optic pass through (SEDI). Much of the development effort on this in situ analyser has focused on miniaturisation. Its low weight (12,6 kg without reagents) and small dimensions (130mm H x 148mm L x 120mm l for the hydraulic module and 264mm H x 140mm D for the detection module) permits simple and accommodating operations for on site deployment, speaking of implementation on submersible, long-term benthic station and at sea maintenance. 2.2 Chemical specifications and performances

The chemical parameters to be measured are total sulphide (ΣS) and total iron (FeII + FeIII). The analytical methods based on colorimetric detection have been extensively studied at Ifremer [1, 3, 4]. Other parameters are envisaged and the analysers will be versatile for existing chemical analysis methods (nitrite, nitrate, phosphate, silicate, pH, pCO2…) and opened for new developments. CHEMINI is the new generation of chemical analyser and is able to work with the various principles of flow analysis (FIA, CFA, stop flow, …).2.3 At sea trials.

During the MOMARETO cruise[5] (Azores, MoMAR zone, august 2006), trials were performed in two steps corresponding to the two legs of the cruise. The first leg was partly focussed on the technical validation of CHEMINI. The second leg was devoted to the operational use of CHEMINI to characterize the spatial distribution of mussel's assemblages on the Eiffel Tower hydrothermal edifice. CHEMINI was used on a remote controlled mode implemented on the ROV VICTOR. The sample lines of the two CHEMINI were directly connected to the ROV sample inlet with 2 ways available for each CHEMINI in case of plugging. The two CHEMINI have been involved in twelve dives, doing 631 samples measurements for total iron and 524 samples measurements for total sulphide with periodic in situ calibration. During the last days of the cruise, CHEMINI Iron has been implemented on the TEMPO autonomous seabed station coupled to the AIM video camera and an autonomous temperature sensor. The whole system has been deployed on the Lucky Strike site for one year. The sample inlet was positioned by Victor in a mussel bed. The measurement rate was set at 8 measurements per day. The recovery is planned in July 2007.

3. Conclusion
Two prototypes of CHEMINI deep-sea are available and operational to perform total sulphide and total iron measurements in hydrothermal environments. We have succeeded in decreasing the dimensions of the analyser with a real miniaturised system easy to implement in different vectors such as the ROV Victor or the TEMPO monitoring station. CHEMINI integrates some innovative parts like the engraved manifold and the detection module. This module allows obtaining in situ analytical performances similar to laboratory products. Last, the system has proved a very good reliability during the final demonstration cruise with a number of dives and data obtained never reached before. The two analysers have been validated during the first leg of the MoMARETO cruise and used operationally during the scientific part. Finally, CHEMINI Iron was implemented on the TEMPO seabed station and leaved on the Lucky Strike site to perform Fe monitoring for one year. It will be recovered on July 2007, and will allow us to evaluate the analyser through a long term deployment which has never been done before especially for a so long duration. We plan in the future to adapt new chemistries on CHEMINI, and to use CHEMINI technology to use passive sensors on a flow system.

4. Acknowledgements
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SMOS: MEASURING SEA SURFACE SALINITY FROM SPACE

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1. Introduction
The distribution and variability of salinity in the world's oceans is a key parameter to understand the role of the oceans in the climate system. However, until now, remote sensing of the sea surface salinity (SSS) from space has not been attempted.

SMOS (Soil Moisture and Ocean Salinity) [1], due to be launch by end 2008, is a European Space Agency mission that aims at generating global ocean salinity maps with an accuracy of 0.1 psu, at spatial and temporal resolution suitable for climatic studies. The satellite sensor is an L-band (1400–1427 MHz) aperture synthesis interferometric radiometer [2]. Sea surface salinity (SSS) can be retrieved since the brightness temperature of sea water is dependent on the frequency, angle of observation, dielectric constant of sea water, sea surface temperature and sea surface state.

The SSS maps are expected to have an accuracy of 0.1 psu at a spatial resolution of 100–200 Km every 10–30 days. The individual measurement is expected to have an accuracy of 1psu with a resolution of 15 Km.

Salinity modifies the dielectric constant of sea water and it is one of the parameters that determine the sea surface emissivity [3]. At L-band, a restricted band for passive observations, the brightness temperature (Tb, measure of the sea surface emission) presents a maximum sensitivity to SSS. However, the sensitivity is quite low: 0.5 K/psu at sea surface temperature (SST)=20 ºC, and decreases to 0.25 K/psu at SST=0 ºC [4]. Moreover, Tb at this frequency is also sensible to sea surface roughness, 0–0.4 K/(m/s), (when roughness is parameterised in terms of wind speed) depending on the incidence angle [5], and to SST, 0.2–0.4 K/ºC. This situation indicates that it is necessary to have an accurate knowledge of the surface roughness and SST (auxiliary parameters) to retrieve salinity with enough accuracy.

To increase the present understanding of the sensitivity of Tb to wind speed and direction at L-band, the European Space Agency (ESA) sponsored the WInd and Salinity Experiments (WISE). These experiments aimed, among other activities, at improving and validating the actual sea surface emissivity models at L-band [6].

2. Campaigns and ongoing studies
WISE 2000 and 2001 took place at the Casablanca oil rig platform in the Mediterranean Catalan coast, at 40º 43.02' N 1º 21.50' E, 40 Km offshore [7]. They were performed during one month in autumn, when maximum wind speed is expected in the region. An L-band full-polarimetric radiometer measured Tb from 33 m above sea level at differ-

ent incidence and azimuth angles, while several oceanographic and meteorological buoys measured SSS, SST, wind speed and direction, significant wave height (SWH) and period, and wave spectrum. Radiometer measurements were performed at different elevation angles from 25 to 65 to emulate the performance of SMOS, since the two-dimensional imaging capability of MIRAS will allow the observation of pixels in a wide range of incidence angles. This is a unique characteristic of this data set to study SSS retrievals and to test several theoretical electromagnetic L-band emissivity models.

EuroSTARRS was an airborne campaign also organized by ESA in November 2001 as part of the
SMOS preparatory studies [8]. An L-band V-polarized multi-angular radiometer of different technology was flown over the same oil platform area in coincidence with WISE 2001.

Based in those datasets, several emissivity and roughness models have been tested, as well as new semi-empirical models have been developed. Camps et al. [7] model described the emissivity due to roughness by the local wind state, while Gabarro et al. [9], described the variability of Tb depending on the local wind but also on sea wave height which take in account the swell effect.

Several emissivity models for flat sea have been analysed, even some of them present very similar behavior, Klein and Swift model [3] is the one selected to be used in the SMOS processing chain.

3. Prototype development

Since 2006, the SMOS Salinity Level 2 prototype processor is in development, lead by the company ACRI and with LOCEAN, IFREMER and ICM as scientific team.

The salinity retrieval algorithm developed is based on an iterative convergence approach that minimize the difference between SMOS Tb measured and those predicted by the full forward model. It includes the modeling of the ocean surface emissivity (depending on sea state, sea surface temperature, and viewing angle), the atmospheric effects, the contamination by sky radiation and the sun glint. A Bayesian approach is considered, which proposes to use some a priori information on the auxiliary variables (like wind speed, wave height and temperature) in addition to the radiometric measurements. These auxiliary parameters are obtained from the European Center for Medium Range Weather Forecasting (ECMWF) output models.

This prototype will be a test tool that should permit to test the algorithms, the thresholds values, the forward models, and the measurement discrimination scheme once the satellite will be fying.

The Spanish company GMV has started to code the Level 2 operational processor for salinity retrieval, based on the prototype, that will be installed in the SMOS ground segment, located in Villafranca del Castillo (Madrid, Spain).

4. Conclusions

SMOS is scheduled to be launch by autum 2008. This will be the first time that a satellite is dedicated to measure Soil Moisture and Ocean Salinity. The payload is an L-band synthetic aperture radiometer (MIRAS) that will measure brightness temperature, which is sensible to salinity. However, other factors influence the Tb measurements, as the surface temperature and the sea state. These parameters should be known with quite good precision to retrieve salinity with good quality.

Salinity is expected to be retrieved with a precision of 0.1 psu after averaging in time and space, and with a quality of 1 psu for the individual measurements.

Several campaigns have been performed to improve the modelling knowledge of Tb in several conditions.

A prototype processor is in development and it will be used in the Cal/Val phase to test the different algorithms

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EEL SILVERING STAGE BASED ON PLS CLASSIFICATION

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1. Introduction

European eel (Anguilla anguilla L., 1758) is a highly migratory catadromous species. The last transformation of its lifecycle (i.e. from yellow to silver; the "silvering") is a crucial event preparing the future spawners for the oceanic reproductive migration and sexual maturation. Silvering process can be characterized by several parameters like change of colour of the livery (Pankhurst and Lythgoe 1982 [1]), the increase in eye diameter (Pankhurst 1982 [2], Pankhurst and Lythgoe 1983 [3]), an increase of liver weight, and finally, a regression of the alimentary tract partly related to natural starvation and cessation of body growth (Sorensen and Pankhurst, 1988 [4]).

The aim of this study is to verify if discrimination of eel developmental stage on the basis of body colour, widely used in current practices and hence referred to in most management documents, can be a correct and simple method to determine whether an eel is immature and sedentary, preparing its metamorphosis or it is about to migrate.

2. Results and Discussion

Partial least squared analysis (PLS) has been used to develop a model explaining the co-variation between several parameters collected from 454 individuals of A. anguilla sampled in the lower stretch of the River Tiber in 2006, and the developmental stage assigned on