

A VIEW OF YOUR INLAND WATERWAYS FROM SPACE

A European innovation project aiming to develop commercial services for monitoring the quality of inland and coastal waters, using satellites, in situ sensors and ecological modelling.

The challenge

Inland waterways are environmentally important, provide multiple ecosystem services and are vital for human consumption, irrigation, sanitation, transportation, recreation and industry.

In previous decades, these ecosystems have experienced increasing pressure from various human activities, as well as from climate change. Amongst these, the increasing eutrophication and pollution of many of these aquatic environments is a major environmental threat.

The EU Water Framework Directive (WFD) has created the need for efficient methods for monitoring the quality of inland and coastal waterways.

EOMORES (Earth Observation-Based Services for Monitoring and Reporting of Ecological Status) addresses this need whilst improving on the effectiveness of traditional methods (i.e. on-the-spot sampling and subsequent laboratory analysis). Although they are very accurate, such methods are both costly and time-consuming, and in most cases fail to capture the spatial differences which may be present within the same body of water.

The space based solution

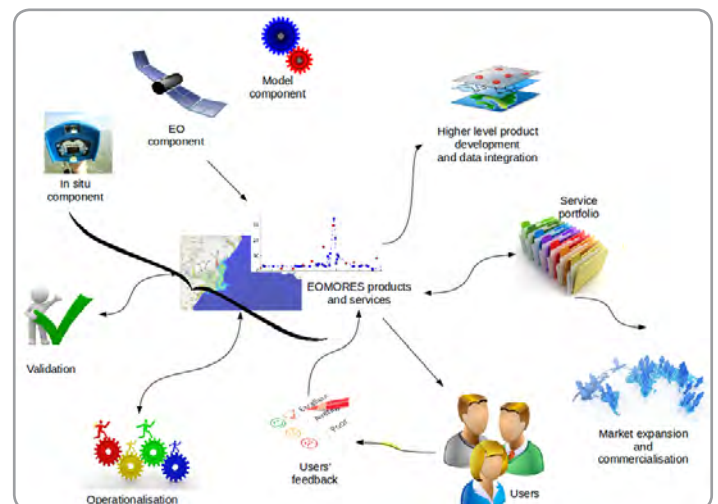
Monitoring inland waterways from space affordably has become possible thanks to the availability of free and open satellite data from the Copernicus Sentinels. The guarantee of long-term data availability makes it feasible to build commercial operational services, whilst the improved spatial resolution (e.g. Sentinel 2 reaches 10 m) and revisit time (5-6 days for both Sentinels 1 and

2) are appropriate for discerning changes in water quality in most European lakes.

Within EOMORES, data from Sentinels 2 and 3 will be automatically acquired and processed to deliver relevant water quality parameters such as chlorophyll-a, Total Suspended Matter (TSM), turbidity, Coloured Dissolved Organic Matter (CDOM), vegetation coverage and type, cyanobacteria blooms and Water Surface Temperature (WST). Sentinel-1 data are also being investigated for their capacity to provide information on water quality (specifically cyanobacterial scum), even under cloud cover, as radar data can penetrate clouds and operate at night.

Benefits to Citizens

EOMORES aims to bring about a paradigm shift in ecological monitoring technologies for water quality management, powered by Earth Observation (EO). EO offers great advantages for water quality monitoring, but its operational use has only really taken off in regions where traditional practices are no longer able to support



Scheme of EOMORES activities in relation to users, which represent the core of the project.

Thematic Area



CLIMATE, WATER AND ENERGY

Region of Application



LOMBARDY, UMBRIA
UNITED KINGDOM,
THE NETHERLANDS,
ESTONIA, LITHUANIA

Sentinel mission used



S2
S3

Copernicus Service used



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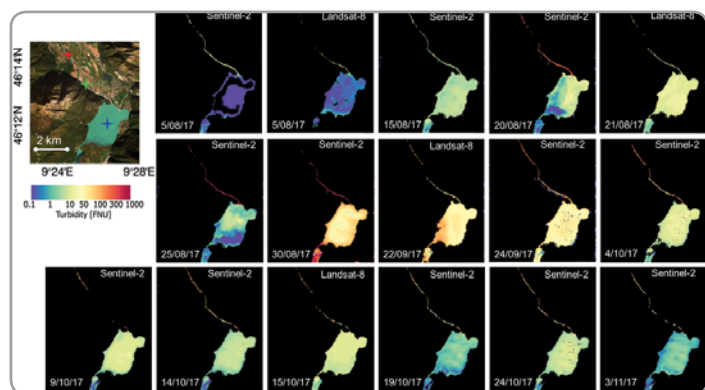
Usage Maturity Level



4

monitoring requirements - due, for instance, to the large number of waterways involved (e.g. in Finland).

EOMORES is targeted at national and regional authorities responsible for monitoring water quality management and environmental reporting, as well as private entities dealing with water quality. Thirteen users from multiple regions of six countries (e.g. Lombardy and Umbria regions in Italy) have already committed to collaborate with the consortium to define and evaluate the EOMORES services. The waterways under investigation represent a variety of different water types and trophic levels, with most of them being (hyper)eutrophic (Italy, Lithuania, Estonia, UK, Finland and the Netherlands).



Monitoring the effect of turbidity in lake Mezzola (Italy), after the rock avalanche of Piz Cengalo on 23-08-2017

Credit: Contains modified Copernicus Sentinel data [2017]

“The issue was that monitoring costs were old fashioned, labour intensive and data not digital. This needed to change, and we also wanted to work in real time. EO contributes to all of these.”

Regional/national organizations responsible for water quality monitoring (13 EOMORES users)

Outlook to the future

EOMORES will provide national, regional, local, public and private water managers with tools for efficient monitoring of water quality for operational management and for reporting according to the requirements of the WFD and other (national) directives.

By building downstream services upon the Copernicus programme, EOMORES will help to ensure that Europe's investments in space infrastructure are exploited for the benefit of citizens, and in order to achieve the goals of the WFD. Data from the Sentinel satellites, with their high-frequency and broad spatial coverage, are an essential input to the EOMORES services. EOMORES services are expected to become a valuable tool for water managers, bringing about a better understanding of their local water systems and enabling timely decisions and actions related to public health.

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ABOUT COPERNICUS4REGIONS

This Copernicus User Story is extracted from the publication “**The Ever Growing use of Copernicus across Europe's Regions: a selection of 99 user stories by local and regional authorities**”, 2018, Edited by NEREUS, the European Space Agency and the European Commission.

The model cases focus on local and regional authorities who successfully applied Copernicus data in 8 major public policy domains. The views expressed in the Copernicus User Stories are those of the Authors and can in no way be taken to reflect the official opinion of the European Space Agency or of the European Commission.

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