

BIOMONDO



Towards Earth Observation supported monitoring of freshwater biodiversity

The European Space Agency (ESA) activity called Biodiversity+ Precursors is a contribution to the joint EC-ESA Earth System Science Initiative launched in February 2020 to jointly advance Earth System Science and its response to the global challenges that society is facing at the onset of this century. BIOMONDO is the ESA Biodiversity+ Precursor project focused on freshwaters and biodiversity in lakes and rivers.



Project partners



ESA Biodiversity+ Precursors



BIOMONDO Pilots

The purpose of the biodiversity pilot studies is to explore how Earth Observation products in combination with models and in situ data can support freshwater biodiversity monitoring and management.

▼ Pilot 1 – Eutrophication Exploring the impact of eutrophication and other habitat changes on the water quality.



Credit: Robbert Frank Hagens (Alamy)

Credit: Peter Leenen (Straystone Pictures)

The EO based water quality products and EO forced model outputs generated in BIOMONDO, were assessed with respect to their usefulness for management and decision support in relation to:

- Monitoring of changes in water quality related to effects of mitigation measures required by the **Nature Directives (Habitat and Birds)** and the **2030 EU Biodiversity Strategy** to restore degraded freshwater habitats by 2030 and extend the **Natura2000 network**.
- The **WFD** assessment of status and changes to water quality to achieve good status of all European surface waters.
- Development of Essential Biodiversity Variables and indicators to monitor progress towards sustainability target 6.6 – Protect and restore ecosystems – of the **2030 Agenda for Sustainable Development** and **KM-Global Biodiversity Framework**.

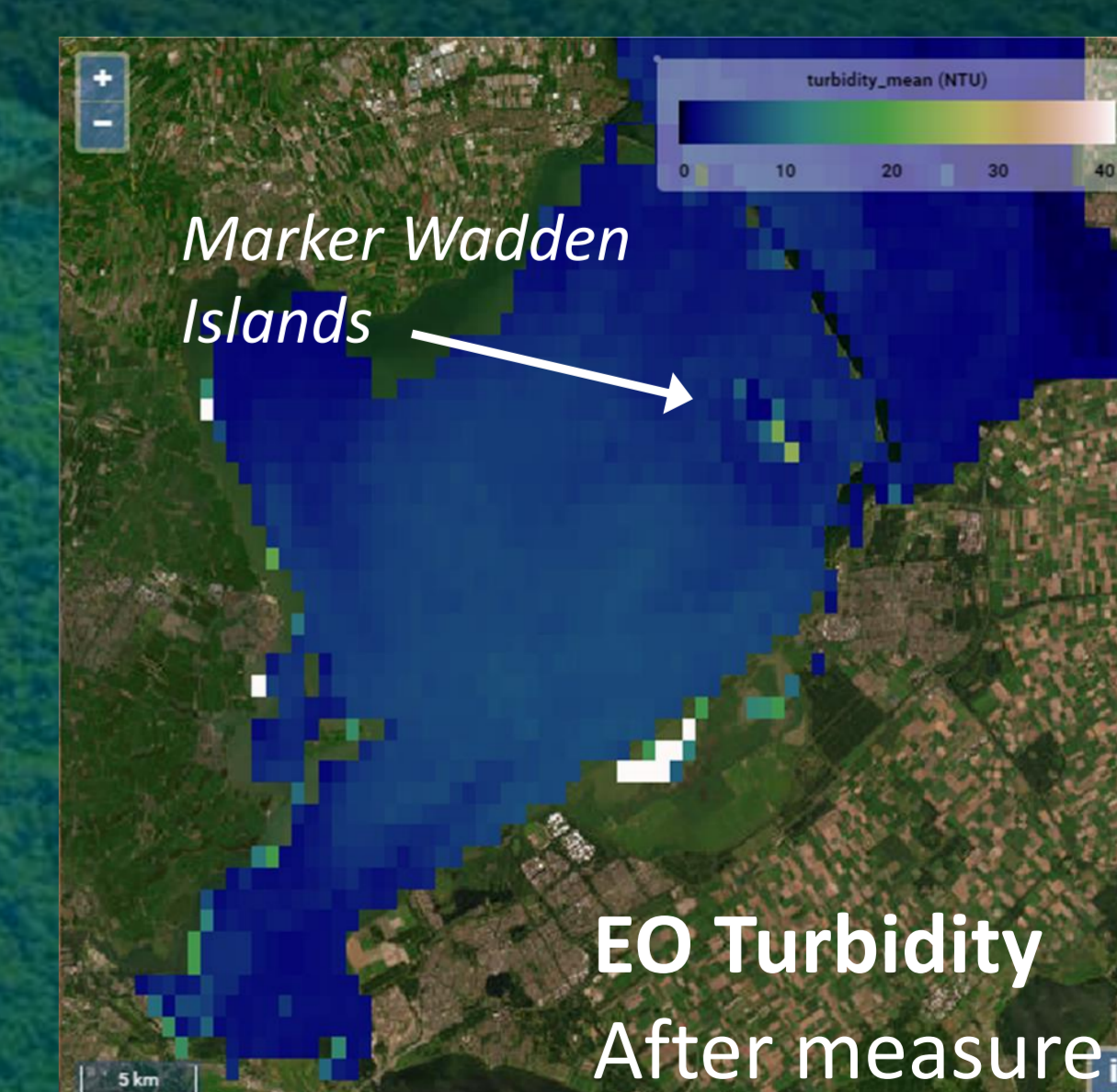
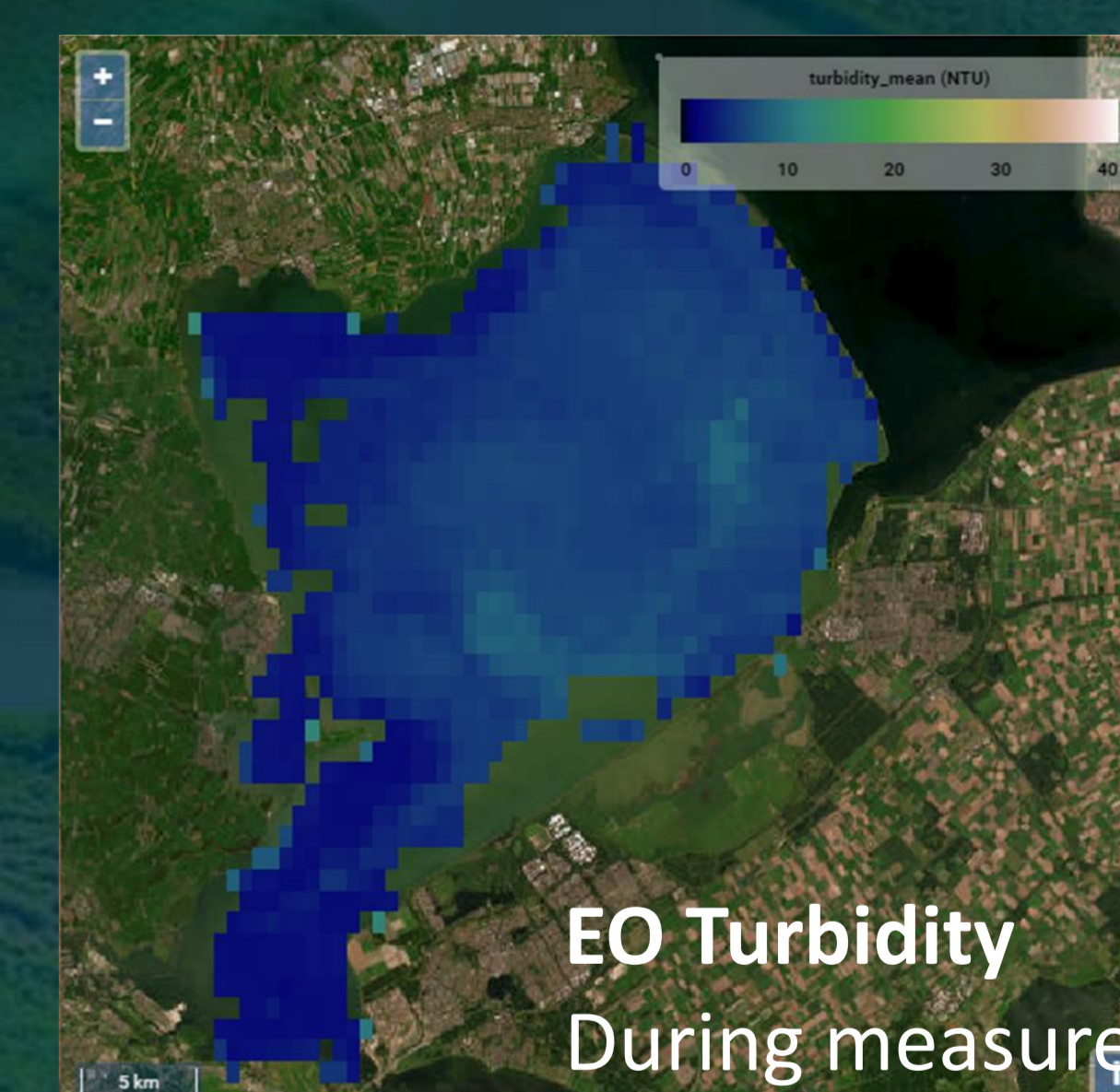
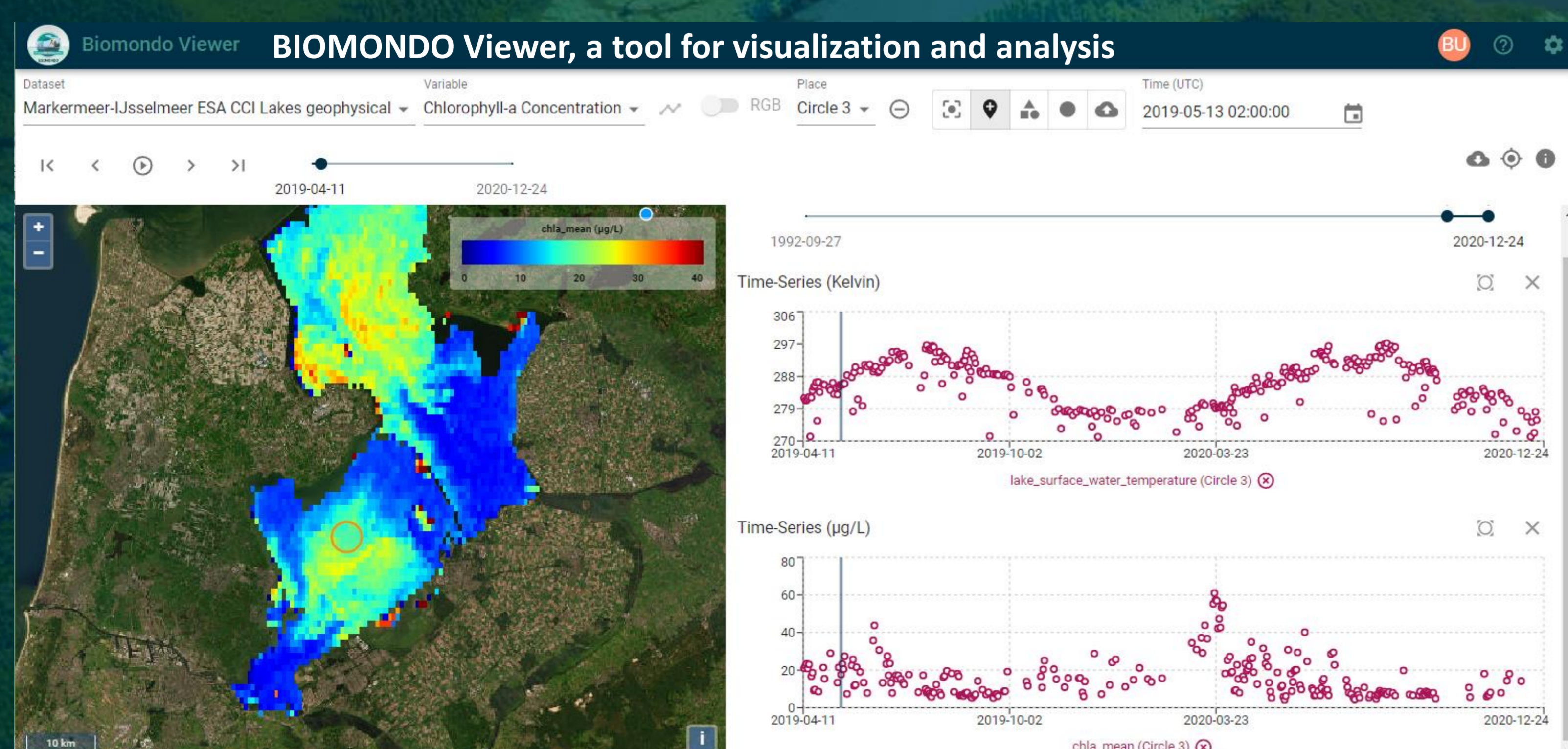
► Pilot 2 – Heat tolerance Exploring the impact of changes in water temperature and heat waves on freshwater fish diversity.

► Pilot 3 – Connectivity Monitoring river connectivity effect by dams, and their changes and impact on biodiversity.

EO products supporting EU Nature Directives and Natura 2000

The EU Nature Directives and the WFD calls for measures to improve habitats, biodiversity and the water quality of European water bodies. In the Pilot 1 Showcase we demonstrate the potential of EO based products to monitor changes in water quality after establishment of mitigation measures. In Lake Marken, an archipelago of artificial islands were built to improve the light climate of the water to create new habitat for plants, fish and birds thereby improving the biodiversity at the site.

The possibility to explore the EO input data and derived products from model integration in the BIOMONDO Viewer is seen by site managers as a valuable contribution to decision-making processes in mitigation and restoration projects.



The satellite time series images of turbidity show the situation before, during and after the creation of Marker Wadden islands. Such time series can aid understanding of complex challenges and processes related to changes in freshwater biodiversity in both the spatial and temporal domain.

Lake Marken is now a better habitat for plants, fish and birds after implementation of measures at this Natura 2000 site.