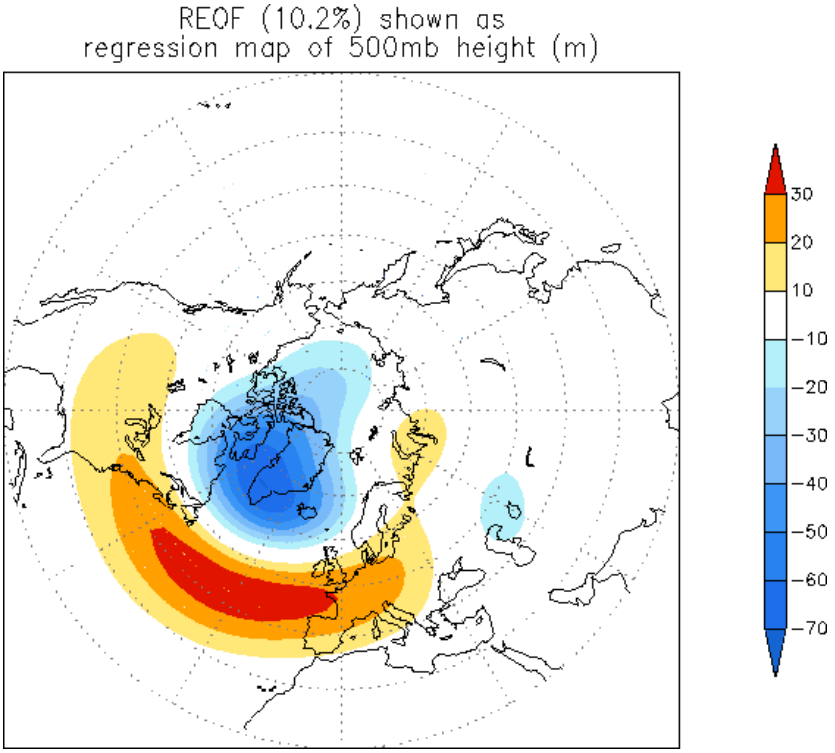


Figure 41. Rotated Empirical Orthogonal Function (REOF) analysis of monthly mean 500 mb height during 1950-2000 time period. Source: NWS/NOAA. http://www.cpc.ncep.noaa.gov/products/precip/CWlink/pna/nao_loading.html (accessed 19 June 2017).

UPWELLING INDEX – UI –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

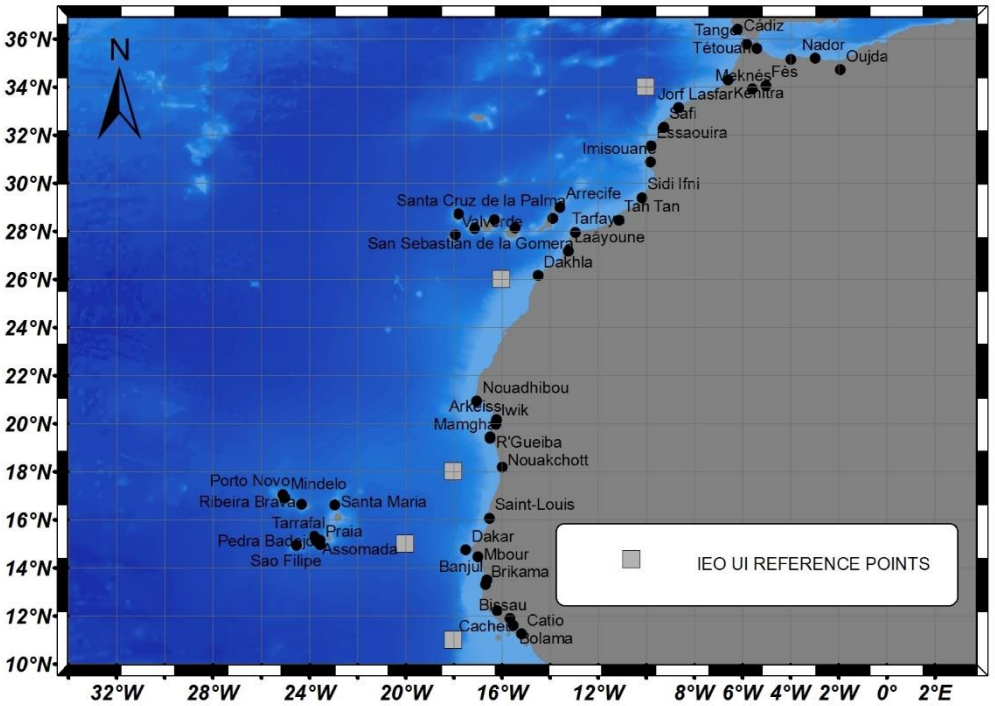


Figure 42. Location of the five reference points where the Upwelling Index is calculated.

Resource abstract:
The Instituto Español Oceanografía coastal upwelling indices are calculated based upon Ekman's theory of mass transport due to wind stress and are available in the IEO website (http://www.indicedeafloramiento.ieo.es, accessed 18 May 2017). The methodology used was the proposed by Bakun (1973) as indicated in the technical reports published by the IEO (Lavín et al., 1991).

The basic input data to calculate UI is the sea level pressure field over the ocean. The Navy Operational Global Atmospheric Prediction System (NOGAPS) model 6 hourly sea level pressure (SLP, hPa) database, maintained by FNMOC (Fleet Numerical Meteorology and Oceanography Center, US Navy's), is used to calculate UI following Lavín et al. (1991).

Resource language:	eng, spa	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Sea Level Pressure	Upwelling Index
		Winds
Geographic location:	20.00°W – 10.00°W	11.00°N – 34.00°N
Spatial resolution:	Five reference points:	
	Casablanca: 10.00°W – 34.00°N	
	Canarias: 16.00°W – 26.00°N	
	Mauritania: 18.00°W – 18.00°N	
	Dakar: 20.00°W – 15.00°N	
	Guineas: 18.00°W – 11.00°N	
Temporal extent:	1967-01-01 / present+7 days of forecast	
Temporal resolution:	6 hours	
Depth range/resolution:	Surface	

Conditions for access & use:	The data can be used without limitations for educational and scientific objectives. It must be cited and acknowledged following the citation example
Limitations on public access:	No
Responsible organization:	Instituto Español de Oceanografía, Vigo, Spain.
Data via:	http://www.indicedeafloramiento.ieo.es Contact: gonzalo.gonzalez@vi.ieo.es. Gonzalo González-Nuevo González. Scientist, Instituto Español de Oceanografía
Data format:	Digital: ASCII (CSV format), Excel and Matlab
References:	"Upwelling index time series has been provided by the Instituto Español de Oceanografía (www.indicedeafloramiento.ieo.es) and has been calculated using sea level pressure obtained from the Fleet Numerical Meteorology and Oceanography Center (www.usno.navy.mil/FNMOC)."
Additional information:	

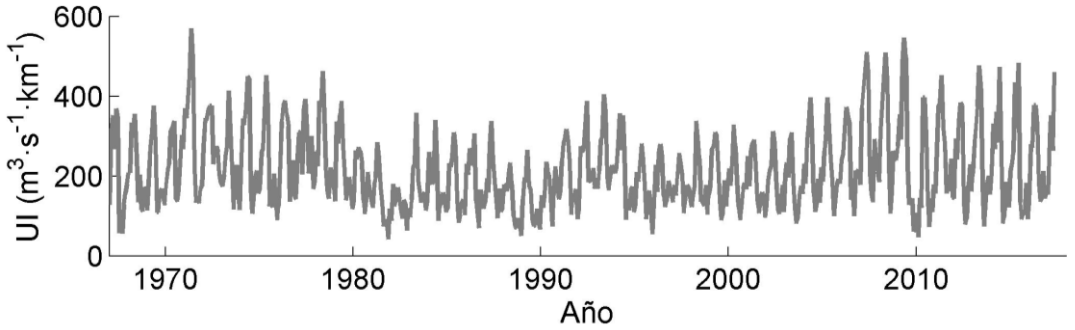


Figure 43. Upwelling Index time series of the Mauritania station. Source: IEO.

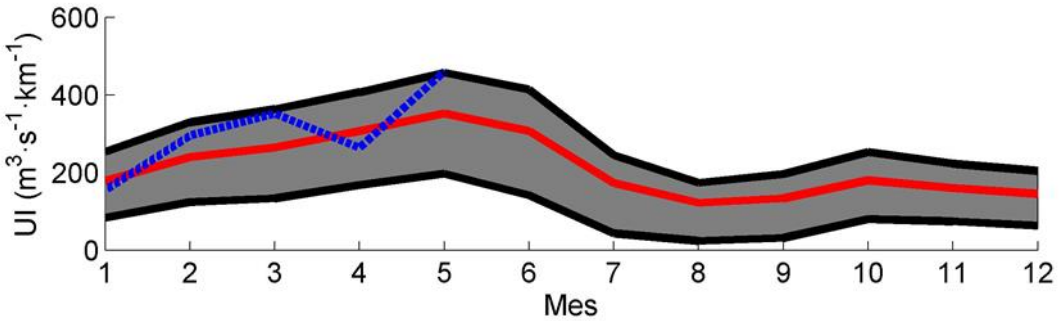
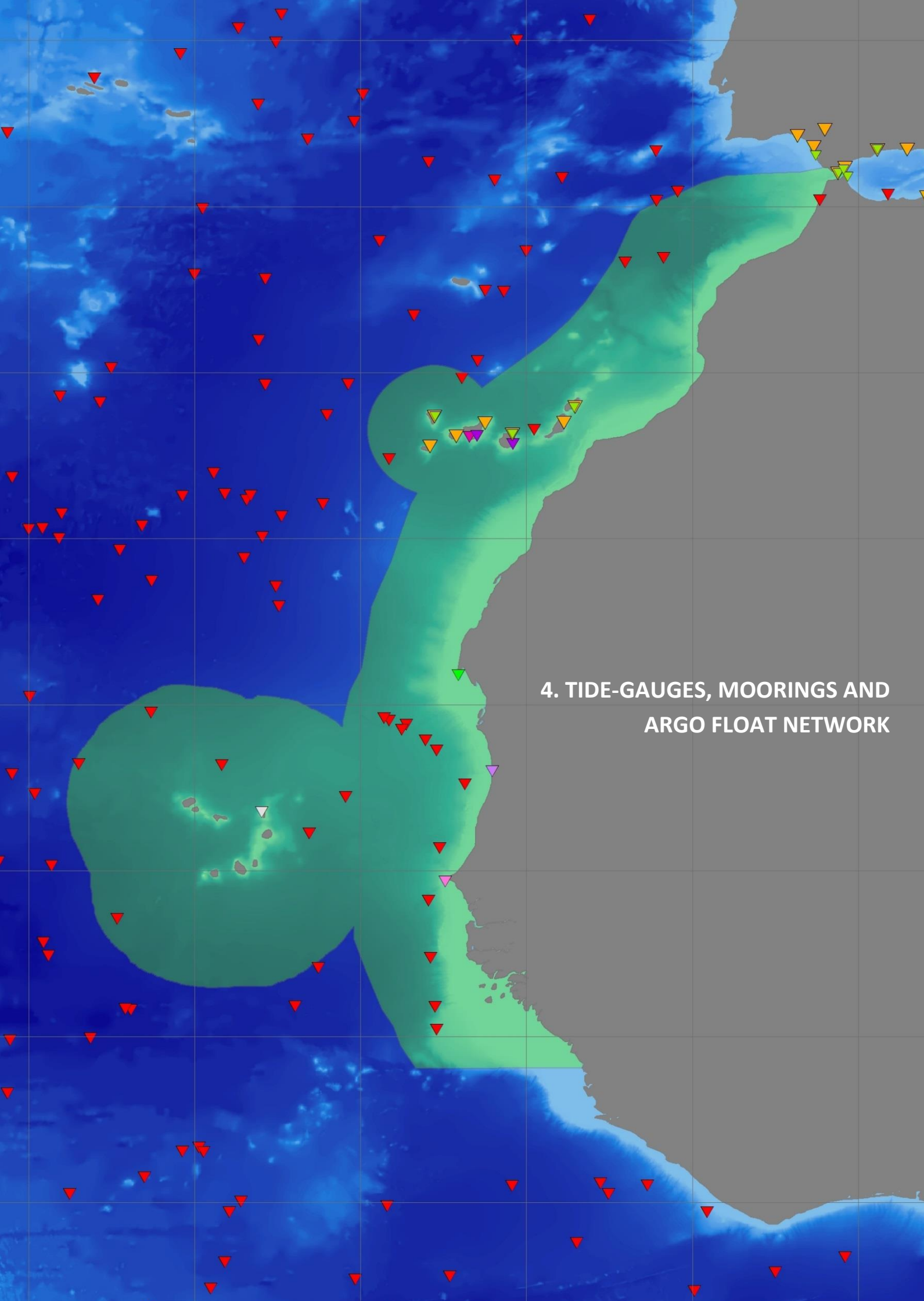


Figure 44. Mean seasonal cycle of upwelling index calculated from the Mauritania station (1967-2017, red line). The black solid lines are the percentile 25 and 75 respectively. The upwelling index series of the year 2017 is represented in blue dashed line. Source: IEO.



4. TIDE-GAUGES, MOORINGS AND ARGO FLOAT NETWORK

Tide gauges, moorings and Argo buoys deployed at the CCLME (green shaded area). The triangle symbols stand for the location of different devices:
Light green, Instituto Español de Oceanografía tide gauges.
Fuchsia, Instituto Geográfico Nacional tide gauges.
Orange, Puertos del Estado tide gauges.
Purple, old Puertos del Estado tide gauges.
Bright green, Nouadhibou tide gauge.
Violet, Nouakchott Port tide gauge.
Grey, Palmeira tide gauge.
Pink, Dakar tide gauge.
Yellow, Eastern boundary Current 4 mooring.
Red, Argo array on 24 October 2014.

NOUADHIBOU TIDE GAUGE

INSTITUT MAURITANIEN DE RECHERCHE OCEANOGRAPHIQUE ET DES PECHES (IMROP), MAURITANIA

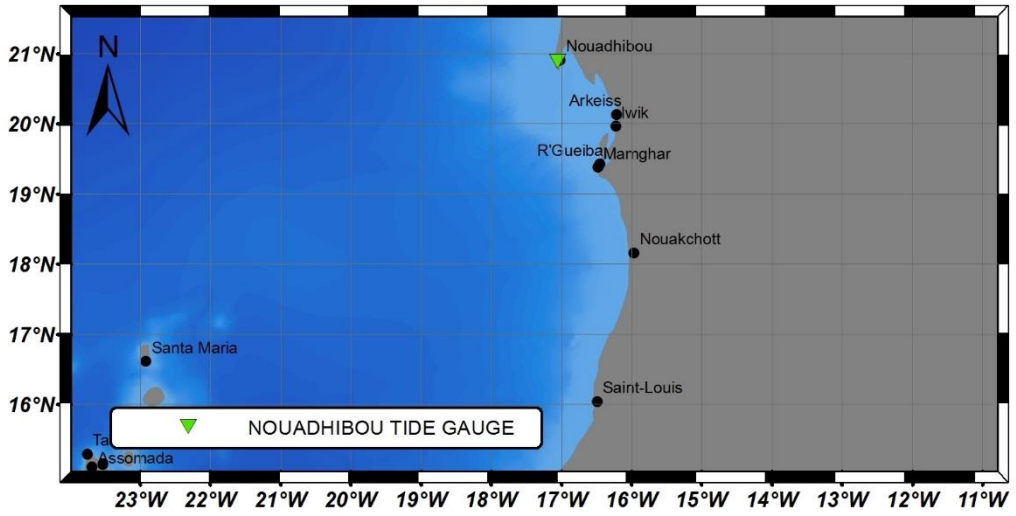


Figure 45. Location of the tide gauge at the Port of Nouadhibou.

Resource abstract:

The tide gauge is located at the Port Autonome de Nouadhibou at Nouadhibou city. Data inputs come from a float sensor. Data are recovered once a month.

Resource language:	fre
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	17.0522°W 20.8985°N
Spatial resolution:	n/a
Temporal extent:	2013-01-24 / present
Temporal resolution:	One sample per 5 min
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply for access and use
Limitations on public access:	No
Responsible organization:	Institut Mauritanien de Recherche Océanographique et des Pêches, Nouadhibou, Mauritanie
Data via:	Contact: abdouldia2005@hotmail.com Abdoul Dia. Head of Laboratory, IMROP Contact: bambayeh@yahoo.fr Bambaye Cheikh Sidi El-Mokhtar. Senior scientist, IMROP
Data format:	Digital (plain text)
References:	When dataset is used, the IMROP must be acknowledge as data owner

Additional information:

Datum information: The data reference is tide gauge zero.

NOUAKCHOTT PORT TIDE GAUGE

NOUAKCHOTT PORT AUTHORITY, MAURITANIA

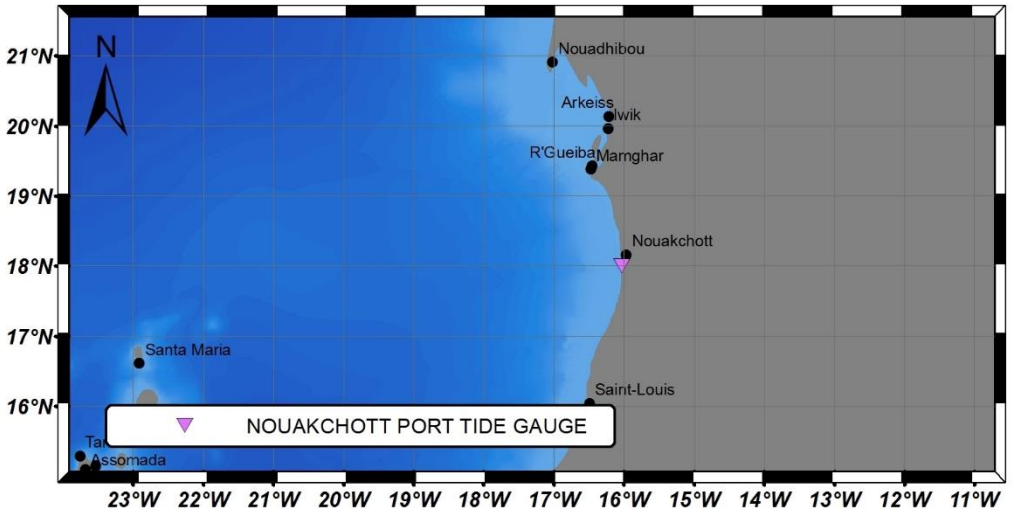


Figure 46. Location of the tide gauge, which is at the Nouakchott Autonomous Port.

Resource abstract:

The tide gauge is located at the western end of the quay of the Nouakchott Port, socalled "Port de l'Amitié". The port itself is located at 18 km in the south-west of Nouakchott city. Data inputs come from a radar sensor.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	16.0369°W 17.9895°N
Spatial resolution:	n/a
Temporal extent:	2007-01-01 / present
Temporal resolution:	One sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Agreement with the Nouakchott Port Authority
Limitations on public access:	Yes
Responsible organization:	Port Autonome de Nouakchott, Nouakchott, Mauritania
Data via:	Real-time data viewer: http://ioc-sealevelmonitoring.org/station.php?code=noct Metric sea-level data: http://www.psmsl.org/data/obtaining/met.monthly.data/2036.metdata Contact: lemine.vall@gmail.com Mohamed Lemine Ould Mohamed Vall. Head of Database and Measurements Section, Port Autonome de Nouakchott
Data format:	Digital (CSV format)
References:	Further information on referencing PSMSL dataset is available at: http://www.psmsl.org/data/obtaining/reference.php

Additional information:

This station is part of the ODINAFRICA project. This is a metric station, so this is not research quality data.

Benchmark: Bolt soldered onto pressure sensors steel tube near radar arm. Chart Datum = 6.517 m below Bolt.
Datum information: The zero of the series is now local Chart Datum.

DAKAR 2 TIDE GAUGE

CENTRE DE RECHERCHES OCEANOGRAPHIQUES DE DAKAR THIAROYE, SENEGAL
INSTITUT SENEGALAIS DE RECHERCHES AGRICOLES, SENEGAL
PORT AUTONOME DE DAKAR, SENEGAL

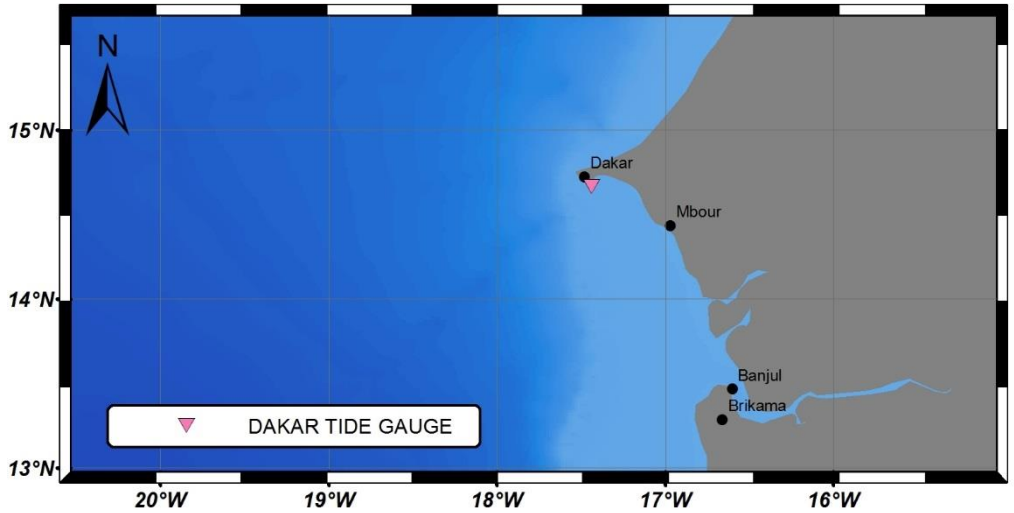


Figure 47. Location of the Dakar tide gauge, at the Autonomous Port of Dakar, in Senegal.

Resource abstract:
The tide gauge is located at the entrance of the harbour at the Autonomous Port of Dakar. Data inputs come from a float and two radar sensors.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	17.4167°W 14.6333°N
Spatial resolution:	n/a
Temporal extent:	1992 / 2004 2007 / present
Temporal resolution:	Variable from 1 minute to 3 minutes
Depth range/resolution:	Surface
Conditions for access & use:	Open access
Limitations on public access:	No
Responsible organization:	University of Hawaii Sea Level Centre (UHSLC), Honolulu, USA; Port Autonome de Dakar, Senegal
Data via:	http://sealevel.odinafrica.org/stations/dakar.htm http://uhslc.soest.hawaii.edu/data/ Real-time data viewer: http://ioc-sealevelmonitoring.org/bgraph.php?code=dakar&output=tab&period=0.5 Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/1816.php Contact: anisml.diallo@gmail.com Anis Diallo. NODC-SN, Data Manager, Centre de Recherches Océanographiques de Dakar Thiaroye
Data format:	Digital (plain text, CSV, NetCDF)

References:

When using the UHSLC tide gauge data in your research or applications, please cite the dataset as:
Caldwell, P. C., Merrfield, M. A. and Thompson, P. R. 2015, Sea level measured by tide gauges from global oceans — the Joint Archive for Sea Level holdings (NCEI Accession 0019568), Version 5.5, *NOAA National Centers for Environmental Information*, Dataset. doi:10.7289/V5V40S7W.
Further information about datasets citation in: http://uhslc.soest.hawaii.edu/datainfo/
Further information on referencing PSMSL dataset is available at: http://www.psmsl.org/data/obtaining/reference.php

Additional information:

Programme: Global Sea Level Observing System – GLOSS – (Joint Technical Commission for Oceanography and Marine Meteorology – JCOMM). Station number: 253

Datum information: The data reference is the Tide Gauge Zero (TGZ).

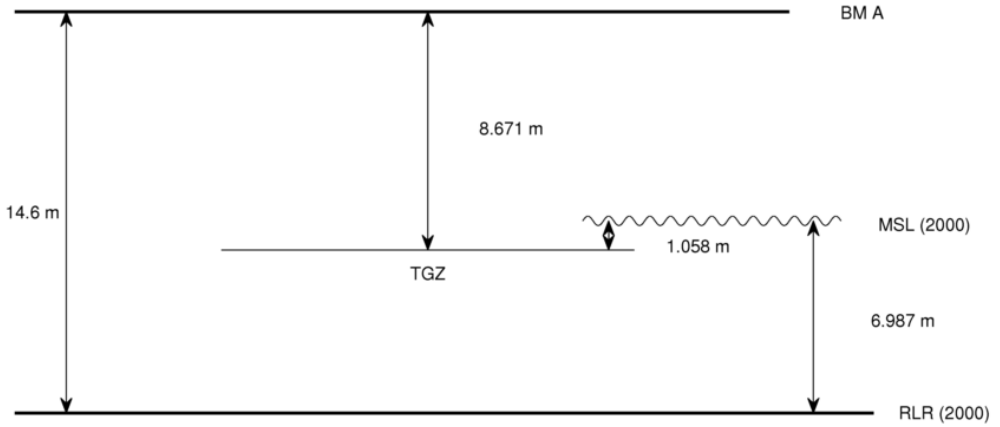


Figure 48. Dakar tide gauge datum information. Source: PSMSL. http://www.psmsl.org/data/obtaining/rlr.diagrams/1816.php , accessed 23 January 2017.

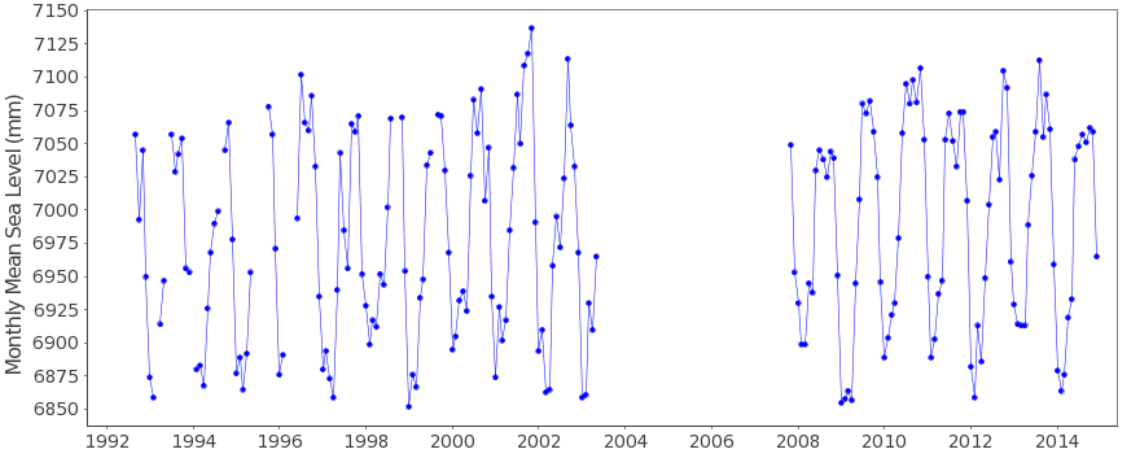


Figure 49. Time-series of monthly mean sea level (mm) at Dakar 2 tide gauge, covering the time period 1992-2015. Monthly mean value was not computed between 2003-2007 because there were very little data and the interpolation was impossible (Holgate et al., 2013; PSMSL, 2017). Source: PSMSL. http://www.psmsl.org/data/obtaining/rlr.monthly.plots/1816_high.png, accessed 23 January 2017.

PALMEIRA TIDE GAUGE

INSTITUTO NACIONAL DE METEOROLOGIA E GEOFISICA, CABO VERDE

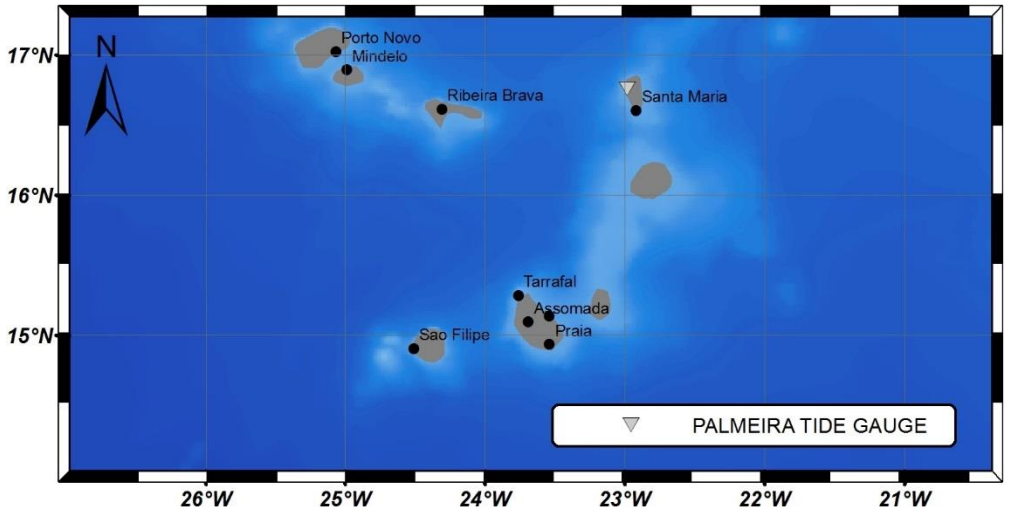


Figure 50. Location of the Palmeira tide gauge in Sal Island (Cabo Verde).

Resource abstract:

The tide gauge is located in Sal Island (Cabo Verde). Data inputs come from a pressure transducer, a radar and a bubble sensor. There is a permanent GPS (PGPS) at this tide gauge.

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	22.9833°W 16.7550°N
Geographic resolution:	n/a
Temporal extent:	2000-03-12 / present
Temporal resolution:	Variable: hourly and daily
Depth range/resolution:	Surface
Conditions for access & use:	Open access. Further information is available at: http://uhslc.soest.hawaii.edu/datainfo/
Limitations on public access:	No
Responsible organization:	University of Hawaii Sea Level Centre (UHSLC), Honolulu, USA
Data via:	http://uhslc.soest.hawaii.edu/data/ Real-time data viewer: http://www.ioc-sealevelmonitoring.org/station.php?code=palm1 Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/1914.php Contact: nik@hawaii.edu Nikolai Turetsky. Senior technician, University of Hawaii Sea Level Centre Contact: jose.c.luz@inmg.gov.cv Jose Carlos da Luz. Engineer, Instituto Nacional de Meteorologia e Geofisica
Data format:	Digital (plain text, CSV, NetCDF)

References:

When using the UHSLC tide gauge data in your research or applications, please cite the dataset as:
Caldwell, P. C., Merrfield, M. A. and Thompson, P. R. 2015, Sea level measured by tide gauges from global oceans — the Joint Archive for Sea Level holdings (NCEI Accession 0019568), Version 5.5, *NOAA National Centers for Environmental Information*, Dataset. doi:10.7289/V5V40S7W.
Further information about datasets citation in: http://uhslc.soest.hawaii.edu/datainfo/

Further information on referencing PSMSL dataset is available at: http://www.psmsl.org/data/obtaining/reference.php

Additional information:

Programme: Global Sea Level Observing System – GLOSS – (Joint Technical Commission for Oceanography and Marine Meteorology – JCOMM). Station number: 329

Benchmark: The primary benchmark is BM1, at the base of the PGPS. BM1 is 3.477 m above the site datum.

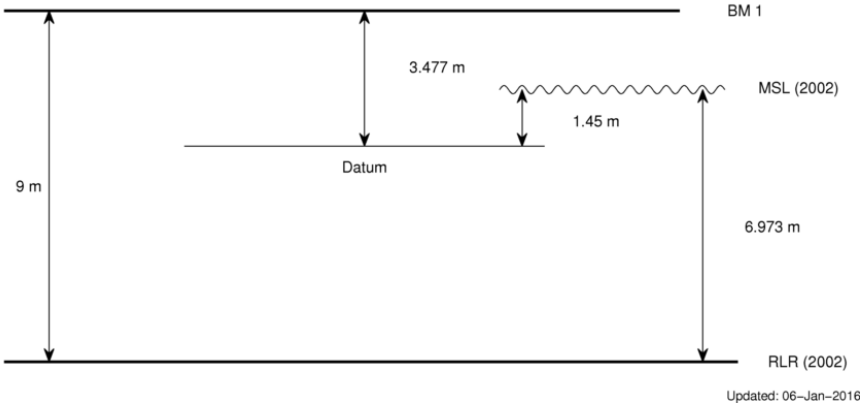


Figure 51. Palmeira tide gauge datum information. Source: PSMSL. http://www.psmsl.org/data/obtaining/rlr.diagrams/1914.php, accessed 11 May 2017.

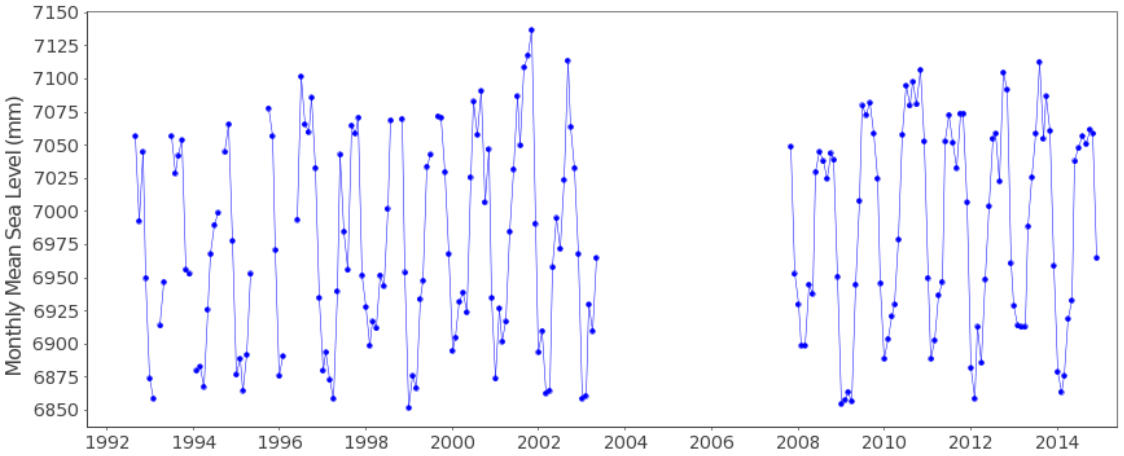


Figure 52. Time-series (1992-2015) of monthly mean sea level (mm) at the Palmeira station (Holgate et al., 2013; PSMSL, 2017). Source: PSMSL.
http://www.psmsl.org/data/obtaining/rlr.monthly.plots/1914_high.png, accessed 11 May 2017.

ARRECIFE-IEO TIDE GAUGE – IEOTG_Arrecife –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

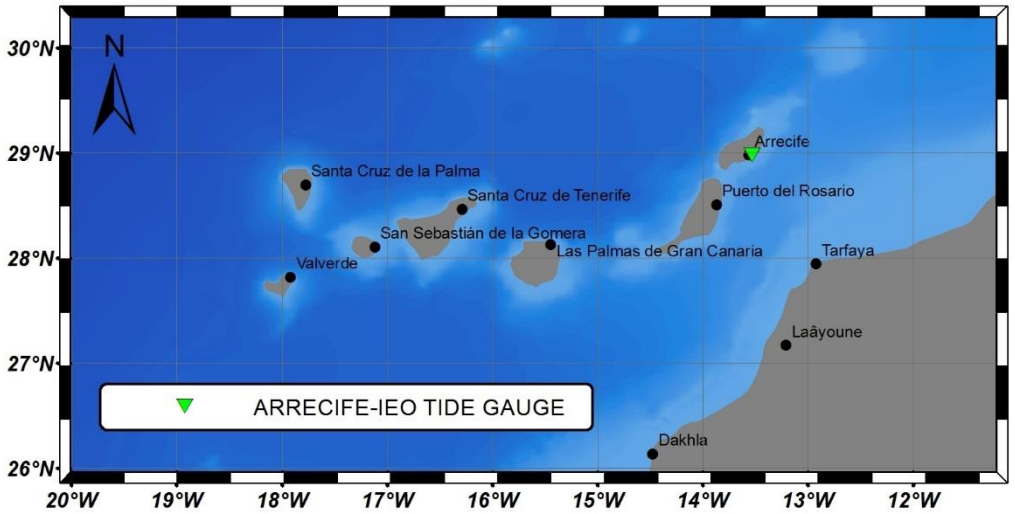


Figure 53. Location of the Arrecife IEO tide gauge.

Resource abstract:
The tide gauge is located in the harbour of Arrecife, in Lanzarote (Canary Islands). It is a float gauge with digital output. Data are automatically downloaded via modem once per day.

Resource language:	spa
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	13.5300°W 28.9718°N
Spatial resolution:	n/a
Temporal extent:	1949-01-01 / 1975 1980 / present
Temporal resolution:	Variable from 5 minutes to 60 minutes
Depth range/resolution:	Surface
Conditions for access & use:	Open access, citing as data source "Red Mareográfica del IEO"
Limitations on public access:	Near real data and graphs can be used only in forecast models, build data-bathymetric corrections and other operational processes, but not to build data-series
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain
Data via:	http://indamar.ieo.es/mareas/mareas.htm Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/593.php Contact: cedo@ieo.es Centro Español de Datos Oceanográficos (CEDO), IEO
Data format:	Digital (plain text and plots for individual datasets)
References:	In any use of the data, the IEO should be acknowledged as the owner

Additional information:
Programme: Red Operacional del Nivel del Mar – RONIMAR – (IEO)

Benchmarks: TGBM: SS-MFO

Datum information: The data reference is the Tide Gauge Zero (TGZ, see Figure 54). For further information about the datum of the network, see http://indamar.ieo.es/mareas/red_mareografica.htm (accessed 15 August 2017).

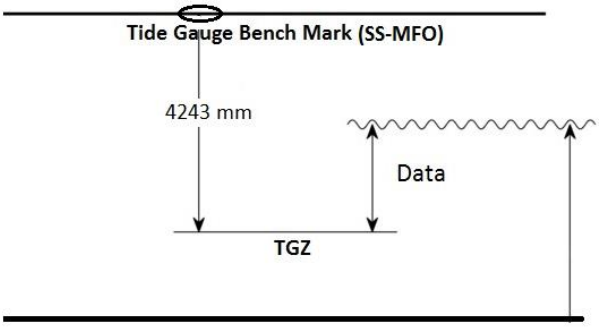


Figure 54. Datum information schema for the Arrecife tide gauge station. Source: IEO. http://indamar.ieo.es/mareas/mareas.htm (accessed 15 August 2017).

All the data are in digital format and quality controlled using IEO QC procedures: date and time, spikes, residual values and comparison with neighbourhood stations. See García et al., 2007, and http://indamar.ieo.es/mareas/informes_y_publicaciones.htm (accessed 15 August 2017).

The IEO mareographs network (12 tide gauges, 3 of them in the Canary Islands) was created in 1943 and meets the requirements established by international services and programmes. This network is part of the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es - accessed 25 June 2017).

All monthly mean sea level time series from all the RONIMAR stations are included in the Permanent Service for Mean Sea Level (PSMSL).

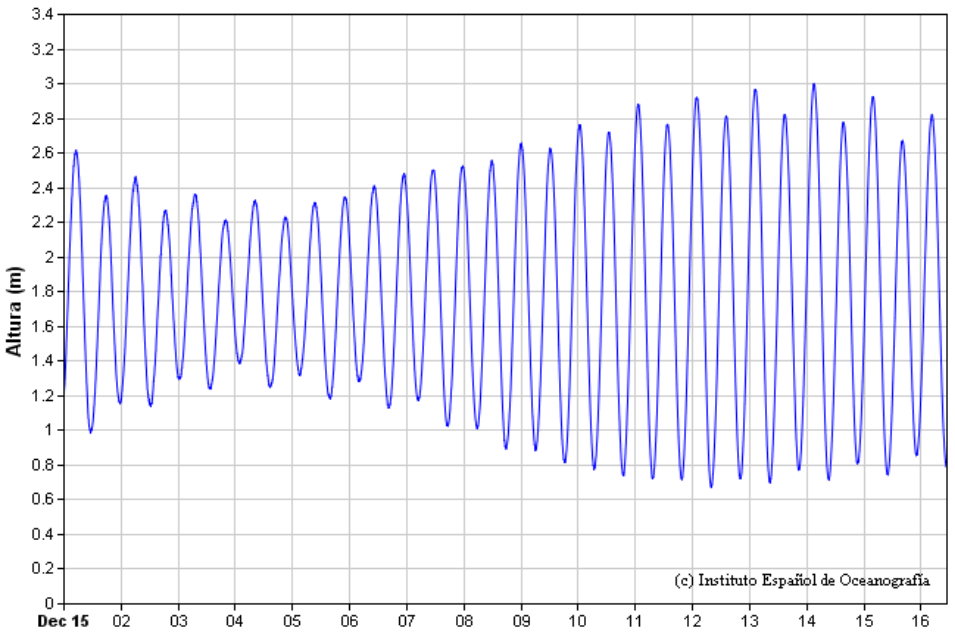


Figure 55. Sea level time-series (1 December 2015 - 16 December 2015) from the Arrecife IEO tide gauge. Source: IEO. http://indamar.ieo.es/mareas/realdata/realarre.png (accessed 16 December 2015).

PUERTO DE LA LUZ-IEO TIDE GAUGE – IEOTG_PuertoDeLaLuz –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

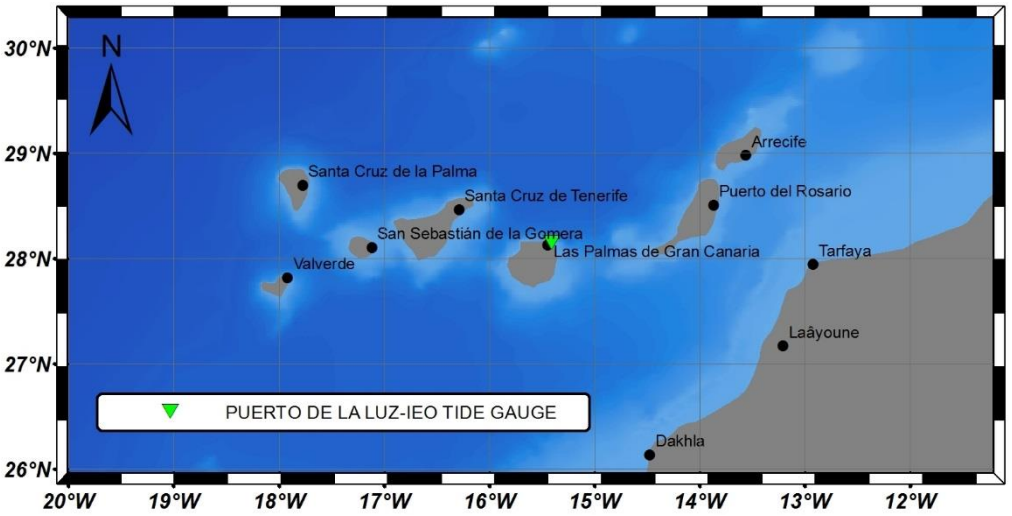


Figure 56. Location of the Puerto de la Luz-IEO tide gauge.

Resource abstract:
The tide gauge is located in a small building in the harbour of Puerto de La Luz, in the city of Las Palmas de Gran Canaria (Canary Islands). The tide gauge equipment (float and radar) is measuring over a stilling well or tube located at the edge of the pier. Data are automatically downloaded via modem once per day.

Resource language:	spa
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	15.4075°W 28.1466°N
Spatial resolution:	n/a
Temporal extent:	1949-01-01 / 1956 1971 / 1989 1991 / present
Temporal resolution:	Variable from 5 minutes to 60 minutes
Depth range/resolution:	Surface
Conditions for access & use:	Open access, citing as data source "Red Mareográfica del IEO"
Limitations on public access:	Near real data and graphs can be used only in forecast models, bathymetric corrections and other operational processes, but not to build data-series
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain
Data via:	http://indamar.ieo.es/mareas/mareas.htm Real-time data viewer: http://www.ioc-sealevelmonitoring.org/station.php?code=pluz Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/565.php Contact: cedo@ieo.es Centro Español de Datos Oceanográficos (CEDO), IEO
Data format:	Digital (plain text and plots for individual datasets)

References: In any use of the data, the IEO should be acknowledged as the owner

Additional information:

Programmes: Red Operacional del Nivel del Mar – RONIMAR – (IEO)
Global Sea Level Observing System – GLOSS – (Joint Technical Commission for Oceanography and Marine Meteorology – JCOMM)

Benchmarks: TGBM: NGU-340.

Datum information: The data are referred to the Tide Gauge Zero (TGZ, see Figure 57). For further information about the datum of the network, see http://indamar.ieo.es/mareas/red_mareografica.htm (accessed 15 August 2017).

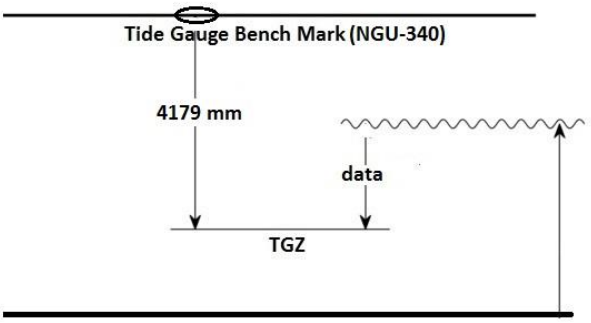


Figure 57. Datum information schema for the Puerto de la Luz tide gauge station. Source: IEO. http://indamar.ieo.es/mareas/mareas.htm (accessed 15 August 2017).

RONIMAR network is part of the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es - accessed 25 June 2017).

All the data are in digital format and quality controlled using IEO QC procedures: date and time, spikes, residual values and comparison with neighbourhood stations. See García et al., 2007, and http://indamar.ieo.es/mareas/informes_y_publicaciones.htm (accessed 15 August 2017).

The station is included in the Permanent Service for Mean Sea Level (PSMSL).

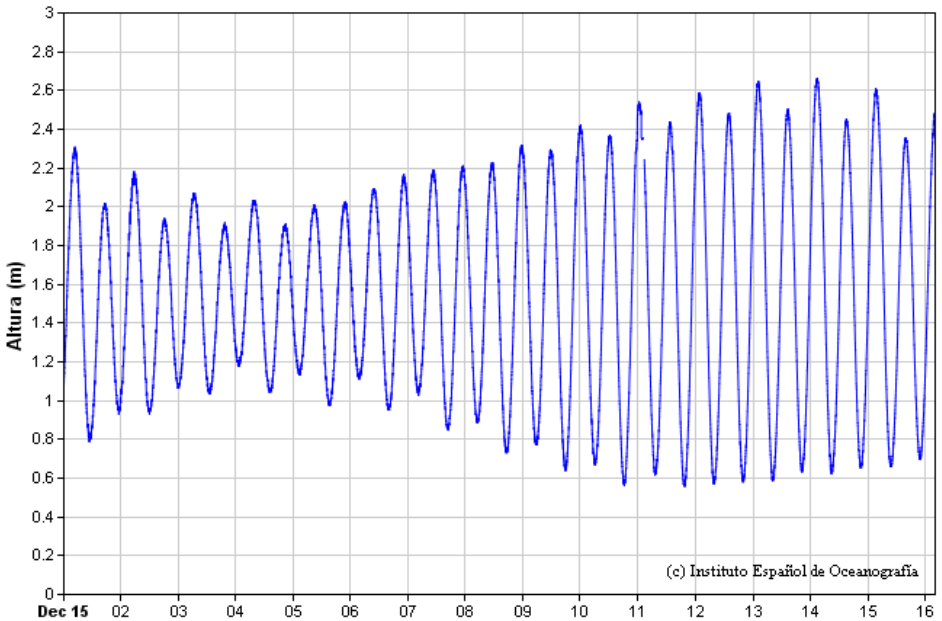


Figure 58. Sea level oscillations (1 December 2015 - 16 December 2015) from the Puerto de la Luz-IEO tide gauge. Source: IEO. http://indamar.ieo.es/mareas/realdata/realplur.png (accessed 16 December 2015).

SANTA CRUZ DE LA PALMA-IEO TIDE GAUGE – IEOTG_StaCruzDelaPalma –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

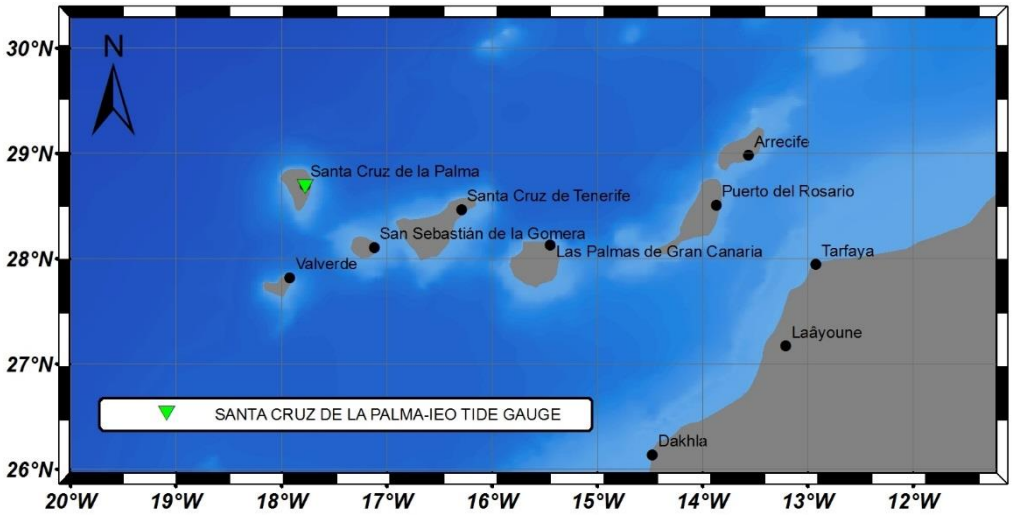


Figure 59. Location of the Santa Cruz de La Palma-IEO tide gauge.

Resource abstract:
The tide gauge is located in a small building in the harbour of Santa Cruz de la Palma (Canary Islands). The tide gauge equipment (float) is measuring over a stilling well or tube.

Resource language:	spa
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	17.7687°W 28.6720°N
Spatial resolution:	n/a
Temporal extent:	1949 / 1960 1997 / present
Temporal resolution:	Variable from 5 minutes to 60 minutes
Depth range/resolution:	Surface
Conditions for access & use:	Open access, citing as data source "Red Mareográfica del IEO"
Limitations on public access:	Near real data and graphs can be used only in forecast models, bathymetric corrections and other operational processes, but not to build data-series
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain
Data via:	http://indamar.ieo.es/mareas/mareas.htm Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/568.php Contact: cedo@ieo.es Centro Español de Datos Oceanográficos (CEDO), IEO
Data format:	Digital (plain text and plots for individual datasets)
References:	In any use of the data, the IEO should be acknowledged as the owner

Additional information:
Programme: Red Operacional del Nivel del Mar – RONIMAR – (IEO)

Benchmarks: TGBM : Clavo Mareografo IO No: 6.027.

Datum information: The data reference is the Tide Gauge Zero (TGZ, see Figure 60). For further information about the datum of the network, see http://indamar.ieo.es/mareas/red_mareografica.htm (accessed 15 August 2017).

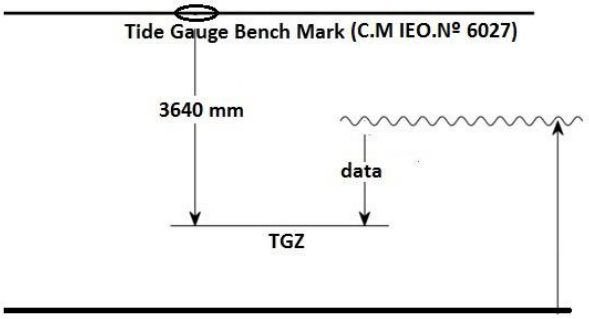


Figure 60. Datum information schema for the Santa Cruz de La Palma tide gauge station. The data reference is the Tide Gauge Zero (TGZ). Source: IEO. http://indamar.ieo.es/mareas/mareas.htm (accessed 15 August 2017).

RONIMAR network is part of the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es - accessed 25 June 2017).

All the data are in digital format and quality controlled using IEO QC procedures: date and time, spikes, residual values and comparison with neighbourhood stations. See García et al., 2007, and http://indamar.ieo.es/mareas/informes_y_publicaciones.htm (accessed 15 August 2017).

This station is included in the Permanent Service for Mean Sea Level (PSMSL).

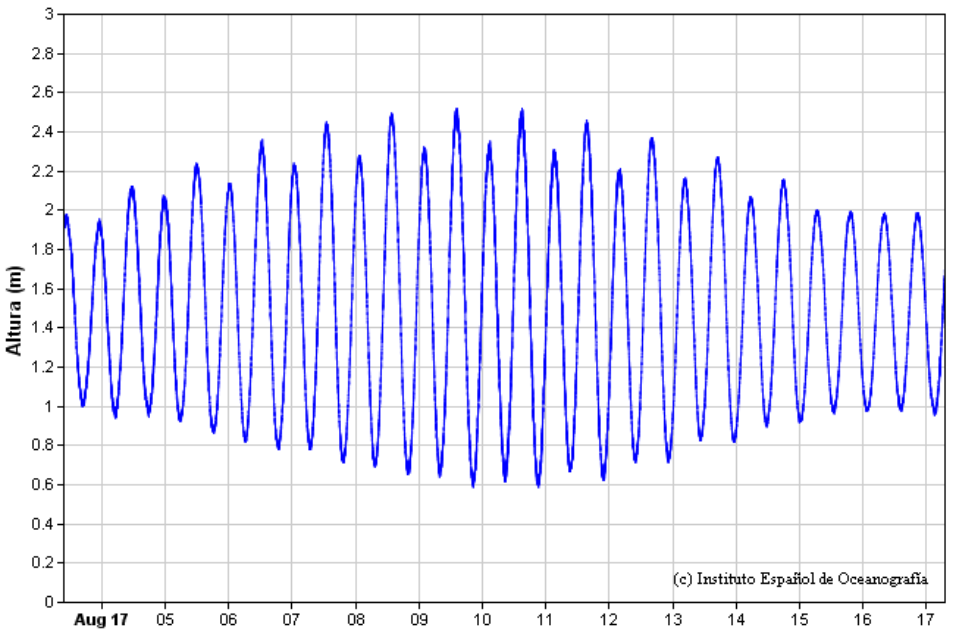


Figure 61. Sea level oscillations (3 August 2017 – 17 August 2017) from the Santa Cruz de La Palma-IEO tide gauge. Source: IEO. http://indamar.ieo.es/mareas/realdata/realstcr.png (accessed 17 August 2017).

LOS CRISTIANOS IGN TIDE GAUGE – TN031 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

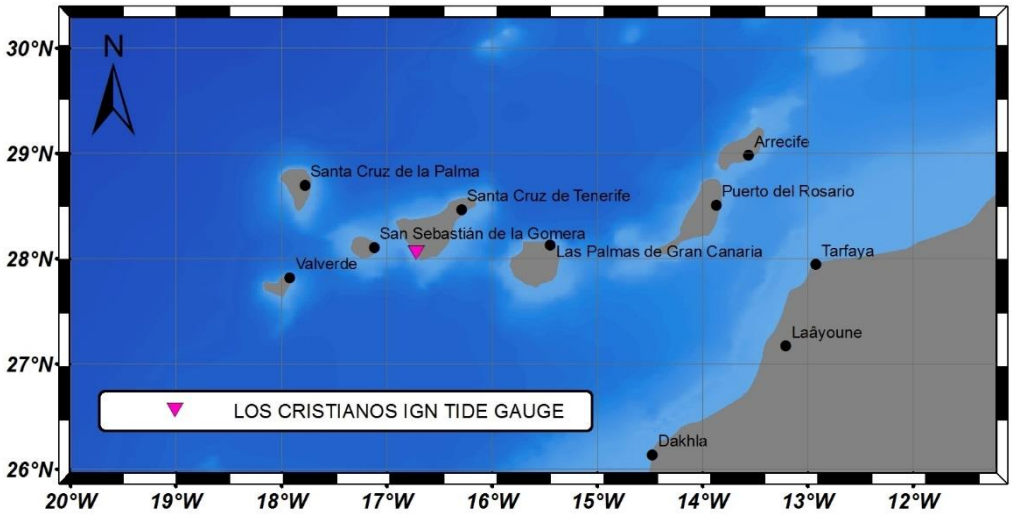


Figure 62. Location of the Los Cristianos IGN tide gauge.

Resource abstract:
The tide gauge was located in the harbour of Los Cristianos, in Tenerife (Canary Islands). Sea level data were obtained in relation to a high precision leveling signal (TGBM). Data inputs came from a radar sensor.

Resource language:	spa
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	16.71800°W 28.04686°N
Spatial resolution:	n/a
Temporal extent:	2009-03 / 2017-07-10
Temporal resolution:	1 minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN
Limitations on public access:	No
Responsible organization:	Instituto Geográfico Nacional, Madrid, Spain
Data via:	http://www.ign.es/web/ign/portal/gds-red-mareografos ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN031/ Contact: mafraile@fomento.es Mª Ángeles Fraile Torrecilla, Technical staff, Madrid IGN
Data format:	Digital (plain text: raw data and average data)

Additional information:
Benchmarks: TGBM: NGAB-161.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 63.

The data are referred to a levelling signal belonging to the National Precision Levelling Network.

The IGN tide gauge network consists of nine stations, four of them in the Canary Islands. At the IGN HQ in Madrid, the data are received via ADSL, GSM or telephonic line. Raw data are recorded. Average data have been screened and quality controlled: date, time, spikes, blanks, data and residues comparison with astronomical tides and neighbourhood stations.

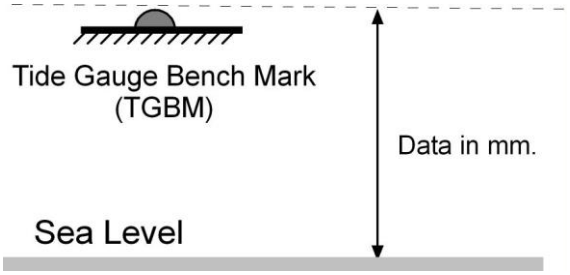


Figure 63. Generic figure about datum information. The data reference is the Tide Gauge Bench Mark (TGBM). Source: Área de Geodesia, IGN.

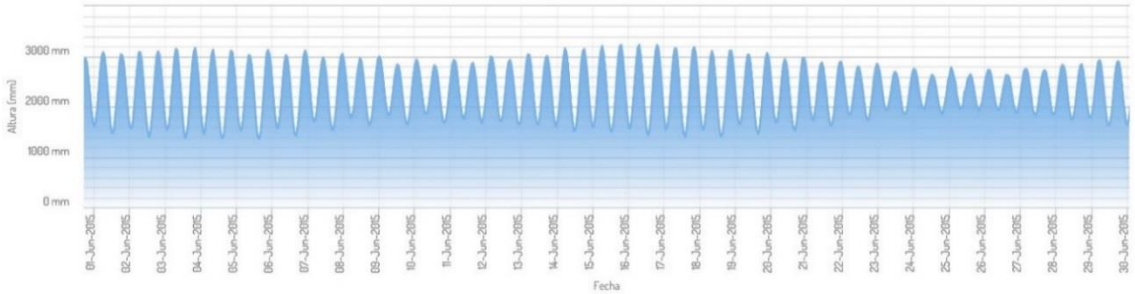


Figure 64. Sea level observed data from the Los Cristianos IGN tide gauge (June 2015). Source: IGN. http://www.ign.es/web/ign/portal/gds-red-mareografos (accessed 11 September 2017).

PUERTO DEL ROSARIO IGN TIDE GAUGE – FUER1 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

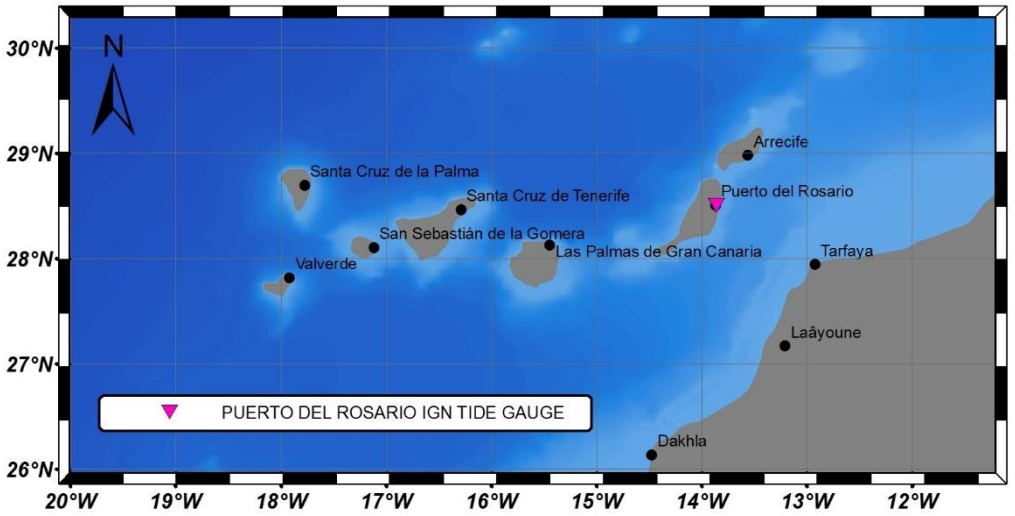


Figure 65. Location of the Puerto del Rosario IGN tide gauge radar sensor.

Resource abstract:
The tide gauge is located in the harbour of Puerto del Rosario, in Fuerteventura (Canary Islands). Sea level data are obtained in relation to a high precision leveling signal (TGBM). Data inputs come from a float and a radar sensor.

Resource language:	spa
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	13.85909°W 28.49659°N
Spatial resolution:	n/a
Temporal extent:	1999-09 / 2002-04 2005-10 /2011-07 2012-09 / present
Temporal resolution:	Variable from 1 minute to 10 minutes
Depth range/resolution:	Surface
Conditions for access & use:	Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN
Limitations on public access:	No
Responsible organization:	Instituto Geográfico Nacional, Madrid, Spain
Data via:	http://www.ign.es/web/ign/portal/gds-red-mareografos ftp://ftp.geodesia.ign.es/Red_de_Mareografos/FUER1/ Contact: mafraile@fomento.es Mª Ángeles Fraile Torrecilla, Technical staff, Madrid IGN
Data format:	Digital (plain text: raw data)

Additional information:
Benchmarks: TGBM: SS Pozo.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 63.

The data are referred to a levelling signal belonging to the National Precision Levelling Network.

This station is part of the IGN tide gauge network. At the IGN HQ in Madrid, the data are received via ADSL, GSM or telephonic line. Raw data are recorded.

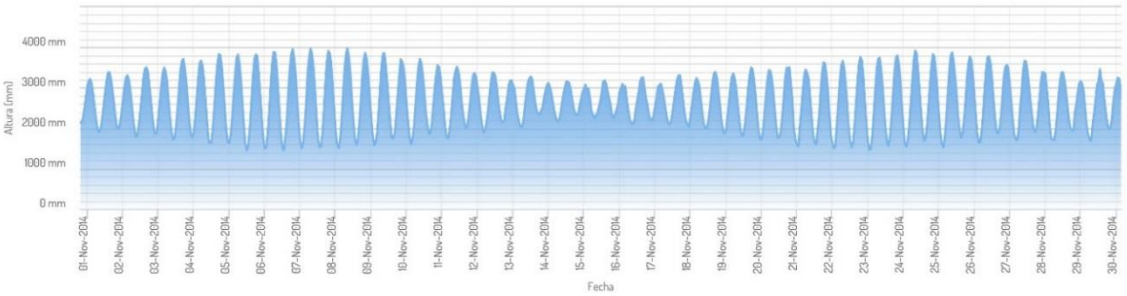


Figure 66. Sea level observed data from the Puerto del Rosario IGN tide gauge radar sensor (November 2014). Source: IGN. http://www.ign.es/web/ign/portal/gds-red-mareografos (accessed 11 September 2017).

PUERTO DE LA CRUZ IGN TIDE GAUGE – TN021 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

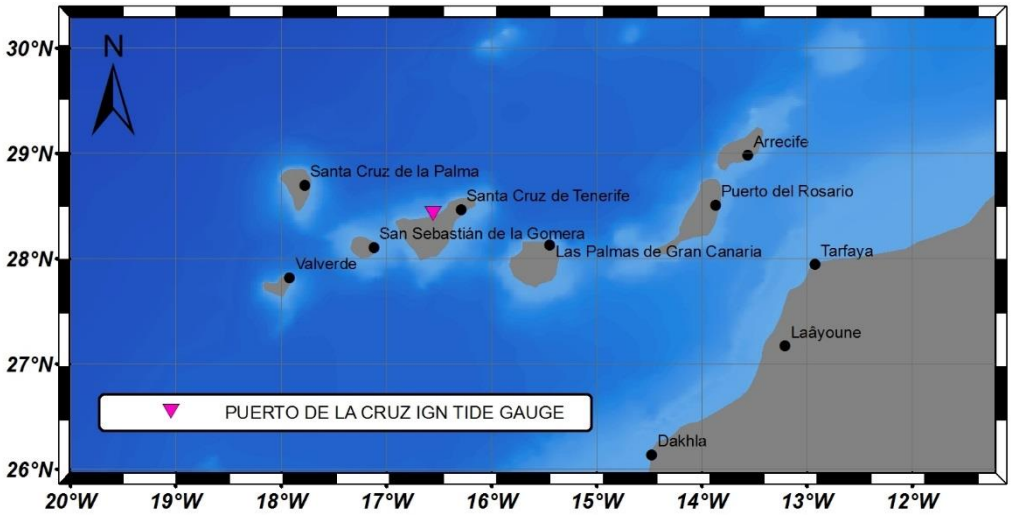


Figure 67. Location of the Puerto de la Cruz IGN tide gauge.

Resource abstract:
The tide gauge is located in the harbour of Puerto de la Cruz, in Tenerife (Canary Islands). Sea level data are obtained in relation to a high precision leveling signal (TGBM). Data inputs come from a radar sensor.

Resource language:	spa
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	16.55047°W 28.41831°N
Spatial resolution:	n/a
Temporal extent:	200810 /2009-01 2009-03 / present
Temporal resolution:	Variable from 1 minute to 5 minutes
Depth range/resolution:	Surface
Conditions for access & use:	Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN
Limitations on public access:	No
Responsible organization:	Instituto Geográfico Nacional, Madrid, Spain
Data via:	http://www.ign.es/web/ign/portal/gds-red-mareografos ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN021/ Contact: mafraile@fomento.es Mª Ángeles Fraile Torrecilla, Technical staff, Madrid IGN
Data format:	Digital (plain text: raw data)

Additional information:
Benchmarks: TGBM: NGZ-581.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 63.

The data are referred to a levelling signal belonging to the National Precision Levelling Network.

This station is part of the IGN tide gauge network. At the IGN HQ in Madrid, the data are received via ADSL, GSM or telephonic line. Raw data are recorded. Average data have been screened and quality

controlled: date, time, spikes, blanks, data and residues comparison with astronomical tides and neighbourhood stations.

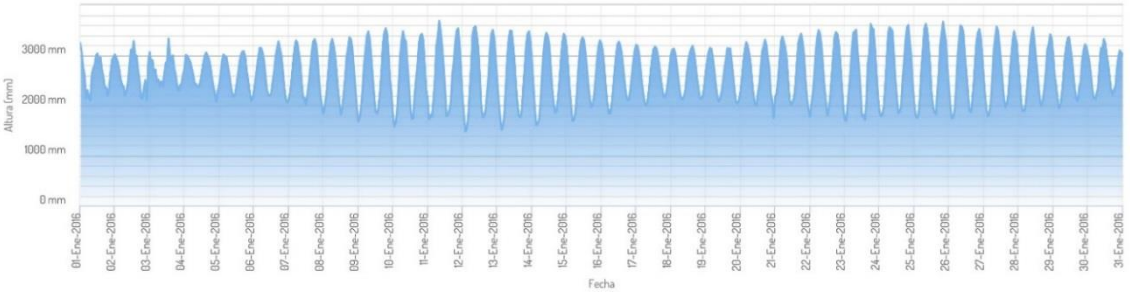


Figure 68. Sea level observed data from the Puerto de la Cruz IGN tide gauge (January 2016). Source: IGN. http://www.ign.es/web/ign/portal/gds-red-mareografos (accessed 11 September 2017).

SANTA CRUZ DE TENERIFE IGN TIDE GAUGE – TN013 –
INSTITUTO GEOGRÁFICO NACIONAL (IGN, MINISTERIO DE FOMENTO), SPAIN

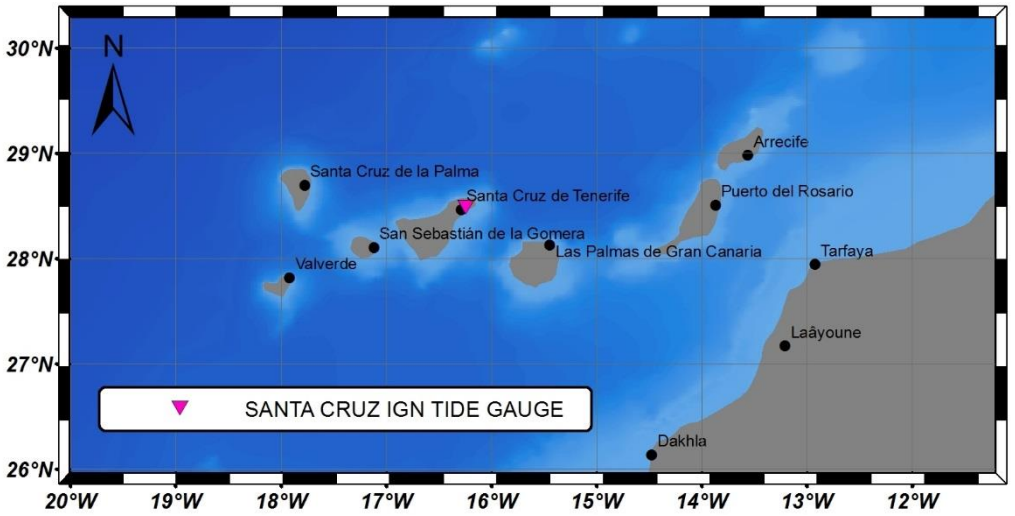


Figure 69. Location of the Santa Cruz de Tenerife IGN tide gauge radar sensor.

Resource abstract:
The tide gauge is located in the harbour of Santa Cruz de Tenerife, in Tenerife (Canary Islands). Its location inside the harbour has been modified 3 times during the tide-gauge history (TN011, TN012 and TN013). Sea level data are obtained in relation to a high precision leveling signal (TGBM). Data inputs come from a float and a radar sensor.

Resource language:	spa
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	16.24111°W 28.47719°N
Spatial resolution:	n/a
Temporal extent:	1927-01 / 1936-05 1940-03 / 1956-06 1958-03 / 1990-09 1992-01 / present
Temporal resolution:	Variable from 1 hour to 1 minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. The publication of results from this data requires the citation of the source: Área de Geodesia, IGN
Limitations on public access:	No
Responsible organization:	Instituto Geográfico Nacional, Madrid, Spain
Data via:	http://www.ign.es/web/ign/portal/gds-red-mareografos ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN011/ ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN012/ ftp://ftp.geodesia.ign.es/Red_de_Mareografos/TN013/ Contact: mafraile@fomento.es Mª Ángeles Fraile Torrecilla, Technical staff, Madrid IGN
Data format:	Digital (plain text: raw data and average data)

Additional information:
Benchmarks: TGBM: NGU-320.

Datum information: The data refer to the Tide Gauge Bench Mark (TGBM). See Figure 63.

The data are referred to a levelling signal belonging to the National Precision Levelling Network.

This station is part of the IGN tide gauge network. At the IGN HQ in Madrid, the data are received via ADSL, GSM or telephonic line. Raw data are recorded. Average data have been screened and quality controlled: date, time, spikes, blanks, data and residues comparison with astronomical tides and neighbourhood stations. More information about Sea level changes at Tenerife Island since 1927 in Marcos et al., 2013.

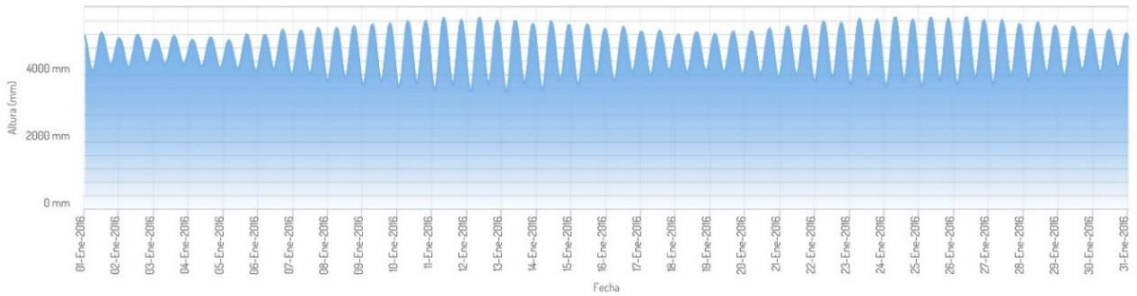


Figure 70. Sea level observed data from the Santa Cruz de Tenerife IGN tide gauge radar sensor (January 2016). Source: IGN. http://www.ign.es/web/ign/portal/gds-red-mareografos (accessed 11 September 2017).

ARINAGA-GRAN CANARIA PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

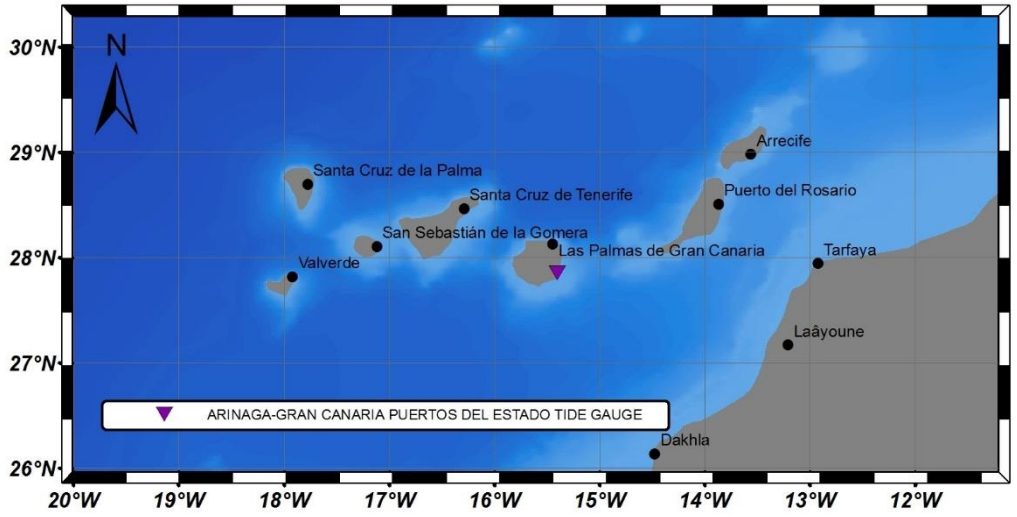


Figure 71. Location of the Arinaga station.

Resource abstract:

The Arinaga tide gauge is an Aanderaa pressure gauge placed in Muelle de Arinaga, at el Puerto de Arinaga in Gran Canaria (Canary Islands) since 2004 to mid-2012. Nowadays, the station is operated by the Port Authority and it is not integrated in the REDMAR network.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	15.40146°W 27.84691°N
Spatial resolution:	n/a
Temporal extent:	2004-01-01 / 2012-07-25
Temporal resolution:	One sample per 5 min
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/2049.php Contact: bego@puertos.es Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado
Data format:	Digital (ASCII format)

Additional information:

Benchmarks: ZN20, 5.550 m relative to the REDMAR datum.

All the data are in digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithm (further information in Pérez et al., 2013).

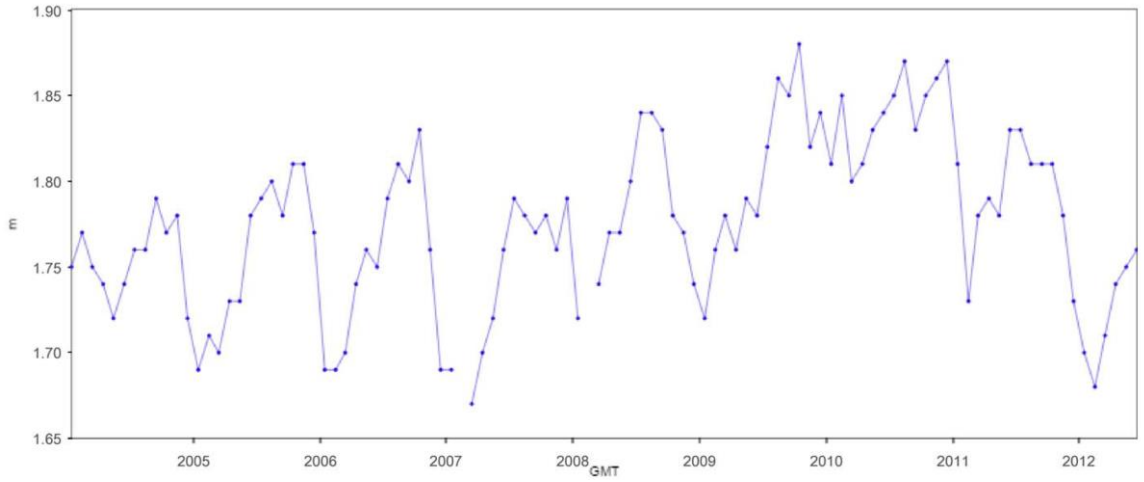


Figure 72. Time-series (2004-2012) of monthly mean sea level (m) at the Arinaga station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 17 August 2017).

EL HIERRO 2 PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

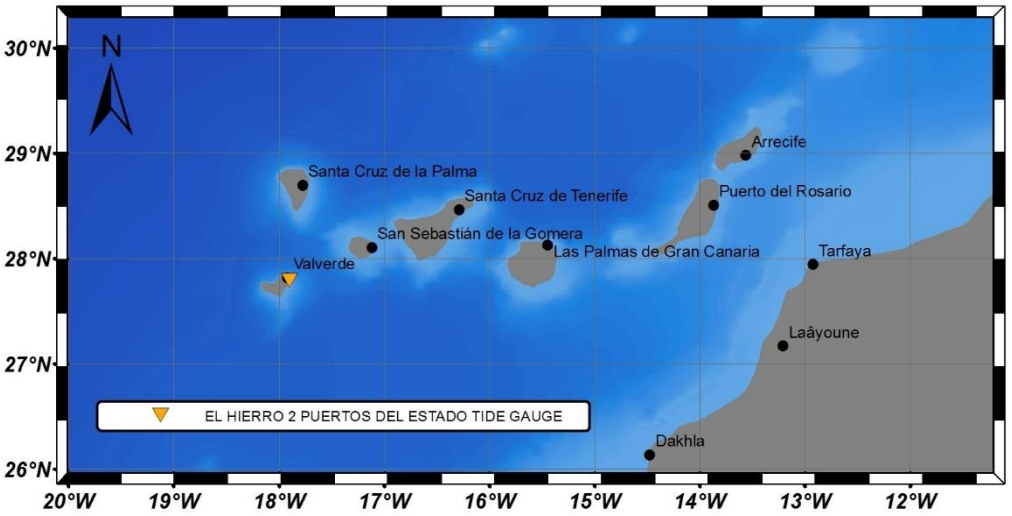


Figure 73. Location of the El Hierro 2 station.

Resource abstract:

The El Hierro (Estaca) tide gauge was an Aanderaa tide gauge placed in Dársena de Embarcaciones Menores at Puerto de la Estaca (El Hierro Island, Canary Islands) from 2004 to 2012. It has been replaced by Hierro2, a MIROS radar tide gauge placed in a dock in the marina at Puerto de La Estaca (Hierro Island). It provides 1 min sea level and wind-wave parameters every 20 min. Both the old and new gauges were running for the time period 14 November 2009 to 15 June 2010 for inter-comparison purposes. A bias (mean difference) of -0.29 cm between the two gauges was obtained and a new complete dataset was re-entered onto the database.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	17.90163°W 27.78408°N
Spatial resolution:	n/a
Temporal extent:	El Hierro (La Estaca): 2004-05-20 / 2010-11-23 El Hierro 2: 2009-11-14 / present
Temporal resolution:	Variable; one sample per 5 min to one sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx To download high frequency files: http://marine.copernicus.eu/ Contact: bego@puertos.es Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado
Data format:	Digital (ASCII format)

Additional information:
Programme: REDMAR – Puertos del Estado.

Benchmarks: B.M. MAREOG. HIERRO2, 4.323 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013). Further information about the transition between the old and the new tide gauge in Pérez et al., 2014.

The original network, established in 1992, was upgraded during last years from SRD Acoustic sensors to MIROS radar sensors. All the 36 stations (7 are located in the Canary Islands) consist of a MIROS radar system that provides 2 Hz raw data and transmits 1-min averages in real time (via ADSL, GPRS or Internet).

All these stations are integrated in the Nivmar Sea Level Forecast System, run by Puertos del Estado, in the IBIROOS Data Portal (IBI In-situ Tac, developed within Myocean project and now integrated in the Copernicus Marine Environment Monitoring Service – CMEMS – IBI In-situ TAC) and practically all are also contributing to the IOC Sea Level Data Facility with 1-min data.

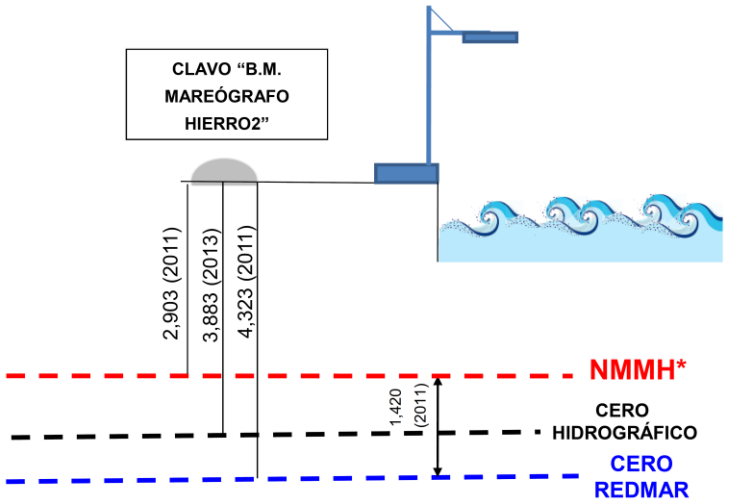


Figure 74. El Hierro 2 Puertos del Estado tide gauge datum information. In red, mean sea level in El Hierro that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx (accessed 17 August 2017).

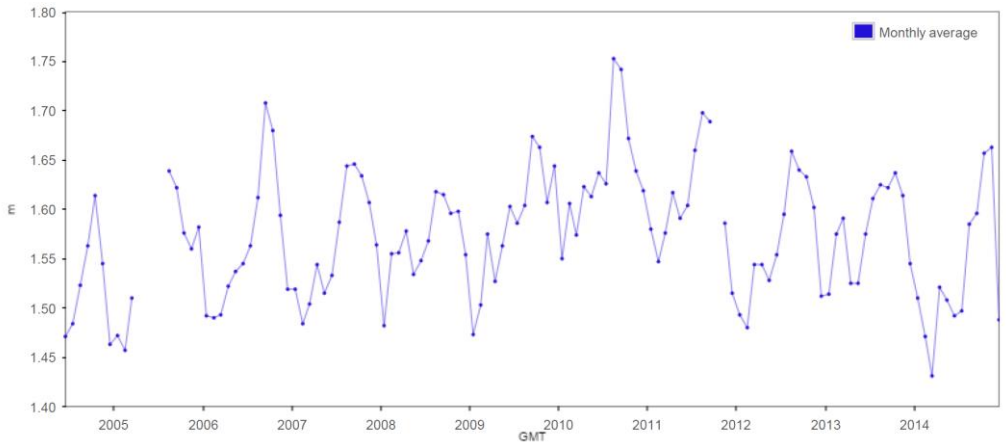


Figure 75. Time-series (2004-2014) of monthly mean sea level (m) at the El Hierro 2 station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 11 February 2016).

FUERTEVENTURA 2 PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

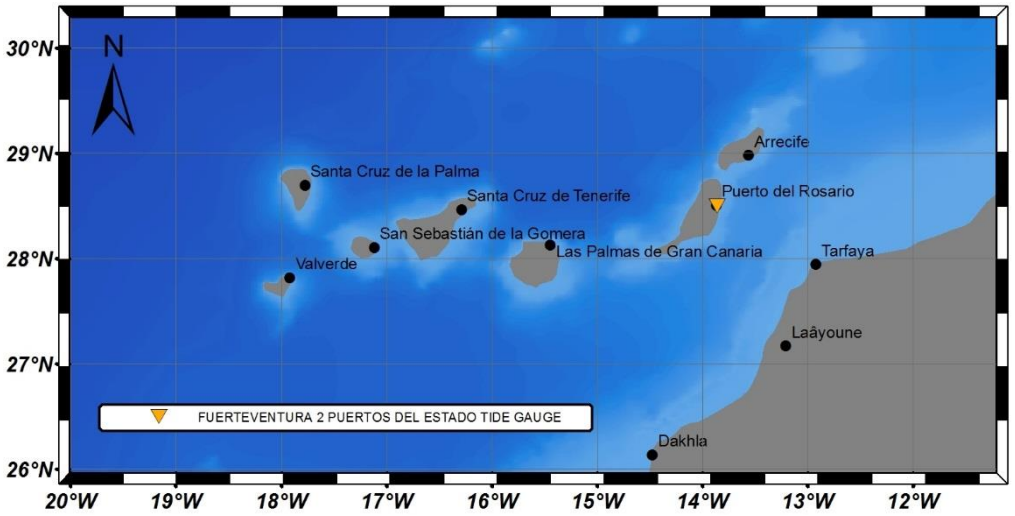


Figure 76. Location of the Fuerteventura 2 station.

Resource abstract:

Fuerteventura tide gauge was an Aanderaa tide gauge placed at the Sports Vessels Dock beside the Avenue in El Rosario (Fuerteventura Island, Canary Islands) since 2004 to 2012. Currently, it is not active and has been replaced by Fuerteventura 2, a MIROS radar tide gauge placed at the end of the cruises dock in El Rosario Harbour (Fuerteventura Island). It provides 1 min sea level and wind-wave parameters every 20 min. Both old and new gauges were running for the time period 1 December 2009 to 7 February 2011. A bias (mean difference) of 4.25 cm was found between the two gauges. Further investigation revealed that the bias was due to a problem with the old pressure gauge. Data from this has been revised and the complete dataset was re-entered onto the database.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	13.85822°W 28.49251°N
Spatial resolution:	n/a
Temporal extent:	Fuerteventura: 2004-01-01 / 2012-03-26 Fuerteventura 2: 2009-11-12 / present
Temporal resolution:	Variable; from one sample per 5 min to one sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx Real-time data viewer: http://www.ioc-sealevelmonitoring.org/station.php?code=fue2 Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/2048.php

Contact: bego@puertos.es
Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado

Data format: Digital (ASCII format)

Additional information:

Benchmarks: NGAB MAREO, 4.269 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

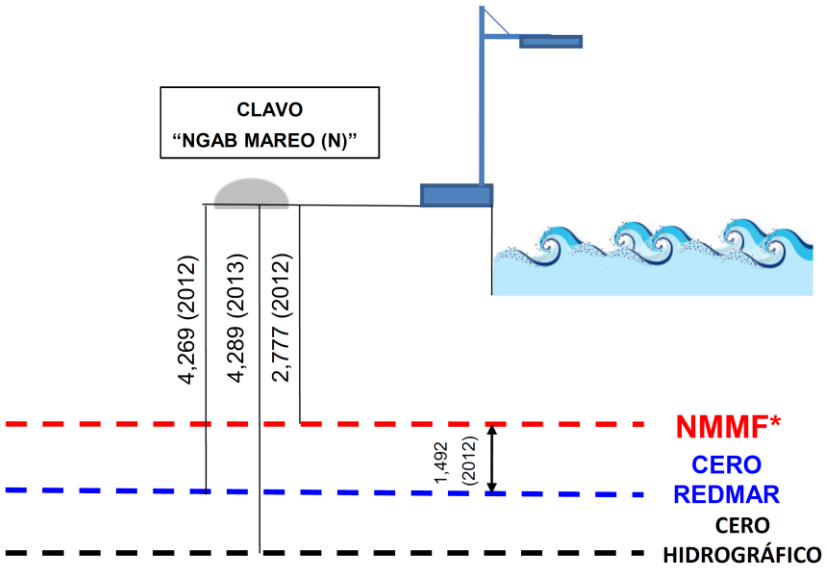


Figure 77. Fuerteventura 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Fuerteventura that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx (accessed 17 August 2017).

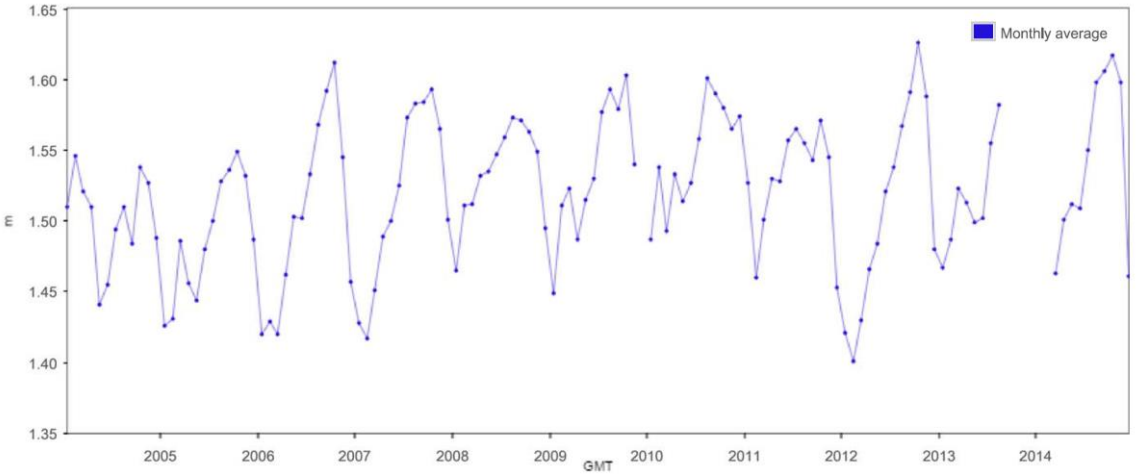


Figure 78. Time-series (2004-2014) of monthly mean sea level (m) at the Fuerteventura 2 station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 11 February 2016).

GRANADILLA PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

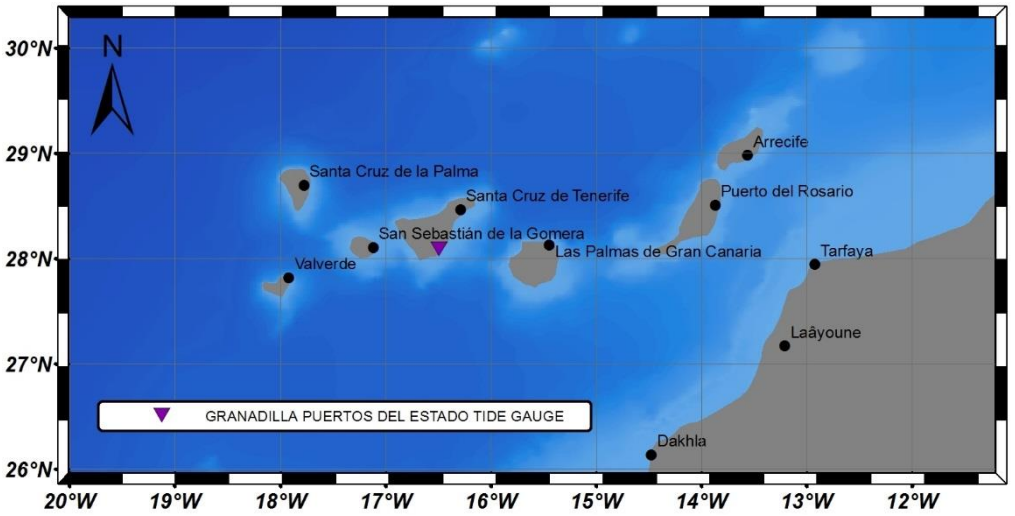


Figure 79. Location of the Granadilla station.

Resource abstract:

Granadilla was a station on the island of Tenerife (Canary Islands), in operation for the REDMAR network from 2003 to mid-2012. Since then the Harbor Authority is responsible of this station. The gauge is an Aanderaa pressure sensor that provided 5 min sea level data.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	16.48964°W 28.08528°N
Spatial resolution:	n/a
Temporal extent:	2004-01-15 / 2012-07-15
Temporal resolution:	One sample per minute
Depth range/resolution:	Surface
Conditions for access & use :	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx Contact: bego@puertos.es Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado
Data format:	Digital (ASCII format)

Additional information:

Benchmarks: AP1, 3.850 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

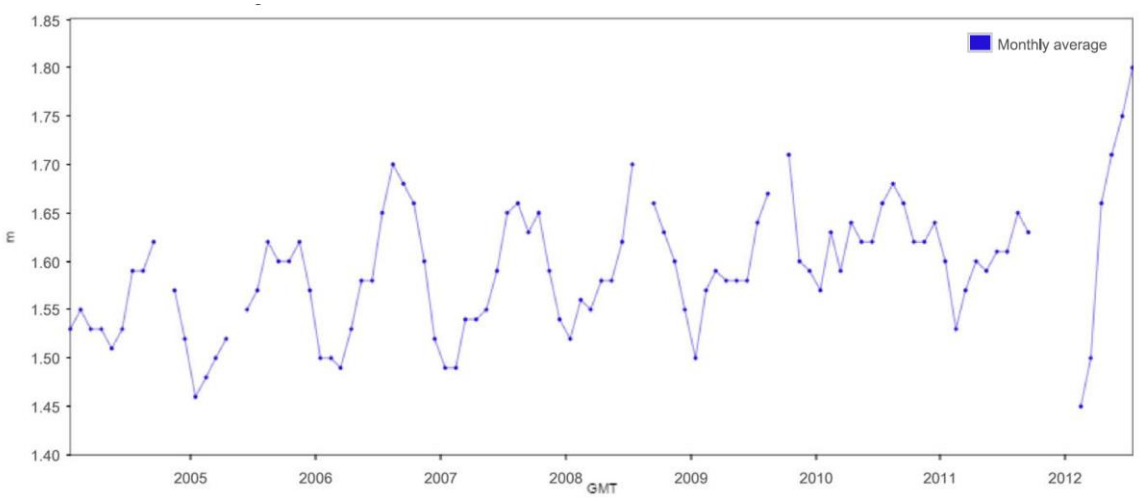


Figure 80. Time-series (2004-2012) of monthly mean sea level (m) at the Granadilla station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 17 August 2017).

LA GOMERA PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

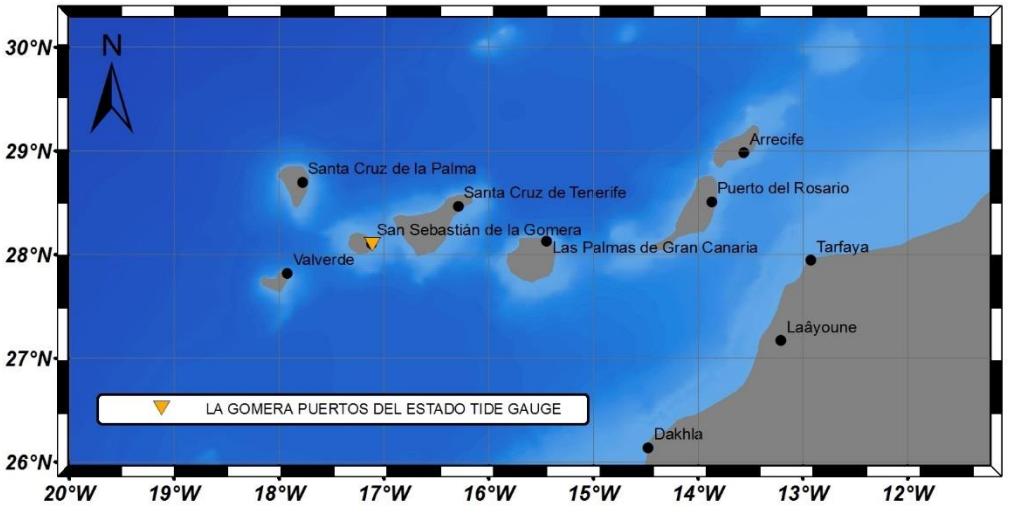


Figure 81. Location of the La Gomera station.

Resource abstract:

This is a tide gauge station placed in La Gomera (Canary Islands). The measurements started in 2007, and the tide gauge is included in the newly established REDMAR network. The gauge is a MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	17.10831°W 28.08777°N
Spatial resolution:	n/a
Temporal extent:	2007-02-15 / present
Temporal resolution:	One sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx Real-time data viewer: http://www.ioc-sealevelmonitoring.org/station.php?code=lago Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/2065.php To download high frequency files: http://marine.copernicus.eu/ Contact: bego@puertos.es Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado
Data format:	Digital (ASCII format)

Additional information:
Benchmarks: B.M.MAREOG.LA GOMERA, 2.899 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

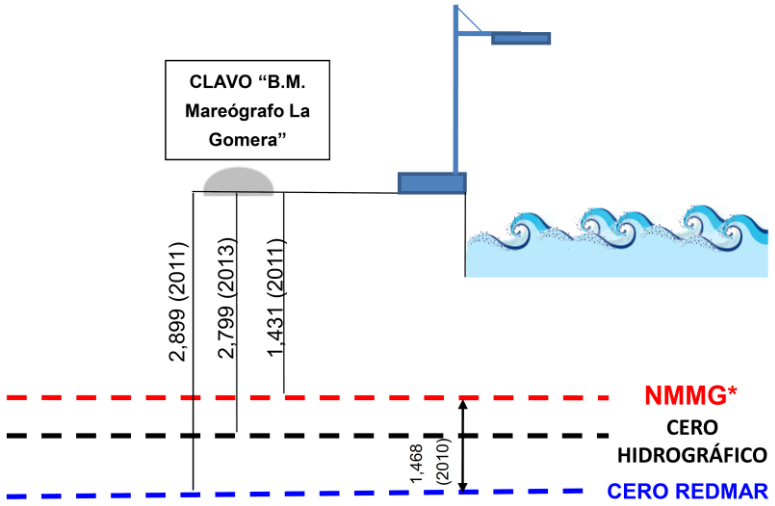


Figure 82. La Gomera Puertos del Estado tide gauge datum information. In red, mean sea level in La Gomera that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx (accessed 17 August 2017).

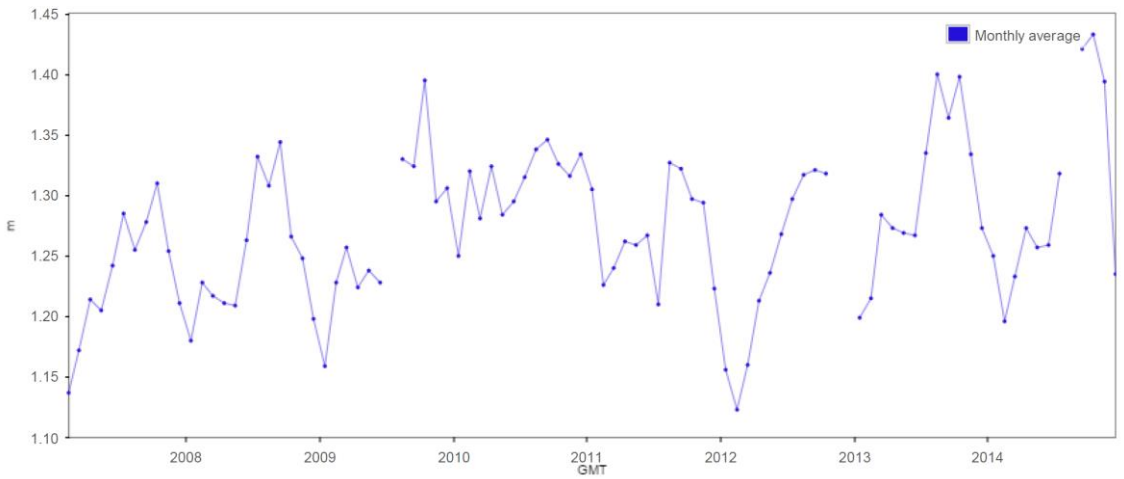


Figure 83. Time-series (2007-2014) of monthly mean sea level (m) at the La Gomera station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 11 February 2016).

LA PALMA PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

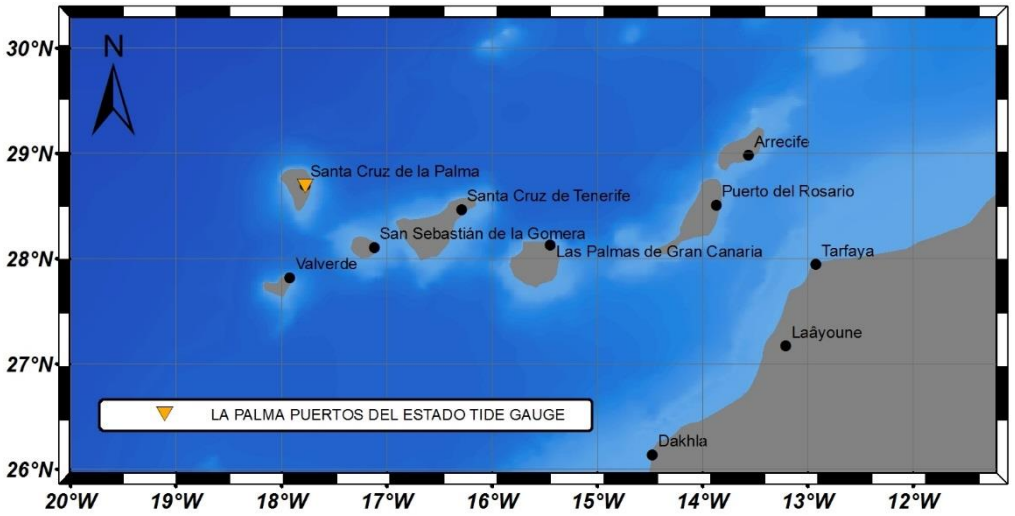


Figure 84. Location of the La Palma station.

Resource abstract:

La Palma tide gauge is placed at the marina entrance. It is a MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	17.76795°W 28.67780°N
Spatial resolution:	n/a
Temporal extent:	2006-11-14 / present
Temporal resolution:	One sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx To download high frequency files: http://marine.copernicus.eu/ Contact: bego@puertos.es Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado
Data format:	Digital (ASCII format)

Additional information:

Benchmarks: B.M.MAR.LAPALMA, 4.320 m relative to the REDMAR datum.

All the data are in a digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

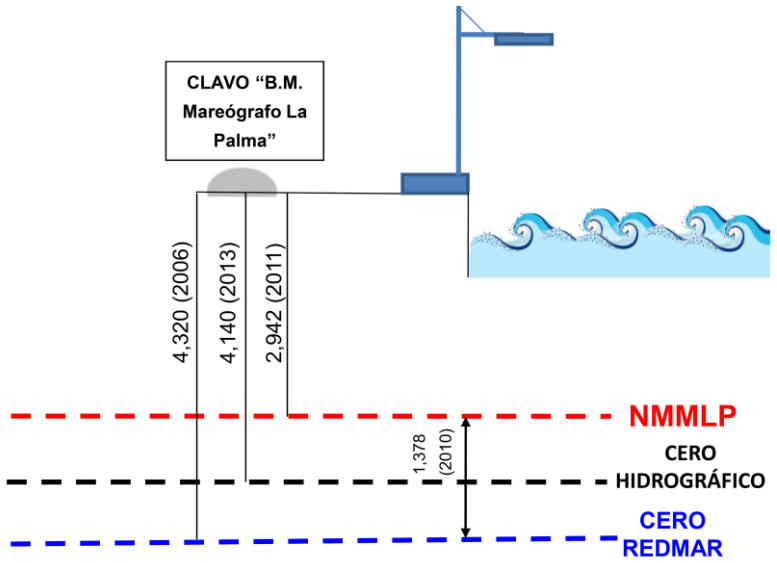


Figure 85. La Palma Puertos del Estado tide gauge datum information. In red, mean sea level in La Palma that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx (accessed 17 August 2017).

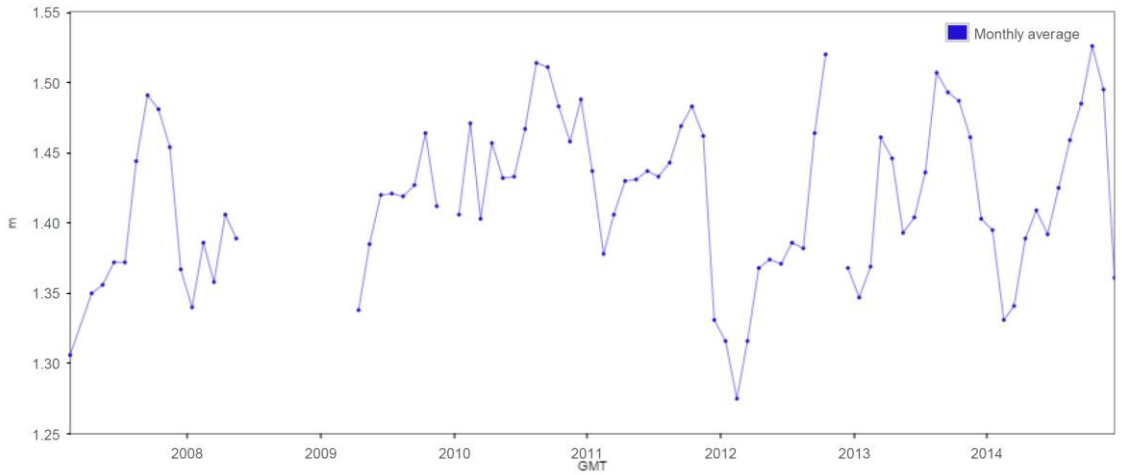


Figure 86. Time-series (2007-2014) of monthly mean sea level (m) at the La Palma station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 11 February 2016).

LANZAROTE-ARRECIFE PUERTOS DEL ESTADO TIDE GAUGE
PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

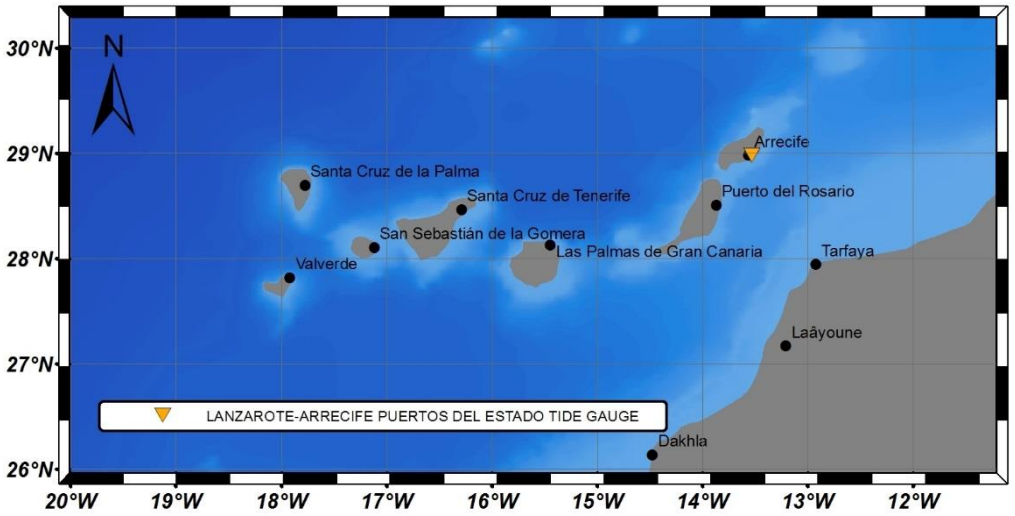


Figure 87. Location of the Arrecife station.

Resource abstract:
The Arrecife 2 tide gauge is on the island of Lanzarote in the Canaries. It is a new station; first data are from 2008. It forms part of the newly established REDMAR network. The gauge is a MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min. Initial hardware problems (de-lamination) have been taken into account in the supplied data.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	13.53006°W 28.97188°N
Spatial resolution:	n/a
Temporal extent:	2008-03-07 / present
Temporal resolution:	One sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx Real-time data viewer: http://www.ioc-sealevelmonitoring.org/station.php?code=arre Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/2066.php To download high frequency files: http://marine.copernicus.eu/ Contact: bego@puertos.es Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado

Data format: Digital (ASCII format)

Additional information:

Benchmarks: SSMFO, 4.243 m relative to the REDMAR datum and 2.530 m relative to IGN datum.

All the data are in digital format and quality controlled using Puertos del Estado QC procedures: several automatic algorithms, including near-real time processing for operational model validation and tsunami detection algorithms (further information in Pérez et al., 2013).

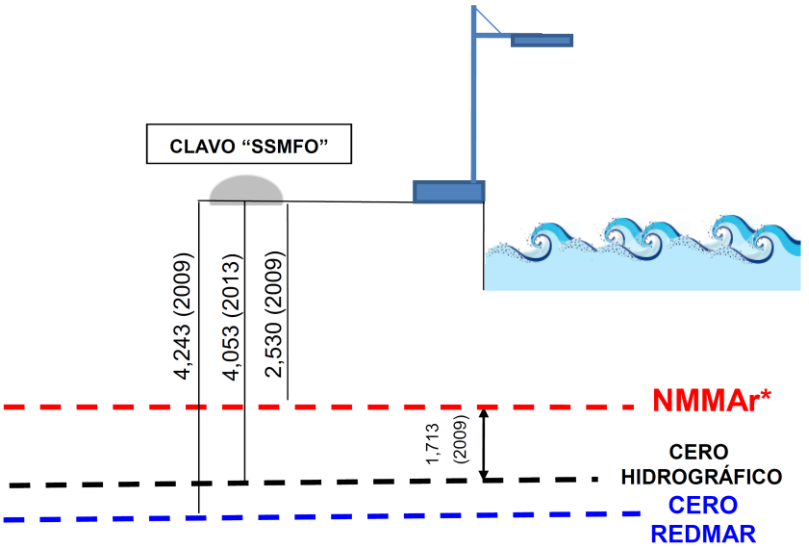


Figure 88. Arrecife 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Arrecife that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx (accessed 17 August 2017).

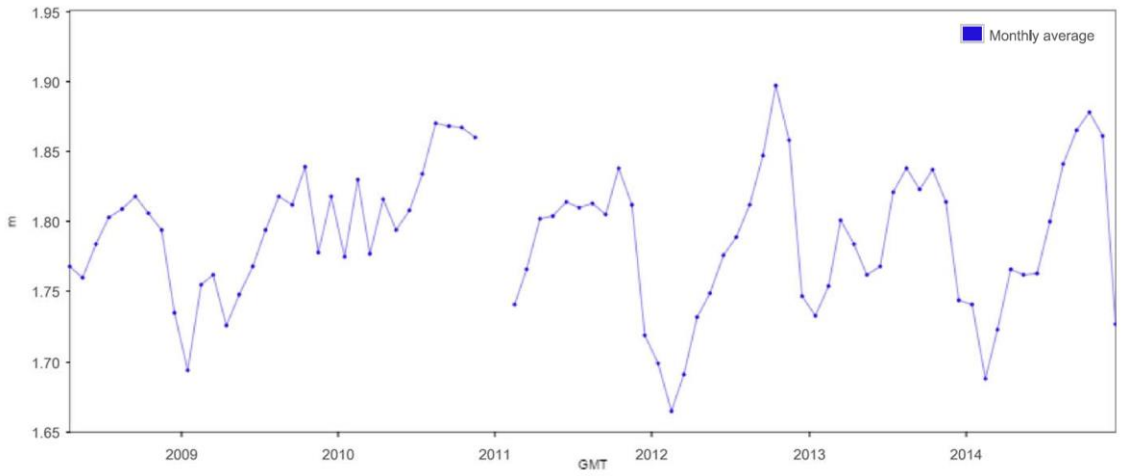


Figure 89. Time-series (2008-2014) of monthly mean sea level (m) at the Lanzarote-Arrecife station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 11 February 2016).

LAS PALMAS 2 PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

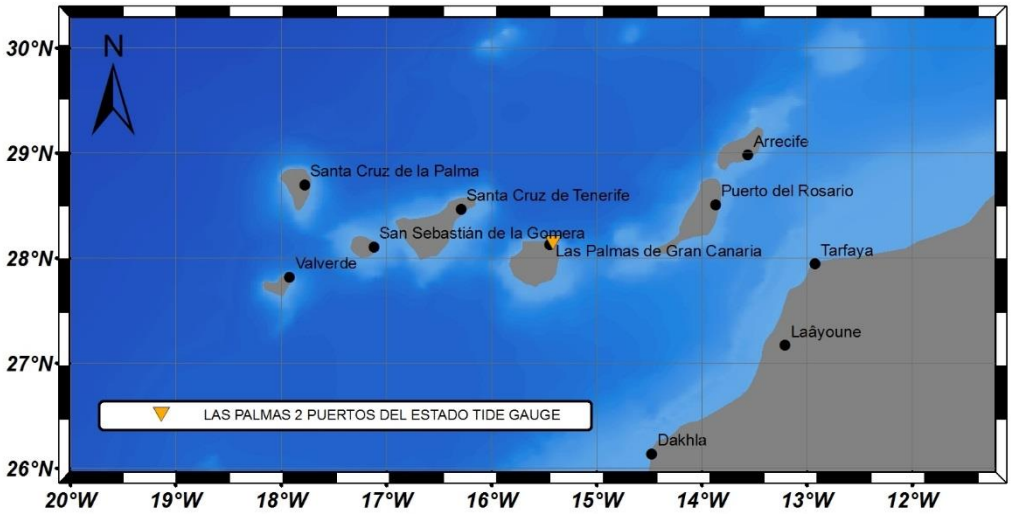


Figure 90. Location of the Las Palmas 2 tide gauge.

Resource abstract:

Las Palmas station was a SRD acoustic gauge placed in the Reina Sofia dike (tankers berth), in Gran Canaria (Canary Islands), since 1992. The SRD acoustic gauge was replaced with a MIROS radar sensor. The Las Palmas 2 station is placed in the Muelle Elder, in Gran Canaria (Canary Islands), and provides 1 min sea level and wind-wave parameters every 20 min. Both old and new gauges were running for the time period 1 January 2009 to 29 April 2010 for inter-comparison purposes. A bias (mean difference) of -0.1 cm was calculated between the two gauges. Hardware problems (de-lamination) occurred with the new Miros gauge and the datum differs by -4 cm from November 2011. This has been accounted for in the supplied data. The complete dataset has been re-entered into the database.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	15.41181°W 28.14056°N
Spatial resolution:	n/a
Temporal extent:	Las Palmas: 1992-07-01 / 2010-11-29 Las Palmas 2: 2009-01-01 / present
Temporal resolution:	Variable from one sample per 5 minutes to one sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx Real-time data viewer: http://www.ioc-sealevelmonitoring.org/station.php?code=lasp Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/1802.php

To download high frequency files: http://marine.copernicus.eu/

Contact: bego@puertos.es
Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado

Data format: Digital (ASCII format)

Additional information:

Benchmarks: For Las Palmas, NGU340 4.295 m relative to datum REDMAR Station. For Las Palmas 2, FARO 4.535 m relative to REDMAR datum.

Further information about quality control Puertos del estado procedures in Pérez et al. (2013). Further information about the transition between the old and the new tide gauge in Pérez et al. (2014).

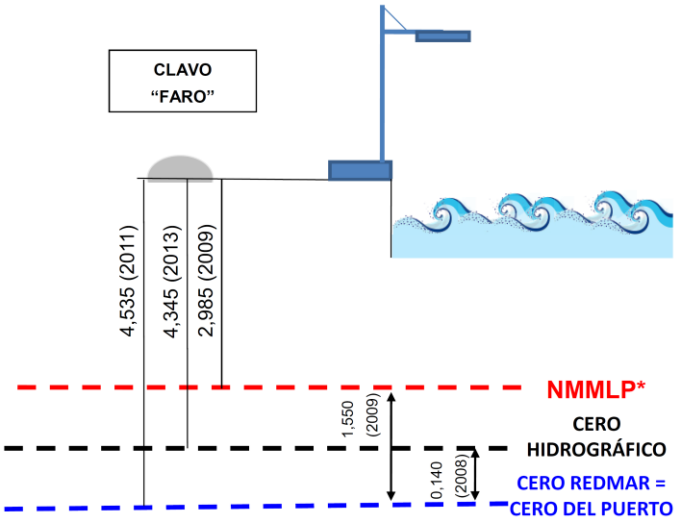


Figure 91. Las Palmas 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Las Palmas that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum, that is equal to the harbor datum. Source: Puertos del Estado. http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx (accessed 17 August 2017).

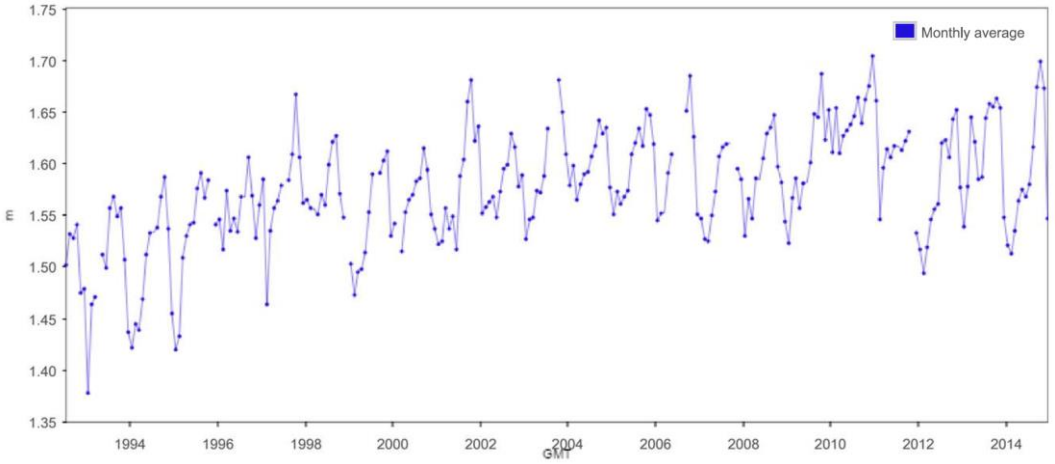


Figure 92. Time-series (2009-2014) of monthly mean sea level (m) at the Las Palmas 2 tide gauge. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 11 February 2016).

TENERIFE 2 PUERTOS DEL ESTADO TIDE GAUGE

PUERTOS DEL ESTADO (MINISTERIO DE FOMENTO), SPAIN

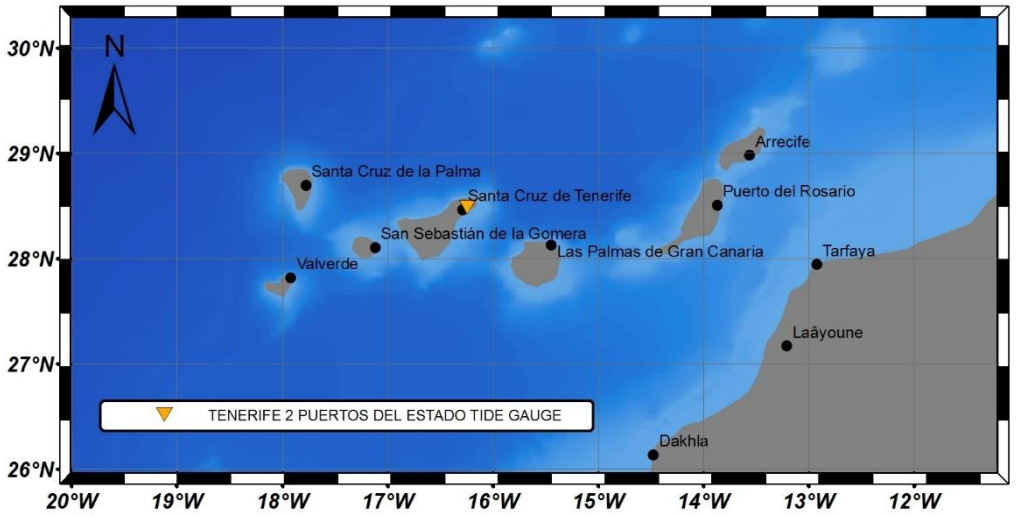


Figure 93. Location of the Tenerife 2 station.

Resource abstract:

Tenerife station is located in Tenerife Island (Canary Islands). The SRD acoustic gauge has been replaced by a new MIROS radar sensor that provides 1 min sea level and wind-wave parameters every 20 min. Both the old and new gauges were running for the time period 22 May 2009 to 12 August 2010 for inter-comparison purposes. During this time, a malfunction in the old sensor was detected. A bias (mean difference) of 1.28 cm between the two gauges was calculated. Furthermore, a datum change has been accounted for in the supplied data. The data was revised and the complete dataset was re-entered into the database.

Resource language:	spa, eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	16.24111°W 28.47722°N
Spatial resolution:	n/a
Temporal extent:	Tenerife: 1992-07-01 / 2011-11-17 Tenerife 2: 2009-05-26 / 2014-02-11
Temporal resolution:	Variable: From one sample per 5 minutes to one sample per minute
Depth range/resolution:	Surface
Conditions for access & use:	Open access. When using the tide gauge dataset, it should be referenced
Limitations on public access:	No
Responsible organization:	Puertos del Estado, Madrid, Spain
Data via:	Data viewer: http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx Real-time data viewer: http://www.ioc-sealevelmonitoring.org/station.php?code=tene# Monthly mean sea level data: http://www.psmsl.org/data/obtaining/stations/1803.php To download high frequency files: http://marine.copernicus.eu/

Contact: bego@puertos.es
Begoña Pérez Gómez. Head of Harbour Oceanography Division, Physical Oceanography Group, Puertos del Estado Portuaria, Área de Medio Físico, Puertos del Estado

Data format: Digital (ASCII format)

Additional information:

Benchmarks: SS 412; 5.198 m relative to REDMAR datum.

Further information about quality control Puertos del Estado procedures in Pérez et al. (2013). Further information about the transition between the old and the new tide gauge in Pérez et al. (2014).

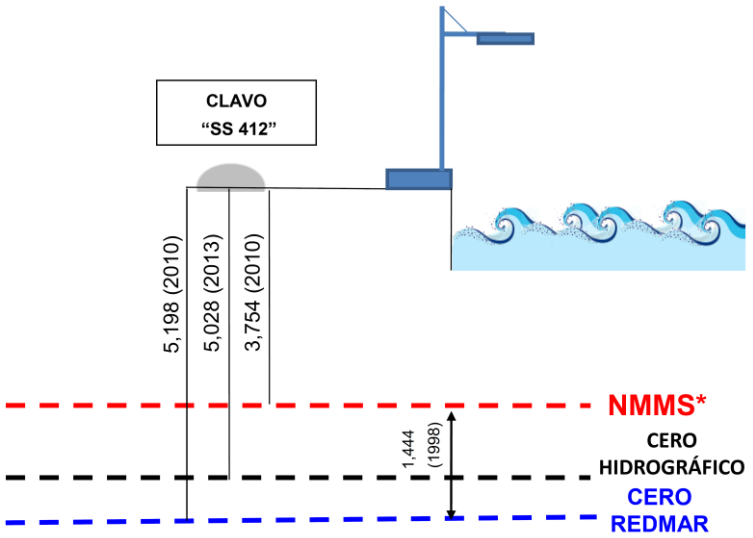


Figure 94. Tenerife 2 Puertos del Estado tide gauge datum information. In red, mean sea level in Santa Cruz de Tenerife that is the IGN datum; in black, hydrographic datum; in blue, REDMAR datum. Source: Puertos del Estado. http://www.puertos.es/es-es/oceanografia/Paginas/portus.aspx (accessed 17 August 2017).

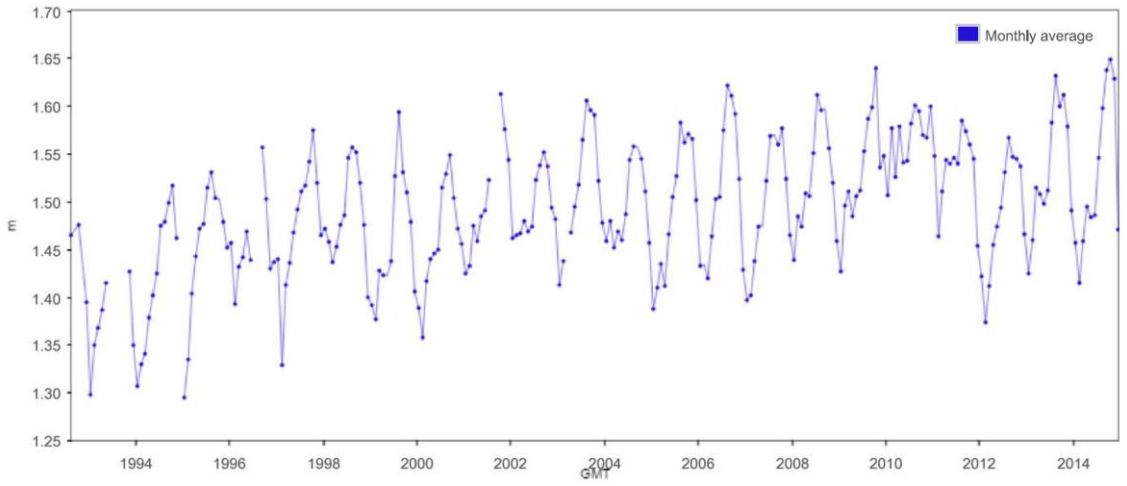


Figure 95. Time-series (June 2009-November 2014) of monthly mean sea level (m) at the Tenerife 2 station. Source: Puertos del Estado. http://www.puertos.es/en-us/oceanografia/Pages/portus.aspx (accessed 11 February 2016).

EASTERN BOUNDARY CURRENT 4 MOORING – EBC4 –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

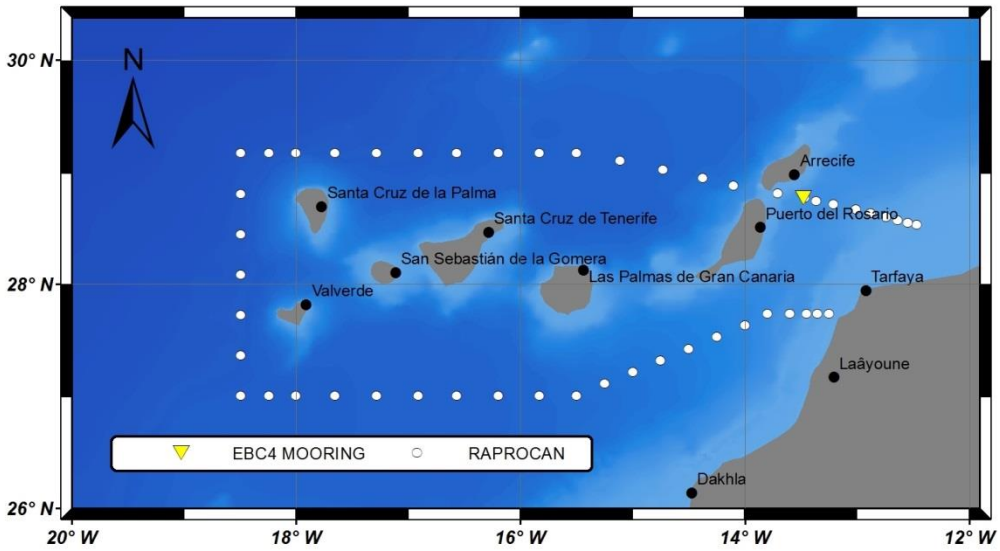


Figure 96. Location of EBC-4 mooring (yellow triangle), in the Lanzarote Passage, between Lanzarote island and Africa. EBC-4 is one sampling station within the RAPROCAN section (white dots).

Resource abstract:
The objective of the Eastern Boundary Current mooring (EBC) is to monitor the decadal and long-term changes of the North Atlantic Subtropical Gyre eastern branch. The mooring monitors the three waters masses found in the area (North Atlantic Central Waters, Antarctic Intermediate Waters and Mediterranean Outflow Waters) and the transport across the Lanzarote Passage. The transport was calibrated during the initial phase (1997-1999) with an array of four moorings across the passage.

Resource language:	spa, eng	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Currents speed and direction	Density Transport
Geographic location:	13.474833°W	28.764000°N
Spatial resolution:	n/a	
Temporal extent:	1997 / present	
Depth range/resolution:	From 50 m to 1380 m depth	
Temporal resolution:	Time series with 2 hours resolution	
Conditions for access & use:	No conditions apply	
Limitations on public access:	No	
Responsible organization:	Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain	
Data via:	Contact: pedro.velez@ca.ieo.es Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía Contact: alonso.hernandez@ulpgc.es Alonso Hernández-Guerra. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria	
Data format:	Digital (plain text)	
References:	Vélez-Belchí, P., Hernández-Guerra, A., Barrera, C., Fraile-Nuez, E., Barrera, A., Llinas, O., Benítez-Barrios, V., Domínguez, F., Alonso-	

González, I., González-Dávila, M., Santana-Casiano, J. M., Hernández-Brito, J. J., Presas-Navarro, C., Arístegui-Ruiz, J., Comas-Rodríguez, I., Garijo-Lopez, J. C., Hernández-León, S., Pérez-Hernández, M. D., Rodríguez-Santana, A. and Sosa-Trejo, D. 2014. *Monitoring the Oceanic Waters of the Canary Islands: the deep hydrographic section of the Canaries.* IV Congress of Marine Science, Las Palmas de Gran Canaria, Spain, 11-13 June 2014. URI: http://hdl.handle.net/10508/2649

Additional information:

These data are collected by the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es - accessed 25 June 2017).

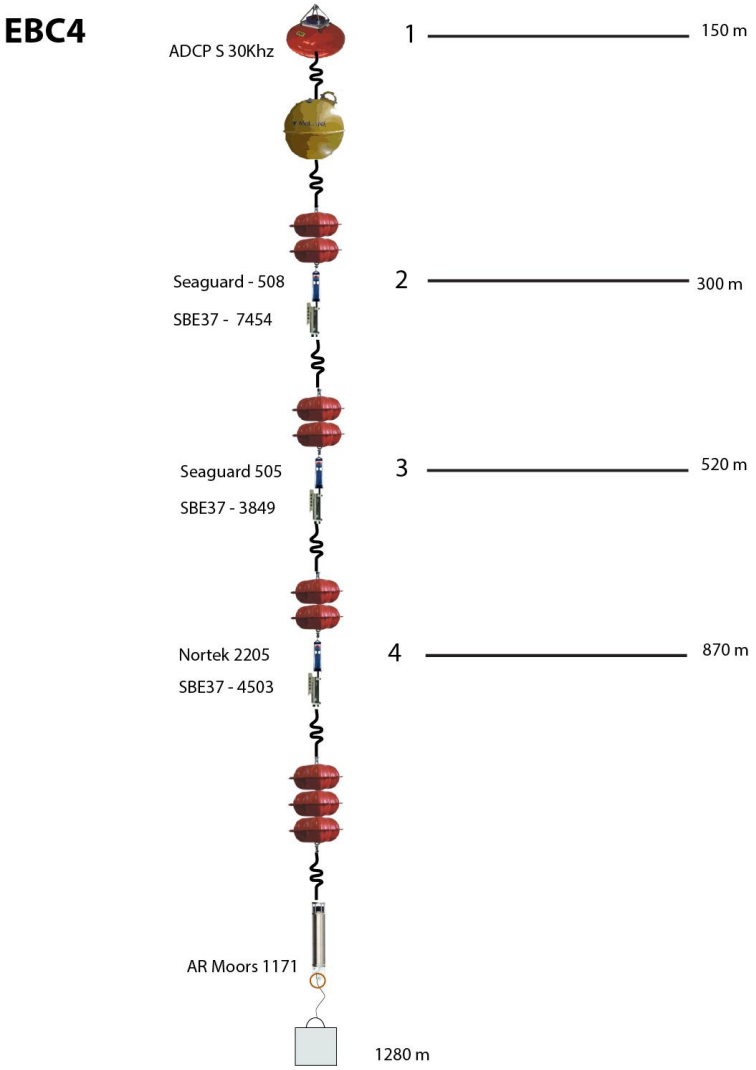


Figure 97. Scheme of the EBC4 mooring, showing the vertical distribution of the instruments taking measurements. One ADCP covers the top 150 meters, and 4 current meters are located at 300 m, 520 m, 800 m and 1200 m depth to monitor the main waters masses in the area. Source: IEO.

ARGO PROGRAM

ARGO PRINCIPAL INVESTIGATORS

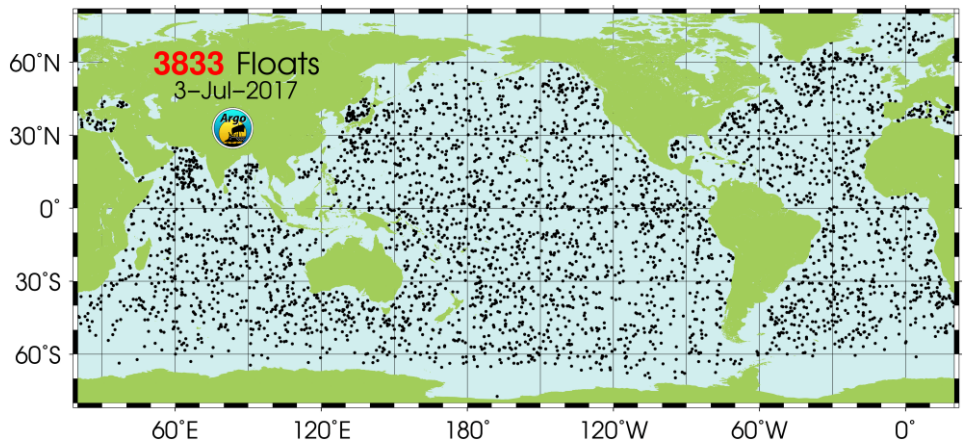


Figure 98. Argo array on 3 July 2017. Source: Argo program. http://www.argo.ucsd.edu/statusbig.gif (accessed 4 July 2017).

Resource abstract:

The broad-scale global array of temperature/salinity profiling floats, known as Argo, is a major component of the ocean observing system. Argo is a standard to which other developing ocean observing systems can look to.

Argo's Objectives:

- It provides a quantitative description of the changing state of the upper ocean and the patterns of ocean climate variability from months to decades, including heat and freshwater storage and transport.

- The data enhance the value of the Jason satellite altimeter through measurement of subsurface temperature, salinity and velocity, with sufficient coverage and resolution to permit interpretation of altimetric sea surface height variability.

- Argo data is used for initializing ocean and coupled ocean-atmosphere forecast models, for data assimilation and for model testing.

- A primary focus of Argo is to document seasonal to decadal climate variability and to aid the understanding of its predictability. The Argo dataset is used in a wide range of applications for high-quality global ocean analyses.

Resource language:	eng
Keyword values:	Oceanographic geographical features
Variables available:	*Observed variables* Salinity Temperature Pressure Velocity
Geographic location:	Global ocean coverage
Spatial resolution:	Variable. The mean coverage is one float in every box of 3° latitude x 3° longitude
Temporal extent:	2000 / present
Depth range/resolution:	From surface to 2000 m depth
Conditions for access & use:	No conditions apply
Limitations on public access:	No
Responsible organization:	USGODAE Global Data Assembly Center (GDAC) and Coriolis GDAC
Data via:	http://www.argodatamgt.org/Access-to-data/Argo-data-selection

http://www.jcommops.org
http://www.usgodae.org/cgi-bin/argo_select.pl
http://www.coriolis.eu.org/Data-Products/Data-Delivery
https://www.nodc.noaa.gov/argo/
http://www.argo.ucsd.edu/

Contact: support@argo.net
Argo Information Centre data users support, JCOMMOPS, Toulouse, France

Contact: aic@jcommops.org
Argo Information Centre, JCOMMOPS, Toulouse, France

Contact: argo@ucsd.edu
Argo Project Office

Contact: codac@ifremer.fr
Programme Coriolis, Ifremer, France

Contact: pedro.velez@ca.ieo.es
Pedro Vélez Belchí. Senior scientist, Argo Spain Project coordinator, Instituto Español de Oceanografía, Canary Islands, Spain

Data format: Digital (plain text)

References: "These data were collected and made freely available by the International Argo Program and the national programs that contribute to it. (http://www.argo.ucsd.edu, http://argo.jcommops.org). The Argo Program is part of the Global Ocean Observing System."

Additional information:

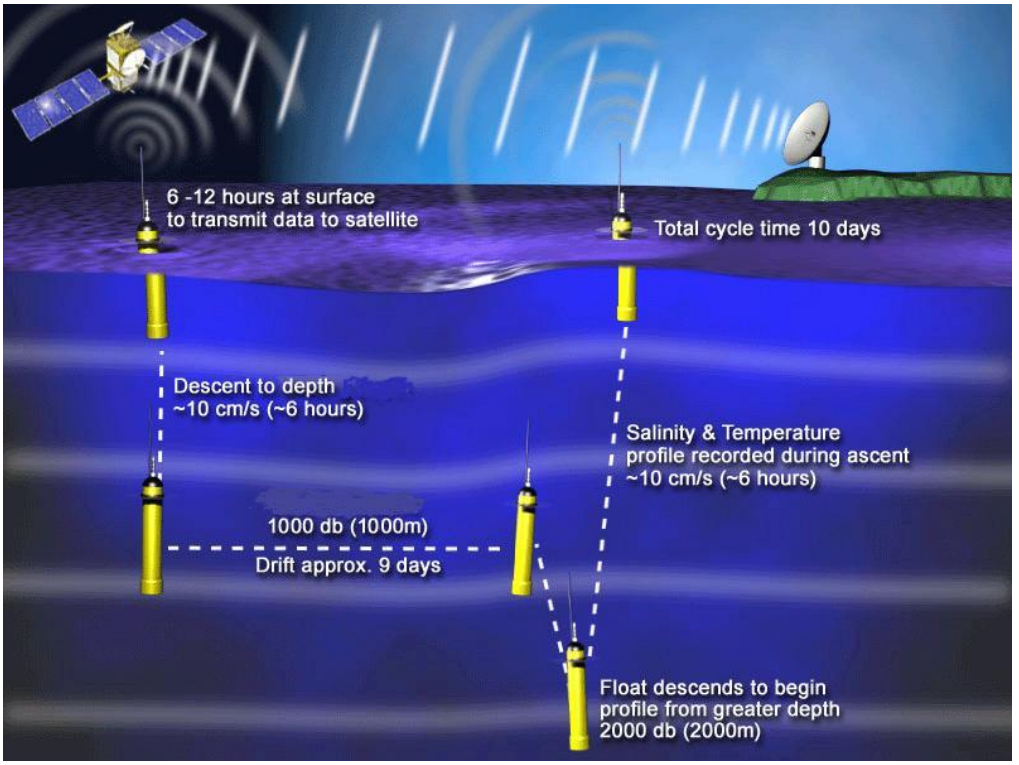


Figure 99. The standard Argo mission is a park and profile mission where the float descends to a target depth of 1000 m to drift and then descends again to 2000 m to start the temperature and salinity profile. In the beginning of 2010, 70% of floats recorded profiles to depths greater than 1500 m. Another 20% between 1000 m and 1500 m. Source: Argo program. Schematic image by Southampton Oceanography Centre, UK. http://www.argo.ucsd.edu/operation_park_profile.jpg (accessed 4 July 2017).

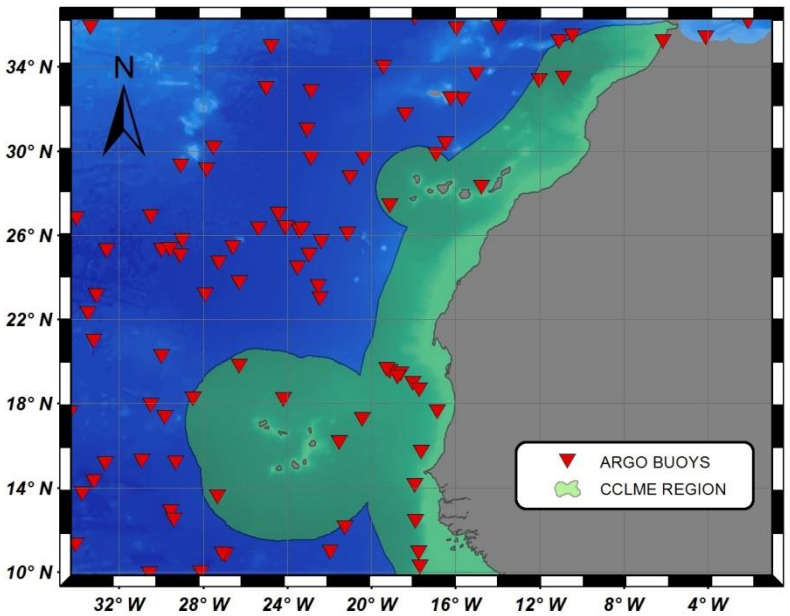


Figure 100. Active Argo buoys deployed in the CCLME and the surrounding area (west coast of Africa) on 24 October 2014. Data source: Argo program.

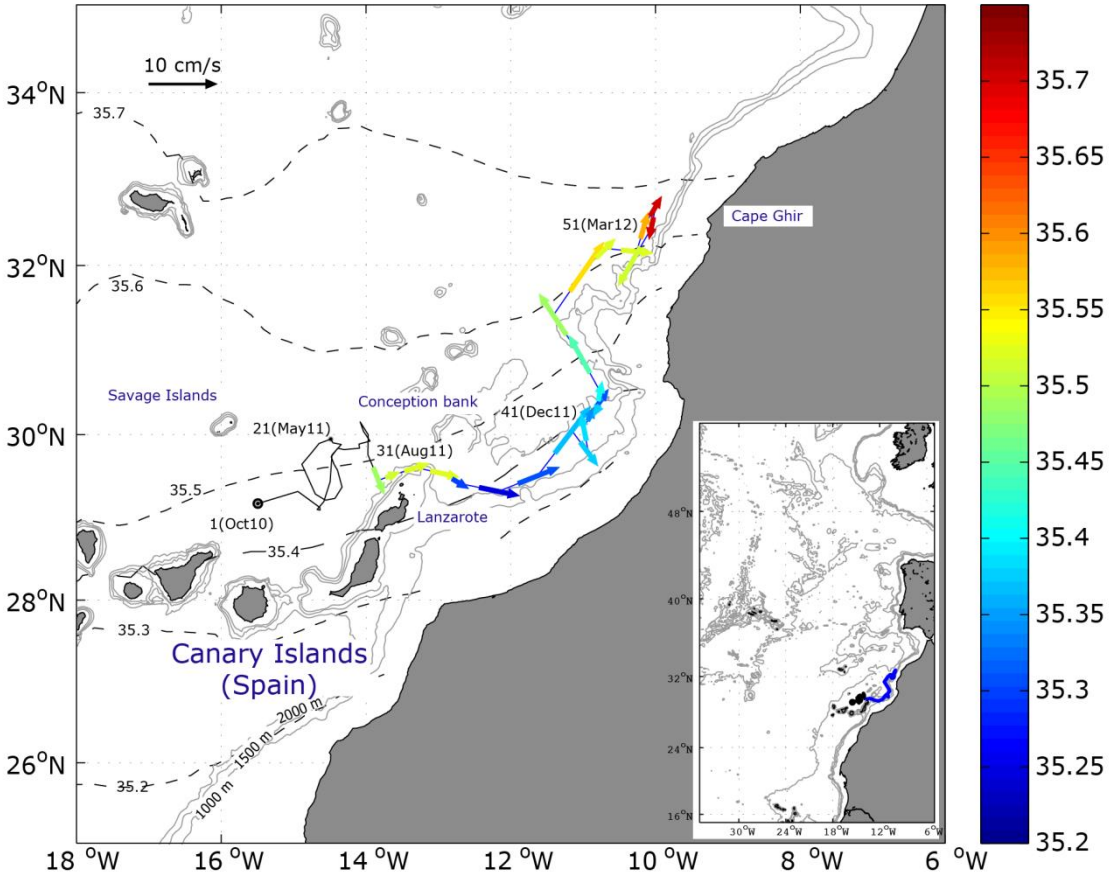
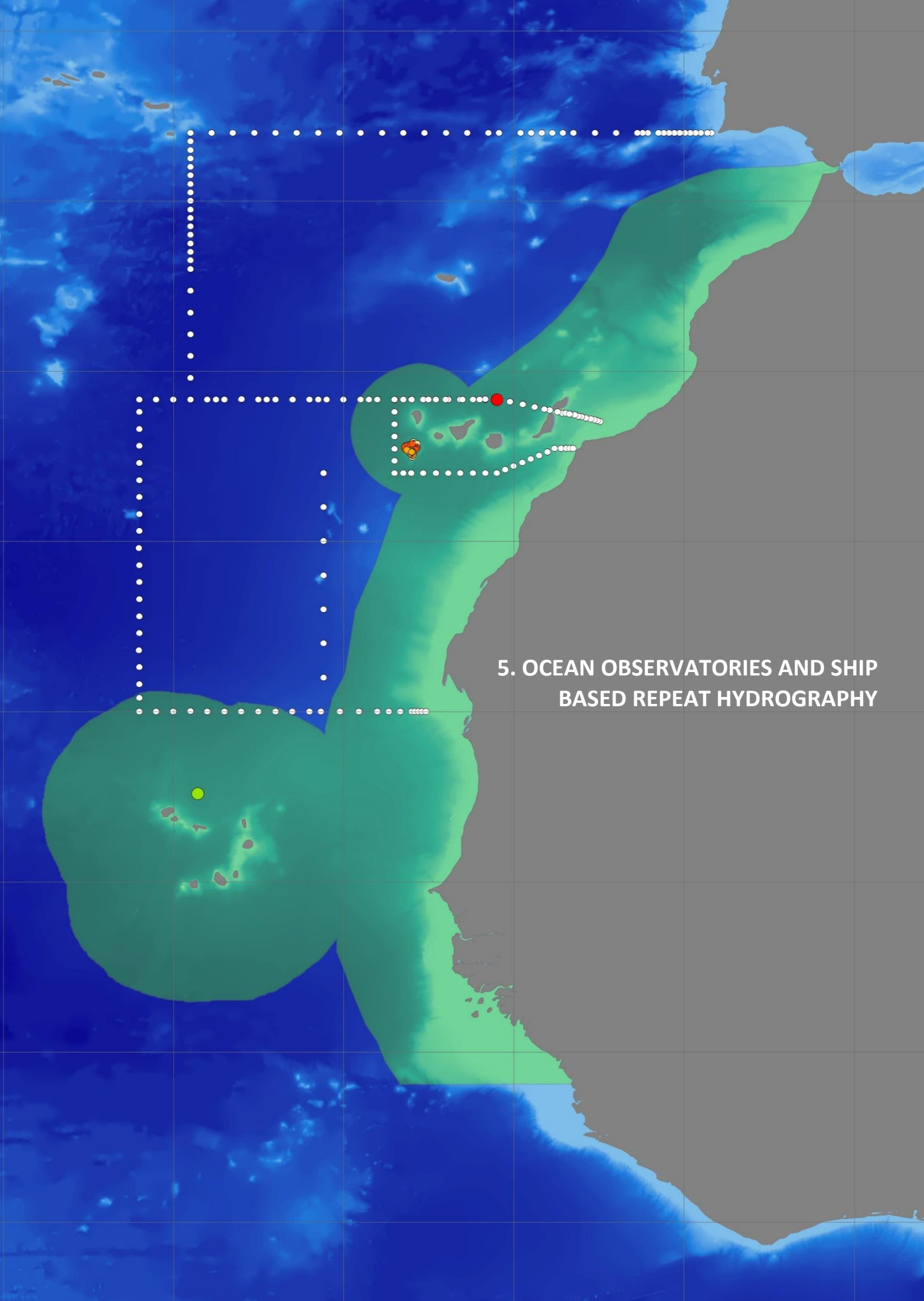


Figure 101. (a) Trajectory of Argo float WMO-690072 in the Canary Current Eastern Upwelling system. The arrows represent the velocity at the parking depth (between two profiles), color-coded with the salinity (PSU) at the parking depth. There are arrows only after the float enters the Canary deep Poleward Undercurrent (CdPU) (profile 33); prior to this, the float trajectory is a thin black line. The labels correspond to the number and the month/year of a profile. The dashed lines represent the climatological for salinity at 1000 m. The isobaths for 1000 m, 1500 m and 2000 m are depicted with a grey line. Source: Vélez-Belchí et al. (2012).



5. OCEAN OBSERVATORIES AND SHIP BASED REPEAT HYDROGRAPHY

Ocean observatories and ship based repeat hydrography in the CCLME region (green shaded area). The red circle shows the location of the European Station for Time Series in the Ocean. The green circle indicates the location of the Cape Verde Ocean Observatory. The white circles stand for the location of the stations in the Canary deep hydrographic section, CORICA 2003 survey and ORCA 2009 survey. The orange circles show the location of the stations in the Vulcano project surveys around El Hierro Island (Vulcano0313, Vulcano1013 and Vulcano0314 surveys).

CAPE VERDE OCEAN OBSERVATORY – CVOO –

INSTITUTO NACIONAL DE DESENVOLVIMENTO DAS PESCAS (INDP), CABO VERDE
HELMHOLTZ CENTRE FOR OCEAN RESEARCH KIEL (GEOMAR), GERMANY

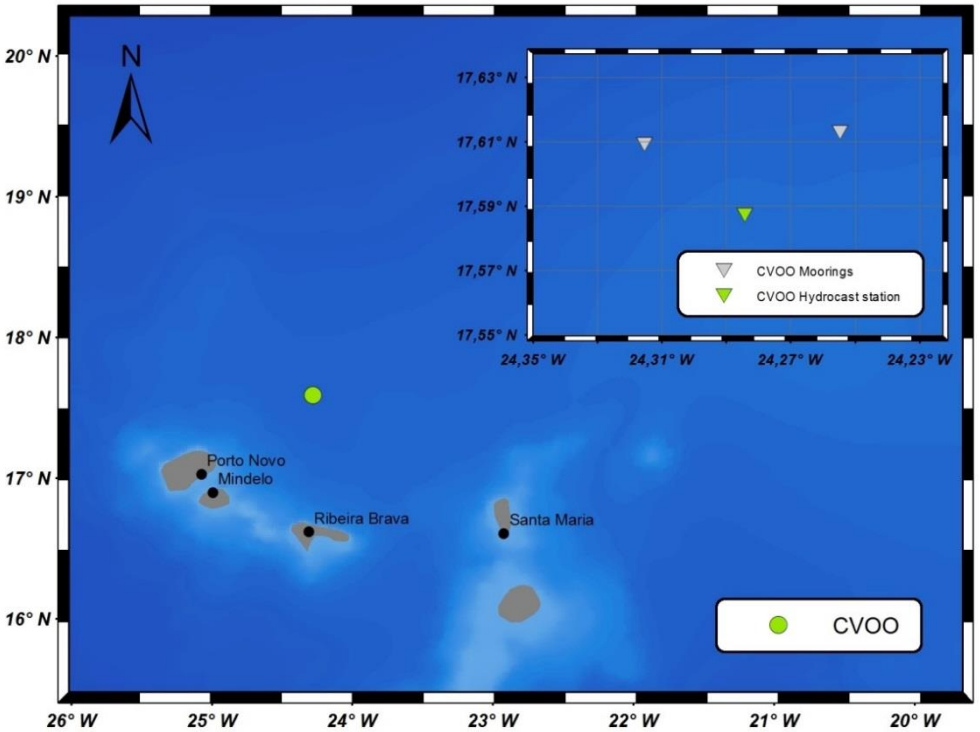


Figure 102. Map showing the location of the Cape Verde ocean observatory (CVOO), 60 nautical miles NE off the Cape Verde archipelago. The CVOO working area (see enlargement) includes the hydrocast station for monthly samplings, the M1 long-term mooring (the eastern one) and the experimental mooring M2 (submersible winch test, at the west).

Resource abstract:

The CVOO is a biogeochemical ocean time-series site in the Eastern Tropical North Atlantic (ETNA) which is based on two pillars: a monthly ship-based sampling programme (measurements of temperature, conductivity, biological parameters, nutrients, dissolved carbon and oxygen), as well as an oceanographic multi-parameter long-term mooring for in-situ observations (including real-time telemetry). The Cape Verdean research vessel Islândia is equipped with state of the art oceanographic instruments to collect samples for oceanographic parameters. Novel observational platforms such as gliders or profiling floats are used within the framework of various field studies at the CVOO.

Collected data are coupled to observations at the atmospheric site (CVAO) which measures meteorological parameters, greenhouse and short-lived gases, and aerosols. Coupled data between both observatories provides highly valuable information about processes at the ocean-atmosphere interface.

Resource language: eng
Keyword values: Oceanographic geographical features
Variables available: *Observed variables*
CTD sensors: Temperature
Conductivity
Pressure
Oxygen
Photoactive radiation (PAR)
Fluorescence

	Turbidity
CTD sampling:	Conductivity
	Oxygen
	Total alkalinity (TA)
	Dissolved inorganic carbon (DIC)
	Particulate organic carbon/nitrogen
	Total organic carbon/nitrogen
	Chlorophyll a
	Nitrate
	Nitrite
	Phosphate
	Silicate
Mooring:	Temperature
	Conductivity
	Pressure
	Oxygen
	pCO_2
	Fluorescence
	Current
	Downward particle flux (sediment traps)
Geographic location:	24.2833°W 17.5833°N
Spatial resolution:	Fixed-point measurements. Occasional surveys around the archipelago (within a radius of ~ 150 nautical miles)
Temporal extent:	Long-term mooring: 2006 / present Monthly samplings: 2008 / present, with interruptions
Temporal resolution:	Variable from monthly (samplings) to hourly (long-term mooring)
Depth range/resolution:	Samplings: 0 m – 500 m depth Long-term mooring: 10 m – 3600 m depth
Conditions for access & use:	No costs for data use. Acknowledgement or co-authorship required for publications
Limitations on public access:	Yes (login via web portal required)
Responsible organization:	Helmholtz Centre for Ocean Research Kiel (GEOMAR), Kiel, Germany
Data via:	http://portal.geomar.de/group/cvoo Contact: bfiedler@geomar.de Dr. Bjoern Fiedler. Scientific Coordinator CVOO, GEOMAR, Germany Contact: akoertzinger@geomar.de Prof. Dr. Arne Koertzinger. Principal Investigator CVOO, GEOMAR, Germany
Data format:	Digital. Available as ASCII text files or via database including web interface (various export formats available)
References:	"Data taken from the Cape Verde Ocean Observatory (CVOO), Mindelo, Republic of Cape Verde, cvoo.geomar.de"

Additional information:

All information presented in this document (plus more detailed information about equipment, setup, etc.) can be found via the observatory's website: cvoo.geomar.de (accessed 4 July 2017).

EUROPEAN STATION FOR TIME SERIES IN THE OCEAN – ESTOC –
OCEANIC PLATFORM OF THE CANARY ISLANDS (PLOCAN), SPAIN

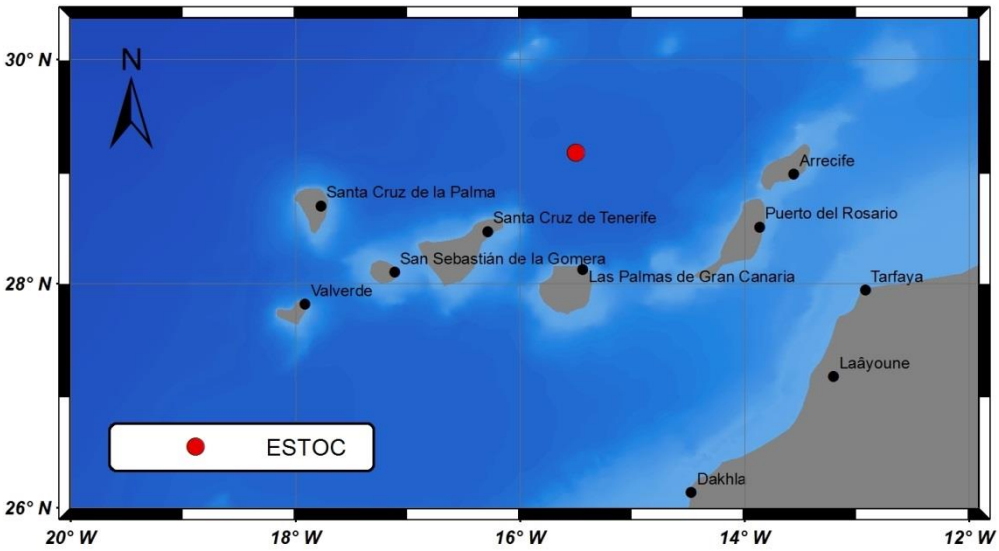


Figure 103. Location of the ESTOC station.

Resource abstract:
Observations of long-term changes in the ocean are a key to understanding regional and global climate variability. ESTOC was sponsored by four European institutions: the Universities of Bremen and Kiel in Germany, and by the Instituto Español de Oceanografía and the Canary Institute for Marine Sciences in Spain and was initially funded by several observational programmes: the German JGOFS (Joint Global Ocean Flux Study), and national and local funding in Spain.

ESTOC is an open ocean site in the sense that it is located well outside the highly variable eastern boundary with its strong coastal upwelling regime (although interaction with this regime exists), is deep enough to encompass the eastern subtropical North Atlantic's major water masses including the North Atlantic Deep Water (however not the Antarctic Bottom Water), is windward of the Canary Islands to avoid wake effects of both the major currents and winds (Canary Current and Northeast Trade Winds), and is far enough from coasts and islands to serve as reference for satellite images and altimetry (the Selvages 100 km northwards are very small and flat).

The first activities included a ship-based observation programme (monthly observations of physical, chemical and biological parameters) and two moored structures with current meters and particle traps. In addition, other cruises were foreseen to carry out process studies in the surrounding area at least once per year.

Resource language:	eng	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	
	Pressure	
	Temperature (ITS90)	
	Salinity (PSS78)	
	Dissolved oxygen	
	Dissolved inorganic nitrogen (Nitrate + Nitrite)	
	Dissolved inorganic Phosphate	
	Dissolved inorganic Silicate	
	Chlorophyll a	
Geographic location:	15.500°W	29.167°N
Spatial resolution:	Station	
Temporal extent:	1994-02 / present	

Temporal resolution:	Variable. ESTOC was regularly occupied once per month from 1994 to 2004 and after this date the sampling frequency changed to seasonal due to logistical constraints
Depth range/resolution:	The depth range is from surface to bottom (3608 m), distributed in 24 levels: 0 m, 10 m, 25 m, 50 m, 75 m, 100 m, 125 m, 150 m, 200 m, 300 m, 400 m, 600 m, 800 m, 1000 m, 1100 m, 1200 m, 1300 m, 1500 m, 1800 m, 2000 m, 2500 m, 2800 m, 3000 m and seabed
Conditions for access & use:	The data access is through ESTOC web site. Data are free of cost by the application form
Limitations on public access:	Yes
Responsible organization:	Oceanic Platform of the Canary Islands, Telde, Spain
Data via:	http://www.estoc.es Drs. Octavio Llinás and Mª José Rueda Principal Investigators of the ESTOC project Contact: marimar.villagarcia@plocan.eu María del Mar Villagarcía. Head of the PLOCAN integrated observatory, PLOCAN Contact: Andres.cianca@plocan.eu Andrés Cianca. ESTOC Data manager, PLOCAN
Data format:	Digital (netCDF file)
References:	Data users are requested that all data produced by the observatory are cited in reports and publications with proper authorship, in agreement with common and standard practices (e.g., using doi: when possible or other form of traceable acknowledgement). Co-authorship of publication may be requested by the owner or principal investigator of the instrument. Preferred format of citation (including doi:): Martin, F., Smith, J., Chang, Y. P. 2002. Acoustic data from 2013 to 2014 at ESTOC site, PLOCAN Observatory. doi:10.1591/PANGAEA.72142 When no Digital Object Identifier exists yet: Martin, F., Smith, J., Chang, Y. P. 2002. Acoustic data from 2013 to 2014 at ESTOC site, PLOCAN Observatory. (Add URL to dataset or data portal if available)

CANARY DEEP HYDROGRAPHIC SECTION – RAPROCAN –
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

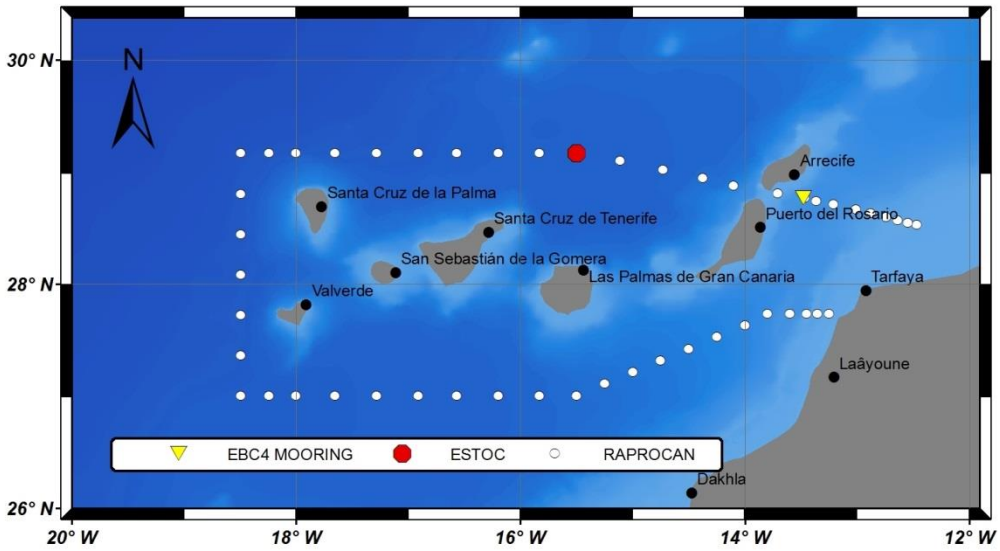


Figure 104. Situation of the 50 stations in the Canary deep hydrographic section, which includes ESTOC and EBC-4 moorings.

Resource abstract:
The objective of the Raprocan project is to monitor and understand the changes happening in the Coastal Transition Zone between the upwelling of the northeast Africa and the oriental limit of the Subtropical Gyre. It is important to understand the mechanisms driving this change since the subtropical gyre plays a significant role in the heat transport in the North Atlantic Ocean and the ocean-atmosphere interaction though the North Atlantic Oscillation (NAO). The RAPROCAN project started in 2006 and includes oceanographic surveys in February and September and the EBC-4 mooring maintained in the Lanzarote passage since 1997.

Resource language:	spa, eng	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Salinity	Density
	Temperature	Geostrophic velocity
	Pressure	Heat content
	Oxygen	
	Nutrients	
	Chlorophyll	
	Current velocity	
Geographic location:	25.00°W – 13.00°W	27.00°N – 29.50°N
Spatial resolution:	50 stations	
Temporal extent:	2006 / present	
Temporal resolution:	Twice a year	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	No conditions apply	
Limitations on public access:	No	
Responsible organization:	Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain	
Data via:	Contact: pedro.velez@ca.ieo.es Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía	

	Contact: eugenio.fraile@ca.ieo.es Eugenio Fraile Nuez. Researcher, Instituto Español de Oceanografía
Data format:	Digital (plain text)
References:	Vélez-Belchí, P., Hernández-Guerra, A., Barrera, C., Fraile-Nuez, E., Barrera, A., Llinas, O., Benítez-Barrios, V., Domínguez, F., Alonso-González, I., González-Dávila, M., Santana-Casiano, J. M., Hernández-Brito, J. J., Presas-Navarro, C., Arístegui-Ruiz, J., Comas-Rodríguez, I., Garijo-Lopez, J. C., Hernández-León, S., Pérez-Hernández, M. D., Rodríguez-Santana, A. and Sosa-Trejo, D. 2014. *Monitoring the Oceanic Waters of the Canary Islands: the deep hydrographic section of the Canaries.* IV Congress of Marine Science, Las Palmas de Gran Canaria, Spain, 11-13 June 2014. URI: http://hdl.handle.net/10508/2649

Additional information:

These data are collected by the Spanish Institute of Oceanography Integrated Ocean Observing System (IEOOS, http://www.ieo.es – accessed 25 June 2017).

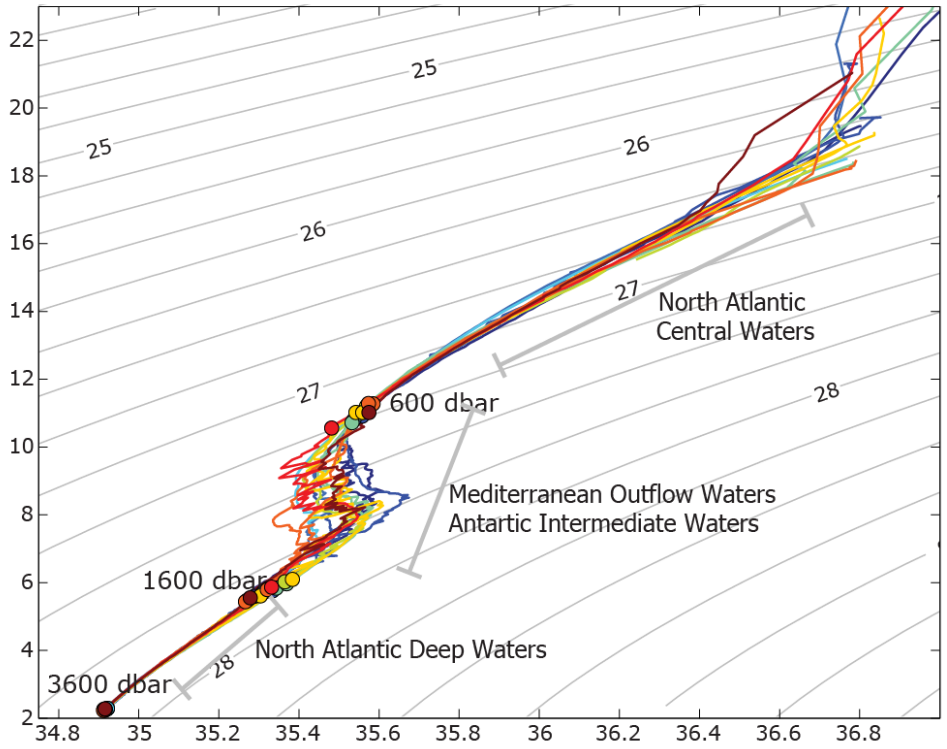


Figure 105. TS diagram for station 10, where the main water mass and its mean depth are indicated (Vélez-Belchí et al., 2014). Salinity on the x-axis is in PSU and temperature on the y-axis is in °C.

CORRIENTE DEL CONTORNO ORIENTAL-CANARIAS SURVEY – CORICA 2003 –
UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

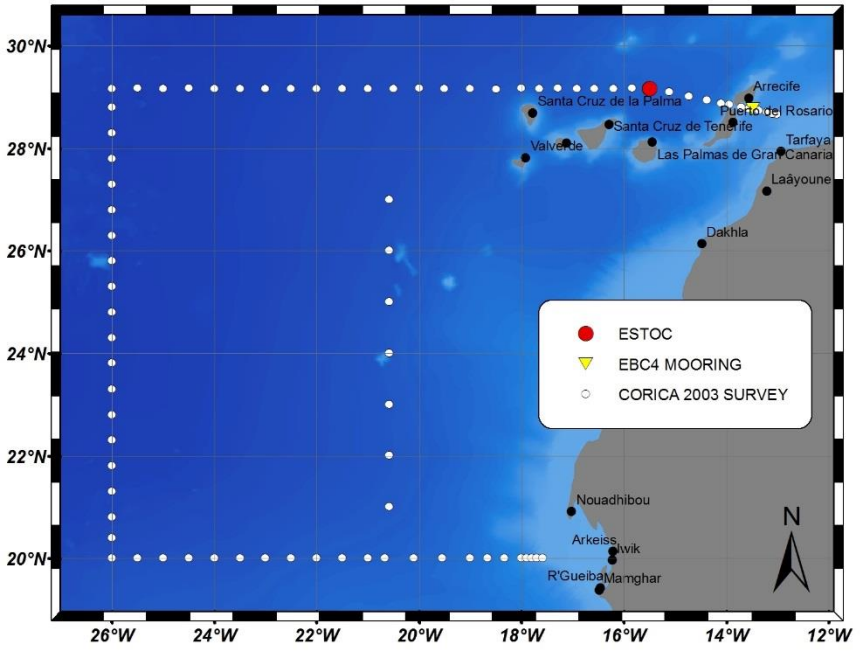


Figure 106. Situation of the 83 hydrographic stations during the Corica2003 survey, which includes ESTOC and the EBC-4 mooring.

Resource abstract:
The objective of this project was to study the Eastern Boundary Current, which transports Antarctic Intermediate Water (AAIW) northwards, the Canary Current and its interaction with the upwelling system off Northwest Africa, as well as the mixing between the AAIW and the Mediterranean Water. The study was aimed to carry out a hydrographic survey bounded by the latitudes 20.00°N-29.25°N, the longitude 26.00°W and the African coast. The hydrographic survey consisted of CTD/O_2, Lowered Acoustic Doppler Current Profiler (LADCP) and nutrient casts following the World Ocean Circulation Experiment (WOCE) recommendation.

Resource language:	spa, eng	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Salinity	Density
	Temperature	Geostrophic velocity
	Pressure	Heat content
	Oxygen	Transport
	Nutrients	
	Chlorophyll	
	Current velocity	
	Zooplankton	
	Upper air observations	
Geographic location:	26.00°W – 12.50°W	20.00°N – 29.50°N
Spatial resolution:	83 stations	
Temporal extent:	2003-09-07 / 2003-09-29	
Temporal resolution:	n/a	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	No conditions apply	
Limitations on public access:	No	

Responsible organization:	Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain
Data via:	Contact: alonso.hernandez@ulpgc.es Alonso Hernández-Guerra. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria Contact: pedro.velez@ca.ieo.es Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía
Data format:	Digital (plain text)
References:	Hernández-Guerra, A., Fraile-Nuez, E., López-Laatzen, F., Martínez, A., Parrilla, G. and Vélez-Belchí, P. 2005. Canary Current and North Equatorial Current from an inverse box model. *Journal of Geophysical Research*, Vol. 110, C12019. doi:10.1029/2005JC003032 Martínez-Marrero, A., Rodríguez-Santana, A., Hernández-Guerra, A., Fraile-Nuez, E., López-Laatzen, F., Vélez-Belchí, P. and Parrilla, G. 2008. Distribution of water masses and diapycnal mixing in the Cape Verde Frontal Zone. *Geophysical Research Letters*, Vol. 35, L07609. doi:10.1029/2008GL033229
Additional information:	

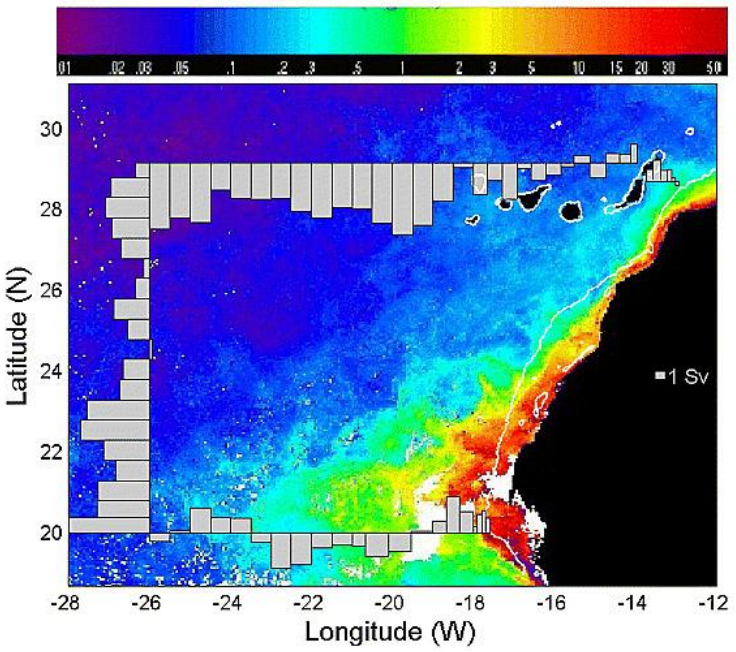


Figure 107. Image of phytoplankton pigment concentration from SeaWIFS data corresponding to September 2003 monthly mean together with the accumulated mass transport (in Sv) for the surface layer. Land and clouds are represented in black and white, respectively. The scale of phytoplankton concentration is given by the color bar at the top (in mg/m^3) of every pixel in the image. The white curve along the African coast is the 200 m isobath. Source: Hernández-Guerra et al. (2005).

ORIGEN DE LA CORRIENTE DE CANARIAS SURVEY – ORCA 2009 –
UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

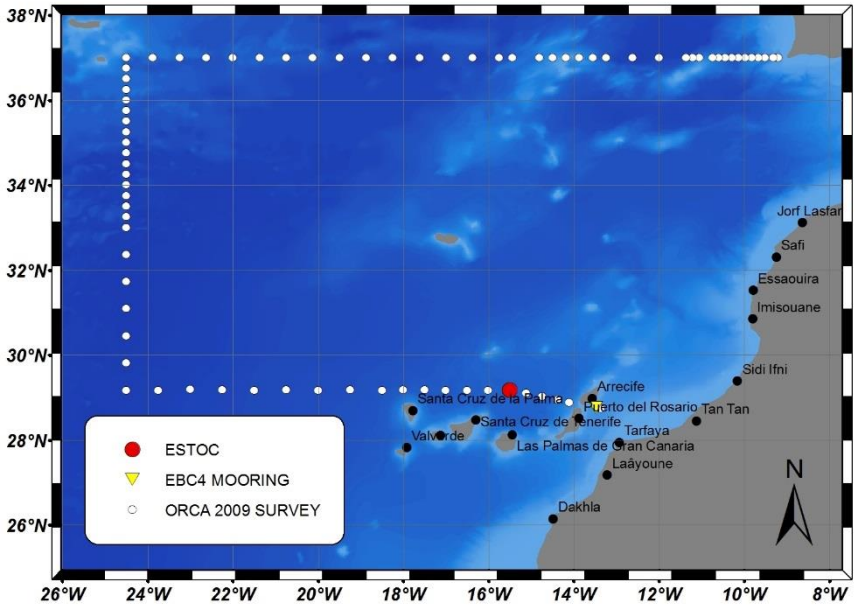


Figure 108. Situation of the 80 stations in the ORCA 2009 survey, which includes RAPROCAN section and ESTOC (station 75) and EBC-4 moorings (station 80).

Resource abstract:
The objective of this project was to study the contributions of the Azores and the Portugal currents to the Canary Current. The study carried out a hydrographic survey bounded by the latitudes 28.73°N - 37.09°N, the longitude 25°W and the African and European coast. The hydrographic survey consisted of 80 CTD/O_2, Lowered Acoustic Doppler Current Profiler (LADCP) and nutrient casts following the WOCE recommendation.

Resource language:	spa, eng	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Salinity	Density
	Temperature	Geostrophic velocity
	Pressure	Heat content
	Gravity	
	Air temperature	
	Wind speed and direction	
	Atmospheric humidity	
	Solar radiation	
Geographic location:	24.5221°W – 6.2762°W	28.7383°N – 37.0938°N
Spatial resolution:	80 stations	
Temporal extent:	2009-10-17 / 2009-11-11	
Temporal resolution:	n/a	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	No conditions apply	
Limitations on public access:	No	
Responsible organization:	Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain	

Data via:

Contact: alonso.hernandez@ulpgc.es
Alonso Hernández-Guerra. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria

Contact: pedro.velez@ca.ieo.es
Pedro Vélez Belchí. Senior scientist, Instituto Español de Oceanografía

Data format: Digital (plain text)

References:

Comas-Rodríguez, I., Hernández-Guerra, A., Fraile-Nuez, E., Martínez-Marrero, A., Benítez-Barrios, V. M., Pérez-Hernández, M. D. and P. Vélez-Belchí. 2011. The Azores Current System from a meridional section at 24.5°W. *Journal of Geophysical Research*, Vol. 116, C09021. doi:10.1029/2011JC007129

Pérez-Hernández, M. D., Hernández-Guerra, A., Fraile-Nuez, E., Comas-Rodríguez, I., Benítez-Barrios, V. M., Domínguez-Yanes, J. F., Vélez-Belchí, P. and De Armas, D. 2013. The source of the Canary current in fall 2009. *Journal of Geophysical Research: Oceans*, Vol. 118, pp. 2874-2891. doi:10.1002/jgrc.20227

Additional information:

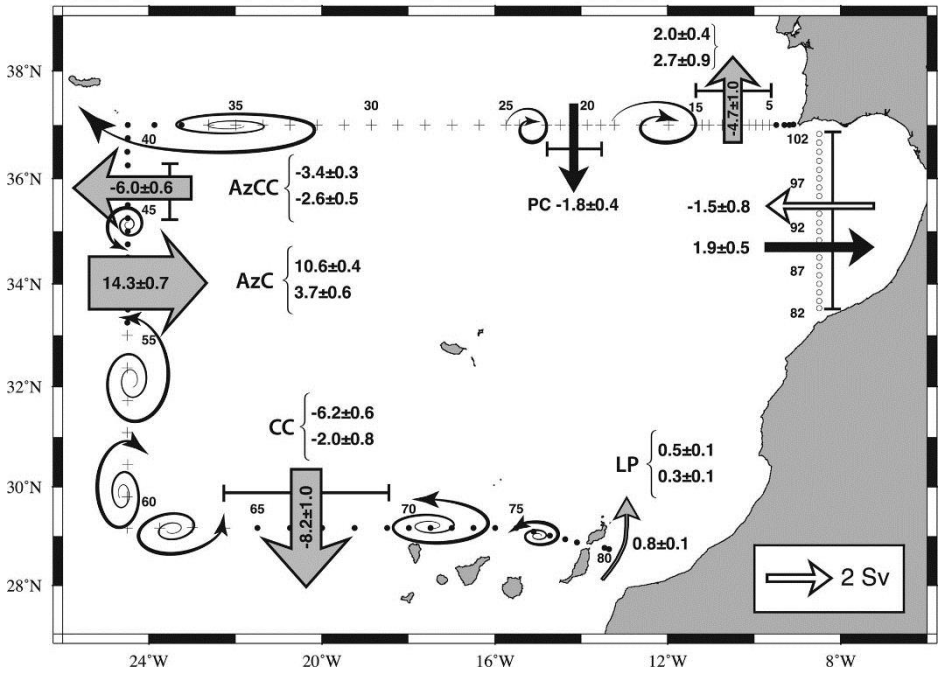


Figure 109. Main currents with their corresponding integrated mass transport (in Sv). PC, AzCC, AzC, CC, and LP stand for Portugal Current, Azores Countercurrent, Azores Current, Canary Current, and Lanzarote Passage, respectively. Curly brackets indicate (top) the surface and (bottom) intermediate mass transport for each current. Gray arrows and the enclosed number, correspond to the integrated surface and intermediate transport. The exchange between the Mediterranean Sea and the Atlantic Ocean is shown with black arrows (surface layers) and white arrows (intermediate layers). The width of the arrow shaft is proportional to the mass transport values. Spiral arrows indicate the presence of an anticyclonic/cyclonic eddy. The stations where deep circulation was found are shown with black crosses instead of black dots (ORCA stations) or white dots (WOCE AR06 stations). Source: Pérez-Hernández et al. (2013).

BIMBACHE1011 SURVEYS

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN
BANCO ESPAÑOL DE ALGAS (BEA), SPAIN
OCEANIC PLATFORM OF THE CANARY ISLANDS (PLOCAN), SPAIN

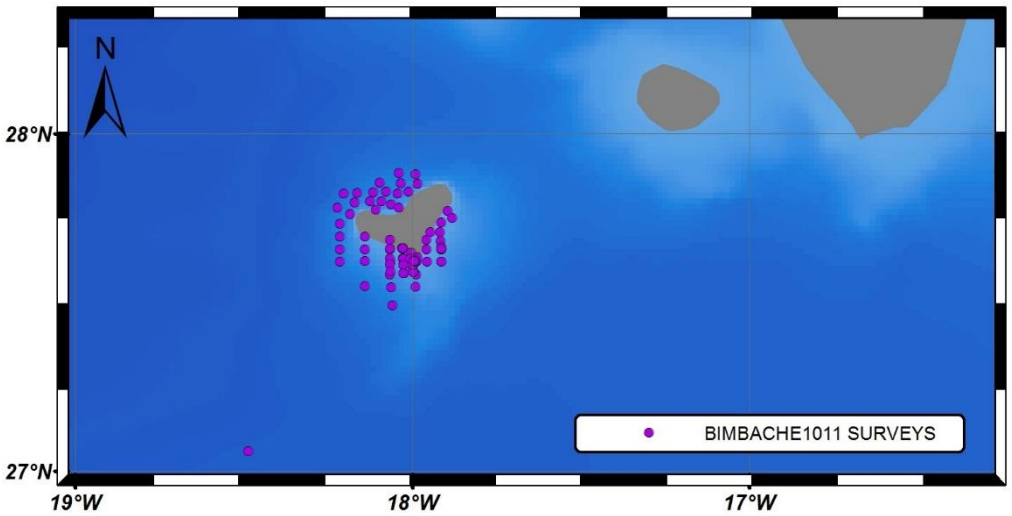


Figure 110. Map showing the location of the sampling stations during 5 of the Bimbache oceanographic surveys carried out between November 2011 and February 2012.

Resource abstract:

12 oceanographic surveys have been undertaken to monitor a submarine eruption happened in El Hierro (Canary Islands) in 2011. This series of surveys was called Bimbache1011. The acquired data was critical to give technical and scientific advice to the civil security committee. The action was organized by Spanish Institut of Oceanography (IEO) in collaboration with the the University of Las Palmas de Gran Canaria (ULPGC), Banco Español de Algas (BEA) and the Oceanic Platform of the Canary Islands (PLOCAN).

Different scientific aspects have been studied to monitor the volcano and its activity as (Fraile-Nuez et al., 2012):

- Geology and geophysics
- Bathymetry
- Impacts on the benthic community
- Physical, chemical and biological characterization
- Impacts in the water column
- Follow up of the eruptive process

Resource language: spa, eng

Keyword values: Oceanographic geographical features

Variables available:	*Observed variables*	*Derived variables*
IEO data:	Salinity	Density
	Temperature	Geostrophic velocity
	Pressure	Heat content
	Oxygen	
	Nutrients	
	Turbidity	
	Chlorophyll	
	Current velocity	
	Meteorological parameters	
ULPGC data:	Phytoplankton	

	Total alkalinity (A_T) Total inorganic carbon (C_T) pH pCO2 Organic matter Metals	
BEA data:	Microorganisms	
Geographic location:	18.30°W – 17.50°W	27.00°N – 28.00°N
Spatial resolution:	n/a	
Temporal extent:	2011-10 / 2012-02	
Temporal resolution:	n/a	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	Agreement with the appropriate institution	
Limitations on public access:	Yes	
Responsible organization:	Centro Oceanográfico de Canarias, Instituto Español de Oceanografía, Santa Cruz de Tenerife, Spain University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain	
Data via:	Contact: eugenio.fraile@ca.ieo.es Eugenio Fraile Nuez. Researcher, Instituto Español de Oceanografía Contact: Magdalena.santana@ulgpc.es Magdalena Santana Casiano. Professor, Instituto de Oceanografia y Cambio Global, University of Las Palmas de Gran Canaria	
Data format:	Digital (plain text). The twelve survey reports are available as well (PDF)	
References:	When datasets from these surveys are used the following article must be cited: Fraile-Nuez, E., González-Dávila, M., Santana-Casiano, J. M., Arístegui, J., Alonso-González, I. J., Hernández-León, S., Blanco, M. J., Rodríguez-Santana, A., Hernández-Guerra, A., Gelado-Caballero, M. D., Eugenio, F., Marcello, J., de Armas, D., Domínguez-Yanes, J. F., Montero, M. F., Laetsch, D. R., Vélez-Belchí, P., Ramos, A., Ariza, A. V., Comas-Rodríguez, I. and Benítez-Barrios, V. M. 2012. The submarine volcano eruption at the island of El Hierro: physical-chemical perturbation and biological response. *Scientific Reports*, Vol. 2, No. 486. doi:10.1038/srep00486. Santana-Casiano, J. M., González-Dávila, M., Fraile-Nuez, E., de Armas, D., González, A. G., Domínguez-Yanes, J. F. and Escánez, J. 2013. The natural ocean acidification and fertilization event caused by the submarine eruption of El Hierro. *Scientific Reports*, Vol. 3, No. 1140, doi:10.1038/srep01140	

Additional information:
These surveys have carried out on board of the R/V *Ramón Margalef*.

For further information, see http://www.ideo-elhierro.ieo.es (accessed 27 March 2017).

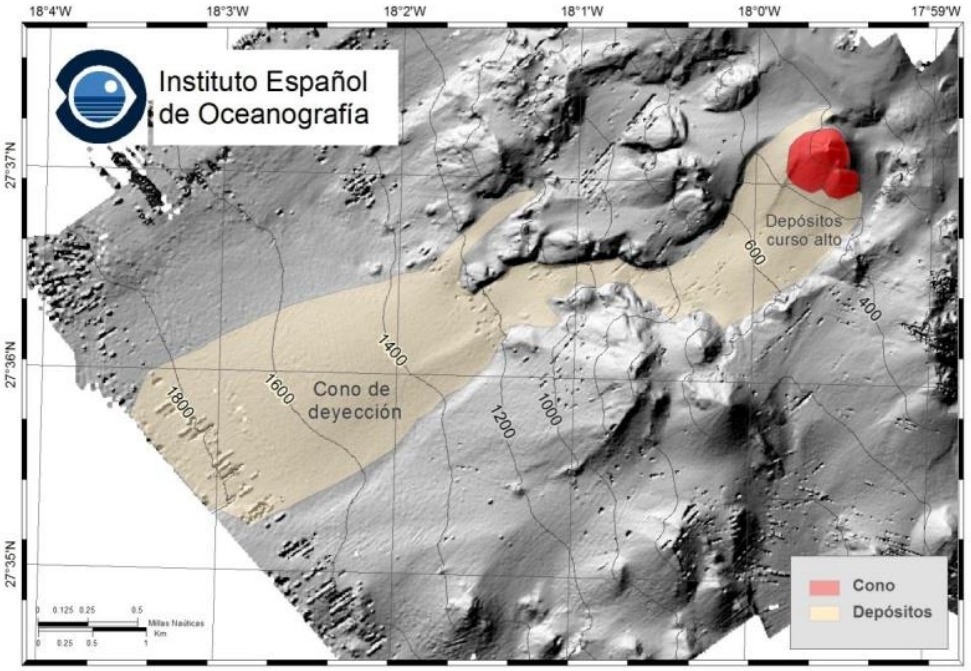


Figure 111. Map of the volcanic cone (in red) and associated deposits (in beige). Bathymetric chart (10 January 2012). Source: IEO.

SUBMARINE TAGORO VOLCANO POST-ERUPTIVE SURVEYS (VULCANO AND VULCANA PROJECTS)

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN
UNIVERSITY OF LA LAGUNA (ULL), SPAIN
MUSEO DE LA NATURALEZA Y EL HOMBRE DE TENERIFE (MNH), SPAIN

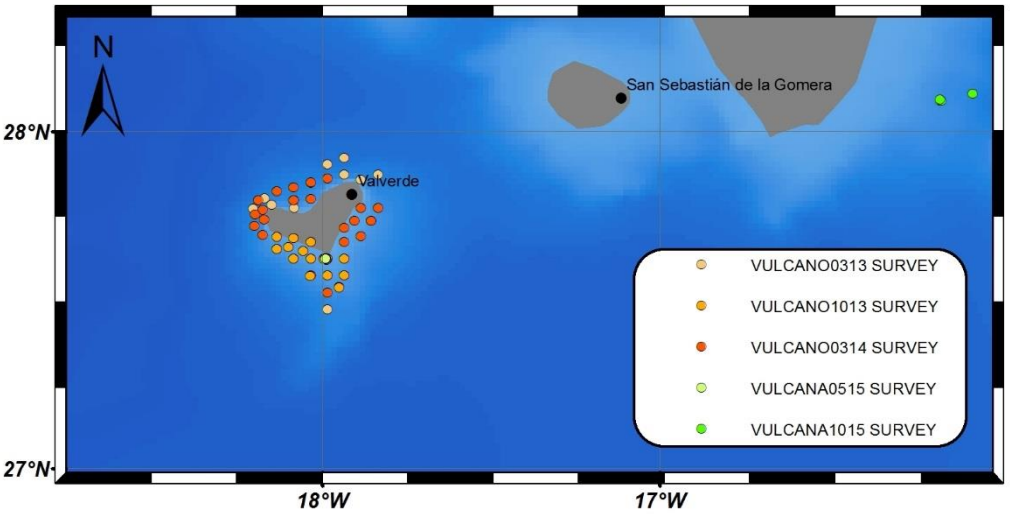


Figure 112. Distribution of the stations in the the first 5 surveys carried out under the frame of Vulcano and Vulcana projects, taking place in 2013-2015. Some stations in sucesive surveys are overlapped. Afterwards, sampling effort has been mainly concentrated in a relatively small area south of El Hierro Island, were Vulcana0515 stations can be observed overlapping stations of all the other surveys represented. A high resolution CTD stations grid has been carried out in that area for every single Vulcana cruise.

Resource abstract:

The main objective of Vulcano and Vulcana projects is to study from an interdisciplinary point of view the active degassing phase of the volcanic submarine eruption in El Hierro (Canary Islands).
Vulcano and Vulcano-II project belong to the Spanish National Plan of Research, Development and Innovation and they are led by the IEO (Code No. CTM2012-36317 and CTM2014-51837-R). The oceanographic surveys organized under this frame are: Vulcano0313, Vulcano1013, Vulcano0314, Vulcano1016 and Vulcano1117.
Vulcana projects are IEO funded projects in which also other areas of the Canarian archipelago are studied. The series of surveys organized under this frame are: Vulcana0515, Vulcana1015, Vulcana0316 and Vulcana0317.
Spanish Bank of Algae (BEA) participated just in Vulcano-I cruises (2013-2014).

Resource language: spa, eng

Keyword values: Oceanographic geographical features; Elevation

Variables available:	*Observed variables*	*Derived variables*
IEO data:	Conductivity	Density
	Salinity	Geostrophic velocity
	Temperature	Heat content
	Pressure	
	Oxygen	
	Current velocity	
	Fluorescence	
	Chlorophyll	
	Nutrients	
	Turbidity	

	Meteorological parameters
	Bathymetry
ULPGC data:	Total alkalinity (A_T)
	Total inorganic carbon (C_T)
	pH
	pCO_2
	Metals
	Organic matter
	Dissolved organic carbon (DOC)
	Particulated organic carbon (POC)
	Particulated organic nitrogen (PON)
	Coloured dissolved organic matter (CDOM)
	Microbial community structure
	Picoplankton, nanoplankton and microplankton composition
BEA data:	Microorganisms
ULL data:	Plankton abundance
	Metals
MNH data:	Plankton composition
IEO, ULL and/or MNH data:	Zooplankton
IEO and/or ULPGC data:	Phytoplankton
	Biomass and prokaryotes abundance
Geographic location:	18.3000°W – 17.5000°W 27.0000°N – 28.0000°N
Spatial resolution:	Variable
Temporal extent:	2013-03 / present
Temporal resolution:	n/a
Depth range/resolution:	From surface to seabed
Conditions for access & use:	Agreement with the appropriate institution
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Instituto de Oceanografia y Cambio Global, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain
Data via:	Contact: eugenio.fraile@ca.ieo.es Eugenio Fraile Nuez. Researcher, Instituto Español de Oceanografía Contact: magdalena.santana@ulgpc.es Magdalena Santana Casiano. Professor, Instituto de Oceanografía y Cambio Global, University of Las Palmas de Gran Canaria
Data format:	Digital (plain text)
References:	When datasets from these surveys are used, the appropriate institution must be acknowledged, including a mention to the reference number of the project and the funding sources, as for example: '"The data obtained under the frame of the VULCANO Project were funded by MINECO and FEDER (Code No. CTM2012-36317)"

Additional information:

These surveys have been carried out on board of the R/V *Ángeles Alvariño* and R/V *Ramón Margalef*. Scientific articles and surveys reports are available at: http://www.vulcanoelhierro.es/publicaciones (accessed 13 February 2017).

For further information, see http://www.vulcanoelhierro.es (accessed 13 February 2017).

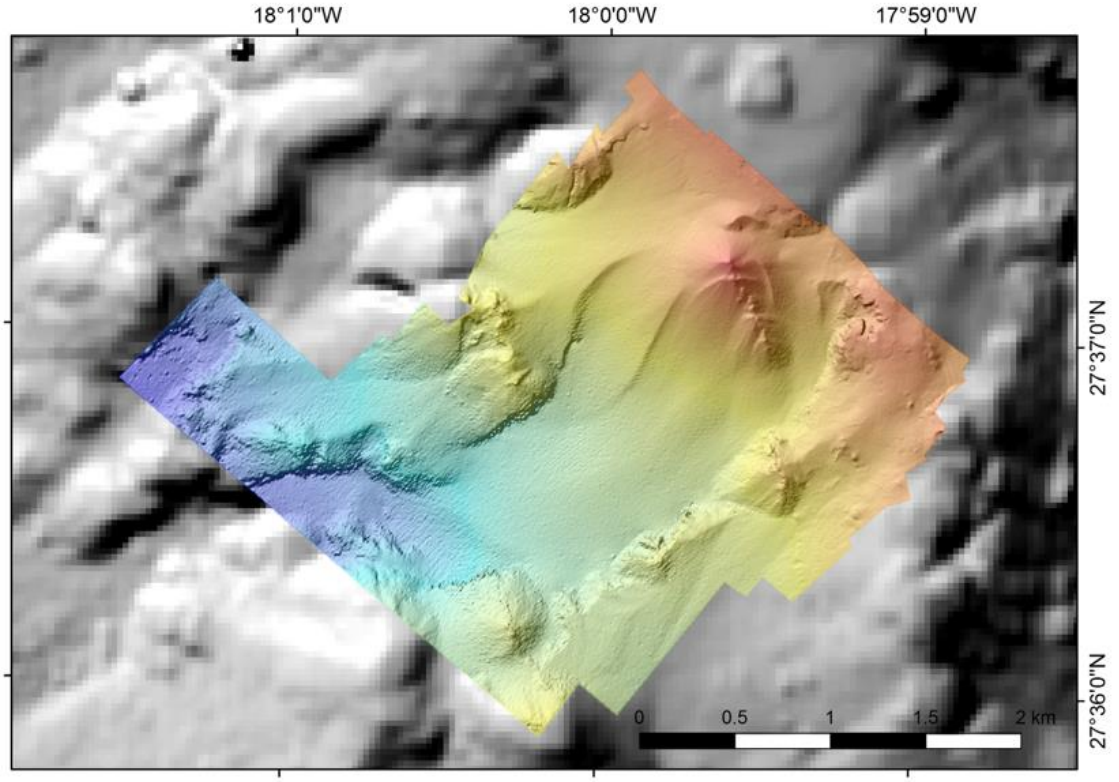
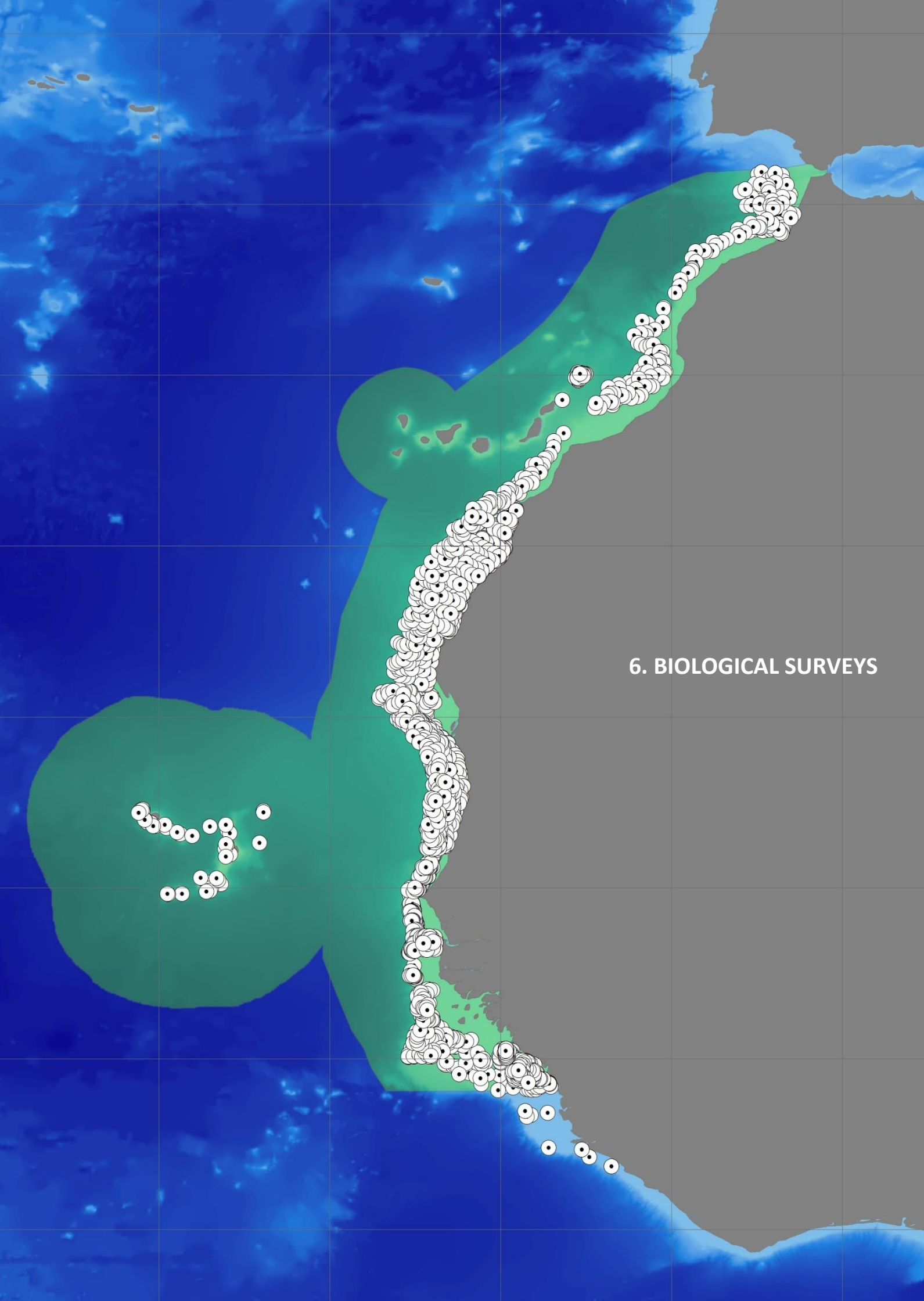


Figure 113. 1x1 m resolution multihaz bathymetry of the Tagoro submarine volcano (El Hierro Island) carried out during the VULCANO1016 survey. Source: IEO (Fraile-Nuez et al., 2016).



6. BIOLOGICAL SURVEYS

Instituto Español de Oceanografía fishing stations (white dots) included in this directory. The CCLME area is represented in green.

EAF-NANSEN PROJECT SURVEYS INVENTORY

INSTITUT NATIONAL DE RECHERCHES HALIEUTIQUES, MOROCCO
INSTITUT MAURITANIEN DE RECHERCHES OCEANOGRAPHIQUES ET DES PECHES, MAURITANIA
CENTRE DE RECHERCHES OCEANOGRAPHIQUES DE DAKAR-THIAROYE, SENEGAL
DEPARTMENT OF FISHERIES, THE GAMBIA
INSTITUTO NACIONAL DO DESENVOLVIMENTO DAS PESCAS, CABO VERDE
CENTRO DE INVESTIGAÇÃO PESQUEIRA APLICADA DE BISSAU, GUINEA-BISSAU
CENTRE NATIONAL DES SCIENCES HALIEUTIQUE DE BOUSSOURA, GUINEA
CENTRE DE RECHERCHE SCIENTIFIQUE DE CONAKRY-ROGBANÈ, GUINEA

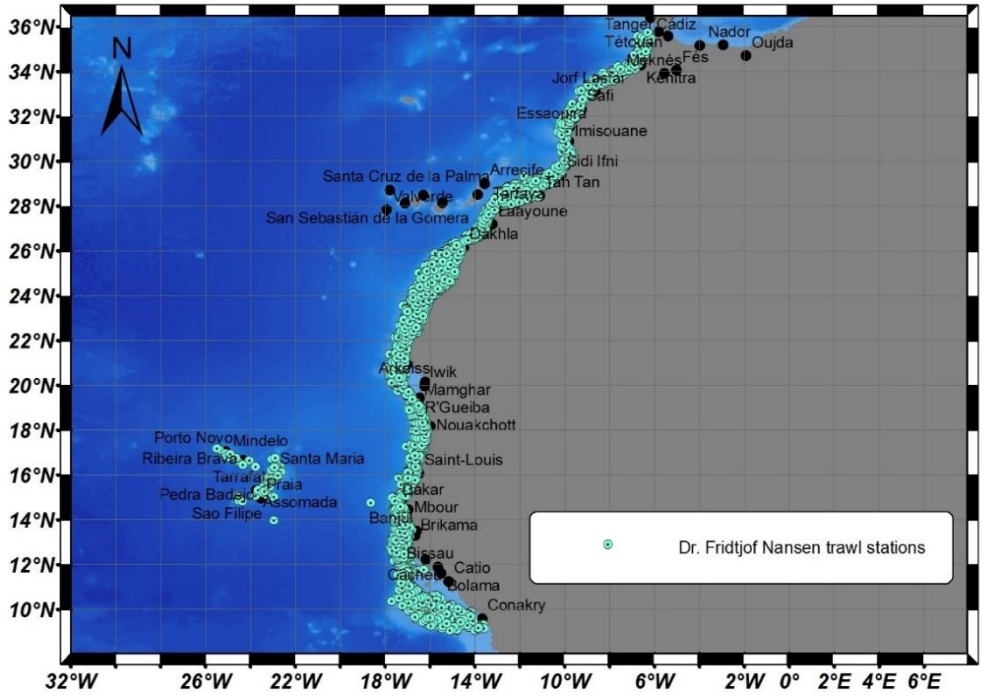


Figure 114. Area surveyed within this publication' target countries from 1994 to 2016. The map shows the trawl stations sampled along the survey tracks (3498 stations sampled from 1994 to 2016). Data Source: EAF-Nansen Project.

Resource abstract:

The long term objective of the EAF-Nansen project is to strengthen regional and country specific efforts to reduce poverty and create conditions to assist in the achievement of food security through development of sustainable fisheries management regimes and specifically through the application of the ecosystem approach to fisheries in a number of developing countries at global level, with an early emphasis on Sub-Saharan Africa.

The long-term objective could be achieved through the provision of support for the development and country driven application of the conceptual framework of the Ecosystem Approach to Fisheries (EAF) through capacity-building, promoting standardized data collection and monitoring, supporting policy development and management practices consistent with EAF principles and contributing to an expanded knowledge base.

The immediate objectives of the project are to provide the fisheries research institutions and management administrations in the participating countries with additional knowledge on their ecosystems for their use in planning and monitoring, and to further increase the acceptance and application of the key principles of the EAF. These are the following:

- The fisheries should be managed to limit their impact on the ecosystem to an acceptable level
- The ecological relationships between species should be maintained
- The management measures should be compatible across the entire distribution of the resource

- Precaution in decision-making and action is needed because the knowledge on ecosystems is incomplete
- Governance should ensure both human and ecosystem well-being and equity.

An inventory of the surveys conducted until 2016 by R/V *Dr. Fridtjof Nansen,* including those carried out in the CCLME and the GCLME (Guinea Current LME) regions has been made available.

Resource language: eng

Keyword values: Area management/restriction/regulation zones and reporting units; Oceanographic geographical features; Species distribution

Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data for:	Ecological diversity index
	Taxonomic identification	Relative abundance
	Depth range	Selectivity of bottom trawl
	Size, weight, sex and maturity by specimen	Richness (No. of species/station)
		Abundance (No. specimen/km^2)
	Zooplankton biomass	Yield (kg/h; kg/km^2)
	Chlorophyll a	Catch rates (kg/trawling)
	Silicate	
	Nitrate	
	Nitrite	
	Phosphate	
	Meteorological data	
	Current data (ADCP)	
CTD profiles:	Conductivity	
	Temperature	
	Oxygen	
	Fluorescence	

Geographic location: 25.468°W - 6.121°W 4.35°N - 35.727°N

Spatial resolution: Variable. 27 cruises in the target area up to February 2017

Temporal extent: 1994 / 2016

Depth range/resolution: CTD: from surface to 2000 m depth
Trawling: from surface to 1100 m depth

Conditions for access & use: Agreement with the country owner of the data

Limitations on public access: Yes

Responsible organization: Centre for Development Cooperation in Fisheries (CDCF), Institute of Marine Research (IMR), Bergen, Norway (coordinating organization)
Responsible organizations in this publication' target countries are:
Institut National de Recherche Halieutique, Casablanca, Morocco
Institut Mauritanien de Recherches Océanographiques et des Pêches, Nouadhibou, Mauritania
Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal
Fisheries Department, Banjul, The Gambia
Instituto Nacional do Desenvolvimento das Pescas, Mindelo, Cabo Verde
Centro de Investigação Pesqueira e Aplicada de Bissau, Bissau, Guinea-Bissau
Centre National des Sciences Halieutique de Boussoura, Conakry, Guinea
Centre de Recherche Scientifique de Conakry-Robagnè, Conakry, Guinea

Data via: http://www.imr.no/forskning/utviklingssamarbeid/tokt/en

Contact: jens.otto.krakstad@imr.no
Jens-Otto Krakstad. Researcher, CDCF

Contact: ines.dias.bernardes@imr.no
Inês Dias Bernardes. Technician, CDCF

Data format: Variable: fisheries data is accessible through a free access software (but can also be exported to text); most of data exists in raw format; and CTD, acoustic biomass, meteorological and fisheries data can be exported to plain text

References: Data Source: Institute of Marine Research, Bergen, Norway. Toktdatabase, Norsk Marine datasenter. Database restricted to public. Accessed on 20-02-2017

Additional information:

During the period 1994-2010 only, 27 surveys were carried out in the CCLME countries waters, 4 of which extended to the Guinea-Bissau and Guinea waters, and 2 surveys in Guinea-Bissau and Guinea waters under the frame of GCLME project. Further information on all the surveys carried out off West Africa with the R/V *Dr. Fridtjof Nansen* during the years 1994-2010 is available at the CDCF website: http://www.imr.no/forskning/utviklingssamarbeid/tokt/en (accessed 1 March 2017).

A metadata visualization tool, and exports from the survey activity, can be accessed from: http://webprod1.nodc.no:8080/nansis/index.html (accessed 14 April 2017).

Post-survey reports were produced for every R/V *Dr. Fridtjof Nansen* survey (PDF) and can be consulted at: https://brage.bibsys.no/xmlui/handle/11250/106981 (accessed 1 March 2017).

Cruise summary information from 2005 on can be consulted from: http://www.fao.org/in-action/eaf-nansen/topic/18011/en (accessed 1 March 2017).

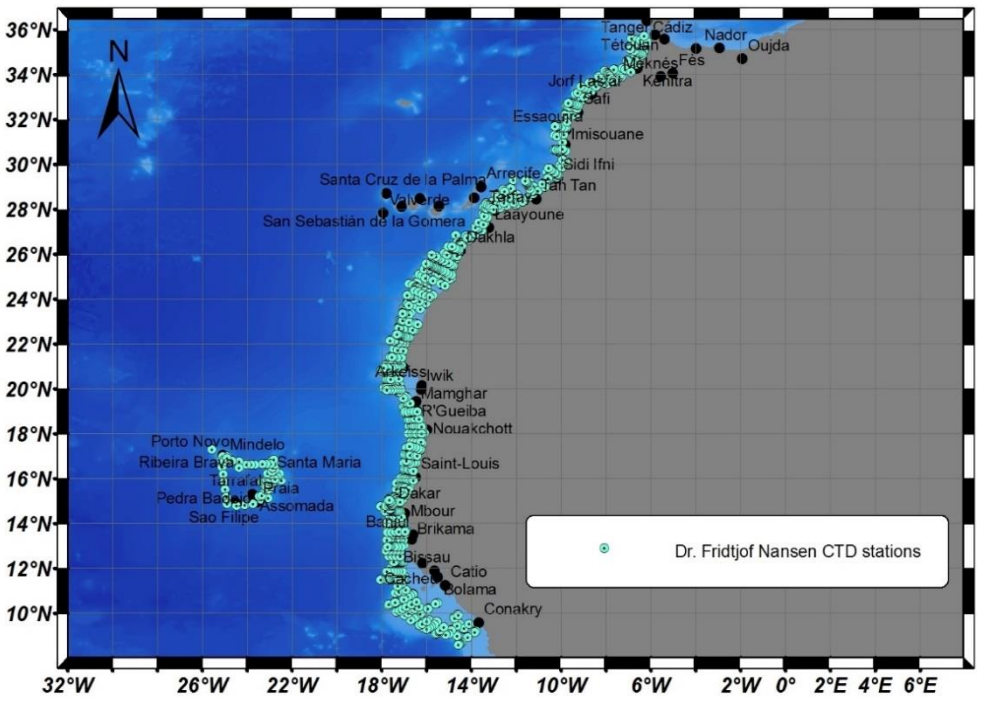


Figure 115. Area surveyed within this publication' target countries from 1994 to 2016. The map shows the CTD stations sampled along the survey tracks (3562 stations sampled from 1994 to 2016). Data Source: EAF-Nansen Project.

BIOLOGICAL AND ENVIRONMENTAL PARAMETERS FROM CERESCOR

CENTRE DE RECHERCHE SCIENTIFIQUE DE CONAKRY ROBAGNÈ (CERESCOR), GUINEA

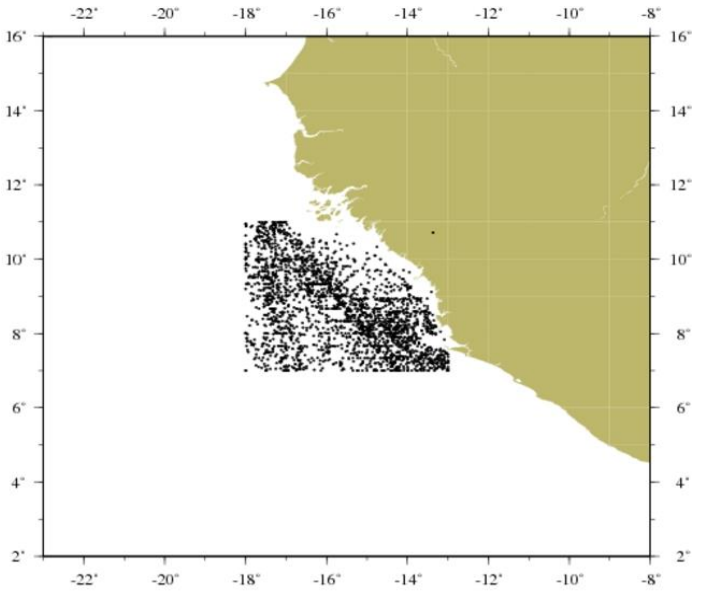


Figure 116. Distribution of biological and environmental samples taken in the continental shelf of Guinea. *Source: Diakité, S., CERESCOR.*

Resource abstract:

Among the objectives of the CERESCOR, a study of the spatio-temporal distribution of biological and environmental parameters in the coastal area and the continental shelf of Guinea has been carried out, including the dominant big groups and plankton species: phytoplankton, zooplankton and ichthyoplankton (see Fig. 116).

The basic objective of the research to the CERESCOR, together with the CNSHB, is to conduct a systematic study of the composition, the biology of the groups and the most common species of plankton in the coastal area, the research on the fish stock, as well as the variability spatio-temporal temperature and salinity.

Resource language:	eng, fre, rus
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features
Variables available:	*Observed variables* Plankton groups and species Air temperature Rainfall Water temperature Density Salinity Ocean currents Waves
Geographic location:	18.00°W – 13.00°W 7.00°N – 10.30°N
Spatial resolution:	n/a
Temporal extent:	1981 / 2010
Temporal resolution:	Daily, monthly and annual data
Depth range/resolution:	From surface to 4529 m depth
Conditions for access & use:	Access to metadata is defined by the CERESCOR and by the database manager. Some data is Open Access
Limitations on public access:	No

Responsible organization:	Centre de Recherche Scientifique de Conakry Rogbanè (CERESCOR), Conakry, Guinea
Data via:	Contact: kandebangourai@gmail.com; bkandey@yahoo.fr Kandè Bangoura. Database manager, CERESCOR
Data format:	Digital (Excel, ASCII, netCDF, JPEG, JPG, GIF, PNG, TIF) and paper (reports, plots and maps)
References:	When datasets from the CERESCOR are used, the appropriate publications indicated by the CERESCOR will be cited

FLIPPER 7601 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

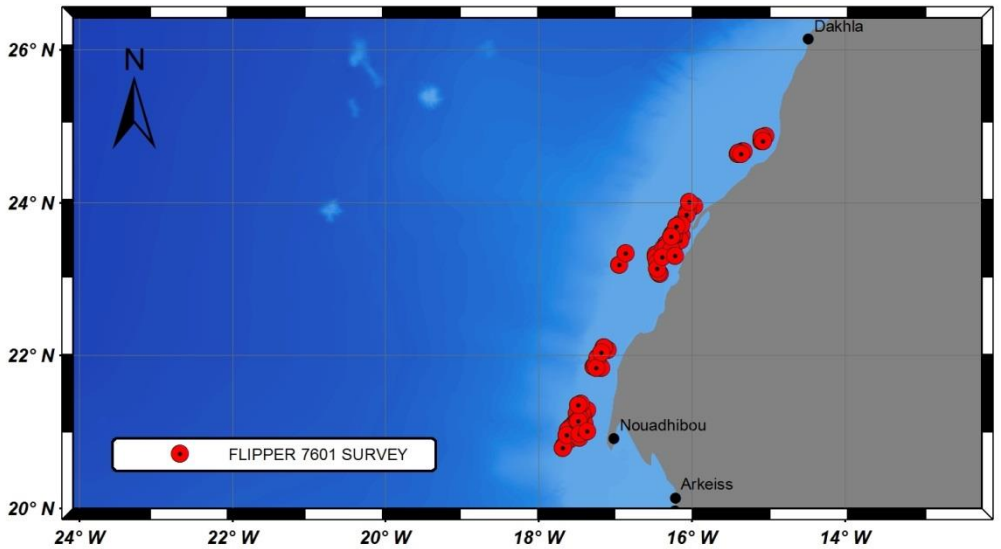


Figure 117. Distribution of the 33 bottom trawl stations in FLIPPER 7601 survey, carried out in the continental shelf off Western Sahara (15.0333°N – 17.6833°N).

Resource abstract:
Study of demersal stocks in the continental shelf off Western Sahara. Studies of cephalopods for different commercial categories, composition analysis and discards.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.6833°W – 15.0333°W	20.7833°N –24.8667°N
Spatial resolution:	33 stations	
Temporal extent:	1976-01-23 / 1976-02-18	
Temporal resolution:	n/a	
Depth range/resolution:	From 20 m to 167 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	Partial results in: Bravo-de-Laguna, J., Ariz-Tellería, J., Santana, J. C. 1980. *Informe sobre la distribución de los rendimientos en la pesquería de cefalópodos del Banco Sahariano, entre Cabo Bojador (26°N) y Cabo*	

Blanco (21°N). Instituto Español de Oceanografía, Spain (unpublished).
Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1976. *Discardings of fishes in the cephalopods fishery off West Africa*. ICES CM 1976/K:32.
Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1977. *Discarding of Sparids in the bottom trawl fishery off Northwest Africa.* ICES CM 1977/G:12

Additional information:
The gear used was the same as the standard one used by the Spanish fleet fishing cephalopods (40 mm. mesh size in the cod end).

FLIPPER 7701 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

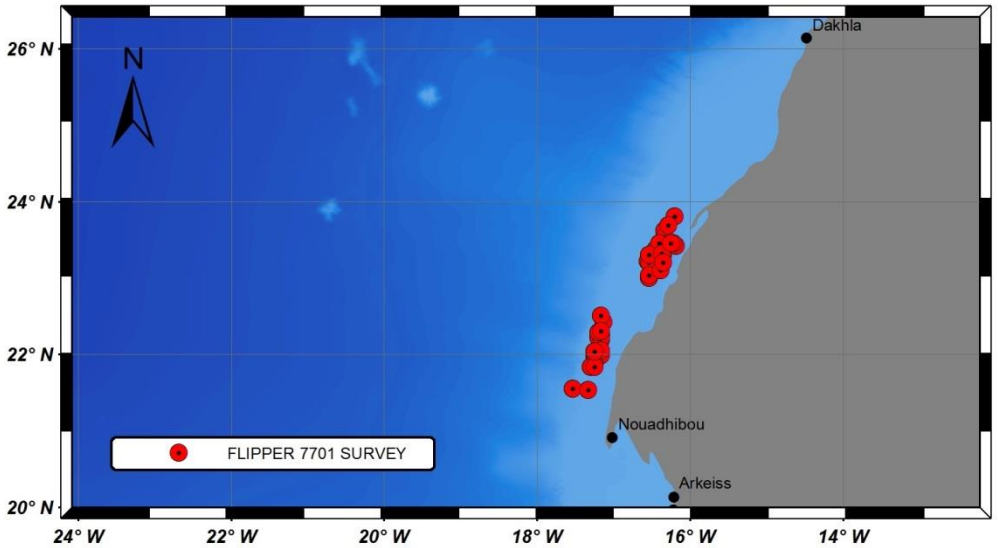


Figure 118. Distribution of the 46 bottom trawl stations in FLIPPER 7701 survey, carried out in the continental shelf off Western Sahara (21.5333°N – 23.6833°N).

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Studies of cephalopods for different commercial categories, tagging of cephalopods and composition and discards size analysis.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.5333°W – 16.1833°W	21.5333°N – 23.6833°N
Spatial resolution:	46 stations	
Temporal extent:	1977-01-24 / 1977-02-06	
Temporal resolution:	n/a	
Depth range/resolution:	From 12 m to 59 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	Partial results in: Bravo-de-Laguna, J., Ariz-Tellería, J., Santana, J. C. 1980. *Informe sobre la distribución de los rendimientos en la pesquería de cefalópodos del Banco Sahariano, entre Cabo Bojador (26°N) y Cabo*	

Blanco (21°N). Instituto Español de Oceanografía, Spain (unpublished).
Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1977. *Discarding of Sparids in the bottom trawl fishery off Northwest Africa.* ICES CM 1977/G:12.
Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1977. *Length Distributions of the Fishes Discarded in the bottom trawl fishery off Northwest Africa*. ICES CM 1977/G:13

Additional information:
The fishing gear employed was the standard one used by the Spanish cephalopods fishing fleet (40 mm mesh size in the cod end).

FLIPPER 7705 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

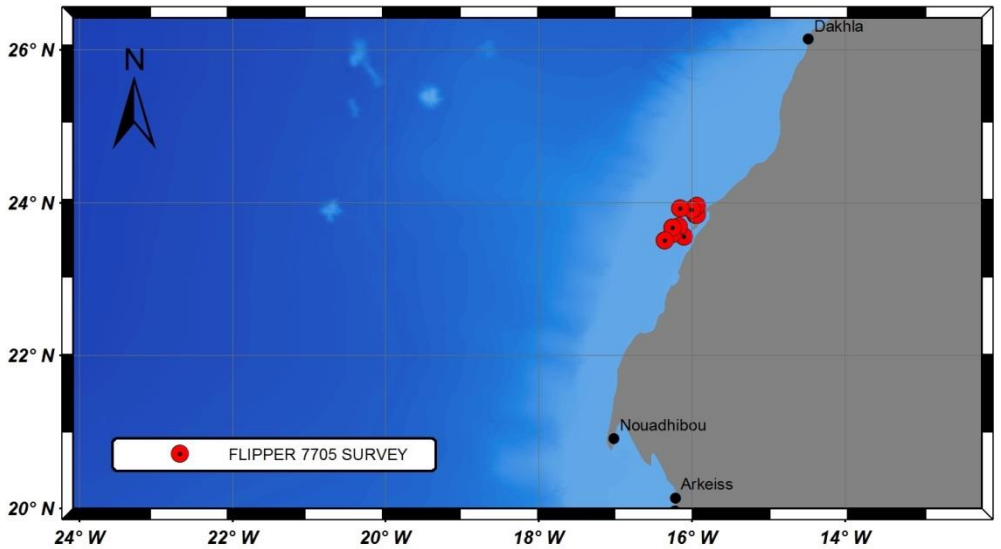


Figure 119. Distribution of the 10 bottom trawl stations in FLIPPER 7705 survey, carried out in the continental shelf off Western Sahara (23.5000°N – 23.9500°N).

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Studies of cephalopods for different commercial categories, tagging of cephalopods and composition and discards size analysis.

Resource language:	spa	
Keyword values:	Species distribution	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	16.3500°W – 15.9333°W	23.5000°N – 23.9500°N
Spatial resolution:	10 stations	
Temporal extent:	1977-05-01 / 1977-05-08	
Temporal resolution:	n/a	
Depth range/resolution:	From 22 m to 31 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	Partial results in: Bravo-de-Laguna, J., Ariz-Tellería, J., Santana, J. C. 1980. *Informe sobre la distribución de los rendimientos en la pesquería de cefalópodos del Banco Sahariano, entre Cabo Bojador (26°N) y Cabo*	

Blanco (21°N). Instituto Español de Oceanografía, Spain (unpublished).
Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1977. *Discarding of Sparids in the bottom trawl fishery off Northwest Africa.* ICES CM 1977/G:12.
Bravo-de-Laguna, J., Fernández, M. A. R., Santana, J. C. 1977. *Length Distributions of the Fishes Discarded in the bottom trawl fishery off Northwest Africa*. ICES CM 1977/G:13

Additional information:
The fishing gear employed was the standard one used by the Spanish cephalopods fishing fleet (40 mm mesh size in the cod end).

IBN SINA 8002 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

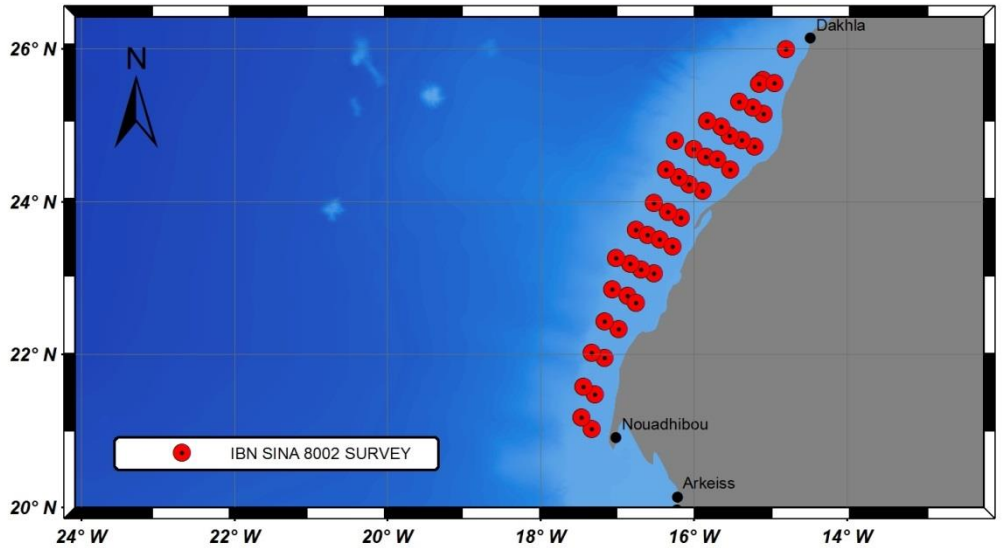


Figure 120. Distribution of the 42 bottom trawl stations in IBN SINA 8002 survey, carried out in the continental shelf off Western Sahara (21.0167°N – 25.9833°N).

Resource abstract:
Investigation of demersal stocks in the continental shelf. A Spanish - Moroccan Cooperative Research Programme started at the beginning of 1980. Within this programme different scientific surveys in the area were carried out to evaluate the stock of cephalopods and sea breams in the region, as well as to investigate the selectivity of the most commonly type of gear used by the cephalopods fishery in that area, and other important commercial fish species. This survey also was part of the project FAO-ISPM: UNPD/FAO/ISPM/MOR 78.018 to estimate and monitor the Moroccan fishery resources (Ariz-Tellería, 1980*a*).

The objectives of this survey were to define, at the beginning of the fishing season in 1980:

- Cephalopod aseemblage and species distribution
- The study of growth, mortality and reproduction of the main cephalopod species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Temperature Weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.4500°W – 14.7833°W	21.0167°N – 25.9833°N
Spatial resolution:	42 stations	
Temporal extent:	1980-03-05 / 1980-03-13	
Temporal resolution:	n/a	
Depth range/resolution:	From 24 m to 108 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	

Limitations on public access: Yes
Responsible organization: Instituto Español de Oceanografía, Madrid, Spain
Data via: Contact: director@md.ieo.es
Head, Instituto Español de Oceanografía
Data format: Digital (plain text and survey report in PDF format)
References: Ariz-Tellería, J. 1980. *Informe de los trabajos realizados en la campaña "IBN SINA 8002"*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain (unpublished)

Additional information:
The survey was carried out in the R/V *Ibn Sina* (ISPM). The fishing gear is described in the following figure.

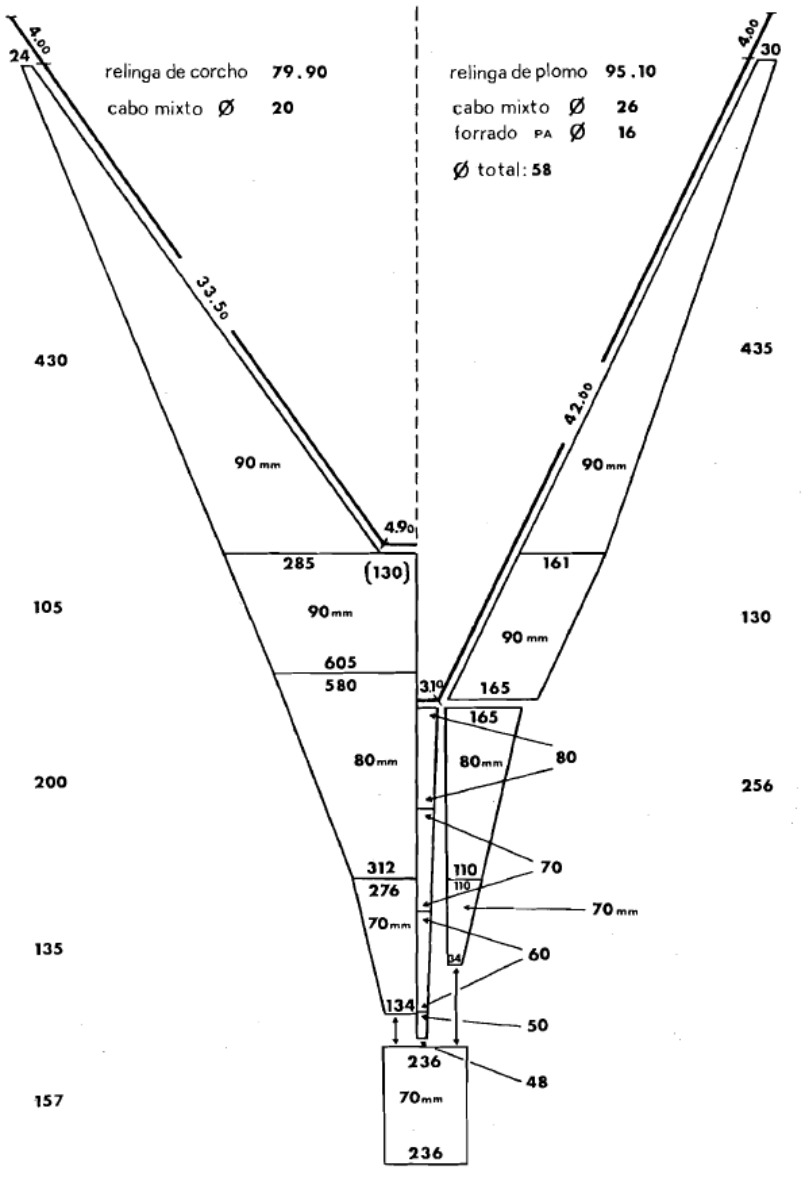


Figure 121. The fishing gear used in this survey is of the type used by the Spanish Cephalopods fishing fleet operating in that area. The material used in its construction is polyamide. In selectivity experiences, it was applied the covered cod-end method (Ariz-Tellería, 1980a).

IBN SINA 8005 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

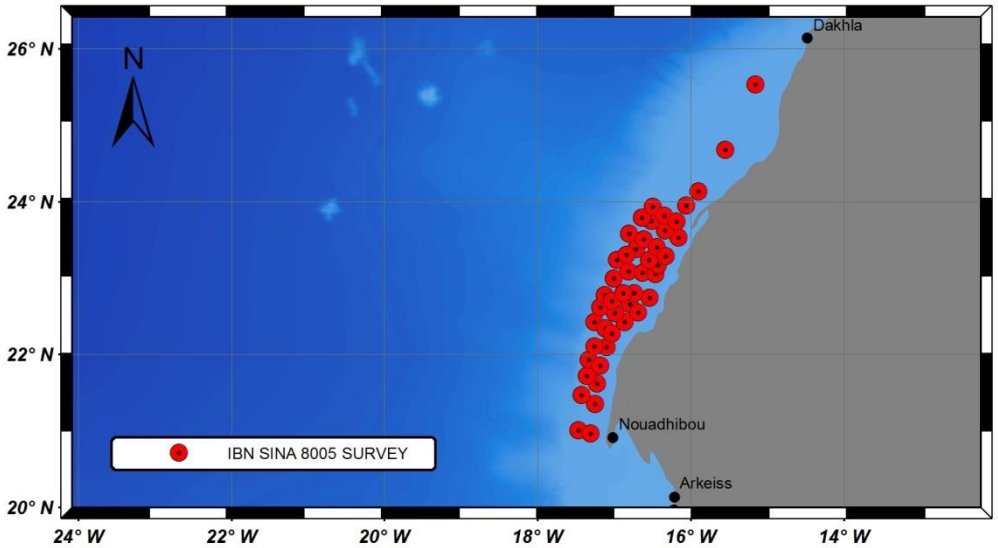


Figure 122. Distribution of the 68 bottom trawl stations in IBN SINA 8005 survey, carried out in the continental shelf off Western Sahara (20.9667°N – 25.5333°N).

Resource abstract:
Investigation of demersal stocks in the continental shelf. This was the second survey carried out in the area under the frame of Spanish - Moroccan Cooperative Research Programme, aiming to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of the most commonly type of gear used by the cephalopods fishery in that area, and other important commercial fish species (Ariz-Tellería, 1980*b*).

The objectives of this survey were:

- To complete the distribution study of main cephalopods species
- To obtain biological data of cephalopods and seabreams
- To determine the selectivity of the gear on each species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Temperature Weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.4667°W – 15.1500°W	20.9667°N – 25.5333°N
Spatial resolution:	68 stations	
Temporal extent:	1980-05-15 / 1980-05-22	
Temporal resolution:	n/a	
Depth range/resolution:	From 21 m to 107 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	

Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text and survey report in PDF format)
References:	Ariz-Tellería, J. 1980. *Informe de la Estancia en el ISPM de Casablanca y de los trabajos realizados en la campaña IBN SINA 8005*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain (unpublished)

Additional information:

The survey was carried out on the R/V *Ibn Sina* (ISPM). The fishing gear used in this survey was of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 121). In selectivity experiences, it was applied the covered cod-end method.

IBN SINA 8104 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

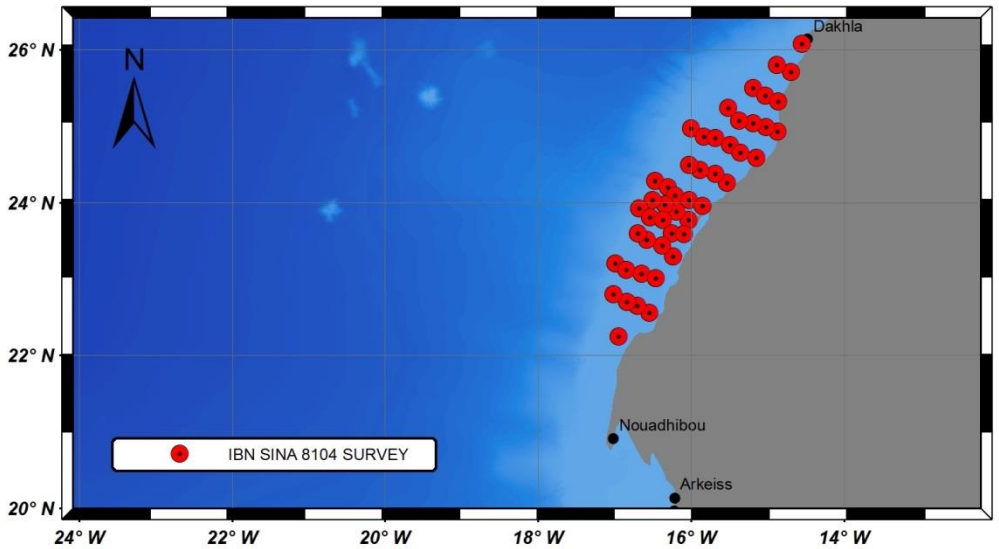


Figure 123. Distribution of the 48 bottom trawl stations in IBN SINA 8104 survey, carried out in the continental shelf off Western Sahara (22.2500°N – 26.1000°N).

Resource abstract:

Investigation of demersal stocks in the continental shelf. Under the frame of the Fishing Agreement between Spain and Morocco, scientific surveys in the area were carried out to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of bottom trawl studies (Delgado-de-Molina and Goñi, 1981).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic distribution Depth range Size, weight, sex and maturity by species Meteorology	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.0167°W – 14.5333°W	22.2500°N – 26.1000°N
Spatial resolution:	48 stations	
Temporal extent:	1981-05-29 / 1981-06-10	
Temporal resolution:	n/a	
Depth range/resolution:	From 18 m to 98 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text and survey report in PDF format)	
References:	Delgado-de-Molina, A. and Goñi, R. 1981. *Informe de los trabajos realizados en la campaña IBN SINA 8104*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 48 pp. (unpublished)	

Additional information:
This survey has been carried out in the R/V *Ibn Sina*. The fishing gear used in it is of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 121).

IBN SINA 8105 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

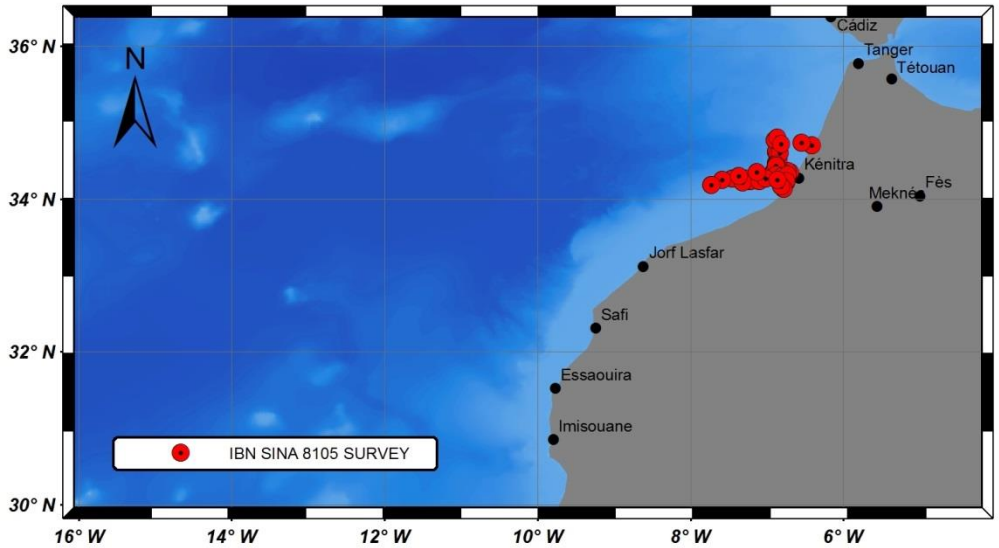


Figure 124. Distribution of the 40 bottom trawl stations in IBN SINA 8105 survey, carried out in the continental shelf off Morocco (34.1667°N – 34.8333°N).

Resource abstract:

This survey was carried out within the Fishing Agreement between Spain and Morocco (Goñi and Delgado-de-Molina, 1981). Selectivity studies for hake and shrimps in the continental shelf and talus were carried out.

Resource language:	spa
Keyword values:	Species distribution
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, sex and maturity by species
Geographic location:	7.8333°W – 6.3333°W 34.1667°N – 34.8333°N
Spatial resolution:	40 stations
Temporal extent:	1981-06-23 / 1981-07-02
Temporal resolution:	n/a
Depth range/resolution:	From 39 m to 700 m
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (survey report in PDF format)
References:	Goñi, R. and Delgado-de-Molina, A. 1981. *Informe de los trabajos realizados en la campaña IBN SINA 8105.* Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 67 pp. (unpublished)

Additional information:

This survey has been carried out on the R/V *Ibn Sina*. The fishing gears used in this survey were Marisco and fresco kind.

IBN SINA 8109 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

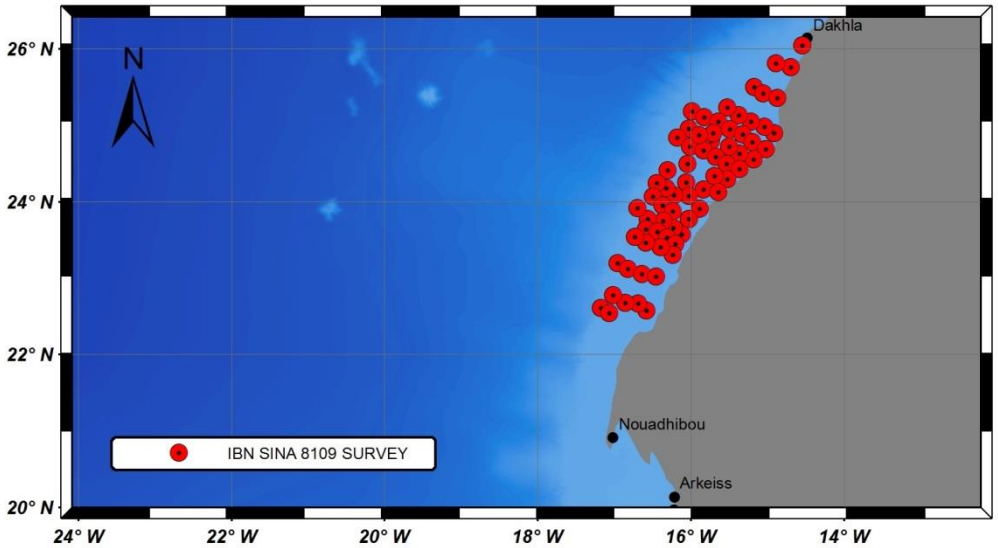


Figure 125. Distribution of the 71 bottom trawl stations in IBN SINA 8109 survey, carried out in the continental shelf off Western Sahara (22.5000°N – 26.0333°N).

Resource abstract:
Investigation of demersal stocks in the continental shelf. Survey carried out within the Fishing Agreement between Spain and Morocco, to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of bottom trawl gears. This survey is especially relevant because it was the first one carried out during autumn. Therefore, it was aimed to complete the spatial-temporal distribution, to determine the spawing-season, etc. of the different studied species (Delgado-de-Molina and Samper, 1981).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, sex and maturity by species Meteorology	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.1667°W – 14.5333°W	22.5000°N – 26.0333°N
Spatial resolution:	71 stations	
Temporal extent:	1981-11-14 / 1981-11-23	
Temporal resolution:	n/a	
Depth range/resolution:	From 17 m to 106 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text and survey report in PDF format)	

References: Delgado-de-Molina, A. and Samper, M. 1981. *Informe de los trabajos realizados en la campaña IBN SINA 8109*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 68 pp. (unpublished)

Additional information:

This survey has been carried out on the R/V *Ibn Sina*. The fishing gear used in this survey is of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 121).

IBN SINA 8203 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

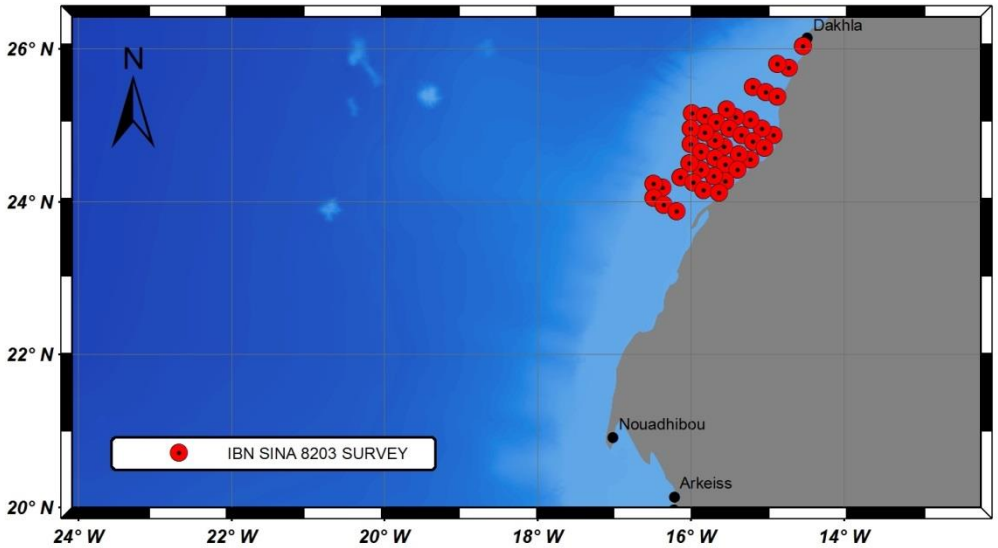


Figure 126. Distribution of the 47 bottom trawl stations in IBN SINA 8203 survey, carried out in the continental shelf off Western Sahara (23.8667°N – 26.0333°N).

Resource abstract:
Investigation of demersal stocks in the continental shelf. Survey carried out within the Fishing Agreement between Spain and Morocco, to evaluate the stock of cephalopods and sea breams in the region, as well as the selectivity of bottom trawl gears (Goñi and Santana, 1982).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	16.4833°W – 14.5333°W	23.8667°N – 26.0333°N
Spatial resolution:	47 stations	
Temporal extent:	1982-03-16 / 1982-03-20	
Temporal resolution:	n/a	
Depth range/resolution:	From 16 m to 92 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text and survey report in PDF format)	
References:	Goñi, R. and Santana, J. C. 1982. *Informe de los trabajos realizados en la campaña IBN SINA 8203.* Instituto Español de Oceanografía, S. C de Tenerife, Spain: 69 pp. (unpublished)	

Additional information:
This survey has been carried out on the R/V *Ibn Sina*. The fishing gear used in this survey is of the type used by the Spanish Cephalopods fishing fleet operating in that area (Fig. 121). In selectivity experiences, it was applied the covered cod-end method.

CONGEL 8905 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

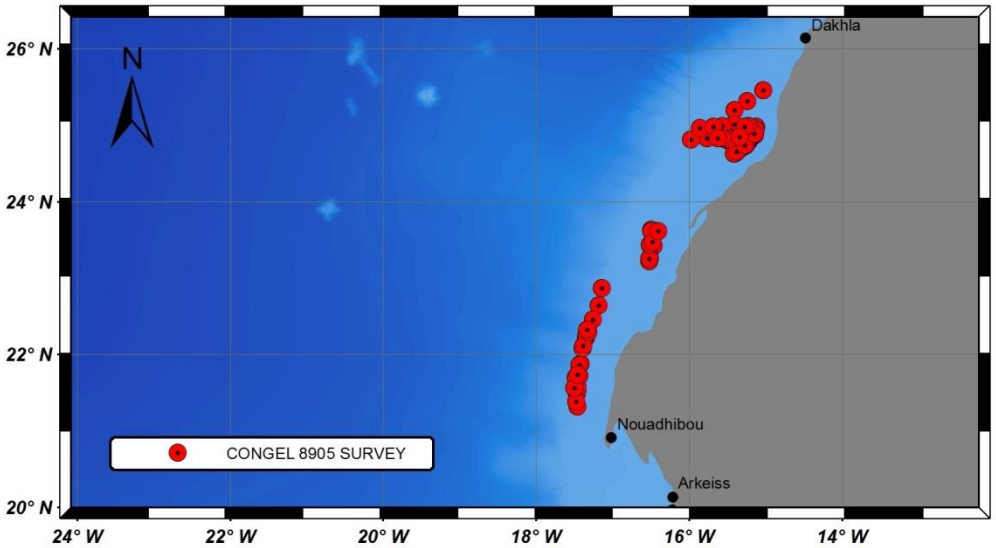


Figure 127. Distribution of the 107 bottom trawl stations in CONGEL 8905 survey, carried out in the continental shelf off Western Sahara (21.3010°N – 25.4567°N).

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. Its main objective was the prospection of commercial cephalopod species. To this aim, the cephalopods assemblage catches, fishing effort, distribution and biologic parameters were studied.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Weight, total body length, wet weight and/or sex by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.4967°W – 15.2833°W	21.3010°N – 25.4567°N
Spatial resolution:	107 stations	
Temporal extent:	1989-05-12 / 1989-05-29	
Temporal resolution:	n/a	
Depth range/resolution:	From 14 m to 130 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged	

CONGEL 8911 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

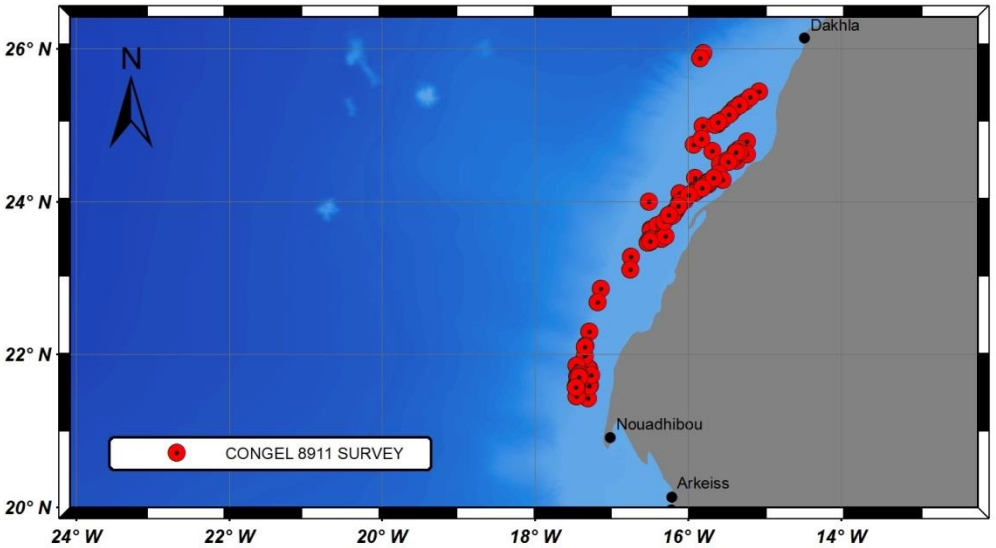


Figure 128. Distribution of the 125 bottom trawl stations in CONGEL 8911 survey, carried out in the continental shelf off Western Sahara (21.4250°N – 25.9383°N).

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. Its main objective had been the prospection of commercial cephalopods. The research focussed on the cephalopods catches, fishing effort, distribution and biologic parameters.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, total body length, wet weight and sex by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.4683°W – 15.0683°W	21.4250°N – 25.9383°N
Spatial resolution:	125 stations	
Temporal extent:	1989-11-04 / 1989-11-25	
Temporal resolution:	n/a	
Depth range/resolution:	From 13 m to 90 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the IEO and the ISPM must be acknowledged	

CONGEL 9006 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

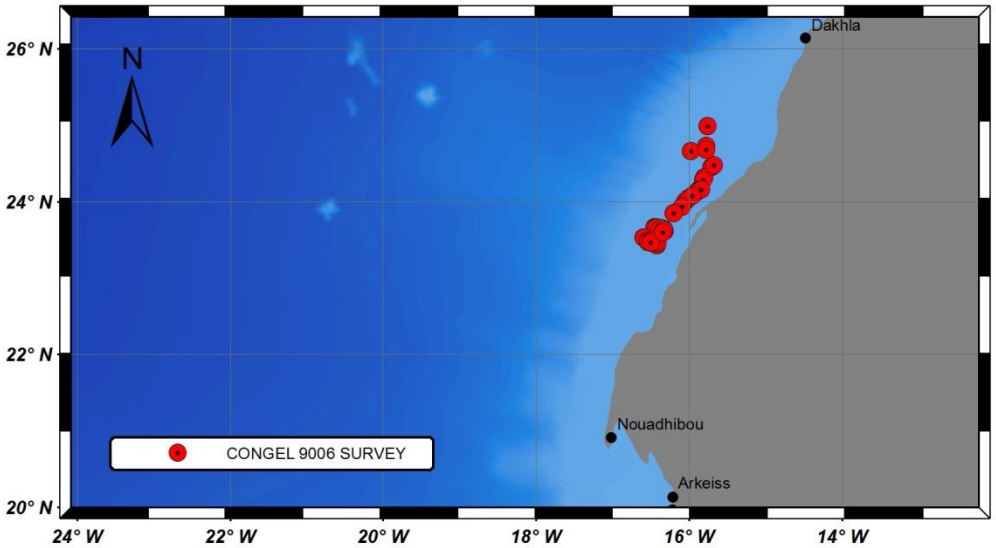


Figure 129. Distribution of the 35 bottom trawl stations in CONGEL 9006 survey, carried out in the continental shelf off Western Sahara (23.4237°N – 24.9867°N).

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. The main objective was the prospection of commercial cephalopods. The research focused on cephalopods catches, fishing effort, distribution and biologic parameters.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, wet weight, eviscerated weight and sex by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	16.5975°W – 15.6738°W	23.4237°N – 24.9867°N
Spatial resolution:	35 stations	
Temporal extent:	1990-06-21 / 1990-06-26	
Temporal resolution:	n/a	
Depth range/resolution:	From 27 m to 64 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the IEO and the ISPM must be acknowledged	

REPOS BIOLOGIQUE 9010 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

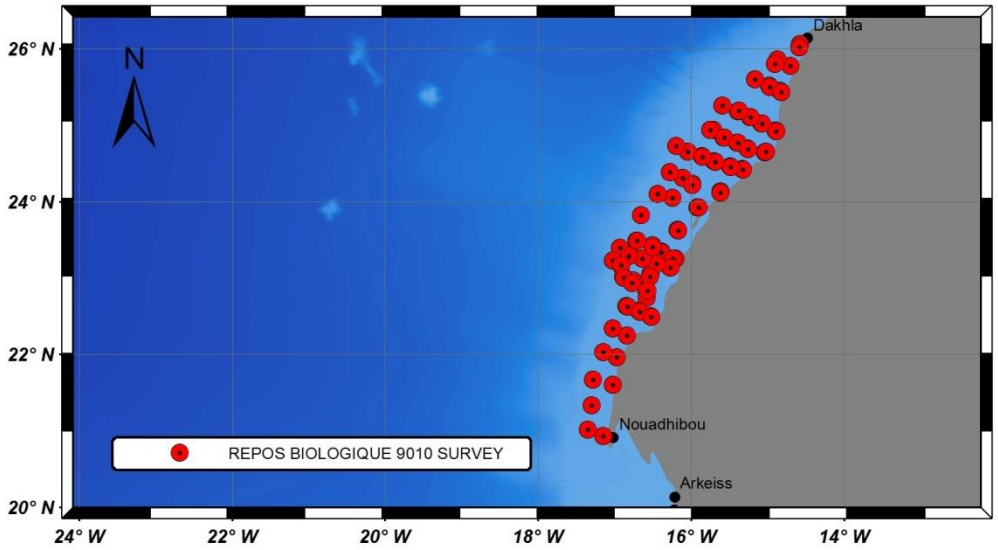


Figure 130. Distribution of the 116 bottom trawl stations in REPOS BIOLOGIQUE 9010 survey, carried out in the continental shelf off Western Sahara (20.9167°N – 26.0500°N).

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods resources. Biologic samples were taken from octopus, cuttlefish and squid.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, total body length, wet weight, sex and maturity by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.3500°W – 14.5667°W	20.9167°N – 26.0500°N
Spatial resolution:	116 stations	
Temporal extent:	1990-09-29 / 1990-10-27	
Temporal resolution:	n/a	
Depth range/resolution:	From 17 m to 105 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged	

Additional information:
Biological samples were taken from 844 specimens of octopus, 86 specimens of cuttlefish and 1911 specimens of squid.

REPOS BIOLOGIQUE 9110 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

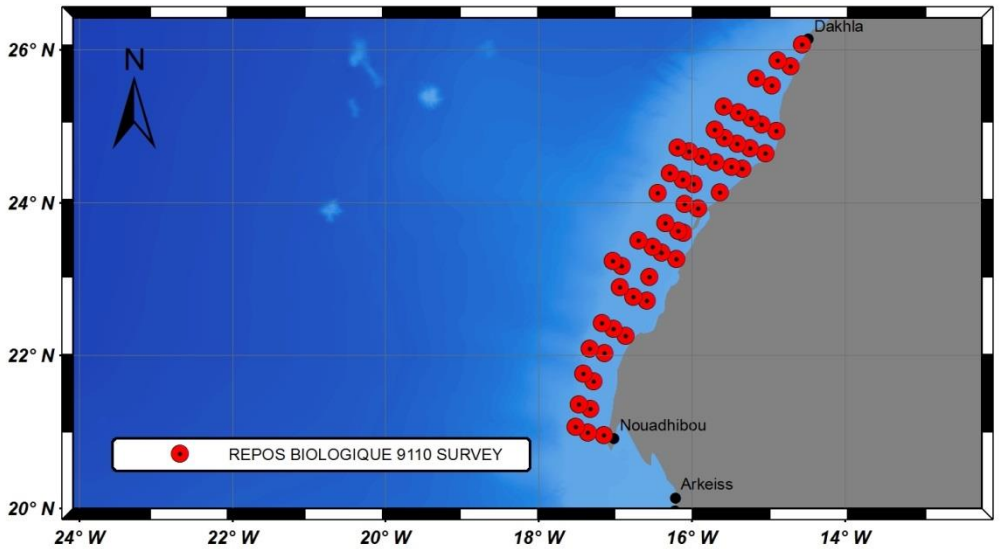


Figure 131. Distribution of the 53 bottom trawl stations in REPOS BIOLOGIQUE 9110 survey, carried out in the continental shelf off Western Sahara (20.9550°N – 26.0683°N).

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods resources. Biologic samples were taken from octopus, cuttlefish and squid.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, total body length, wet weight, sex and maturity by species Sea surface temperature (SST)	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.5133°W – 14.5583°W	20.9550°N – 26.0683°N
Spatial resolution:	53 stations	
Temporal extent:	1991-10-04 / 1991-10-25	
Temporal resolution:	n/a	
Depth range/resolution:	From 18 m to 107 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged	

Additional information:
Biological samples were taken from 1878 specimens of octopus, 125 specimens of cuttlefish and 1715 specimens of squid.

REPOS BIOLOGIQUE 9305 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

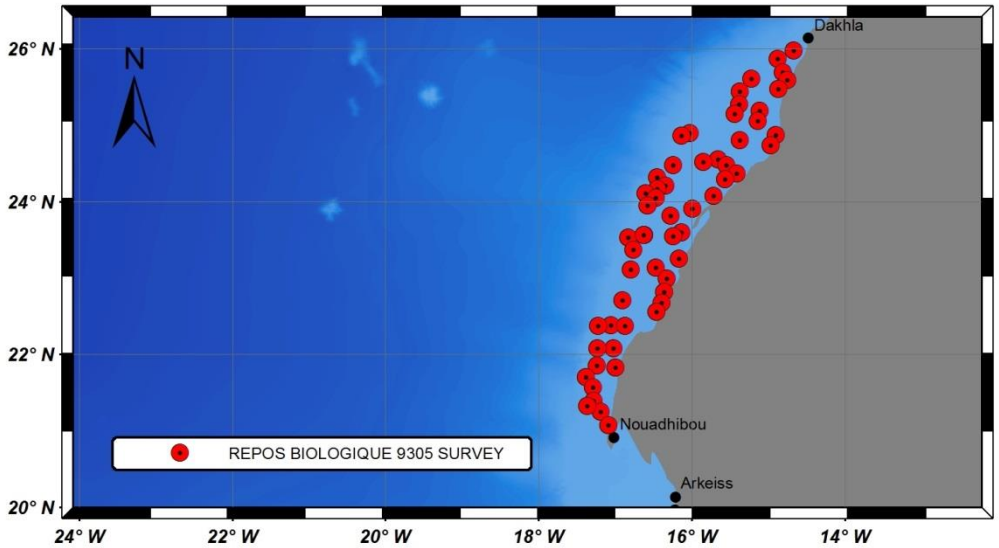


Figure 132. Distribution of the 58 bottom trawl stations in REPOS BIOLOGIQUE 9305 survey, carried out in the continental shelf off Western Sahara (21.0700°N – 25.9767°N).

Resource abstract:
Study of demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods and fish stocks during the biological rest period which was established by the Fishing Agreement between the European Economic Community (EEC) and Morocco, as well as selectivity studies. Biological samples were taken from octopus, cuttlefish, squid and some species of fishes.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, total body length, wet weight, sex and maturity by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.3800°W – 14.6667°W	21.0700°N – 25.9767°N
Spatial resolution:	58 stations	
Temporal extent:	1993-05-02 / 1993-05-23	
Temporal resolution:	n/a	
Depth range/resolution:	From 20 m to 104 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged	

Additional information:
This survey was carried out on board of the R/V *Charif Al Idrissi*. The fishing gear chosen for the cruise was of the Spanish kind for cephalopods bottom trawl net.

Biological samples were taken from 4245 specimens of octopus, 125 specimens of cuttlefish, 830 specimens of squid and 1245 specimen of fish.

REPOS BIOLOGIQUE 9310 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

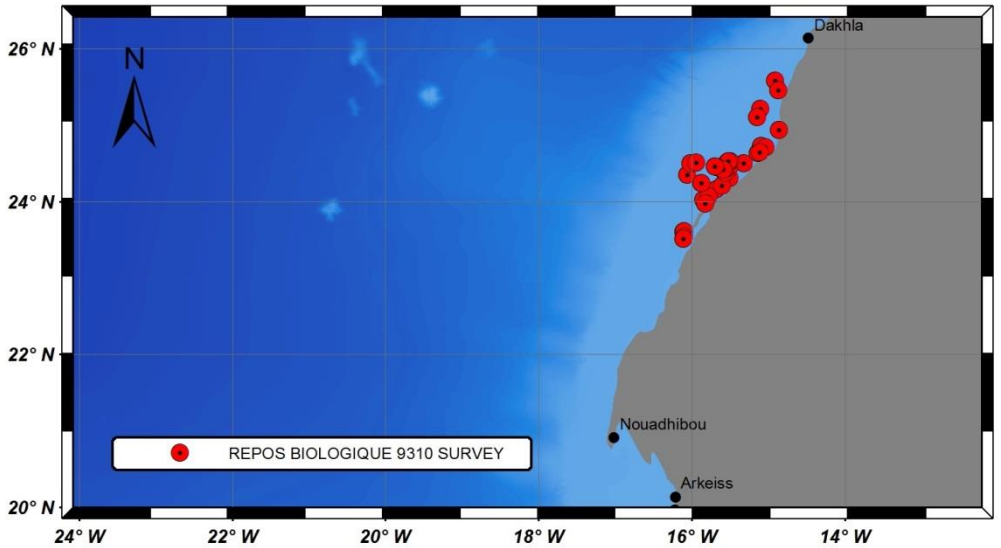


Figure 133. Distribution of the 41 bottom trawl stations in REPOS BIOLOGIQUE 9310 survey, carried out in the continental shelf off Western Sahara (23.5058°N – 25.5773°N).

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf off Western Sahara. The objective was to evaluate the cephalopods and fish stocks during the biological rest period which was established by the Fishing Agreement between the EEC and Morocco, as well as selectivity studies. Biological samples were taken from octopus, cuttlefish, squid and some species of fishes.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, total body length, wet weight, sex and maturity by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	16.1095°W – 14.8500°W	23.5058°N – 25.5773°N
Spatial resolution:	41 stations	
Temporal extent:	1993-10-12 / 1993-10-24	
Temporal resolution:	n/a	
Depth range/resolution:	From 18 m to 37 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged	

Additional information:
This survey was carried out by two cephalopod freezer trawlers: *Agdal IV* and *Al-Hariri*. The fishing gear chosen for the cruise were the Spanish and Korean nets for demersal cephalopods. Biological samples were taken from 397 specimens of octopus.

CONGEL 9404 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

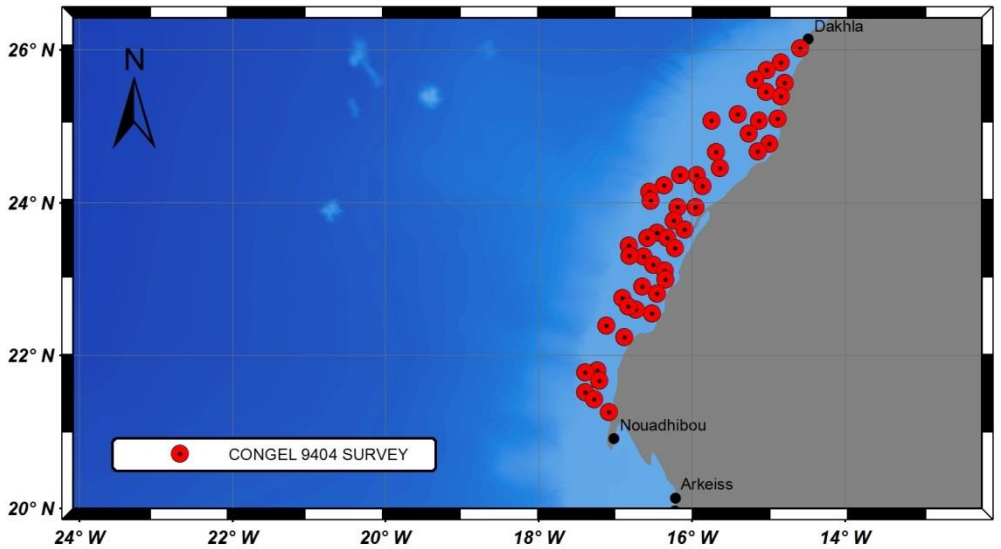


Figure 134. Distribution of the 58 bottom trawl stations in CONGEL 9404 survey, carried out in the continental shelf off Western Sahara (21.2566°N – 26.0150°N).

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Monitoring of the biological recovery period for cephalopods and selectivity experiences for seabreams.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic distribution Depth range Total body length, wet weight, sex and maturity by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.3917°W – 14.5833°W	21.2566°N – 26.0150°N
Spatial resolution:	58 stations	
Temporal extent:	1994-03-29 / 1994-04-07	
Temporal resolution:	n/a	
Depth range/resolution:	From 25 m to 104 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged	

CONGEL 9902 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT SCIENTIFIQUE DES PECHES MARITIMES (ISPM), MOROCCO

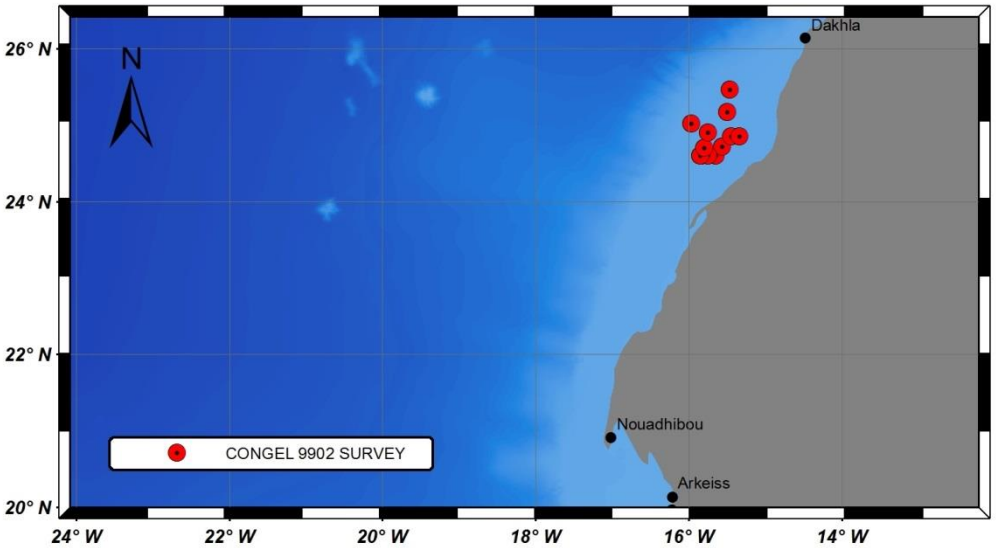


Figure 135. Distribution of the 13 bottom trawl stations in CONGEL 9902 survey, carried out in the continental shelf off Western Sahara (24.6000°N – 25.4667°N).

Resource abstract:

Study of demersal stocks in the continental shelf off Western Sahara. Genetic studies of octopus, cuttlefish and squid.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size, weight, total body length, sex and maturity by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	15.9667°W – 15.3333°W	24.6000°N – 25.4667°N
Spatial resolution:	13 stations	
Temporal extent:	1999-02-25 / 1999-02-28	
Temporal resolution:	n/a	
Depth range/resolution:	From 35 m to 110 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the organization concerned in Morocco	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text)	
References:	When using the data, the Instituto Español de Oceanografía and the Institut Scientifique des Pêches Maritimes must be acknowledged	

Additional information:

This survey has been carried out under the umbrella of the project “Cephalopods resources dynamics: Patterns in environmental and genetic variation” (FAIR-CT96-1520).

MAROC-0411 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE (INRH), MOROCCO

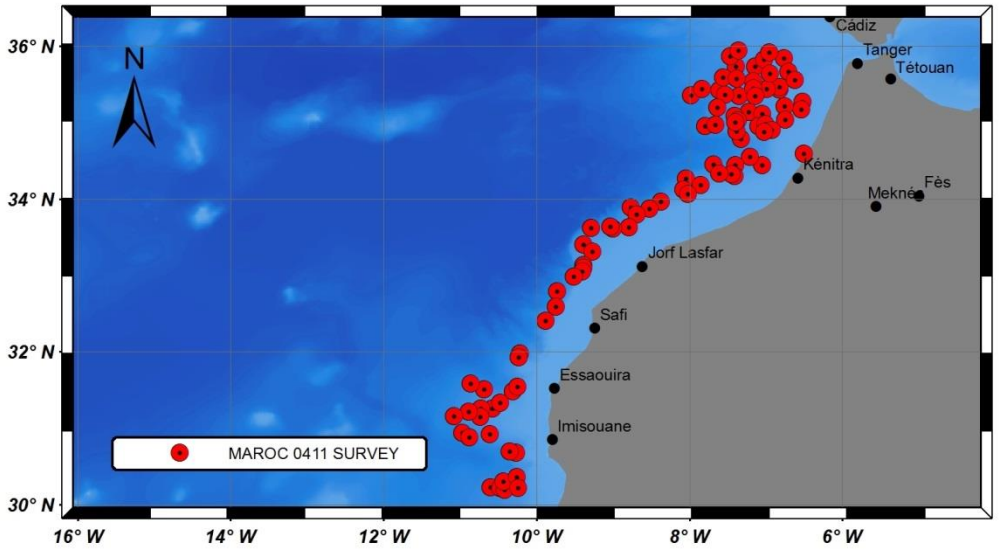


Figure 136. Distribution of the 93 trawling stations in Maroc-0411 survey (30.1002°N – 35.9385°N).

Resource abstract:

Under the frame of the scientific and technique cooperation between Spain and Morocco, and in relation to the deep waters prospection by trawl in the Atlantic coast of Morocco and the Western Sahara, three surveys have been planed to study and evaluate deep demersal resources and megabenthos (fish, crustaceans and cephalopods) in the littoral strip between Tangier and Cape Blanc, within 2004 and 2006 (Ramos et al., 2005). The main objective was the determination of yields.

Resource language:	spa, fre	
Keyword values:	Species distribution; Habitats and biotopes; Elevation	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species Sizes all fishes and other selected invertebrates Biological data of selected species Faunistic collections demersal fishes and benthic invertebrates Pictures collection Multibeam records	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	11.0637°W – 6.3724°W	30.1002°N – 35.9385°N
Spatial resolution:	93 stations	
Temporal extent:	2004-11-13 / 2004-12-14	
Temporal resolution:	n/a	
Depth range/resolution:	From 500 m to 2000 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and Institut National de Recherche Halieutique (INRH)	
Limitations on public access:	Yes	

Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut National de Recherche Halieutique, Casablanca, Morocco
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía Contact: faraj@inrh.ma Abdelmalek Faraj. Director, Institut National de Recherche Halieutique
Data format:	Digital (plain text)
References:	Ramos, A., Faraj, A., Balguerías, E., Belcaid, S., Burgos, C., Gómez, M., González, J. F., Hakim, M., Hernández, C., Manchih, K., Meiners, C., Ramil, F., Salmerón, F., Sanz, J. L. and Settih, J. 2005. *Informe de resultados de la Campaña 'Maroc-0411'. Prospección por arrastre de los recursos demersales profundos del norte de Marruecos*. Inf. Int. IEO-SGPM (MAPA), Málaga, Spain: 230 pp + Annexes (unpublished)

Additional information:

The fishing gears chosen for the cruise were the Lofoten commercial trawl.

Other devices: Multibeam echosounder EM-300.

MAROC 0511 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE (INRH), MOROCCO

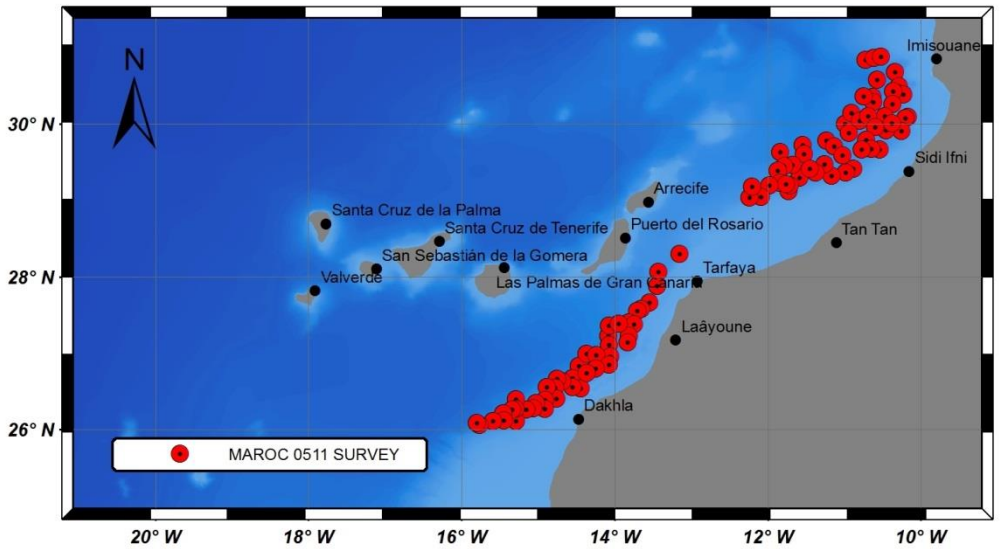


Figure 137. Situation of the 95 bottom trawl stations in Maroc 0511 survey (26.0596°N – 30.9160°N).

Resource abstract:

Under the frame of the scientific and technique cooperation between Spain and Morocco, and in relation to the deep waters prospection by trawl in the Atlantic coast of Morocco and the Western Sahara, three surveys have been planed to study the littoral strip between Tangier and Cape Blanc, within the time period 2004-2006. This was the second survey undertaken.

The objectives of these surveys were (Hernández-González et al., 2006):

- To study the bathymetry of the seabed
- To evaluate deep demersal stocks.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data for cephalopods, crustaceans, fishes and main groups of benthic invertebrates: Taxonomic identification (to species level when it was possible) Depth range Size composition of catches Size, weight, sex and maturity by species Temperature	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	15.7490°W – 10.1691°W	26.0596°N – 30.9160°N
Spatial resolution:	95 stations	
Temporal extent:	2005-11-12 / 2005-12-14	
Temporal resolution:	n/a	
Depth range/resolution:	From 500 m to 1867 m depth	

Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Institut National de Recherche Halieutique (INRH)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut National de Recherche Halieutique, Casablanca, Morocco
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía Contact: faraj@inrh.ma Abdelmalek Faraj. Director, Institut National de Recherche Halieutique
Data format:	Digital (plain text)
References:	Hernández-González, C. L., Faraj, A., Balguerías, E., Belcaid, S., Burgos, C., Cansado, S., Fernández, L., González, J. F., Jiménez, P., Manchih, K., Meiners, C., Muñoz, A., Nuño, L., Presas, C., Ramos, A., Salmerón, F., Settih, J. and Soto, E. 2006. *Informe Final de la campaña MAROC 0511 para la prospección por arrastre de los recursos demersales profundos en aguas del centro de Marruecos*. Instituto Español de Oceanografía and Institut National des Recherches Halieutiques, S. C. de Tenerife, Spain: 526 pp. (unpublished)

Additional information:

The survey has been carried out on the R/V *Vizconde de Eza*. The fishing gear chosen for the cruise was the Lofoten bottom trawl net.

MAROC 0611 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT NATIONAL DE RECHERCHE HALIEUTIQUE (INRH), MOROCCO

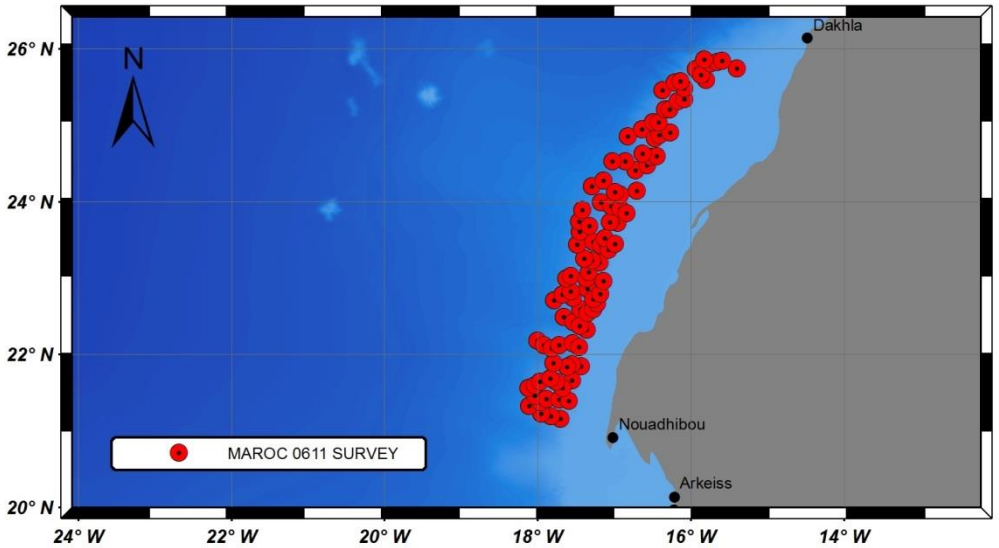


Figure 138. Situation of the 99 bottom trawl stations in Maroc 0611 survey (21.1510°N – 25.8900°N).

Resource abstract:

Under the frame of the scientific and technique cooperation between Spain and Morocco, and in relation to the deep waters prospection by trawl in the Atlantic coast of Morocco and the Western Sahara, three surveys have been planed to study the littoral strip between Tangier and Cape Blanc, within the time period 2004-2006.

This was the third survey undertaken, and it covered the waters of the southern zone of Western Sahara littoral strip.

The objectives of these surveys have been (Hernández-González, 2007):

- To study the bathymetry of the seabed
- To prospect and to evaluate deep demersal stocks.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data for cephalopods, crustaceans, fishes and main groups of benthic invertebrates: Taxonomic identification (to species level when it was possible) Depth range Size composition of catches Size, weight, sex and maturity by species Temperature	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	18.1237°W – 15.3925°W	21.1510°N – 25.8900°N
Spatial resolution:	99 stations	
Temporal extent:	2006-11-12 / 2006-12-12	

Temporal resolution:	n/a
Depth range/resolution:	From 207 m to 1860 m depth
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Institut National de Recherche Halieutique (INRH)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut National de Recherche Halieutique, Casablanca, Morocco
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía Contact: faraj@inrh.ma Abdelmalek Faraj. Director, Institut National de Recherche Halieutique
Data format:	Digital (plain text)
References:	Hernández-González, C. L. 2007. *Informe Preliminar de la campaña Maroc 0611 de prospección por arrastre de los recursos demersales profundos en aguas del sur de Marruecos*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain. (unpublished)

Additional information:
The survey has been carried out on the R/V *Vizconde de Eza*. The fishing gear chosen for the cruise was the Lofoten bottom trawl net.

AL AWAM 9810 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCEANOGRAPHIQUES ET DES PECHES (IMROP), MAURITANIA

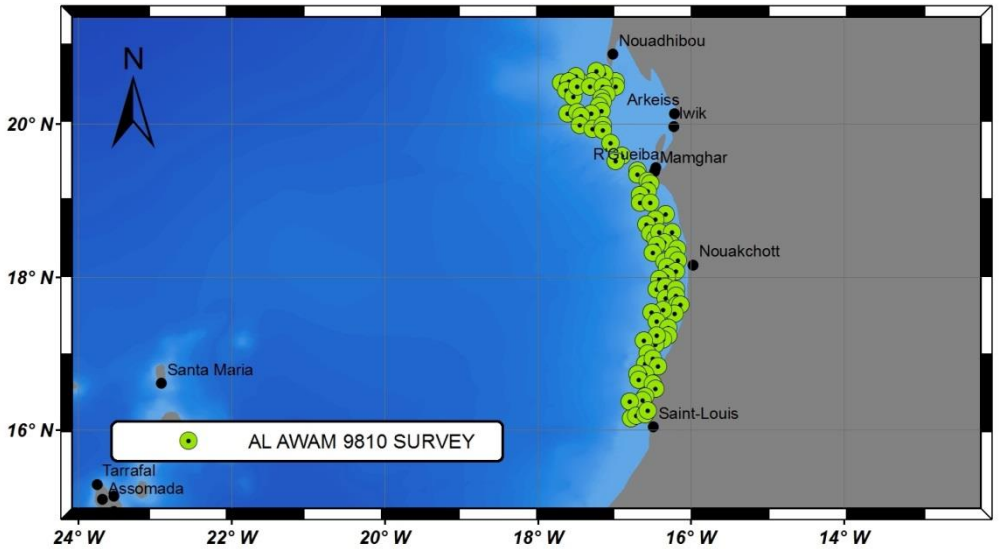


Figure 139. Situation of the 91 bottom trawl stations in Al Awam 9810 survey, carried out in the continental shelf off Mauritania (16.1500°N – 20.9833°N).

Resource abstract:

Study of demersal stocks in waters of Mauritania.

Resource language:	spa	
Keyword values:	Species distribution; Oceanographic geographical features	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Weight, sex and maturity by species Beaks pH Temperature Wind speed Current velocity	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.7000°W – 16.1333°W	16.1500°N – 20.9833°N
Spatial resolution:	91 stations	
Temporal extent:	1998-10-11 / 1998-10-23	
Temporal resolution:	n/a	
Depth range/resolution:	From 10 m to 200 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut Mauritanien des Recherches Océanographiques, Nouadhibou, Mauritania	
Data via:	Contact: director@ieo.es Head, Instituto Español de Oceanografía	

Data format:	Digital (plain text)
References:	When using the data, the Instituto Español de Oceanografía and the Institut Mauritanien des Recherches Océanographiques must be acknowledged

AL AWAM 9910 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCEANOGRAPHIQUES ET DES PECHES (IMROP), MAURITANIA

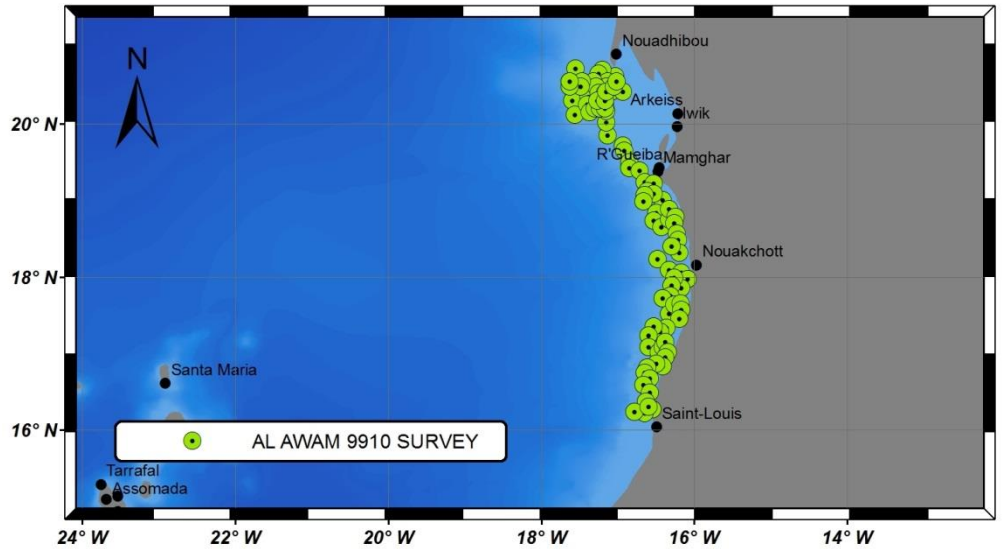


Figure 140. Situation of the 99 bottom trawl stations in Al Awam 9910 survey (16.2167°N – 20.9167°N).

Resource abstract:

Study of demersal stocks in waters of Mauritania.

Resource language:	spa	
Keyword values:	Species distribution; Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data: Taxonomic identification Depth range Size, weight, sex and maturity by species Beaks pH Temperature Salinity Wind speed Current velocity	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.6333°W – 16.0833°W	16.2167°N – 20.9167°N
Spatial resolution:	99 stations	
Temporal extent:	1999-10-12 / 1999-10-28	
Temporal resolution:	n/a	
Depth range/resolution:	From 12 m to 110 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut Mauritanien des Recherches Océanographiques, Nouadhibou, Mauritania	
Data via:	Contact: director@ieo.es	

	Head, Instituto Español de Oceanografía
Data format:	Digital (plain text)
References:	When using the data, the Instituto Español de Oceanografía and the Institut Mauritanien des Recherches Océanographiques must be acknowledged

MAURIT 1107 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCEANOGRAPHIQUES ET DES PECHES (IMROP), MAURITANIA

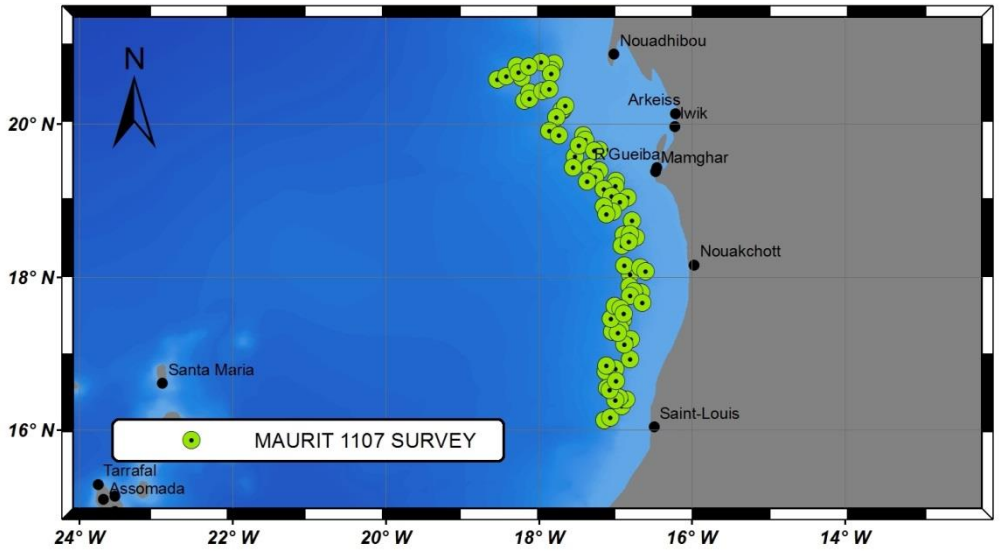


Figure 141. Situation of the 77 bottom trawl stations in Maurit 1107 survey (16.1242°N – 20.8022°N).

Resource abstract:

Ecosystems study in the continental shelf and shelf break in Mauritania waters. Prospection and evaluation of demersal stocks. The main objective was to determine the yield of cephalopods, crustaceans and some fish species in that area. Benthos population analyses have been undertaken (Hernández-González et al., 2010).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables* Georeferenced data for cephalopods, crustaceans, fishes and main groups of benthic invertebrates: Taxonomic identification (to species level when it was possible) Depth range Size composition of catches Size, weight, sex and maturity by species Temperature (in some fishing stations conductivity was also obtained)	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	18.5377°W – 16.6065°W	16.1242°N – 20.8022°N
Spatial resolution:	77 stations	
Temporal extent:	2007-11-14 / 2007-12-15	
Temporal resolution:	n/a	
Depth range/resolution:	From 403 m to 1824 m depth	

Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut Mauritanien des Recherches Océanographiques, Nouadhibou, Mauritania
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía Contact: mahfoudht@yahoo.fr Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques
Data format:	Digital (plain text)
References:	Hernández-González, C. L., Bouzouma, M. O., Burgos, C., Hernández-Rodríguez, E. and Cheikhna, S. Y. O. 2010. *Informe de la campaña Maurit-1107 de prospección por arrastre de los recursos demersales profundos en aguas de la República Islámica de Mauritania.* Instituto Español de Oceanografía and Institut Mauritanien des Recherches Océanographiques et Pêches, S. C. de Tenerife, Spain: 416 pp. (unpublished)

Additional information:

The survey has been carried out on the R/V *Vizconde de Eza*. The fishing gear chosen for the cruise was the Lofoten bottom trawl net.

MAURIT-0811 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCÉANOGRAPHIQUES ET PÊCHES (IMROP), MAURITANIA

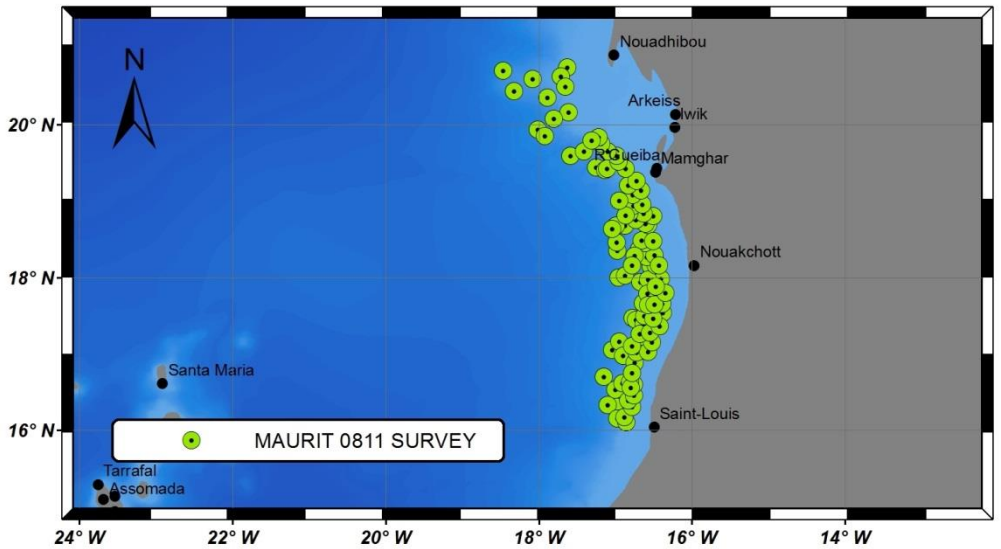


Figure 142. Distribution of the 99 trawling stations in Maurit-0811 survey (16.0970°N – 20.7445°N).

Resource abstract:

Trawling survey for exploration and evaluation of demersal resources, ichthyoplankton and megabenthos study in deep shelf and continental margin off Mauritania.

The main objective of this survey was to determining the yield for fishes, crustaceans and cephalopods (Ramos and Bouzouma, 2008).

Resource language:	spa, fre	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features; Elevation	
Variables available:	*Observed variables* Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species Sizes all fishes and other selected invertebrates Biological data of selected species Temperature and salinity of water mass Ichthyoplankton data Faunistic collections demersal fishes and benthic invertebrates Pictures collection Multibeam records	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	18.4647°W – 16.3462°W	16.0970°N – 20.7445°N
Spatial resolution:	99 stations	
Temporal extent:	2008-11-15 / 2008-12-16	
Temporal resolution:	n/a	
Depth range/resolution:	From 400 m to 2000 m depth	

Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut Mauritanien des Recherches Océanographiques et Pêches, Nouadhibou, Mauritania
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía Contact: mahfoudht@yahoo.fr Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques
Data format:	Digital (plain text)
References:	Ramos, A. and Bouzouma, M. 2008. *Prospección por arrastre de los recursos demersales de la plataforma y margen continental de Mauritania. Plan de la Campaña Maurit-0811*. IEO-SGPM (MAPA), IMROP, Vigo, Spain: 29 pp. (unpublished)

Additional information:

The fishing gear chosen for the cruise was the Lofoten commercial trawl.

Other devices: Multibeam echosounder EM-300, net CTD 37-SM Micro CAT, Bongo plankton trawl net.

MAURIT-0911 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCÉANOGRAPHIQUES ET PÊCHES (IMROP), MAURITANIA

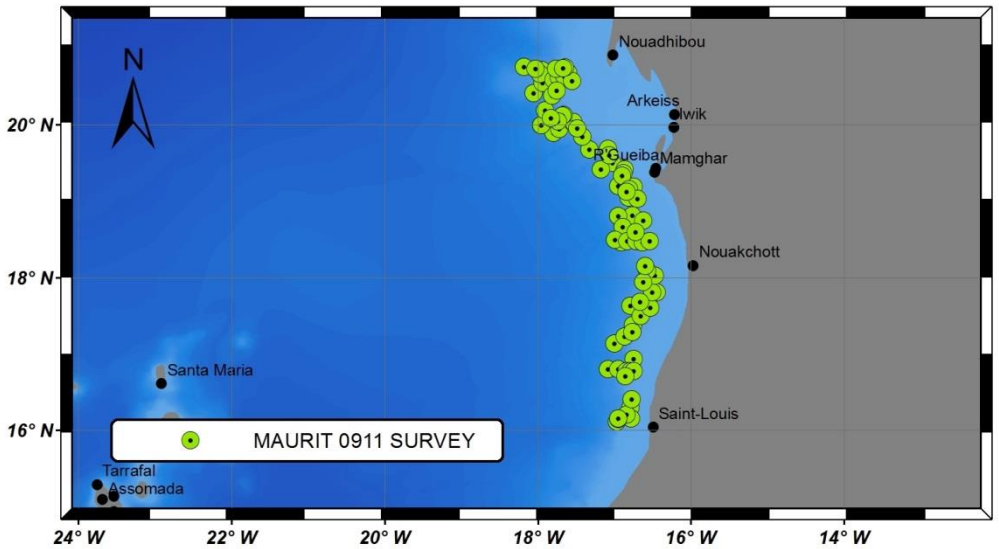


Figure 143. Distribution of the 57 bottom trawl stations in Maurit-0911 survey (16.1055°N – 20.7596°N).

Resource abstract:

Characterization of the demersal, benthic and ichthyoplanktonic ecosystems of deep shelf and shelf break off Mauritania. Geomorphologic prospecting and oceanographic sampling was undertaken (Ramos et al., 2010).

Resource language:	spa, fre	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features; Elevation; Land cover	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species Sizes all fishes and other selected invertebrates Biological data of selected species Temperature and salinity of water mass Ichthyoplancton data Faunistic collections demersal fishes and benthic invertebrates Pictures collection Multibeam and TOPAS records Video recording	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	18.1868°W – 16.4445°W	16.1055°N – 20.7596°N
Spatial resolution:	57 stations	
Temporal extent:	2009-11-16 / 2009-12-16	
Temporal resolution:	n/a	

Depth range/resolution:	From 80 m to 2000 m depth
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut Mauritanien des Recherches Océanographiques et Pêches Nouadhibou, Mauritania
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía Contact: mahfoudht@yahoo.fr Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques
Data format:	Digital (plain text)
References:	Ramos, A., Alcalá, C., Fernández, F., Fernández, L., González-Porto, M., López, V., Moya, J. A., Pascual, P., Presas, C., Puerto, M. A., Ramil, F., Salmerón, F., Sanz, J. L., Rey, J., Viscasillas, L., Abed, J. O., Baye, S. O., Ciré, B. A., Mohamed, B. O., Samba, A. O. and Valy, Y. O. 2010. *Estudio de los ecosistemas de la plataforma y margen continental de Mauritania. Informe de resultados de la campaña 'Maurit-0911'.* Inf. Técn. IEO-IMROP, Spain: 161 pp. (unpublished)

Additional information:

The fishing gear chosen for the cruise was the Lofoten commercial trawl.

Other devices: Multibeam echosounder EM-300, high resolution seismic profiler (TOPAS), CTD Seabird-25, net CTD 37-SM Micro CAT, Bongo plankton trawl net, Agassiz trawl, rock dredge.

MAURIT-1011 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

INSTITUT MAURITANIEN DES RECHERCHES OCÉANOGRAPHIQUES ET PÊCHES (IMROP), MAURITANIA

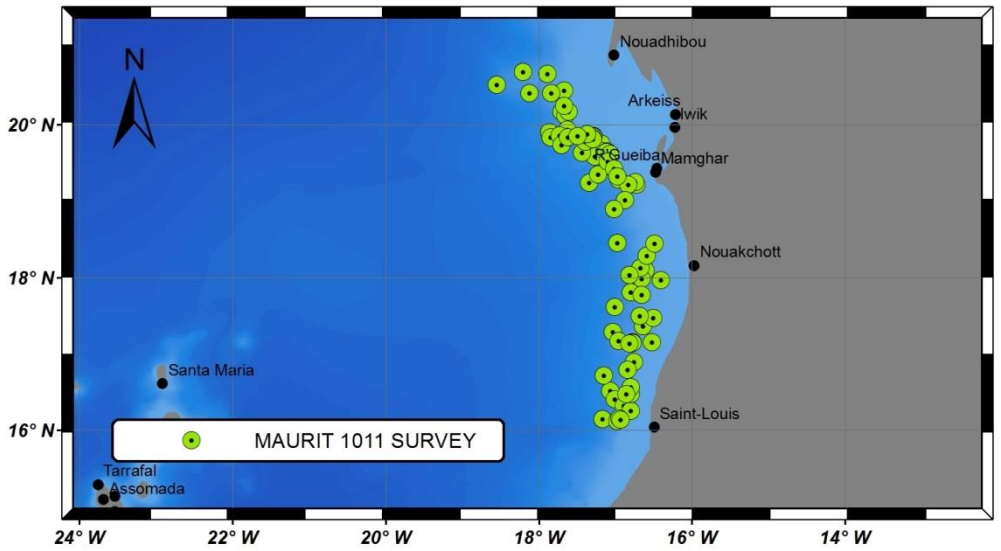


Figure 144. Distribution of the 56 bottom trawl stations in Maurit-1011 survey (16.1158°N – 20.6953°N).

Resource abstract:

Multidisciplinary survey for the characterization of demersal, benthic and ichthyoplanktonic ecosystems of deep shelf and shelf break off Mauritania. Geomorphologic prospecting characterization and oceanographic sampling was undertaken (Ramos and Bouzouma, 2010).

Resource language:	spa, fre	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features; Elevation; Land cover	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species Sizes all fishes and other selected invertebrates Biological data of selected species Temperature and salinity of water mass Ichthyoplancton data Macrobenthos specific sampling Faunistic collections demersal fishes and benthic invertebrates Pictures collection Multibeam and TOPAS records	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	18.5500°W – 16.3962°W	16.1158°N – 20.6953°N
Spatial resolution:	56 stations	
Temporal extent:	2010-11-16 / 2010-12-15	

Temporal resolution:	n/a
Depth range/resolution:	From 80 m to 2000 m depth
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Institut Mauritanien des Recherches Océanographiques et Pêches (IMROP)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Institut Mauritanien des Recherches Océanographiques et Pêches Nouadhibou, Mauritania
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía Contact: mahfoudht@yahoo.fr Mahfoudh Ould Taleb Ould Sidi. Head, Institut Mauritanien des Recherches Océanographiques
Data format:	Digital (plain text)
References:	Ramos, A. and Bouzouma, M. 2010. *Estudio de los ecosistemas de la plataforma y margen continental de Mauritania. Plan de la Campaña Maurit-1011*. IEO-SGPM (MAPA), IMROP, Vigo, Spain: 24 pp. (unpublished)

Additional information:

The fishing gear chosen for the cruise was the Lofoten commercial trawl.

Other devices: Multibeam echosounder EM-300, high resolution seismic profiler (TOPAS), CTD Seabird-25, net CTD 37-SM Micro CAT, Bongo plankton tow net, Agassiz trawl, rock dredge.

SENEGAL 8210 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCEÁNOGRAPHYQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

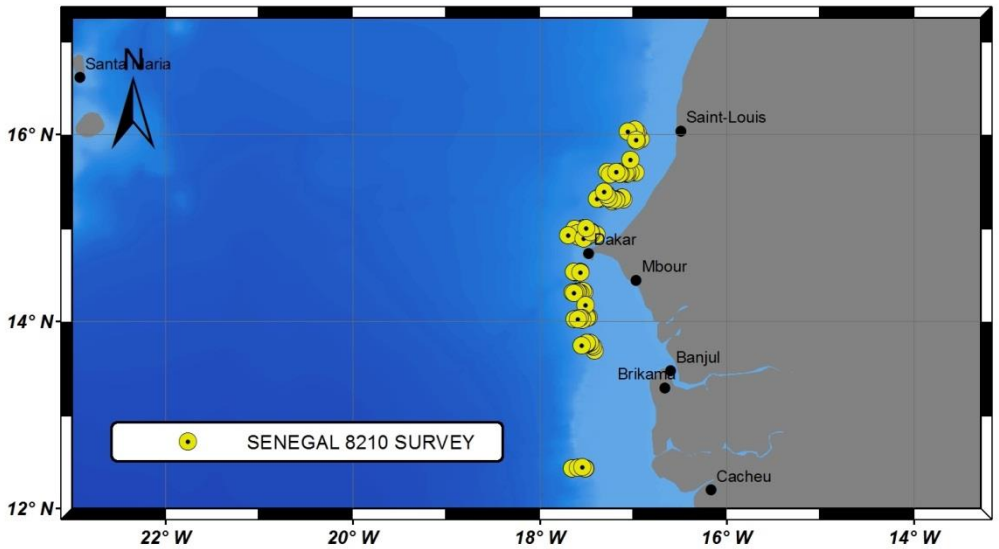


Figure 145. Distribution of the 98 bottom trawl stations in the shelf break off Senegal (Senegal 8210 survey, 12.4170°N – 16.0463°N).

Resource abstract:

This deep sea fishing research was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal. Two surveys per year were planned to evaluate deep stocks of crustaceans and hake. The research programme was established by the Centre de Recherches Océanographiques de Dakar-Thiaroye and the Instituto Español de Oceanografía.

This first survey had the following specific objectives (López-Abellán et al., 1982):

- To record the qualitative inventory of the species assemblage in the area
- To study the geographic and bathymetric distribution of the species, as well as their demographic structures
- To obtain relative abundance and reproduction indices for the main species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data: Taxonomic identification Depth range Size and weight by species	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.700°W – 16.9243°W	12.4170°N – 16.0463°N
Spatial resolution:	98 stations	
Temporal extent:	1981-10-17 / 1981-11-03	
Temporal resolution:	n/a	
Depth range/resolution:	From 100 m to 1000 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)	
Limitations on public access:	Yes	

Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal
Data via:	http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selcampagne%5B%5D=SENEGAL-8210&methode=1 Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text and survey report in PDF format)
References:	López-Abellán, L. J., Ariz-Tellería, J., Santana, J. C., Caveriviere, A. and Thiam, M. 1982. *Informe de la primera campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. "Senegal 8210".* Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 110 pp. (unpublished)

Additional information:

This survey was carried out on the F/V *Cruz de Aralar*. The fishing gears used in this survey were the Clásico Tangón and Troli trawl nets.

SENEGAL 8304 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCÉANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

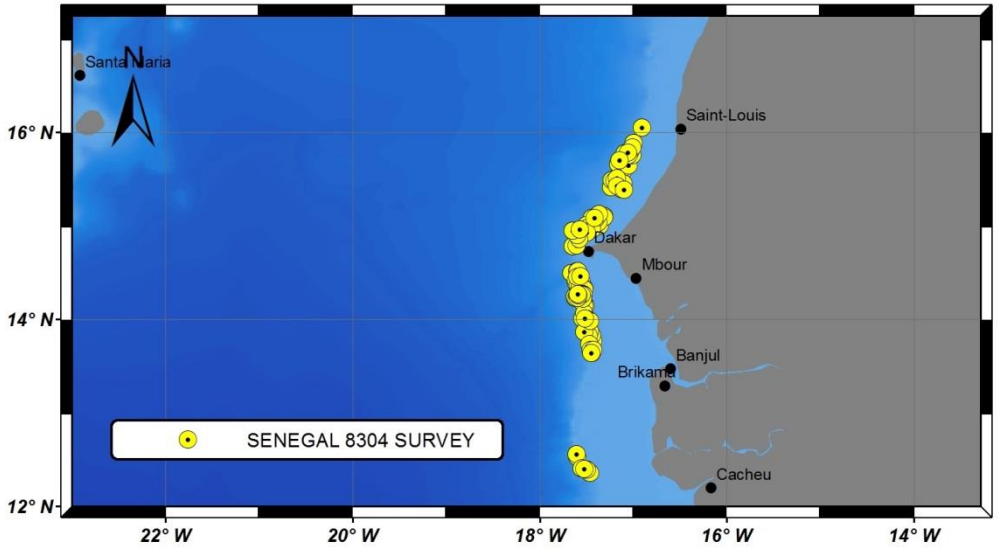


Figure 146. Distribution of the 99 bottom trawl stations in the shelf break off Senegal (Senegal 8304 survey, 12.4167°N – 16.0000°N).

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective (López-Abellán et al., 1983*a*):

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:
- To obtain relative abundance index for hake, scorpion fish and other fish species
- To study the demographic structures for the main species
- To obtain biological data for the main species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.6500°W – 16.9000°W	12.4167°N – 16.0000°N
Spatial resolution:	99 stations	
Temporal extent:	1983-04-29 / 1983-05-17	
Temporal resolution:	n/a	
Depth range/resolution:	From 150 m to 800 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)	
Limitations on public access:	Yes	

Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal
Data via:	http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selcampagne%5B%5D=SENEGAL-8304&methode=1 Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text and survey report in PDF format)
References:	López-Abellán, L. J., Ariz-Tellería, J., García-Vela, J. A., Caveriviere, A. and Thiam, M. 1983. *Informe de la segunda campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. "Senegal 8304"*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 141 pp. (unpublished)

Additional information:

This survey was carried out on the F/V *Villa Ana*. The fishing gear used in this survey was the Marisco trawl net.

SENEGAL 8306 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCÉANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

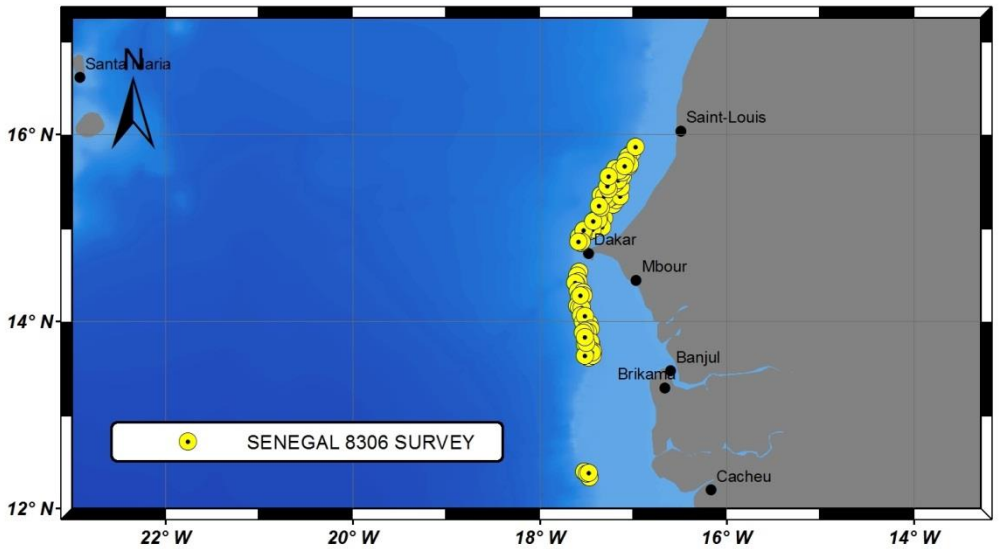


Figure 147. Distribution of the 84 bottom trawl stations in the shelf break off Senegal (Senegal 8306 survey, 12.4167°N – 16.0000°N).

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective (López-Abellán et al., 1983*b*):

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:

- To obtain relative abundance index for hake, scorpion fish and other fish especies
- To study the demographic structures for the main species
- To obtain biological data for the main species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.6167°W – 16.9667°W	12.4167°N – 16.0000°N
Spatial resolution:	84 stations	
Temporal extent:	1983-06-26 / 1983-07-10	
Temporal resolution:	n/a	
Depth range/resolution:	From 150 m to 800 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)	
Limitations on public access:	Yes	

Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal
Data via:	http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selcampagne%5B%5D=SENEGAL-8306&methode=1 Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text and survey report in PDF format)
References:	López-Abellán, L. J., Ariz-Tellería, J., García-Vela, J. A., Caveriviere, A. and Thiam, M. 1983. *Informe de la tercera campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. "Senegal 8306"*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 136 pp. (unpublished)

Additional information:

This survey was carried out on the F/V *Villa Ana*. The fishing gear used in this survey was the Marisco trawl net.

SENEGAL 8402 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCEANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

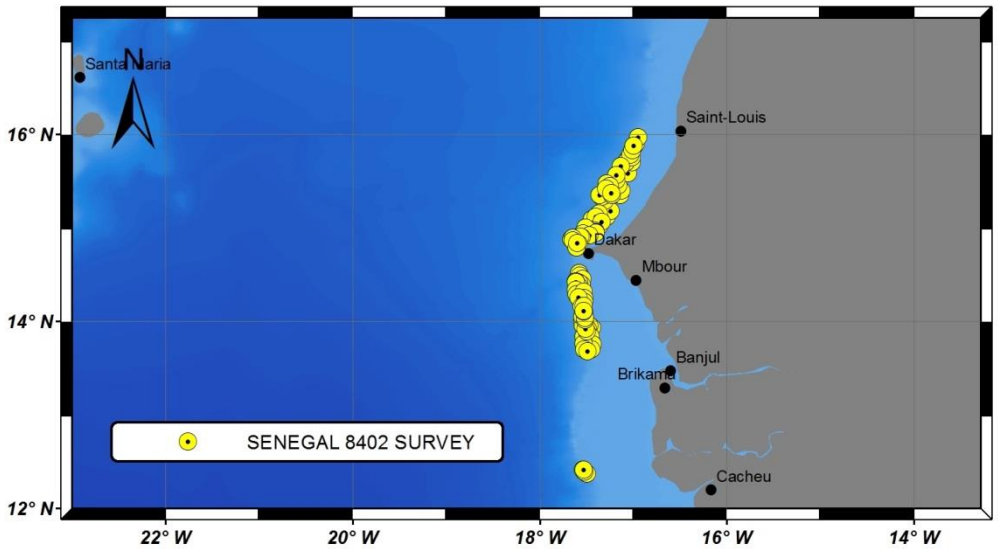


Figure 148. Distribution of the 93 bottom trawl stations in the shelf break off Senegal (Senegal 8402 survey, 12.3333°N – 16.0000°N).

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective (Delgado-de-Molina et al., 1984):

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:

- To obtain relative abundance indicators for hake, scorpion fish and other fish especies
- To study the demographic structures for the principal species
- To obtain biological data for the principal species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.6500° W – 16.9333° W	12.3333°N – 16.0000°N
Spatial resolution:	93 stations	
Temporal extent:	1984-02-19 / 1984-03-16	
Temporal resolution:	n/a	
Depth range/resolution:	From 150 m to 800 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar Thiaroye (CRODT)	
Limitations on public access:	Yes	

Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal
Data via:	http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selcampagne%5B%5D=SENEGAL-8402&methode=1 Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text and survey report in PDF format)
References:	Delgado-de-Molina, A., Santana, J. C., Torres-Núñez, S., Caveriviere, A., Thiam, M. and Thiam, D. 1984. *Informe de la cuarta campaña hispano-senegalesa de prospección pesquera de los stocks profundos de Senegal. Senegal 8402.* Instituto Español de Oceanografía, Spain: 271 pp. (unpublished)

Additional information:

This survey has been carried out on the F/V *Villa Ana*. The fishing gear used in this survey was the Marisco kind.

SENEGAL 8611 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRE DE RECHERCHES OCEANOGRAPHIQUES DE DAKAR-THIAROYE (CRODT), SENEGAL

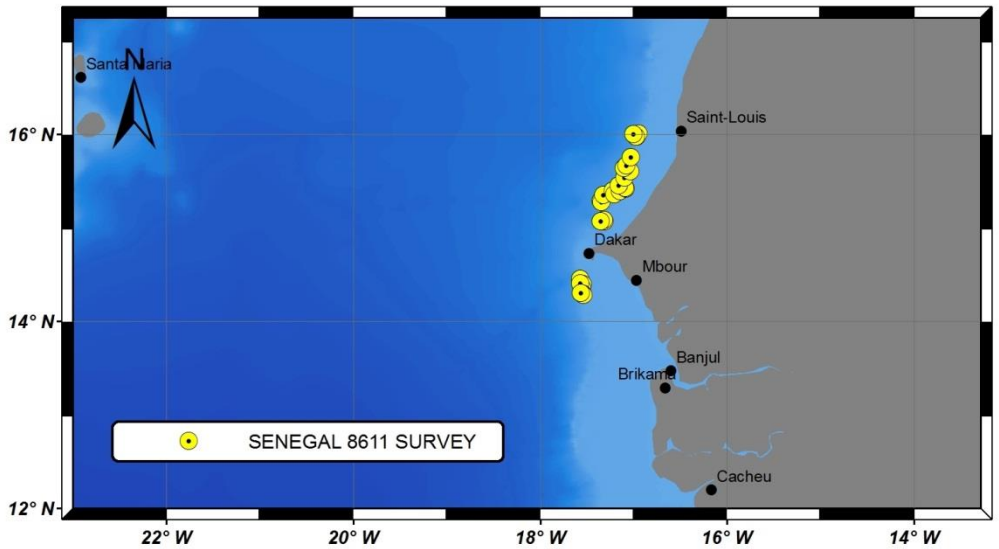


Figure 149. Distribution of the 28 bottom trawl stations in the continental slope off Senegal (Senegal 8611 survey, 14.2500°N – 16.0000°N).

Resource abstract:

This survey was conducted in Senegal waters within the framework of the Fishing Agreement signed in February 1982 between the governments of Spain and Senegal.

This survey had the following main objective:

- To estimate the relative biomass of deep-sea crustaceans such as the rose shrimp (*Parapaneus longirostris*), striped red shrimp (*Aristeus varidens*) and red crab (*Chaceon maritae*).

Other objectives:

- To obtain relative abundance index for hake, scorpion fish and other fish especies
- To study the demographic structures for the main species
- To obtain biological data for the main species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.5667°W – 16.9333°W	14.2500°N – 16.0000°N
Spatial resolution:	28 stations	
Temporal extent:	1986-11-18 / 1986-11-21	
Temporal resolution:	n/a	
Depth range/resolution:	From 151 m to 726 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Centre de Recherches Océanographiques de Dakar-Thiaroye (CRODT)	
Limitations on public access:	Yes	

Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain Centre de Recherches Océanographiques de Dakar-Thiaroye, Dakar, Senegal
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text)
References:	When using the data, the Instituto Español de Oceanografía and the Centre de Recherches Océanograhiques de Dakar- Thiaroye must be acknowledged

GAMBIA 8611 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN
SECRETARÍA GENERAL DE PESCA MARÍTIMA, SPAIN

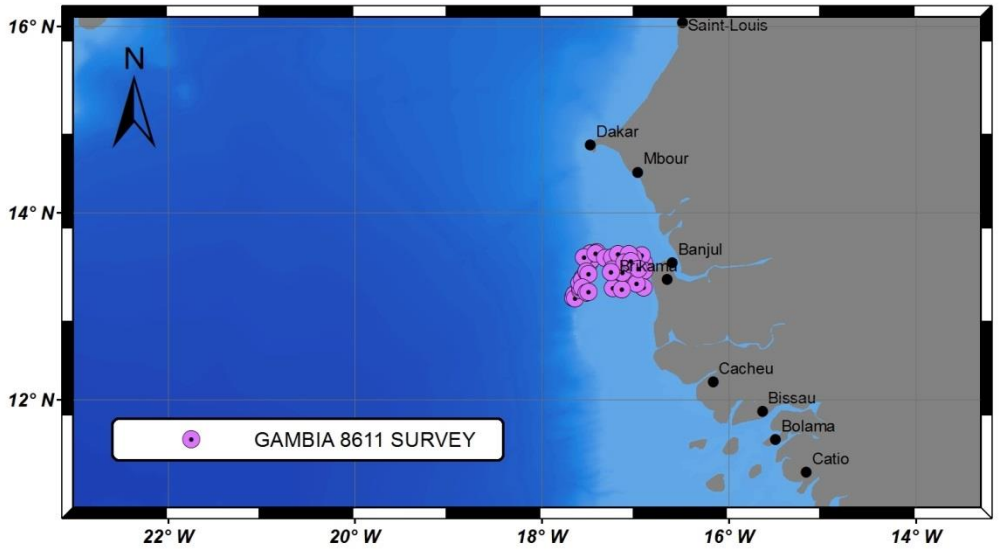


Figure 150. Distribution of the 41 bottom trawl stations in GAMBIA 8611 survey (13.0833°N – 13.5833°N).

Resource abstract:
Exploratory fishing survey for demersal stocks in waters of the Republic of Gambia, undertaken within the framework of the Programme for the Development of Fisheries in the Eastern Central Atlantic (Committee for the Eastern Central Atlantic Fisheries -CECAF-). This survey was a collaborative work between the Secretaría General de Pesca Marítima (Spain) and the Instituto Español de Oceanografía (Spain).

The General Objective of the Gambia 8611 cruise was to estimate the coastal and deep water demersal stocks in Gambian waters (López-Abellán et al., 1987*a*, 1987*b*).

Specific objectives:

- To obtain relative abundance index of the main demersal commercial species, particularly hake, shellfish, cephalopods and sea breams
- To study the geographical and bathymetrical distribution of the main species, as well as their age structure
- To obtain biological data on the main species.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Size and weight by species	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.6667°W – 16.8833°W	13.0833°N – 13.5833°N
Spatial resolution:	41 stations	
Temporal extent:	1986-11-24 / 1986-11-30	
Temporal resolution:	n/a	

Depth range/resolution:	From 0 m to 800 m depth
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain
Data via:	http://halieut.agrocampus-ouest.fr/istam/trawlbase/inter2_1.php?dbse=&active=1&selcampagne%5B%5D=GAMBIA-8611&methode=1 Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text and report in PDF format)
References:	López-Abellán, L. J., Cervantes, A. and De-La-Serna, J. M. 1987. *Campaña de prospección pesquera de los stocks demersales en aguas de la República de Gambia. "Gambia 8611"*. Instituto Español de Oceanografía, Spain (unpublished). López-Abellán, L. J., Cervantes, A. and De-La-Serna, J. M. 1987*b*. *Exploratory fishing cruise for demersal stocks in waters of the Republic of the Gambia. "Gambia 8611".* Programme for the development of fisheries in the Eastern Central Atlantic. United Nations Food and Agriculture Organization (FAO), Dakar, CECAF/TECH/87/87: 187 pp.

Additional information:

This survey was carried out on board of the bottom trawl vessel *Isla Lanzarote*. The fishing gear chosen for the cruise was the so-called Marisco. Because of the continuous breakages of this fishing gear on the continental shelf, another gear called Bou had to be used for five stations.

GUINEA BISSAU 10-2002 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRO DE INVESTIGAÇÃO PESQUEIRA APLICADA (CIPA), GUINEA-BISSAU

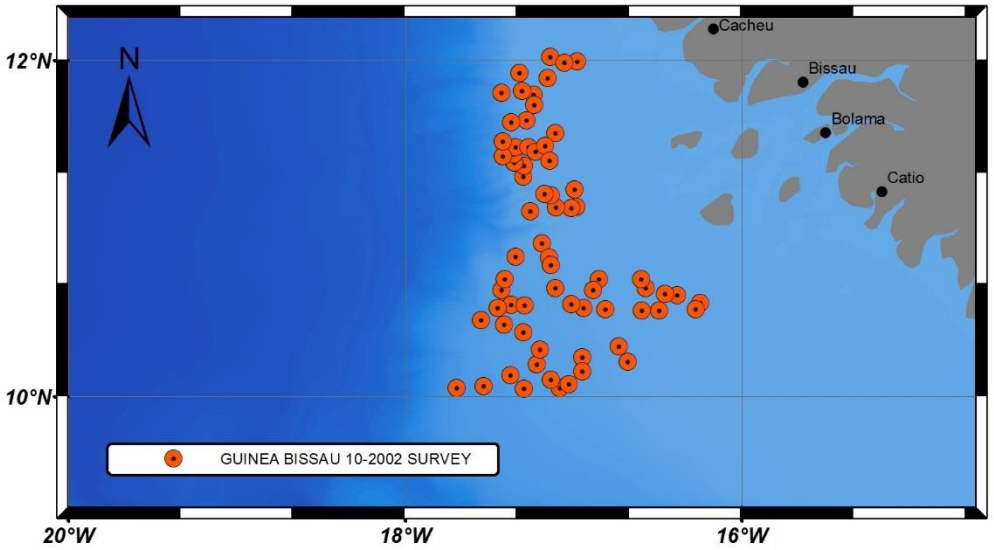


Figure 151. Distribution of the 68 bottom trawl stations in Guinea Bissau 10-2002 survey, carried out in the continental slope and middle slope of Guinea-Bissau (10.0450°N – 12.0200°N).

Resource abstract:

Exploratory fishing cruise for demersal stocks in the shelf and slope waters of the Guinea-Bissau exclusive economic zone. It was conducted in a cooperation framework between Spain and Guinea-Bissau, with the main aim of assessing main commercial species in the area (fish, crustaceans and cephalopods) (Sobrino and Malaba, 2003).

Resource language:	spa, por	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight by species) by station for all fishes, crustaceans and cephalopods Size composition of all fishes and commercial crustacean and cephalopods Biological parameters of commercial species (body length, sex and maturity stages)	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.695°W – 16.2483°W	10.0450°N - 12.0200°N
Spatial resolution:	68 stations	
Temporal extent:	2002-10-10 / 2002-10-31	
Temporal resolution:	n/a	
Depth range/resolution:	From 16 m to 916 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Centro de Investigação Pesqueira Aplicada (CIPA)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español Oceanografía. Madrid, Spain Centro de Investigação Pesqueira Aplicada, Bissau, Guinea-Bissau	

Data via:	Contact: director@ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text)
References:	Sobrino, I. and Malaba, L. F. 2003. *Informe de la campaña Guinea Bissau 10-2002*. Instituto Español de Oceanografía and Centro de Investigaçao Pesqueira Aplicada, Cádiz, Spain: 40 pp. (unpublished)

Additional information:
The survey was carried out on the R/V *Vizconde de Eza.* The fishing gear chosen for the cruise was a trawl net called Baka.

GUINEA BISSAU 0810 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

CENTRO DE INVESTIGAÇÃO PESQUEIRA APLICADA (CIPA), GUINEA-BISSAU

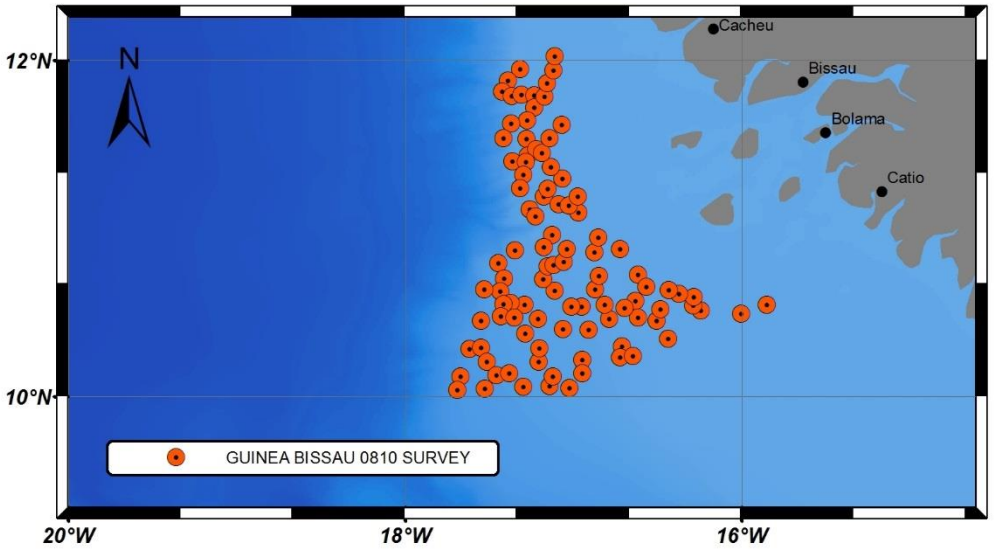


Figure 152. Distribution of the 100 bottom trawl stations in Guinea Bissau 0810 survey, carried out in the shelf and continental slope of Guinea-Bissau (10.0362°N – 12.0212°N).

Resource abstract:

Exploratory fishing cruise for demersal stocks in the shelf and slope waters of the Guinea-Bissau exclusive economic zone. It was conducted in a cooperation framework between Spain and Guinea-Bissau, with the main aim of assessing main commercial species in the area (fish, crustaceans and cephalopods). Other objectives developed during the survey were: the study of the population structure and biological parameters of main species; mapping of main species; analysis of benthos and ichthyoplankton communities; and hydrographic characterization of the area (García-Isarch et al., 2009).

Resource language: spa, por

Keyword values: Species distribution; Habitats and biotopes; Hydrography; Oceanographic geographical features

Variables available:

Observed variables	*Derived variables*
Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and macrobenthos species	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as:
Size composition of all fish and selected crustacean and cephalopod species	Abundance
Biological data of main commercial species	Ecological diversity indices
Biomass	
Icthyoplankton data	
Densities of fish eggs and larvae and other zooplankton components, at global level and by taxonomical groups (at the lowest possible taxonomical level)	

	Faunistic collections of demersal fish and benthic invertebrates Pictures collection of the caught species Temperature Salinity	
Geographic location:	17.6927°W – 15.8520°W	10.0362°N - 12.0212°N
Spatial resolution:	100 stations	
Temporal extent:	2008-10-22 / 2008-11-12	
Temporal resolution:	n/a	
Depth range/resolution:	From 20 m to 940 m	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO) and the Centro de Investigação Pesqueira Aplicada (CIPA)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español Oceanografía. Madrid, Spain Centro de Investigação Pesqueira Aplicada, Bissau, Guinea-Bissau	
Data via:	Contact: director@ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plein text)	
References:	García-Isarch, E., Burgos, C., Sobrino, I., Mendes, A., Barri, I., Assau, V., Gomes, R. and Gomes. M. J. 2009. *Informe de la Campaña de Evaluación de Recursos Demersales de la ZEE de Guinea Bissau a bordo del B/O Vizconde de Eza "Guinea Bissau 0810"*. Instituto Español de Oceanografía and Centro de Investigaçao Pesqueira Aplicada, Cádiz, Spain: 112 pp + Annexes (unpublished)	

Additional information:

The survey was carried out on the R/V *Vizconde de Eza*. Demersal trawls were conducted using a Conakry otter bottom trawl (baka type). Plankton sampling was conducted with a squared mouth Bongo of 90 cm aperture.

Other devices: CTD SBE25 equipped with a SBE43 oximeter and a SeaPoint fluorometer.

For further information about this survey results, see Muñoz et al. (2012) and Jiménez et al. (2015).

GUINEA CONAKRY 8010 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

SECRETARIA GENERAL DE PESCA MARÍTIMA, SPAIN

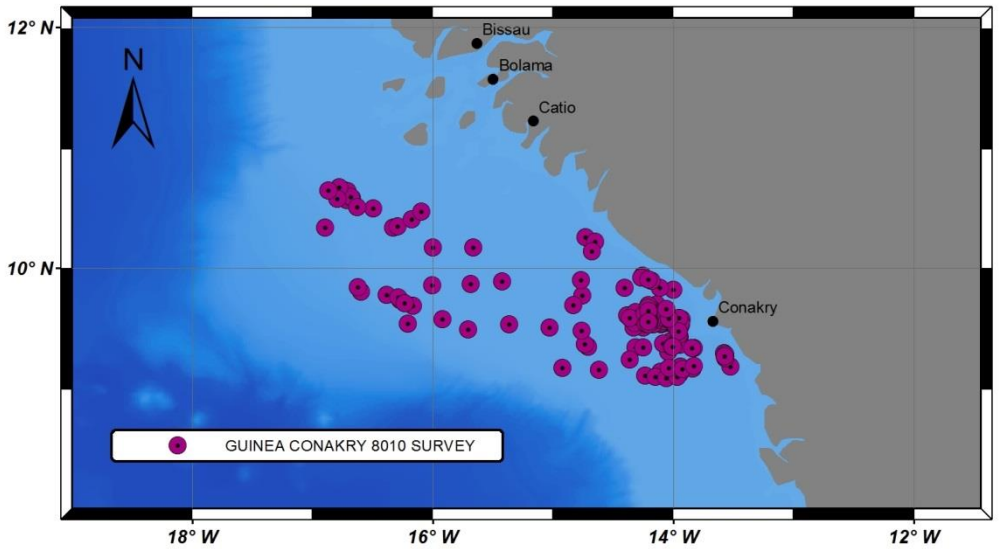


Figure 153. Distribution of the 151 bottom trawl stations in Guinea Conakry 8010 survey (9.0550°N – 10.6667°N).

Resource abstract:

Exploratory fishing cruise for demersal stocks in the continental shelf of the Republic of Guinea Conakry. Its main objective has been the investigation of cephalopods and crustaceans. To this aim, the composition of commercial species, catches size distribution, areas of major concentration, yields and other fish species caught were studied (Ariz-Telleria, 1981).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Weight of catches	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.1667°W – 13.5833°W	9.0550°N – 10.6667°N
Spatial resolution:	151 stations	
Temporal extent:	1980-10-27 / 1980-11-27	
Temporal resolution:	n/a	
Depth range/resolution:	From 18 m to 244 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text and survey report in PDF format)	
References:	Ariz-Tellería, J. 1981. *Campaña de prospección pesquera de los stocks demersales en aguas de la República de Guinea Conakry.* Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 93 pp. (unpublished)	

Additional information:
The fishing gears chosen for the cruise were:

- 2 semipelagic gears
- Clásico tangón
- Clásico Marisco
- Cephalopods mix
- Cephalopods nylon

CONAKRY 8305 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

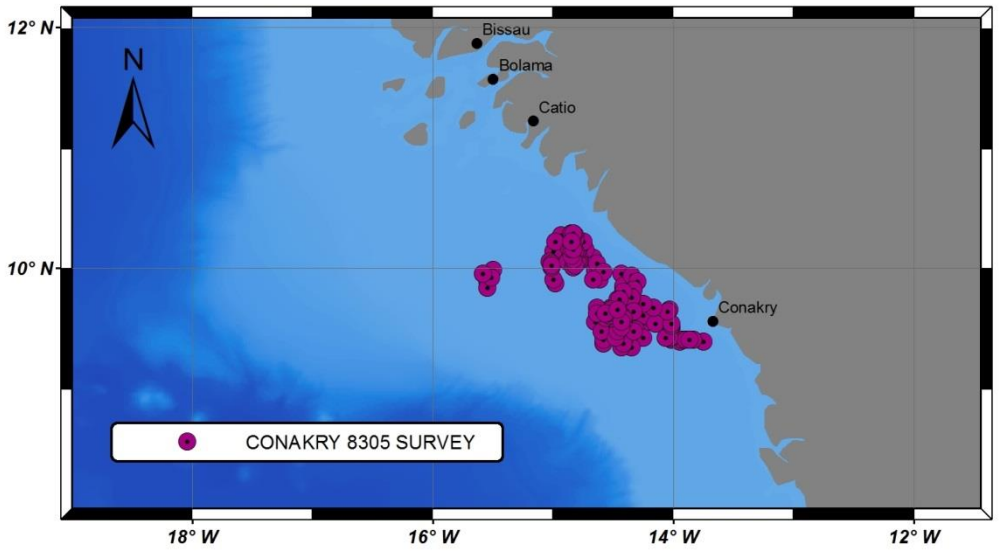


Figure 154. Distribution of the 151 bottom trawl stations in CONAKRY 8305 survey (9.3333°N – 10.2833°N).

Resource abstract:

Exploratory trawling survey for demersal stocks in the continental shelf of the Republic of Guinea. Its main objective has been to determine the yield of cephalopods and crustaceans in that area, completing the information obtained in the surveys Guinea Conakry 8010 and Guinea Conakry 8011 (Santana and Samper, 1983).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Weight of catches	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	15.5500°W – 13.7500°W	9.3333°N – 10.2833°N
Spatial resolution:	151 stations	
Temporal extent:	1983-05-22 / 1983-06-19	
Temporal resolution:	n/a	
Depth range/resolution:	From 9 m to 58 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text and survey report in PDF format)	
References:	Santana, J. C. and Samper, M. 1983. Campaña de prospección en aguas de la República Popular Revolucionaria de Guinea. *Informes Técnicos del Instituto Español de Oceanografía*, Vol. 18: 122 pp.	

Additional information:
This survey has been carried out on the F/V *Villa Ana*. The fishing gears chosen for the cruise were the so called Marisco and Cefalópodos.

GENERAL LANSANA CONTE 2004-12-DM SURVEY – GLC 2004-12-DM SURVEY –
CENTRE NATIONAL DES SCIENCES HALIEUTIQUES DE BOUSSOURA (CNSHB), GUINEA

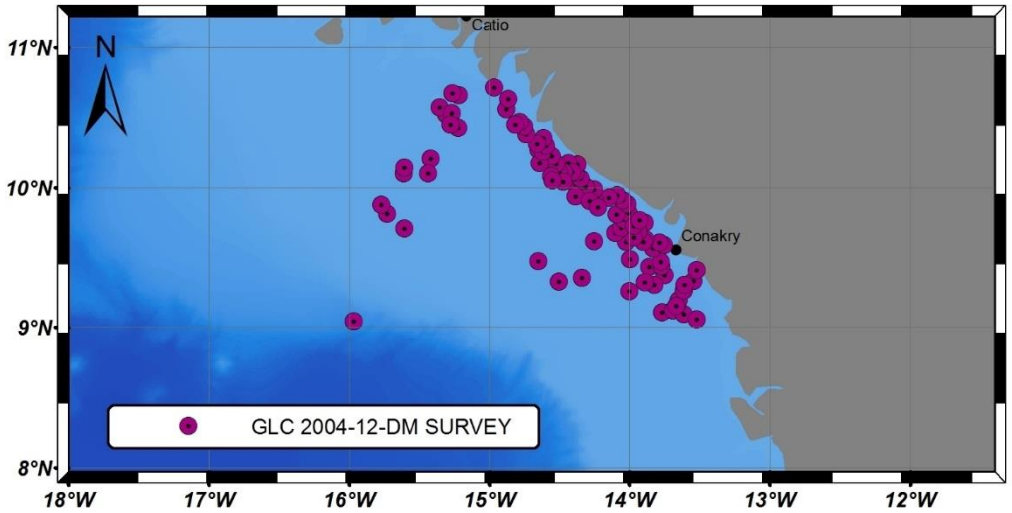


Figure 155. Distribution of the 74 bottom trawl stations in Général Lansana Conté 2004-12-DM survey, carried out in waters of Guinea (9.0436°N – 10.7344°N).

Resource abstract:
Trawling survey for demersal stocks in the Guinea exclusive economic zone, extending from the coastal zone to a part of the intermediate zone. It was conducted under the frame of the fisheries resources follow-up activities in Guinean waters, with the main objective of recovering information on the status of demersal fisheries resources. It was the first time a commercial or professional sampling device was used to carry out a demersal resources prospection survey in the Guinean exclusive economic zone (Diallo et al., 2005).

Resource language:	fre	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all fishes, crustaceans, cephalopods and gastropods species Size composition for main commercial species Sex and maturity for selected fishes species	Catch rate (kg/30 min) Dispersion and relative dispersion of average yields Dispersion and relative dispersion of main sizes
Geographic location:	15.9672°W – 13.0772°W	9.0436°N – 10.7344°N
Spatial resolution:	74 stations	
Temporal extent:	2004-12-20 / 2005-01-05	
Temporal resolution:	n/a	
Depth range/resolution:	From 5 m to 40 m depth	
Conditions for access & use:	Agreement with the Centre National des Sciences Halieutiques de Boussoura (CNSHB)	
Limitations on public access:	Yes	
Responsible organization:	Centre National des Sciences Halieutiques de Boussoura. Conakry, Guinea	
Data via:	Contact: ibamy@gmx.com Head, Centre National des Sciences Halieutiques de Boussoura	
Data format:	Digital (Excel file)	

References: Diallo, I., Traore, S. and Soumah, M. 2005. *Rapport de la campagne de chalutage demersal du navire de recherche N/R «Général Lansana Conté» (du 20 décembre 2004 au 5 janvier 2005).* Centre National des Sciences Halieutiques de Boussoura, Guinea: 20 pp. (unpublished)

Additional information:

The survey was carried out on the R/V *Général Lansana Conté* (R/V *GLC*). Demersal trawls were conducted using a bottom trawl net made in Japan and delivered with the vessel.

The sampling plan of the prospected zone is the random stratified sampling (Domain, 1989). This is the methodology used by the CNSHB since 1985 in collaboration with the Institut de Recherche pour le Développement (IRD, France) in coastal demersal trawl surveys with the R/V *André Nizery*.

GENERAL LANSANA CONTE 2006-04-DM SURVEY – GLC 2006-04-DM SURVEY –
CENTRE NATIONAL DES SCIENCES HALIEUTIQUES DE BOUSSOURA (CNSHB), GUINEA

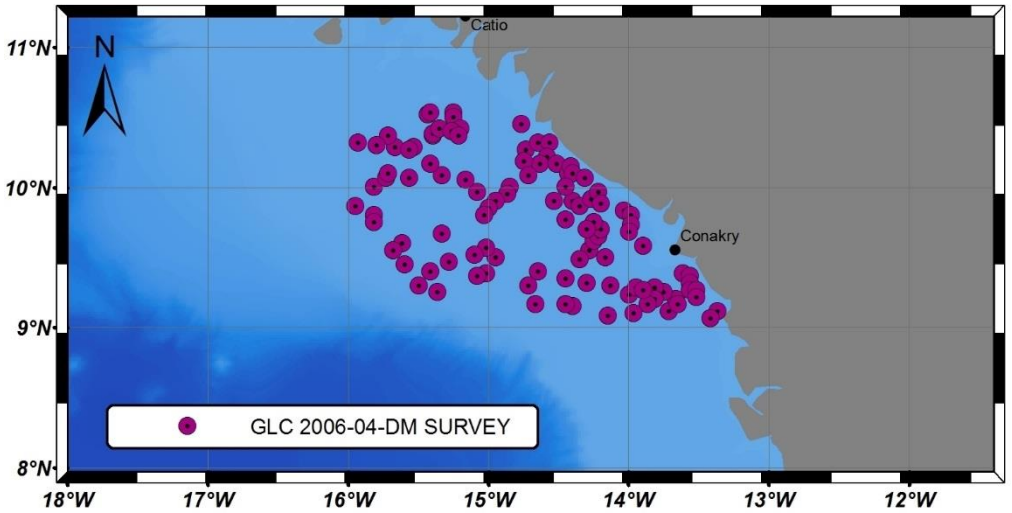


Figure 156. Distribution of the 109 bottom trawl stations in Général Lansana Conté 2006-04-DM survey, carried out in waters of Guinea (9.0667°N – 10.5333°N).

Resource abstract:
Trawling survey for demersal stocks in the Guinea exclusive economic zone, extending from the coastal zone (5 m to 20 m depth, delimitation differing from previous campaigns) to the intermediate zone (20m to 80 m depth). It was conducted under the frame of the fisheries resources follow-up activities in Guinean Economic Exclusive Zone (EEZ), with the main objective of recovering information on the status of demersal fisheries resources (Sidibé and Diallo, 2006).

Resource language:	fre	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all species Size composition for main commercial species	Catch rate (kg/30 min)
Geographic location:	15.9500°W – 9.6000°W	9.0667°N – 10.5333°N
Spatial resolution:	109 stations	
Temporal extent:	2006-04-09 / 2006-04-23	
Temporal resolution:	n/a	
Depth range/resolution:	From 5 m to 40 m depth	
Conditions for access & use:	Agreement with the Centre National des Sciences Halieutiques de Boussoura (CNSHB)	
Limitations on public access:	Yes	
Responsible organization:	Centre National des Sciences Halieutiques de Boussoura. Conakry, Guinea	
Data via:	Contact: ibamy@gmx.com Head, Centre National des Sciences Halieutiques de Boussoura	
Data format:	Digital (excel file)	
References:	Sidibé, A. and Diallo, I. 2006. *Rapport de la campagne d'évaluation des ressources demersales de la ZEE guinéenne. Réalisée par le N/R «Général Lansana Conté» (du 09 au 23 Avril 2006.* Centre National des Sciences Halieutiques de Boussoura, Guinea: 25 pp. (unpublished)	

Additional information:
The survey was carried out on the R/V *Général Lansana Conté* (R/V *GLC*). Demersal trawls were conducted using a bottom trawl net made in polyethylene.

The stations were selected randomly from the list of stations sampled in previous surveys held during the same period (March and April, in 1985 and 1998. The selection of those stations allows the comparison of the catch rates with previous values.

GENERAL LANSANA CONTE 2007-11-DM SURVEY – GLC 2007-11-DM SURVEY –
CENTRE NATIONAL DES SCIENCES HALIEUTIQUES DE BOUSSOURA (CNSHB), GUINEA

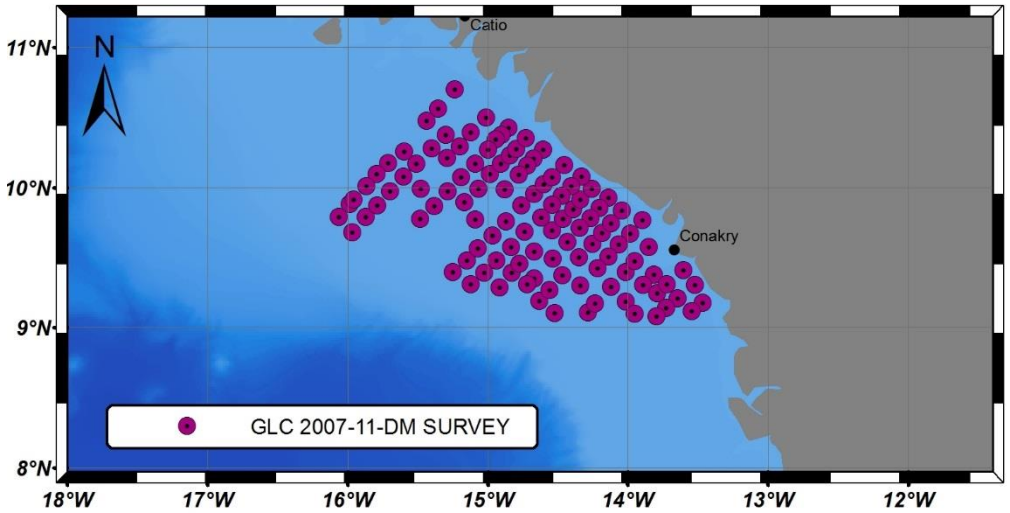


Figure 157. Distribution of the 117 bottom trawl stations in Général Lansana Conté 2007-11-DM survey, carried out in waters of Guinea (9.0786°N - 10.6958°N).

Resource abstract:
Trawling survey for fishes demersal stocks in the Guinea continental shelf coastal and intermediate zones. It was conducted under the frame of the fisheries resources follow-up activities in Guinean waters, through a systematic prospection of the stations sampled during the André Nizery 1992-10-DM survey (Diallo et al., 2007).

Resource language:	fre	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all species Size for commercial species Size composition for selected species Temperature Salinity	Catch rate (kg/30 min) Relative abundance
Geographic location:	16.0675°W – 13.4675°W	9.0786°N - 10.6958°N
Spatial resolution:	117 stations	
Temporal extent:	2007-11-17 / 2007-12-07	
Temporal resolution:	n/a	
Depth range/resolution:	From 4 m to 50 m depth	
Conditions for access & use:	Agreement with the Centre National des Sciences Halieutiques de Boussoura (CNSHB)	
Limitations on public access:	Yes	
Responsible organization:	Centre National des Sciences Halieutiques de Boussoura. Conakry, Guinea	
Data via:	Contact: ibamy@gmx.com Head, Centre National des Sciences Halieutiques de Boussoura	
Data format:	Digital (Excel file)	

References: Diallo, I., Camara, O., Soumah, M., Sacko, D., Balde, A., Diallo, A. P. and Koivogui, R. 2007. *Rapport préliminaire de la campagne d'évaluation des ressources démersales du plateau continental Guinéen (17 Novembre au 7 Décembre 2007).* Centre National des Sciences Halieutiques de Boussoura, Guinea: 14 pp.

Additional information:

The survey was carried out on the R/V *Général Lansana Conté* (R/V *GLC*).

CTD data was obtained for 6 stations off the mouths of rivers Forécaréa, Taboria, Dubréka and Rio-Nunez.

This survey was interrupted between 29 November and 2 December 2007.

GENERAL LANSANA CONTE 2008-03-DM SURVEY – GLC 2008-03-DM SURVEY –
CENTRE NATIONAL DES SCIENCES HALIEUTIQUES DE BOUSSOURA (CNSHB), GUINEA

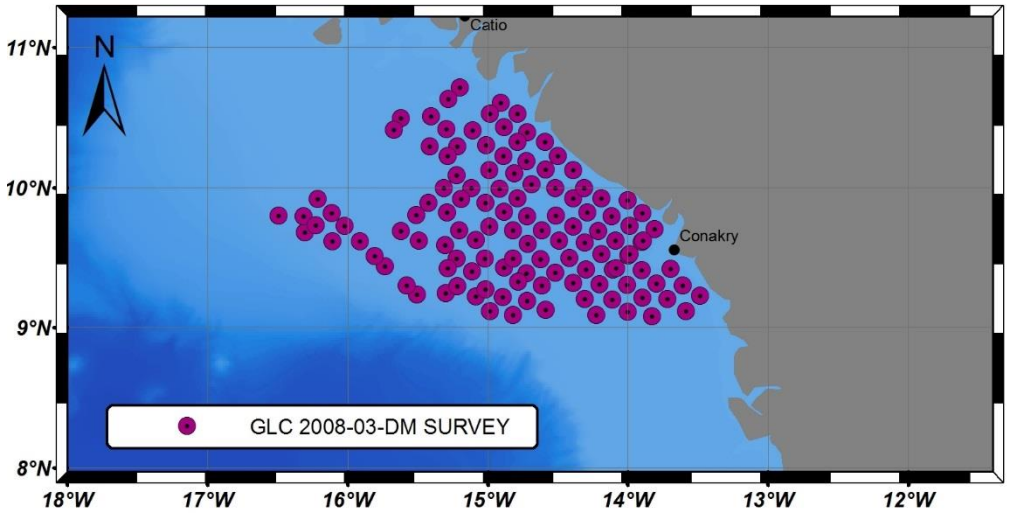


Figure 158. Distribution of the 118 bottom trawl stations in Général Lansana Conté 2008-03-DM survey, carried out in waters of Guinea (9.0769°N - 10.7100°N).

Resource abstract:
Trawling survey for fishes and cephalopods demersal stocks in the Guinea continental shelf; coastal zone, intermediate zone and offshore zone. It was conducted under the frame of the fisheries resources follow-up activities in Guinean waters. This evaluation contributes to the assessments for the negotiations of fisheries agreements with the European Union (Diallo et al., 2008*a*).

Resource language:	fre	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all species Size for selected fishes and one cephalopod species Size composition for selected species Biomass Temperature Salinity	Catch rate (kg/30 min) Relative abundance Exploitable potential Richness (No. of species/station)
Geographic location:	16.4961°W – 13.4872°W	9.0769°N – 10.7100°N
Spatial resolution:	118 stations	
Temporal extent:	2008-03-10 / 2008-04-05	
Temporal resolution:	n/a	
Depth range/resolution:	From 5 m to 100 m depth	
Conditions for access & use:	Agreement with the Centre National des Sciences Halieutiques de Boussoura (CNSHB)	
Limitations on public access:	Yes	
Responsible organization:	Centre National des Sciences Halieutiques de Boussoura. Conakry, Guinea	
Data via:	Contact: ibamy@gmx.com Head, Centre National des Sciences Halieutiques de Boussoura	
Data format:	Digital (Excel file)	

References: Diallo, I., Soumah, M., Sacko, D., Camara, O.T., Camara, O., Maomou, H., Diallo, A.P. and Baldé, A. 2008. *Rapport final de campagne d'évaluation des ressources démersales (poissons et céphalopodes) du plateau continental guinéen (mars 2008). N/O Général Lansana Conté.* Centre National des Sciences Halieutiques de Boussoura, Guinea. Doc. Int. CNSHB: 51 pp. (unpublished)

Additional information:

The survey was carried out on the R/V *Général Lansana Conté* (R/V *GLC*). Demersal trawls were conducted using a bottom trawl net made in Japan and delivered with the vessel, used to sample fishes and cephalopods specimens.

CTD data was obtained for six stations off the mouths of rivers Méllakoré, Konkouré and Rio-Nunez.

This survey was interrupted between 21 and 26 Mars 2008.

GENERAL LANSANA CONTE 2008-04-CR SURVEY – GLC 2008-04-CR SURVEY –
CENTRE NATIONAL DES SCIENCES HALIEUTIQUES DE BOUSSOURA (CNSHB), GUINEA

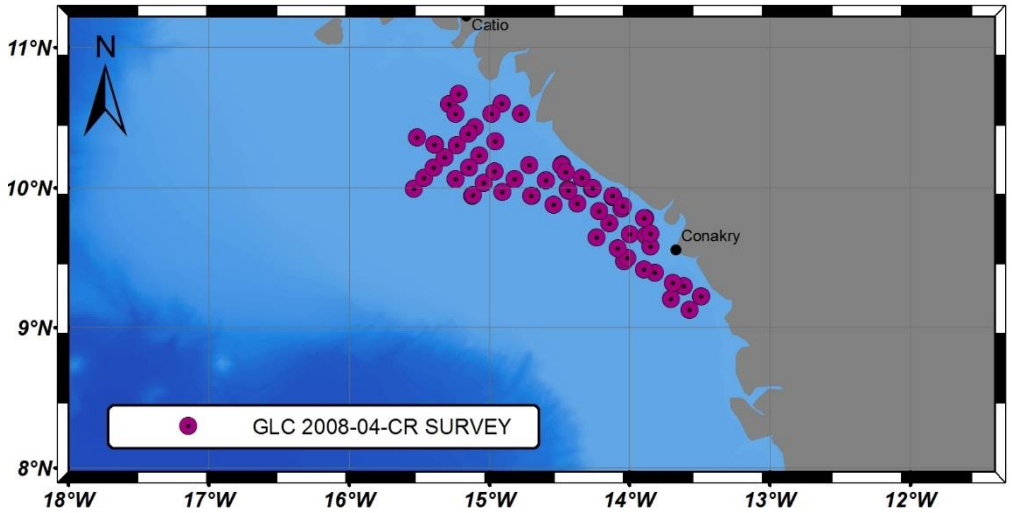


Figure 159. Distribution of the 65 bottom trawl stations in Général Lansana Conté 2008-04-CR survey, carried out in waters of Guinea (9.0769°N - 10.7100°N). It should be taken into account that four of the stations were sampled both during the day and during the night.

Resource abstract:
Evaluation survey for coastal shrimps in the Guinea continental shelf, in the coastal and intermediate zones. It was conducted under the frame of the fisheries resources follow-up activities in Guinean waters. This exploratory survey contributes to the assessments for the negotiations of fisheries agreements with the European Union.
Sampling took place during the night and during the day, being four stations sampled during both the night and day (Diallo et al., 2008*b*).

Resource language:	fre	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all species Size for selected crustaceans, fishes, cephalopods and gastropods species Size composition for selected species Biomass	Catch rate (kg/30 min) Relative abundance
Geographic location:	16.4961°W – 13.4872°W	9.0769°N - 10.7100°N
Spatial resolution:	65 stations	
Temporal extent:	2008-04-17 / 2008-04-28	
Temporal resolution:	n/a	
Depth range/resolution:	From 5 m to 35 m depth	
Conditions for access & use:	Agreement with the Centre National des Sciences Halieutiques de Boussoura (CNSHB)	
Limitations on public access:	Yes	
Responsible organization:	Centre National des Sciences Halieutiques de Boussoura. Conakry, Guinea	
Data via:	Contact: ibamy@gmx.com Head, Centre National des Sciences Halieutiques de Boussoura	

Data format: Digital (Excel file)

References: Diallo, I., Soumah, M., Camara, M. L., Camara, O. T., Camara, O., Maomou, H., Cissé, M. and Baldé, A. 2008. *Rapport de la champagne d'évaluation des crevettes côtières du plateau continental guinéen. Réalisée par le N/R «Général Lansana Conté» (du 17 au 28 Avril 2008.* Centre National des Sciences Halieutiques de Boussoura, Guinea: 23 pp. (unpublished)

Additional information:

The survey was carried out on the R/V *Général Lansana Conté*. For sampling, a polyethylene scientific bottom trawl net was used.

GENERAL LANSANA CONTE 2009-04-DM SURVEY – GLC 2009-04-DM SURVEY –
CENTRE NATIONAL DES SCIENCES HALIEUTIQUES DE BOUSSOURA (CNSHB), GUINEA

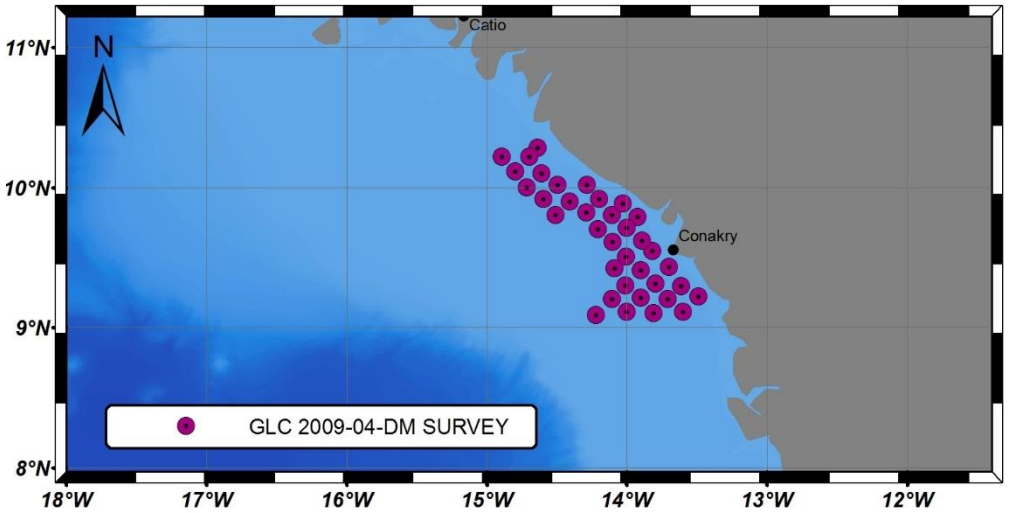


Figure 160. Distribution of the 59 bottom trawl stations in Général Lansana Conté 2009-04-DM survey, carried out in waters of Guinea (9.0869°N - 10.2803°N).

Resource abstract:
Trawling survey for fishes and cephalopods demersal stocks in the Guinea continental shelf coastal and intermediate zones. It was conducted under the frame of the strategic mission assigned to the CNSHB to contribute to the development of fisheries and aquaculture, and to improve the knowledge on the fisheries resources, their exploitation, the future, and the valorisation of fishing products and their economic profit (Diallo et al., 2009).

The main objective of the survey was to evaluate the status of fisheries resources, as well as the characterisation of the marine ecosystem and the respect of fishing areas by the industrial vessels.

Resource language:	fre	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all species Size for selected fishes species Size composition and maturity for selected species Biomass	Catch rate (kg/30 min) Numeric abundance (No. of specimens/trawling) Relative abundance Exploitable potential Richness (No. of species/station)
Geographic location:	14.8939°W – 13.4908°W	9.0869°N – 10.2803°N
Spatial resolution:	59 stations	
Temporal extent:	2009-04-27 / 2009-05-16	
Temporal resolution:	n/a	
Depth range/resolution:	From 5 m to 40 m depth	
Conditions for access & use:	Agreement with the Centre National des Sciences Halieutiques de Boussoura (CNSHB)	
Limitations on public access:	Yes	
Responsible organization:	Centre National des Sciences Halieutiques de Boussoura. Conakry, Guinea	
Data via:	Contact: ibamy@gmx.com Head, Centre National des Sciences Halieutiques de Boussoura	
Data format:	Digital (Excel file)	

References: Diallo, I., Soumah, M., Camara, O. and Camara, Y. 2009. *Rapport de la campagne d'evaluation des ressources demersales du plateau continental Guineen a bord du N/R GLC (du 27 avril au 16 mai 2009)*. Centre National des Sciences Halieutiques de Boussoura, Guinea: 33 pp.

Additional information:

The survey was carried out on the R/V *Général Lansana Conté* (R/V *GLC*). Demersal trawls were conducted using a bottom trawl, used to sample fishes and cephalopods specimens.

This survey was interrupted between 4 and 12 May 2009 due to vessel technic failures, among others in the CTD device, making it impossible to obtain temperature, salinity and dissolved oxygen dat

CAPVERT 8201 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

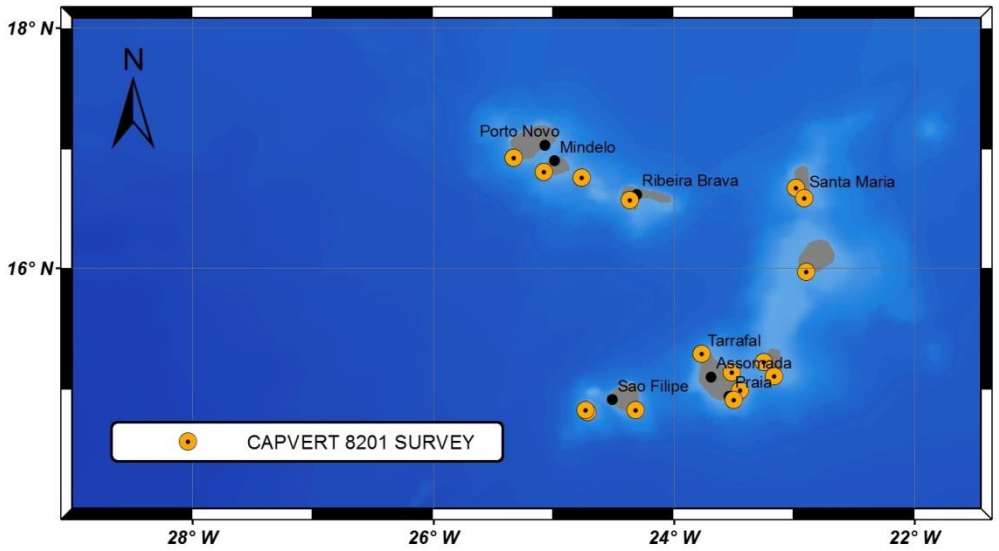


Figure 161. Distribution of the 16 fishing stations in CAPVERT 8201 survey (14.8000°N – 16.9167°N).

Resource abstract:

Investigation of pelagic fisheries on the continental shelf, undertaken under the frame of the Scientific and Technical Cooperation Agreement between Spain and the Republic of Cabo Verde, signed on 18 June 1979.

The aim of this survey was to study technical possibilities of fishing of Atlantic mackerel, as well as the areas suitable for this activity in the waters of the Republic of Cape Verde (Torres-Núñez, 1982*a*).

Resource language:	spa
Keyword values:	Species distribution; Habitats and biotopes
Variables available:	*Observed variables* Georeferenced data: Depth range Weight of catches Accompanying species Wind speed Sea conditions Nature of the seabed
Geographic location:	25.3333°W – 22.9000°W 14.8000°N – 16.9167°N
Spatial resolution:	16 stations
Temporal extent:	1982-04-22 / 1982-05-26
Temporal resolution:	n/a
Depth range/resolution:	From 25 m to 65 m depth
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (survey report in PDF format)
References:	Torres-Núñez, S. 1982. *Informe de la campaña CAPVERT 8201: posibilidades de pesca de caballa en Cabo Verde*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 23 pp. (unpublished)

Additional information:
This survey has been carried out on the F/V *El Gran Rey*. The fishing gear chosen for the cruise was the seine net.

CAPVERT 8202 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

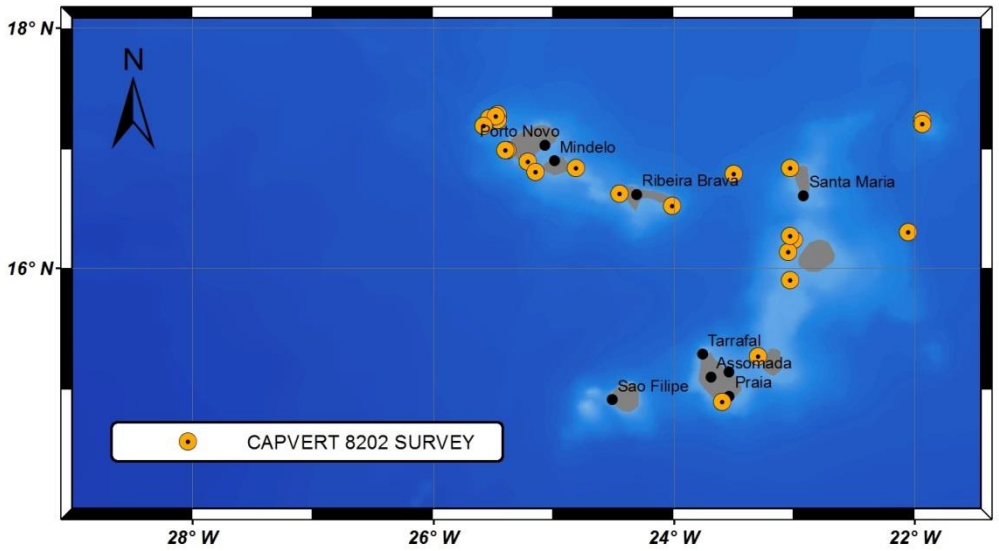


Figure 162. Distribution of the 24 fishing stations in CAPVERT 8202 survey (*14.8833°N – 17.3500°N*).

Resource abstract:
Investigation of demersal and pelagic fisheries on the continental shelf, undertaken under the frame of the Scientific and Technical Cooperation Agreement between Spain and the Republic of Cabo Verde, signed on 18 June 1979. The aim of this survey was to explore and evaluate the possibilities of longline fisheries, in surface and deep waters, of the Republic of Cabo Verde.

The objectives of this survey were (Torres-Núñez, 1982*b*):

- Exploration of commercial species using longline
- Evaluation of the profitability of fishing demersal and pelagic species catched during the investigation using longline.

Resource language:	spa
Keyword values:	Species distribution; Habitats and biotopes
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range Total weight of catches Number of specimen by station Mean size and mean weight by species Accompanying species Wind speed Sea conditions Air temperature Sea surface temperature (SST)
Geographic location:	25.7500°W – 21.9000°W 14.8833°N – 17.3500°N
Spatial resolution:	24 stations
Temporal extent:	1982-09-24 / 1982-10-21
Temporal resolution:	n/a
Depth range/resolution:	From 125 m to 1000 m depth
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)
Limitations on public access:	Yes
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain

Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (survey report in PDF format)
References:	Torres-Núñez, S. 1982. *Informe de la campaña CAPVERT 8202: posibilidades de pesca con palangre en el archipiélago de Cabo Verde.* Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 30 pp. (unpublished)

Additional information:
This survey has been carried out on the F/V *Playa de Tamaris*. The fishing gears chosen for the cruise were two kinds of surface longline and one kind of demersal longline.

BAN/CO 8102 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

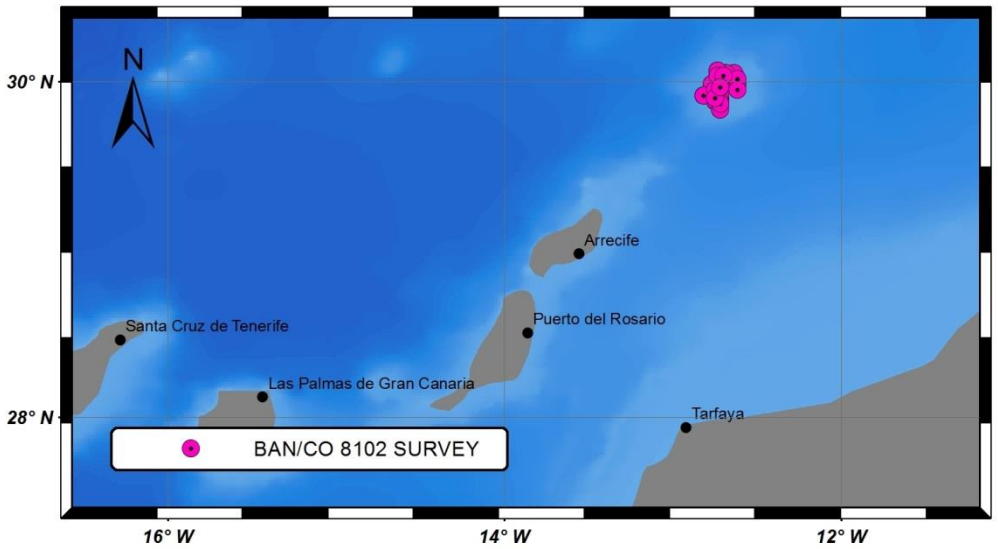


Figure 163. Distribution of 20 bottom trawl stations in BAN/CO 8102 survey (29.8333°N – 30.0667°N).

Resource abstract:

Exploratory trawl survey for demersal stocks in Conception Bank, northeast of Canary Islands. The main objective was to obtain data about commercial species and yields in the area, as well as data about the seabed quality and fishing areas (Santana, 1981*a*).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	12.8167°W –12.6167°W	29.8333°N – 30.0667°N
Spatial resolution:	20 stations	
Temporal extent:	1981-02-15 / 1981-02-23	
Temporal resolution:	n/a	
Depth range/resolution:	From 201 m to 326 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text and survey report in PDF format)	
References:	Santana, J. C. 1981. *Estudio de los rendimientos de las especies de interés comercial del Banco de la Concepción*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 41 pp. (unpublished)	

Additional information:

This survey has been carried out on board of three vessels: *Pasajes de San Juan*, *Pasajes de San Pedro* and *Pasajes Ancho*.

BAN/CO 8103 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

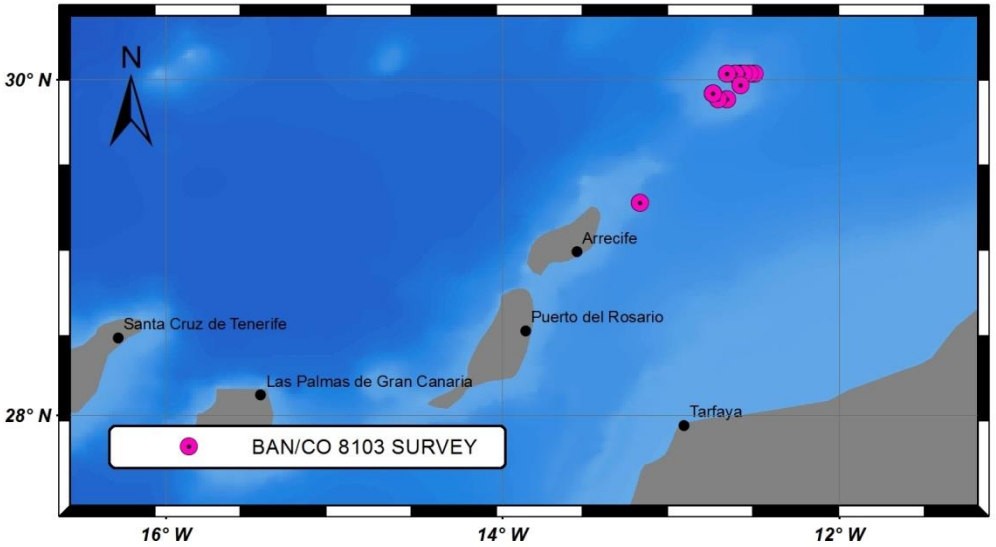


Figure 164. Distribution of the 39 bottom trawl stations in BAN/CO 8103 survey (29.2667°N – 30.0333°N).

Resource abstract:

Exploratory trawl survey for demersal stocks in Conception Bank, northeast of Canary Islands. The main objective was to obtain data about commercial species and yields in the area, as well as data about the seabed quality and fishing grounds, trying to complete the information obtained during BAN/CO 8103 (Santana, 1981*a*).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data: Taxonomic identification Depth range	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	13.1833°W – 12.5000°W	29.2667°N – 30.0333°N
Spatial resolution:	39 stations	
Temporal extent:	1981-03-14 / 1981-03-30	
Temporal resolution:	n/a	
Depth range/resolution:	From 146 m to 351 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text and survey report in PDF format)	
References	Santana, J. C. 1981. *Estudio de los rendimientos de las especies de interés comercial del Banco de la Concepción*. Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 41 pp. (unpublished)	

Additional information:

This survey has been carried out on board of the vessel *Pondal*.

GUINEA CONAKRY 8011 SURVEY

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

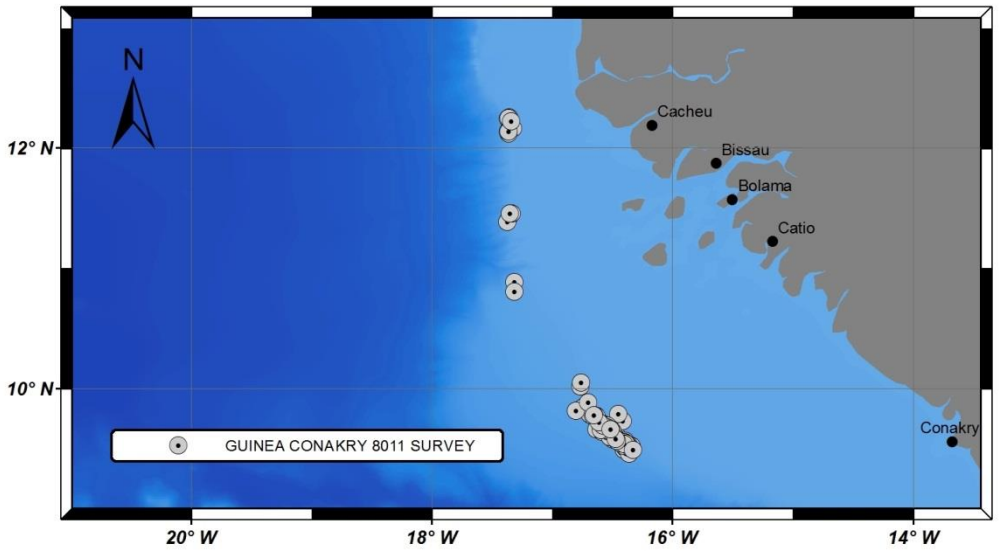


Figure 165. Distribution of the 107 bottom trawl stations in GUINEA CONAKRY 8011 survey, in the waters off Guinea Bissau and Guinea (9.4498°N – 12.2540°N).

Resource abstract:

Exploratory bottom trawl survey for demersal stocks in the continental shelf of the Republic of Guinea Conakry and Guinea Bissau. The main objective was to obtain data about commercial yields of crustaceans and fish in the waters of both countries (Santana, 1981*b*).

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables* Georeferenced data: Taxonomic identification Depth range	*Derived variables* A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.3745°W – 16.3268°W	9.4498°N – 12.2540°N
Spatial resolution:	107 stations	
Temporal extent:	1980-10-31 / 1980-11-25	
Temporal resolution:	n/a	
Depth range/resolution:	From 185 m to 384 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	
Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía	
Data format:	Digital (plain text in PDF format)	
References:	Santana, J. C. 1981. *Estudio de los rendimientos comerciales de crustáceos y peces en aguas de la República de Guinea Conakry y Guinea Bissau.* Instituto Español de Oceanografía, S. C. de Tenerife, Spain: 101 pp. (unpublished)	

Additional information:
This survey has been carried out on the R/V *Vicente Barreiro*. The fishing gear chosen for the cruise was the so called Tangon.

PELAGOS 7909 SURVEY
INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO), SPAIN

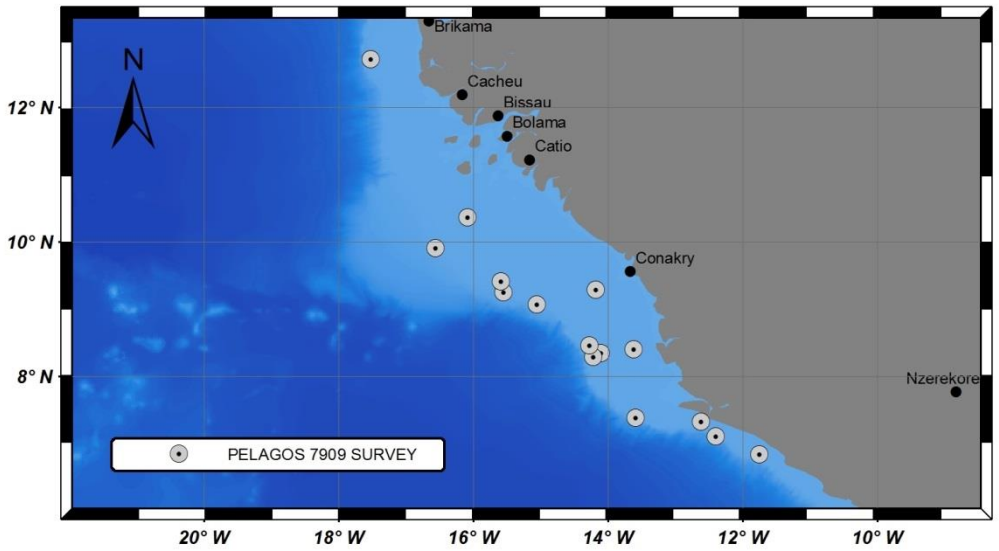


Figure 166. Distribution of the 15 fishing stations in Pelagos 7909 survey (6.8333°N – 12.7167°N).

Resource abstract:
Acoustic survey between Cabo Mount (Sierra Leona) and the mouth of river Gambia, Cabo Roxo (Senegal).

Objectives (Bravo-de-Laguna, 1981):

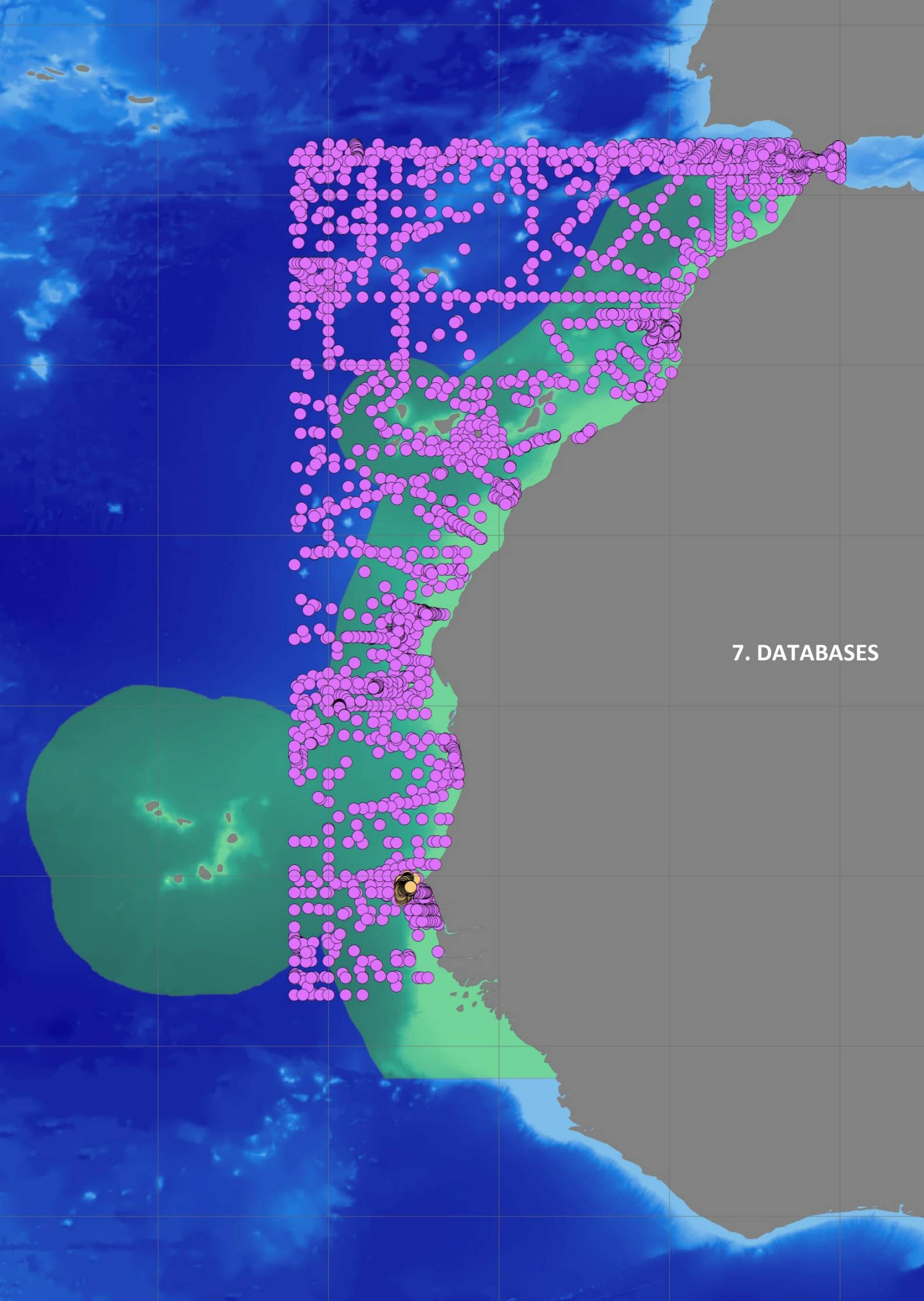
- To estimate the biomass of coastal pelagic fish stocks, including *Balistes carolinensis*, on the continental shelf (from 20 m to 200 m depth)
- To cartography stocks distribution in the studied area
- To start systematic research in this field and to enhance the cooperation between scientists and institutions participating in the programme, as well as with other institutions in the Committee for the Eastern Central Atlantic Fisheries (CECAF) area
- To create capacities among scientist from CECAF coastal countries in the evaluation of fishes populations through acoustic methods
- To accomplish complementary studies of hydrologic characteristics in the zone.

Resource language:	spa	
Keyword values:	Species distribution; Habitats and biotopes	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data: Taxonomic identification Depth range Species distribution	A variety of derived variables can be calculated by sector/stratum, depth range and station, depending on the quantity of data available in each case, such as: Abundance Ecological diversity indices
Geographic location:	17.5250°W – 11.7483°W	6.8333°N – 12.7167°N
Spatial resolution:	15 stations	
Temporal extent:	1979-09-14 / 1979-09-27	
Temporal resolution:	n/a	
Depth range/resolution:	From 22 m to 136 m depth	
Conditions for access & use:	Agreement with the Instituto Español de Oceanografía (IEO)	
Limitations on public access:	Yes	
Responsible organization:	Instituto Español de Oceanografía, Madrid, Spain	

Data via:	Contact: director@md.ieo.es Head, Instituto Español de Oceanografía
Data format:	Digital (plain text and survey report in PDF format)
References:	Bravo-de-Laguna, J. 1981. *Informe sobre la campaña "Pelagos 7909": Prospección acústica de peces pelágicos en aguas de Sierra Leona, Guinea Conakry, Guinea Bissau y sur de Senegal.* Instituto Español de Oceanografía, S. C. de Tenerife, Spain. (unpublished)

Additional information:

This survey was carried out on the R/V *Capricorne*. The gear used during this survey was the Cornide kind.



7. DATABASES

Some data extracted from WOD 2013 in an area including the CCLME (green shaded area).
The violet circles show CTD stations.
The orange circles show the trajectory of one glider.

GENERAL BATHYMETRIC CHART OF THE OCEAN – GEBCO –
GEBCO

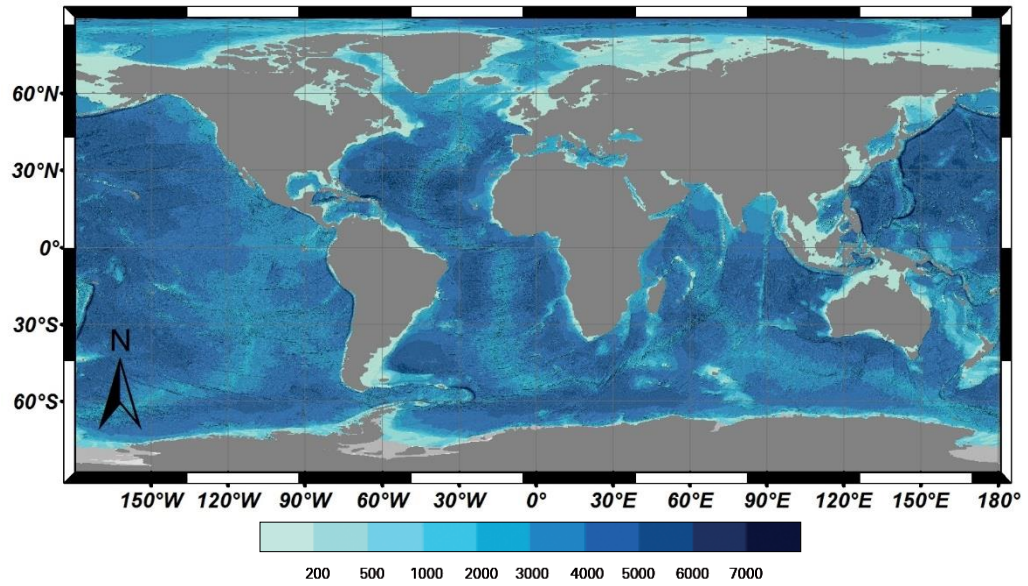


Figure 167. GEBCO Wold Ocean Bathymetry. The scale shows the depths in corrected meters below mean sea level. Image reproduced from GEBCO_2014 Grid, version 20150318, http://www.gebco.net (accessed 4 July 2017).

Resource abstract:
The General Bathymetric Chart of the Oceans (GEBCO) consists of an international group of experts who work on the development of a range of bathymetric datasets and data products, including gridded bathymetric data sets, the GEBCO Digital Atlas, the GEBCO world map and the GEBCO Gazetteer of Undersea Feature Names. Their aim is to provide the most authoritative publicly-available bathymetry of the world's oceans.

GEBCO operates under the joint auspices of the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Hydrographic Organization (IHO), and it is directed by a Guiding Committee and supported by sub-committees on ocean mapping and undersea feature names plus *ad hoc* working groups.

Resource language:	eng	
Keyword values:	Elevation	
Variables available:	*Observed variables*	*Derived variables*
	Bathymetry of the worlds' ocean	Bathymetric contours Geographic names of undersea features
Geographic location:	Global ocean coverage	
Spatial resolution:	30 arc-seconds – 1 arc-minute	
Temporal extent:	1903 / present	
Temporal resolution:	n/a	
Depth range/resolution:	From 200 m depth to the seabed	
Conditions for access & use:	Providing the source material is properly credited, the reproduction of the gridded bathymetry data sets in derivative form for scientific research, environmental conservation, education or other non-commercial purposes is authorised without prior permission. GEBCO encourages downloading gridded datasets from their web site rather than providing the grids to third parties themselves. This allows GEBCO to keep statistics on the use of GEBCO gridded data. Users	

	who intend to use GEBCO's gridded data for commercial purposes are kindly asked to seek GEBCO prior permission
Limitations on public access:	No
Responsible organization:	Intergovernmental Oceanographic Commission of UNESCO, Paris, France International Hydrographic Organization, Monaco
Data via:	GEBCO Gridded bathymetry data: http://www.gebco.net/data_and_products/gridded_bathymetry_data IHO-IOC GEBCO Gazetteer of Undersea Feature Names: http://www.ngdc.noaa.gov/gazetteer/ Contact: http://www.gebco.net/about_us/contact_us/
Data format:	Digital: 2D CF-netCDF, 1D netCDF, Esri ASCII raster, INT16 data GeoTIFF and WMS images. The data format available depends on the product. The Undersea Feature Names are available as a WMS images, KML and ArcGIS layer
References:	If the datasets are used in a presentation or publication, the source must be acknowledged. This should be of the form (including the appropriate version number): For the GEBCO_2014 Grid: 'The GEBCO_2014 Grid, version 20150318, http://www.gebco.net'. For the GEBCO_2014 SID Grid: 'The GEBCO_2014 SID Grid, version 20150318, http://www.gebco.net'. The version number of the grid is given in the header information within the grid file. If imagery from the WMS is included in web sites, reports and digital and printed imagery the source of the data set must be acknowledged and be of the form: "Imagery reproduced from the GEBCO_2014 Grid, version 20150318, www.gebco.net". Please include the following citation when data from the gazetteer are used or reproduced in reports, presentations and other products: "IHO-IOC GEBCO Gazetteer of Undersea Feature Names, www.gebco.net"

Additional information:

Traditionally GEBCO had focused on providing bathymetric datasets and maps for areas deeper than 200 m. However, they have been working to improve gridded bathymetric datasets in shallower water. Shallow water bathymetry data are being incorporated into the GEBCO gridded datasets and products as the data become available.

Data about the Waters off the West Coast of Africa were used to update the original GEBCO_08 base grid, upon which the GEBCO_2014 Grid is based. These data were included in the version 20141103 of the GEBCO_2014 Grid, released in November 2014 (http://www.gebco.net/data_and_products/gridded_bathymetry_data/documents/gebco_2014.pdf, accessed 4 July 2017).

Dataset coverage: 18.50°W – 7.50°W / 8.00°N – 34.00°N

This dataset is largely focussed in shallower water areas.

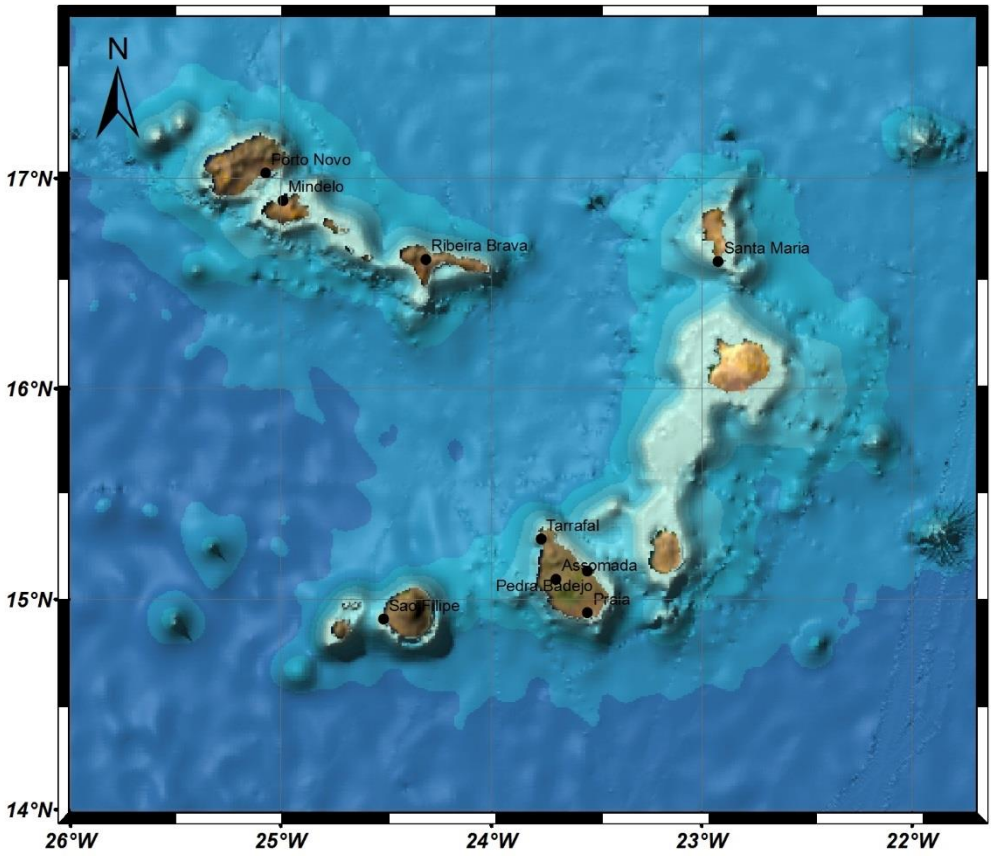


Figure 168. Bathymetry around Cabo Verde archipelago. Numerous seamounts are observable. Image reproduced from the GEBCO_2014 Grid, version 20150318, http://www.gebco.net (accessed 4 July 2017).

ONEGEOLOGY PORTAL

DIFFERENT DATA OWNERS

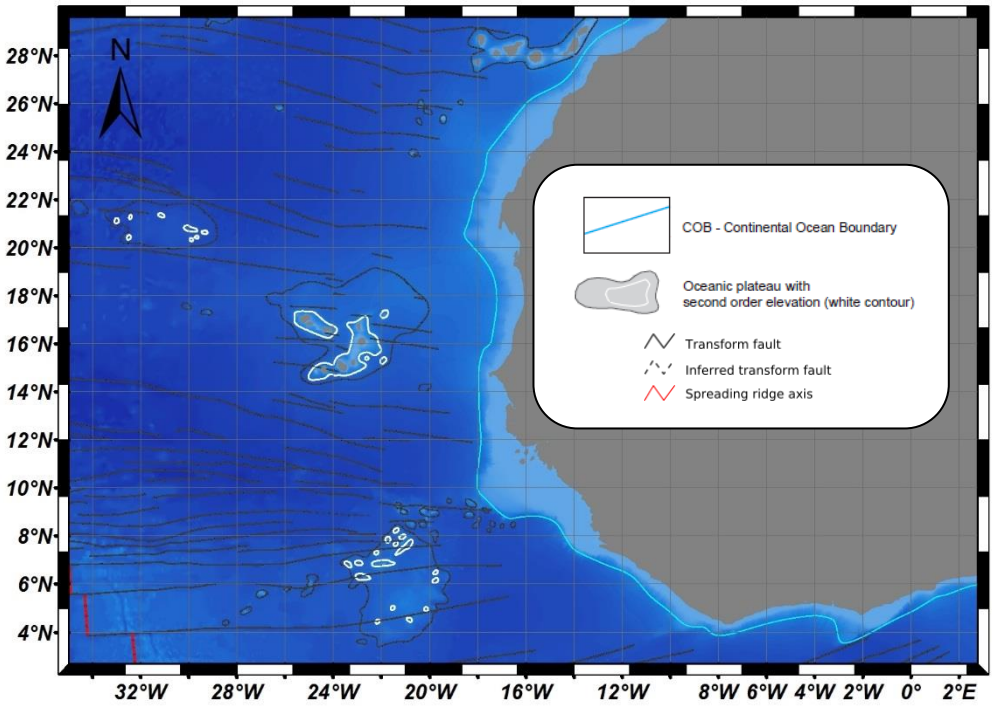


Figure 169. Geological map off the seabed off Northwest Africa. Based upon the Commission for the Geological Map of the World (CGMW) and the French Geological Survey (BRGM), with the permission of OneGeology. Source: OneGeology Portal. http://portal.onegeology.org/ (accessed 24 March 2017).

Resource abstract:

OneGeology is a Geological Survey initiative with the aim of making public and web-accessible the best available geological and other geoscience data worldwide at the best possible scales, initially at a scale of about 1:1 million but now evolved to covering all scales available, to better address the needs of society. It is an international initiative of the geological surveys of the world who are working together with the support of international organizations, regional organizations and industry sponsors.

The objectives of OneGeology are:

- To be the provider of geoscience data globally;
- To ensure an exchange know-how and skills so all can participate;
- Use of the global profile of OneGeology to increase awareness of the geosciences and their relevance.

Resource language: eng, fre

Keyword values: Oceanographic geographical features

Variables available:

Observed variables	*Derived variables*
Magnetic anomaly	Delimitation of oceanic plateau
Geological age (Ma)	
Continental ocean boundary	
Transform faults and ridge axis	

Geographic location: Global coverage

Spatial resolution: Variable. The target scale is 1:1 000 000 but the project accepts a range of scales and the best available data

Temporal extent: n/a

Temporal resolution:	n/a
Depth range/resolution:	From surface to seabed
Conditions for access & use:	OneGeology material, which is defined as data, mapping, map extracts, illustrations, images (but not including institutional logos) which are available on the OneGeology website, is freely available for all uses. The only condition placed on the use of the materials is that they are not used in any offensive, derogatory or political manner, which might offend the owner of the materials in question. The OneGeology logo can be displayed and should be clearly visible and used in conjunction with all materials. The reference of the owner of the data sources, where available, should also be clearly visible or recognised. For further information, access: http://www.onegeology.org/docs/OneGeologyIntellectualPropertyRights200815-English.pdf
Limitations on public access:	No
Responsible organization:	Responsible organization for each dataset service is described on the portal
Data via:	http://portal.onegeology.org/ Contact: onegeology@bgs.ac.uk OneGeology Initiative
Data format:	Digital (vector digital geological data in a GIS format such as ESRI's shapefile, or a digitally scanned map in an image format such as GeoTIFF or JPEG)
References:	The use of the following acknowledgement to accompany any uses of OneGeology materials would be appreciated: “Reproduced with the permission of the OneGeology. All rights Reserved”. Where illustrations, map extracts, data or images are used as the basis of specifically generated illustrations, the source of the material should be cited as follows: “Based upon [source details], with the permission of OneGeology”

INTERNATIONAL COMPREHENSIVE OCEAN-ATMOSPHERE DATA SET – ICOADS –
DIFFERENT DATA PROVIDERS

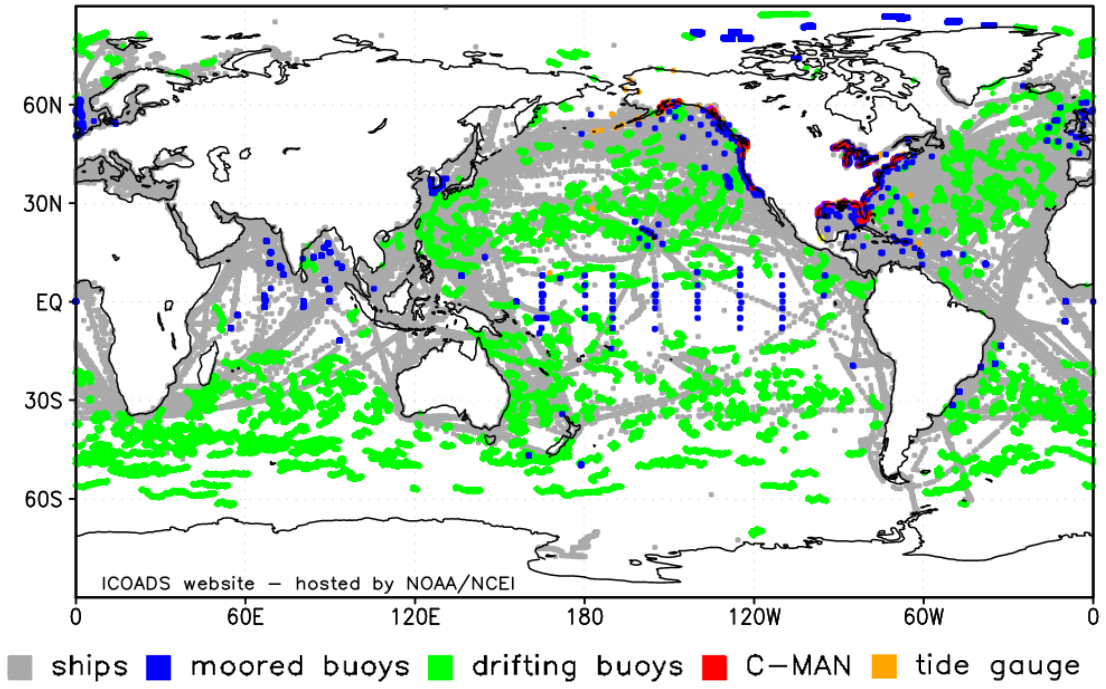


Figure 170. ICOADS preliminary marine reports (based on NOAA/NCEP data) stratified by platform type (May 2017). Source: ICOADS web information page. http://icoads.noaa.gov/ (accessed 4 July 2017).

Resource abstract:
The International Comprehensive Ocean-Atmosphere Data Set (ICOADS) is a global ocean marine meteorological and surface ocean dataset. It is formed by merging many national and international data sources that contain measurements and visual observations from ships (commercial, navy and research), moored and drifting buoys, coastal stations, and other marine platforms.

ICOADS Release 3.0 (R3.0) was completed in June 2016 with data covering 1662-2014, plus preliminary data and products for 2015 to near-real-time.

ICOADS data are made available in two main forms:

- Observations: Surface marine reports from ships, buoys, and other platform types. Each report contains individual observations of meteorological and oceanographic variables, such as sea surface and air temperatures, wind, pressure, humidity, and cloudiness;
- Monthly summary statistics: Ten statistics (such as the mean and median) are calculated for each of 22 observed and derived variables, using 2° latitude x 2° longitude boxes back to 1800 (and 1° x 1° boxes since 1960).

Resource language: eng
Keyword values: Oceanographic geographical features
Variables available: *Observed variables*
Air temperature
Cloud amount/frequency
Cloud height
Cloud types
Dew point temperature
Humidity

	Ice edges Precipitation amount Pressure tendency Sea ice concentration Sea level pressure Sea surface temperature (SST) Surface winds Swells Visibility Wave frequency Wave height Wave speed/direction
Geographic location:	Global ocean coverage
Spatial resolution:	Varies depending on date and geographic position relative to shipping routes and ocean observing systems. 2° latitude x 2° longitude boxes back to 1800, and 1° x 1° boxes since 1960
Temporal extent:	1662-10-15 / present
Temporal resolution:	n/a
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use, but user registration is required in NCAR/UCAR Research Data Archive
Limitations on public access:	No
Responsible organization:	Physical Sciences Division (PSD), Earth System Research Laboratory (ESRL), NOAA, USA National Centers for Environmental Information (NCEI), NOAA, USA National Science Foundation's National Center for Atmospheric Research (NCAR), USA
Data via:	http://icoads.noaa.gov/products.html Contact: http://icoads.noaa.gov/contacts.html ICOADS, NOAA
Data format:	Digital (ASCII and netCDF format)
References:	For further information about ICOADS Release 2.5 citation and redistribution Information: http://icoads.noaa.gov/e-doc/R3.0-citation.pdf Research Data Archive/Computational and Information Systems Laboratory/National Center for Atmospheric Research/University Corporation for Atmospheric Research, Physical Sciences Division/Earth System Research Laboratory/OAR/NOAA/U.S. Department of Commerce, Cooperative Institute for Research in Environmental Sciences/University of Colorado, National Oceanography Centre/University of Southampton, Met Office/Ministry of Defence/United Kingdom, Deutscher Wetterdienst (German Meteorological Service)/Germany, Department of Atmospheric Science/University of Washington, Center for Ocean-Atmospheric Prediction Studies/Florida State University, and National Centers for Environmental Information/NESDIS/NOAA/U.S. Department of Commerce. 2016, updated monthly. *International Comprehensive Ocean-Atmosphere Data Set (ICOADS) Release 3, Individual Observations*. Research Data Archive at the National Center for Atmospheric Research, Computational and Information

Systems Laboratory. https://doi.org/10.5065/D6ZS2TR3. Accessed dd mmm yyyy

Additional information:

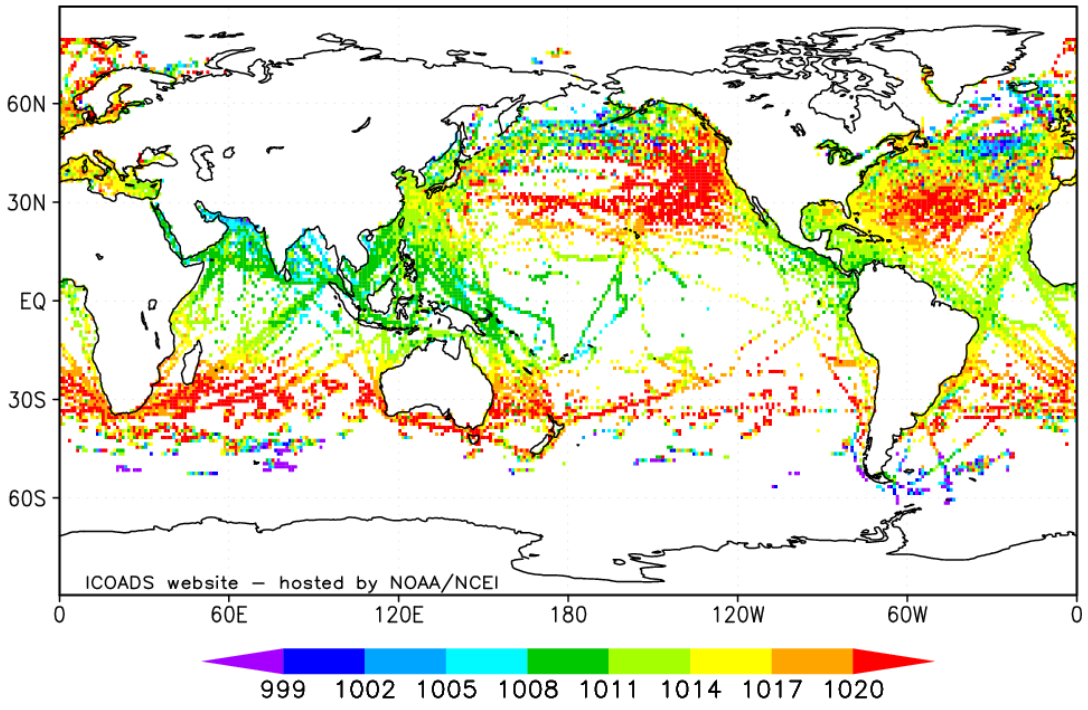


Figure 171. Cumulated sampling for May 2017, provided by 1° monthly summaries and departures (based on mean values for sea level pressure in hPa; departures are with respect to 1971-2000 long-term mean based on Release 3.0). Source: ICOADS web information page. http://icoads.noaa.gov/ (accessed 4 July 2017).

EXTENDED RECONSTRUCTED SEA SURFACE TEMPERATURE – ERSST –
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA), USA

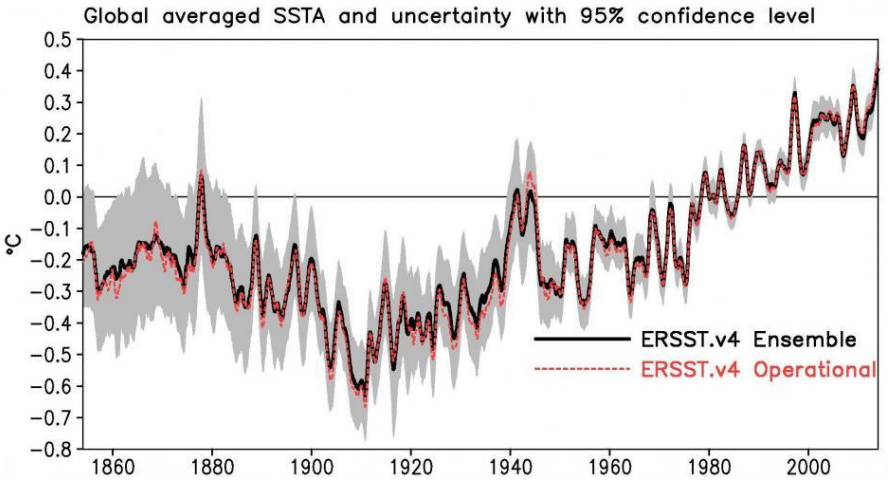


Figure 172. Monthly and globally averaged ERSST.v4 anomaly (°C) from 1854-2014. Note that the data is more reliable after the 1940's. The magnitude of the temperature increase in recent decades is much greater than the uncertainty in the data. Source: NOAA/NESDIS/NCEI. https://www.ncdc.noaa.gov/data-access/marineocean-data/extended-reconstructed-sea-surface-temperature-ersst-v4 (accessed 4 July 2017).

Resource abstract:
The most recent version of the Extended Reconstructed Sea Surface Temperature (ERSST) analysis is version 4 (v4) which has been revised from version 3b (ERSST.v3 is described in Smith et al., 2008). The analysis is based on the International Comprehensive Ocean-Atmosphere Data Set (ICOADS) release 2.5 and uses improved analysis methods. One of the most significant improvements involves corrections to account for the rapid increase in the number of ocean buoys in the mid-1970s; buoy measurements are systematically cooler than ship measurements of SST, and in ERSST v4 a new correction accounts for ship-buoy differences thereby compensating for the cool bias to make them compatible with historical ship observations. ERSST.v4 is described in Huang et al. (2015*a,b*) and Liu et al. (2015).

The monthly analysis extends from January 1854 to the present, but because of sparse data in the early years, the analyzed signal is damped before 1880. After 1880, the strength of the signal is more consistent over time. ERSST is suitable for long-term global and basin wide studies; local and short-term variations have been smoothed in ERSST. The anomalies are computed with respect to a 1971-2000 month climatology (Xue et al., 2003).

Resource language:	eng
Keyword values:	Oceanographic geographical features
Variables available:	*Observed variables*: Extended Reconstructed Sea Surface Temperature (ERSST); *Derived variables*: Anomalies
Geographic location:	Global ocean coverage
Spatial resolution:	2° grid
Temporal extent:	1854 / present. After 1880, the strength of the signal is more consistent over time
Temporal resolution:	Monthly means
Depth range/resolution:	Surface
Conditions for access & use:	No constraints on data access or use
Limitations on public access:	No

Responsible organization:	National Centers for Environmental Information (NCEI), NOAA, Asheville, USA Physical Sciences Division (PSD), NOAA, Boulder, USA
Data via:	NOAA NCEI: https://www.ncdc.noaa.gov/data-access/marineocean-data/extended-reconstructed-sea-surface-temperature-ersst Contact: Boyin.Huang@noaa.gov Boyin Huang. NOAA Contact: Tom.Smith@noaa.gov Tom Smith. NOAA NOAA PSD: http://www.esrl.noaa.gov/psd/data/gridded/data.noaa.ersst.v4.html Contact: esrl.psd.data@noaa.gov
Data format:	Digital (ASCII format, netCDF format)
References:	When acquiring NOAA_ERSST_V4 data products from Physical Sciences Division, they must be acknowledged in the use of the data. This may be done by including text such as *"*NOAA_ERSST_V4 data provided by the NOAA/OAR/ESRL PSD, Boulder, Colorado, USA, from their Web site at http://www.esrl.noaa.gov/psd/*"* in any documents or publications using these data
Additional information:	

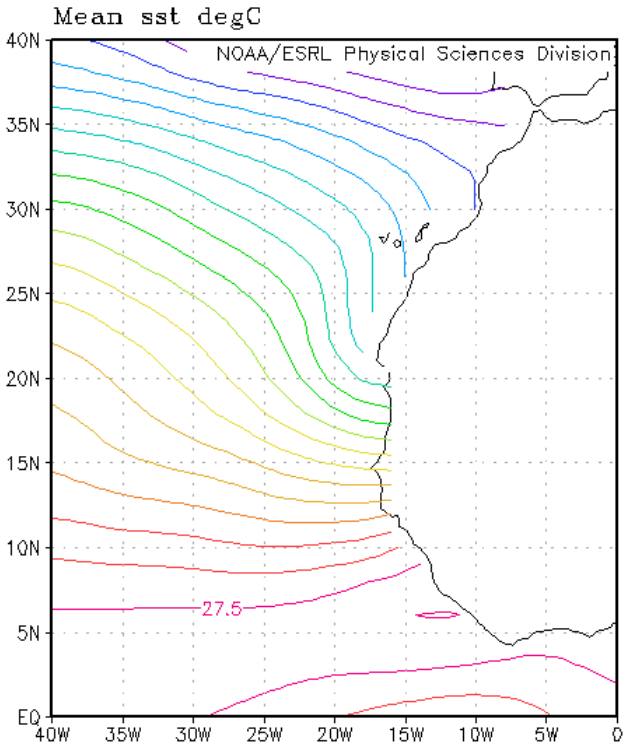


Figure 173. Contour map of mean ERSST.v4 (°C) from January 1966 to January 2016. The contour interval is 0.5°C, ranging from 18.5°C (purple) to 28°C (pink) in this map. Source: NOAA/OAR/ESRL PSD. http://www.esrl.noaa.gov/psd/ (accessed 4 July 2017).

OCEANCOLOR WEB

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA), UNITED STATES OF AMERICA

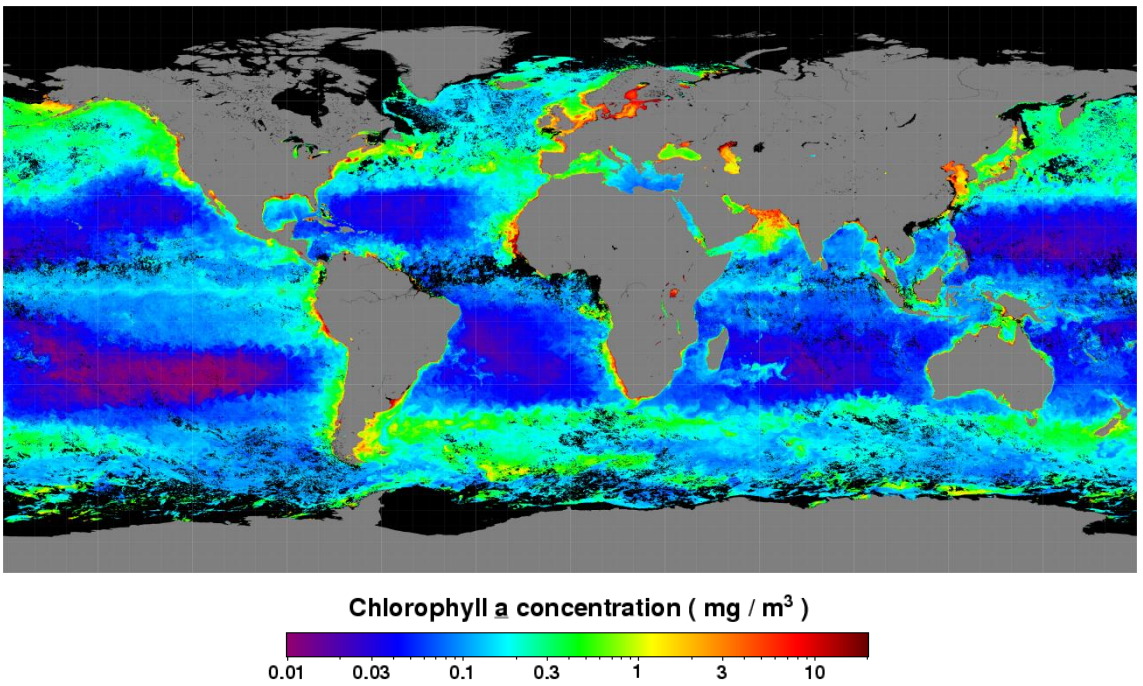


Figure 174. Chlorophyll a concentration (MODIS-A) on 4 km grid in March 2014 (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014a). Source: OceanColor Web L3 visual browser. http://oceancolor.gsfc.nasa.gov (accessed 4 July 2017).

Resource abstract:

The OceanColor website contains open access information on ocean colour data and products at various levels of information. Data are derived from the following satellite sensors:

- CZCS: Coastal Zone Color Scanner Experiment
- OBPG OCTS GAC Data Set: The Ocean Color and Temperature Scanner calibrated and processed by the Ocean Biology Processing Group Global Area Coverage Data Set
- SeaWIFS: Sea-viewing Wide Field-of-view Sensor
- MODIS-AQUA and MODIS-TERRA: Moderate Resolution Imaging Spectroradiometer
- MERIS: MEdium Resolution Imaging Spectrometer
- Aquarius: Sea Surface Salinity from Space
- VIIRS: Visible and Infrared Imager/Radiometer Suite
- HICO: Hyperspectral Imager for the Coastal Ocean

Resource language:	eng	
Keyword values:	Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Global ocean color	Ocean productivity
	Sea surface temperature (SST)	Particulate Inorganic Carbon (PIC)
	Sea surface salinity (SSS)	Particulate Organic Carbon (POC)
	Diffuse attenuation coefficient at 490 nm	
	Photosynthetically Active Radiation (PAR)	
	etc	
Geographic location:	Global ocean coverage	
Spatial resolution:	Variable	
Temporal extent:	1978-10 / present	

Temporal resolution:	n/a
Depth range/resolution:	Surface
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	National Aeronautics and Space Administration (NASA), USA
Data via:	Data L1/2 visual browser: http://oceancolor.gsfc.nasa.gov/cgi/browse.pl Data L3 visual browser: http://oceancolor.gsfc.nasa.gov/cgi/l3 Data archives: http://oceandata.sci.gsfc.nasa.gov/ Contact: https://oceancolor.gsfc.nasa.gov/contact/ OceanColor Web, NASA
Data format:	Digital (HDF format and netCDF format)
References:	Information about citation and acknowledgements in: https://oceancolor.gsfc.nasa.gov/citations/

Additional information:

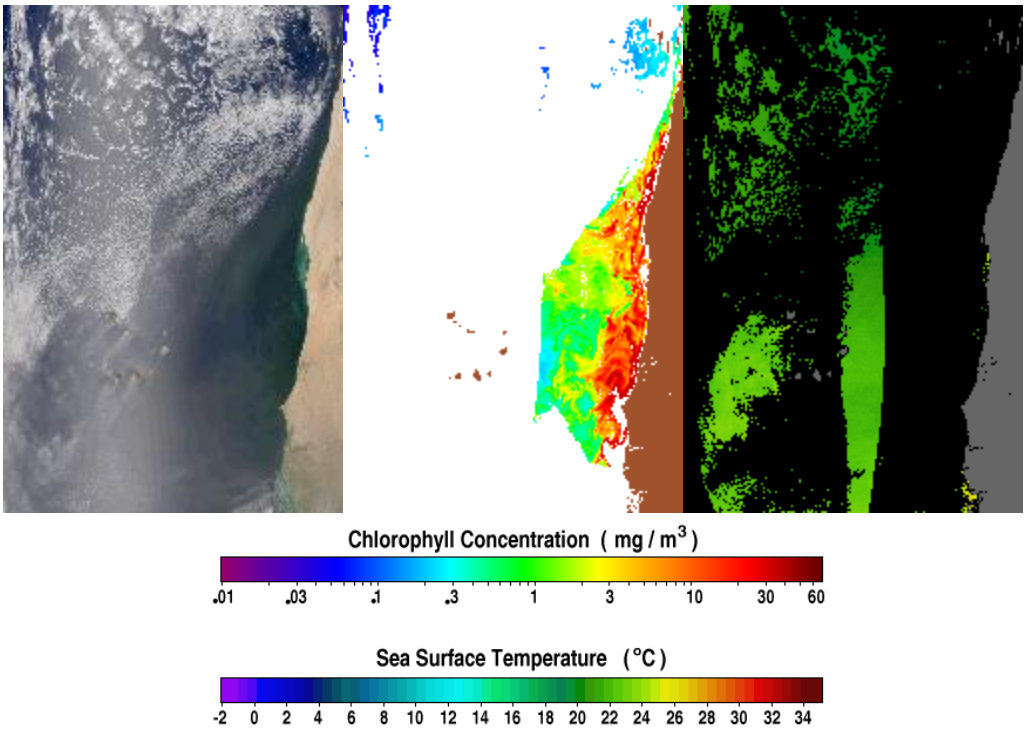


Figure 175. From the left to the right: Quasi True Colour, chlorophyll concentration (mg/m^3) and sea surface temperature (°C) (11 µ) MODIS-A on 26 April 2014 (daytime) covering the marine area around Western Sahara, Mauritania, Senegal, The Gambia, Guinea-Bissau and Cabo Verde (NASA Goddard Space Flight Center, Ocean Ecology Laboratory, Ocean Biology Processing Group, 2014f,g). Source: OceanColor Web L1/2 visual browser. http://oceancolor.gsfc.nasa.gov (accessed 4 July 2017).

PERMANENT SERVICE FOR MEAN SEA LEVEL – PSMSL –

DIFFERENT DATA PROVIDERS

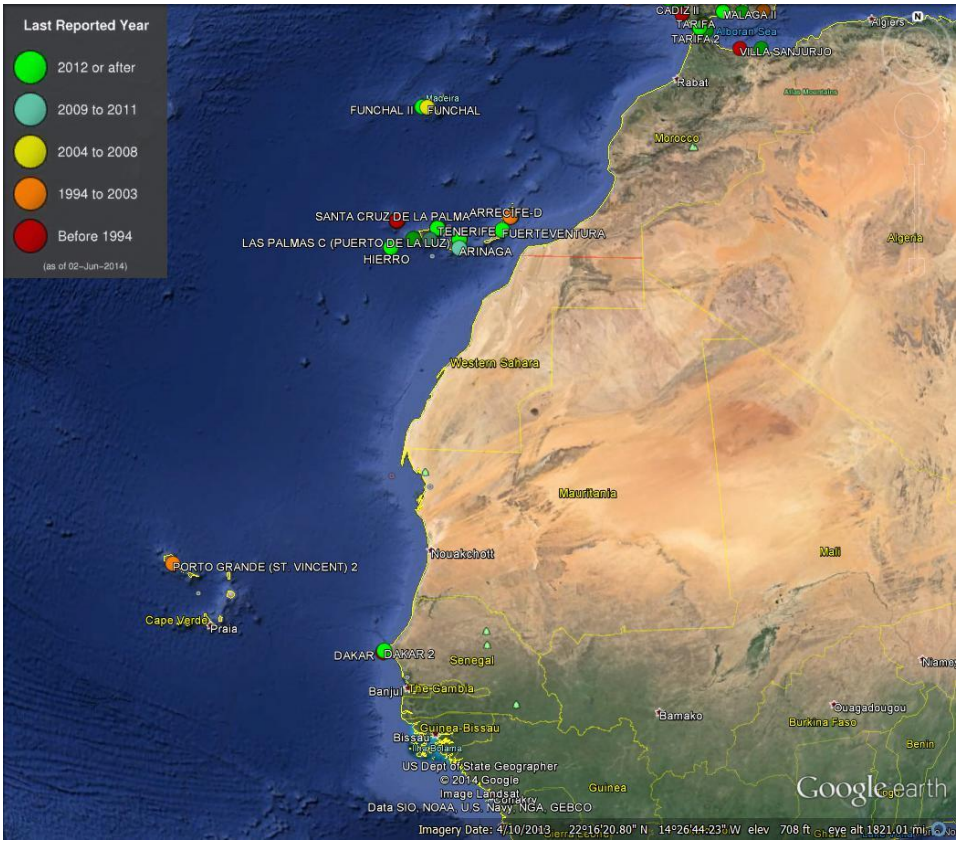


Figure 176. Tide gauges supplying data to PSMSL in the CCLME. Coloured dots show each tide gauge latest data range. Source: PSMSL Google Earth visualisation. http://www.psmsl.org/products/kml_data/ (accessed 16 June 2014).

Resource abstract:

Established in 1933, the Permanent Service for Mean Sea Level (PSMSL) is responsible for the collection, publication, analysis and interpretation of sea level data from the global network of tide gauges. It is based at the National Oceanography Centre (NOC), Liverpool (United Kingdom), which is a component of the UK Natural Environment Research Council (NERC).

The database of the PSMSL contains monthly and annual mean values of sea level from almost 2000 tide gauge stations around the world.

Funding for the PSMSL comes from the Federation of Astronomical and Geophysical Data Analysis Services (FAGS), the Intergovernmental Oceanographic Commission (IOC-UNESCO), and the U.K. Natural Environment Research Council (NERC).

Resource language:	eng
Keyword values:	Environmental monitoring facilities
Variables available:	*Observed variables* Sea level
Geographic location:	Global coverage (with gaps)
Spatial resolution:	Almost 2000 tide gauge stations
Temporal extent:	1933 / present
Temporal resolution:	Monthly and annual
Depth range/resolution:	Surface

Conditions for access & use:	The free access to data by users is central to the PSMSL's mission, and conversely no supplier is ever paid for their data, nor are licensing terms ever entered into
Limitations on public access:	No
Responsible organization:	Permanent Service for Mean Sea Level, Liverpool, United Kingdom
Data via:	http://www.psmsl.org/data/obtaining Contact: psmsl@noc.ac.uk Permanent Service for Mean Sea Level
Data format:	Digital (data files in txt format and plots in PNG format)
References:	When using the tide gauge data set from the PSMSL, PSMSL request to reference the last paper describing the data set, as well as the data set itself. As an example, "the tide gauge data [Holgate et al., 2013; PSMSL, 2017] show that ..." Permanent Service for Mean Sea Level (PSMSL), 2017. "Tide Gauge Data", Retrieved 12 June 2017 from http://www.psmsl.org/data/obtaining/. Holgate, S. J., Matthews, A., Woodworth, P. L., Rickards, L. J., Tamisiea, M. E., Bradshaw, E., Foden, P. R., Gordon, K. M., Jevrejeva, S. and Pugh, J. 2013. New Data Systems and Products at the Permanent Service for Mean Sea Level. *Journal of Coastal Research*, Vol. 29 (3), pp. 493-504. doi:10.2112/JCOASTRES-D-12-00175. Note above that the "Retrieved" date above should correspond to the "Extracted from Database" date on the data page. This date and advice is also distributed in the zip files that contain the whole data set. While bibliographic requirements will vary from journal to journal, PSMSL believe that is important to include the "Extracted from Database" date

Additional information:

The metadata includes descriptions of benchmarks and their locations, types of instrumentation and frequency of data collection (where available) as well as notes on other issues that the users should be aware of (e.g. earthquakes that are known to have occurred in the vicinity or subsidence due to local groundwater extraction).

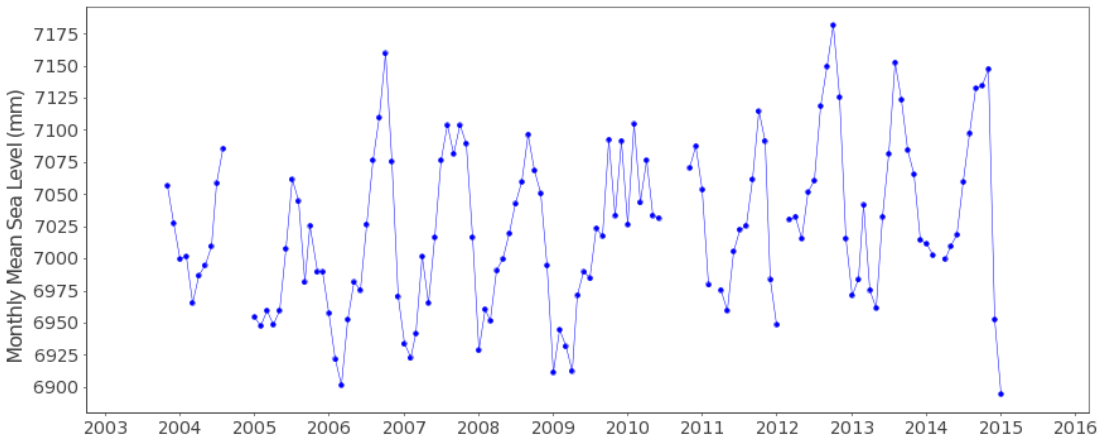


Figure 177. Time-series of monthly mean sea level (mm) at Funchal II tide gauge, which is bordering the CCLME area, covering the time period 2003-2015 (Holgate et al., 2013; PSMSL, 2017). Source: PSMSL. http://www.psmsl.org/data/obtaining/rlr.monthly.plots/2024_high.png (accessed 18 September 2017).

SURFACE OCEAN CO_2 ATLAS - SOCAT -

DIFFERENT DATA OWNERS

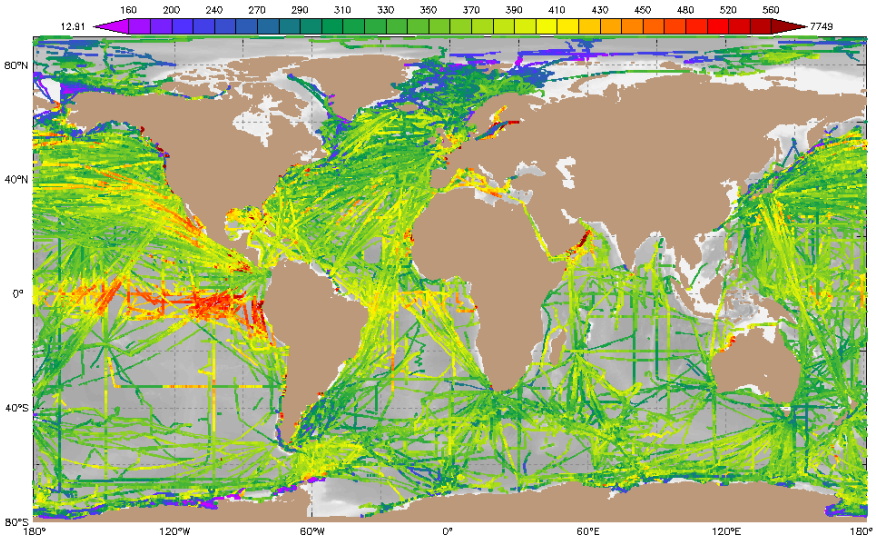


Figure 178. Map of SOCAT (v4, Bakker et al. 2016) surface fCO_2 values (in µatm) from 1957 to 2016, showing 4277 trajectories. Source: SOCAT. http://www.socat.info/ (accessed 4 July 2017).

Resource abstract:

The Surface Ocean CO_2 ATlas (SOCAT) is a global surface quality controlled fCO_2 (fugacity of carbon dioxide) dataset that brings together, in a common format, all publicly available data from the global oceans. It includes the Arctic, and the coastal seas. SOCAT is an international effort, endorsed by the IOCCP (International Ocean Carbon Coordination Project), SOLAS (Surface Ocean Lower Atmosphere Study) and IMBER (Integrated Marine Biogeochemistry and Ecosystem Research), and functions under auspices of the IOC-UNESCO and SCOR (Scientific Committee on Oceanic Research).

SOCAT version 4 has 18.5 million quality-controlled, *f*CO2 observations from 1957 to 2015 with an accuracy higher than 5 µatm. SOCAT enables the quantification of the ocean carbon sink and ocean acidification and the evaluation of ocean biogeochemical models (Bakker et al., 2016).

Resource language: eng

Keyword values: Oceanographic geographical features

Variables available:

Observed variables	*Derived variables*
Water xCO_2 at equilibrator temperature (dry air) Water xCO_2 at SST (dry air) Water pCO_2 at equi. temp. (wet air) Water pCO_2 at SST (wet air) Water fCO_2 at SST (wet air) Water fCO_2 at equi. temp. (wet air) etc.	Recommended fCO_2 calculated for the SOCAT protocol

Geographic location: Global coverage

Spatial resolution: Variable: 2nd level quality controlled global surface ocean *f*CO2 dataset; and gridded SOCAT product of monthly surface water *f*CO2 means on a 1° x 1° grid with no temporal or spatial interpolation (0.25° x 0.25° grid for coastal regions)

Temporal extent: 1957 / present

Temporal resolution: Variable

Depth range/resolution: Surface

Conditions for access & use:	The requirements for the users of SOCAT data products are listed in the Fair Data Use Statement of SOCAT, which can be consulted at: http://www.socat.info/SOCAT_fair_data_use_statement.htm
Limitations on public access:	No
Responsible organization:	Surface Ocean CO_2 ATlas
Data via:	http://www.socat.info/access.html Contact: submit@socat.info Surface Ocean CO_2 Atlas
Data format:	Digital (netCDF, ASCII, CSV, html Table, json, mat, nc, tsv, xhtml formats)
References:	Further information on the specific citation requirements of SOCAT and its data products, the references and the required acknowledgments can be found in the SOCAT Fair Data Use Statement: http://www.socat.info/SOCAT_fair_data_use_statement.htm Users of SOCAT data products must include in the acknowledgements: "The Surface Ocean CO_2 Atlas (SOCAT) is an international effort, endorsed by the International Ocean Carbon Coordination Project (IOCCP), the Surface Ocean Lower Atmosphere Study (SOLAS) and the Integrated Marine Biogeochemistry and Ecosystem Research program (IMBER), to deliver a uniformly quality-controlled surface ocean CO_2 database. The many researchers and funding agencies responsible for the collection of data and quality control are thanked for their contributions to SOCAT."

Additional information:
All data are evaluated for data quality using methods that are transparent and fully documented. Regional working groups conduct quality control of the datasets.

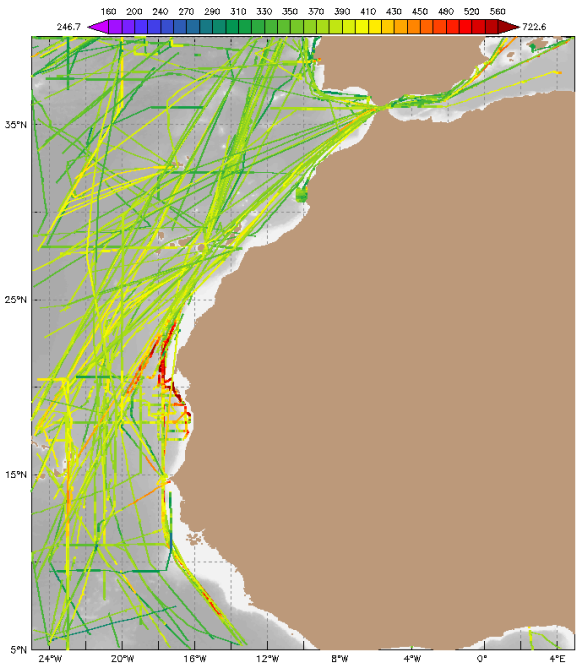


Figure 179. Map of SOCAT (v4, Bakker et al., 2016) surface fCO_2 values (in µatm) from 1957 to 2016 for Northwest Africa, showing 187 trajectories. Data source: SOCAT. http://www.socat.info/ (accessed 4 July 2017).

GLOBAL MARINE INFORMATION SYSTEM – GMIS –

INSTITUTE FOR ENVIRONMENT & SUSTAINABILITY, JOINT RESEARCH CENTRE, EUROPEAN COMMISSION

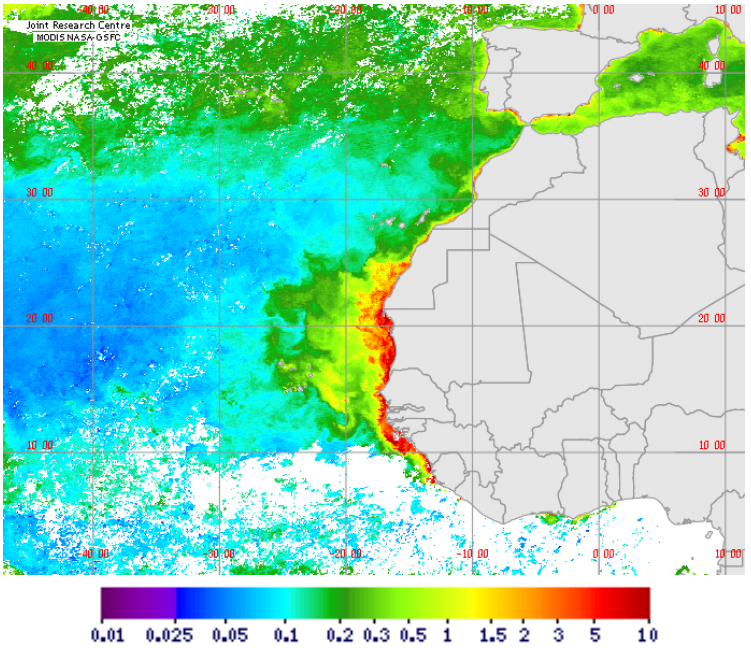


Figure 180. Monthly mean surface chlorophyll a (mg/m^3, December 2012) in the CCLME (MODIS-AQUA 9 km resolution). Source: Joint Research Centre (GMIS Discovery tool: http://gmis.jrc.ec.europa.eu/gis.php, accessed 4 July 2017).

Resource abstract:

The Global Marine Information System has been developed to provide the scientific community and other users with an appropriate set of biophysical information to monitor and conduct water quality assessment in the coastal and marine waters. The bulk of environmental analysis in GMIS relies on Earth Observation data, and the provision of continuous, detailed and accurate information on relevant marine biophysical parameters as derived from optical and infrared satellite sensors.

GMIS is an activity of the European Commission – DG Joint Research Centre (JRC), developed within the Water Resources Unit of the Institute for Environment and Sustainability (IES). The Global Environment Monitoring Unit at JRC processes, analyzes and distributes these data at various levels of information. The satellite products are retrieved using standard (space agency-related) and in house peer-reviewed algorithms, which have been implemented in a fully operational processing chain for applications in African waters.

Resource language: eng

Keyword values: Environmental monitoring facilities; Oceanographic geographical features

Variables available:

Observed variables	*Derived variables*
Sea surface temperature (SST)	Anomalies
Bathymetry (GEBCO)	
Absorption coefficient	
Particulate backscatter coefficient	
Diffuse attenuation coefficient	
Chlorophyll concentration	
Surface productive layer	

	Primary production
Geographic location:	Global ocean coverage
Spatial resolution:	4 km and 9 km
Temporal extent:	1978-10 / 2012-12-31
Temporal resolution:	n/a
Depth range/resolution:	n/a
Conditions for access & use:	The GMIS Datasets are available as a Web Map Service (WMS). No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	Global Marine Information System, Institute for Environment & Sustainability, Joint Research Centre, European Commission
Data via:	GMIS Discovery tool: http://gmis.jrc.ec.europa.eu/gmis_6_0.php http://gmis.jrc.ec.europa.eu/gis.php Contact: emis@jrc.ec.europa.eu Global Marine Information System, Institute for Environment & Sustainability, Joint Research Centre, European Commission
Data format:	Digital (GIS digital format, netCDF format, WMS PNG image, WCS GeoTIFF format, XML format)

Additional information:

The JRC developed an Observatory for Sustainable Development with its primary focus on Africa. This provides policy makers with recent information on specific locations regarding condition and evolution of environmental resources, as well as on potential conflicts linked to resource exploitation, water resource management and climate change impacts.

The GMIS WMS is accessible in 2 dataset resolutions (4 km or 9 km) for several sensors at the global, Africa, Pacific, Caribbean scales. In both cases, data are derived from the following satellite sensors: MODIS-AQUA, MODIS-TERRA, SeaWiFS, PATHFINDER and MERIS.

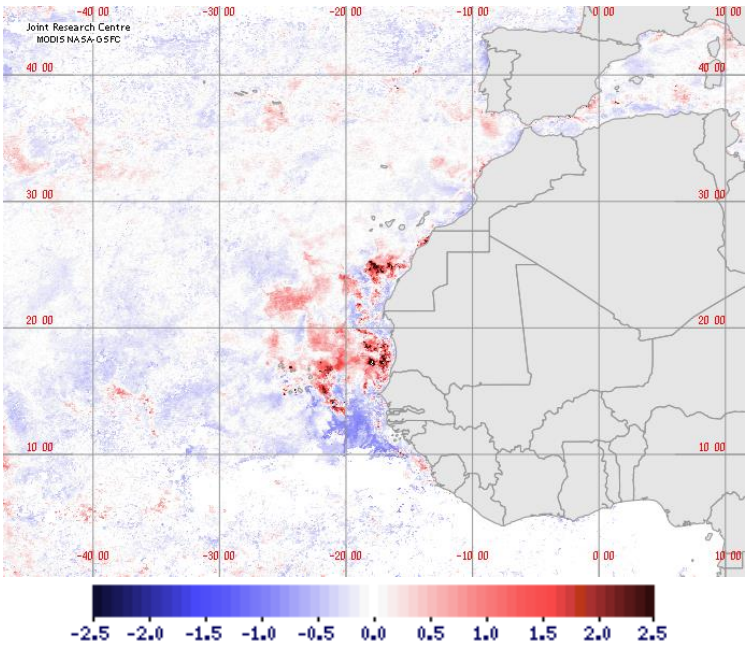


Figure 181. Monthly anomalies of sea surface chlorophyll a (%, December 2012) in the CCLME (MODIS-AQUA 9 km resolution). Source: Joint Research Centre (GMIS Discovery tool: http://gmis.jrc.ec.europa.eu/gis.php, accessed 4 July 2017).

WORLD OCEAN DATABASE 2013 – WOD13 –
NATIONAL OCEANOGRAPHIC DATA CENTER (NODC), UNITED STATES OF AMERICA

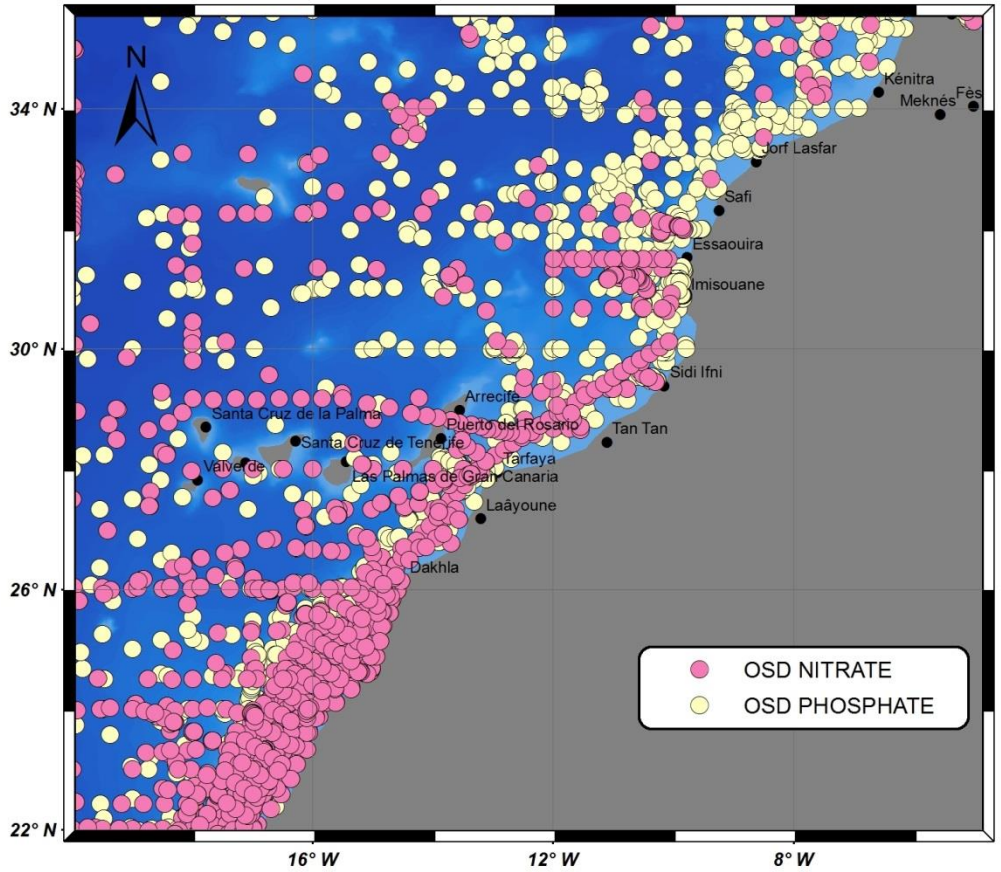


Figure 182. NOAA CTD stations in an area including the CCLME. Data source: WOD13.

Resource abstract:
The World Ocean Database 2013 is a powerful tool for studying climate and the ocean environment, providing uniform, easy, and quality-assured access to nearly 19000 datasets consisting of more than 200000 oceanographic cruises from the National Oceanographic Data Center archive. The WOD13 contains nearly 13 million temperature profiles, and almost 6 million salinity measurements.

With records dating as far back as 1772, the World Ocean Database integrates ocean profile data from approximately 90 countries around the world, collected from buoys, ships, gliders, and other instruments. WOD13 development and distribution goal is to make available to anyone, without restriction, the most complete set of historical ocean profile data and plankton measurements possible in digital form along with ancillary metadata and quality control flags.

The oceanographic data that comprise WOD13 have been acquired through many sources and projects as well as from individual scientists.

Resource language: eng
Keyword values: Oceanographic geographical features; Species distribution
Variables available: *Observed variables*
Beam attenuation coefficient (BAC)
Chlorophyll
Oxygen
Salinity
Temperature
Alkalinity
Argon

	CFC113 deltaC14 Helium Neon Nitrate Oxy18 pCO2 Phosphate Silicate tCO2 deltaC13 Ocean currents Sea level Waves etc
Geographic location:	Global ocean coverage
Spatial resolution:	Data are organized by World Meteorological Organization (WMO) 10 degree squares
Temporal extent:	1772 / 2012
Temporal resolution:	n/a
Depth range/resolution:	From surface to seabed
Conditions for access & use:	No conditions apply to access and use
Limitations on public access:	No
Responsible organization:	National Oceanographic Data Center (NODC), Silver Spring, United States of America
Data via:	http://www.nodc.noaa.gov/OC5/SELECT/dbsearch/dbsearch.html Contact: ncei.info@noaa.gov National Centers for Environmental Information, NOAA
Data format:	Digital (netCDF format, CSV format and ASCII format)
References:	Boyer, T. P., Antonov, J. I., Baranova , O. K., Coleman C., Garcia, H. E., Grodsky, A., Johnson, D. R., Locarnini, R. A., Mishonov, A. V., O'Brien, T. D., Paver, C. R., Reagan, J. R., Seidov, D., Smolyar, I. V. and Zweng, M. M. 2013. World Ocean Database 2013. In: *NOAA Atlas NESDIS 72*. Levitus, S. (ed.) and Mishonov, A. (technical ed.). Silver Spring, MD: 209 pp.

Additional information:
Each individual data value and each profile in WOD13 has quality control flags associated with it.

Table 2. Instrument types in the WOD13. Source: Boyer et al. (2013).

DATASET	SOURCE
OSD	Bottle, low-resolution Conductivity-Temperature-Depth (CTD), low-resolution XCTD data, and plankton data
CTD	High-resolution Conductivity-Temperature-Depth (CTD) data and high-resolution XCTD data
MBT	Mechanical Bathythermograph (MBT) data, DBT, micro-BT
XBT	Expendable (XBT) data
SUR	Surface only data (bucket, thermosalinograph)
APB	Autonomous Pinniped Bathythermograph - Time-Temperature-Depth recorders attached to elephant seals
MRB	Moored buoy data from TAO (Tropical Atmosphere-Ocean), PIRATA (moored array in the tropical Atlantic), MARNET, and TRITON (Japan-JAMSTEC)
PFL	Profiling float data
DRB	Drifting buoy data from surface drifting buoys with thermistor chains
UOR	Undulating Oceanographic Recorder data from a Conductivity/Temperature/Depth probe mounted on a towed undulating vehicle
GLD	Glider data

Table 3. Meteorological and Sea-state parameters stored in the WOD13. Source: Boyer et al. (2013).

Variables	OSD	MBT	XBT	CTD	MRB	Total
Bottom depth (m)	1,720,643	615,999	457,760	465,218		*3,259,620*
Water color (Forel-Ule color scale)	282,109	12,412	476	10,000		*304,997*
Secchi disk visibility depth (m)	446,737	12,150	452	14,944		*474,283*
Wave direction (WMO 0877)	360,534	30,005	30,587	6,822		*427,948*
Wave height (WMO 1555)	228,123	114,322	50,568	24,813		*417,826*
Sea state (WMO 3700)	570,029	478,174	53,969	29,851		*1,132,023*
Wind force (Beafort Scale)	604,615	14,444	3,264	3,945		*626,268*
Wave period (WMO 3155 or NODC 0378)	133,298	34,385	40,819	15,508		*224,010*
Wind direction (WMO 0877)	1,242,924	653,670	156,191	51,571	494,299	*2,621,216*
Wind speed (in knots)	607,232	673,374	157,098	56,132	499,361	*1,993,197*
Barometric pressure (millibar)	761,775	338,204	29,534	69,301		*1,198,814*
Dry bulb temperature (°C)	1,148,663	622,892	139,625	59,471	530,374	*2,501,025*
Wet bulb temperature (°C)	231,664	495,850	51,969	37,461		*816,944*
Weather condition (WMO 4501 and WMO 4677)	655,166	514,896	45,925	39,889		*1,255,876*
Cloud type (WMO 0500)	363,125	25,589	14,328	24,424		*427,466*
Cloud cover (WMO 2700)	706,432	524,097	28,596	42,779		*1,301,904*
Horizontal visibility (WMO 4300)	102,627	185,593	863	23,409		*312,492*
Reference/Sea surface temperature (°C)	23,384	1,171,291	117,066	391		*1,312,132*
Absolute air humidity ($g\ m^{-3}$)	95,550	1,768		677		*97,995*
Sea surface salinity		2,556	11,656			*14,214*

HERBARIO BOTÁNICA CIENCIAS DEL MAR – BCM HERBARIUM –
UNIVERSITY OF LAS PALMAS DE GRAN CANARIA (ULPGC), SPAIN

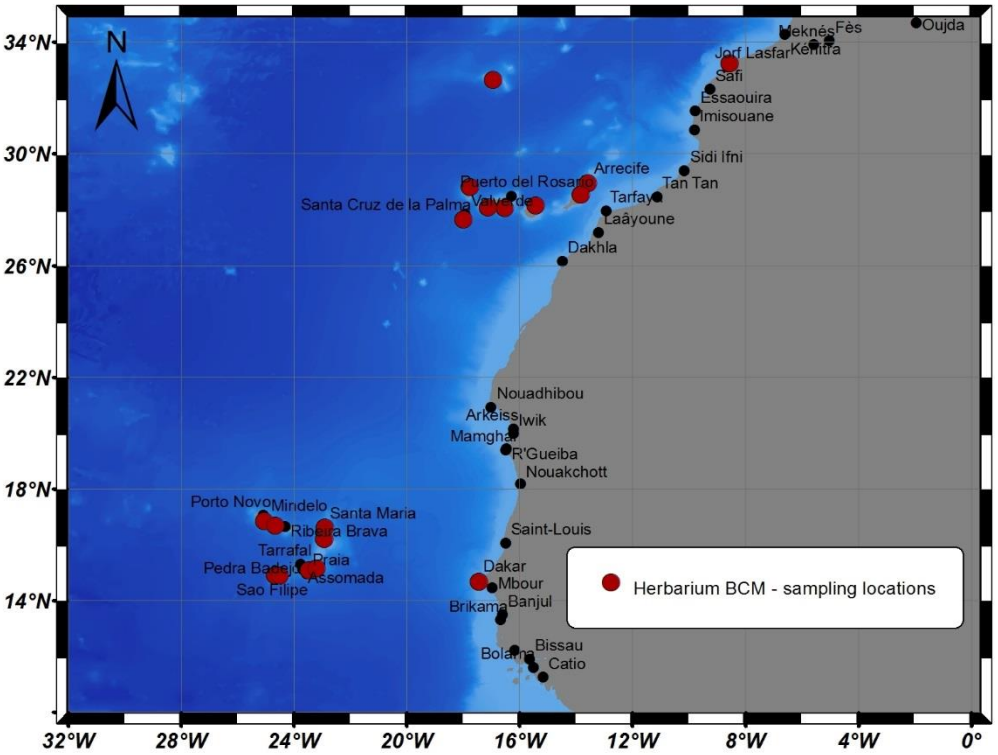


Figure 183. Sampling location areas for the BCM Herbarium (the number of available voucher specimens varies in each area).

Resource abstract:
The herbarium of the Department of Biology of the ULPGC was created with the aim of having a database of marine macroalgae from de Canary Islands and a depot of marine plants of the Atlantic Ocean. The study and teaching of Botany is its main purpose. In 1993, the herbarium became part of the Index Herbatorium - entity that globally homologates and relates herbariums with a certain volume of specimens in their collections - under the acronym BCM (from Marine Science Botany, in Spanish).

Nowadays, the BCM Herbarium counts with more than 7000 specimens of marine macrophytes (phanerogams and seaweed) and a large database including all the information collected, i.e. oceanographic surveys in the Macaronesian region and periodic sampling in the coast of the Canary Islands. There also exist exchange relationships with herbariums from all around the World that have permitted the BCM Herbarium to have small collections from different locations around the globe (Cabo Verde, Morocco, Senegal, Japan, USA, Australia, Panama, etc.).

Resource language: spa
Keyword values: Species distribution; Habitats and biotopes
Variables available: *Observed variables*
Taxonomic identification
Pictures collection
Habitat
Level/Depth range
Nature of substrate
Kind of sampling
Type species
Useful DNA available

Geographic location:	Temperate and tropical oceans coverage
Spatial resolution:	n/a
Temporal extent:	1989-12-25 / present
Temporal resolution:	n/a
Depth range/resolution:	From surface to 120 m depth
Conditions for access & use:	Data is provided free of charge
Limitations on public access:	No
Responsible organization:	University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain
Data via:	http://www.geoportal.ulpgc.es/herbariobcm Contact: maria.viera@ulpgc.es María Ascensión Viera Rodríguez. Herbarium curator and professor, BCM Herbarium, University of Las Palmas de Gran Canaria Contact: fco.suarezsantana@ulpgc.es Francisco Suárez Santana. Herbarium technician, BCM Herbarium, University of Las Palmas de Gran Canaria
Data format:	Paper and digital (netCDF)
References:	If you use data from the BCM Herbarium database, the following acknowledgment would be appreciated: "Data provided by the BCM Herbarium database. http://www.geoportal.ulpgc.es/herbariobcm"

Additional information:

The BCM Herbarium includes in its collection some holotype species, the original specimen used to describe for the first time one genus or subgenus.

Voucher specimens from herbariums can be used in comparative studies over time. The BCM Herbarium preserves voucher specimens used in particular studies as data source, so the data can be available for future verifications (i.e. Robaina et al., 1995; Garcia-Jimenez et al., 1998). Another example is the use of *Padina pavonica* voucher specimens to study the effects of ocean acidification in severe (El Hierro submarine volcano eruption) and chronic events around the Canary Islands waters, concluding that this species can be implemented as a bio-indicator of ocean acidification at short and long time scales (Gil-Díaz et al., 2014).

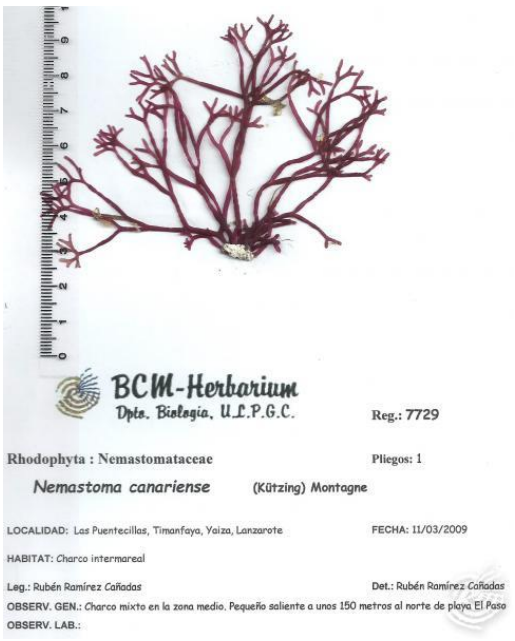


Figure 184. Picture of a BCM Herbarium voucher of Nemastoma canariense species, collected from an intertidal pool during a casual sampling (11 March 2009, Yaiza, Lanzarote Island, Spain). Source: BCM Herbarium. http://www.geoportal.ulpgc.es/herbariobcm (accessed 7 July 2017).

FISHERIES GLOBAL INFORMATION SYSTEM – FIGIS –
DIFFERENT DATA PROVIDERS

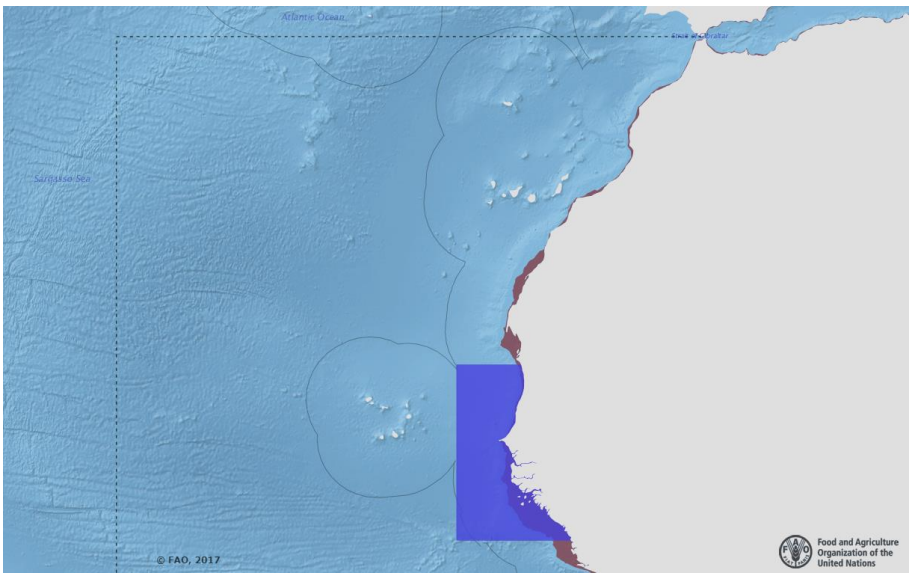


Figure 185. In blue, fish stock of Madeiran sardinella (Sardinella maderensis) in Mauritania, Senegal and The Gambia inventoried in the FIRMS system for the Eastern Central Atlantic. In brown, distribution of Madeiran sardinella; the dashed lines delimitate FAO fishing areas in the Atlantic Ocean; and the lines delimitate the EEZ (200 nautical miles arcs from the coast). Source: FAO Fishery Resources Monitoring System, Stocks and Fisheries map viewer: http://firms.fao.org/firms/stocks-fisheries-map-viewer (accessed 27 July 2017).

Resource abstract:
FIGIS is an information management tool that interconnects groups of institutional partnerships to build up a network of subsystems. FIGIS, as part of the Food and Agriculture Organization (FAO) Fisheries and Aquaculture Department's regular activities acts as a framework with reference to FAO information management policy. FIGIS delivers expert knowledge, a set of software tools, collaborative mechanisms, and interoperability solutions to a broad range of needs in fisheries information.
With the adoption by the Committee on Fisheries of the Strategy for Improving Information on Status and Trends of Capture Fisheries (STF) on 28 February 2003, FIGIS becomes one of the privileged tools for its implementation (http://www.fao.org/fishery/figis/en, accessed 4 July 2017).

FIGIS is designed according to guiding principles:

- To promote policy change towards the sustainable development of the world's fishery resources by highlighting major issues, presenting possible solutions and providing the best scientific information available;
- To offer a single and unique entry point to an integrated system comprising strategic data, information, analyses and reviews of issues and trends on a broad range of fisheries subjects;
- To provide integrated, quality-controlled, harmonized, streamlined and comprehensive information.

Resource language: eng
Keyword values: Species distribution; Area management/restriction/regulation zones and reporting units
Variables available: *Observed variables*
Fishery and Aquaculture Statistics

	Geospatial data (Species distribution maps, Atlas of Tuna and Billfish Catches, Regional Fishery Bodies map viewer, NASO aquaculture maps) Measures on conservation and management of sharks
Geographic location:	Global coverage
Spatial resolution:	n/a
Temporal extent:	1950 / present
Temporal resolution:	n/a
Depth range/resolution:	n/a
Conditions for access & use:	Please see FAO Terms and Conditions at http://www.fao.org/contact-us/terms/en/
Limitations on public access:	No
Responsible organization:	Food and Agriculture Organization (FAO)
Data via:	FAO Fisheries and Aquaculture: http://www.fao.org/fishery Fishery Resources Monitoring System (FIRMS): http://firms.fao.org Including the following links: Aquatic Species Distribution Map Viewer: http://www.fao.org/fishery/species/distribution Fishery Resources Monitoring System (FIRMS) CECAF Scientific advice reports: http://firms.fao.org/firms/search/institution/cecaf/en FIRMS Stocks and Fisheries map viewer: http://firms.fao.org/firms/stocks-fisheries-map-viewer Regional Fishery Bodies Map Viewer: http://www.fao.org/fishery/rfb/mapviewer Contact: figis-comments@fao.org Fisheries Global Information System, FAO
Data format:	Digital

PRESH DATABASE

DIFFERENT DATA PROVIDERS

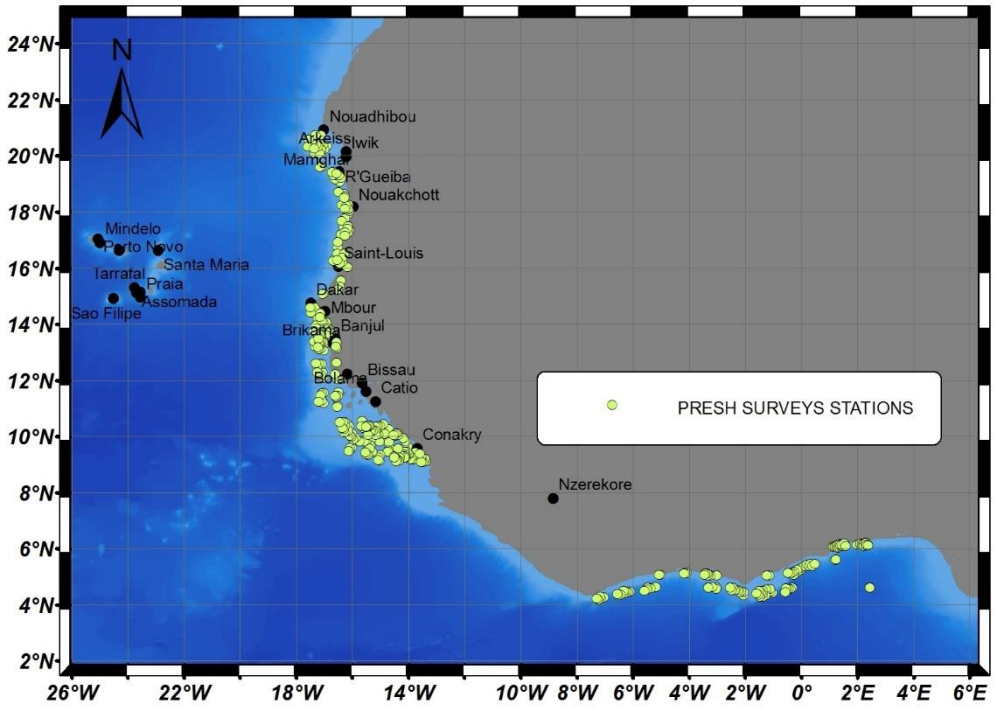


Figure 186. Distribution of the stations in 2012 and 2015 PRESH surveys, carried out in the waters of Mauritania, Senegal, The Gambia, Guinea-Bissau, Guinea, Ivory Coast, Ghana, Togo and Benin (4.1413°N - 20.7192°N).

Resource abstract:

Trawling surveys for the evaluation of demersal and pelagic coastal stocks in the shelf coastal and intermediate zones in the EEZ of Mauritania, Senegal, The Gambia, Guinea-Bissau, Guinea, Ivory Coast,Ghana, Togo and Benin, as well as the characterisation of the marine ecosystem.

These surveys are carried out under the frame of the PRESH project (from the French acronym of Regional Project for the Evaluation of Fisheries Stocks). The project is funded by the West African Economic and Monetary Union Commission (also known under the French acronym, UEMOA).

The main objective of the PRESH project is to improve and enhance the knowledge on the fisheries resources of the UEMOA Member States. Taking into account the continuity of the West Africa coast and the existence of shared stocks, four nonmember countries of the UEMOA are also associated to the project.

Resource language:	fre	
Keyword values:	Species distribution; Habitats and biotopes; Oceanographic geographical features	
Variables available:	*Observed variables*	*Derived variables*
	Georeferenced data (number and weight) by station for all species Biomass (Tm) Sea temperature Salinity	Catch rate (kg/30 min) CPUE (kg/N. station) Numeric abundance (No. of specimens/trawling) Density (Tm/km^2) Richness (No. of species/station)
Geographic location:	17.3562°W – 2.4622°E	4.1413°N - 20.7192°N
Spatial resolution:	375 stations	

Temporal extent:	2012-03-02/ 2015-04-20
Temporal resolution:	n/a
Depth range/resolution:	From 10 m to 200 m depth
Conditions for access & use:	Data are publicly available through the Regional Fisheries Information system leaded by UEMOA. Agreement needed for publication with the country owner of the data
Limitations on public access:	No
Responsible organization:	West African Economic and Monetary Union Commission, Ouagadougou, Burkina Faso
Data via:	Atlas UEMOA of the Fisheries Information System (PRESH section): http://atlas.statpeche-uemoa.org/ Contact: dndong@uemoa.int Head of Animal and Fisheries Resources, Department of Food Security, Agriculture, Mining and Environment, UEMOA Contact: soumahmohamed2009@gmail.com Mohamed Soumah. Responsible of the Fisheries information system, Centre National des Sciences Halieutiques de Boussoura
Data format:	Digital (CSV files)
References:	UEMOA (2015). *Atlas UEMOA de l'évaluation des stocks halieutiques de l'UEMOA* - © 2015. http://atlas.statpeche-uemoa.org/atlas_presh/

Additional information:

The 2012 and 2015 surveys were carried out on board of the R/V *Itaf Dème* (R/V *ID*) and R/V *Général Lansana Conté (*R/V *GLC*).

Survey reports are elaborated for every survey and for each country, as well as a regional report. All the reports are also available at: http://atlas.statpeche-uemoa.org (accessed 12 June 2017).

TRAWLBASE-ISTAM DATABASE
DIFFERENT DATA PROVIDERS

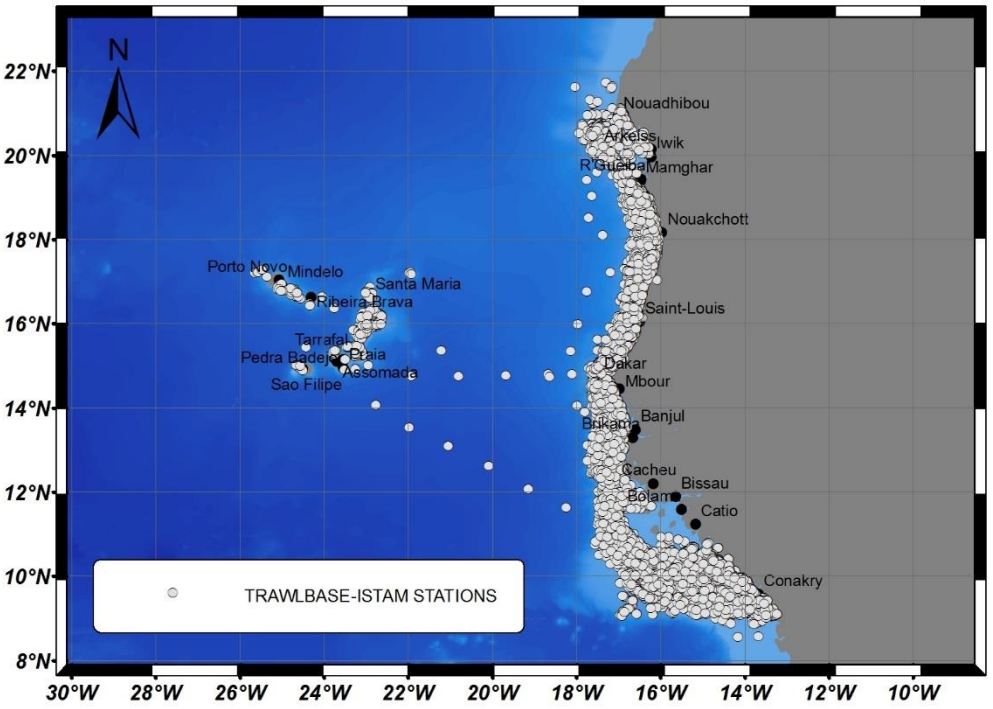


Figure 187. Surveyed area and sample stations described in the scientific surveys included in the Trawlbase-Istam database. Source: Trawlbase-Istam.

Resource abstract:
The ISTAM project (Improve Scientific and Technical Advices for fisheries Management) supports the coordination of scientific activities to ensure the methodological reinforcement of information systems and more generally to monitor, assess good practices on:

- The improvement of the quality and quantity of data used as the basis for stock assessments;

- The harmonisation, in the general perspective of fisheries management, of stock assessments by promoting the use of the most suitable and best controlled assessment methods at appropriate geographical scales;

- The improvement of the availability of validated and referenced datasets;

- Dialogue to facilitate the identification of future research needs to improve the information that supports fisheries management.

The project is broken down into six "WorkPackages" (WP). WP2 is named Subregional information systems. An inventory of the datasets was elaborated.

Resource language: eng

Keyword values: Area management/restriction/regulation zones and reporting units; Oceanographic geographical features; Species distribution

Variables available:

Observed variables	*Derived variables*
Georeferenced data for different species:	Ecological diversity index
Taxonomic identification	Relative abundance
Biomass	Catch rates (kg/trawling)
Depth range	
Density (kg/m^2)	

	Size, weight, sex and maturity by specimen
Geographic location:	CECAF region (Committee for the Eastern Central Atlantic Fisheries
Spatial resolution:	Around 14000 stations
Temporal extent:	1936 / 2008
Depth range/resolution:	From surface to 4870 m depth
Conditions for access & use:	Agreement with the country owner of the data. The users must follow the proposed Trawlbase-ISTAM data policy http://www.projet-istam.org/
Limitations on public access:	Yes
Responsible organization:	Centre for the Economics and Management of Aquatic Resources, University of Portsmouth, United Kingdom Centre National des Sciences Halieutiques de Boussoura, Guinea Centre de Recherches Océanographiques de Dakar-Thiaroye, Senegal Centro de Investigação Pesqueira Aplicada, Guinea-Bissau Department of Fisheries, Gambia Institut de Recherche pour le Développement, France Institut National de Développement des Pêches, Cabo Verde Food and Agriculture Organization (FAO), Fisheries Department, Italy Pôle halieutique Agrocampus Ouest, France Institut français de recherche pour l'exploitation de la mer, France Institut National de Recherche Halieutique, Morocco Institut Universitaire de Pêche et d'Aquaculture, Senegal Instituto de Investigação das Pescas e do Mar, Portugal Instituto Español de Oceanografía, Spain Institut Mauritanien de Recherches Océanographiques et de Pêches, Mauritanie University of Las Palmas de Gran Canaria, Spain
Data via:	http://www.projet-istam.org/ Contact: Jerome.Guitton@agrocampus-ouest.fr Jérôme Guitton. Fisheries data specialist, Ecology and Ecosystem Health research unit Agrocampus Ouest
Data format:	Digital (plain text)
References:	In any written document (publications, rapports, memories), the data source must be cited in the text or in the acknowledges in the following or an equivalent way: "Data source: Research centre XXX, City, Country; data have been extracted from database Trawlbase-Istam." In any other publication, the data responsible organization must be cited in the text or in the acknowledges as follows or in an equivalent way: "The surveys XXX have been undertaken by YYY, Country."

Additional information:

This project was funded by the European Union.

The Trawlbase-Istam database was based on the previous project FIAS (Fisheries Information and Analysis System - http://ec.europa.eu/development/body/publications/fish/099928.pdf, accessed 23 May 2017).

For further information and bibliography:

http://halieutique.agrocampus-ouest.fr/projets.php?idproj=17 (accessed 10 May 2017).

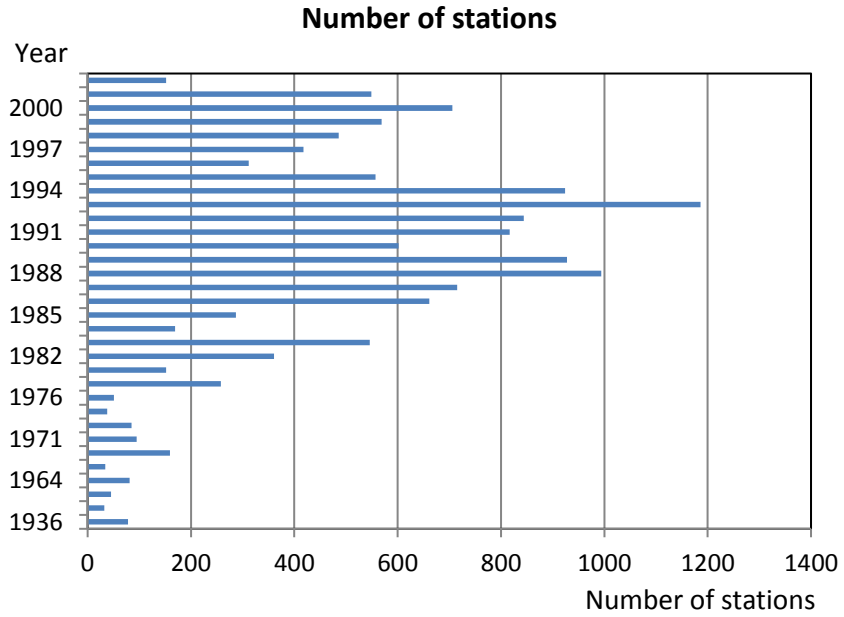


Figure 188. Number of stations recorded in Trawlbase-ISTAM per year. A total of around 14000 stations have been inventoried. Source: ISTAM project.

SEABIRD TRACKING DATABASE
DIFFERENT DATA PROVIDERS

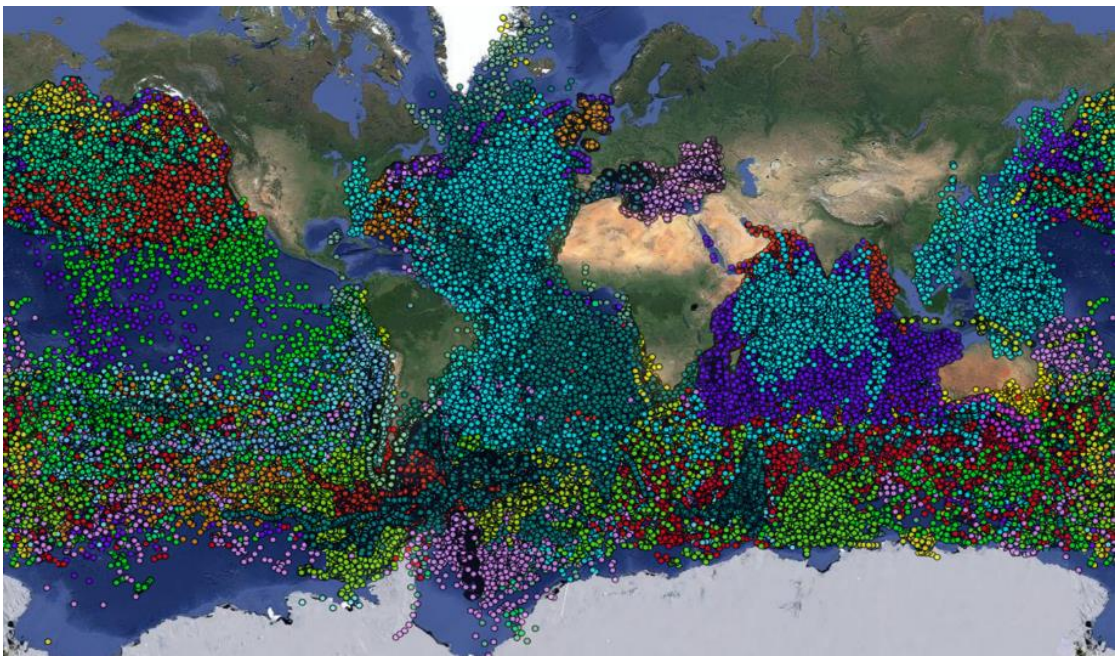


Figure 189. All seabird track points available in the database, including 703 datasets provided by 175 contributors. The total of 9,907,313 points in the map corresponds to 113 seabird species, represented in a range of colours. Source: Seabird Tracking Database. http://www.seabirdtracking.org (accessed 23 May 2017).

Resource abstract:
Seabird tracking information (GPS-loggers, PTT -Platform Terminal Transmitters- and global location sensing GLS-loggers) of a range of seabird families and species. This database has been made possible entirely though the unique collaboration of seabird scientists from around the world. The website has been developed to build links between data owners and their data, as well as provide tools to support data submission and standardising as well as to foster further seabird conservation work.

Resource language:	eng	
Keyword values:	Species distribution	
Variables available:	*Observed variables*	*Derived variables*
	Tracking of seabirds Taxonomic identification Colony name Biological parameters (specimen age, sex, breed stage and breed status)	Tracklines of seabirds trajectories
Geographic location:	Global ocean coverage	
Spatial resolution:	Variable	
Temporal extent:	1989 – present	
Temporal resolution:	Twice daily for GLS data; variable intervals (seconds to few hours) for PTT and GPS-data at each position	
Depth range/resolution:	n/a	
Conditions for access & use:	Data can be searched and viewed (subject to owner's permissions) within the site, but actual access to tracking data is restricted within a request process. Requests are passed to the data owners for review. Further information on the Term of use can be consulted at:	

	http://seabirdtracking.org/?q=termsofuse. Data-owners are free to stipulate additional conditions to those contained in this document
Limitations on public access:	No
Responsible organization:	BirdLife International, Cambridge, UK
Data via:	http://www.seabirdtracking.org Contact: http://seabirdtracking.org/?q=contact
	Contact: maria.dias@birdlife.org. Maria Dias. Senior Marine Science Officer, BirdLife International
Data format:	Digital (CSV format, track-lines, kernel maps)
References:	Further guidance in the Term of data Access and Use is available at: http://seabirdtracking.org/?q=termsofuse

Additional information:

Data in the Seabird Tracking Database are organized by datasets (corresponding broadly to studies of individual species, in a single colony and collected by a research team). The oldest data available for Northwest African waters are from 2006. In May 2017, 113 seabird tracking datasets overlap with the Northwest African waters, corresponding to 28 species collected by 47 researchers in 48 different colonies. The most represented species are the Cory's Shearwater *Calonectris borealis*, the Cape Verde Shearwater *Calonectris edwardsii* and the Desertas Petrel *Pterodroma deserta*, but the datasets also include information from several migrants from the North and South Atlantic (e.g. Arctic Tern *Sterna paradisea*, Long-tailed Jaeger *Stercorarius longicaudus* and Sooty Shearwater *Ardenna grisea*, among several others).

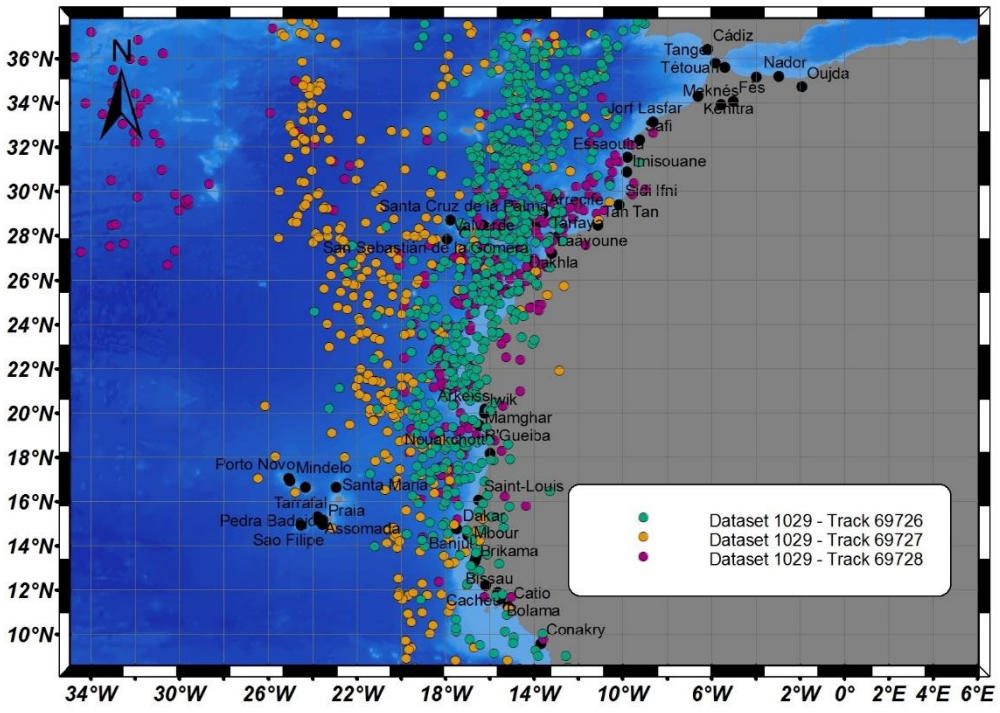


Figure 190. Some examples of tracking information gathered and available upon request, corresponding to Puffinus lherminieri (Audubon's shearwater) adults specimens (Paiva et al., 2016). The positions were registered during the following periods: track number 69726, from 3 April 2012 to 7 April 2013; track 69727, from 7 April 2010 to 20 February 2011; and track 69728, from 24 February to 16 August 2010. It must be noted that some positions are out of the bounding box represented. Data source: BirdLife Seabird Tracking Database. http://www.seabirdtracking.org (accessed 24 March 2017).

REPOSITORIO DE DATOS MARINOS INTEGRADOS DE CANARIAS – REDMIC –

OBSERVATORIO AMBIENTAL GRANADILLA, SPAIN

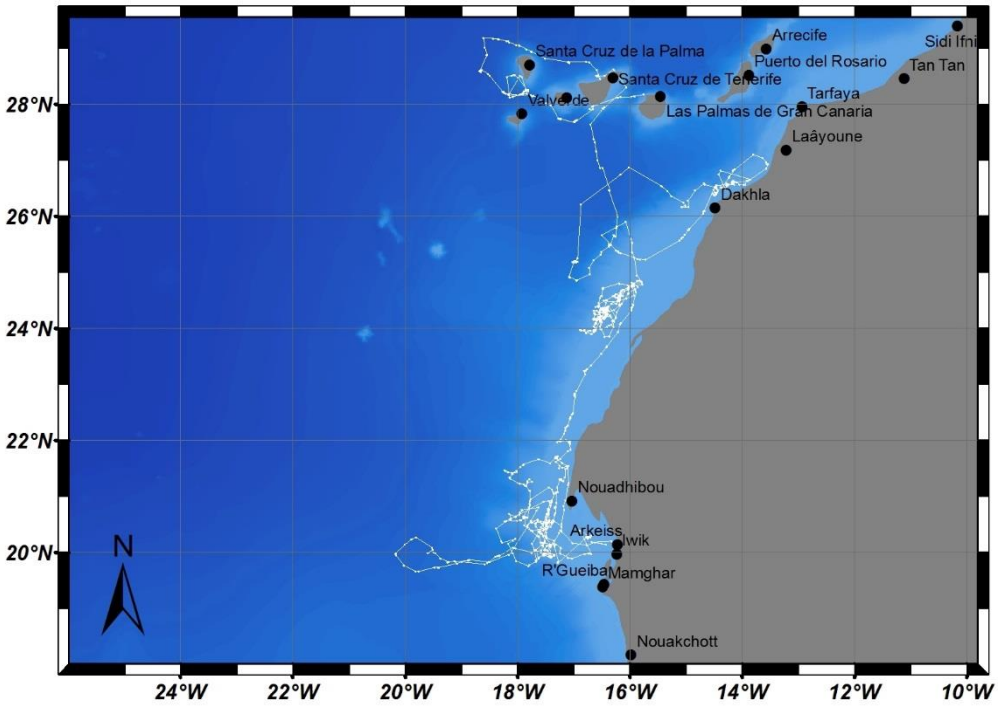


Figure 191. Registered positions and derived trajectory of the loggerhead seaturtle (Caretta Caretta) specimen named Catalina, obtained through a transmitter stocked on its carapace. The radiotracking started at the east Gran Canaria Island (Spain) on 02 July 2006 and last data was obtained off Arkeiss (Mauritania) on 17 July 2008. A distance of around 8960 km was covered during 746 days. Source: REDMIC. http://www.redmic.es (accessed 23 Mars 2017).

Resource abstract:

REDMIC (standing for Integrated Marine Data Repository for the Canary Islands) is a permanent system of systematic storage, custody, and service of marine data, which follows the OpenData and Open-Science philosophy. It has been designed for the Canary Islands (Spain), and by extension, Macaronesia. The novelty of REDMIC is that marine data, whatever their nature, are integrated in a single and coherent geographic information system. After the initial effort of feeding data in a common framework, thereafter they can be used and combined as often as desired with maximum agility. The aim of REDMIC is to maximize the potential use of marine data.

Resource language:	eng, spa	
Keyword values:	Environmental monitoring facilities; Elevation; Species distribution	
Variables available:	*Observed variables*	*Derived variables*
	Species distribution Bathymetry Radiotracking of loggerhead seaturtles	Tracklines of seaturtles trajectories
Geographic location:	28.3088°N – 27.1229°N	12.6328°W – 19.6471°W
Spatial resolution:	Variable: 100 m, 500 m, 1000 m and 5000 m grid	
Temporal extent:	1825-12-31 / present	
Temporal resolution:	Variable	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	Access is free. For data download and use, register and commitment of referring source are required	
Limitations on public access:	No	

Responsible organization:	Observatorio Ambiental Granadilla, Santa Cruz de Tenerife, Spain
Data via:	https://redmic.es/login
	Contact: marta@oag-fundacion.org Marta González Carballo. Data Curator, OAG
	Contact: director@oag-fundacion.org Antonio Machado Carrillo. Director, OAG
Data format:	Digital (PDF, JPG, CSV, Shapefile, GeoTIFF formats)
References:	Elaborated products offered in REDMIC must be referred by their title and credit, followed by: "Available at www.redmic.es."

Additional information:

REDMIC is still under development. At present, documented species distribution registers are available, as well as some bathymetric, jurisdictional, protected areas, and infrastructure information. However, the repository is ready to hold all sorts of marine data (geological, climatic, physico-chemicals, biological, coastal use, fisheries, navigation, etc.).

Marine bibliography of the region is accessible at: https://redmic.es/bibliography (accessed 14 March 2017).

Further information on the OAG Foundation at: http://www.oag-fundacion.org (accessed 13 March 2017).

OCEAN BIOGEOGRAPHIC INFORMATION SYSTEM – OBIS –
DIFFERENT DATA PROVIDERS

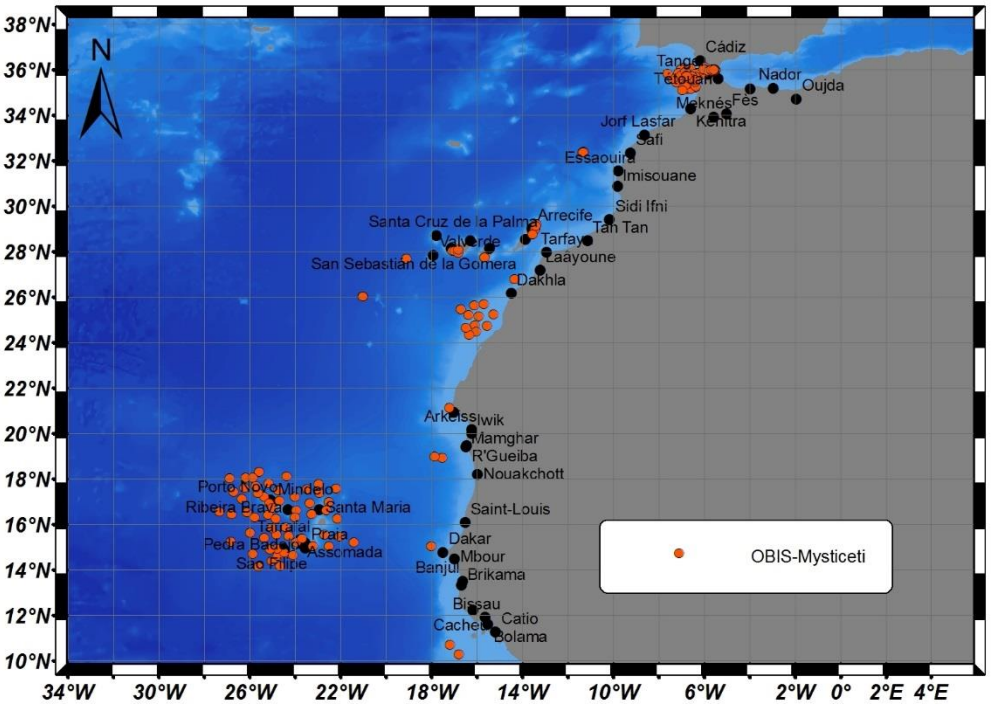


Figure 192. Distribution of georeferenced data for parvorder Mysticeti species (baleen whales) identified at the CCLME. Data source: IOC-UNESCO OBIS. http://www.iobis.org (accessed 31 March 2016).

Resource abstract:
OBIS is an open-access database that allows users to search marine species datasets from the world's oceans and marginal seas.

OBIS site permits the access to:
- taxonomically and geographically resolved data on marine life and the ocean environment
- interoperability with similar databases
- software tools for data exploration and analysis.

Resource language: eng
Keyword values: Species distribution

Variables available:

Observed variables	*Derived variables*
Record distribution by taxon	Shannon Diversity Index
Date collected/observed	ES 50
Bottom depth	Simpson Diversity Index
Sample depth	Hill1 and Hill2 index
Temperature	Chao2 index + completeness
Nitrate	Number of species, records and sampling days
Salinity	Number of IUCN Redlist species
Oxygen	
Phosphate	
Silicate	

Geographic location: Global ocean coverage
Spatial resolution: n/a
Temporal extent: 1611-2014
Temporal resolution: n/a
Depth range/resolution: From surface to 10900 m depth

Conditions for access & use: The OBIS Datasets are available online as well as via Web Services (WMS/WFS, JSON/API). Cite the original data contributors

Limitations on public access: No

Responsible organization: OBIS Secretariat, UNESCO-IOC Project Office for IODE, Oostende, Belgium

Data via: http://iobis.org/mapper/

Visit the Search Interface ('Search Data' menu) and search OBIS data by species, higher taxon, geographic area and/or other options. Then, in the Search Interface, open up the Show Results window and switch to [Download] tab where you can choose data type and data format to download.

Contact: info@iobis.org

OBIS Secretariat, UNESCO-IOC Project Office for IODE

Data format: Digital (CSV format, XML format, KML format and WMS image: GIF, JPEG, PNG, SVG, TIFF)

References: For database citations:

When using OBIS data, please cite the relevant data sources. A suggested citation is included in the metadata for most datasets. When using data from many data sources so that citing the specific data sources becomes highly impractical, or you use the biodiversity indices maps, which are based on >1000 datasets, you can cite as follows (e.g.):

OBIS (YEAR). Global biodiversity indices from the Ocean Biogeographic Information System. Intergovernmental Oceanographic Commission of UNESCO. Web. http://www.iobis.org (consulted on YYYY/MM/DD)

or,

OBIS (YEAR). Data from the Ocean Biogeographic Information System. Intergovernmental Oceanographic Commission of UNESCO. Web. http://www.iobis.org (consulted on YYYY/MM/DD).

For general citation of the OBIS website:

Intergovernmental Oceanographic Commission (IOC) of UNESCO. The Ocean Biogeographic Information System. Web. http://www.iobis.org. (Consulted on dd/mm/yy)

For webpage citations:

Intergovernmental Oceanographic Commission (IOC) of UNESCO. “Title”. OBIS. Date of publication or recent update: dd/mm/yy. Web. (Consulted on dd/mm/yy)

When the author is well identified:

Family name, first name. “Title”. UNESCO/IOC/OBIS. Date of publication or recent update: dd/mm/yy. Web. (Consulted on dd/mm/yy)

Additional information:

Data published through OBIS must come from credible, authoritative sources. The scientists and institutions responsible for collecting and managing the data are clearly named. Before publication, the data must pass through a series of technical controls, and these are repeated every time the data are crawled again from its source. Any errors, such as species name misspellings, names not recognised in The World Register of Marine Species (WoRMS), and possible mapping errors, are reported to the OBIS nodes to review, and if necessary, correct.

OCEAN DATA AND INFORMATION NETWORK FOR AFRICA – ODINAFRICA –
DIFFERENT DATA PROVIDERS

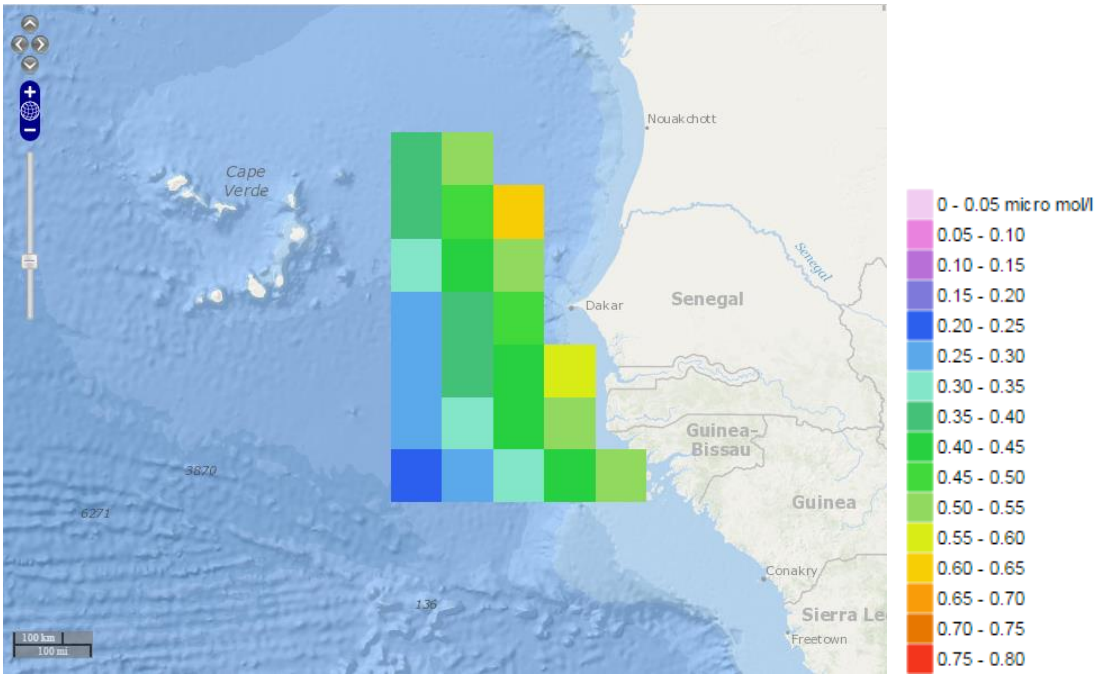


Figure 193. Example of monthly average in Senegal (April) of phosphates concentration in squares on 1° grid (extracted from Garcia et al., 2006). Source: ODINAFRICA. http://www.africanmarineatlas.org/ (accessed 2 December 2014).

Resource abstract:
The Ocean Data and Information Network for Africa (ODINAFRICA) brings together more than 40 marine related institutions from twenty-five countries in Africa (Algeria, Angola, Benin, Cameroon, Comoros, Congo, Cote d'Ivoire, Egypt, Gabon, Ghana, Guinea, Kenya, Madagascar, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Senegal, Seychelles, South Africa, United Republic of Tanzania, Togo and Tunisia). With the support of the Intergovernmental Oceanographic Commission of UNESCO and the Government of Flanders (Kingdom of Belgium) the network strives to address the challenges faced in ensuring that ocean and coastal data and information generated in national, regional and global programmes are readily available to a wide range of users in an easily understandable format.

Starting with the implementation of the project on Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean region (RECOSCIX-WIO) in 1989, IODE has focussed on the development of the capacity and infrastructure for the collection, processing, archival, analysis, interpretation and dissemination of data and information products.

Resource language: eng

Keyword values: Atmospheric conditions; Meteorological geographical features; Species distribution; Habitats and biotopes; Area management/restriction/regulation zones and reporting units; Oceanographic geographical features; Environmental monitoring facilities

Variables available:

Observed variables	*Derived variables*
Air temperature	Apparent oxygen utilization (AOU)
Rainfall	
Relative humidity	
Chlorophyll	
Nitrate	

	Oxygen Phosphate Salinity Sea temperature Silicate Fish species distribution Current speed and direction	
Geographic location:	30.00°W – 80.00°E	50.00°S – 40.00°N
Spatial resolution:	n/a	
Temporal extent:	n/a	
Temporal resolution:	n/a	
Depth range/resolution:	From surface to seabed	
Conditions for access & use:	No conditions apply for access and use	
Limitations on public access:	No	
Responsible organization:	The International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO	
Data via:	Ocean Data Collections and Catalogues (metadatabases): http://geonetwork.iode.org/geonetworkAMA Sea level data collection: http://www.ioc-sealevelmonitoring.org Coastal and Marine Atlases: http://www.africanmarineatlas.org Coastal and Marine Atlases continental maps and data sets: http://omap.africanmarineatlas.org African Register of Marine Species: http://www.marinespecies.org/afremas/ African Union list of Journals from information centers: http://www.iamslic.org/unionlist/africa/index.php OceanDocs-Africa: http://www.oceandocs.net/handle/1834/1337 Directories of experts and institutions: http://ioc-africa.org/experts/searchDetails/ African Oceans Portal: http://www.africanoceans.net/ Contact: m.odido@unesco.org Mika Odido. Coordinator, IOC Sub Commission for Africa and the Adjacent Island States, IOC-UNESCO	
Data format:	Digital (image format in the website linked to the datasets in their original format: plain text, Excel, Access, PDF format, netCDF format, etc.)	
References:	The dataset from the African Marine Atlas will be cited as follows: “UNESCO-IOC [date retrieved], [map title/data set title], Retrieved [date] from African Marine Atlas, www.africanmarineatlas.org”	

8. DISCUSSION

Bathymetry of the Eastern Central Atlantic Ocean. Image reproduced from the GEBCO_2014 Grid, version 20150318, http://www.gebco.net (accessed 4 July 2017).

The efforts in compiling metadata for the elaboration of a directory on scientific information existing and available in the CCLME under the frame of the project "Enhancing oceanography capacities on Western Africa countries" started in 2013. This initiative resulted in a tangible product through the publication of the *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem* as IOC Technical Series 110 (Déniz-González et al., 2014). This first edition included 85 metadata sheets describing a total of 425 datasets, 27 databases and 21 time-series sites identified in the area (Déniz-González et al., op. cit).

Being aware of the fact that further efforts were required to compile the information managed by new contributors in the region but also from new metadata continuously becoming available, two editions of the IOC Technical Series 110 were programmed within the project Phase II. The 2nd edition, revised and expanded, contains 107 metadata sheets on 429 datasets, 30 databases and 21 time-series sites (Déniz-González et al., 2016). The current 3rd edition includes up to 118 metadata sheets referring to a total of 449 datasets, 34 databases and 26 time-series sites. It must be highlighted that metadata on several datasets managed by organizations in North-West African countries are described in this 3rd edition, including biological data from fisheries surveys.

The progressive implication of the countries is the result of a positive networking, through the implementation of our activities in the CCLME (e.g. the monograph *Oceanographic and biological features in the Canary Current Large Marine Ecosystem*, published as IOC Technical Series 115, Valdés and Déniz-González, 2015) and through the implication of the regional scientists, which have much contributed with their expertise to the successful results obtained throughout these years of work.

The Directory has been well received by the scientific community and this initiative can be exported and applied in others LMEs of the World. One lesson learnt is that it requires of international coordination and leadership from a trustable organization, as provided by the organizations within the United Nations System.

The main objective of this publication is to foster new collaborations within the countries inside and outside the CCLME, by accelerating the dataflow. This should reinforce the capacities of the organizations and contribute to build new scientific knowledge. As concluded in the IOC's *Global Ocean Science Report* (UNESCO, 2017) international collaboration increases science impact as publications with multiple authors from multiple countries have higher citation rates (Valdés et al., 2017).

New datasets must be prospected in the future as new technologies will emerge and will be implemented in the region, like the High Frequency Radar Systems (HF radar). Africa's first HF radar system was made operational in Morocco in 2016, through a pilot project consisting in the installation of two stations, one in Casablanca and one in Temara (Bouksim et al., 2016). Within the CCLME, a future installation of one HF radar is already programmed in the Canary Islands (Spain) as indicated in *The European HF radar inventory* (Mader et al., 2016).

Apart from new technologies, we are aware of the existence of other datasets, databases and time-series sites in the area, but they were not included in the current edition of the Directory for different reasons, mainly related to the availability of the data, the accuracy of the metadata to be compiled and the feasibility of compiling the data in terms of time to accomplish the tasks; some centres were very collaborative but the time-lapse remaining to publish the volume was not enough to get all the sheets ready and reviewed properly.[4] It should be also taken into account that the Directory compiles

[4] i.e. Several tide gauges exist in the area but were not included in this volume. For some of them and due to different reasons, there was a lack of metadata, the information was not digitalized or it was not ready to be shared. For example, contact was established with the Marinemet network of tide gauges and weather stations. The equipment was installed under the framework of the international cooperation project "Marinemet", implemented by AEMET and Puertos del

metadata on datasets from 1976 onwards, and therefore we are aware of several datasets before 1976, maily on surveys carried out in the region.[5]

To conclude, barriers still need to be removed as some reluctance was observed in several organizations when asked for sharing information. To this end, it is necessary to reinforce the networking in the area and build new relationships based in trust among the organizations, and furthermore among the scientists. Their personal commitment has made every task easier and has widening the scope of our activities, which, at the end, reinforce their own organizations.

Estado (PE) with the cooperation of the World Meteorological Organization (WMO). The devices were delivered to the African countries' organizations in 2016, but data were not visualizable online at the moment of publishing this volume.

[5] Surveys carried out in the region before 1976 include Abrego 4105, Cierzo 4207, Walther Herwig 6403, Thalassa 6211 (on board of the R/V *Thalassa*), several scientific surveys carried out on board of the R/V *Cornide de Saavedra* between 1971 and 1976 (Guerra-Sierra and Prego-Reboredo, 2003), and the many surveys carried out in the Guinean Economic Exclusive Zone since 1963 (being the data managed by the Centre National des Sciences Halieutiques de Boussoura, Guinea).

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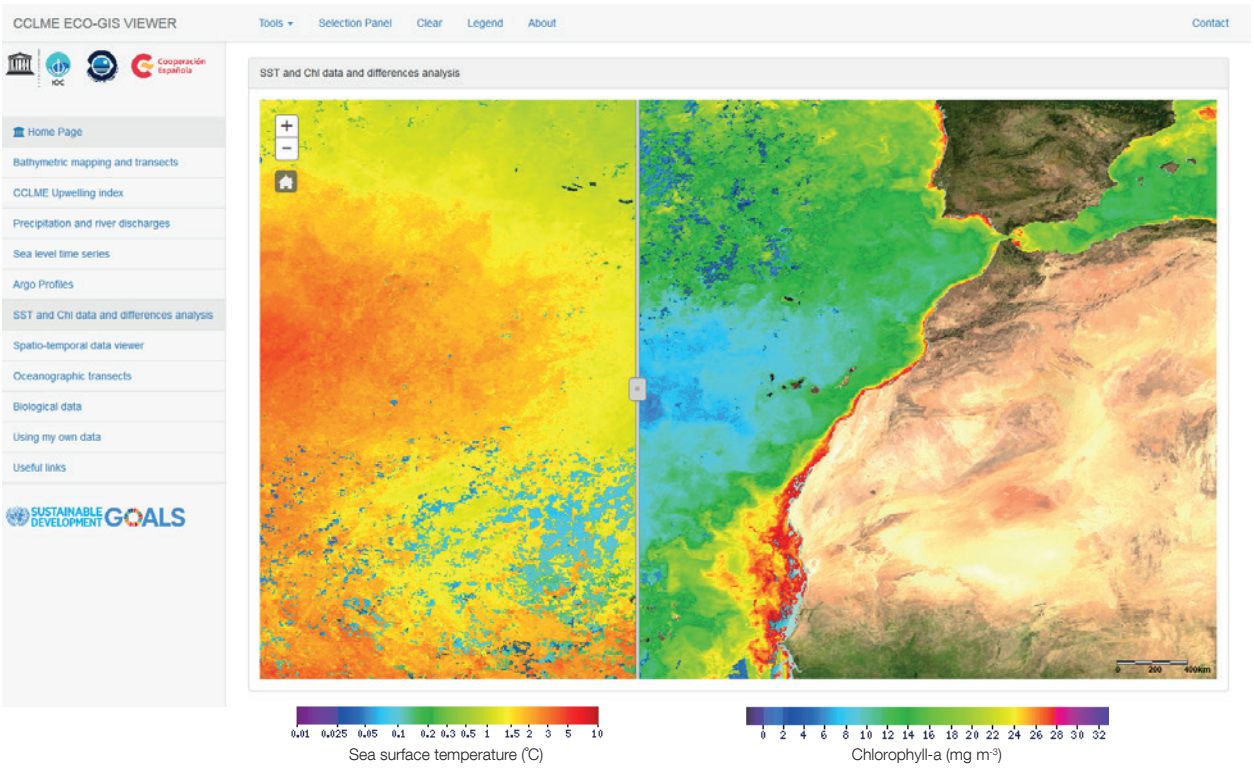

Example of comparison of two layers obtained from the CCLME Eco-GIS Viewer. At the left, sea surface temperature (Pathflinder) in August 2000; at the right, concentration of chlorophyll-a (MODIS) in April 2003, showing phytoplanktonic blooms along the coast of Northwest Africa and Iberian Peninsula. Source of the datasets: Environmental Marine Information System/Joint Research Centre (EMIS/JRC).

Now in open access:

CCLME Eco-GIS Viewer
http://www.ideo-cclme.ieo.es

The compilation of metadata from different sources has given as result the publication of the current *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem. 3rd Edition: Revised and Expanded*.

In sight of the richness, variety and multidisciplinarity of the information available for the region, it was made accessible and operative in a Geographic Information Systems—GIS, data analytic viewer, increasing the delivery of services to end-users. These efforts have resulted in the CCLME Eco-GIS Viewer.

The most recent advances in GIS geo-technology were used to develop the CCLME Eco-GIS Viewer, a dynamic application tailored to facilitate analysis and to produce new scientific knowledge. The application includes a wide variety of analytic tools, which allow the users to develop spatial and statistical studies in their areas of interest, and to create meaningful data products at regional scale adding value to raw data. With the CCLME Eco-GIS Viewer, the users can analyse and compare related and unrelated records, and have the possibility to drag their own data files into several tools.

The CCLME Eco-GIS Viewer is available in open access at: http://www.ideo-cclme.ieo.es

The elaboration of these products would not have been possible without the financial support given by the Spanish Agency for International Development Cooperation (AECID) to the project entitled *Enhancing oceanography capacities on CCLME Western Africa countries Phase II*.

Further information about the project at: http://www.unesco.org/new/en/natural-sciences/ioc-oceans/sections-and-programmes/ocean-sciences/canary-current-large-marine-ecosystem-project-cclme/

The Canary Current Large Marine Ecosystem (CCLME) is a major upwelling region off the coast of northwest Africa. It extends southwards from Canary Islands (Spain) and the Atlantic coast of Morocco, Western Sahara, Mauritania, Senegal, The Gambia and Guinea-Bissau, but also Cabo Verde and the waters of Guinea are considered adjacent areas within the zone of influence of the CCLME.

A total of 449 datasets, 34 databases and 26 time-series sites have been identified in the area. A substantial part of them were rescued from archives supported in paper copy. The current directory refers to 118 datasets, databases and time-series sites.

This catalogue and the recovered data offer an exceptional opportunity for the researchers in the CCLME to study the dynamics and trends of a multiplicity of variables, and will enable them to explore different data sources and create their own baselines and climatologies under a spatial and temporal perspective.

The *Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem* and its updates are available online at: http://www.unesco.org/new/ioc_ts110

A close collaboration has been established with different institutions in order to rescue, review and quality control the information, and to fill and validate the sheets compiled in this directory.

The compilation of such a complex directory by the Intergovernmental Oceanographic Commission and the Instituto Español de Oceanografía would not have been possible without the financial support given by the Spanish Agency for International Development Cooperation (AECID) to the project entitled *Enhancing oceanography capacities on Western Africa countries.* The revision and the update of the technical report take place under the frame of the project *Enhancing oceanography capacities on CCLME Western Africa countries Phase II,* also funded by the AECID.

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