COMBINING SAMPLING, PROFILING, REMOTE SENSING AND MODELLING TO EFFICIENTLY MONITORING ESTUARINE AND COASTAL WATER QUALITY

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ABSTRACT

Monitoring of coastal and estuarine water quality has been traditionally performed by sampling with subsequent laboratory analysis. This has the disadvantages of low spatial and temporal resolution and high cost. In the last decades two alternative techniques have emerged to overcome this drawback: profiling and remote sensing. Profiling using multi-parameter sensors is now in a commercial stage. It can be used, tied to a boat, to obtain a quick "picture" of the system. The spatial resolution thus increases from single points to a line coincident with the boat track. The temporal resolution however remains unchanged since campaigns and resources involved are basically the same. The need for laboratory analysis was reduced but not eliminated because parameters like nutrients, microbiology or metals are still difficult to obtain with sensors and validation measurements are still needed. In the last years the improvement in satellite resolution has enabled its use for coastal and estuarine water monitoring. Although spatial coverage and resolution of satellite images in the present is already suitable to coastal and estuarine monitoring, temporal resolution is naturally limited to satellite passages and cloud cover. With this panorama the best approach to water monitoring is to integrate and combine data from all these sources. The natural tools to perform this integration are numerical models. Models benefit from the different sources of data to obtain a better calibration. After calibration they can be used to extend spatially and temporally the methods resolution. In Algarve (South of Portugal) a monitoring effort using this approach is being undertaken. The monitoring effort comprises five different locations including coastal waters, estuaries and coastal lagoons. The objective is to establish the base line situation to evaluate the impact of Waste Water Treatment Plants design and retrofitting. The field campaigns include monthly synoptic profiling, using an YSI 6600 multi-parameter system, laboratory analysis and fixed stations. The remote sensing uses ENVISAT\MERIS Level 2 Full Resolution data. This data is combined and used with the MOHID modelling system to obtain an integrate description of the systems. The results show the limitations of each method and the ability of the modelling system to integrate the results and to produce a comprehensive picture of the system.