AUTONOMOUS NUTRIENT ANALYSIS MONITORING USING A PORTABLE SYSTEM ALONG COASTAL TRANSECTS

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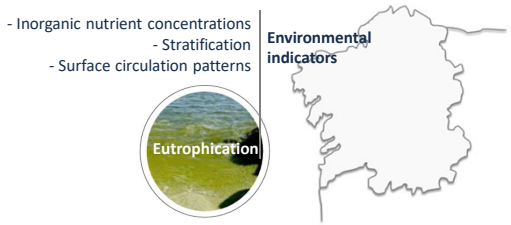
MarRISK project goal: Consolidation of a knowledge infrastructure for evaluating coastal risks in the Galicia-North Portugal Euroregion.

INORGANIC NUTRIENT VARIATION as ENVIRONMENTAL INDICATOR of the EUTROPHICATION RISK

Coastal eutrophication can cause adverse effects on marine ecosystems leading to an accelerated proliferation of opportunistic microbial and macroalgae communities, altering the trophic structure and affecting ecosystem services.



The MarRISK project (0262_MARRISK_1_E) have identified risks such as eutrophication, ocean acidification and algal blooms regime alterations and all of them directly affect supporting and provisioning services in the Galicia-North Portugal Euroregion.

Marine ecosystem services

Provisioning	Regulating	Cultural
Seafood Mineral resources Natural products Energy	Climate regulation Flood/storm protection Erosion control Air quality regulation	Ecotourism Recreation Educational Aesthetic values

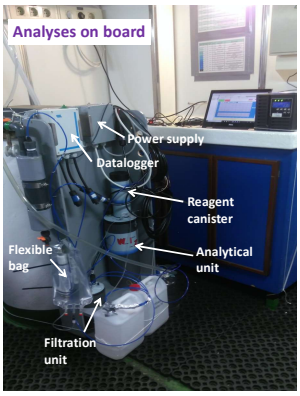
Supporting

Nutrient cycling, Primary production, Photosynthesis, Biological diversity

Millennium Ecosystem Assessment, 2005. *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, D.C.

WIZ-4 PROBE for NUTRIENT ANALYSIS

WIZ-4 probe of Systea S.p.A. is based on the automated micro-Loop Flow Reactor technology (www.systea.it).



Main advantages of the WIZ system are:
1) the low reagents consumption (of the order of µL), and; 2) it allows to analyse until four parameters (nitrate+nitrite, nitrite, phosphate and ammonium) using one single unit (reagent canister and analytical unit).

Analytical methods:

Nitrate+nitrite. Based on UV-photoreduction using solutions of DTPA-TRIS buffer, sulfanildamide and NED. 525 nm.

Phosphate. Reaction with molybdate-Na with ascorbic acid and catalyzed with antymonium-K. 880 nm.

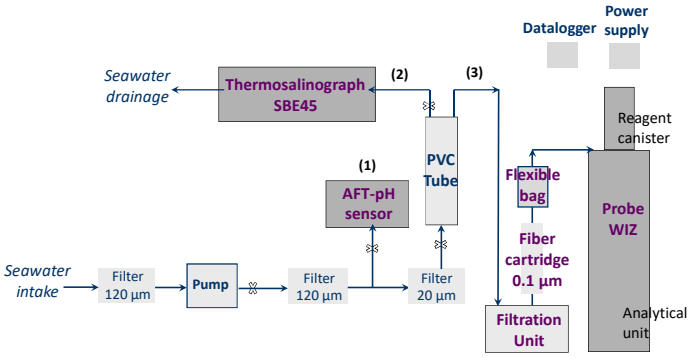
Ammoniun. Fluorimetric method with a buffered solution of OPA. 420 nm.

AUTONOMOUS MODULE to collect OCEANOGRAPHIC VARIABLES

The determination of the nutrient enrichment risk requires a continuous acquisition of nutrient data to establish environmental trends (EEA, 2014).

We have designed a module to autonomously measure inorganic nutrients, pH, temperature and salinity. In-situ measuring instruments of this module (WIZ nutrient probe, AFT-pH sensor and thermosalinograph SBE45) are mounted on a pumping circuit collecting sea-surface waters.

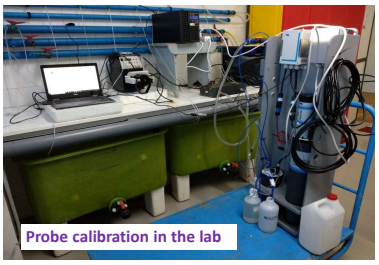
European Environment Agency, 2014. *Digest of EEA indicators*. Technical report, 8/2014.

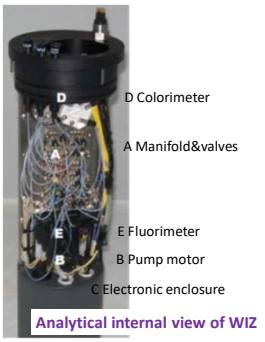


(1). Sea-surface waters are pumped through three filters. Seawater flow is distributed to an **AFT-pH sensor** and a **PVC tube.** This PVC tube is completely filled with seawater and its flow is controlled by two valves.

(2) In this circuit, a **SBE45 thermosalinograph** is installed through which passes a constant seawater flow (~30 mL/s).

(3) From this PVC tube, the seawater sample is also filtered through a **fiber cartridge 0.1 µm** and pumped with a **filtration unit** (100 mL/min) into a **flexible bag** before entering the **WIZ probe**. WIZ system is activated with a datalogger depending on the analysis frequency, for example, sequential measurement of nitrate+nitrite and phosphate takes 40 min.





This multi-parameter system has been tested in several campaigns in automatic and continuous mode for more than 24 h, showing that it is a powerful tool for biogeochemistry studies in coastal areas.

MarRISK group, **Galicia-North Portugal Euroregion**: MeteoGalicia-Xunta de Galicia, Santiago de Compostela (Spain); APA, Amadora (Portugal); CETMAR, Vigo (Spain); CIIMAR, Universidade do Porto (Portugal); IEO-A Coruña (Spain); IIM-CSIC, Vigo (Spain); IH, Lisboa (Portugal); INESC-TEC, Braga (Portugal); INTECMAR, Vilagarcía de Arousa (Spain); IPMA, Lisboa (Portugal); LMAG-Xunta de Galicia, Pontevedra (Spain); Universidade de Aveiro (Portugal); Universidade do Minho, Braga (Portugal); Universidad de Vigo (Spain).

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