

Consolidation of Marine Datasets at Marine Biology Station, NODC for Slovenia

Branko Čermelj¹, **Damir Deželjin**², Andrej Rojec²

¹National Institute of Biology, Marine Biology Station Piran, Slovenia
²DEZO Damir Deželjin s.p., Slovenia

Introduction

Environmental awareness in Slovenia has increased in recent years, thanks in part to the increasing level of general education of the population and other factors like various publications regarding climate change, etc. Consequently, the local community expects simple, but still accurate and trustworthy news about the status of the environment and environmental issues to be available.

The National Institute of Biology, Marine Biology Station Piran (MBS), as a NODC for Slovenia, is taking seriously the demand for information about the environmental status of the North Adriatic Sea. Here are just few of the initiatives which address that demand:

- Near Real time oceanographic and weather information are published on the Internet;
- Once a month the oceanographic and ecological status of Slovenian coastal waters is published in an automatic way using Ocean Data View (ODV) as a tool;
- Live underwater video streaming installed in protected area was set up and made available on the Internet;

The precondition for carrying out all these activities is continuous scientific research work supported by measurements, sample collection and data analysis.



Figure 1: Oceanographic buoy Vida is continuously collecting oceanographic and meteorological data.



Figure 2: Free floating floats data loggers.

Data Collection

From the 1980s, MBS has regularly monitored the southeastern part of the Gulf of Trieste (the northernmost part of the Adriatic Sea). This includes conducting regular measurements of seawater temperature, conductivity, depth and other oceanographic parameters as well as chemical and biological analysis of seawater samples collected during sampling cruises.

MBS is also continuously increasing the amount and accuracy of oceanographic data collected. The following list summarizes just a few related activities carried out over the last decade:

- An oceanographic buoy was deployed 2 NM from the local coast. The buoy continuously collects oceanographic data;
- The measurement of sea currents and sea waves became routine;
- A set of free floating floats is deployed periodically for collecting information on sea surface currents, waves, temperature and other data;
- New methodologies and measurements have been introduced for biological and chemical analyses;
- An oceanographic, numerical model for sea status forecast has been developed and will shortly start to be employed on a regular basis.

The increased amount of collected and generated data overtook the legacy data collection and storage methods such as TXT and Excel files. For mitigating these limitations, data have been moved to a relational database.

Consolidation of Marine Datasets

Initially the data was simply moved into a relational database. This was a significant improvement over the usage of TXT and Excel files for data storage. Some of the benefits of the new data organization are:

- The data format was partially consolidated and documented;
- Multiple users gained the ability to access the data concurrently;
- The data passed an additional quality check on import time;
- Data retention policy was introduced

In line with simplification of data access, new demands arose such as utilizing one requirement to be able to associate one type of data with another. An example of this is a query for all existing oceanographic measurement data acquired close to the place and at the time a water sample was taken for chemical analysis.

A project for consolidating the various existing marine datasets and the development of input/output procedures for new data collection was begun and is currently ongoing.

The aim of the project is defining well the relationship between newly collected data and, wherever possible, relating historical marine data sets with one another. A great help towards the achievement of the project targets is the knowhow developed during the SeaDataNet project – e.g. the CSR (Cruise Summary Reports) turned out to be a natural glue between various marine data sets though with some limitations.



Figure 3: The MBS's data warehouse.

General Public Education

In 2011 MBS in collaboration with the Institute for the Protection of Cultural Heritage of Slovenia set up a continuous acquisition of underwater still images from the Madonna Reef sea floor. The images were made available to the public on the Internet. According to our inquiries, this was the first publically available underwater webcam in Europe. Last year an enhancement to the system brought live video streaming capabilities. The live video stream was also made available on the Internet; The streaming service provided by ARNES was well accepted by the public – our monitors detected a pick usage in August 2013 when at a certain time there were several hundred users watching the video stream at the same time.

A publically available bulletin about the environmental status of the Southern part of the Gulf of Trieste is automatically generated on a monthly basis. The bulletin is created from the data collected during regular monthly monitoring of Slovenian coastal waters.

Current oceanographic and weather data from the oceanographic buoy Vida as well as local tidal predictions are accessible on the Internet.

Local mass media rely on MBS for news of the local coastal water environmental status.

MBS is also getting positive feedback from sailors, fishermen, and others.

Future activities

In the future, MBS plans further consolidation of in-house existing marine data sets into a unified data platform that will become the core for further research and environmental data sharing activities. The following list outlines just few projects that will become part of the unified data platform this year and in future years:

- Within the implementation of the Marine Strategy Framework Directive (2008/56/ES) and the Water Framework Directive (2000/60/ES) in Slovenia, a central database for marine biodiversity and abiotic data is being developed. The target is to integrate this Slovenian database into the unified European data platform by 2015.
- A HF radar system is to be installed in the next few months along the Slovenian coast. Paired with a similar system located on the Italian coast, it will monitor sea surface currents, waves and winds all over the Gulf of Trieste (Northern Adriatic). The aim is to improve the early warning system in case of emergencies at sea and at the same time to improve actual knowledge of sea surface water mass movement in the gulf. The integration or at least linkage of these newly acquired data into a new platform is a logical consequence.
- In the future at MBS we plan to enhance the existing platforms such as the automatic sea environmental bulletin creation platform and the oceanographic forecasting model with additional input parameters and thus improve the accuracy of environmental status and sea forecast information.



Figure 4: Underwater live video.

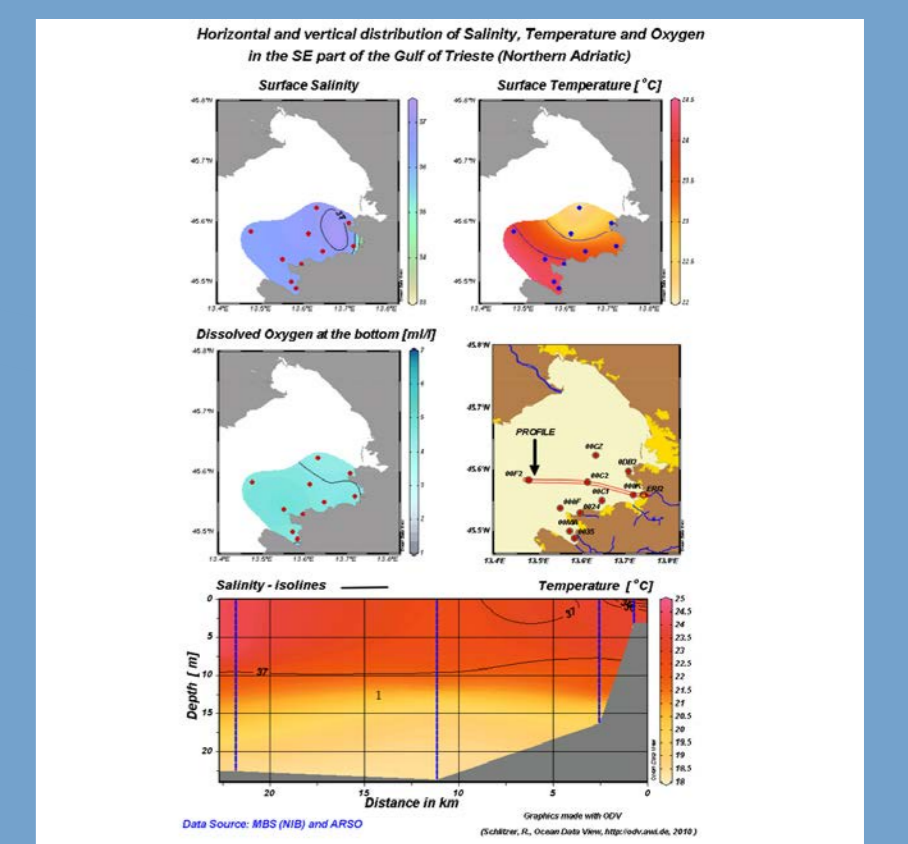


Figure 5: Environmental status of Slovene coastal water.

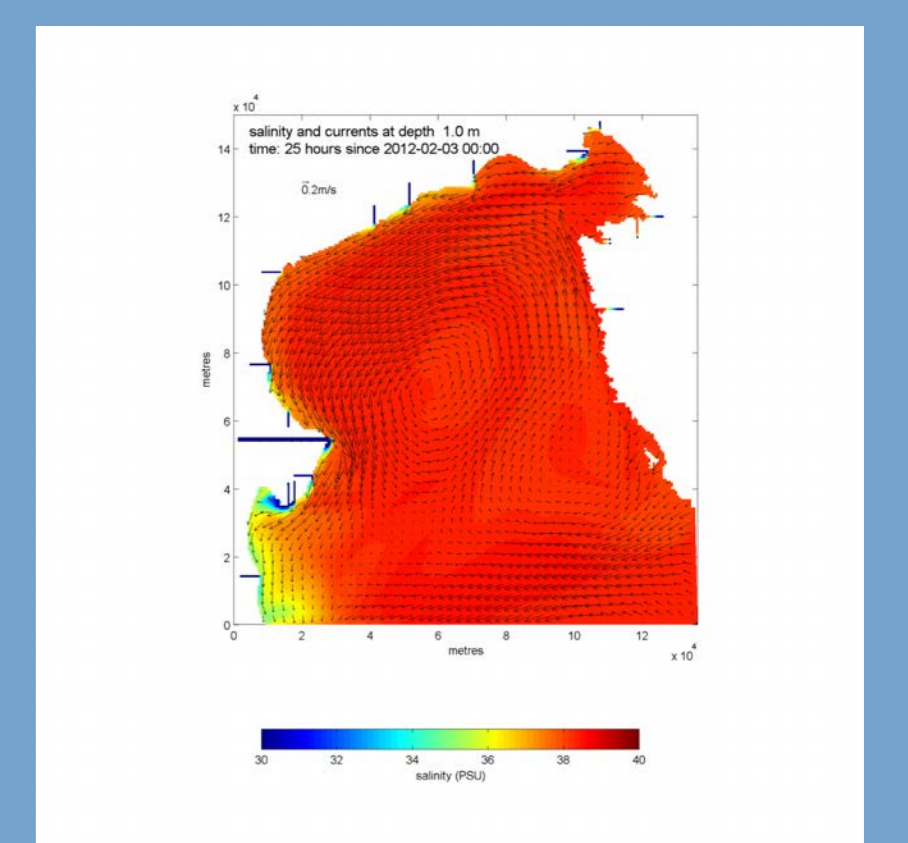


Figure 6: An output of the automatic NAPOM forecast system (photo B. Petelin).

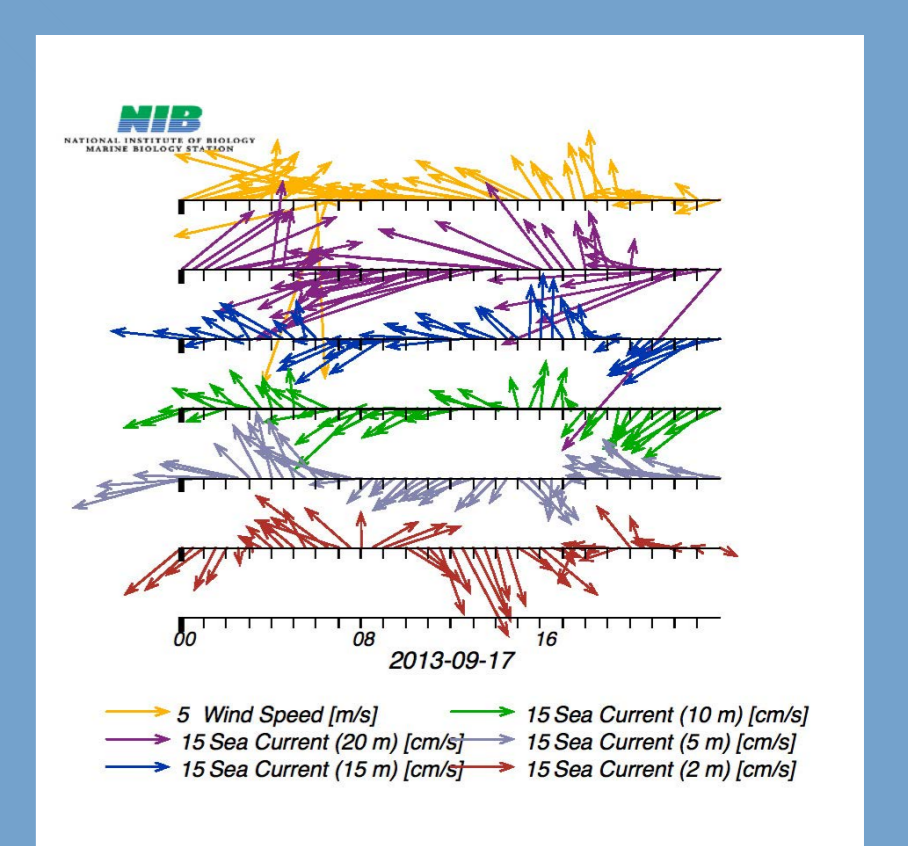


Figure 7: Oceanographic and meteorological status plot of data collected by the Oceanographic Buoy Vida - showing wind and sea currents vectors.