PN23300301: Innovative system for managing the dynamics of the Romanian Black Sea coastline by integrating direct measurements, numerical modelling, and remote sensing to create the "Digital Twin" of the Romanian Coastal Zone

**Phase 4 : Evaluation of the impact of winter storms on pilot beaches in front of the Danube Delta and on restored beaches from the southern sector of the Romanian Black Sea shore at the end of the cold season. The update of the SHYFEM hydrodynamic model grid. The functional adaptation of the data portal to project’s requirements.**

Objectives: (I) The evaluation of the impact of winter storms on pilot beaches in front of the Danube Delta and on restored beaches from the southern sector of the Romanian Black Sea shore at the end of the cold season; (II) The update of the SHYFEM hydrodynamic model grid;(III) The functional adaptation of the data portal to meet the project's requirements.

To achieve the objectives, geomorphological data sets were collected through seasonal field measurements. These data were assessed and compared with data from previous campaigns to carry out the analysis of morphological changes on the beaches.

The hydrodynamic model grid was updated using bathymetric measurements taken last year.

Additionally, during this phase, installation, testing, and configuration activities were conducted, leading to an expansion of the data portal’s core functionalities (including the addition of geospatial features, data ingestion, and new visualization types) as well as the portal's architecture (allowing the inclusion of new information pages).

**Phase 5: Morphological/bathymetric and coastal sedimentology measurements on the beaches in the pilot sectors. Establishing the requirements for the SHYFEM model and preparing the corresponding data files to be processed by the model**

Objectives:

(I) Conducting morphological/bathymetric and coastal sedimentology measurements on the beaches in the pilot sectors; (II) Establishing the requirements for the SHYFEM model and preparing the corresponding data files to be processed by the model

To achieve the objectives, measurements were carried out to assess the dynamics of the beach sectors in front of the Danube Delta and in the southern sector. Sediment samples were collected from the sectors between Sulina and Periboina, aerial photogrammetry measurements were taken at Sfântu Gheorghe, and recent bathymetric data were analyzed. Data files were prepared for processing by the hydrodynamic model.

**Phase 6: Field measurements and analysis of beach sediment composition. Processing of remote sensing data (aerial photogrammetry and satellite imagery). Running the updated SHYFEM hydrodynamic model under various meteorological conditions. Defining the database architecture based on FAIR data principles.**

Objectives: (I) Conducting field measurements; (II) Analyzing the composition of beach sediments; (III) Processing remote sensing data; (IV) Running the updated SHYFEM hydrodynamic model under various meteorological conditions; (V) Defining the database architecture based on FAIR data principles.

To achieve the objectives, field measurements were carried out to assess the dynamics of the beach sectors in front of the Danube Delta and the southern sector. The composition of the beach sediments was analyzed, aerial photogrammetry data were processed, the updated SHYFEM hydrodynamic model was run under various meteorological conditions, and the database architecture was defined based on FAIR data principles.

During this phase, activities were also carried out to analyze and develop a metadata and data model catalog for the datasets to be uploaded to the project’s portal (database). Representative datasets were analyzed, and a consistent model was created for them. Additionally, the terms used in the catalog were defined, with an emphasis on achieving the highest possible level of FAIRness by selecting representative terms for the datasets. The data harvesting mechanism from the portal to a client portal was successfully tested.

**In 2024, a TRIMBLE R580 GNSS SYSTEM with a TDC6 control unit and accessories was acquired for the project.**





