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GA1 PONTOS platform development

PONTOS WebGIS

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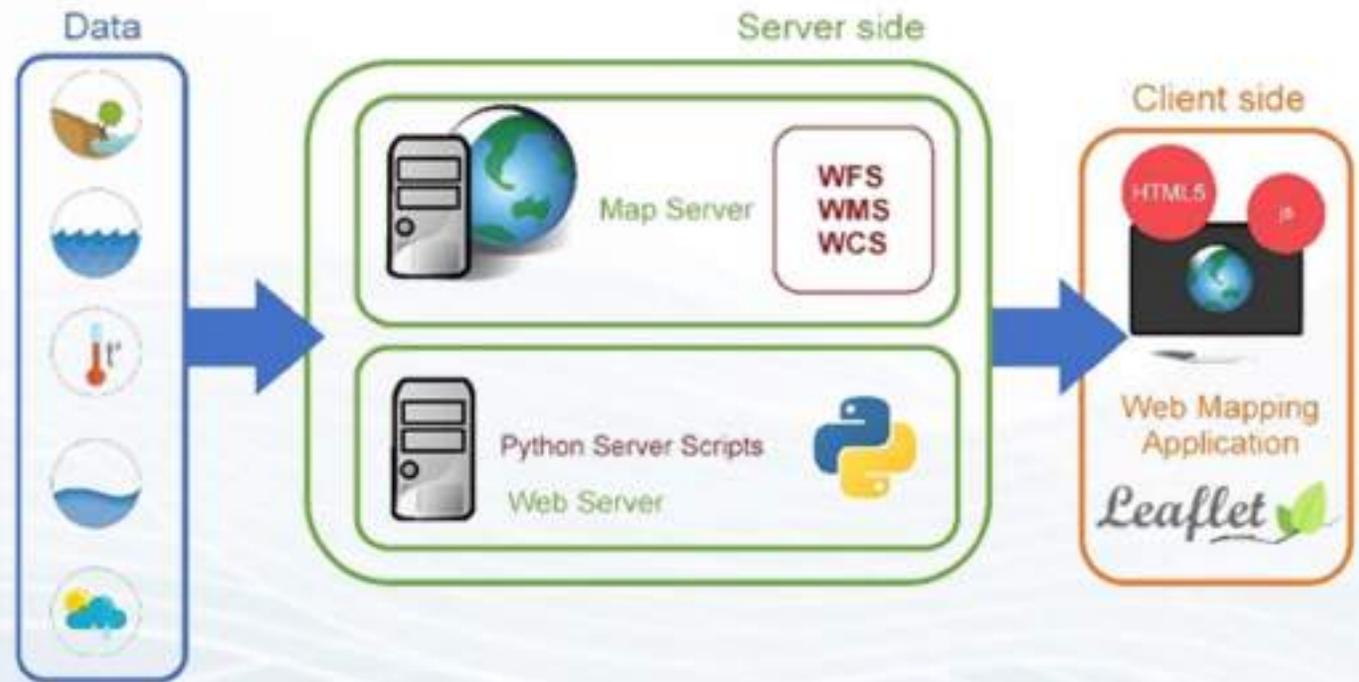


WebGIS – System architecture

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

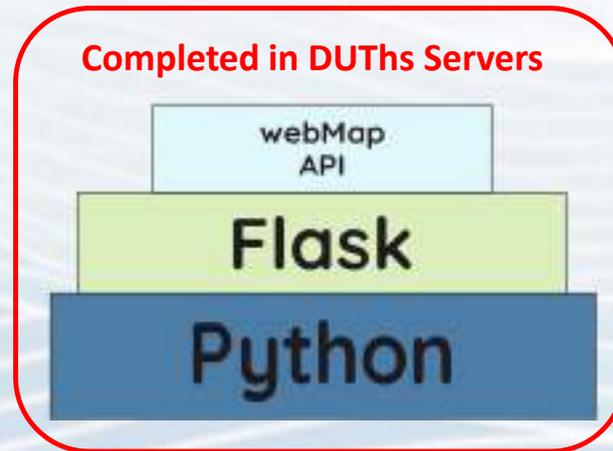
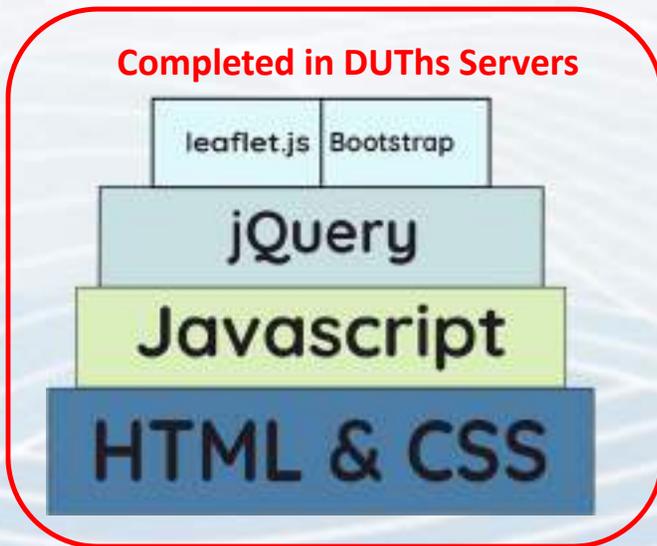


Current Development

Our Stack

Client Side

Server Side



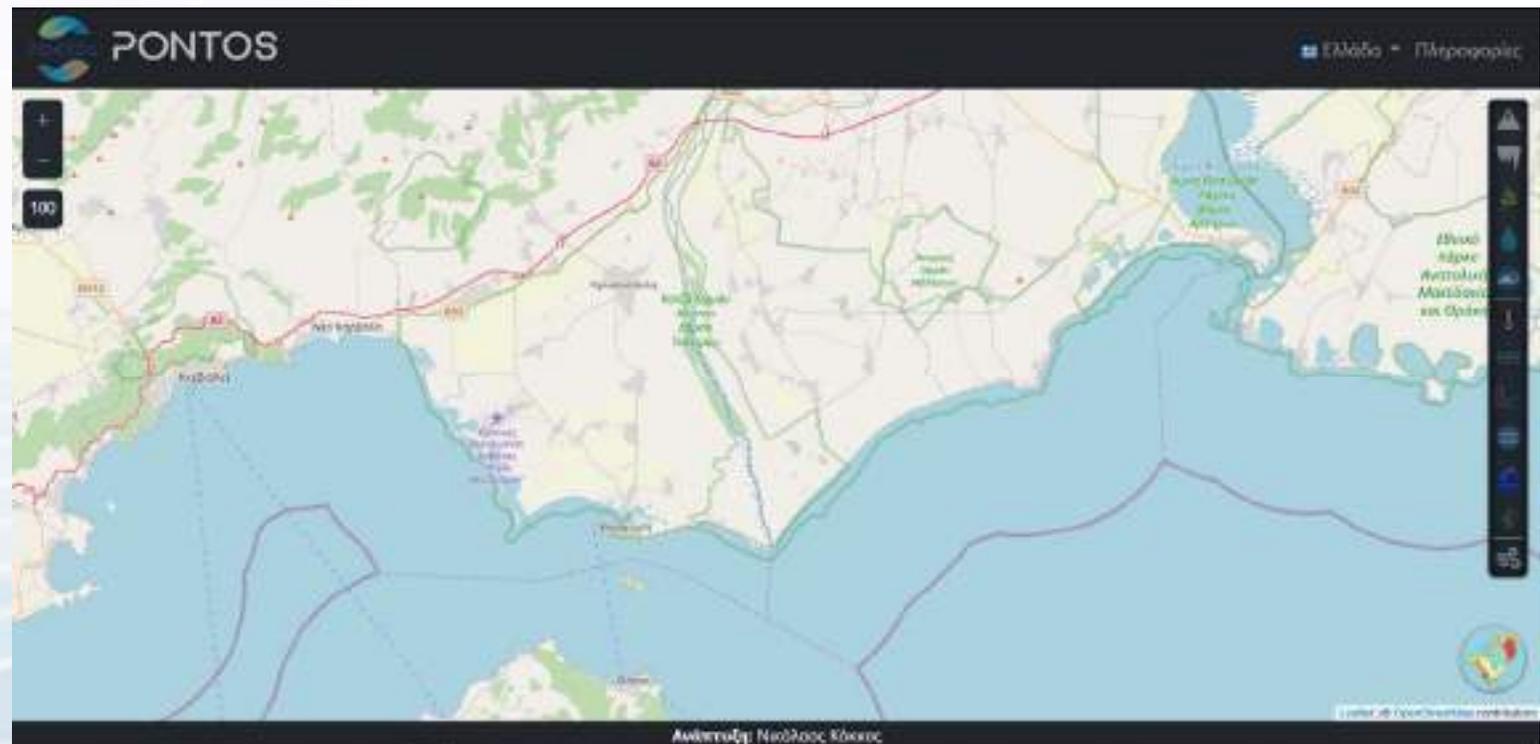
WebGIS – Available datasets

- **Topographic data:** retrieved from the SRTM30 Database,
- **Bathymetric data:** retrieved from the EMODnet Bathymetry Portal,
- **Land Use 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

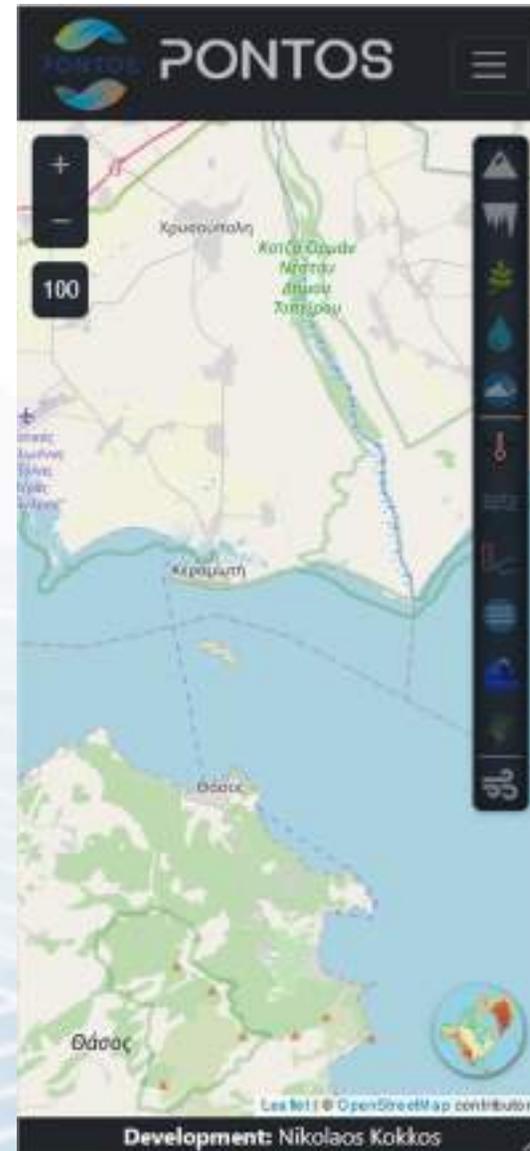
<http://labcolftp.env.duth.gr/PONTOS>



- 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.

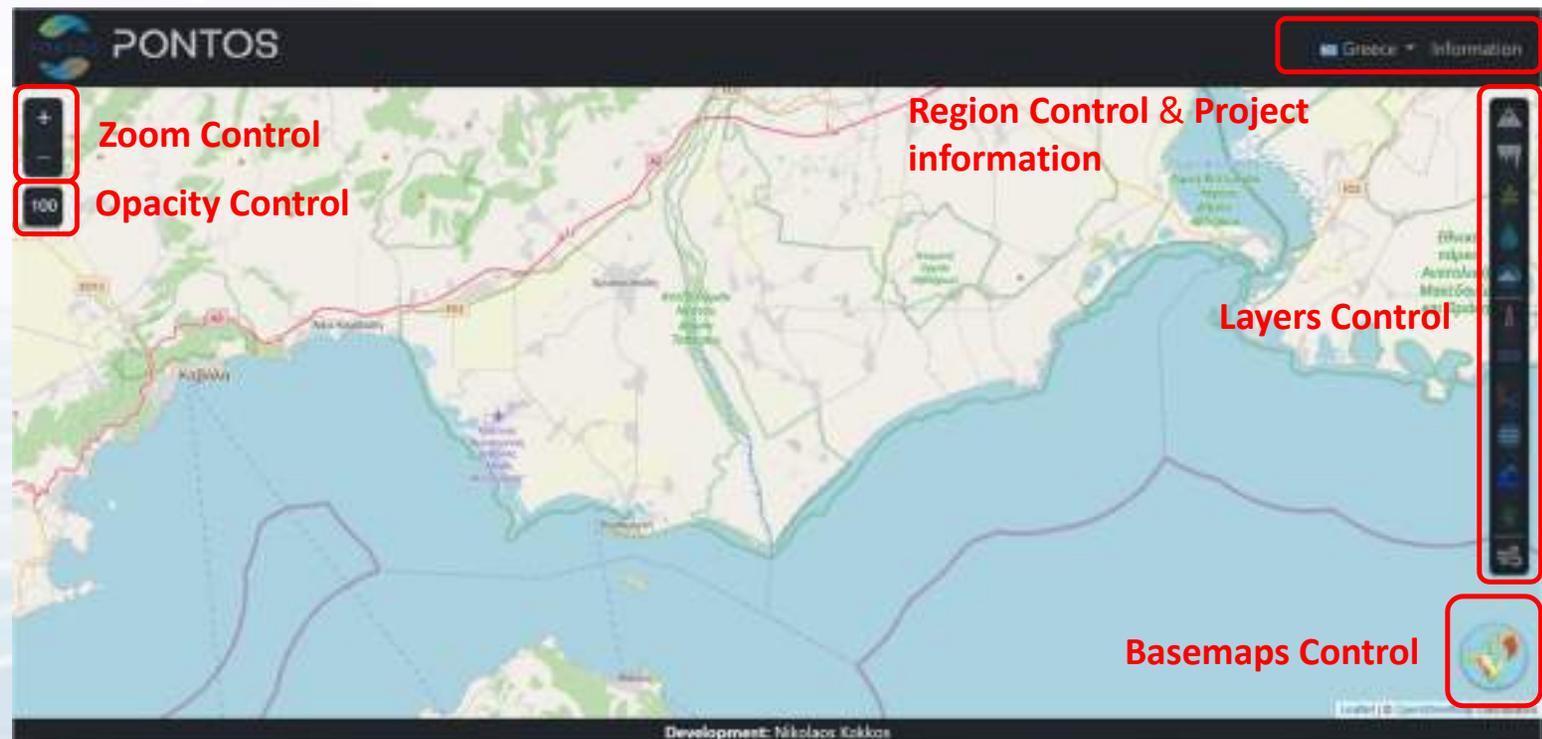
WebGIS – Initial Display – Mobile

- Fully compatible with mobile devices

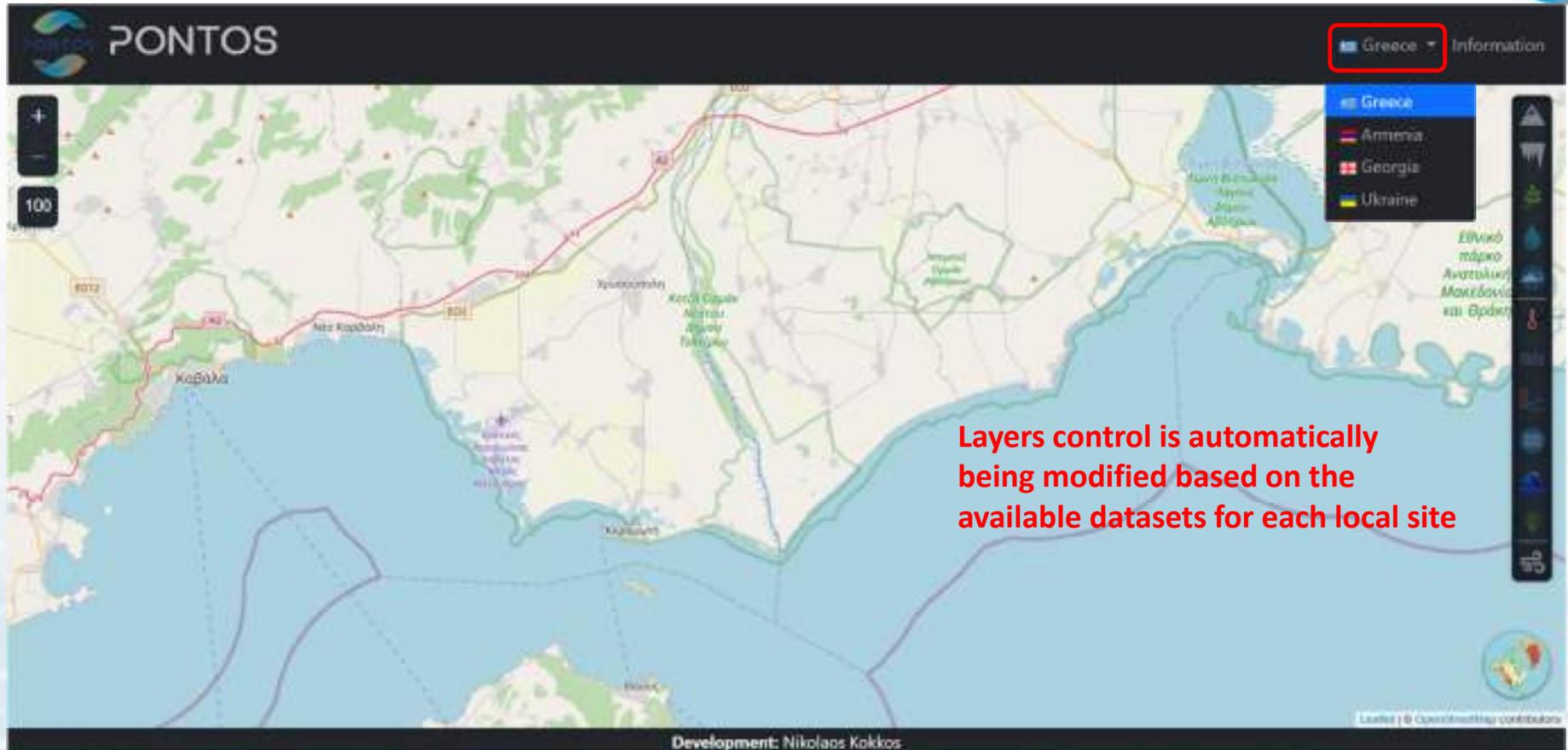


WebGIS – Menu

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



WebGIS – Region Control



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

Development: Nikolaos Kokkos

Leaflet | © OpenStreetMap contributors

WebGIS – Information

PONTOS

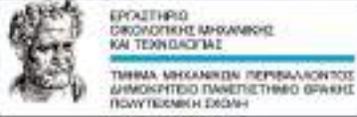
PONTOS aims to enhance transboundary cooperation for large-scale, harmonized environmental monitoring across the countries of the Black Sea region and beyond. The vehicle towards this objective is the exploitation of numerous freely available and incrementally credible Copernicus data and services (e.g. 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 inquired 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 (treasures 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.







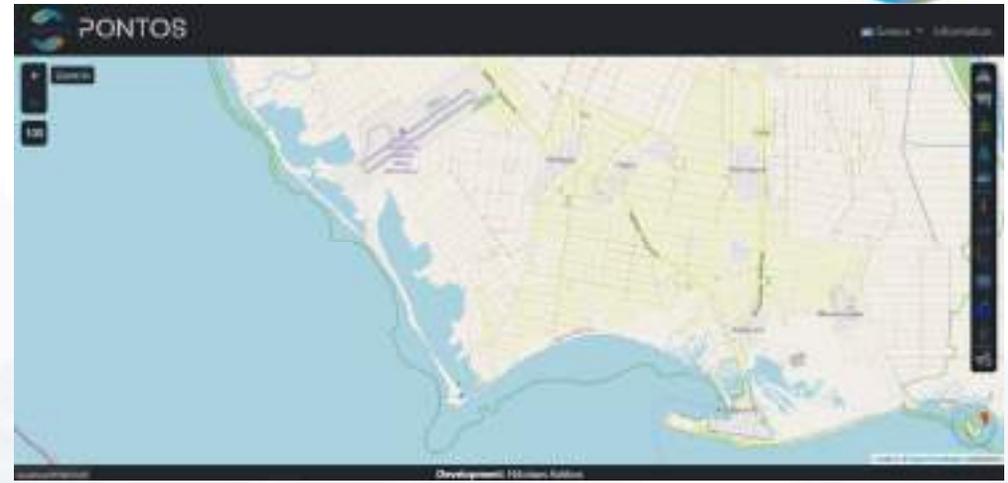
ΕΡΕΥΝΗΤΙΚΟ ΙΝΣΤΙΤΟΥΤΟ ΠΕΡΙΒΑΛΛΟΝΤΟΣ ΚΑΙ ΤΕΧΝΟΛΟΓΙΑΣ
ΤΜΗΜΑ ΜΗΧΑΝΙΣΜΩΝ ΠΕΡΙΒΑΛΛΟΝΤΟΣ
ΔΗΜΟΚΡΙΤΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΡΑΚΗΣ
ΚΟΜΠΟΤΕΡΗ ΔΙΟΝΗ



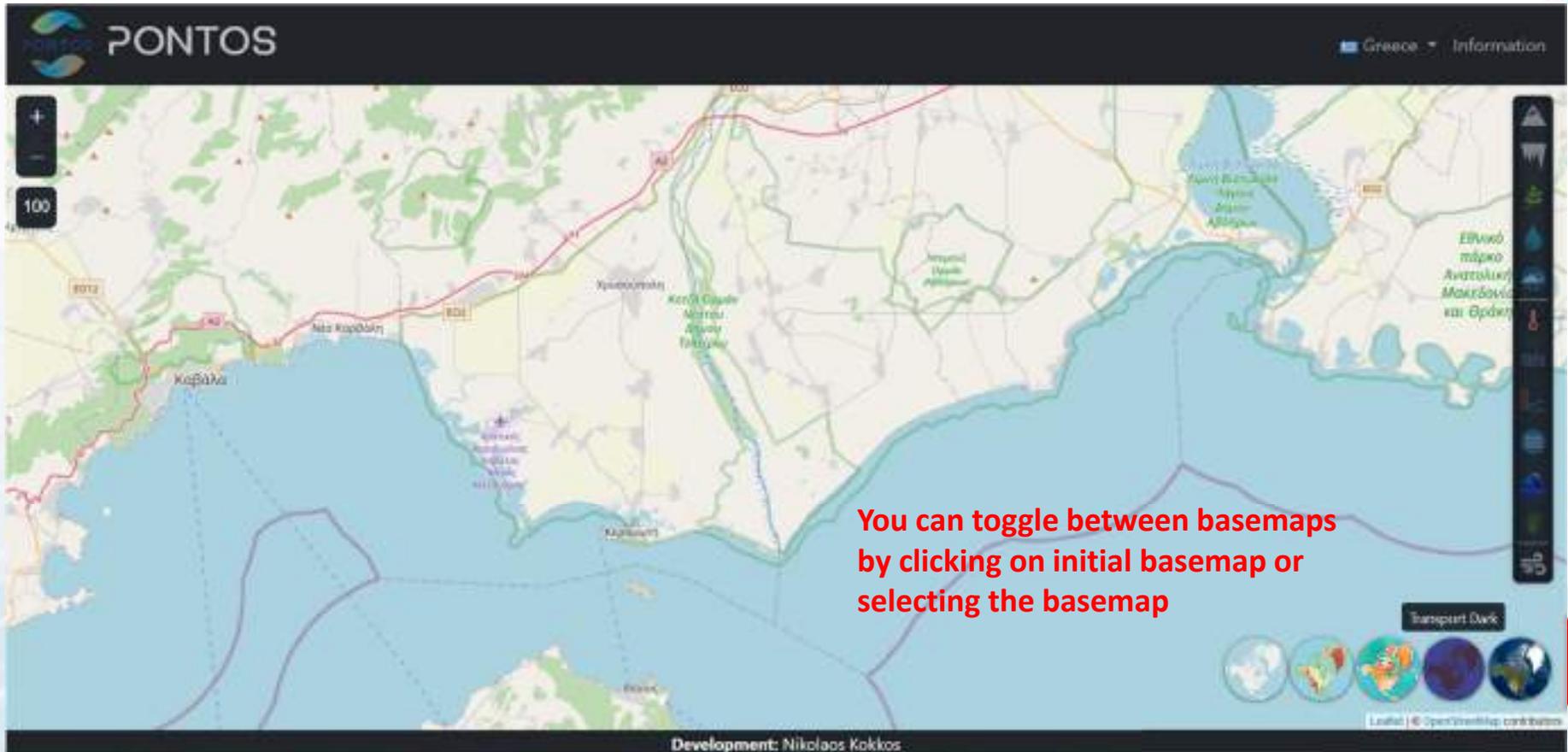
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WebGIS – Zoom & Opacity Control



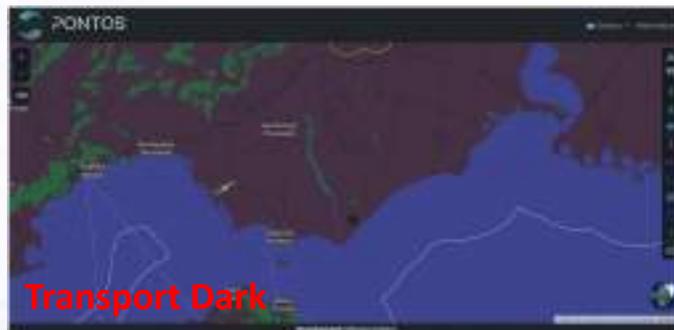
WebGIS – Basemap Control



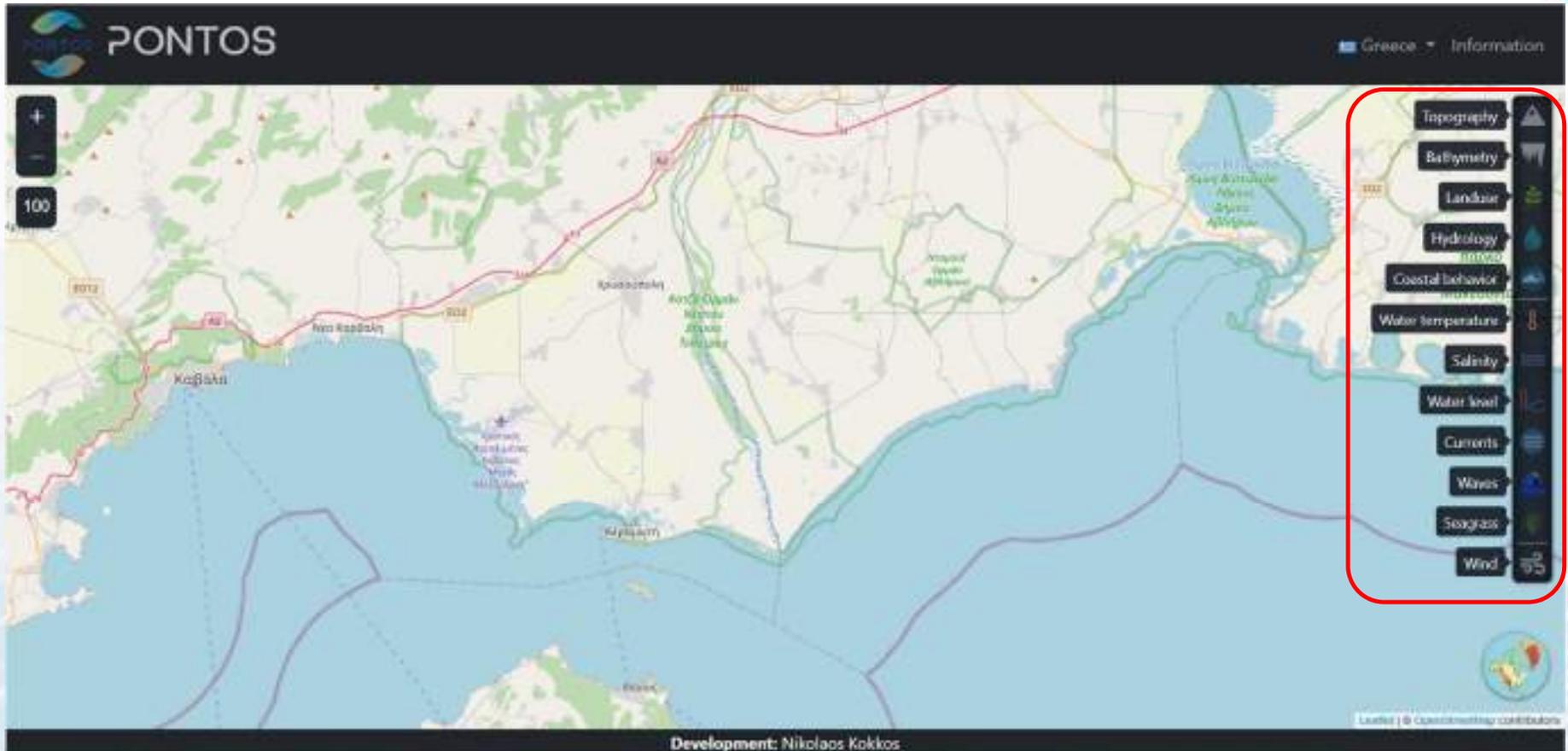
You can toggle between basemaps by clicking on initial basemap or selecting the basemap



WebGIS – Basemap Control



WebGIS – Layers Control



The screenshot displays the PONTOS WebGIS interface. At the top left, the PONTOS logo is visible. The top right corner shows the location 'Greece' and an 'Information' link. The main area is a map of Greece, with a scale bar indicating 100 units. On the right side, a vertical layers control panel is highlighted with a red border. This panel contains the following layers, each with a corresponding icon:

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

At the bottom of the map, the text 'Development: Nikolaos Kokkos' is displayed. In the bottom right corner, there is a small globe icon and the text 'Layers | © OpenStreetMap contributors'.

WebGIS – Layers Control



A screenshot of the PONTOS WebGIS interface. The main map area shows a topographic map of Ukraine with a blue overlay representing a specific region. The interface includes a header with the PONTOS logo and a dropdown menu for "Ukraine" with an "Information" link. On the left, there are zoom controls (+, -) and a scale bar showing "100". On the right, a vertical layers control panel is highlighted with a red box, containing icons for various map layers such as terrain, roads, and water. At the bottom, the text "Development: Nikolaos Kikkos" is visible.



WebGIS – Available Layers



Topography

Bathymetry

Landuse



Hydrology

Coastline Movement

Water Temperature



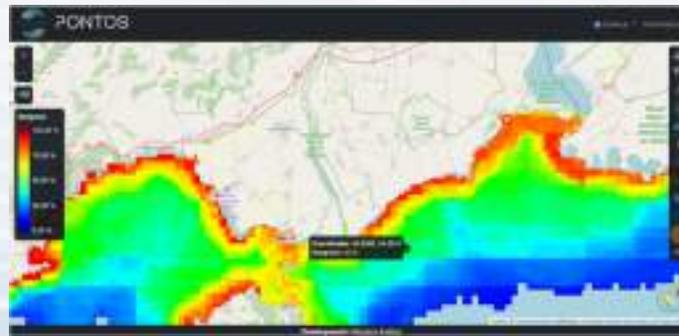
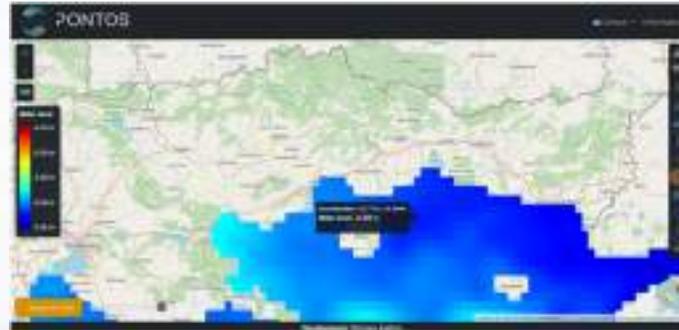
WebGIS – Available Layers



Salinity

Water Level

Currents



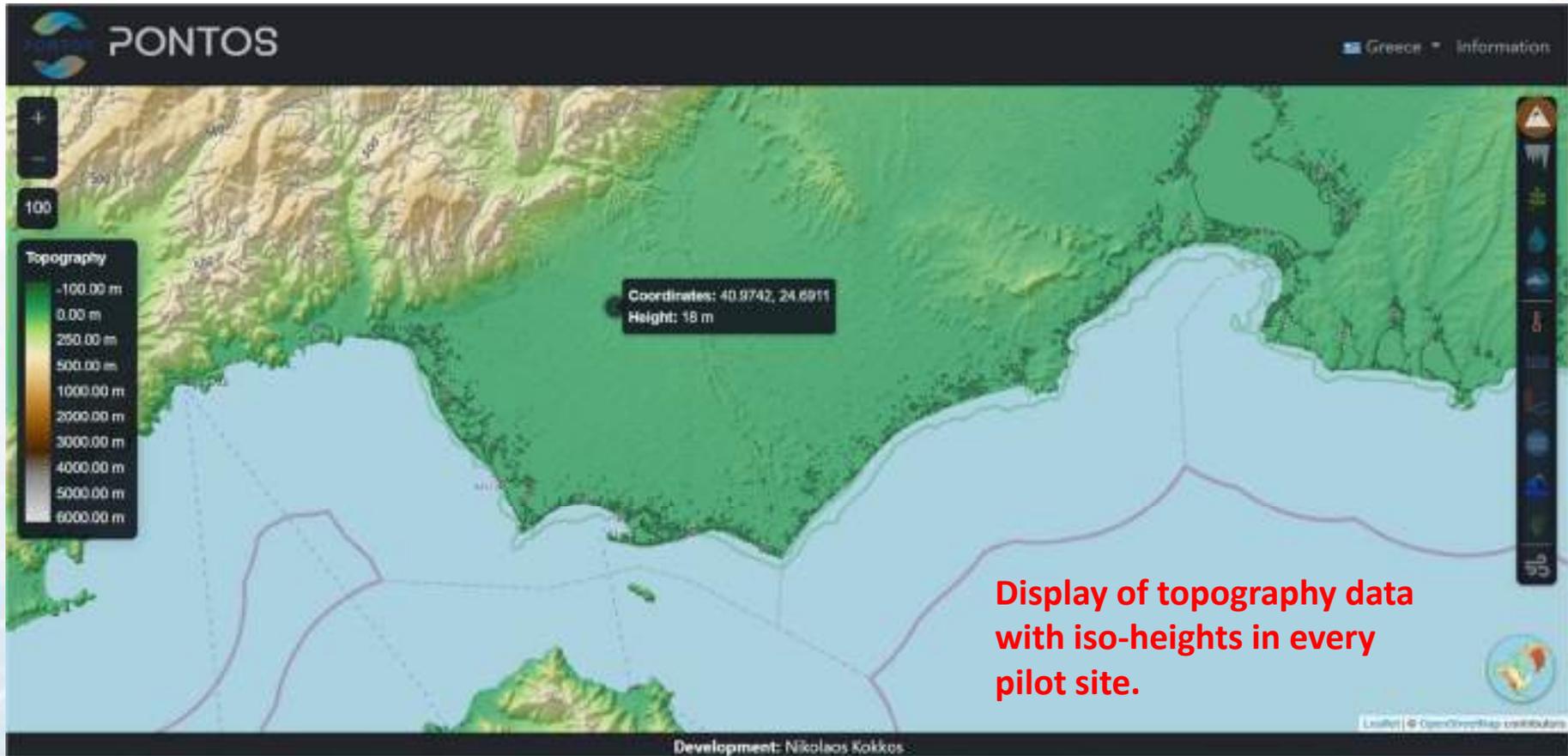
Waves

Seagrass

Weather

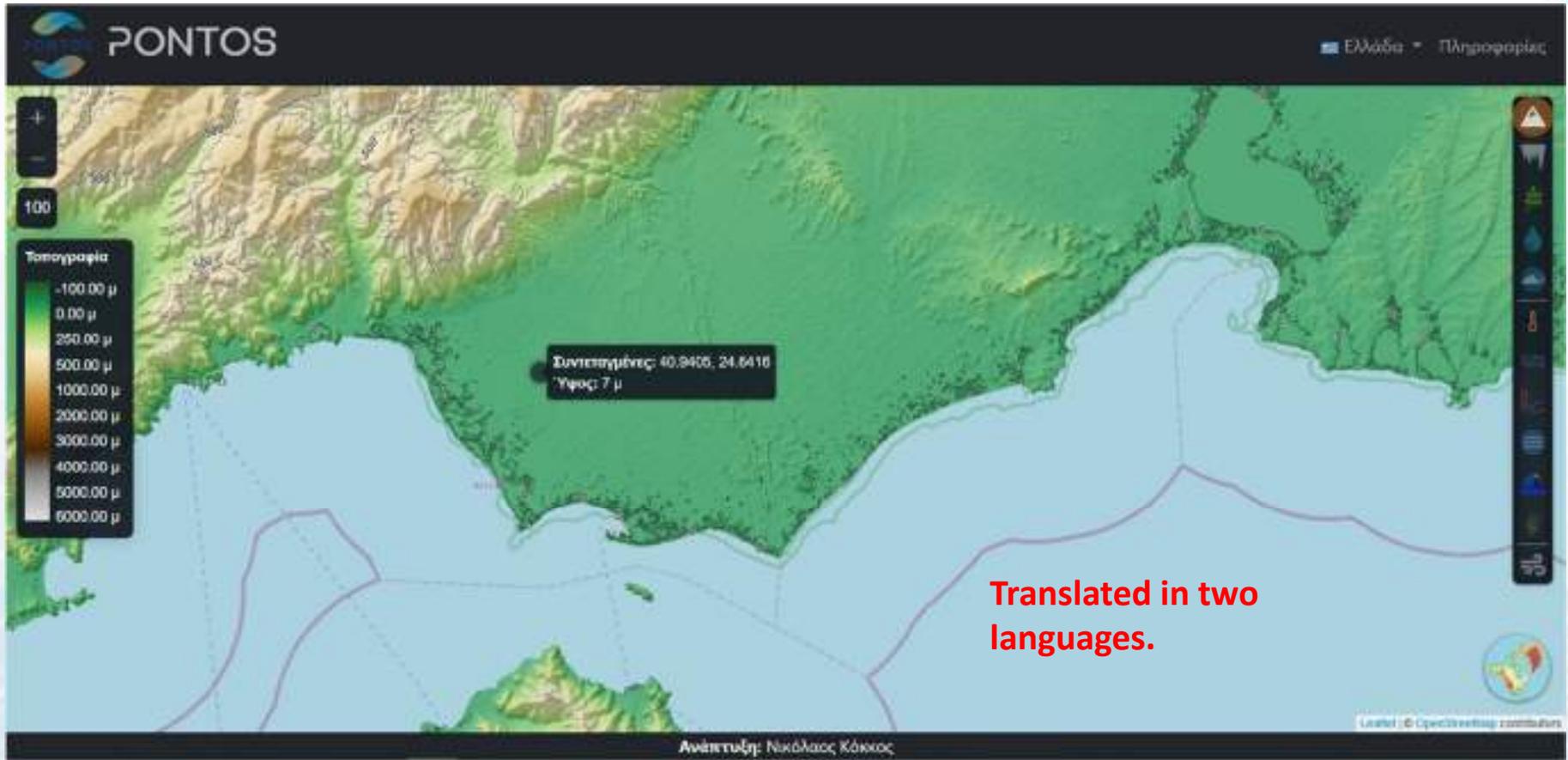


WebGIS – Layers Control – Topography

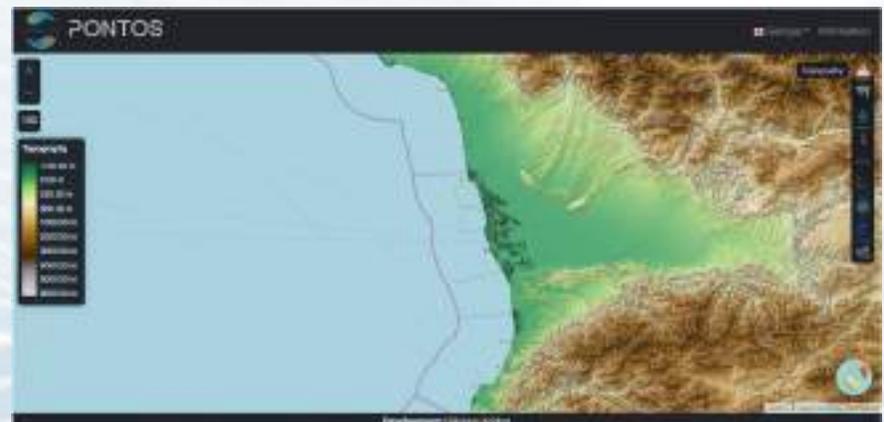


Display of topography data with iso-heights in every pilot site.

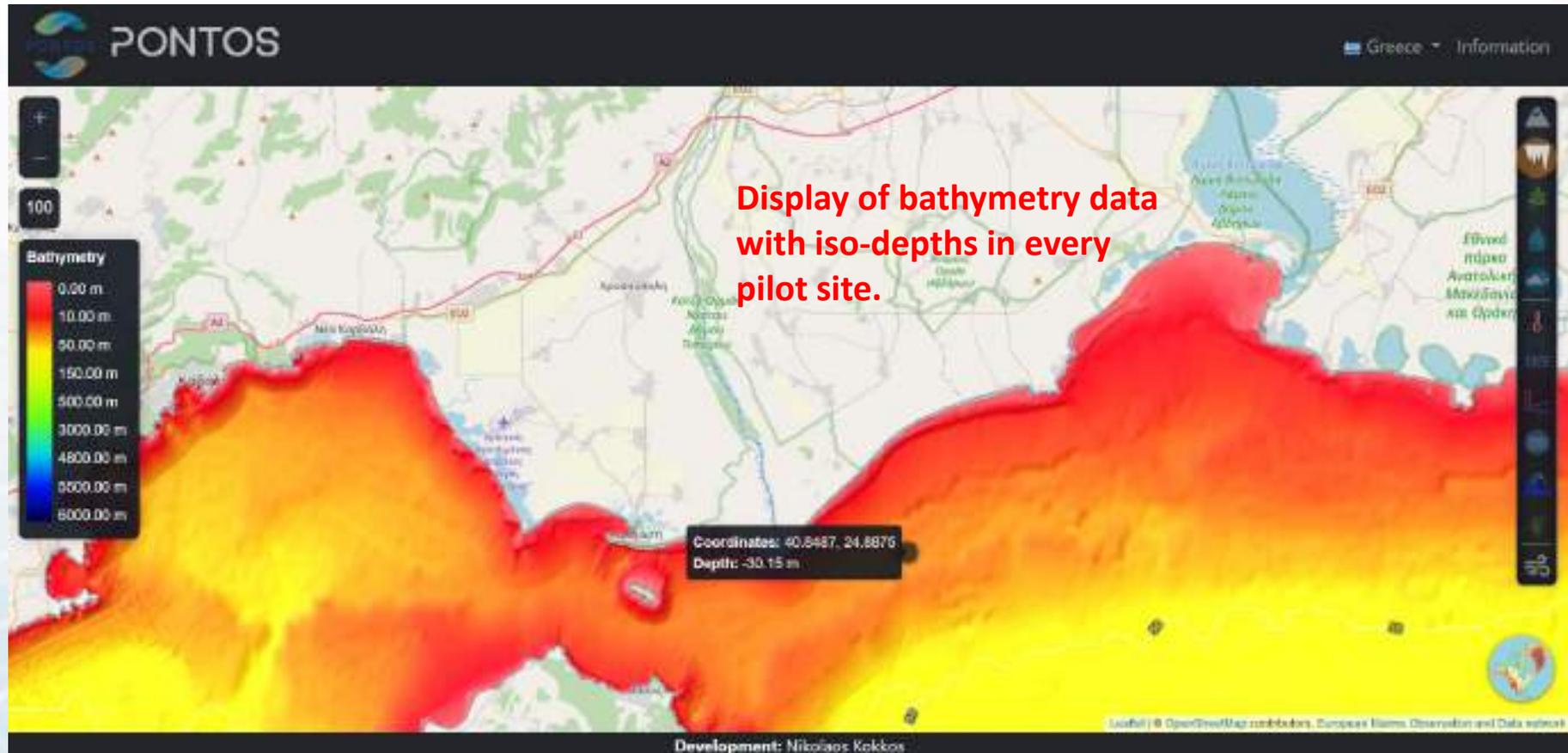
WebGIS – Layers Control – Topography



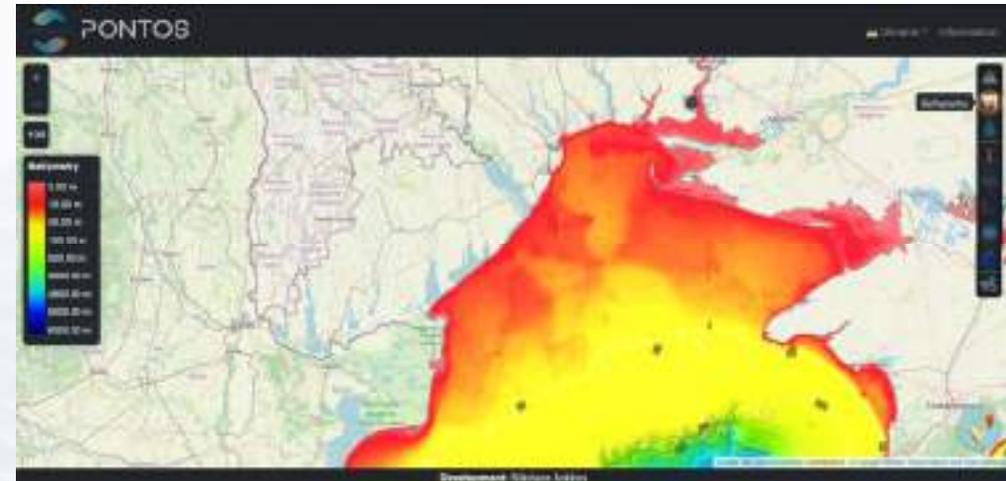
WebGIS – Layers Control – Topography



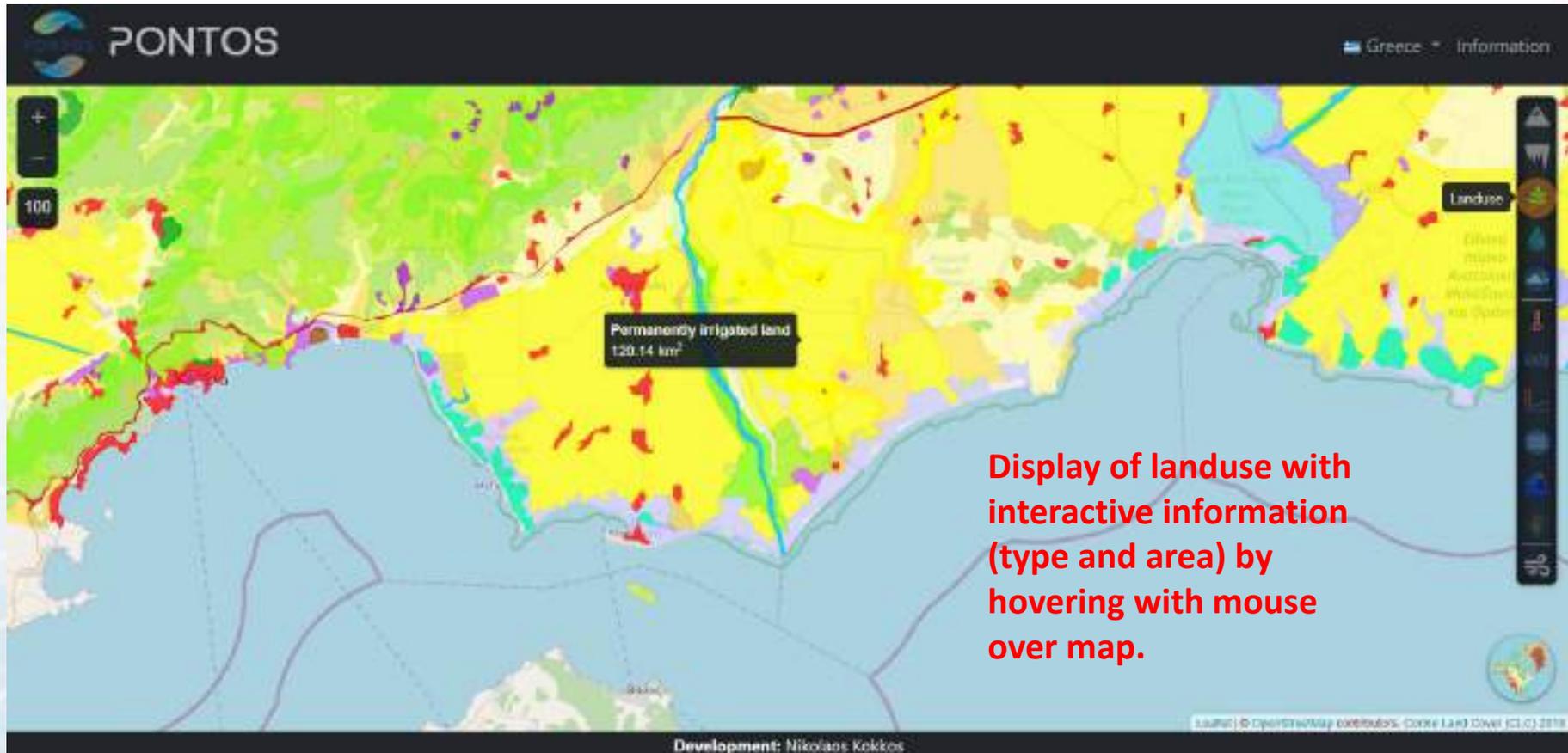
WebGIS – Layers Control – Bathymetry



WebGIS – Layers Control – Bathymetry



WebGIS – Layers Control – Landuse



Display of landuse with interactive information (type and area) by hovering with mouse over map.

WebGIS – Layers Control – Hydrology



π. Νέστος

Hydrology
πάρκο
Αγροτική
Μακροβιοτική
και Εξοχική

Display name of the rivers in local language.

Display of river discharge data in every pilot site.

Development: Nikolaos Kekkos

WebGIS – Layers Control – Hydrology

The screenshot displays the PONTOS webGIS interface. The main window shows a map of Greece with a hydrology data graph for station TI, ΝΕΩΤΟC. The graph displays discharge data from November 2021 to March 2022. The control panel on the right includes a 'Forecast' button (4), the station name 'TI, ΝΕΩΤΟC' (1), zoom controls (2), time range selection (3), and an export menu (5) with options like 'Print chart', 'Download PNG image', 'Download JPEG image', 'Download PDF document', 'Download SVG vector image', 'Download CSV', and 'Download XLS'. A calculator is also visible over the graph.

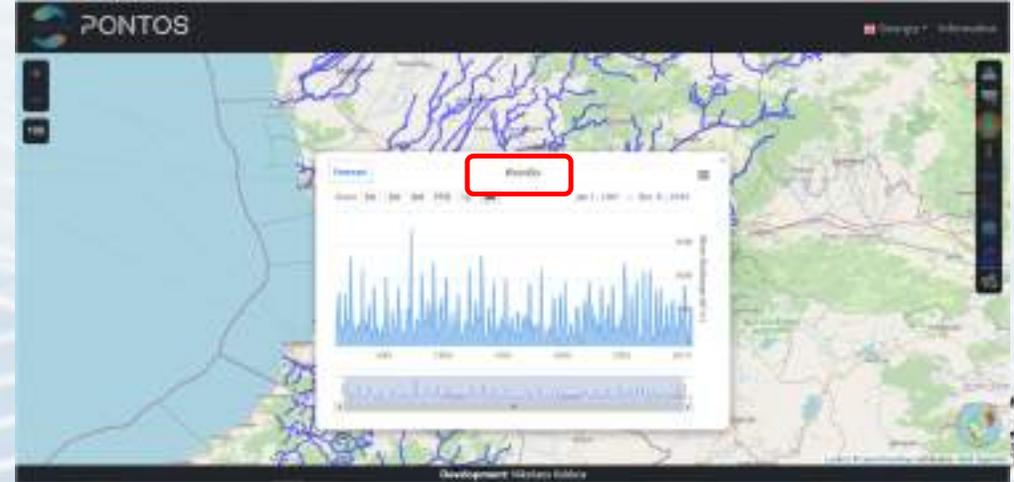
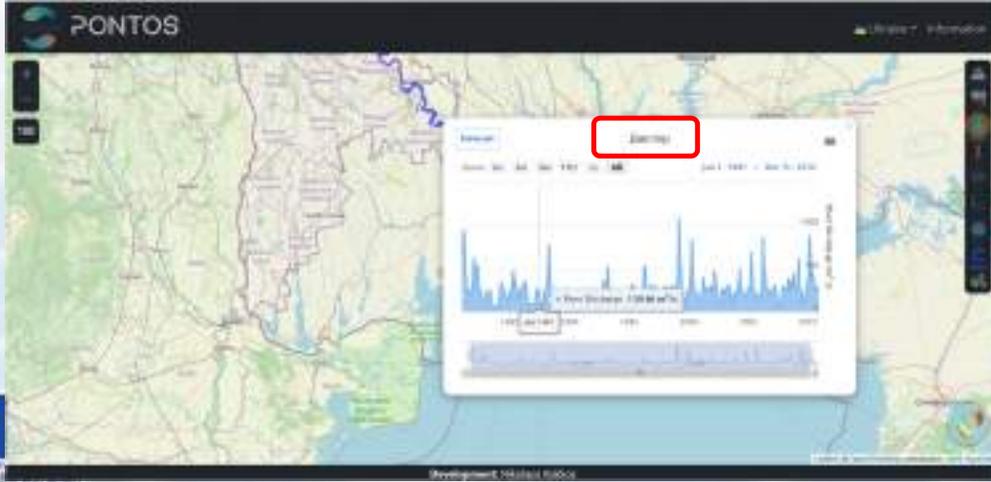
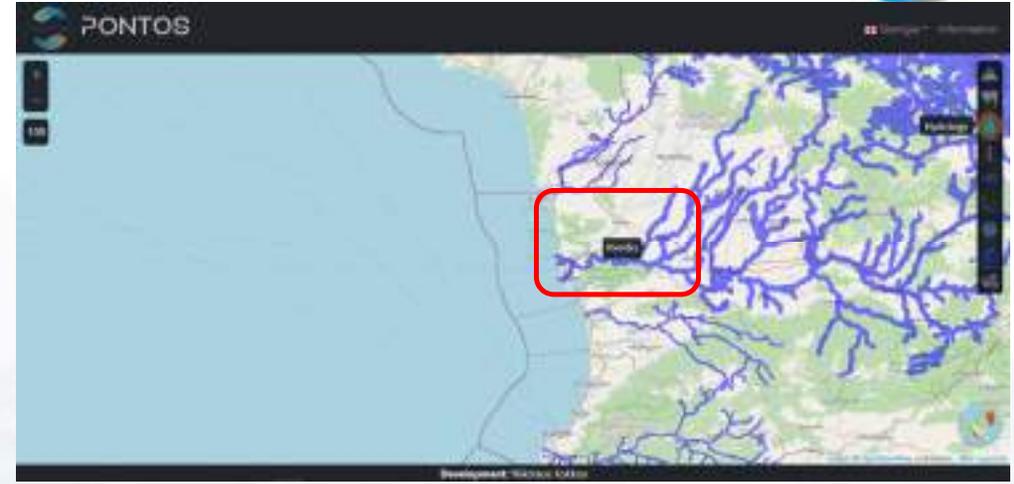
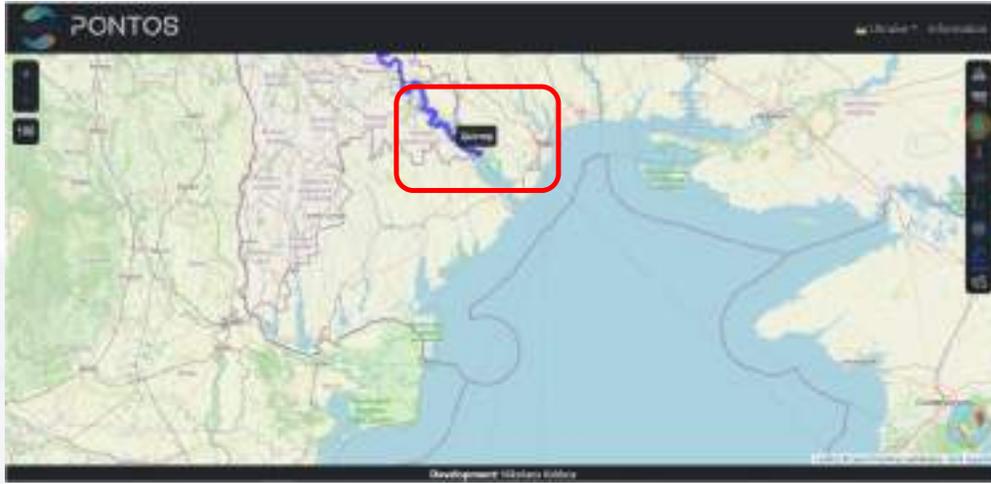
discharge

5. Export toolkit of graph

Development: Nikolaos Kokkos



WebGIS – Layers Control – Hydrology



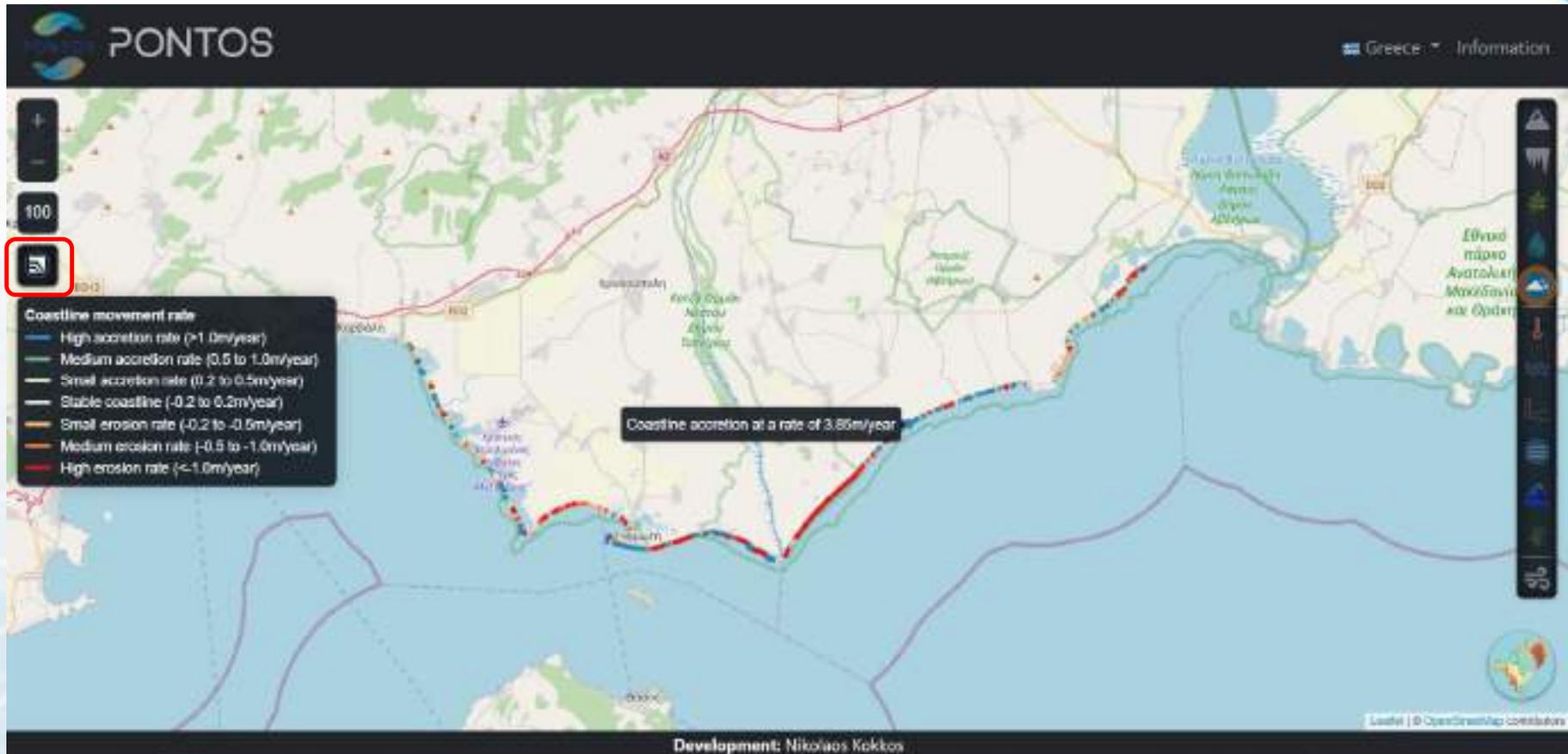
WebGIS – Layers Control – Coastal Behavior



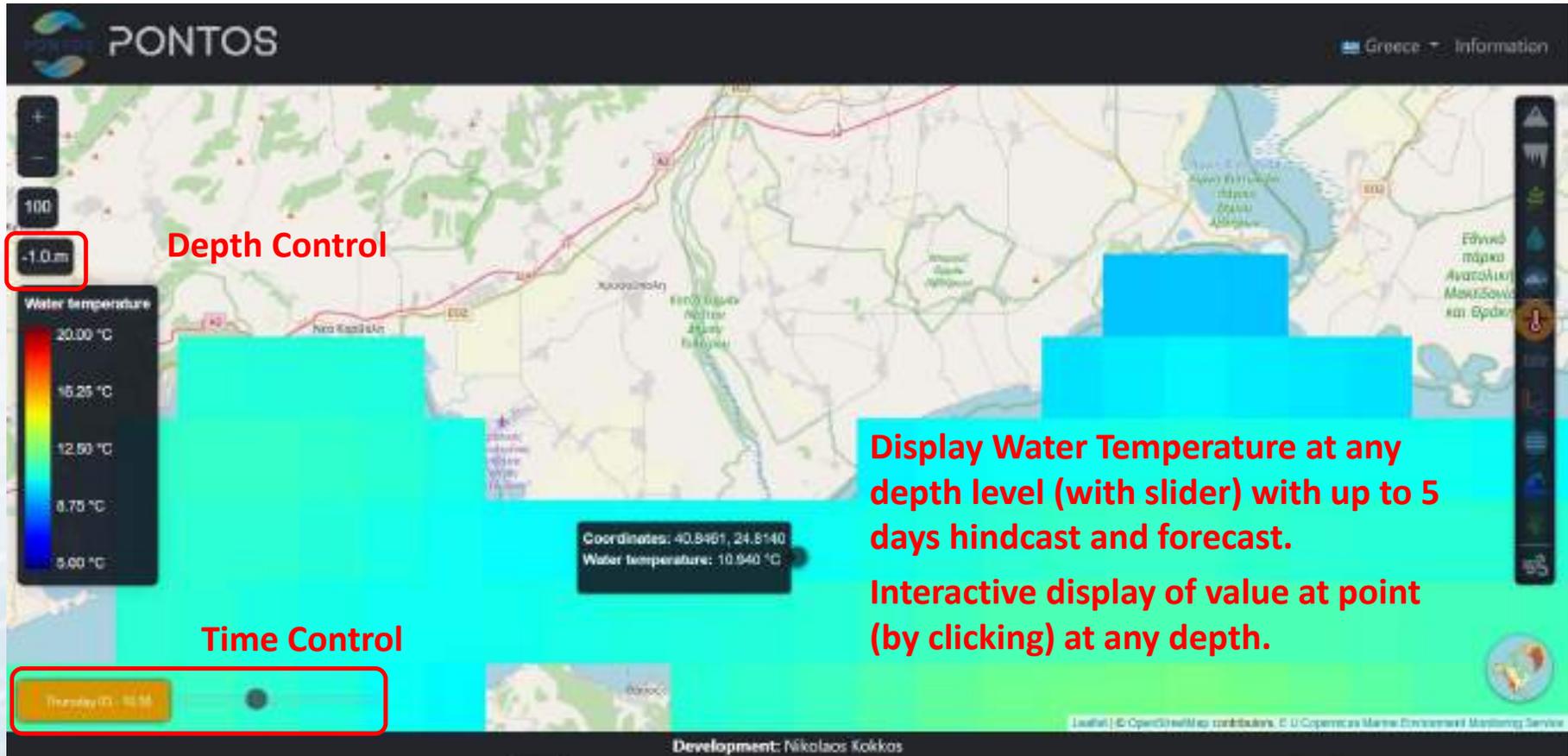
Display of coastline movement and movement rate

Display of values at hovering over coastline

WebGIS – Layers Control – Coastal Movement Rate



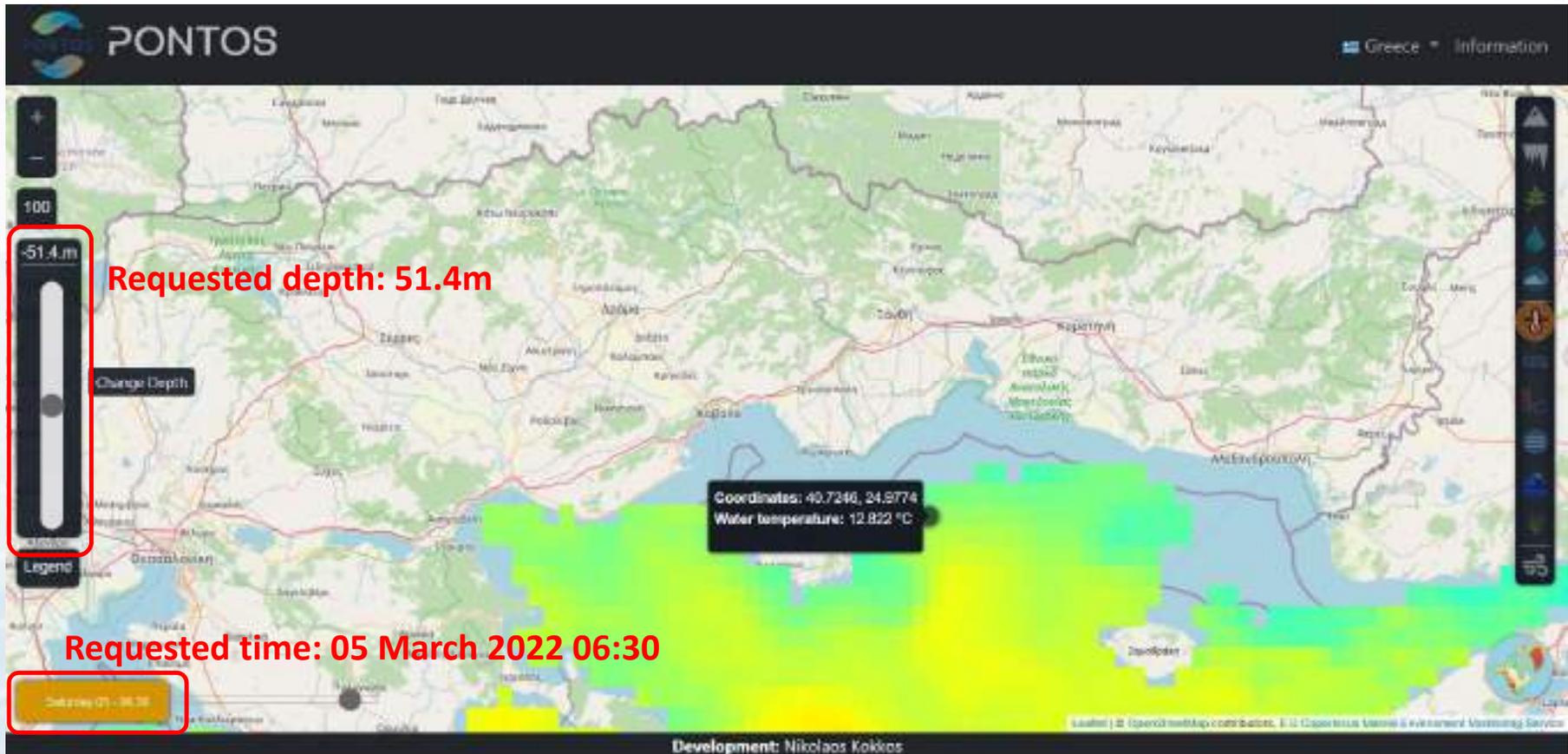
WebGIS – Layers Control – Water Temperature



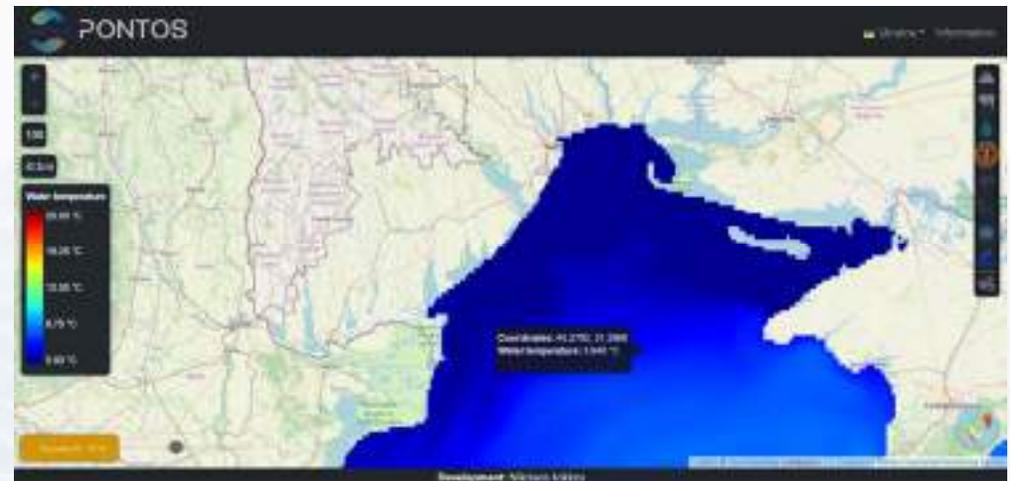
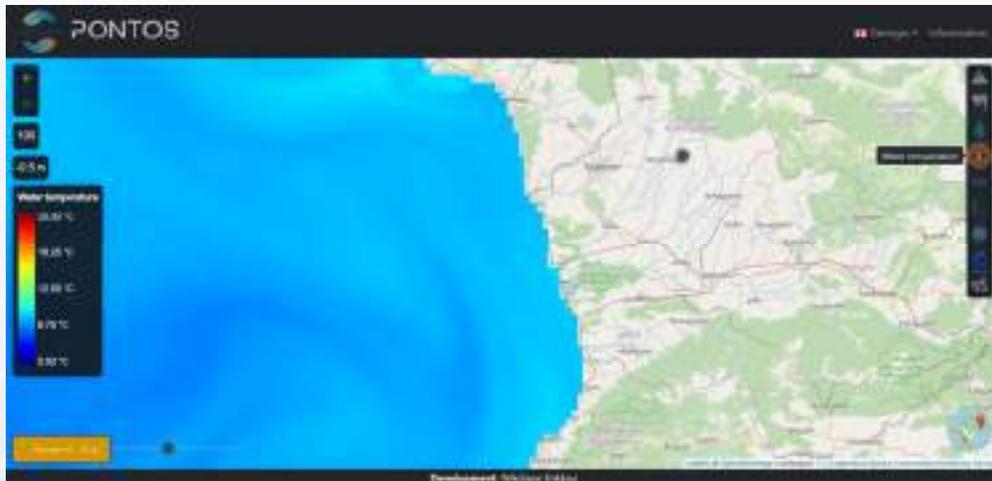
The screenshot displays the PONTOS WebGIS interface. At the top left, the 'PONTOS' logo is visible. In the top right corner, there is a language dropdown set to 'Greece' and an 'Information' link. The main map area shows a geographical view with a water temperature overlay. On the left side, there is a 'Depth Control' slider set to '-1.0 m'. Below it is a 'Water temperature' legend with a color scale from 5.00 °C (dark blue) to 20.00 °C (red). At the bottom left, there is a 'Time Control' slider set to 'Thursday 03 - 14:30'. A tooltip on the map displays 'Coordinates: 40.8461, 24.8140' and 'Water temperature: 10.940 °C'. On the right side, there is a vertical toolbar with various icons. At the bottom, the text 'Development: Nikolaos Kokkos' is visible.

Display Water Temperature at any depth level (with slider) with up to 5 days hindcast and forecast.
Interactive display of value at point (by clicking) at any depth.

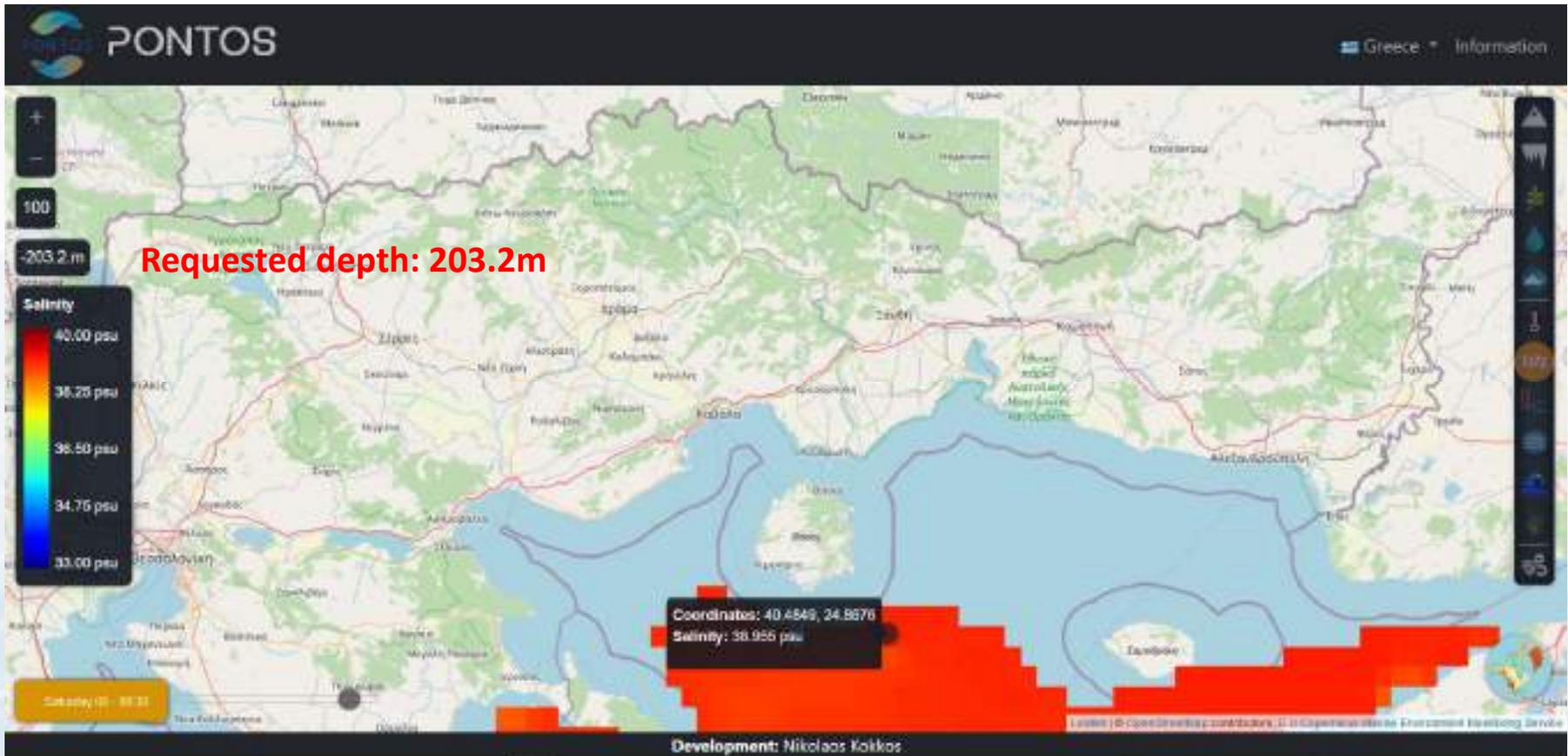
WebGIS – Layers Control – Water Temperature



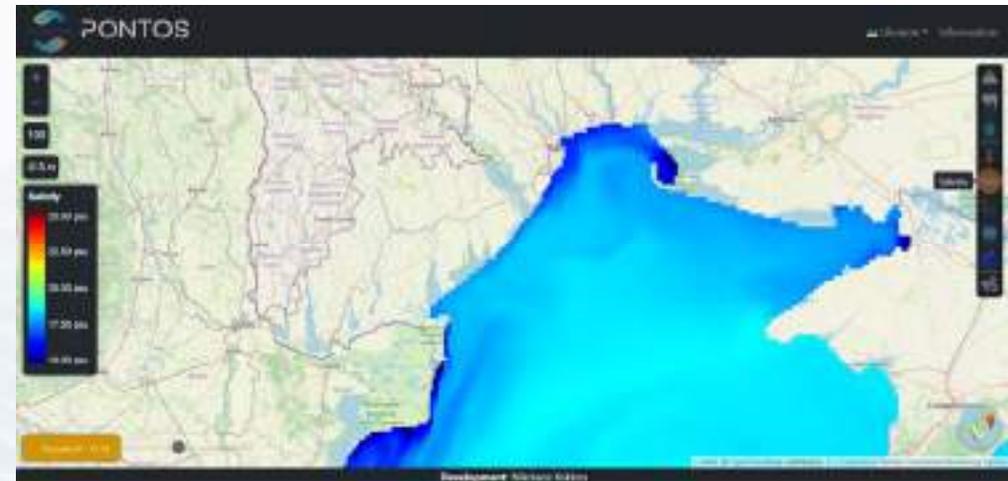
WebGIS – Layers Control – Water Temperature



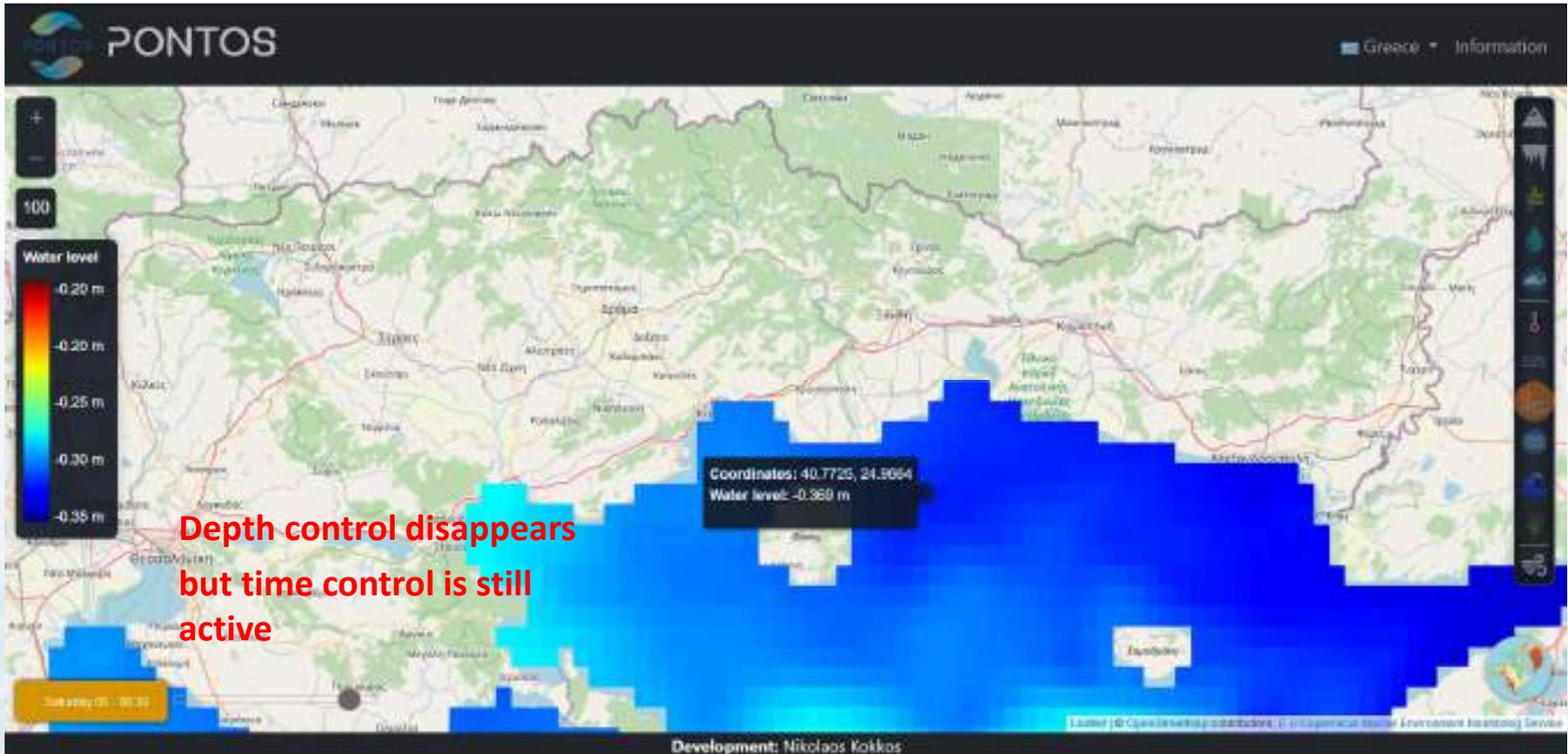
WebGIS – Layers Control – Salinity



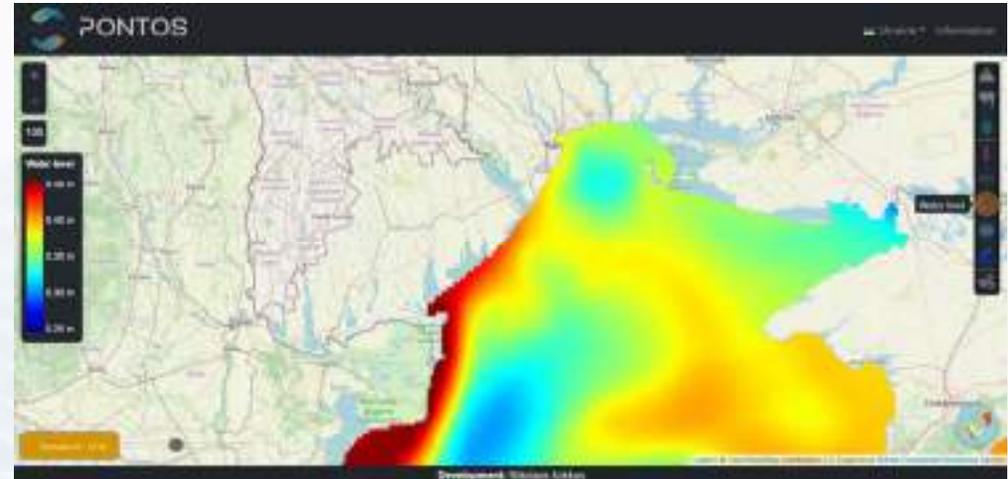
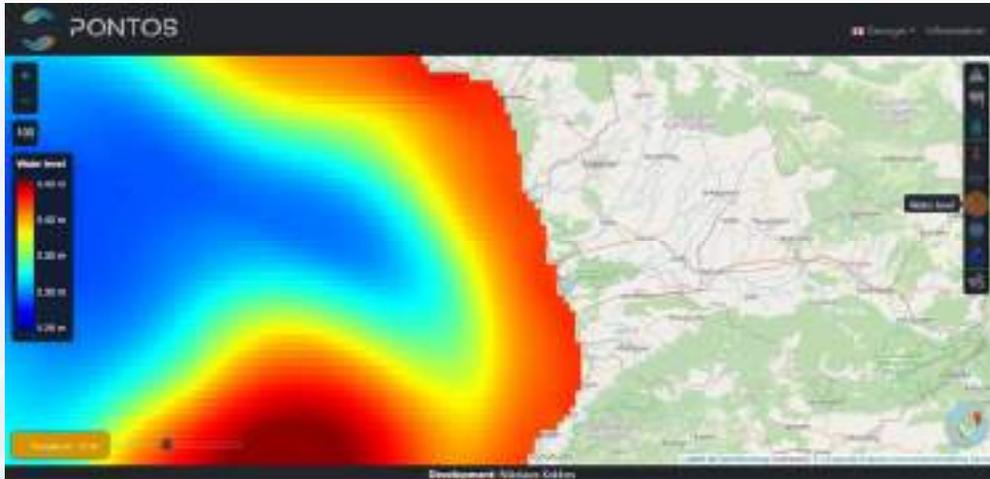
WebGIS – Layers Control – Salinity



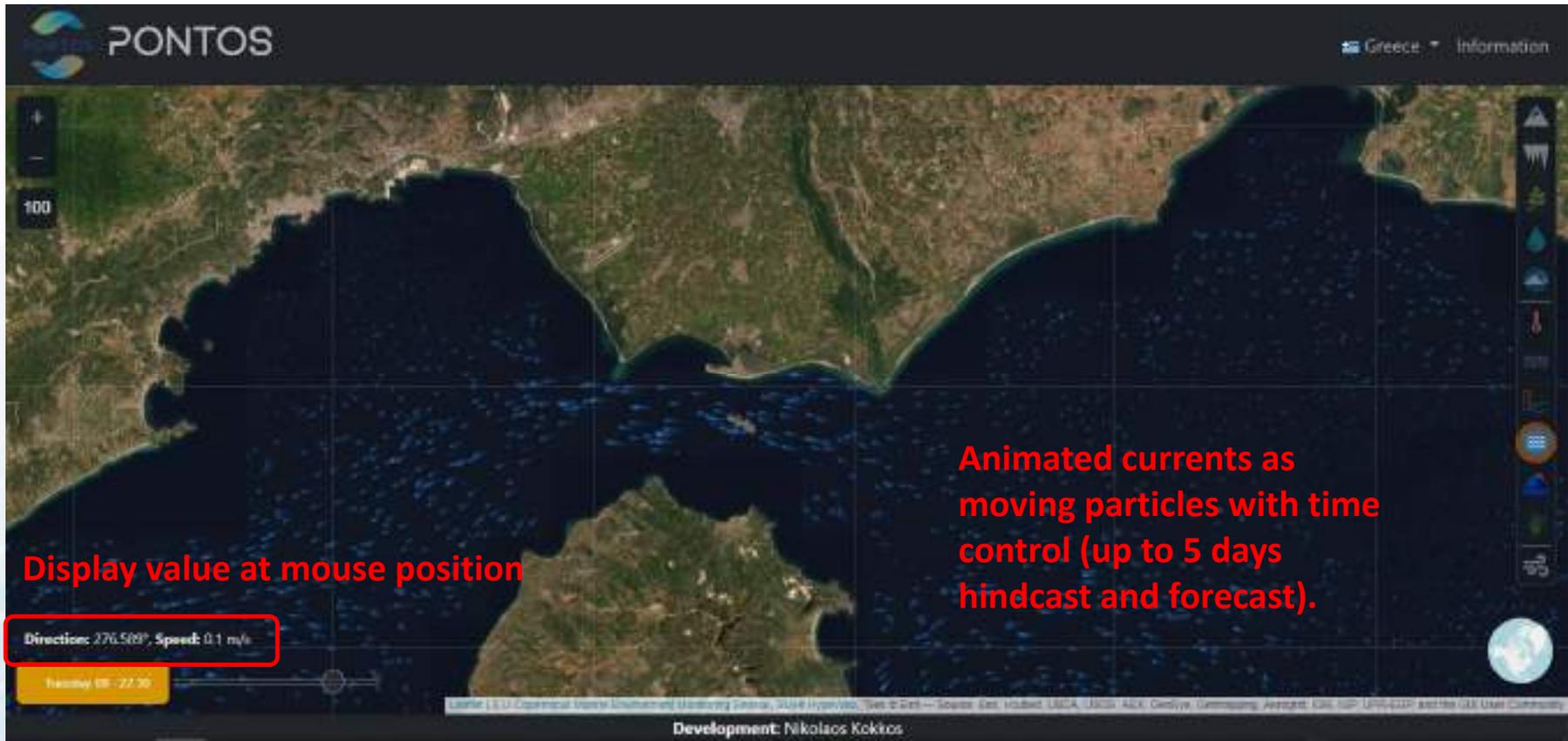
WebGIS – Layers Control – Water Level



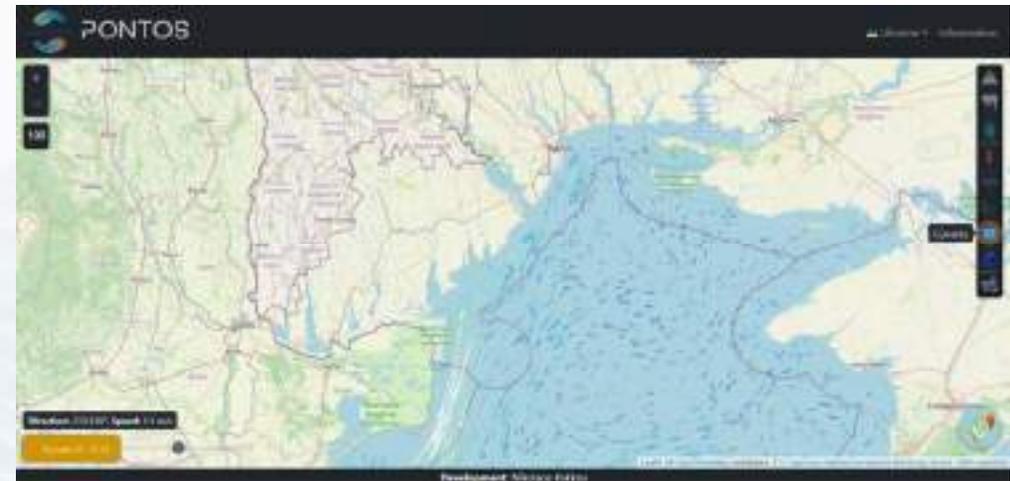
WebGIS – Layers Control – Water Level



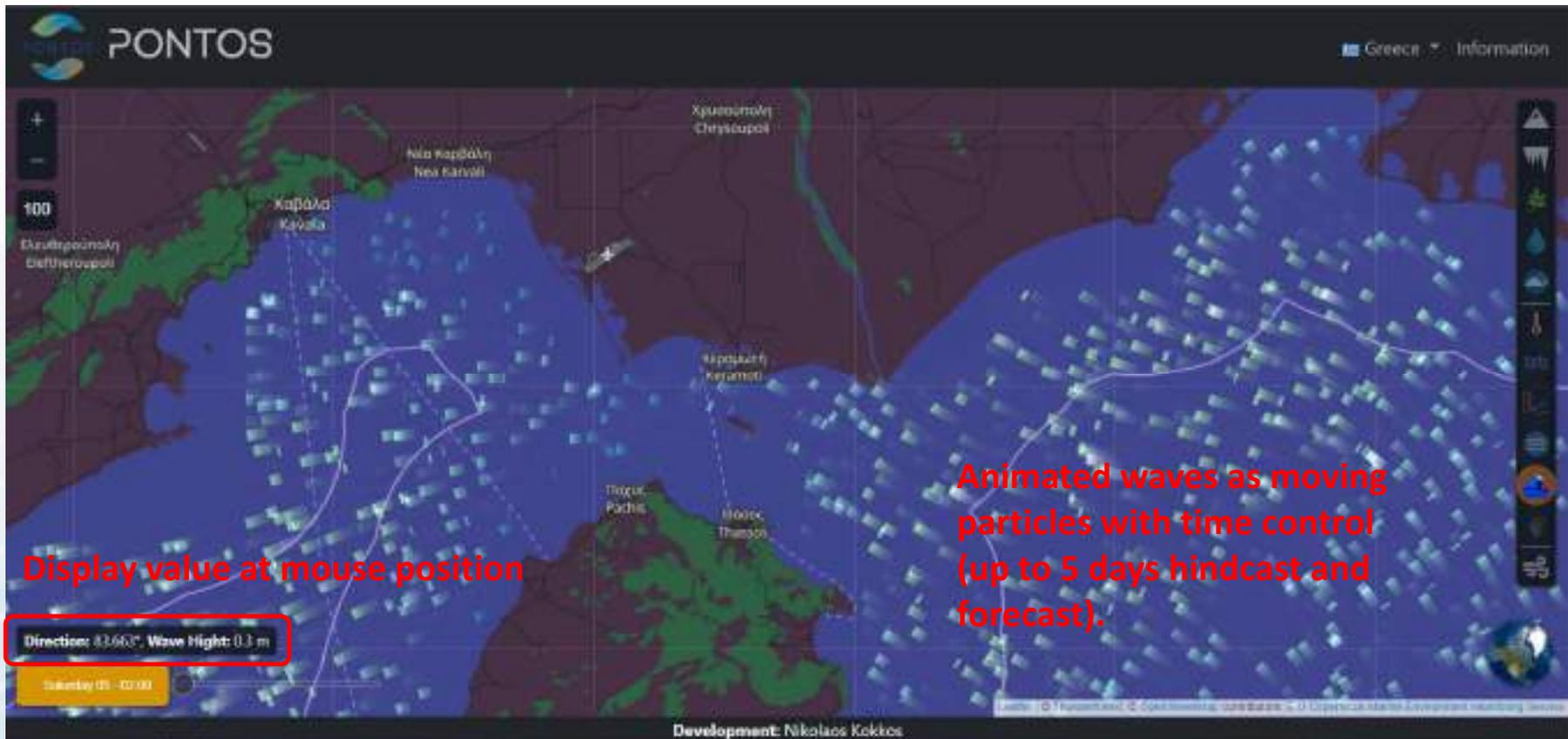
WebGIS – Layers Control – Currents



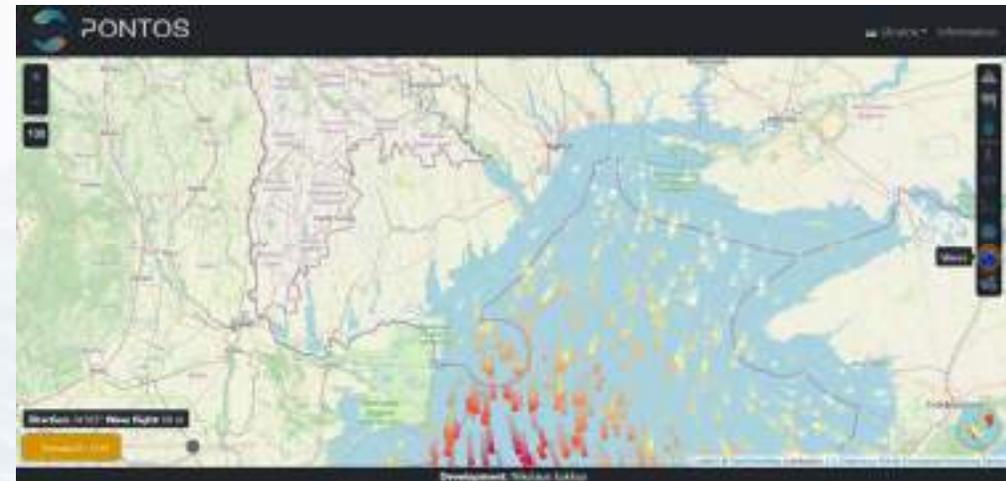
WebGIS – Layers Control – Currents



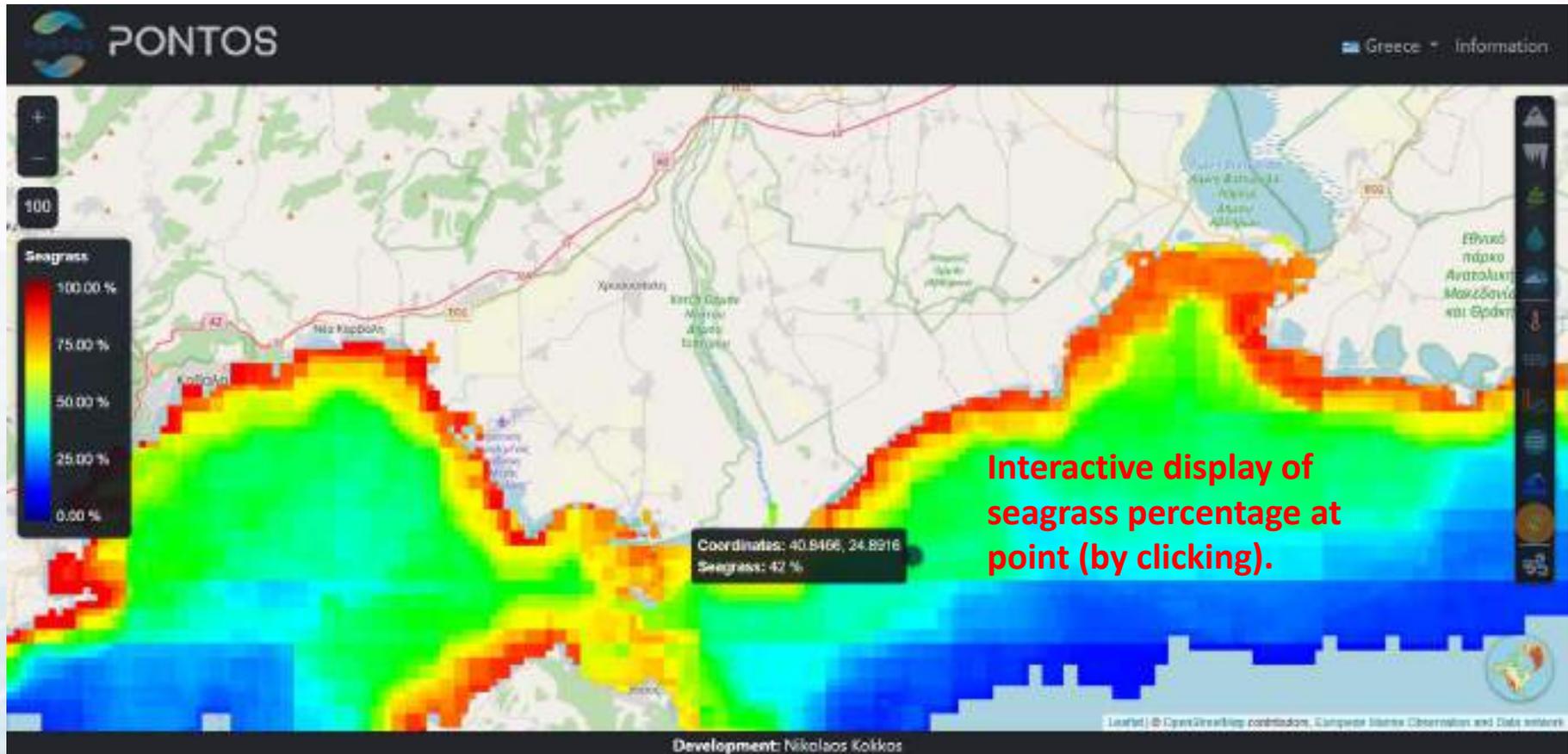
WebGIS – Layers Control – Waves



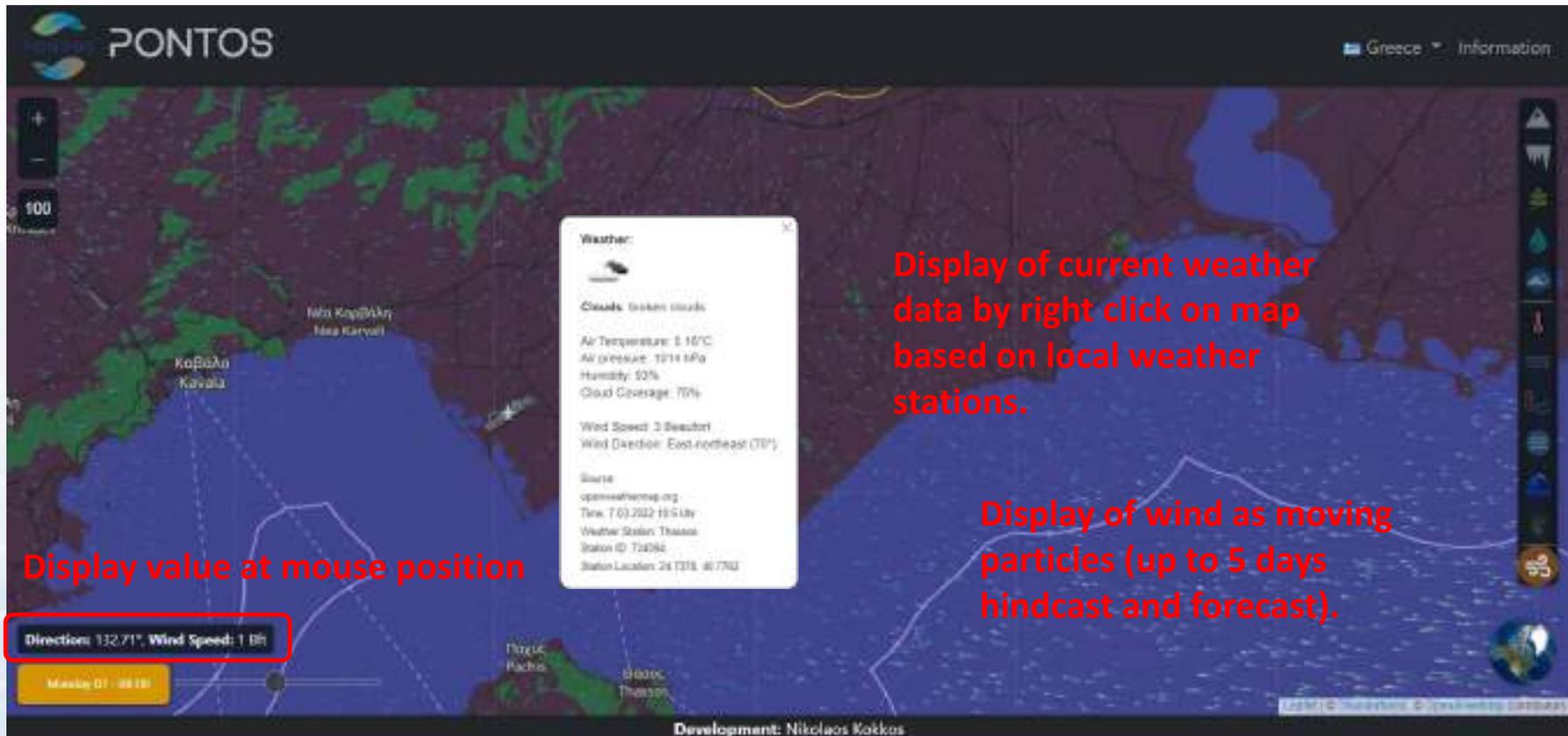
WebGIS – Layers Control – Waves



WebGIS – Layers Control – Seagrass



WebGIS – Layers Control – Weather



Display value at mouse position

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).

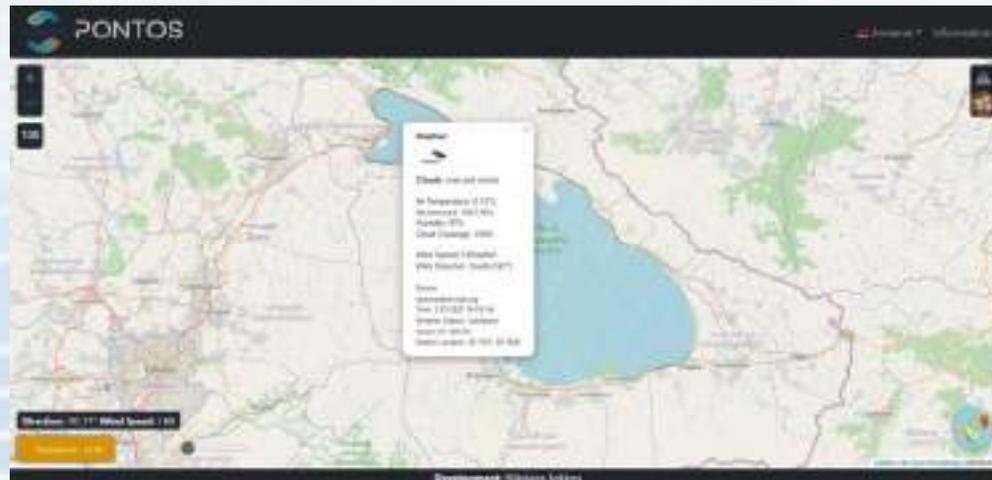
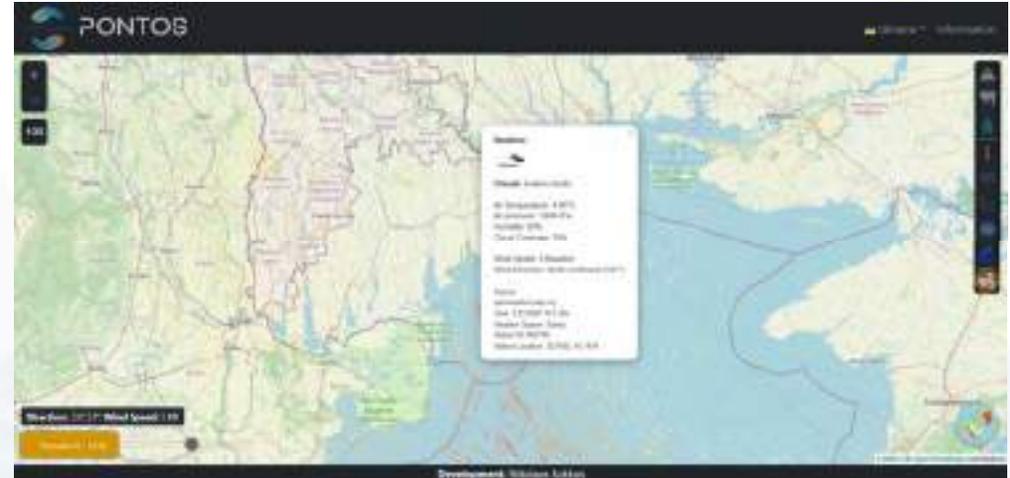
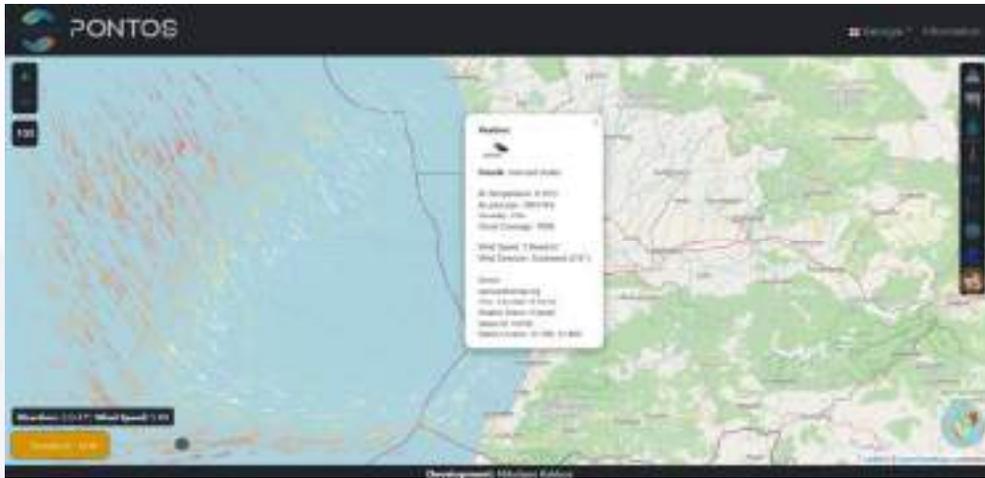
Weather:
☁️
Clouds: Broken clouds
Air Temperature: 16°C
Air pressure: 1014 hPa
Humidity: 50%
Cloud Coverage: 70%
Wind Speed: 3 Beaufort
Wind Direction: East-northeast (70°)
Source: openweathermap.org
Time: 7/3/2022 19:54 UTC
Weather Station: Thessalon
Station ID: 724564
Station Location: 24.7318, 40.7792

Direction: 132.71°, Wind Speed: 1.0h

Map labels: Kavala, Thessalon, Thessalon, Thessalon

Development: Nikolaos Kokkos

WebGIS – Layers Control – Weather



WebGIS – Future Development

Data Collection from other Pilot sites (e.g. Coastline movement) & integration to platform



Localization





Project funded by
EUROPEAN UNION



Common borders. Common solutions.



Thank You

Dr. Nikolaos Kokkos
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