Database of environmental data collected for modelling

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Partner in Charge	CNR
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Summary

Abstract

This document describes the database of environmental data collected for modelling.

1. Introduction

The main objective of the project is to create a cross-border technical, scientific and institutional cooperation to face together the challenge of assessing the impact of underwater environmental noise on the marine fauna and in general on the Northern Adriatic Sea ecosystem. At this stage, in fact, there are no extensive data on underwater noise in the area and the knowledge on noise pollution and its impact on biodiversity is very limited.

Therefore, according to the project work plan, the network of the underwater noise monitoring stations will be set up in the Northern Adriatic Sea (Activity 3.2). The continuous underwater noise produced by anthropogenic activities such as marine traffic (both commercial and recreational) and hydrocarbon exploitation will be monitored.

The monitoring results will be used to fill the knowledge gap about underwater noise levels in the Northern Adriatic Sea but also to support setting up and validation of the underwater noise model (Activity 5.2). This activity is crucial for the assessment of the underwater soundscape, it means the spatial distribution and temporal evolution of the underwater noise modeled on the basis of different frequencies.

2 Environmental data for modelling

To achieve objectives of the project mentioned earlier, in order to run the underwater noise model (Activity 5.2) the input data for the sound propagation model need to be collected and organized flowing step by step the time frame of the underwater noise field survey. Three environmental datasets will be saved in the server:

1) Static data describing geometry and features of the basin useful for noise propagation (Bathymetry, seafloor sediment distribution);
2) Temperature salinity and sea roughness from hydrodynamic model (D5.1.2)
3) Shipping (AIS) and fishing data (VMS data) (D5.1.3)

2.1. Static data describing geometry and features of the basin useful for noise propagation

Bathymetry

Source

Bathymetry data was gathered from the European Marine Observation and Data Network (EMODnet, www.emodnet.eu). The data were downloaded through the web services from the EMODnet Bathymetry portal (www.emodnet-bathymetry.eu). The EMODnet Bathymetry portal is operated and developed by a European partnership that comprises members of the SeaDataNet consortium together with organizations from marine science, the hydrographic survey community, and industry. The partners combine expertises and experiences of collecting, processing, and managing of bathymetric data together with expertises in distributed data infrastructure development and operation and providing OGC services (WMS, WFS, and WCS) for viewing and distribution.

The latest version of the EMODnet DTM (Digital Terrain Model) has been released 24th September 2018 with an improved resolution of 1/16 * 1/16 arc minutes (circa 115*115 m2), using 9369 unique CDI references and 87 DTM references.

The DTM values have been determined from 4 possible sources of data:

- Bathymetric survey data: high resolution data sets from single and multibeam surveys that are referenced via the CDI Data Discovery and Access service.

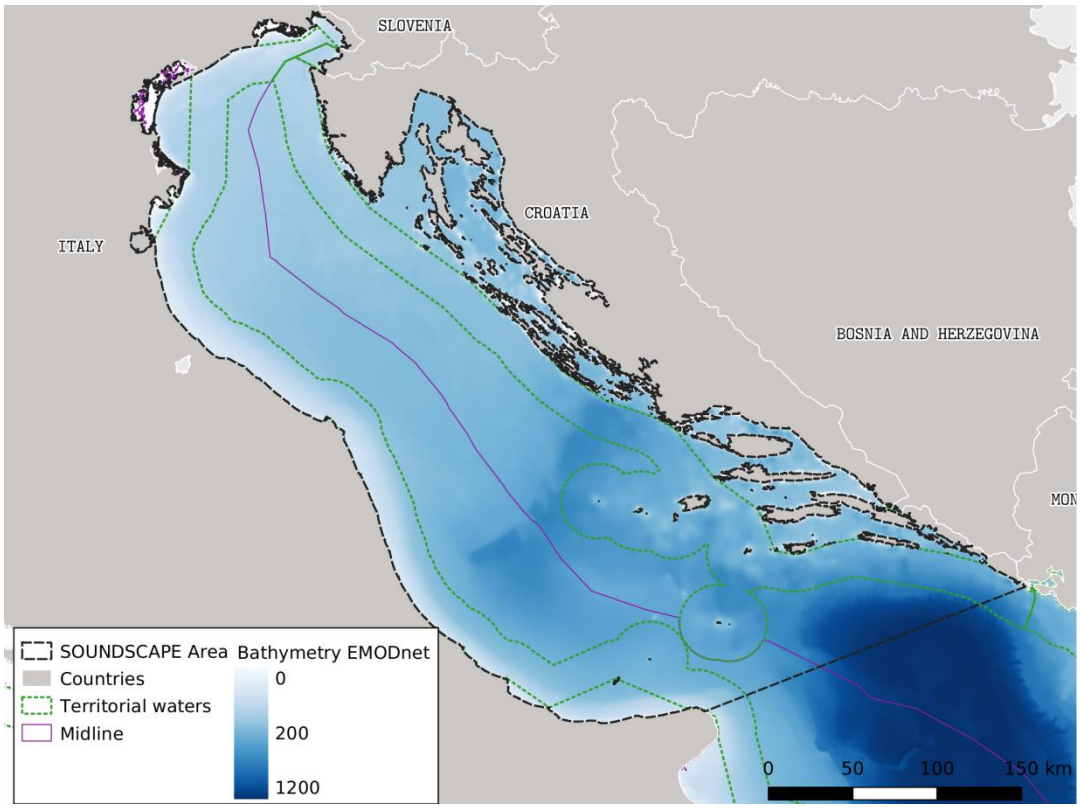
- Digital Terrain Model data: composite data sets produced and delivered by a number of external data providers such as Hydrographic Offices derived from their internal bathymetric database and based upon historic surveys.

- Satellite Derived Bathymetry data: composite data sets produced from Landsat 8 images, in particular for coastal stretches in Greece and Spain.

- GEBCO 2014 30” Gridded data: used to complete area coverage in case there are no survey data or composite data sets available. It is accepted that the accuracy and precision of the gridded data will vary over the basins in question. In case of multiple survey data for a cell, all surveys have been used for the calculations after having filtered datasets not satisfying to the QA/QC criteria.

Description

The Adriatic Sea is a mostly shallow, semi-enclosed and elongated basin, with increasing depth from north to south, with different characteristics and topographic gradients. The bathymetry of the Adriatic Sea shows that the northern Adriatic has a low longitudinal topographic gradient, whereas the maximum shelf gradient along the central Adriatic surrounds the Mid Adriatic Deep, a 260 m deep slope basin.



The southern Adriatic Sea reaches the depth of about 1200 m and is flanked by a steep and rugged slope (Trincardi et al., 2014). The northern section, occupying the flooded seaward extension of the Po Plain and reaching an average bottom depth of about 35 m, is the most extensive continental shelf of the entire Mediterranean Sea, gently sloping down to around 100 m depth to a line between Pescara and Sibenik, where a slope leads to the central basin at depths of 140 -150 m. The central Adriatic is up to 50 km wide, it shows an average depth of 130-150 m, but is also characterized by the presence of the Pomo Depression (Pomo Pit / Jabuka Pit) a complex transverse depression, reaching the depth of 240-

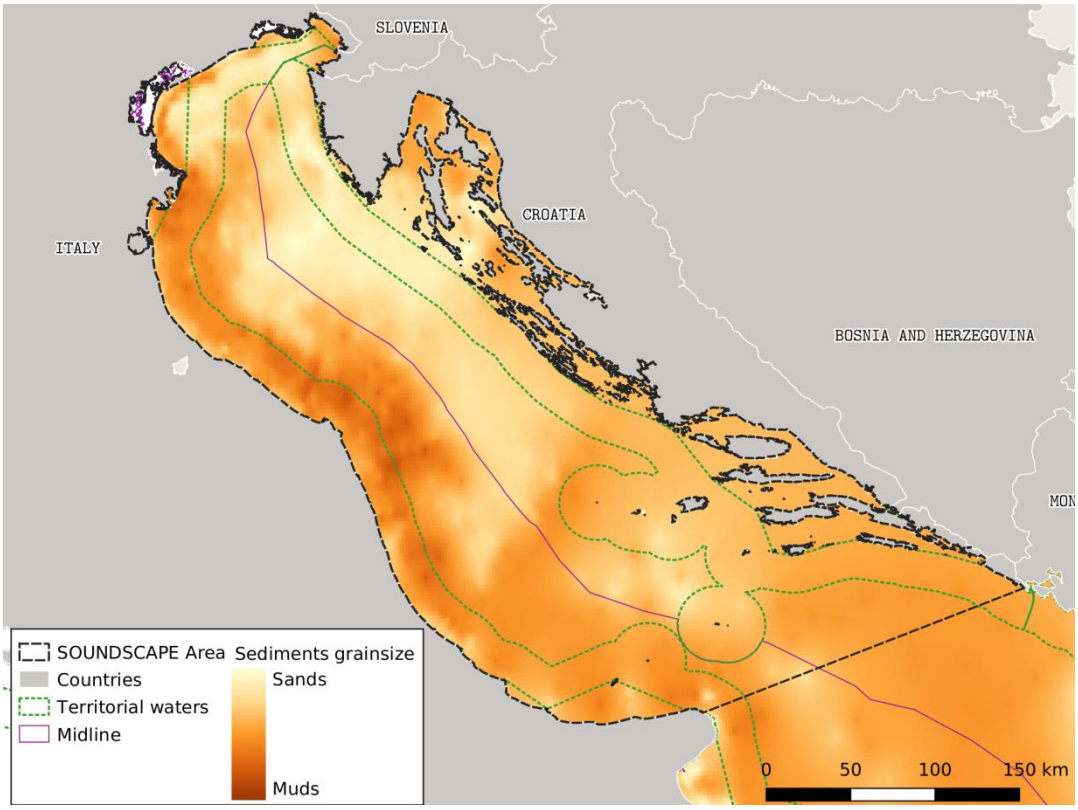
270 m. South of the depression is the morphological elevation known as Palagruzasill.The southern area shows a wide depression (1218 -1225 m deep) and contains a comparatively large bathyal basin.

2.1.2 Seafloor sediment distribution

Source

The seafloor sediment distribution was obtained from the Tools4MSP Geoplatform (http://data.adriplan.eu/). The Tools4MSP Geoplatform (former ADRIPLAN Portal) is a community-based, open source portal based on GeoNode, a web-based Content Management System (CMS) for developing geospatial information systems (GIS) and for deploying spatial data infrastructure (SDI). The Tools4MSP Geoplatform is regularly updated by the Tools4MSP Development Team.

The geotiff of the distribution of sediment grainsize as mean diameter (d50) using phi (licence CC-BY 4.0) is the integration of the latest data acquired in the Adriatic by CNR ISMAR with a database that, for the basin, had been compiled in collaboration with researchers of INSTARR Colorado (Institute for Arctic and Alpine Research), University of Colorado at Boulder European projects EURODELTA and EUROSTRATAFORM PROMESS1 and PALICLAS (dbSEABED: Information Integration System for Marine Substrates). The data d50 of the table from dbseabed, integrated with the more recent data, were interpolated using the form ArcGIS Geostatistical Analyst tool, Kriging (simple).



Description

The Adriatic seabed sediments are predominantly sandy–muddy, while the main clastic sources are located along the western side. While the Italian coast has sedimentary tracts, the Balkan coast is rugged and rocky, that from Istrian Peninsula to Albania delimits the seaward edge of the Karst Plateau, consisting of carbonate rocks and numerous carbonate islands offshore. The western coast is largely sedimentary and tends to be alluvial or terraced, it is low and mostly sandy, while the eastern coast is generally high and rocky. The Croatian coast is one of the most indented in the Adriatic as well as in the Mediterranean with 1.246 islands, islets, and rocks.

The main morphological along Italian coasts features reflect two sets of processes: the modern oceanographic circulation that is distributing sediments along the western coast of the basin and the processes active when global sea level was 120 m lower than today (during the last Glacial Maximum, about 20 kyr BP). Current sea level was reached about 5.5 kyr BP when the north Adriatic turned from a broad alluvial plain in to an epicontinental shelf (Trincardi et al., 1994).Modern processes control the deposition of the Late Holocene mud wedge extending over 600 km along the coast of Italy from the modern Po River Delta to the area south of the Gargano Promontory. Post-glacial sea level rise resulted in the deposition and drowning of coastal sand barriers, which are particularly well preserved in the north Adriatic shelf (Trincardi et al., 2014).

The numerous rivers discharging into the basin plus underground freshwater seeping into the sea along the eastern coast affect the sedimentation with significant inputs of clastic (sandy-clay) materials. The highest area of inflow of fresh water of the entire northern and middle regions of the Adriatic is between the Po and the Isonzo rivers, while between Trieste and Dubrovnik the main flows of freshwater are subterranean, through the coastal edge of the Karst Plateau. The Po river terrigenous supply is composed mainly of pelitic fraction and sand, in consequence the finest sediments are distributed in the more western portion of the basin where the Po river delta is, while the shallow northern and central shelf is mainly characterized by fine sands and sands with more coarse sediments around the eastern coast of the basin.

3 References

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