Labeled Test-site of the European projects ESONET & EMSO

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SPAIN

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The UTM together with the Marine Science Institute belongs to the Natural Resources Area of the CSIC, and both are integrated in the Mediterranean Centre for Marine and Environmental Research.

- The UTM is National Technical Service for Marine and polar Science (from 1992). Large Scale Facilities (ICTS) technical/technological support, maintenance & logistics.

- Marine Science & Technological Development. To generate knowledge and formation of the marine environment and advance in a sustainable development of the seas, coastal areas, and marine resources of Spain
The **SARTI** group is built up of a multi-field staff including researchers of different departments of the Technical University of Catalonia (UPC).

SARTI’s main field of action is in the instrumentation and environmental sensor development for industrial and scientific applications including digital signal processing, acquisition system electronic design and complex measurement system automation.
The aim of the ESONET Network of Excellence is to create an organisation capable of implementing, operating and maintaining a network of multidisciplinary ocean observatories in deep waters around Europe from the Arctic Ocean to the Black Sea.

The NoE will structure the resources of the participating institutes to create the necessary critical mass, remove barriers and through a joint programme of activities arrive at durable solutions for this future organisation.
EMSO, is a Research Infrastructure within the ESFRI Roadmap, the European network of seafloor observatories constitute a distributed infrastructure for long-term (mainly) real-time monitoring of environmental processes related to ecosystems, global changes and geo-hazards.

The EMSO development relays upon the synergy between the scientific community and the industry to improve the European competitiveness.

In the EC-FP7 EMSO Preparatory Phase (12 countries) started in April 2008 for 4 years, with the aim to design and create the legal entity in charge of the infrastructure.
Why Seafloor Observatories?

- To study the Earth as an integrated system: geo-bio-hydro-sphere
- To monitor long time series for the study of multiple, interrelated processes to highlight temporal scale and variability of the phenomena

Scientific topics

Role of the Ocean in Climate
- Turbulent mixing and Biophysical interactions
- Ecosystem dynamics and Biodiversity
- Fluids and Life in the Ocean Crust
- Dynamics of lithosphere and Imaging Earth’s interior

http://www.oceanleadership.org/ocean_observing
OBSEA- Test site

- Ground Station
- Pilot Node (3km 20m)
- Canyó de Coma-Ruga (15km 500m)
- Clot del Vinyet (22km 1000m)
- Canyó del Foix (18km 1300m)

Iberian Running S&T activities (shallow water) Permanent infrastructures
OBSEA is a project whose objective is to install a cabled seafloor observatory 4 kilometers away from the Vilanova I la Geltru coast in a fishing protected area, 20m depth.

The objective of this project is to have a test-bed for the development of oceanographic instrumentation and at the same time to have an observatory that provides valuable information to the scientific community.

OBSEA will be extended in the future in order to form a seafloor observatory network that covers several interesting sites. Every node will provide connectivity to several instruments (at least 8) as well as a link to other nodes.
OBSEA Location

Vilanova i la Geltrú (SPAIN)

- 4 Km to shore
- 20 m depth
OBSEA Deployment

19 May 2009; 06:00 to 22:00. Very good sea conditions

- **Phase 1**: Cable Deployment (from ship station 1 to shore)
  - Shore connection and cable tests (optical fibre)
- **Phase 2**: Cable Deployment (from ship station 1 to final site)
- **Phase 3**: Observatory deployment
- Tests (power and data)

BO Sarmiento de Gamboa

- Built as multipurpose research vessel in 2007
- Oceanic
- Overall length: 70 meters
- Crew 16 / Scientists 26
- 24 hours per day
- A-frames /winches /cranes
- 8000 m depth deployed equipment
- USBL u.p.s
- D.P Class 1

Expandable Seafloor Observatory
Scuba dive activity: Remove and recover buoys. Cable verification
Onshore activity: Deployment of the firsts 200 m of cable at shore into a concrete protection pipe.
Cable connection at land anchorage point (Fibre termination connector takes 8 hours)
- Deployment of 3000 m of cable
- Ship with very low maintained speed (0.6 to 1.1 knots)
- Cable connection to junction box
- Deployment and final placement assisted by divers
Interdisciplinary research priorities

- **Physical oceanography**
  - water mass characterization, water column processes, thermodynamics, ice cover, climatology, and impacts on climate change

- **Biogeochemistry**
  - global carbon cycle and elemental cycling within the ocean through both physical and biological processes, and ocean acidification

- **Marine ecology**
  - distribution and abundance of sea life, ocean productivity, biodiversity, ecosystem function, living resources, and climate feedbacks

- **Geosciences**
  - transfer from Earth’s interior to the crust, hydrosphere and biosphere, fluid flow and gas seepage through sediments and gas hydrate, non-living resources, sediment transfer to deep-sea and climate change

- **Geo-hazards**
  - earthquake and tsunami hazard, volcanic hazard, slope instability and failure
Instrumentation

- IP Camera
- ADCP
- CTD
- Hydrophone
Subsea Node General Schema

Subsea node
Lat: 41°10'53.82"N
Long: 1°45'8.40"E

Submarine cable
Splice box

DC/DC 300/48
Switch 2
IP: 192.168.1.70

Switch 1
IP: 192.168.1.71

DC/DC 48/12

Auxiliar link and reset
IP: 192.168.1.60

Control System ColdFire Based
IP: 192.168.1.36

Eth. Control signals
DC selector

Main box

WET - MATEABLE Connectors

Oceanographic Instruments

IP Camera
IP: 192.168.1.172

CTD
Adaptation Cable
IP: 192.168.1.171

Hydrophone
IP: 10.0.0.88

Auxiliar link and reset
IP: 192.168.1.60

Main box

Oceanographic Instruments

IP Camera
IP: 192.168.1.172

CTD
Adaptation Cable
IP: 192.168.1.171

Hydrophone
IP: 10.0.0.88

Auxiliar link and reset
IP: 192.168.1.60

Main box
Protection framework

- Designed for deployment at low depth (diver assisted)
- Structure of 5 m² in stainless steel
- Frame protecting the sensors
- Several instruments can be installed in the frame
Shore Station General Schema

Shore Station

CTVG building VG5
IP: 192.168.1.74
Lat: 41°13′24.61″N
Long: 1°44′10.58″E

Power room
Power Supply
0–325Vdc 11A
IP: 192.168.1.79

University building VG1
IP: 192.168.1.72
Lat: 41°13′18.81″N
Long: 1°43′48.28″E

Linux data
Server
IP: 192.168.1.xx
Lab. 5

Windows Server
IP: 192.168.1.100

Comms. room
Sw. Eth. Cisco
P: 192.168.1.73

4 Singlemode F.O.
1+1 Gbps

3x10mm2 Cable

Computing Center
Sw. Eth. Cisco
IP: 192.168.1.72

Remote terminal

Internet / UPC
Network

Submarine Cable

Ground termination

Beach manhole
Lat: 41°13′3.62″N
Long: 1°44′8.62″E
Marine hybrid cable
1. Copper tube at -1500Vdc (neg)
2. Aluminum screen at 0Vdc (pos)
parallel connection to ground
Real Time Data Visualization

30’ Time Buffered Data Stream (DataTurbine)
Real Time Data Visualization

Real Time Web Based Video Streaming
Data Set Visualization

1 Year Web based charts
Impact

Public Policy
– Environmental
– Resources
– Public health and safety
– Security

Economic Development
– Growth of marine technology industry
– Innovative technologies
– Tourism

Education and Public Engagement
Scientific & Technological applications

- Geology & Geophysics
- Oceanography
- ROV’s, Auvs, etc
- Maritime control security
- Meteorology
- Climate Change
- Biology
- Physical process
- Water quality

SARM
UTM UNIDAD DE TECNOLOGÍA MARINA
OBSEA EXPANDABLE SEAFLOOR OBSERVATORY

Physical process
Water quality
http://www.utm.csic.es
http://www.cdsarti.org