



Klaipeda  
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# EO-BALP: Earth Observation for aquatic pollution and maritime security monitoring

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Aims to develop a **cloud service platform** for Earth Observation (EO) **data access** and **processing** and provide different **applications** that demonstrate the **practical use of satellite data** in different domains. Funded by European Space Agency, 2023.11 – 2025.05, 2025.07 – 2026.11

## The Platform

To acquire, process, analyze, and publish EO imagery and spatial data.

Standards: XYZ/TMS, WMS, JSON/GeoJSON; compatible with QGIS and ArcGIS

## Applications

7 open access,  
6 proprietary.

## Sector-specific solutions

Agricultural land, Forestry, Flood & Fire, Water Quality, Maritime, Natural resource extraction, Urban & infrastructure planning.

## Authentication

Secure user authentication with role-based access to platform services and data.

No vendor lock-in: Import and export data at any time

## Countries

Latvia, Estonia, Lithuania, Croatia, Poland, Greece, Türkiye, South Korea

## Users

**100+ active users**

Government agencies, forestry, agriculture, utilities companies, universities, R&D institutes



<https://www.geohub.net>

<https://app.geohub.net/compute/>



### Agricultural land monitoring service

The main purpose of the application is to improve the management of agricultural land by effectively addressing fire and flooding problems. Key objectives include increasing efficiency through automated mapping using satellite imagery, supporting regulatory compliance processes and rapid response, and centralizing operations for better resource optimization. The application allows users to identify, monitor, analyze, download and manage agricultural areas affected by fires and floods.



### Forest monitoring service

The Forest Monitoring Service provides monitoring of forestry activities, such as clearcuts, and detects windfalls, along with annual monitoring for less visible forest damage, including excess water, insects, disease, and fire, across the Baltics. This service reduces the need for manual surveys, allowing human resources to focus on damage prevention and enabling timely updates to the State Forest Registry.



### Infrastructure and settlement monitoring service

Infrastructure and settlement monitoring application allows to observe subsidence in cities with population more than 60 thousand. The service supports monitoring and analyzing how construction activities affect nearby buildings/infrastructure, identifying and preempting potential issues. InSAR analysis shows vertical displacement grids for the biggest 10 Baltic cities. The grids are derived from the persistent scattered interferometric analysis (PS-InSAR) of Sentinel-1 satellite radar images. Multitemporal InSAR analyzes for the time period of one year are calculated monthly. The precision of InSAR derived displacements is 2 mm on average.



### Earth Observation for Ecosystem Services in Lubuskie

Earth Observation products map portal for the Lubuskie Voivodship in Poland, developed under the EO-BALP-CCN1 project. Provides interactive access to satellite-derived thematic geodatasets for selected ecosystem services with multilingual support and on-demand layer information.



### Marine monitoring service

This service by using synthetic aperture radar (SAR) technology complements the monitoring of marine vessels in the waters of the exclusive economic zone of the Baltic States, and allows the detection of vessels not connected to the automatic identification system (AIS), especially under harsh weather conditions. Such data can assist in identification of illegal activities such as fishing in protected areas or during prohibited periods, illegal dumping and water pollution.



### Natural resource extraction monitoring service

The Natural Resource Extraction Monitoring service is intended to produce classified maps of Natural Resource Extraction sites using Sentinel-2 imagery and available reference information. Monitoring of the licensed extraction sites is performed by observing the changes of their geographical extent and comparing the licence data with the classification results.



### Water quality monitoring service

Satellite data based Water Quality monitoring application significantly expands water monitoring for surface waters in time (weekly observations) and in space (on the scale of almost the entire water body) enhancing the assessment of water quality, the number of problematic water bodies, their change in time and the locations of hot spots. Combining such data with agricultural land monitoring data makes it possible to identify possible sources of impact and develop environmental measures to improve water quality.

## Aquatic pollution and maritime security monitoring

– user requirement driven application combines satellite and AIS data to provide near-real-time information on water quality and maritime activity, supporting environmental assessment and maritime safety.

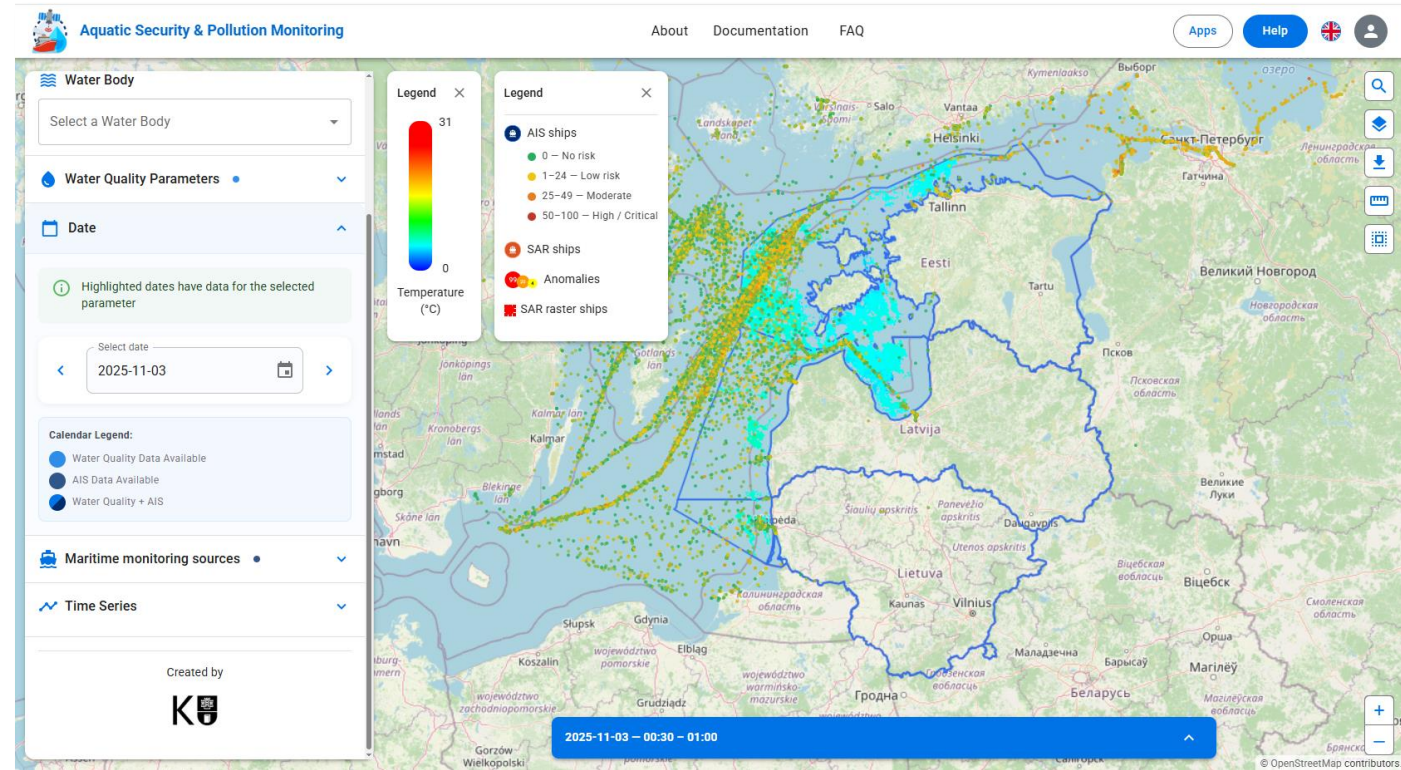
Two applications are synchronized:



**Water quality monitoring**



**Maritime monitoring**



## 4 parameters

Chlorophyll-a,  
Water temperature,  
Suspended matter,  
Aquatic vegetation

## S2·S3·L8/9

Optical + Thermal

## Coverage

LT, LV, EE Baltic Sea  
Lagoons  
Lakes, reservoirs

## Temporal scope

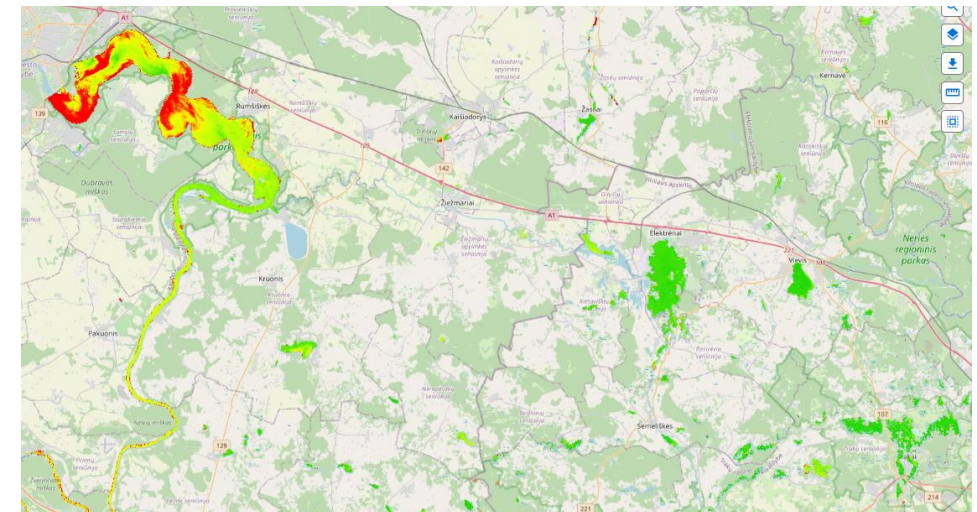
Since 2025 up today

- ✓ Ecological status assessment WFD, MSFD, BWD
- ✓ Environmental protection and restoration
- ✓ Operational pollution detection

- ✓ Human induced ecological disturbance
- ✓ Aquatic vegetation harvesting
- ✓ Ecosystem functioning & biogeochemical processes

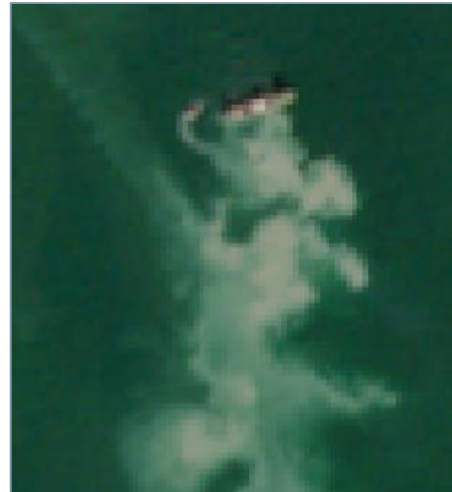
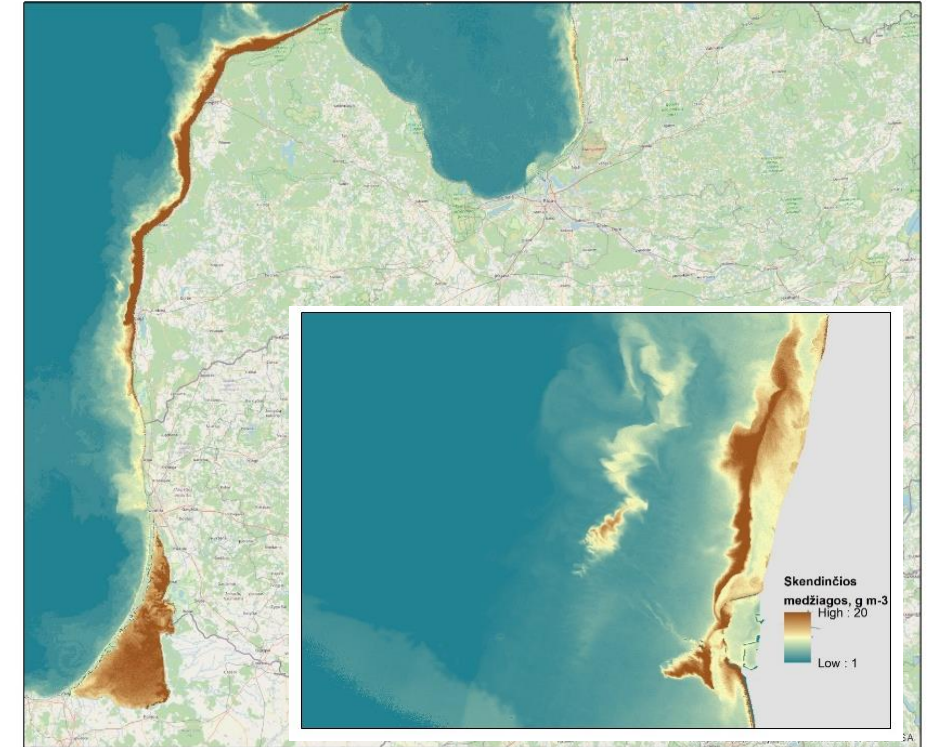
# Algal bloom situation

Identify areas at risk of algal blooms and support timely warnings to protect public health and recreational activities.



# Human induced pollution

Identify and monitor dredging and dumping activities and assess their potential impacts on the marine environment.



## Maritime security module

### 4 parameters

EO + AIS vessels,  
SAR detected not registered  
vessels,  
Navigation anomalies,  
Risk scores & dark-ship flags

### S1·S2

Radar + Optical

### 4 AIS sources

Terrestrial networks, a  
commercial stream and  
**our own receiver**

### Temporal scope

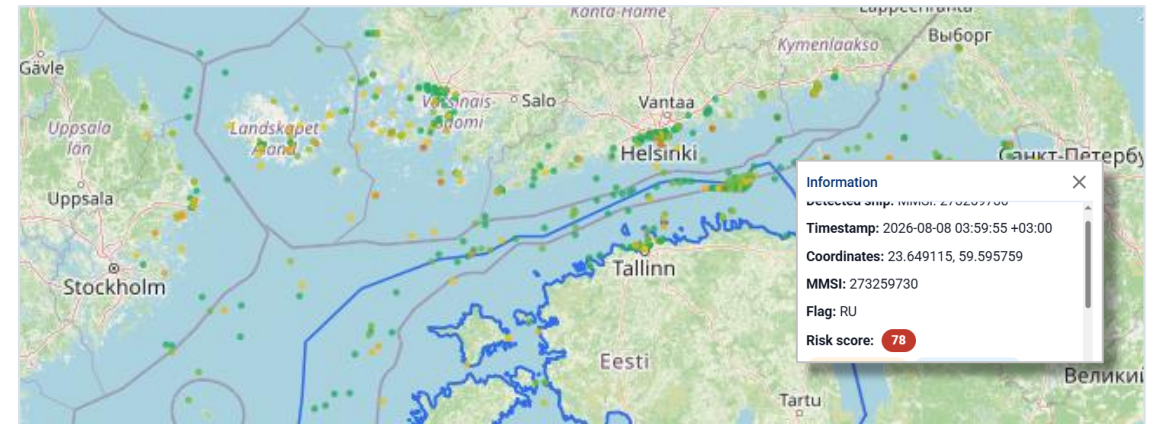
Since 2025 up today

- ✓ AIS – satellite discrepancy detection
- ✓ Illegal maritime activities
- ✓ Shadow fleet risk assessment

- ✓ GPS-anomaly heatmaps
- ✓ Environmental impact assessment
- ✓ Daily sea-ice concentration & thickness

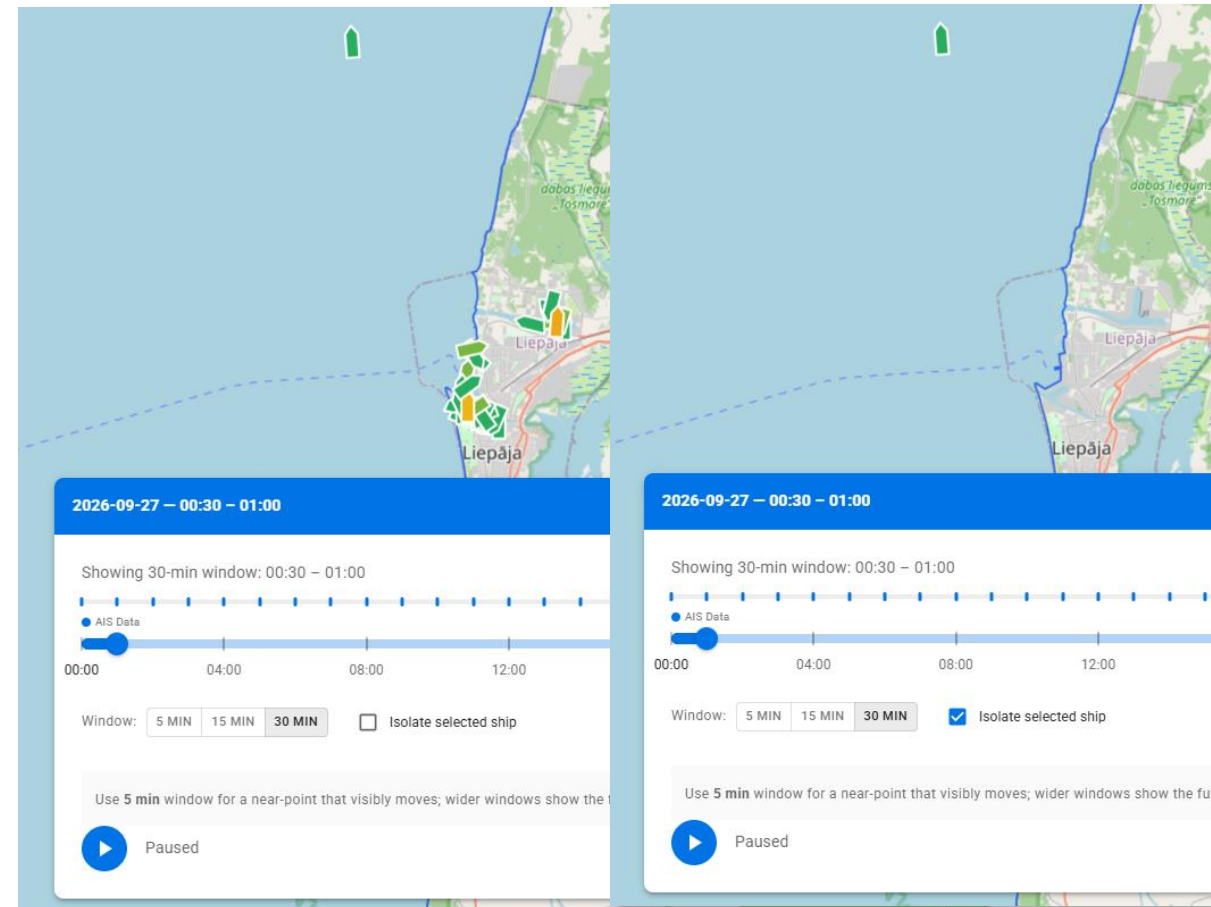
# Every vessel carries a risk score

Vessel Risk Scoring: Multiple behavioral indicators are combined into 0–100 score to support the identification of potentially suspicious vessels and possible “shadow fleet” activity.



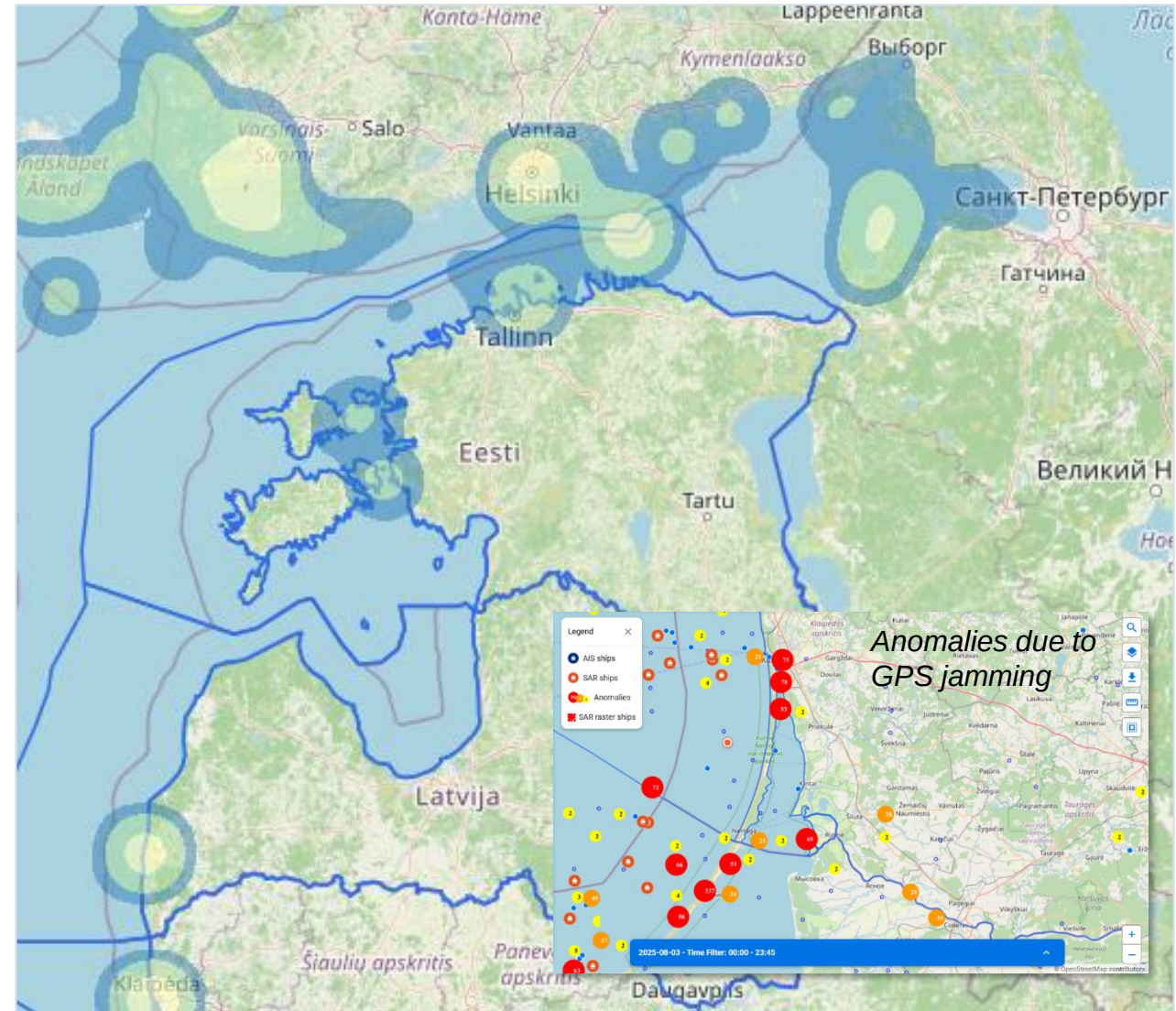
# Follow one vessel through the day

Users can isolate a selected vessel, replay its track in 5-, 15-, or 30-minute intervals, and use play/pause controls to follow its movement over time while other vessels are filtered out.



# GPS-anomaly heatmaps

A date and time filtered density map of AIS GPS anomalies. Analysis helps identify potential GPS signal jamming.



## Next steps

From visualization to AI-supported analysis | Integrated monitoring | Multi-source data |  
New indicators | Inland water navigation monitoring | Real-time alerts | Demonstration  
seminars



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