ARGO an Open-Designed USV Mapping Autonomous Platform

Authors : **Papakonstantinou Apostolos**, Argyrios Moustakas, Panagiotis Zervos, Dimitrios Stefanakis, Manolis Tsapakis, Nektarios Spyridakis, Mary Paspaliari, Christos Kontos, Antonis Legakis, Sarantis Houzouris, Konstantinos Topouzelis
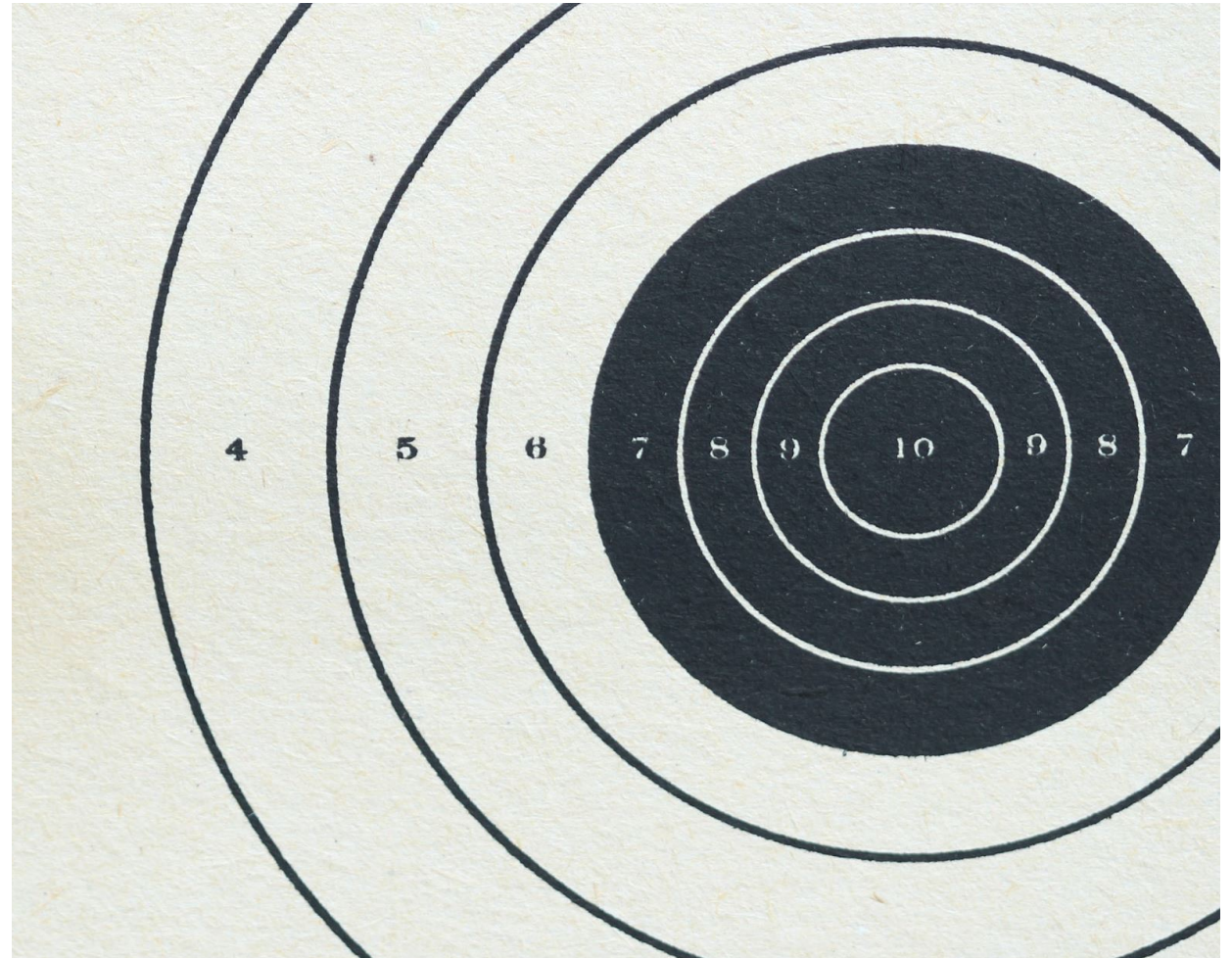
Aim of the ARGO Project

To *develop an open-design USV drone with integrated*

- *Multi-level control hardware architecture*

- *state-of-the-art sensors, and*

- *payloads*

for the **autonomous monitoring** *of* **environmental parameters** *for* **large geographical sea areas.**

Project framework

A partnership of **4 Businesses and 2 Research Institutes**

The research project refers to the **industrial research actions for protecting the marine environment, aiming to develop** viable and economical solutions to the problem of monitoring the marine environment.
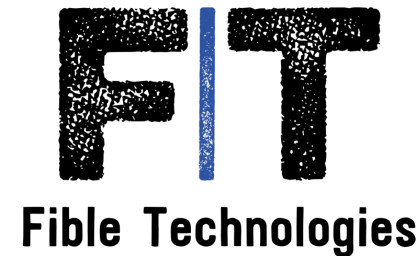
Methodology

Research the autonomous data acquisition and automatic analysis of data and information related to the marine environment.

Definition of existing functional framework, User Needs and Use Cases

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Definition of Specifications (Analysis of operational & technical specifications)

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USV & Web Portal Design

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USV and Web Services Testing

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Final actions
(publicity, commercialization & reporting)
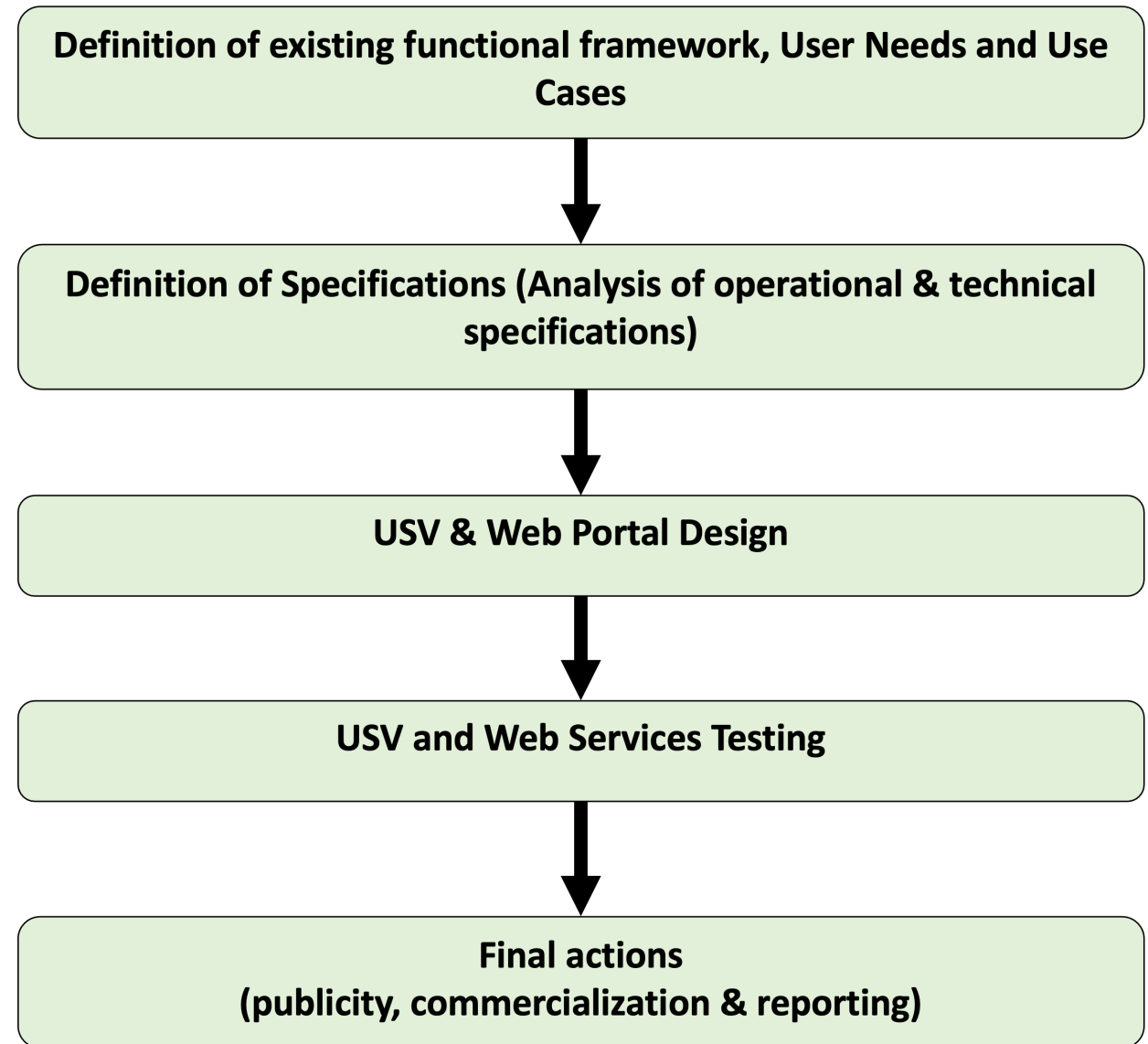
ARGO USV

- Fully autonomous Unmanned Surface Vehicle

- Catamaran-type USV

- Open source system configuration - Unlimited waypoints

- High Accuracy GNSS module

- 4x100watts solar panels

- Length 3m

- Weight 82kg

- Motor electrical power 2x300watts

- Speed (Max): 16knts

Multiparameter Payloads

- Multiparameter module with depth and temperature sensors

- Conductivity + Temperature

- Turbidity

- Dissolved Oxygen

- Automatic wiper

- pH

Sea environment monitoring

Fresh water application and profiles recording

Integrable on any platforms

Multibeam Sonar System

- Turnkey Multibeam Sonar System 512 beams → High-resolution Bathymetry

- Integrated Inertial Navigation System & Ntrip client

- Roll Stabilization

Backscatter outputs for

- Coastal surveys

- Shallow water bathymetry

- Sound velocity profiler for Data correction
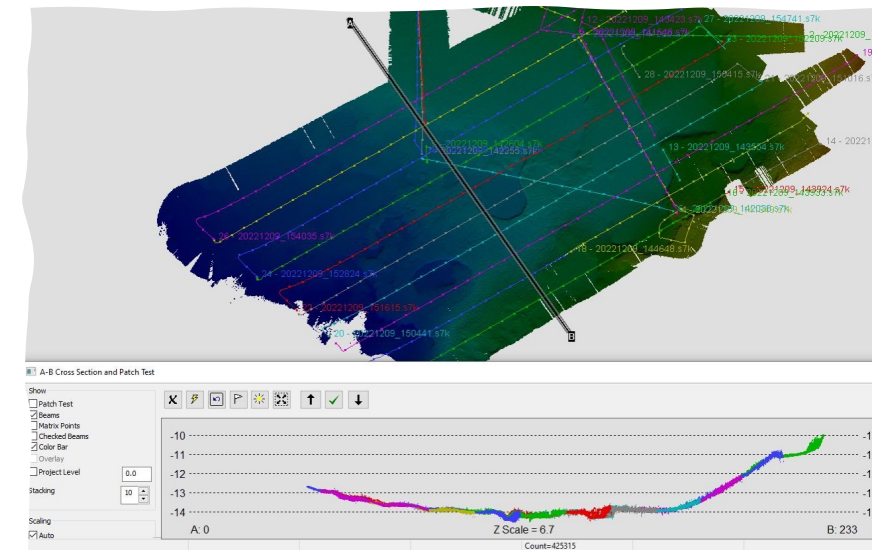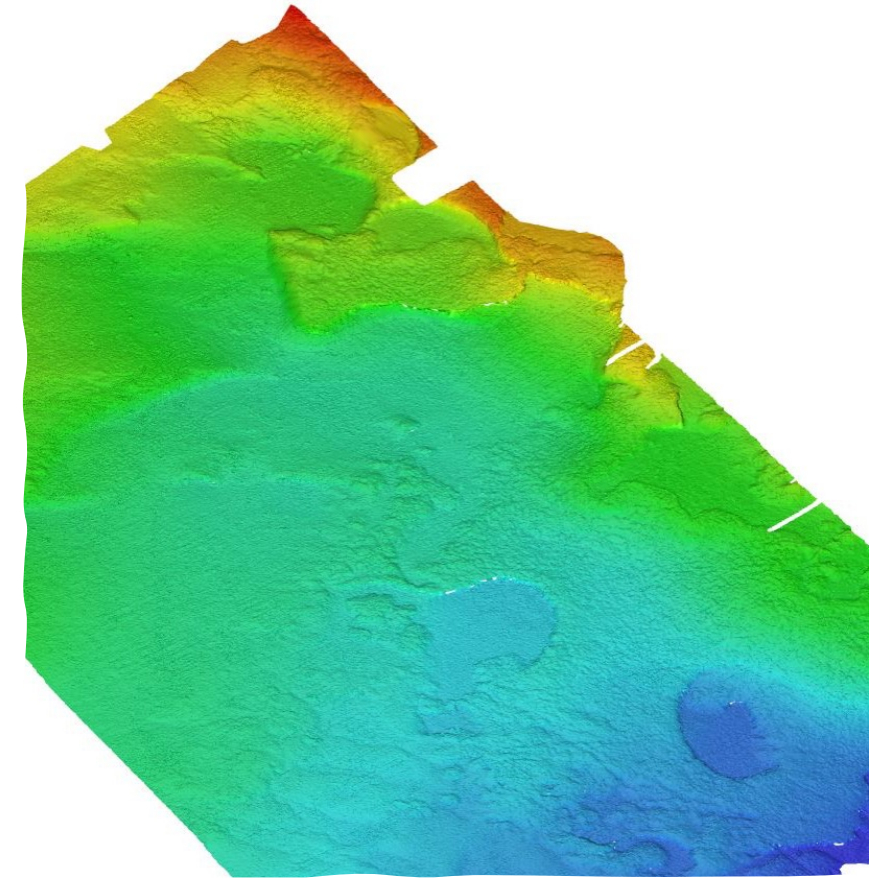
Data Interoperability

- Photogrammetric, Sonar & Parameter Data Fusion

- Data Geotagging

- On board High processing power

- Data transmission through RF, WIFI, and 5G connectivity in any Ground Station Terminal

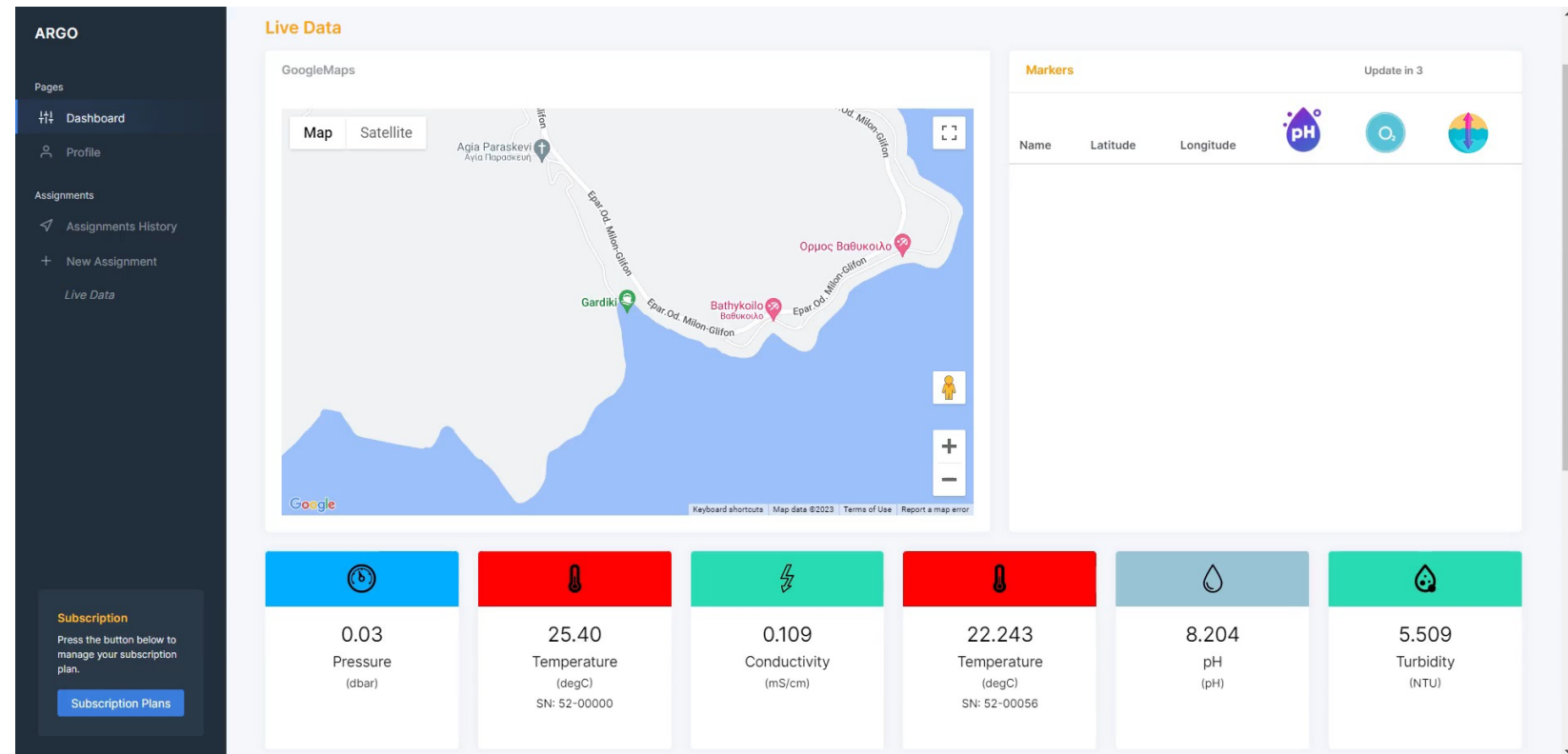- Data uploading in PostgreSQL Geodatabase

ARGO web system

- Highly Interactive Dashboard for Data Presentation (Real Time Data)
- Data Acquisition History Details
- RAW & Processed Data access
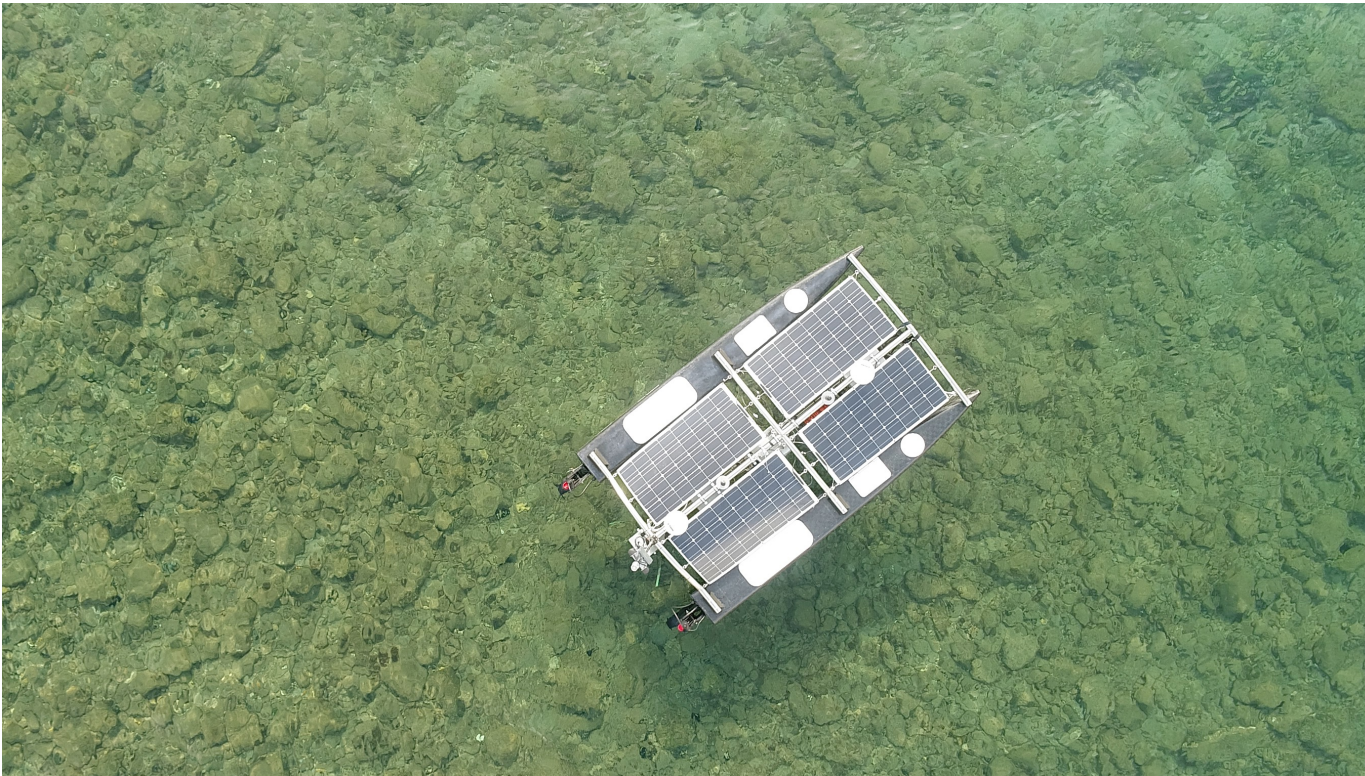- Future Missions Calendar
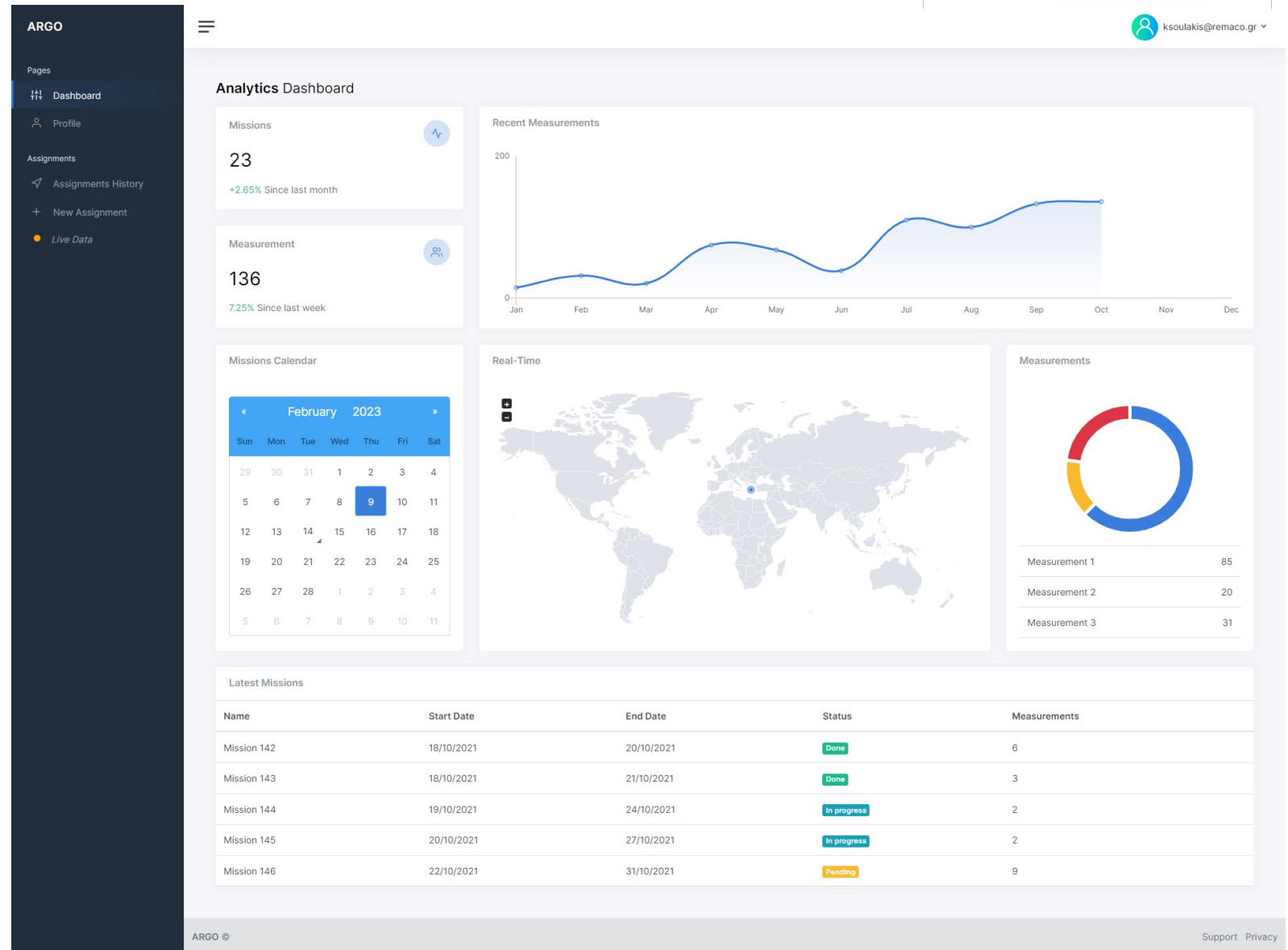
Real Time Data

Parameters Measured for ARGO

- Pressure
- Conductivity
- Temperature
- Turbidity
- pH
- Oxygen Saturation
- Oxygen Concentration

ARGO Innovation

- i) the on-board/real-time data processing/analysis capabilities

- ii) the energy-independent and environmentally friendly platform entirely made using the latest aeronautical and marine materials

- iii) the integration of advanced technology sensors, all in one system (photogrammetric and radiometric footprint, as well as its connection with various environmental and inertial sensors) and

- iv) the information management application

Advantages of ARGO system

- cost reduction

- rational allocation of resources and use of human resources

- capability of real-time monitoring

- expansion in the scope of academic interdisciplinarity and

- directness of communication lines among the participants of the academic and the private sector.

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