Ship of Opportunity Monitoring of the Western Mediterranean Sea using FerryBox

Sana Ben Ismail, INSTM (Tunisia), sana.benismail@instm.rnrt.tn
Sondes Awachri, INSTM (Tunisia)
Mohamed Anis Ben Ismail, INSTM (Tunisia)
Nouha Barraj, INSTM (Tunisia)
Cherif Sammari, INSTM (Tunisia)

Introduction.

The use of "Ships of Opportunity" (SoO) in marine observation networks has been promoted by Global Ocean Observing System to deal with the lack of monitoring systems in ocean that enable continuous observation of coastal seas is a major obstacle when it comes to understand the implications for ecosystem dynamics and functioning. In fact, traditional monitoring of marine environments using oceanographic research vessels is costly and often lacks the spatial coverage and temporal resolution that is required to study variability in physical, chemical and biological conditions on seasonal or interannual time scales. Hitherto, these gaps in the data are a serious problem for accurate assessments of climate- and human-induced changes in marine environments. Unattended autonomous observing systems aboard SoO are cost-effective and reliable alternatives to obtain continuous observations on near-surface parameters with high spatial coverage and temporal resolution. Here after examples are presented that highlight the added value of the recorded data for the study of both long- and short-term variability in water mass stability, plankton communities and surface water productivity in the Western Mediterranean Basin.

By the evaluation of technical and scientific performance, it is evident that FerryBoxes have become a valuable tool in marine research that helps to fill gaps in coastal and open ocean operational observation networks.

Material and methods.

The FerryBox continuously measures oceanographic parameters in a flow-through system (Fig. 1). Depending on the draught of the ship, the water intake is fixed at a depth between 2 and 7 m. A debubbling unit removes air bubbles, which may enter the system during heavy sea. Coupled to the debubbler is an internal water loop in which the water passes different sensors as it circulates. The basic sensors used measure temperature and salinity, turbidity and chlorophyll-a fluorescence. In addition, an oxygen sensor (Clark electrode or oxygen optode) and pH sensor were installed. Housekeeping parameters such as flow rates and pressures inside the water loops were measured to supervise the system which was developed in collaboration with an industrial partner and is commercially available (4HJena engineering GmbH, Germany).

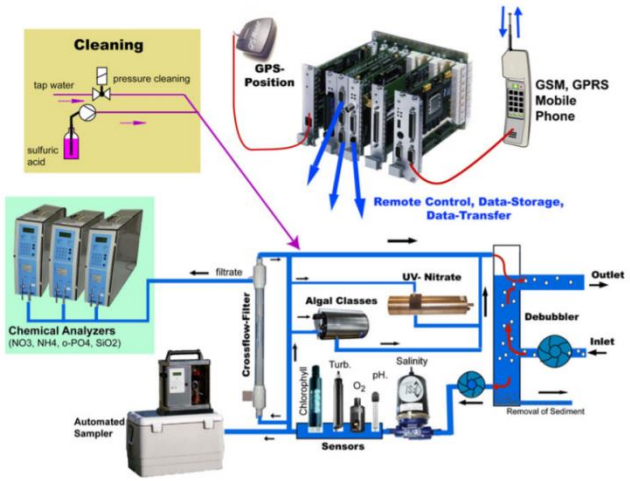

Figure 1: FerryBox system

The FerryBox system is installed on board a Carthage ferry of the Compagnie Tunisienne de Navigation (CTN) (Figure 2). The ferry crosses the western Mediterranean Sea mainly between Tunis and Marseille and between Tunis and Genova on a weekly basis, recently since 2018 the trajectories of the ferry changes in summer season and we had Genova-Zarzis cross.

Figure 2: FerryBox lines operated in the Western Mediterranean Sea

Results.

We outline our experience from 4 years of continuous FerryBox research in the Western Mediterranean and then allude to some of the possible applications. In this study, we give, in the first insight detailed comparisons of inter-annual FerryBox measurements in the Western Mediterranean Sea between 2016 and 2017, which shows a decrease in the Primary Production against an increase in temperature for similar days of each year. In the second place, we give comparisons of FerryBox measurements with satellite data in bloom period in order to demonstrate the value of these data for satellite validation. We give insight in the folowing section about the developement of database and FerryBox data management. The system we are about to create should respect most of the requirements of ISO 9001 quality norms. the data stream from the shore station to the Python MySQL data base is described.