Augmented observation strategy in the coastal zone to feed numerical twins of the ocean in river impacted areas

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Abstract

The continental shelves are vulnerable coastal areas that face a double constraint. On the one hand, the input of nutrients, particles and contaminants from rivers can cause eutrophication, hypoxia, toxic algal blooms, enhanced turbidity, and contamination in the coastal environment. On the other hand, climate change leads to an alteration of coastal circulation, changes in stratification, warming and acidification of the ocean, and an increase in the occurrence and intensity of extreme events (storms, heat waves, floods). The future of these highly productive ecosystems, generally located in densely populated areas, remains particularly uncertain, and their medium- and long-term management (20 to 100 years) requires numerical tools as well as observations.

In the framework of the PPR RiOMar project, the building of future augmented observatories in river impacted areas along the French coast is foreseen to anticipate the future of coastal water quality (primary production, oxygenation, acidification, eutrophication, contamination, toxic algae). Augmented observatories will go beyond the existing observation networks within the french ILICO research infrastructure by densifying and spatializing data using autonomous and mobile devices (gliders, micro-AUVs), synoptic devices (satellites) or low-cost systems (Mastodon-2D lines). This new generation of connected observations will be oriented towards a "smart" data acquisition optimizing energy consumption and data storage, and allowing, in the long run, to interface measurements of all types through tools such as the Internet of Things (IoT).

A first experiment was set up to deploy those systems together over the Gulf of Lions. The systems that were deployed during the RIOMAR-RIGOL (R.V. Téthys II) and RIOSB2 (R.V. Antedon 2) campaigns will be presented, together with the data collected. The first steps towards the development of smart observation at fixed stations of the COAST-HF network will also be presented, with a focus on oversampling during extreme events like floods and storms.