

OCEANOGRAPHIC CALIBRATION LABORATORY – IBERIAN MARGIN OCEAN OBSERVATORY (RAIA)

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IBERIAN MARGIN OCEAN OBSERVATORY – PROJECT RAIA

The improved knowledge of the marine science in the cross-frontier region of Galicia and Northern Portugal has a positive impact in environmental, economic and scientific areas as maritime safety, resources management, coastal water or conservation of the coast. The availability of continuous meteorological, oceanographic and biological data, complemented by predictive models will guarantee the future sustainability of this maritime region.

With the objective of placing Galicia and Northern Portugal amongst the leading regions of the world in respect of the level of coastal monitoring and modelling, the project RAIA, supported by POCTEP through the European Regional Development funds, will focus on the development of a cross-frontier infrastructure: an Ocean Observatory.

The observatory will be based on the monitoring and prediction of the ocean environment through the use of numerical models, the construction and development of new oceanographic-meteorological platforms and the implementation of an Oceanographic Calibration Service.

BACKGROUND

Assuring high quality marine data is an actual need for all the institutions which are interested in field observation, measurement or experimentation about marine research. To achieve the best performance of instrumentation used in oceanographic surveys and moorings is necessary to ensure that probes and sensors are measuring accurately, which means that obtained values are both good and precise. Having accurate results is compulsory for data to be reliable and comparable.

Unfortunately, in Europe there is an important absence of infrastructures in which oceanographic probes calibration can be performed. At present, sending an instrument to be calibrated means, most of the times, sending it overseas and it has a high price in money and in time. Some institutions have already detected this gap and there are some initiatives to fill it, both in public centres and private companies.

The Marine Technology Unit (UTMAR) and its Oceanographic Calibration Service from CETMAR are born to enable Research Centres in Galicia and Northern Portugal to have a strategic service in the region in order to favour the quality of their data and to fulfil their present and future needs.

GENERAL METODOLOGY

According to the BIPM, calibration is an operation that, under specified conditions, in a first step, establishes a relation between the quantity values with measurement uncertainties provides by measurement standards and corresponding indications with associated measurement uncertainties and, in a second step, uses this information to establish a relation for obtaining a measurement result from an indication.

Measuring a determined magnitude under specified and controlled conditions enables the operator to compare obtained measurement results from the probe to calibrate and the transfer or secondary standard ones. It is essential to know the real value of the secondary standards, in order to assure the traceability of measurements to base derived units of the SI.

All procedures are developed according to the requirements of the main International Standards regarding quality and laboratory performing, as ISO 9001 and ISO/IEC 17025, to achieve the accreditation of the Oceanographic Calibration Service.

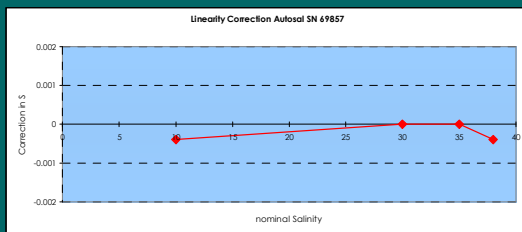


Figure 1 – Linearity test of the Autosol Salinometer. Range in Y axis represents the accuracy of the instrument.

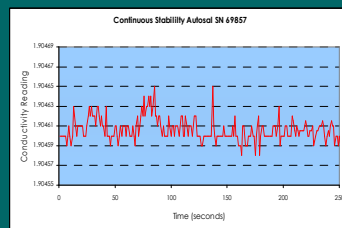


Figure 2 – Stability test of the Autosol Salinometer



Photo 1 – General view of the Oceanographic Laboratory Service. Salinity and pressure equipments

TEMPERATURE

To calibrate temperature probes, SPRT are the most usual equipment. Correct performing of SPRT, used as transfer standard, is regularly checked by fixed points of the ITS90 temperature scale. Both the SPRT and the CTD are immersed in a temperature controlled bath in which temperature is decreased. At specified steps, measures from SPRT and CTD are compared to establish the relation between them.

A Pt25 SPRT is used to calibrate probes, connected to a superthermometer with an internal resistor. It is possible to make the fixed points in our facilities in order to maintain SPRT in the best available conditions and to check their perfect working conditions.



Photo 2 – CTD in the controlled temperature bath

SALINITY

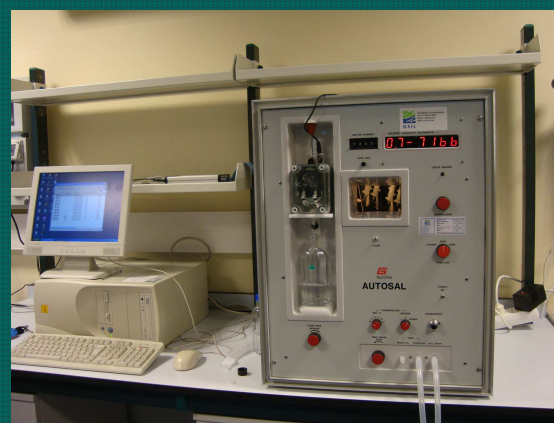


Photo 3 – GuildLine Salinometer

Salinity is calibrated by changing temperature. In those conditions, and because of the great dependence of conductivity on temperature, the CTD are calibrated in a wide measuring range. At the same time that measures from the CTD are recorded, a sample is taken by a salinity bottle. Salinity of those bottles is measured in a salinometer, calibrated with IAPSO standard seawater.

The salinometer is an Autosol from Guildline, with high accuracy. OSIL standard seawater is the only worldwide recognised transfer standard for salinity.

PRESSURE

General method to calibrate any pressure sensor is by means of a death weight tester, that transfers the pressure exerted by calibrated weights and a piston-cylinder system. This pressure is perfectly known and is compared to the readings from the sensor.

To cover the whole range of CTD probes, there are two different death weight testers, one hydraulic for high pressures and another pneumatic for low ones. Two large sets of stainless steel weights enable the operator to select the pressure to exert on the sensor.

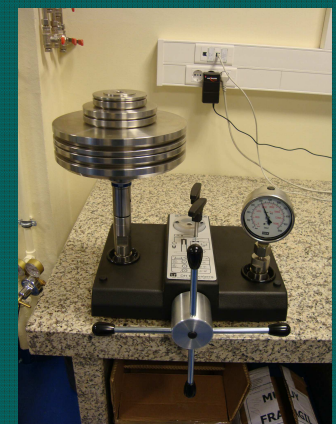


Photo 4 – Hydraulic Death Weight Tester

CONCLUSIONS

The main CTD sensors (conductivity, temperature and depth – pressure) are calibrated in the Oceanographic Calibration Service, according to established procedures and by specialized technicians. Procedures are developed to comply with all the requirements of the highest quality standards for testing and calibration laboratories, ISO 9001 and ISO/IEC 17025.

Continuous improvement of Oceanographic Calibration Service is vital for us in order to achieve the excellence and to provide our clients the best calibration service and technological advice.

FUTURE LINES OF WORK

UTMAR's main aim is to give technical and logistic support for design and integration of marine observation and monitoring technology, placing at our client's disposal our facilities and highly qualified human team. Our clients are mainly research groups, public administration and maritime sensor companies.

In this context, UTMAR completely backs the Oceanographic Calibration Service and its commitment to satisfy all our clients' needs, including the calibration of other type of sensors, as pH, oxygen, turbidity and fluorescence ones. For UTMAR, the development of international standards for oceanographic sensors calibration is essential and the Oceanographic Calibration Service is open to cooperate with other institutions in order to improve these standards and methods.

ACKNOWLEDGEMENTS

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Photo 5 – General view of the Oceanographic Laboratory Service. Temperature equipments

