

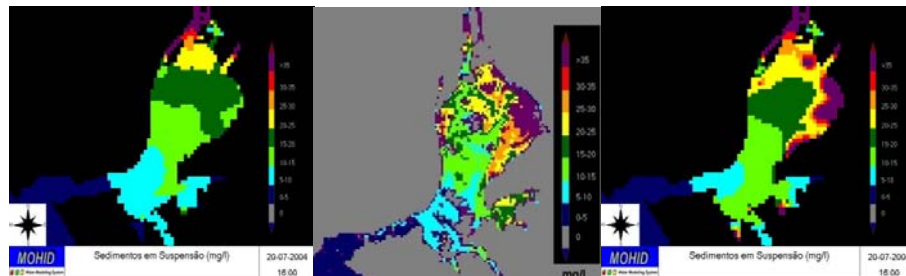
## Global Monitoring for Environment and Security (GMES): Water Management Case Studies in Portugal

GMES is a joint initiative from the European Commission and the European Space Agency (ESA) to develop innovative and cost-effective management tools based on Earth Observation systems and technologies. At present, GMES has been integrated into the Kopernikus Program.

Águas de Portugal (AdP) and Instituto da Água (INAG) have been working with Instituto Superior Técnico (IST) in the scope of specific applications of satellite imagery for water management. Those specific applications, in operation at some critical locations of interest to both AdP and INAG, have provided important, reliable and cost-effective monitoring, forecast and pollution event analysis.

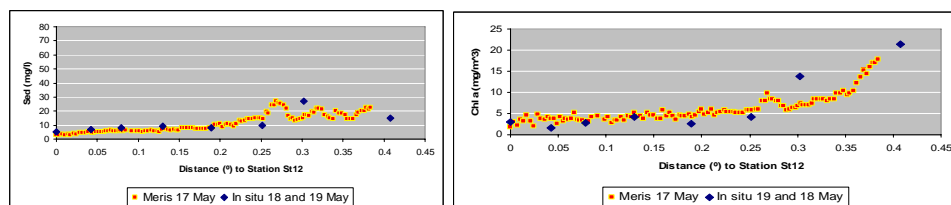
The basic assumption is: The best and less costly results will be obtained combining models, in-situ data and remote sensing data. Models allow the description of processes responsible for the actual data and are very useful as interpolation and forecasting tools. The quality of their results improves with the detail of the field data. In situ data scarcity can be improved using remote sensing data. Figure 1 below illustrates the process.

Figure 1 – From left to right: Mohid output of turbidity in Tagus Estuary with existing information; MERIS image of turbidity in the Estuary; Mohid output after integration of a wave routine, that remote sensing images showed necessary.



The process will ultimately produce a more reliable modeling tool, less dependent from in situ data with obvious advantages in terms of cost. In fact, as processes are more accurately understood and represented, less information will be required for each model run. On the other hand, at that stage of model development, satellites can override the need for extensive field monitoring, with cheap, fast and reliable data as illustrated in Figure 2 below.

Figure 2 – Turbidity and Chlorophyll in a Tagus Estuary area under study: In situ vs MERIS



At present, IST and other partners are implementing a demonstration project covering the Portuguese part of Tagus Basin, with the purpose of building an information service dedicated to water managers and water users' needs. That demonstration project, funded by ESA, will

deliver relevant information to manage the implementation of the Urban Wastewater Treatment Directive (sensitive area delimitation, wastewater treatment requirements' determination), the Water Framework Directive (non compliance cause-effect relationship analysis, optimization of programs of measures, cost allocation analysis) and the Environmental Liability Directive (pollution events cause-effect relationship analysis).

See more at: <http://www.aquapath.info/en>