



Project funded by
EUROPEAN UNION



Common borders. Common solutions.

GA1 PONTOS platform development

PONTOS WebGIS

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Odessa, Ukraine

AUA ACOPIAN CENTER
for the ENVIRONMENT



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GA Green
Alternative



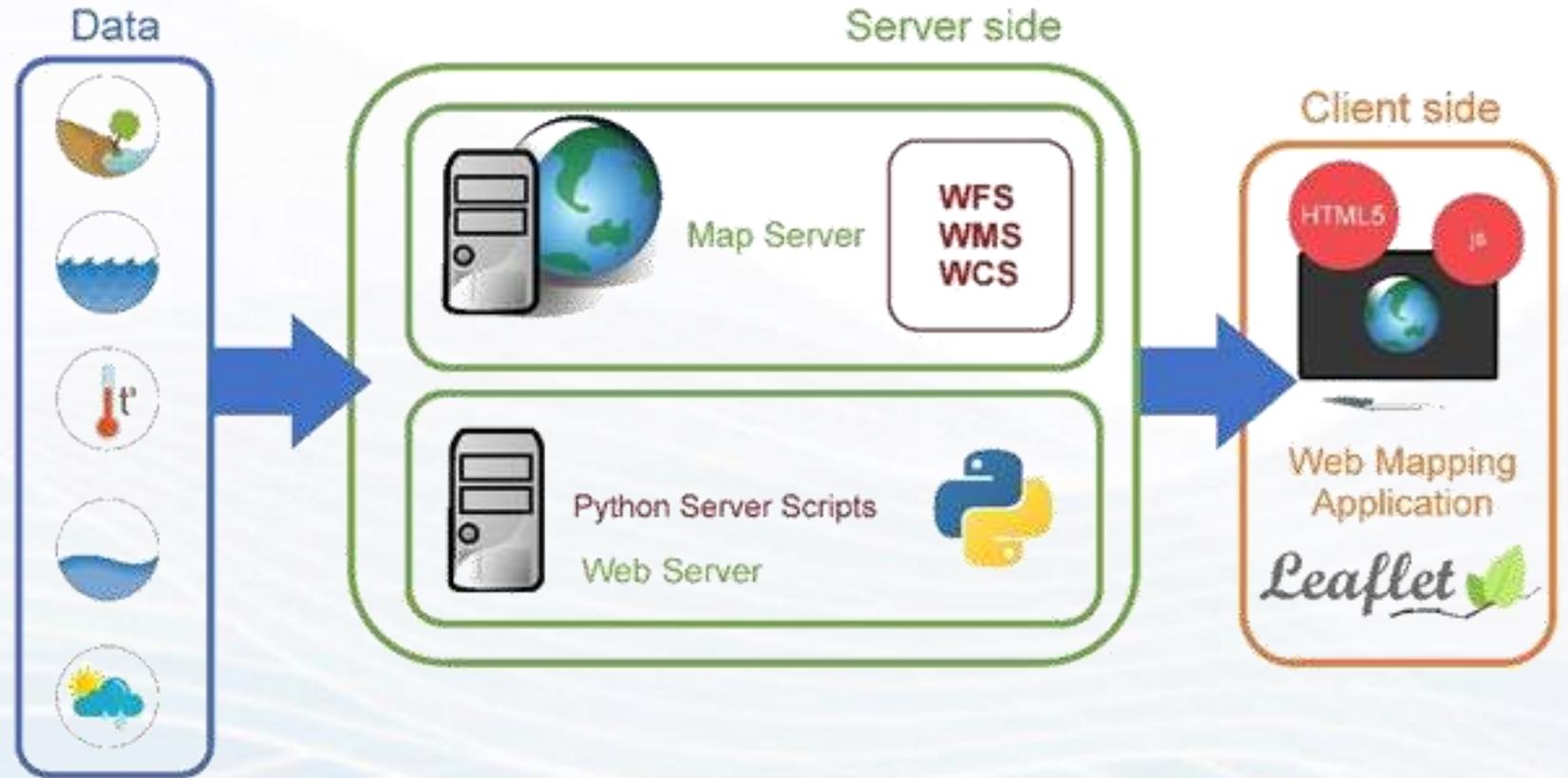
1865

WebGIS – System architecture

The PONTOS's WebGIS is a website for interactive visualization of the spatial data collected in the Project and organized in a common spatial infrastructure.

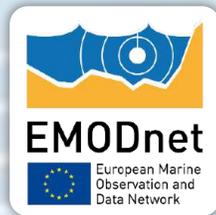
Consists of two different components:

- a **Map server** that pushes the user's queries to external Data Servers.
- a **Web Server** that hosts the PONTOS's webGIS website and handles Python Server scripts



WebGIS – Available datasets

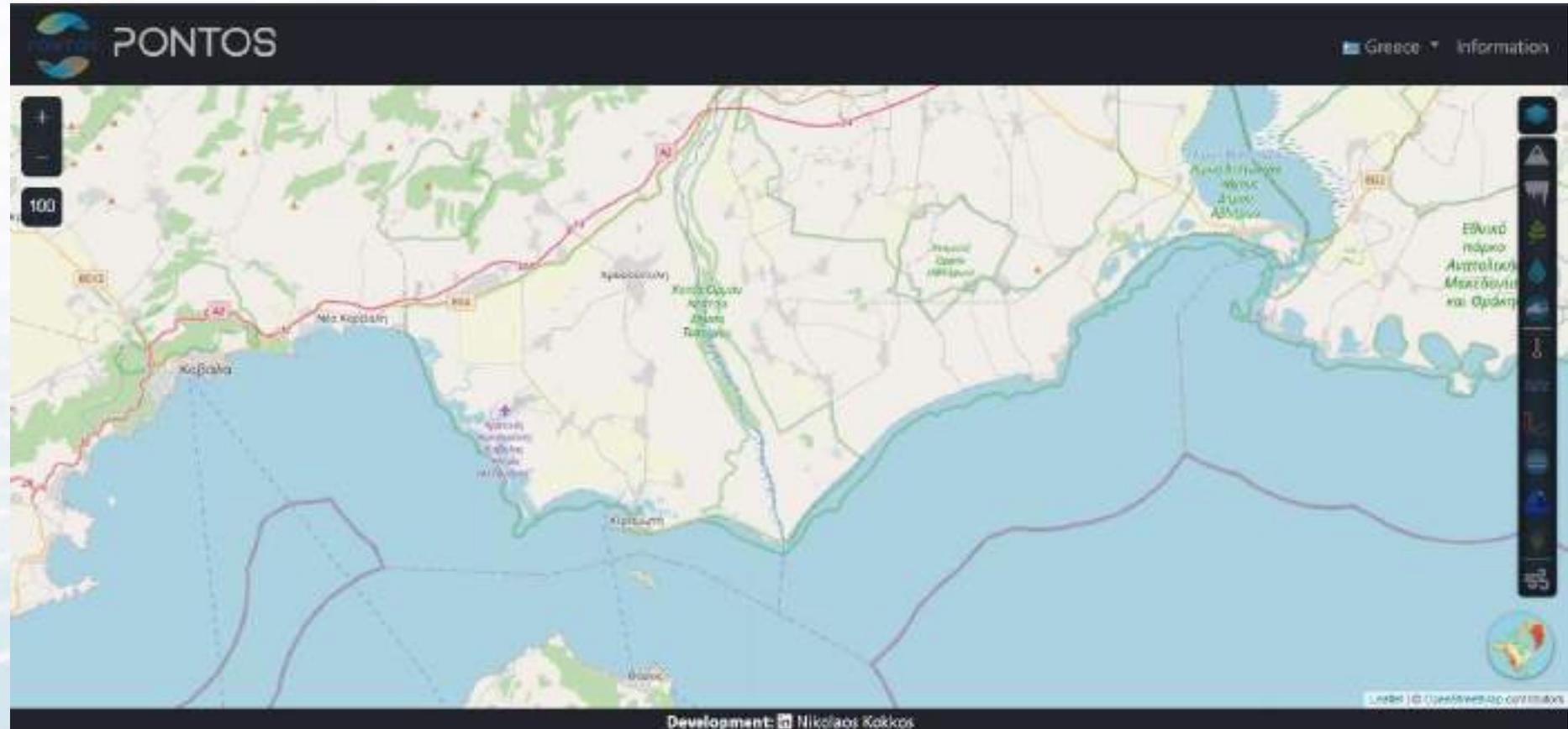
- **Topographic data:** retrieved from the SRTM30 Database,
- **Bathymetric data:** retrieved from the EMODnet Bathymetry Portal,
- **Land Use/cover data:** retrieved from the Copernicus Land Monitoring Service (CLMS) or other local services,
- **Hydrologic data:** for each of the major rivers of the pilot sites retrieved from the Swedish Meteorological and Hydrological Institute (SMHI),
- **Shoreline evolution data:** retrieved from historic satellite images analyzed according to the methodology developed by the Laboratory of Ecological Engineering and Technology, Democritus University of Thrace,
- **Oceanographic data:** such as water temperature, salinity, water level, currents, waves and seagrass retrieved from Copernicus Marine Environmental Monitoring Service (CMEMS) and the EMODnet Seabed Habitats Portal,
- **Meteorological data:** such as wind speed and direction retrieved from Global Forecasting System (GFS) of NOAA.



WebGIS – Initial Display

<http://labecolftp.env.duth.gr/PONTOS>

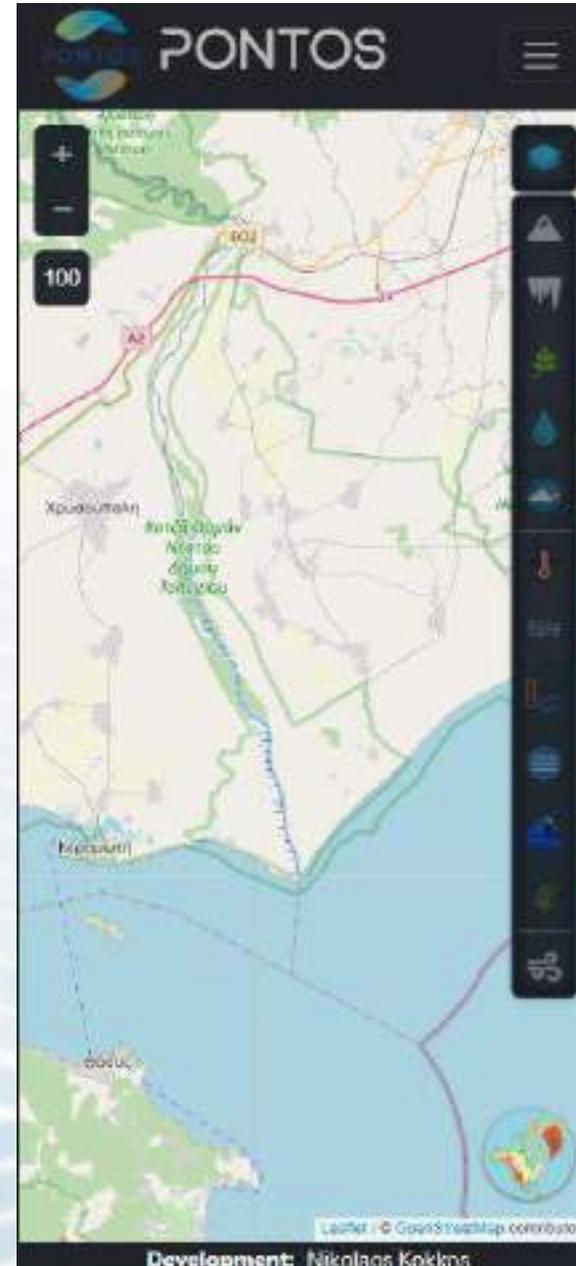
- One webGIS website for all pilot areas.
- Every component is translated in two languages (Greek and English) with the possibility to be translated in local language.



WebGIS – Initial Display – Mobile

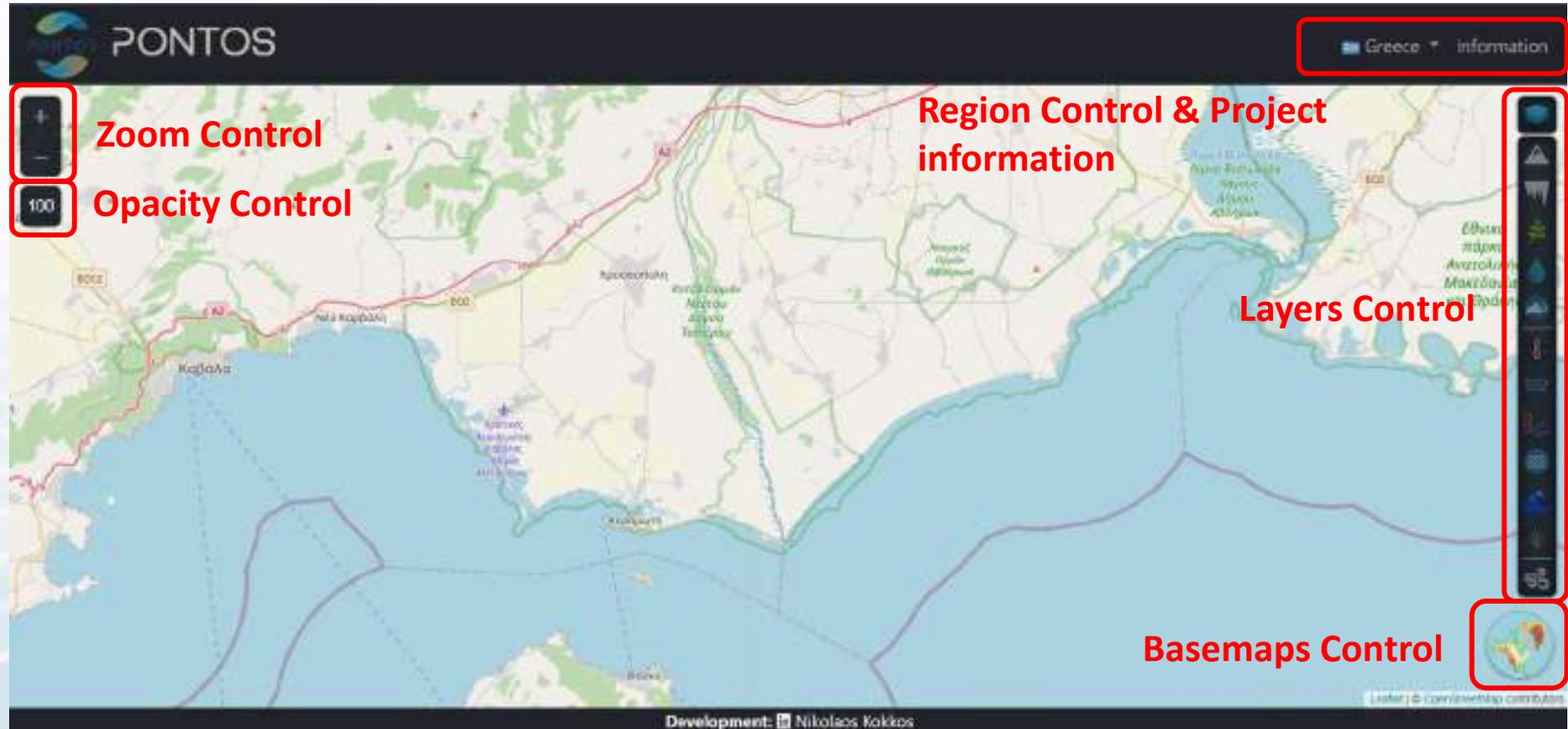


- Fully compatible with mobile devices

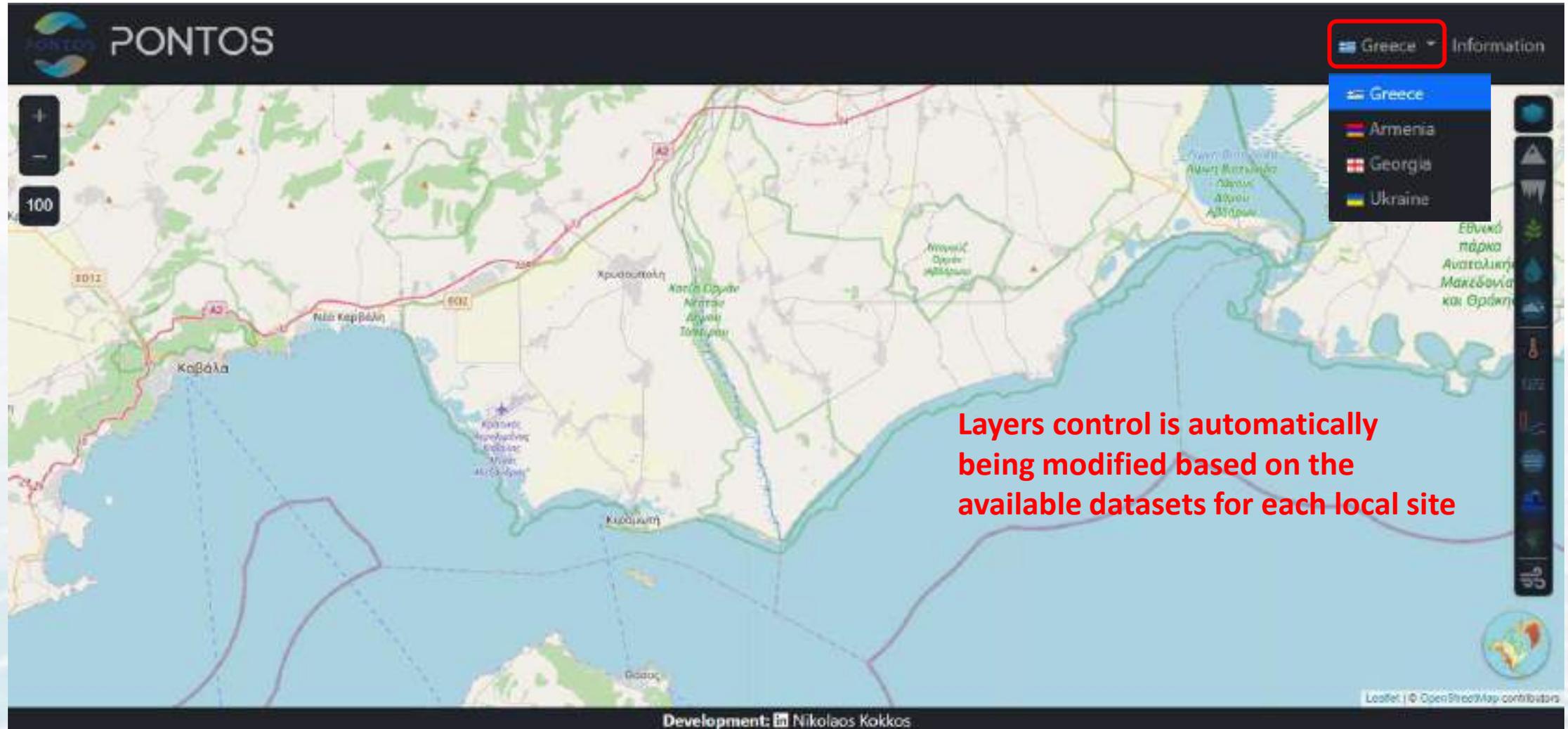


WebGIS – Menu

- 5 components:
 - Region Control & Project information
 - Layers Control
 - Basemaps Control
 - Zoom Control
 - Opacity Control



WebGIS – Region Control



The screenshot displays the PONTOS WebGIS interface. At the top left, the PONTOS logo and name are visible. The main area is a map of the Black Sea region, showing various geographical features and labels in Greek, such as 'Καβάλα', 'Νέοι Καπέβουλι', and 'Κυζίκουλη'. On the right side, a layers control menu is open, showing a list of regions: Greece (highlighted in blue), Armenia, Georgia, and Ukraine. The 'Greece' option is selected, and the map displays data corresponding to this region. The interface also includes a scale bar (100), a compass, and a globe icon. At the bottom, the text 'Development: Nikolaos Kokkos' is visible.

Layers control is automatically being modified based on the available datasets for each local site

WebGIS – Information

PONTOS

PONTOS aims to enhance transboundary cooperation for large-scale, harmonized environmental monitoring across the countries of the Black Sea region and beyond. The vehicle towards this objective is the exploitation of numerous freely available and incrementally credible Copernicus data and services (e.g. Copernicus Land and Marine Environment Monitoring Services). Intelligent fusion of data and information shall lead to novel services and products for actors operating along the coastal zone. Latter shall become, through PONTOS operational platform and mounted online services, freely available to and accessible by a multitude of local, national and regional stakeholders. Transboundary spaceborne derived primary (e.g. images) and secondary (e.g. maps) products will be coupled with existing data and knowledge of in situ conditions. Tailored to the regional challenges, solutions will be generated by utilizing this information thesaurus and retrieving methods and results (e.g. online modules and models) from EU and national past and ongoing research and development projects. Citizens' current and future well-being will be the focus. As such, marine and lake coastal and inland human activities will be mapped targeting industry, recreation, agriculture, aquaculture, and commerce in Armenia, Georgia, Ukraine, and pilot-wise in Greece. Their effluents towards the Black Sea or the lakes around it will be calculated, while at the same time spaceborne and in situ data will monitor fluctuations in marine features' values such as surface water temperature, salinity, nutrients, potentially toxic elements, and algae presence. The impact will be assessed in relation to set benchmark conditions. Local stakeholders and actors will be informed and equipped with an adequate interface to access the information and its regular updates. Co-development and co-creation actions will respect national and local needs, constraints and vision. Together with capacity building activities PONTOS aims to offer the means to exploit in tandem existing local monitoring networks and Copernicus products and services, to align its online services with a compatible manner to existing hard- and software infrastructures, and to leverage cooperation and exchange of ideas and best practices across the region.

OVERALL OBJECTIVES

PONTOS's overall objective is to make information and knowledge available to scientists, policymakers, citizens, and other relevant stakeholders and provide a full picture of the state and temporal evolution of Black Sea region environment. This is expected to be achieved by exploiting information technologies to automatically retrieve Copernicus products, couple them with national or regional infrastructures for data acquisition and processing, and provide monitoring services for the Black Sea and the surrounding environment in a transboundary, standardized and homogenized manner. Convergent conservation strategies will be promoted at sites of regional significance as pilots to showcase the efficacy and credibility of the online services.







ΕΡΓΑΣΤΗΡΙΟ
ΟΙΚΟΝΟΜΙΚΗΣ ΜΗΧΑΝΙΚΗΣ
ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ

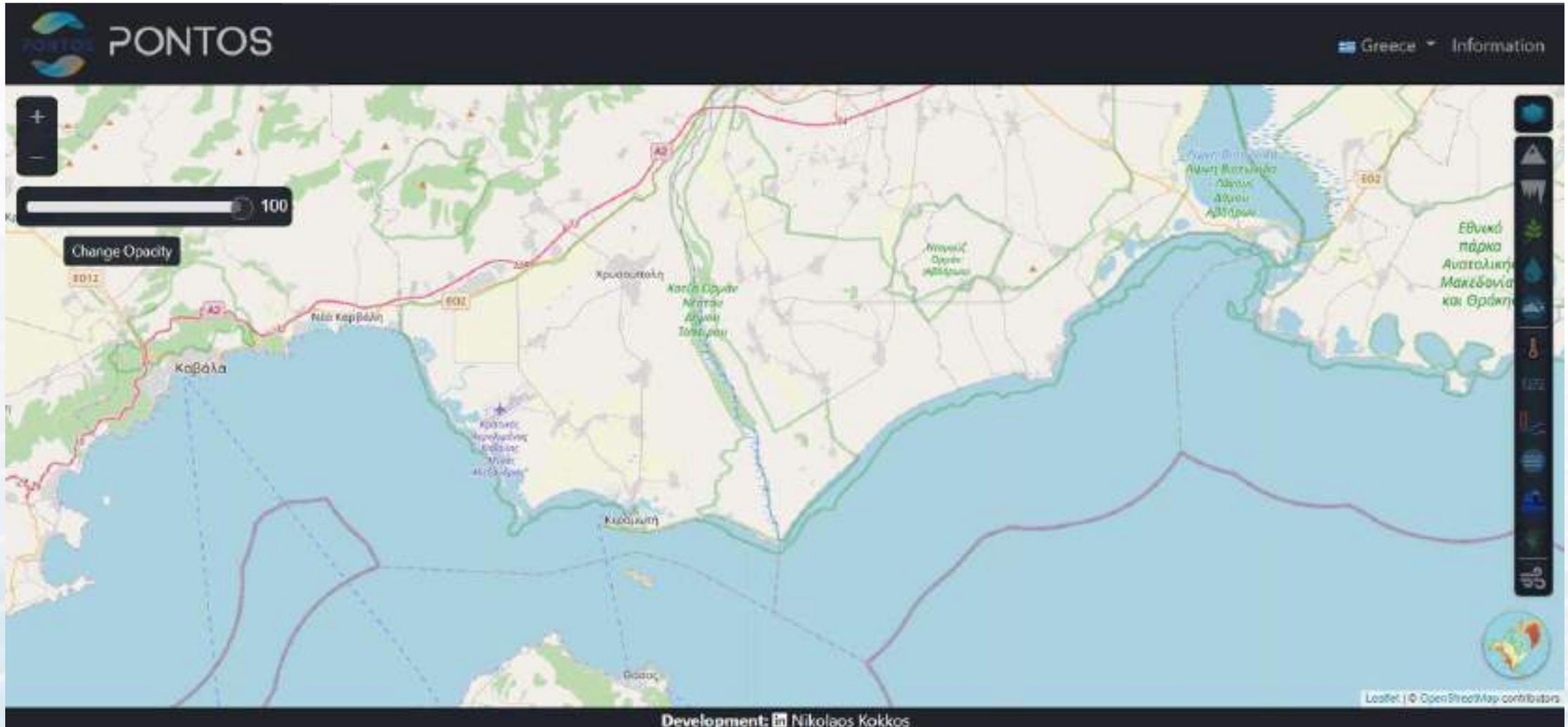
ΤΜΗΜΑ ΜΗΧΑΝΙΚΩΝ ΠΕΡΙΒΑΛΛΟΝΤΟΣ
ΔΗΜΟΚΡΑΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ
ΠΟΛΥΤΕΧΝΙΚΗ ΣΧΟΛΗ



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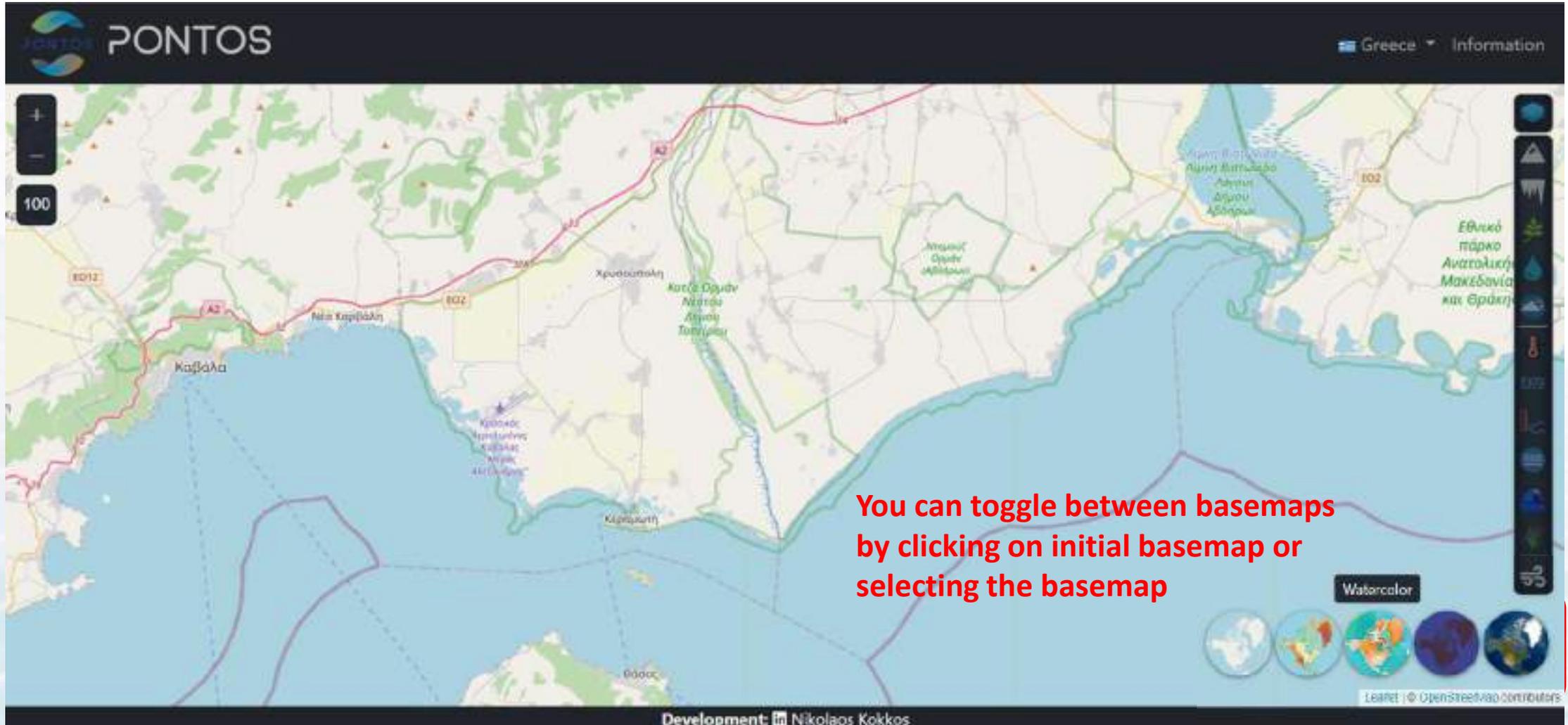


WebGIS – Zoom & Opacity Control



The screenshot displays a web-based GIS application interface. At the top left, the 'PONTOS' logo is visible. The top right corner shows a dropdown menu set to 'Greece' and an 'Information' link. The main map area shows a geographical view of Greece with various features like roads, rivers, and parks. On the left side, there are zoom controls (+ and - buttons) and a 'Change Opacity' slider set to 100. On the right side, there is a vertical toolbar with icons for map navigation and layers. The map includes labels for locations such as Καβάλα, Κιόλαξη, and Κασσινός. A scale bar is also present. At the bottom right, there is a small globe icon and the text 'Leaflet | © OpenStreetMap contributors'. At the bottom center, it says 'Development: Nikolaos Kokkos'.

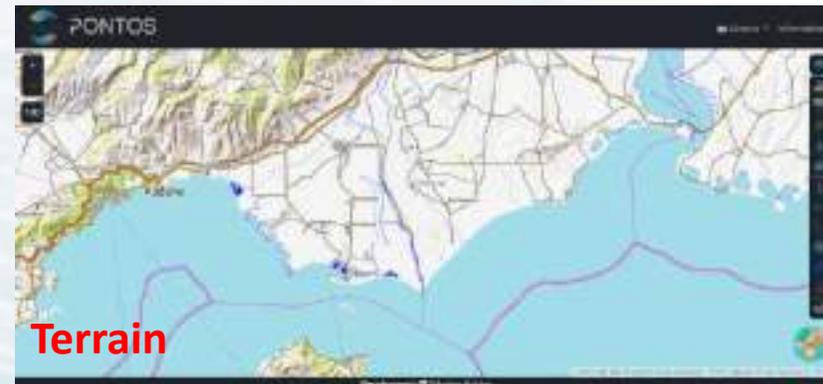
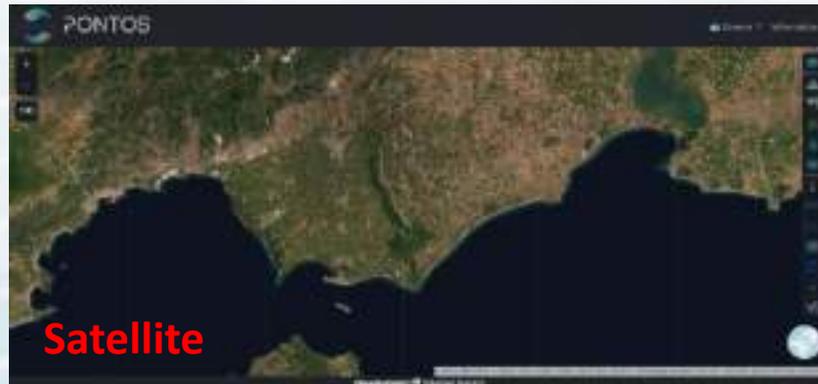
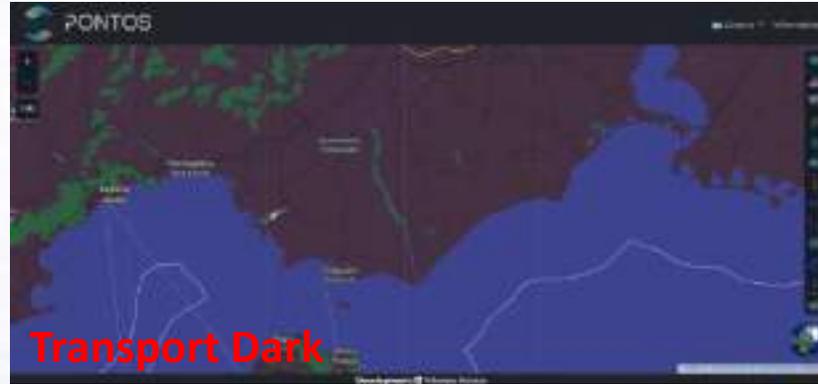
WebGIS – Basemap Control



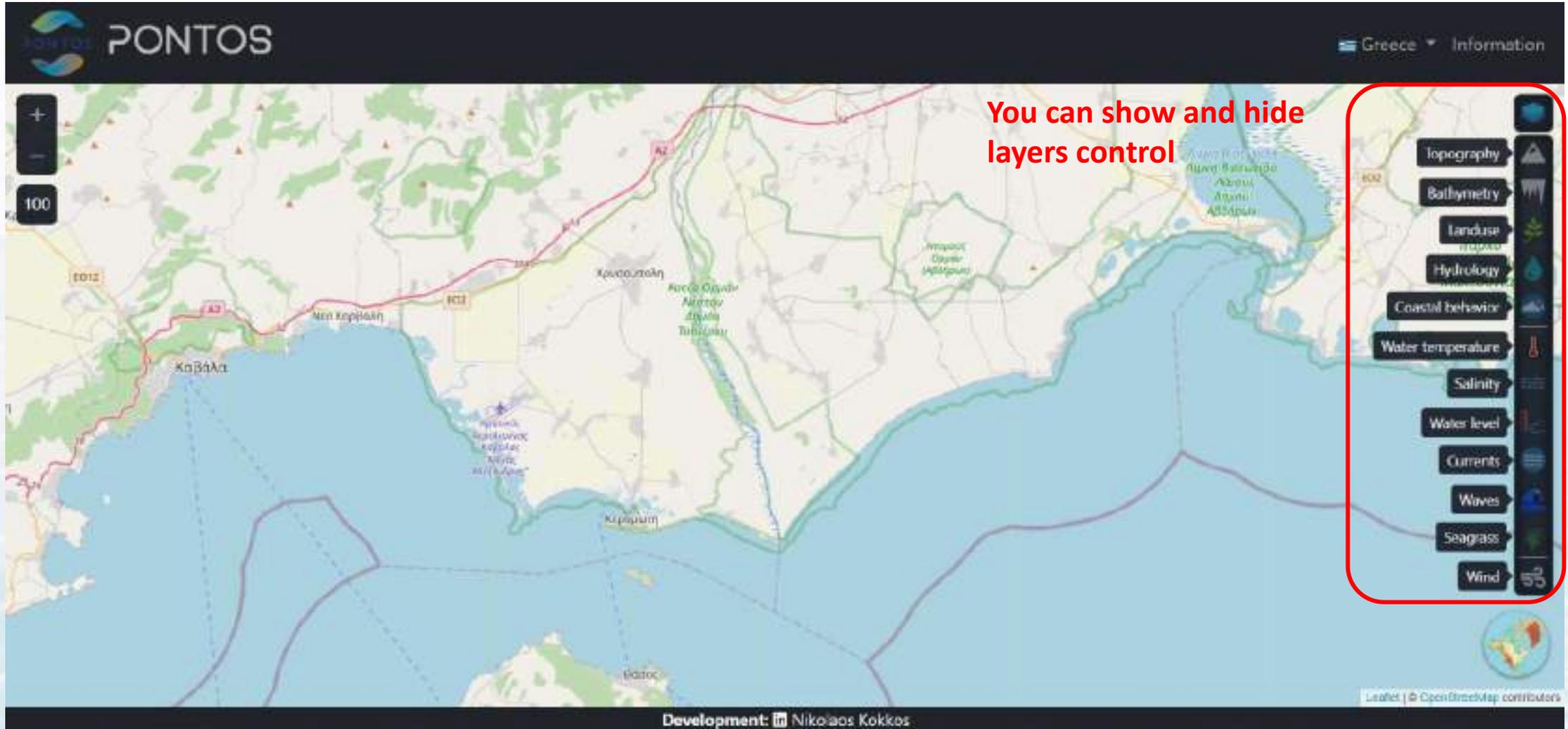
The screenshot displays a web-based GIS application interface. At the top left, the 'PONTOS' logo is visible. The top right corner shows a dropdown menu for 'Greece' and an 'Information' link. The main area is a map of Greece, showing roads (A2, E012, E02), cities (Kafkalia, Chrysoupoli, Katerini, Katerini, Katerini), and a large lake (Lagothron). A vertical toolbar on the right side contains various map controls like zoom in/out, full screen, and layers. At the bottom right, there is a 'Watercolor' button and a row of five circular basemap thumbnails. A red text box is overlaid on the map with the text: 'You can toggle between basemaps by clicking on initial basemap or selecting the basemap'. The bottom of the interface shows 'Development: Nikolaos Kokkos' and 'Leaflet | © OpenStreetMap contributors'.

You can toggle between basemaps by clicking on initial basemap or selecting the basemap

WebGIS – Basemap Control



WebGIS – Layers Control

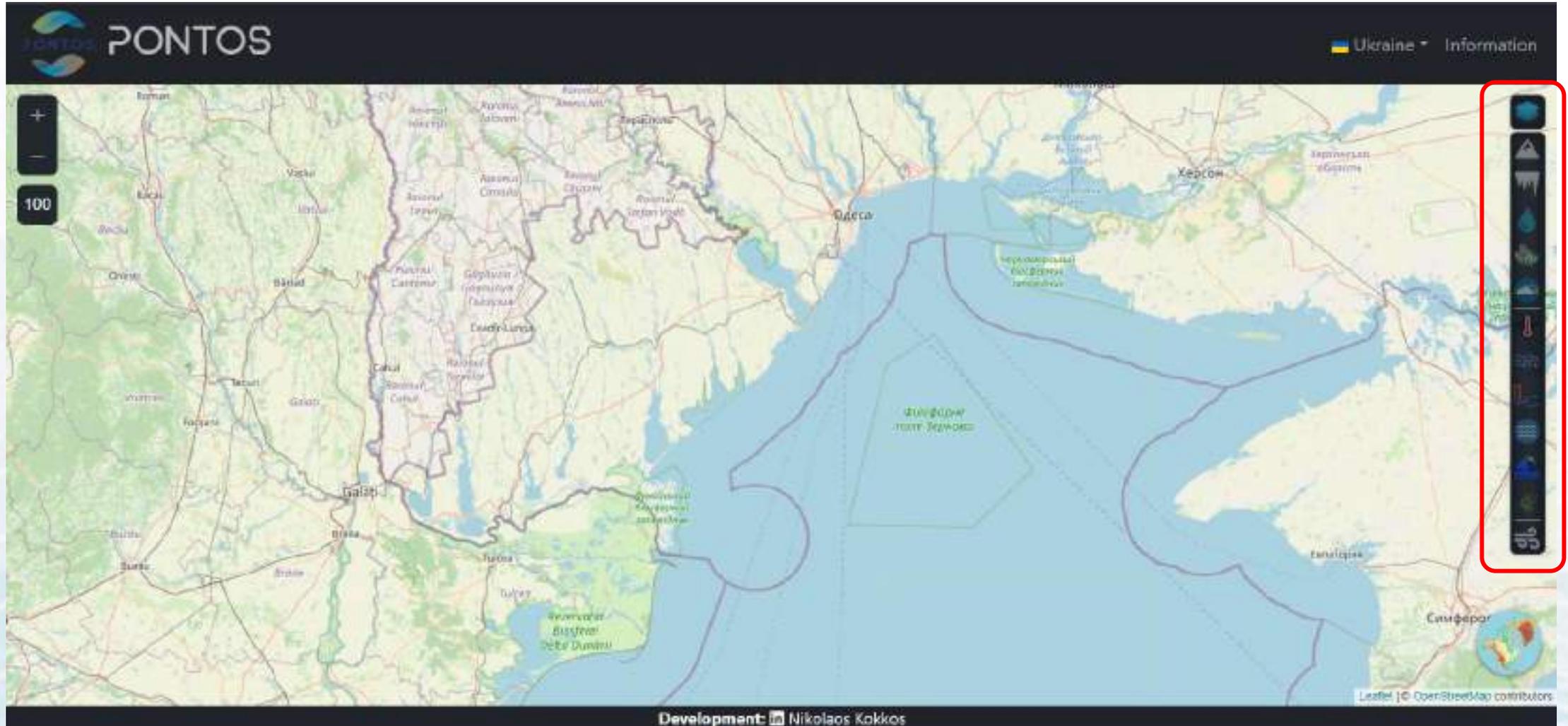


You can show and hide layers control

- Topography
- Bathymetry
- Landuse
- Hydrology
- Coastal behavior
- Water temperature
- Salinity
- Water level
- Currents
- Waves
- Seagrass
- Wind

Development:  Nikolaos Kokkos

WebGIS – Layers Control



The screenshot displays a web-based GIS application interface. At the top left, the 'PONTOS' logo is visible. In the top right corner, there is a language selector set to 'Ukraine' and an 'Information' link. The main area is a map of the Black Sea region, showing cities like Odessa and Kherson, and various geographical features. On the right side, a vertical layers control panel is highlighted with a red rectangle. This panel contains several icons for map interaction: a blue circle with a white dot, a white triangle pointing up, a white triangle pointing down, a white circle with a blue dot, and a white circle with a blue dot. At the bottom of the map, there is a 'Development: Nikolaos Kokkos' credit and a small globe icon. The bottom left corner features logos for the European Union and the Black Sea Initiative.



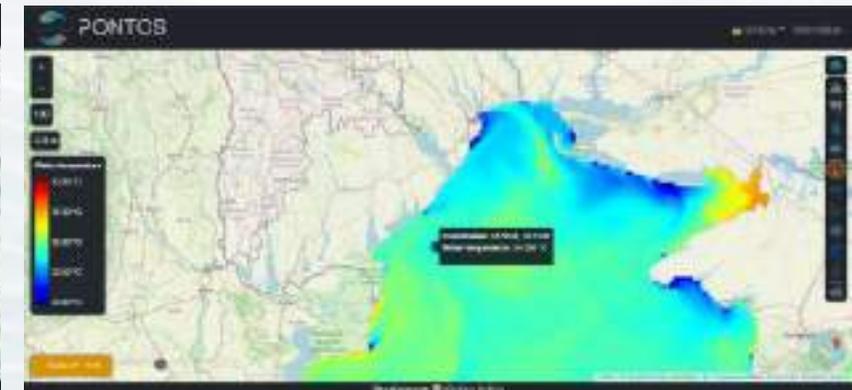
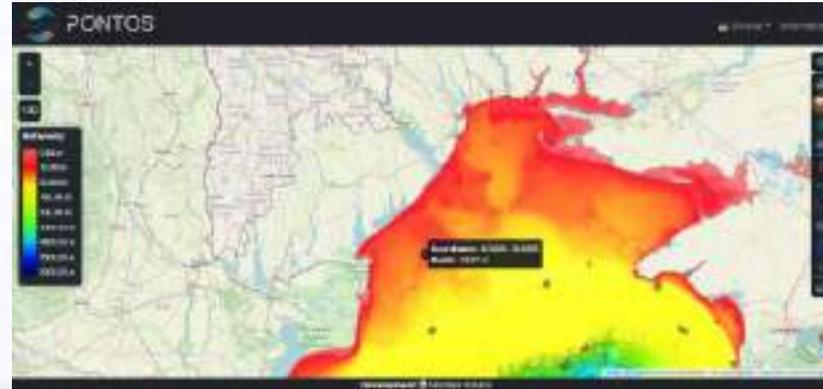
WebGIS – Available Layers



Topography

Bathymetry

Landcover



Hydrology

Coastline Movement

Water Temperature



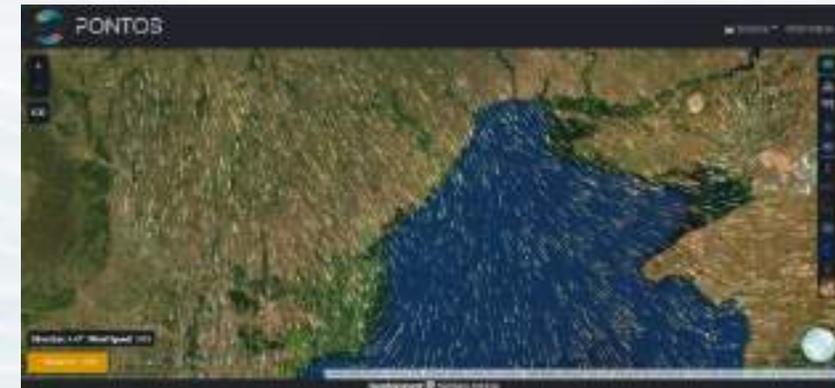
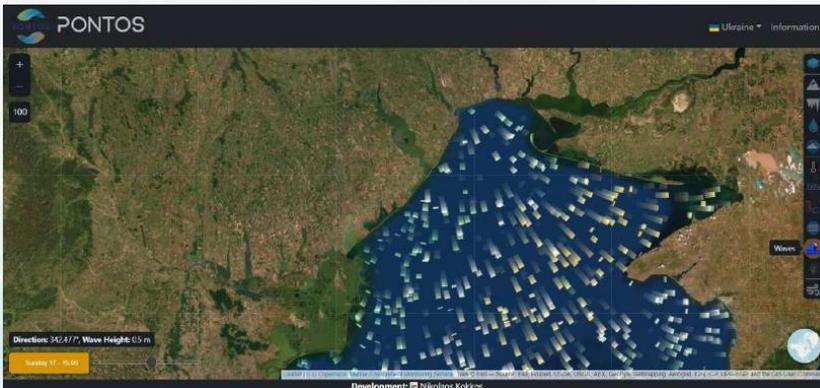
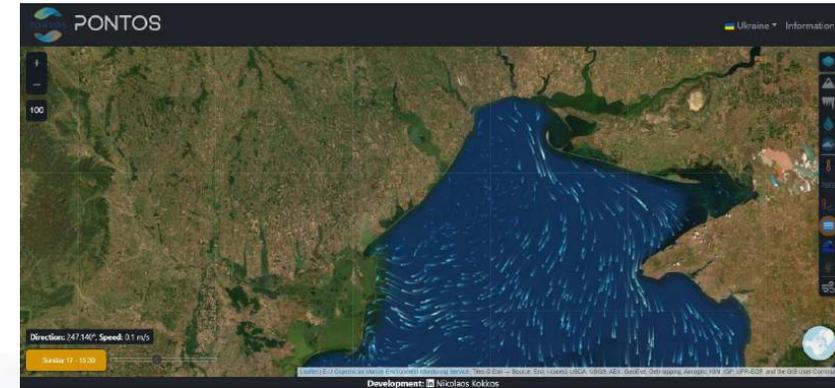
WebGIS – Available Layers



Salinity

Water Level

Currents



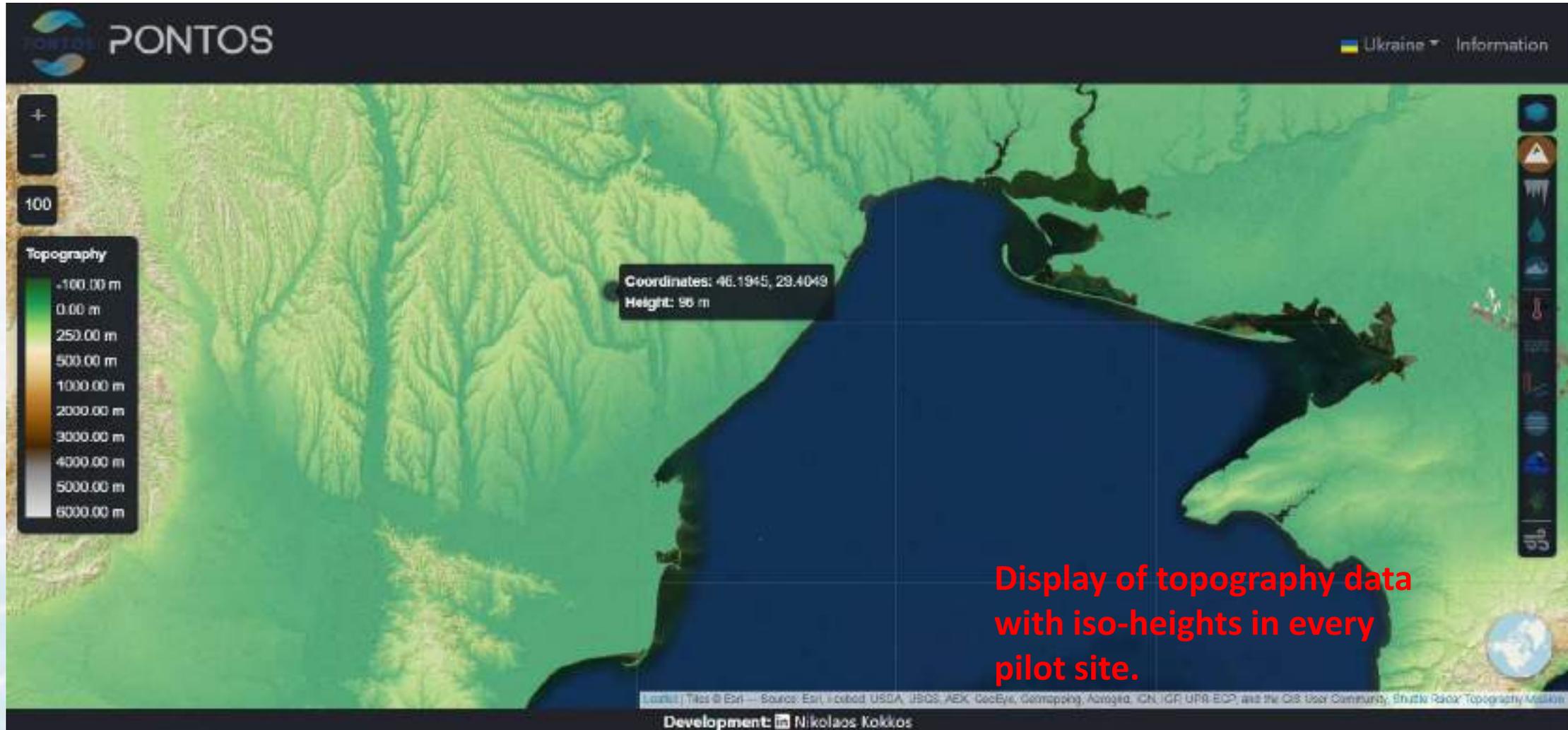
Waves

Seagrass

Weather

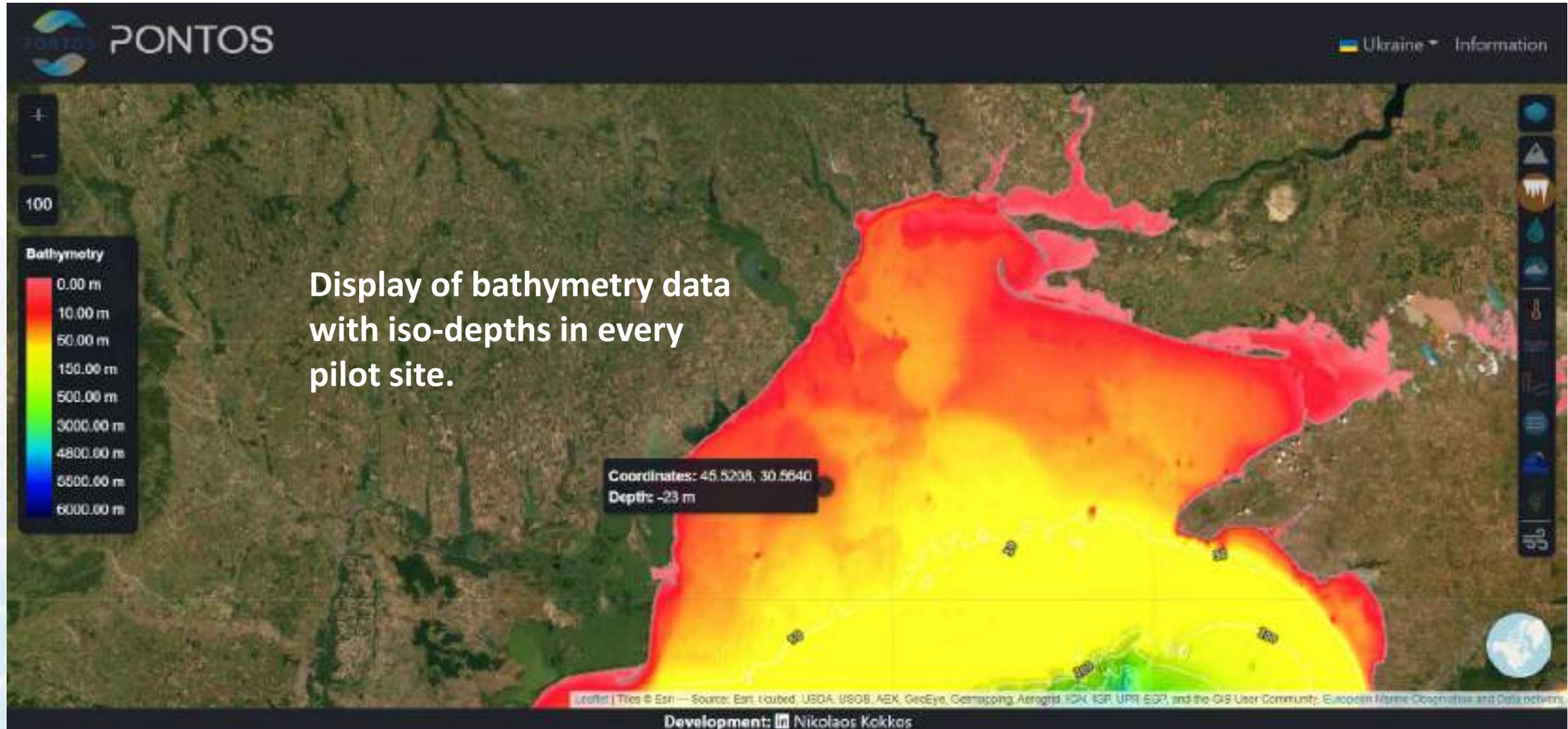


WebGIS – Layers Control – Topography



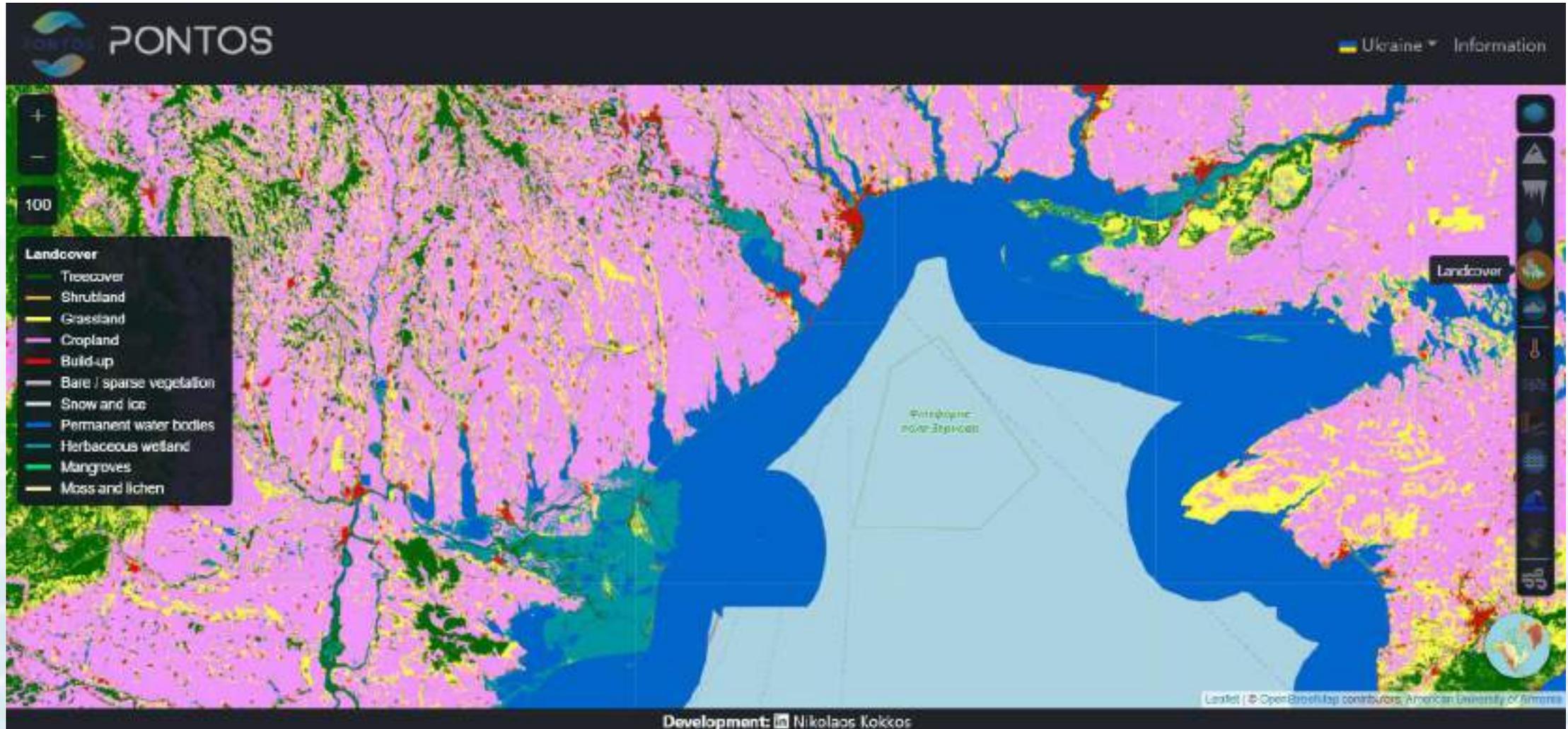
Display of topography data with iso-heights in every pilot site.

WebGIS – Layers Control – Bathymetry



Display of bathymetry data with iso-depths in every pilot site.

WebGIS – Layers Control – Landcover



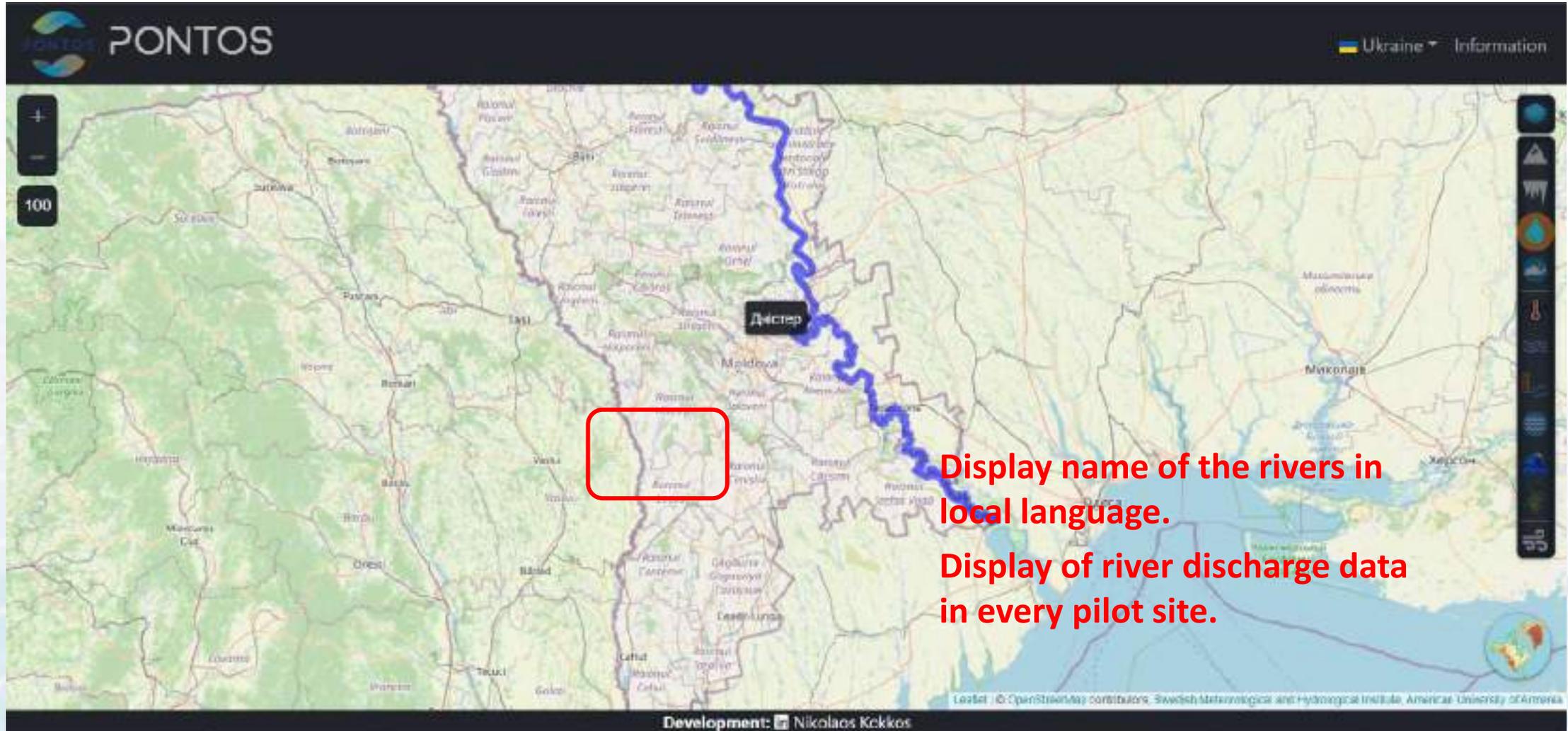
PONTOS Ukraine Information

Landcover

- Treecover
- Shrubland
- Grassland
- Cropland
- Build-up
- Bare / sparse vegetation
- Snow and ice
- Permanent water bodies
- Herbaceous wetland
- Mangroves
- Moss and lichen

Development: Nikolaos Kokkos

WebGIS – Layers Control – Hydrology



Display name of the rivers in local language.

Display of river discharge data in every pilot site.

Development: Nikolaos Kekkios

WebGIS – Layers Control – Hydrology

The screenshot displays the PONTOS webGIS interface for the Dniester river. The main panel shows a 'Forecast' tab for 'Дністер' with a zoom level of 100. The graph displays 'River Discharge (m³/s)' from Feb 12, 2022, to May 21, 2022, with a current value of 257.24 m³/s. A secondary graph shows historical data from 1985 to 2020. A red box highlights the 'Forecast' tab (4), the 'Дністер' label (1), the zoom controls (3), the 'Дністер' label (1), the export menu (5), and the graph area (2). The export menu includes options like 'Print chart', 'Download PNG image', 'Download JPEG image', 'Download PDF document', 'Download SVG vector image', 'Download CSV', and 'Download XLS'.

5. Export toolkit of graph

Development: Nikolaos Kokkos



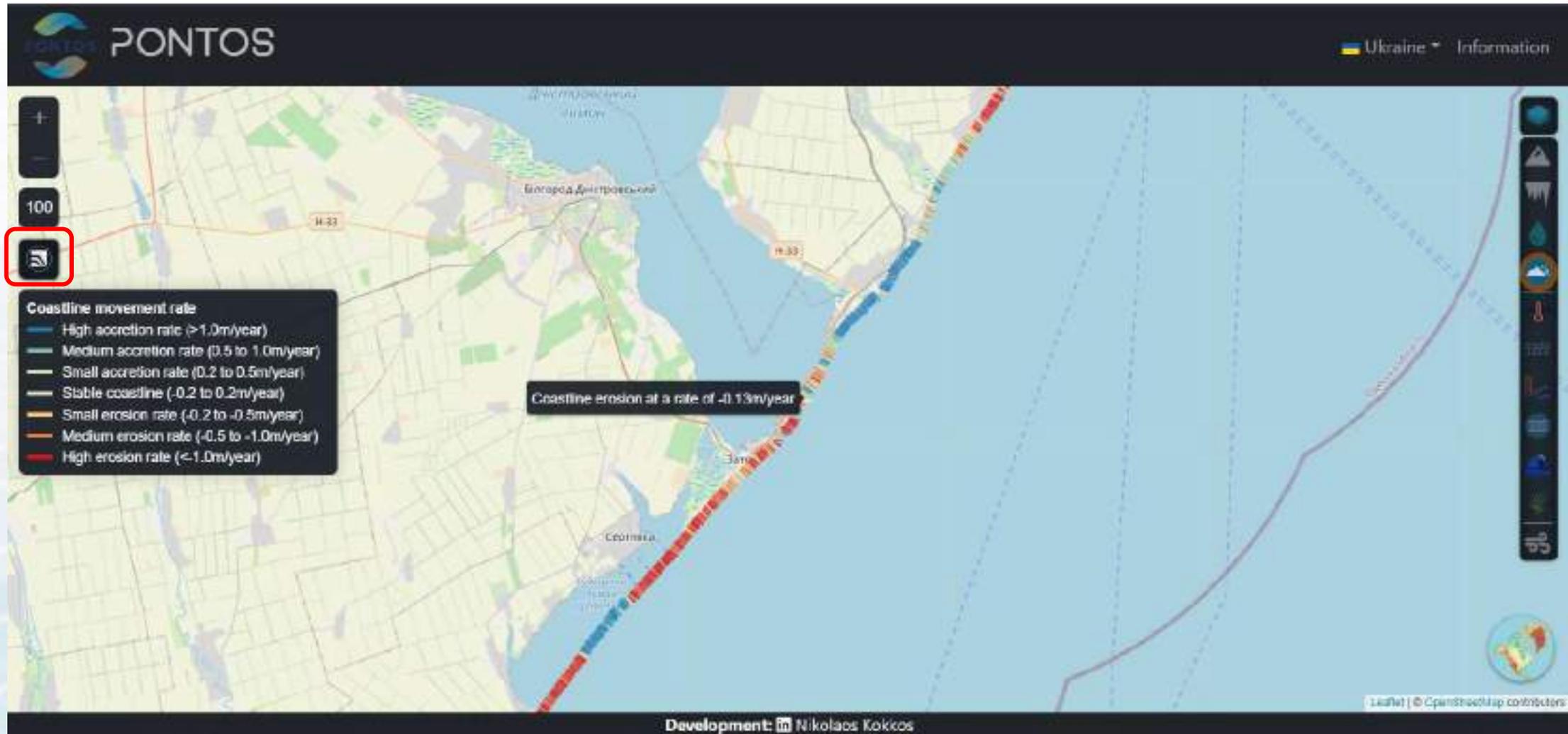
WebGIS – Layers Control – Coastal Behavior



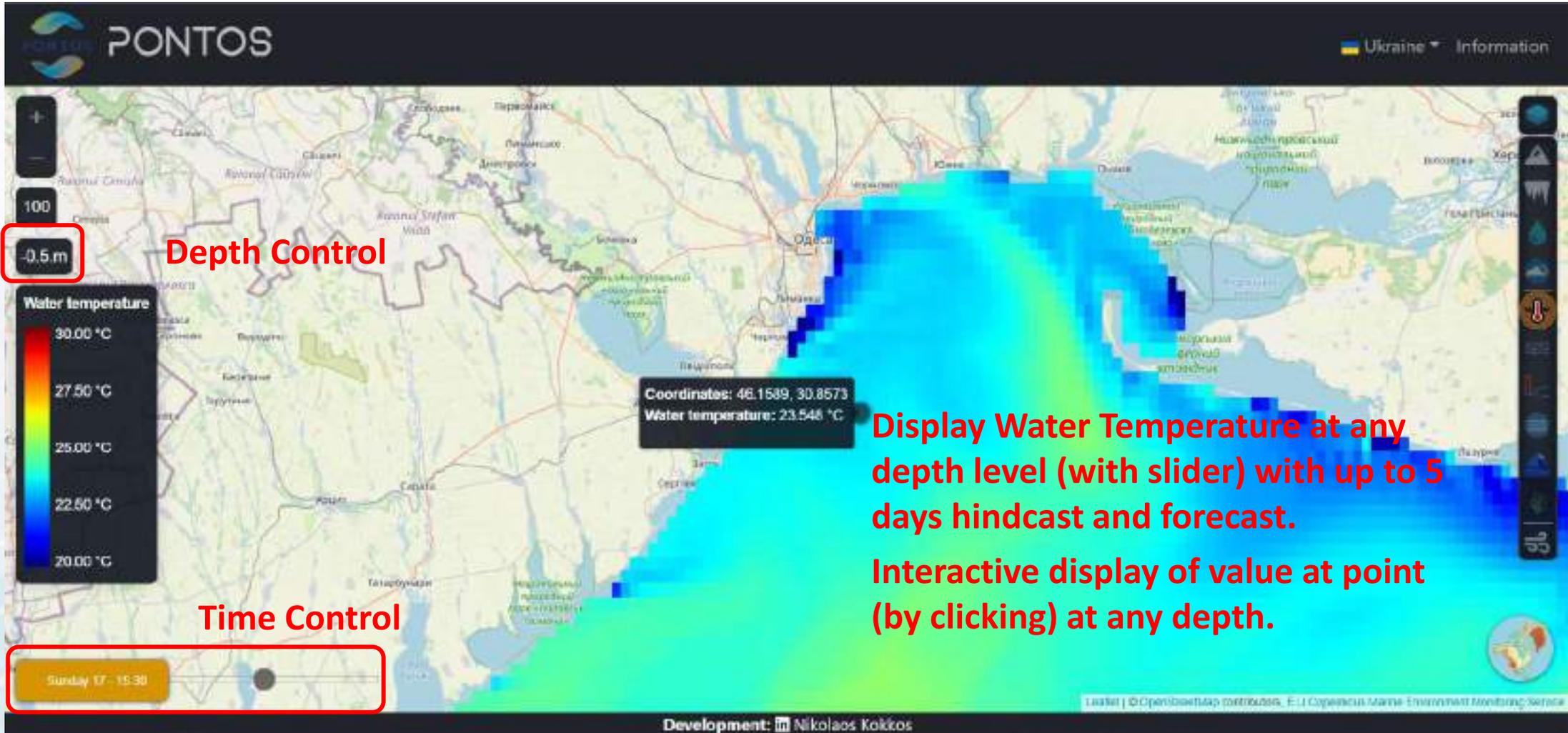
Display of coastline movement and movement rate

Display of values at hovering over coastline

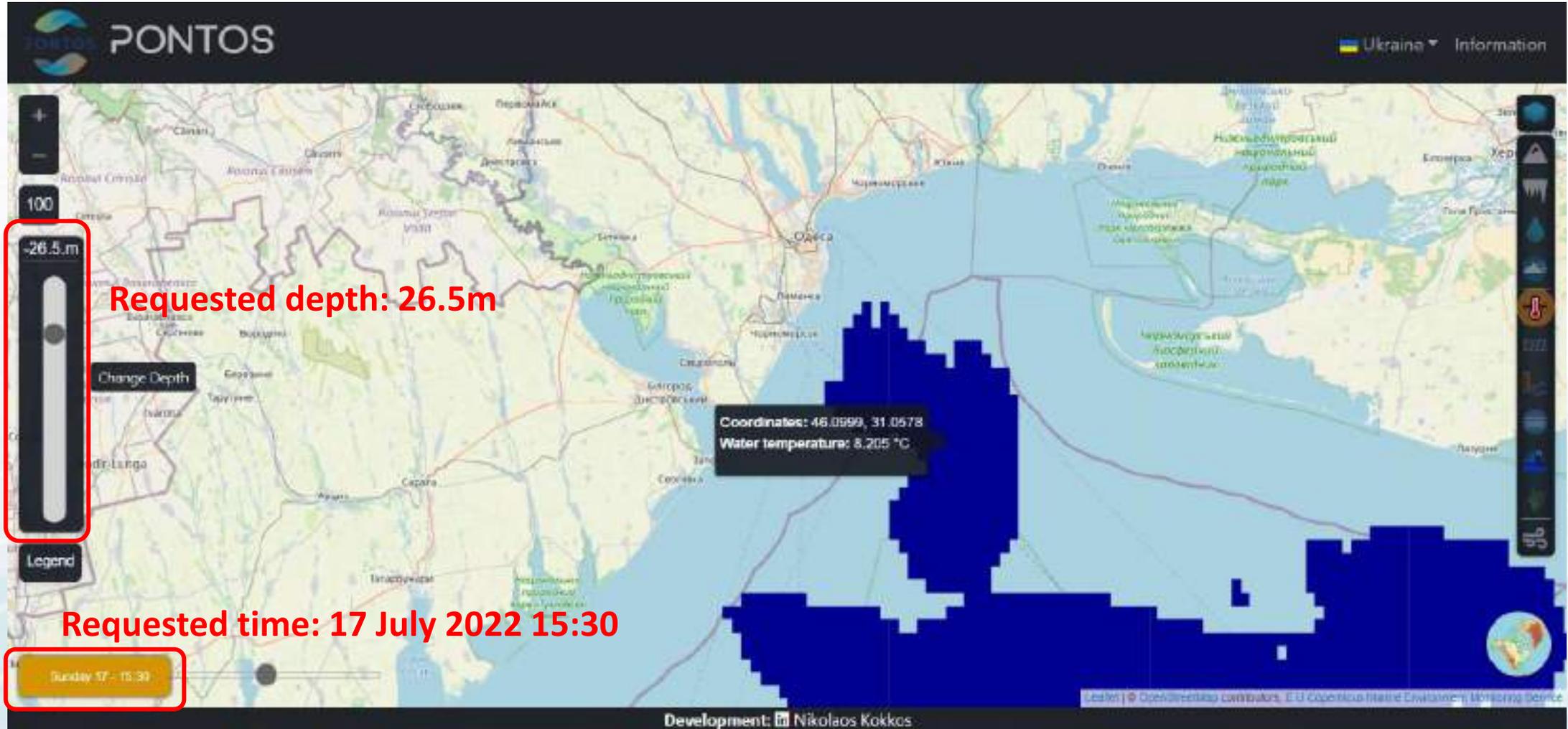
WebGIS – Layers Control – Coastal Movement Rate



WebGIS – Layers Control – Water Temperature



WebGIS – Layers Control – Water Temperature

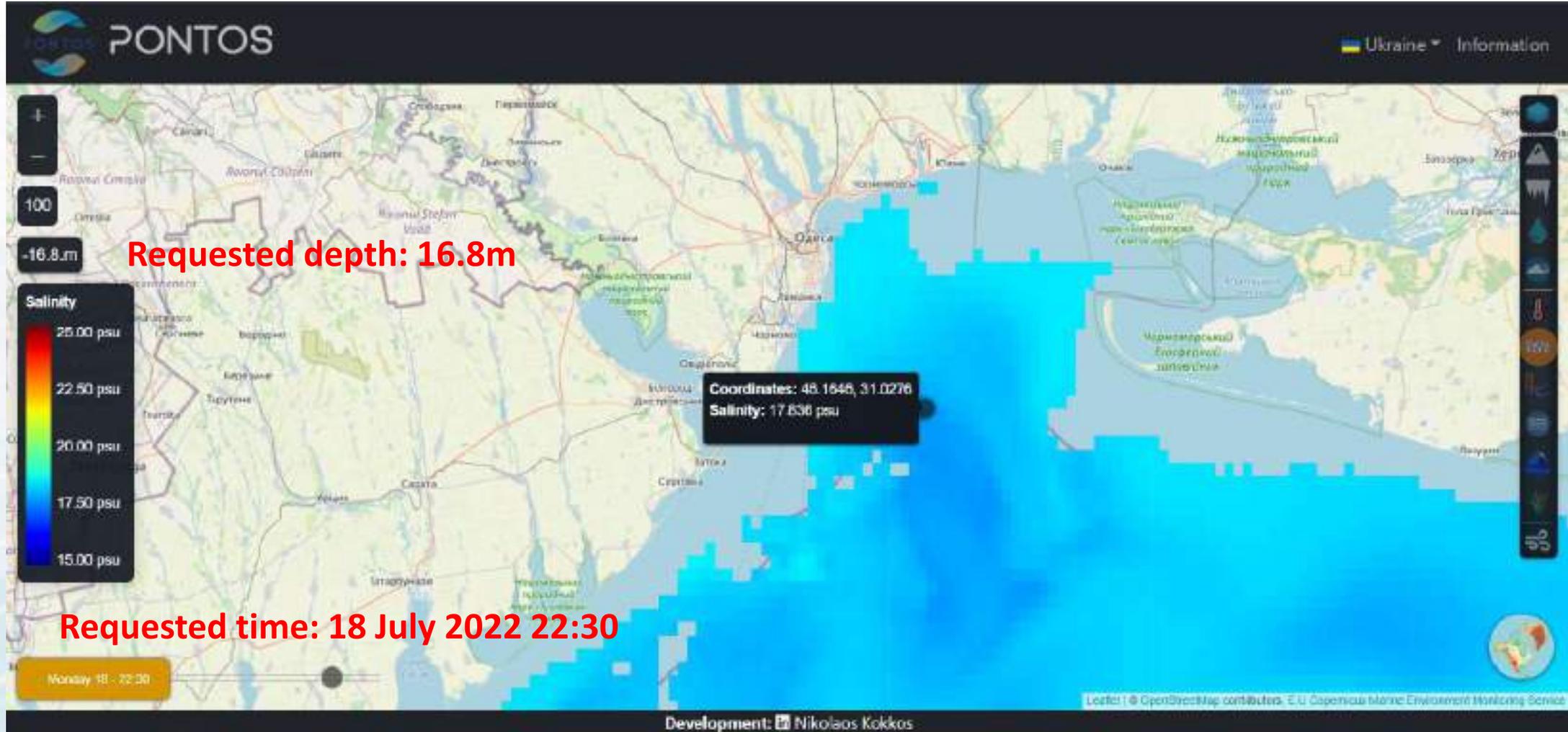


Requested depth: 26.5m

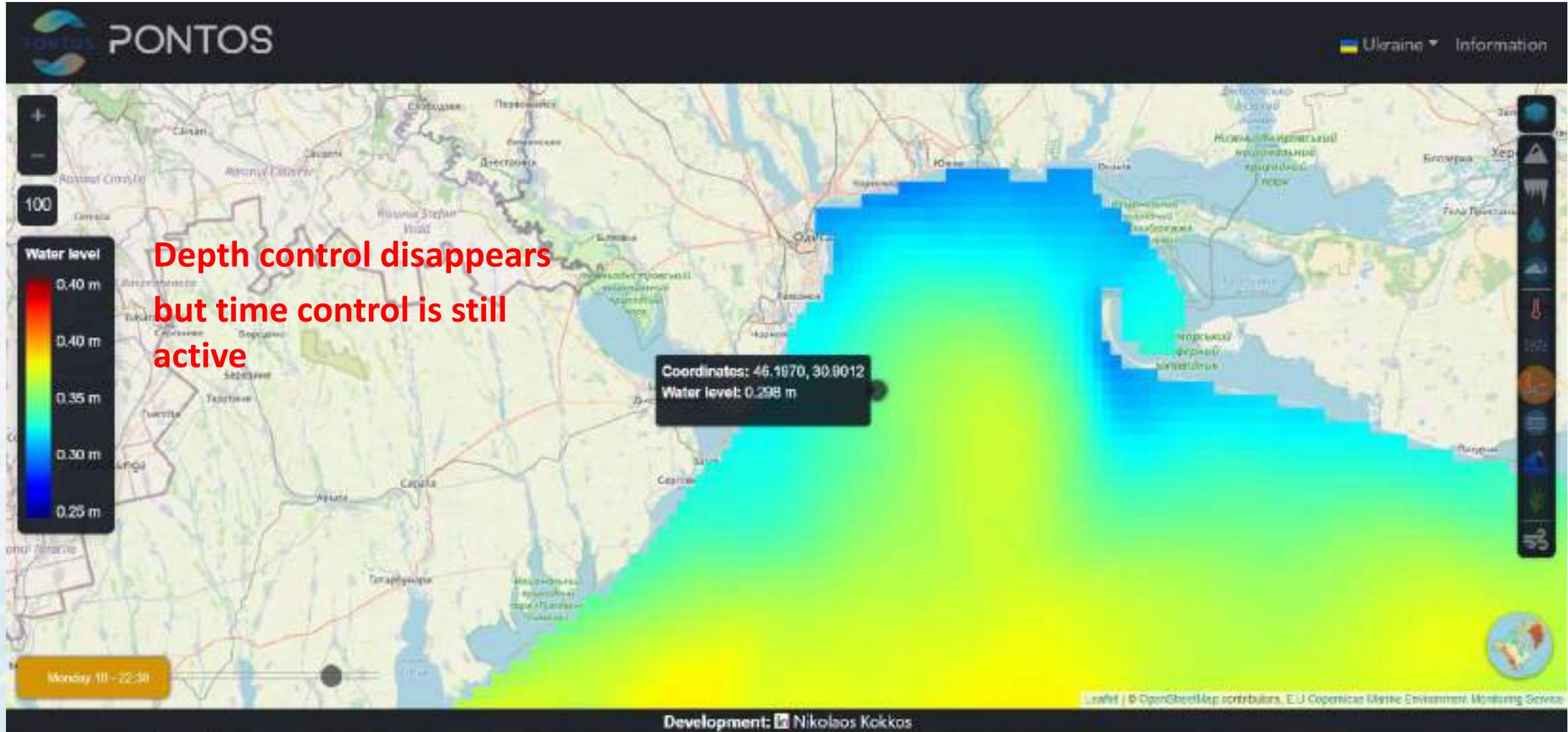
Requested time: 17 July 2022 15:30

Coordinates: 46.0599, 31.0578
Water temperature: 8.205 °C

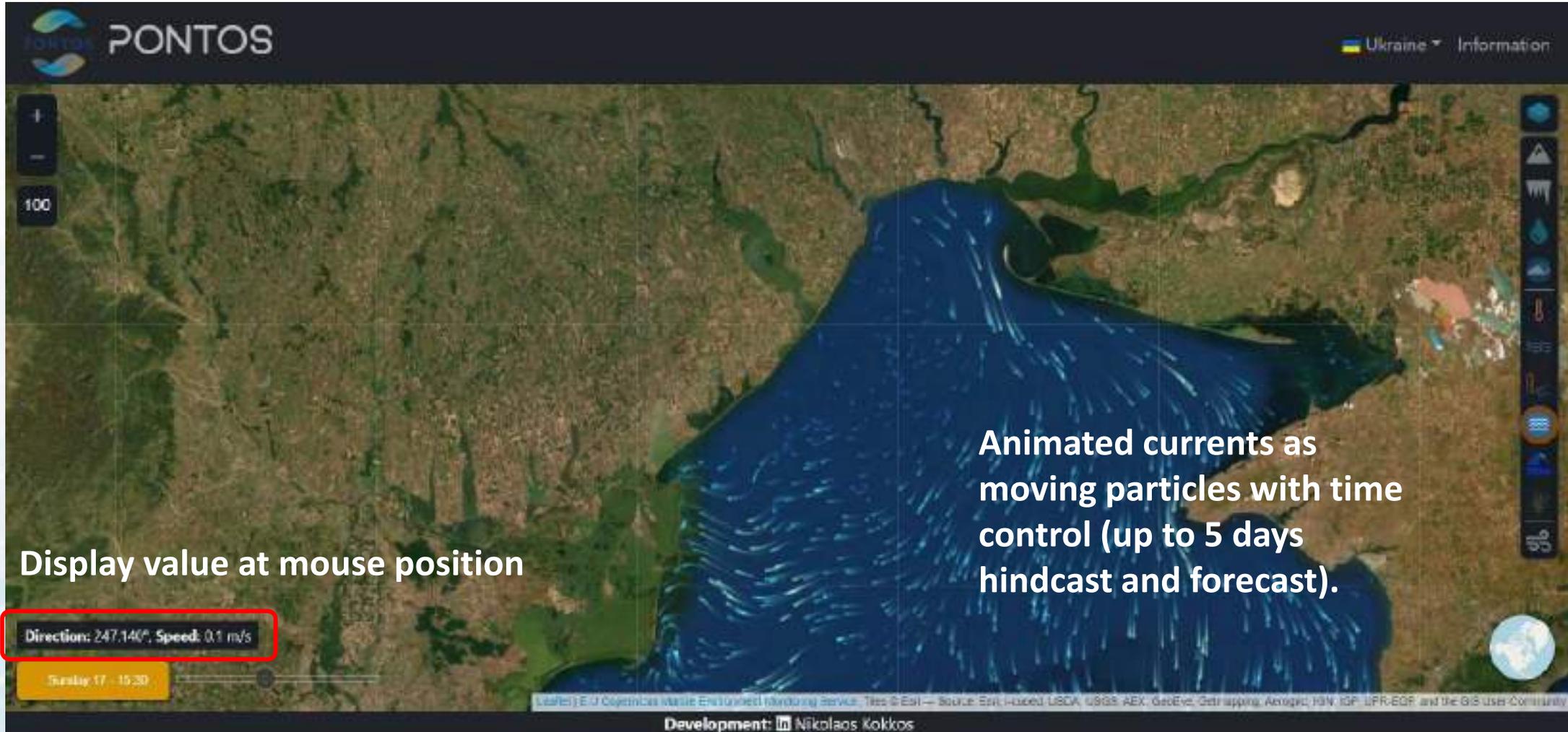
WebGIS – Layers Control – Salinity



WebGIS – Layers Control – Water Level



WebGIS – Layers Control – Currents



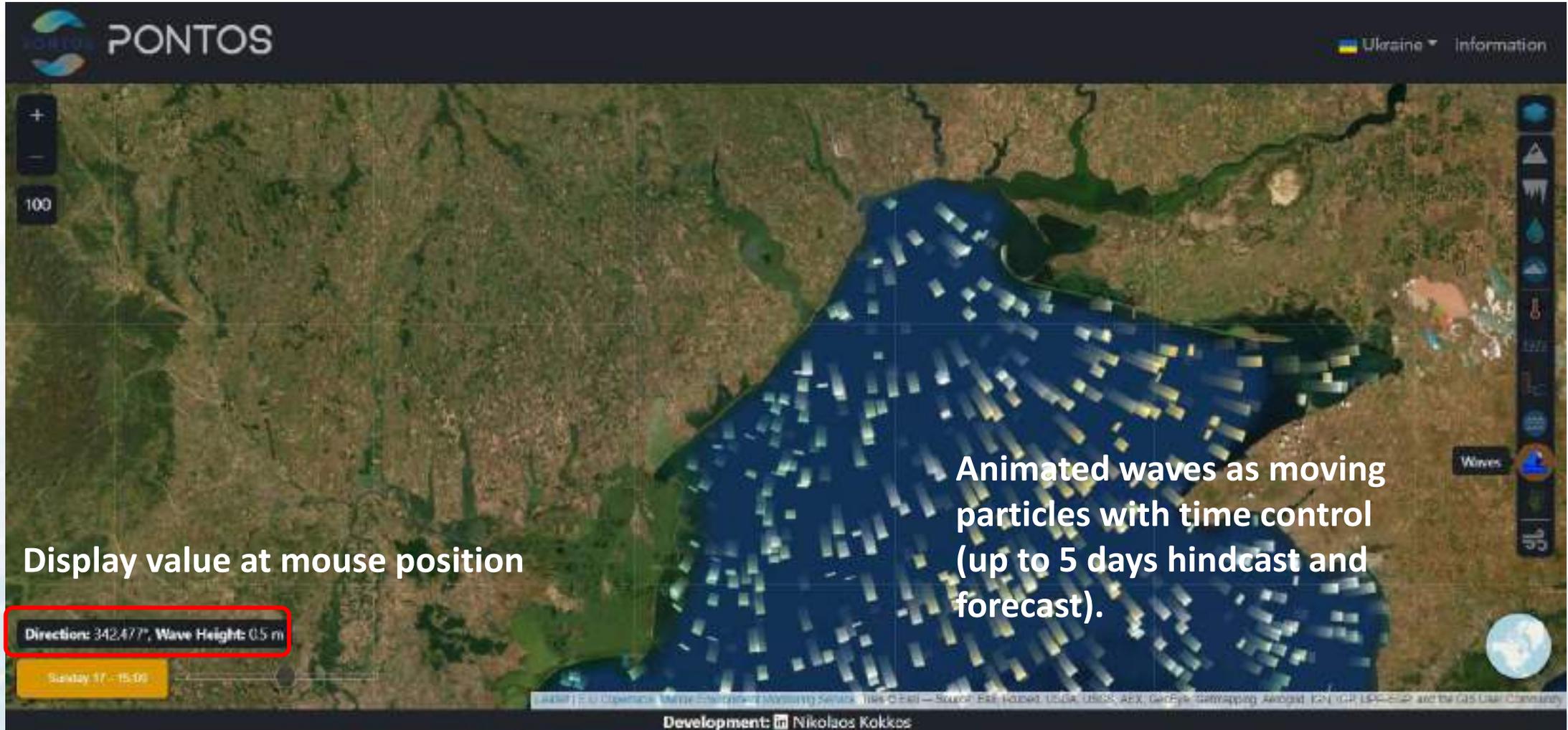
Display value at mouse position

Direction: 247.140°, Speed: 0.1 m/s

Animated currents as moving particles with time control (up to 5 days hindcast and forecast).

Development: Nikolaos Kokkos

WebGIS – Layers Control – Waves



Display value at mouse position

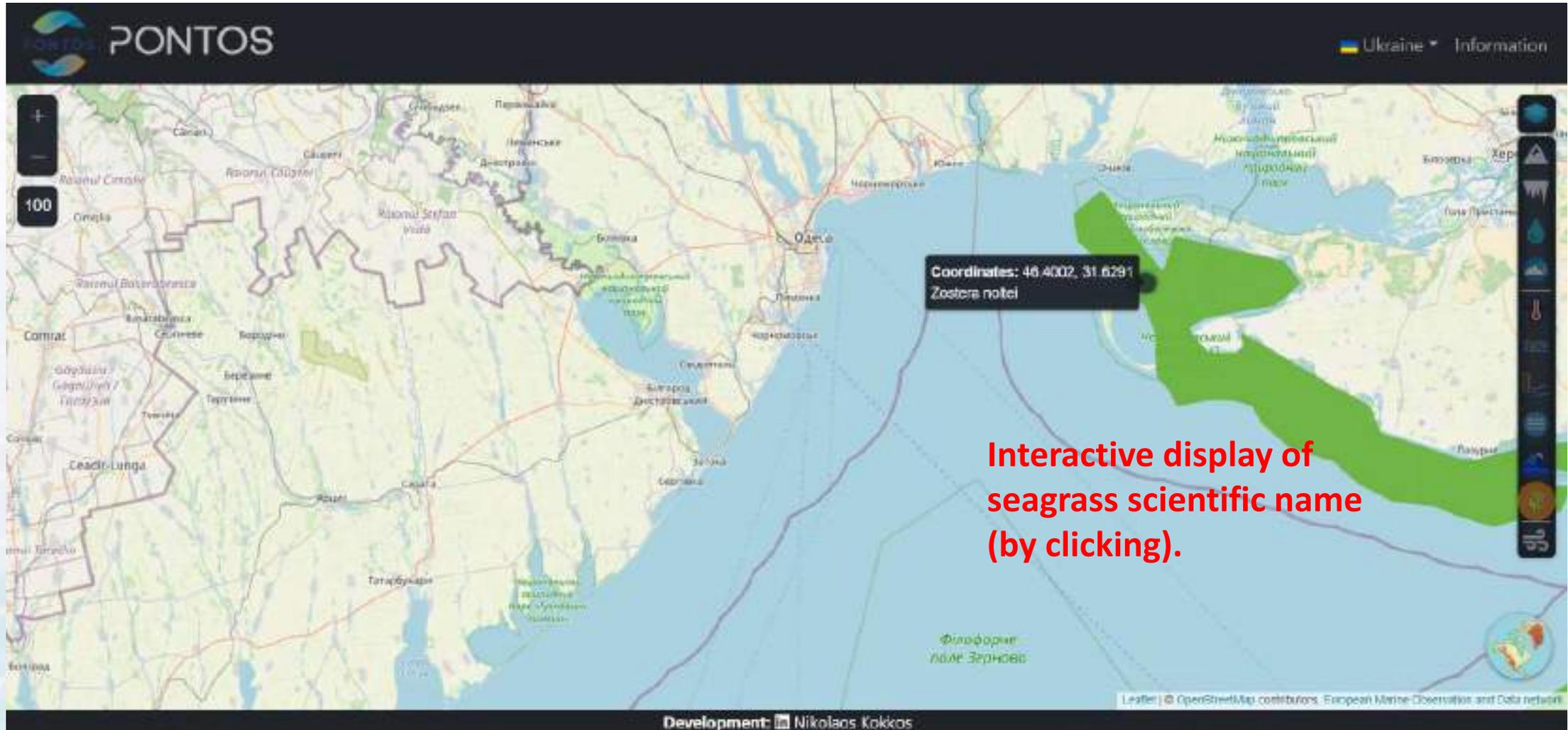
Direction: 342.477°; Wave Height: 0.5 m

Sunday, 17 - 15:00

Development: Nikolaos Kokkos

Animated waves as moving particles with time control (up to 5 days hindcast and forecast).

WebGIS – Layers Control – Seagrass

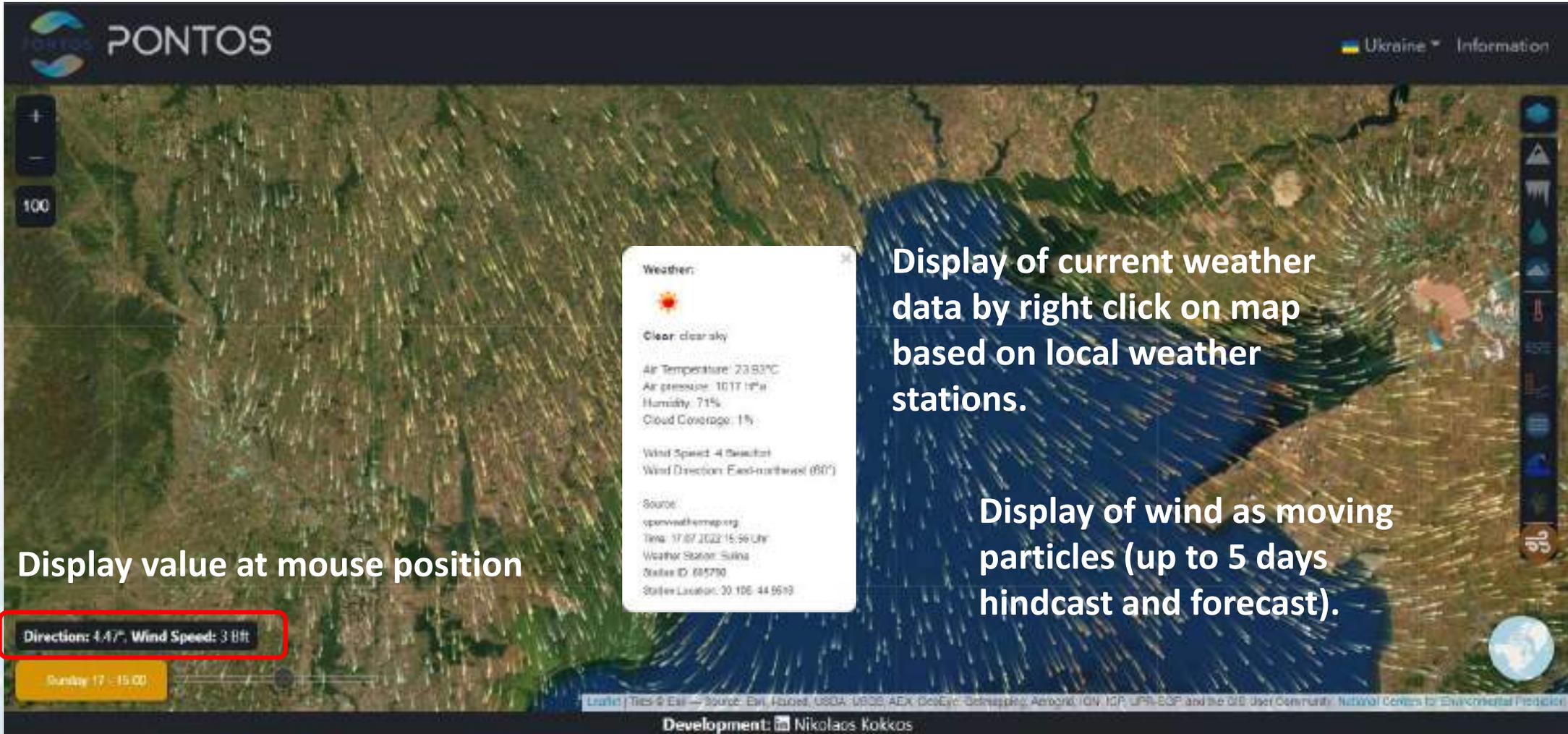


The screenshot shows the PONTOS WebGIS interface. At the top left is the PONTOS logo. At the top right, there is a dropdown menu for 'Ukraine' and an 'Information' link. The main map area displays a satellite-style map of the Black Sea coast. A green shaded area represents the seagrass layer. A tooltip box is overlaid on the map, showing the coordinates '46 4002, 31 6291' and the scientific name 'Zostera noltii'. On the right side of the map, there is a vertical toolbar with various icons for map navigation and layer control. At the bottom of the map, there is a 'Development' credit to Nikolaos Kokkos and a small globe icon. The bottom of the interface features logos for the European Union and the Black Sea Environment Initiative.

Interactive display of seagrass scientific name (by clicking).



WebGIS – Layers Control – Weather



The screenshot displays the PONTOS WebGIS interface. At the top left is the PONTOS logo. At the top right, there is a dropdown menu for 'Ukraine' and an 'Information' link. The main map area shows a satellite view of a region in Ukraine with blue arrows representing wind vectors. A white popup window titled 'Weather:' is centered on the map, displaying the following data:

- Weather: 
- Clear: clear sky
- Air Temperature: 23.83°C
- Air pressure: 1011 hPa
- Humidity: 71%
- Cloud Coverage: 1%
- Wind Speed: 4 Beaufort
- Wind Direction: East-northwest (60°)
- Source: openweathermap.org
- Time: 17.07.2022 15:56 Uhr
- Weather Station: Sulina
- Station ID: 685790
- Station Location: 30.106 44.9519

At the bottom left of the map, a red-bordered box contains the text: 'Direction: 4.47°, Wind Speed: 3.8ft'. Below this, a yellow button shows 'Sunday 17 - 15:00'. At the bottom center, the text 'Development: Nikolaos Kokkos' is visible. On the right side of the map, there is a vertical toolbar with various icons for map navigation and layers control.

Display of current weather data by right click on map based on local weather stations.

Display of wind as moving particles (up to 5 days hindcast and forecast).

Display value at mouse position

Direction: 4.47°, Wind Speed: 3.8ft

Sunday 17 - 15:00

Development: Nikolaos Kokkos



Project funded by
EUROPEAN UNION



Common borders. Common solutions.

Thank You
Дякую тобі

Dr. Nikolaos Kokkos
Democritus University of Thrace, Greece