



DHI SOLUTION

MEDITERRANEAN WIND WAVE MODEL (MWM)

High resolution historical database for wind and wave hindcast conditions in the Mediterranean Sea

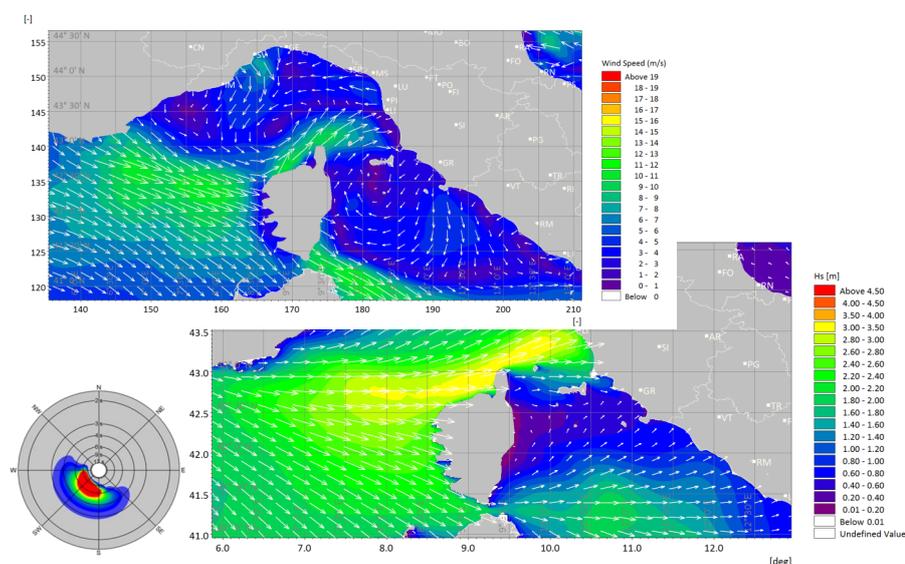
The availability of reliable wind and wave data is of primary importance in planning and managing operations at sea. A wide range of sectors of activity – such as coastal engineering, oil and gas, civil protection, renewable energy, design of offshore structures, and planning of operations at sea and beyond – can benefit from the availability of accurate wind and wave data.

DATASET FOR THE COMPLEX MEDITERRANEAN SEA

Today, the availability of reliable data is often very limited, due to the small number of measurements at sea and, where applicable, the number of years recorded.

In addition, the high complexity of the Mediterranean Sea, which is characterised by large variability of wind and wave conditions in relatively small temporal and spatial scales, also requires extensive knowledge of local physical phenomena at proper temporal and spatial resolution.

DHI and HyMOLab developed a complex dataset of wind and wave conditions (hindcast) at high temporal and spatial resolution for the entire Mediterranean Sea, which provides a robust and reliable answer to the above issues.



Wind fields (upper left) and wave fields (lower right) – Ligurian Sea and North Tyrrhenia Sea. Polar plot of spectral wave energy (lower left).

IN PARTNERSHIP WITH



CLIENT

- Oil and gas companies
- Renewable energy companies
- Port and terminal operators
- Civil and naval construction companies
- Environmental consulting companies
- Insurance companies
- Civil protection authorities

CHALLENGE

Need for wind and wave hindcasts of the Mediterranean Sea in order to:

- design offshore structures such as platforms, pipelines and liquefied natural gas (LNG) facilities
- design coastal structures such as ports and coastal protection
- design vessels
- optimise ship routes
- stimulate historical events to conduct risk analyses

SOLUTION

- Developing a modelling chain using state-of-the-art numerical models
- Model calibration
- Using comparisons of model data, in-situ data and satellite data to ensure extensive validation
- Implementing a forecast service to support the planning of operations at sea

VALUE

- Reliable wind and wave data to be used when measurements are not available
- Wind-wave dataset wider than other available databases
- Dedicated services and technical support

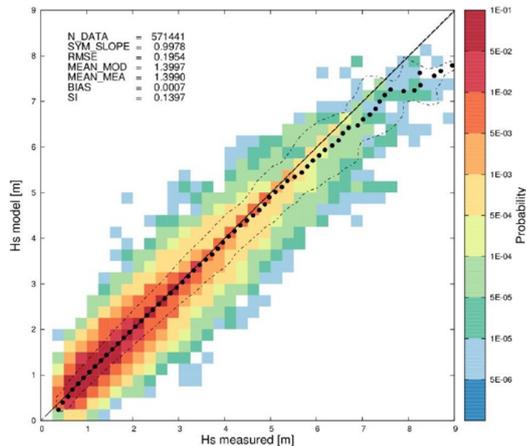
THE MODELLING SYSTEM

The Mediterranean Wind Wave Model (MWM) database is the result of implementing a modelling chain that combines two state-of-the-art models for atmospheric modelling. The first—Weather Research and Forecasting (WRF)-Advanced Research of WRF (WRF-ARW)—is a widely used non-hydrostatic open source model and the second—MIKE 21 SW—is a wave model developed by DHI and widely used in thousands of offshore and coastal applications worldwide.

Several technical and scientific challenges have been addressed in the production of the database:

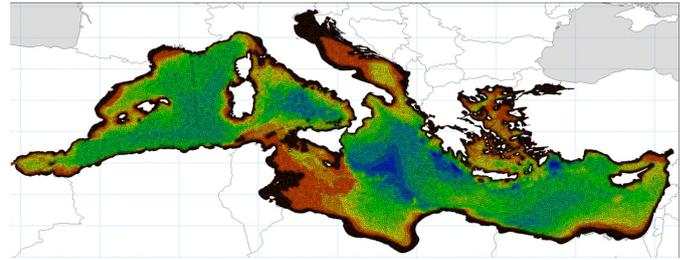
- the computational effort for simulating a long-term analysis at high resolution, which required the use of a powerful High Performance Computing (HPC) infrastructure
- the huge storage capacity needed to save both wind-wave parameters and wave energy spectra
- the implementation of complex and robust procedures for model validation, data handling and simulation control

THE MWM DATABASE OFFERS YOU:



Probability Scatter Plot of Hs (Significant Wave Height) - comparison of model data vs satellite data (ENVISAT)

- 35 years of historical data (1980-2014)
- wind and wave parameters (wind speed and direction, wave height, direction and periods)
- spectral data (available on a 0.1° grid for the whole



Bathymetry data on a flexible mesh of the Mediterranean Sea

Mediterranean Sea)

- line series to be used as boundary conditions of local scale wave models
- ordinary and extreme wind and wave conditions
- statistical processing of data
- specific products and analyses at higher resolution upon request

BENEFITS OF THE MWM

Compared to other available hindcast datasets, MWM has a number of features which makes it the main reference in the Mediterranean Sea, in particular:

- the high resolution (up to 0.03° for the wave model, never lower than 0.1° for both wind and wave models) allows a proper simulation of local dynamics
- the specific calibration based on measured data, both for ordinary and extreme conditions
- the validation against satellite data over the entire Mediterranean Sea, through robust and innovative procedures
- state-of-the-art numerical models, used in thousands of applications worldwide
- the technical support from our team of experts
- readily available data
- Dedicated studies and data processing upon request

MORE THAN JUST HISTORICAL DATA

In addition to the historical hindcast database, a forecast service for wind and wave in the Mediterranean Sea is also available. The system can be activated upon request and configured according to specific requirements.

ABOUT DHI AND HYMOLAB

DHI are the first people you should call when you have a tough challenge to solve in a water environment. In the world of water, our knowledge is second-to-none, and we strive to make it globally accessible to clients and partners. So whether you need to save water, share it fairly, improve its quality, quantify its impact or manage its flow, we can help. Our knowledge, combined with our team's expertise and the power of our technology, hold the key to unlocking the right solution.

HyMOLab (Hydrodynamics and Met-Ocean Laboratory) is a structure of the Department of Engineering and Architecture of the University of Trieste (Italy). The HyMOLab group of researchers has operated for years within the fields of naval and Metocean engineering, with self-owned software and High Performance Computing facilities (HPSC).

Contact: info@dhigroup.com

For more information visit: www.dhigroup.com