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The COASTAL CRETE downscaled forecasting system

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COASTAL & MARINE RESEARCH LABORATORY
IACM - FORTH

ORION Joint Research & Development Center

MEEO
Meteorological Environmental Earth Observation

COASTAL CRETE

at a glance

- ✓ A high-resolution operational forecasting system for the coastal area of Crete
- ✓ Implements advanced numerical hydrodynamic and sea state models nested in CMEMS Med MFC
- ✓ Provides, on a daily basis, 5-days hourly forecasts of currents, sea temperature, salinity, wave characteristics
- ✓ Downscaled high-resolution COASTAL CRETE forecasts are used in maritime safety and coastal management & monitoring

On demand simulation of different response actions in case of a pollution accident.

Early warnings and alerts (e.g. warn me when the waves are higher than 5 meters from north).

COASTAL CRETE

The partners

❖CMRL conducts basic research and provide research and consultancy services to the private and public sectors in the field of marine monitoring & forecasting.

❖MEEO is devoted to the development and implementation of products and services for the public and private sector based on remote sensing of the Earth-Atmosphere system.

❖ORION works towards for the development of operational information systems and forecasting of environmental phenomena in the Eastern Med Sea.

❖CMRL (est. 2006, Hellas): N.A. Kampanis, K. Spanoudaki, G. Alexandrakis, G.V. Kozyrakis

❖MEEO (est. 2004, Italy): M. Folegani, D. Barboni, M. L. Quarta

❖ORION (est. 2014, Cyprus): G. Zodiatis, R. Lardner, E. Zhuk, M. Nikolaidis

COASTAL CRETE

context and description

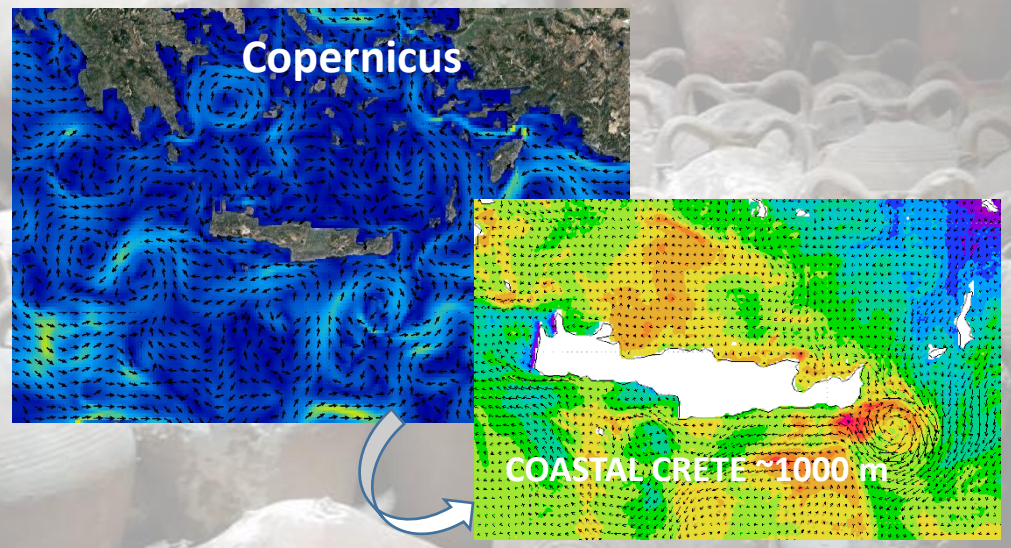
EMODNET Bathymetry & local measurements

Copernicus Med MFC initial & boundary conditions

ECMWF surface forcing & local meteorological data

EO SST, Sea level anomaly Mooring time series

COASTAL CRETE high-resolution (1/120°) hydrodynamic model: forecasts of currents, SSH, T, S



COASTAL CRETE wave model (the latest ECMWF WAM CY46R1 parallel version) series of nested models of increasing resolution - 1/120° to ~250 m -

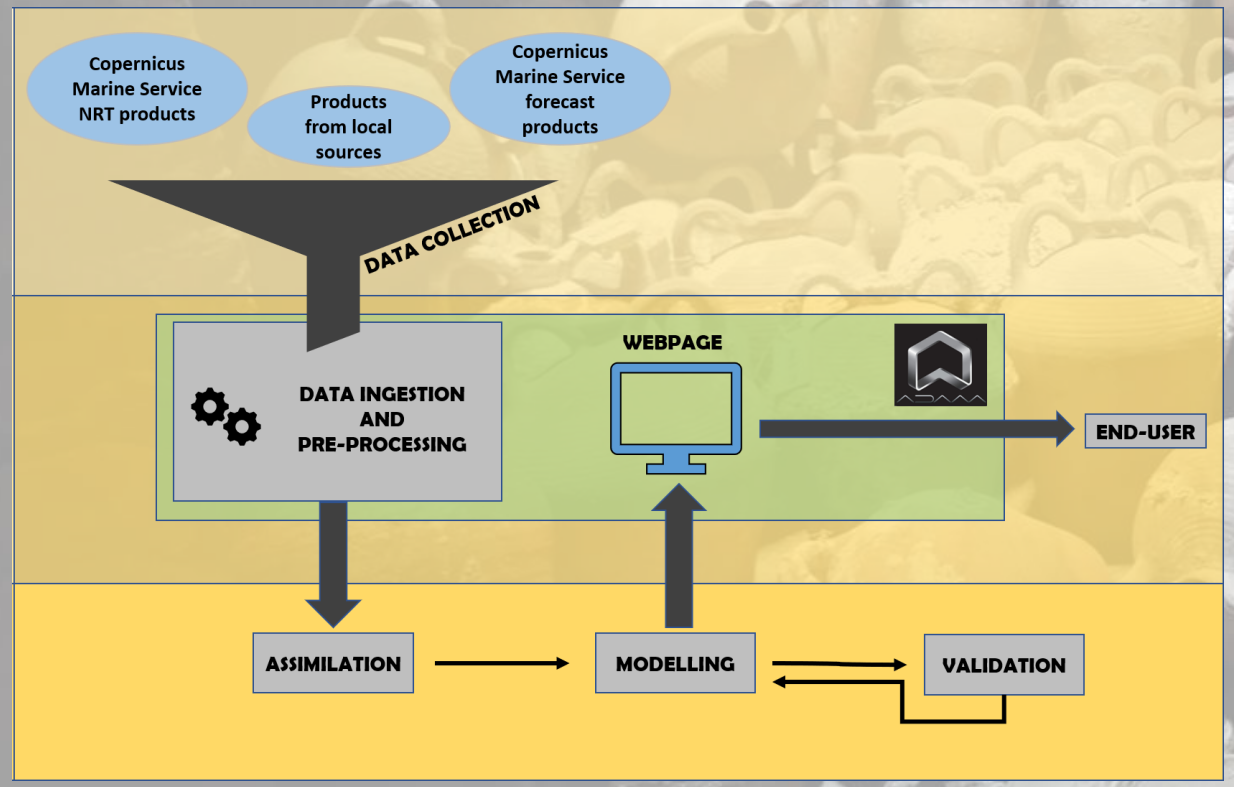
Marine variables

Maps, information services, warning & alerts

COASTAL CRETE

context and description

✓ Copernicus Marine Service products play a key role in the operational forecasting chain providing the required initial and open boundary conditions to run the series of nested hydrodynamic and wave models



Analysis and Forecast

✓ Mediterranean Sea Physics Analysis and Forecast
MEDSEA_ANALYSIS_FORECAST_PHY_006_013

✓ Mediterranean Sea Waves Analysis and Forecast
MEDSEA_ANALYSIS_FORECAST_WAV_006_017

Observations

✓ Mediterranean Sea High Resolution and Ultra High Resolution Sea Surface Temperature Analysis
SST_MED_SST_L4_NRT_OBSERVATIONS_010_004

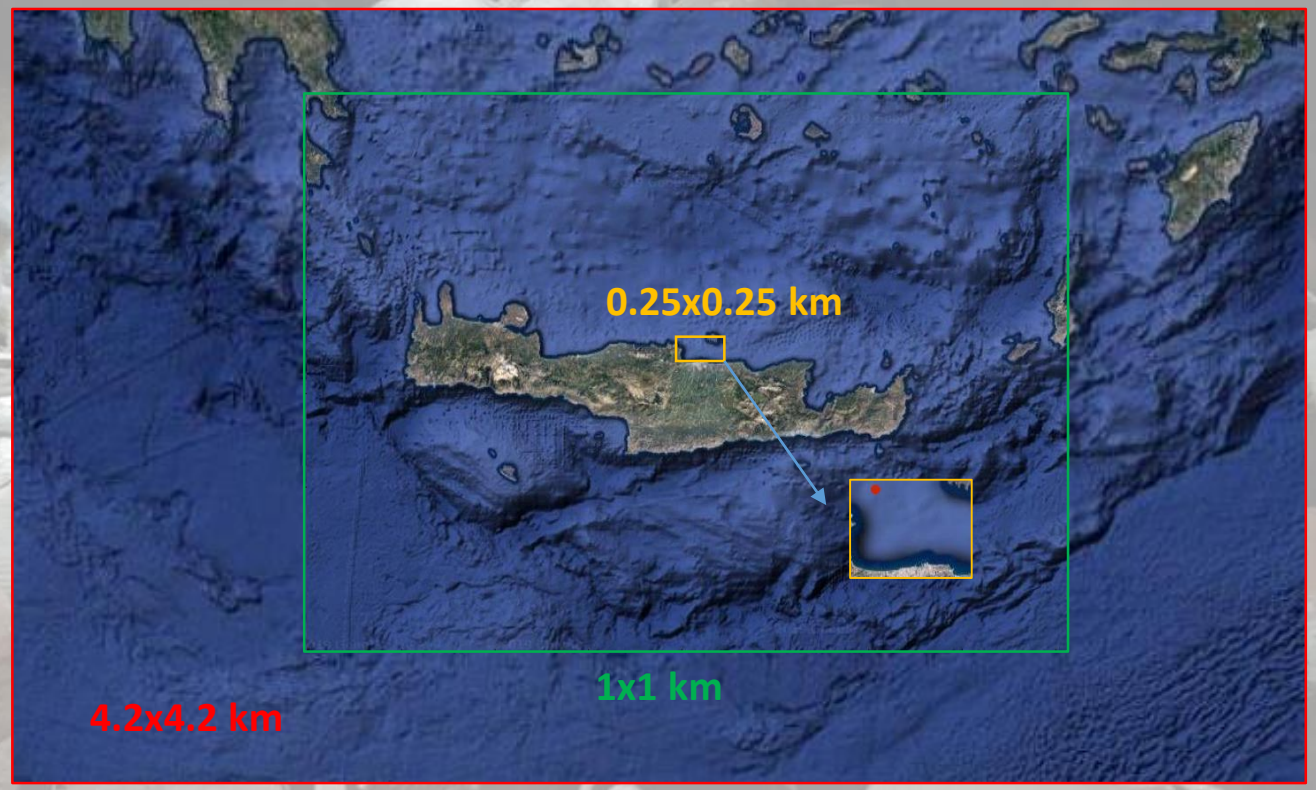
✓ Mediterranean Sea- In-Situ Near Real Time Observations
NSITU_MED_NRT_OBSERVATIONS_013_035

✓ MEDITERRANEAN SEA GRIDDED L4 SEA SURFACE HEIGHTS AND DERIVED VARIABLES NRT
SEALEVEL_MED_PHY_L4_NRT_OBSERVATIONS_008_050

COASTAL CRETE

context and description

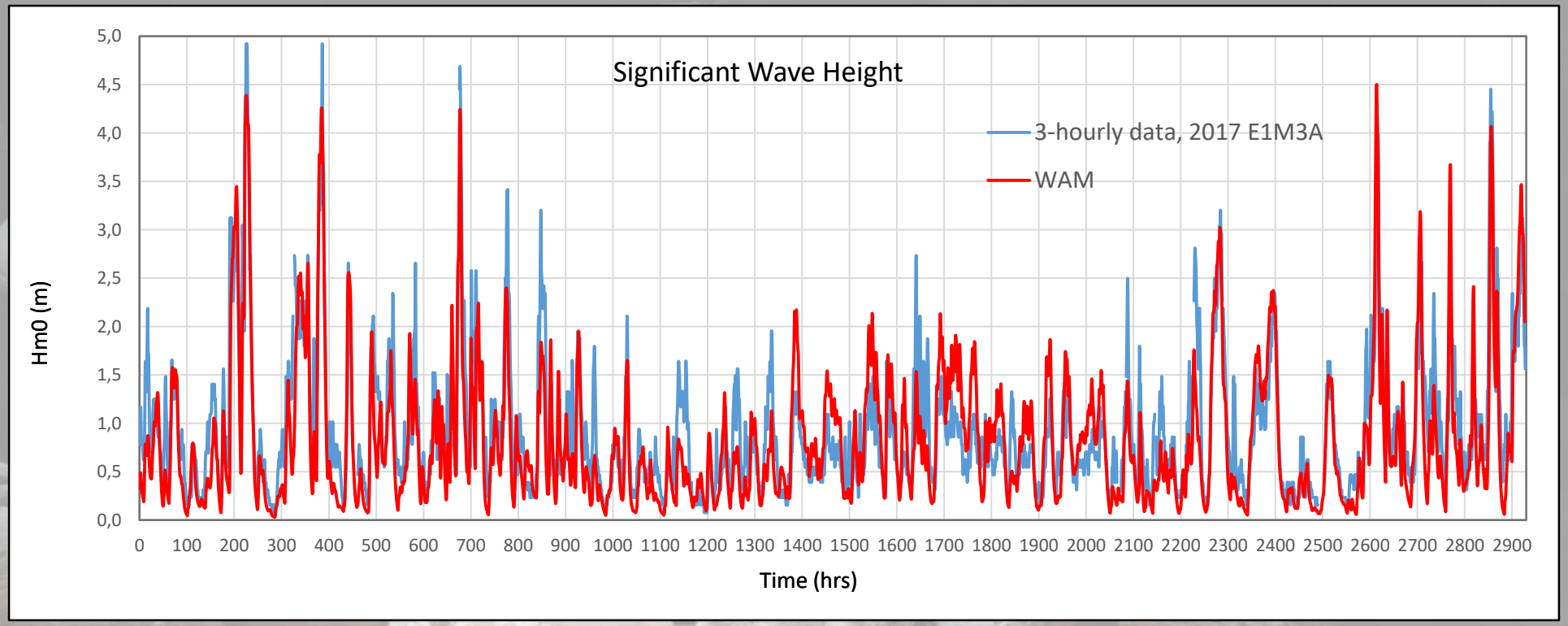
COASTAL CRETE wave model



Series of computational grids (nesting)

COASTAL CRETE

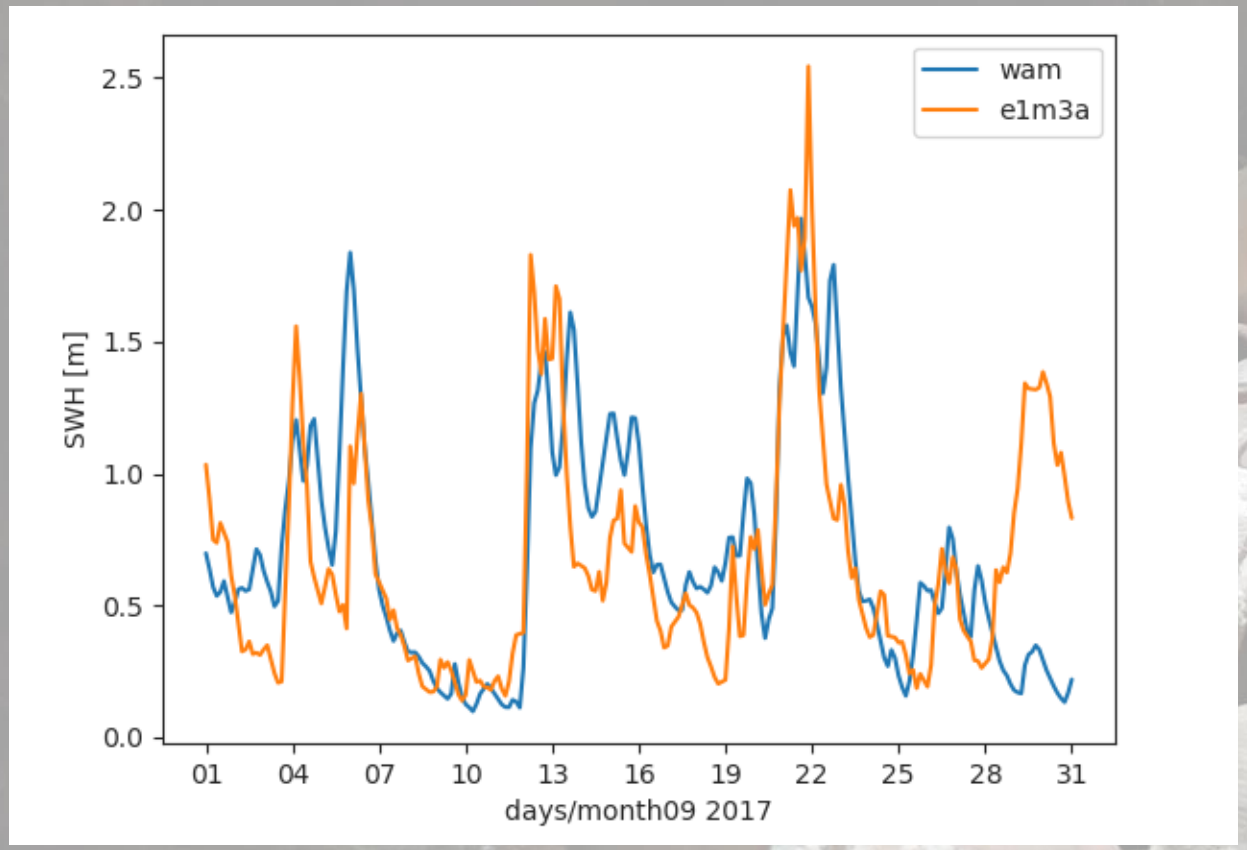
context and description

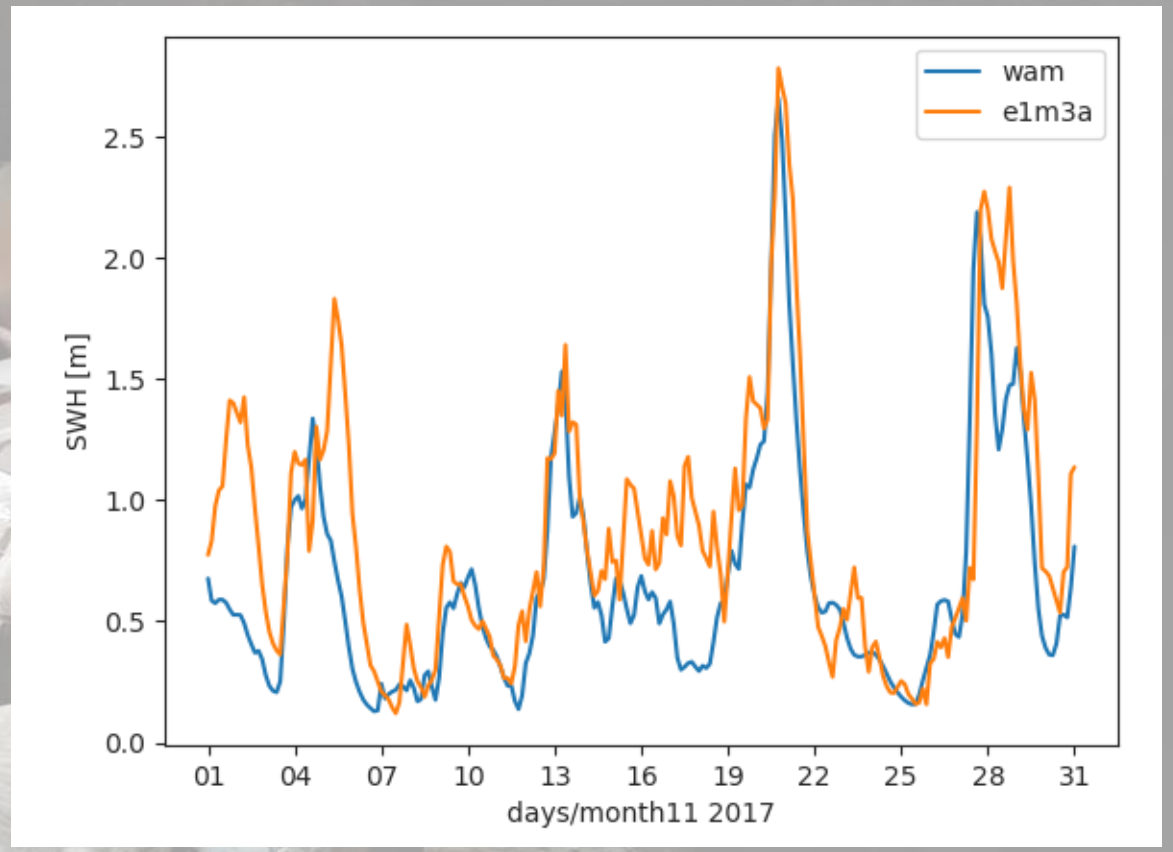


2nd grid, hindcast, comparison with HCMR buoy E1M3A data, 2017, ERA 5 wind forcing

COASTAL CRETE

context and description

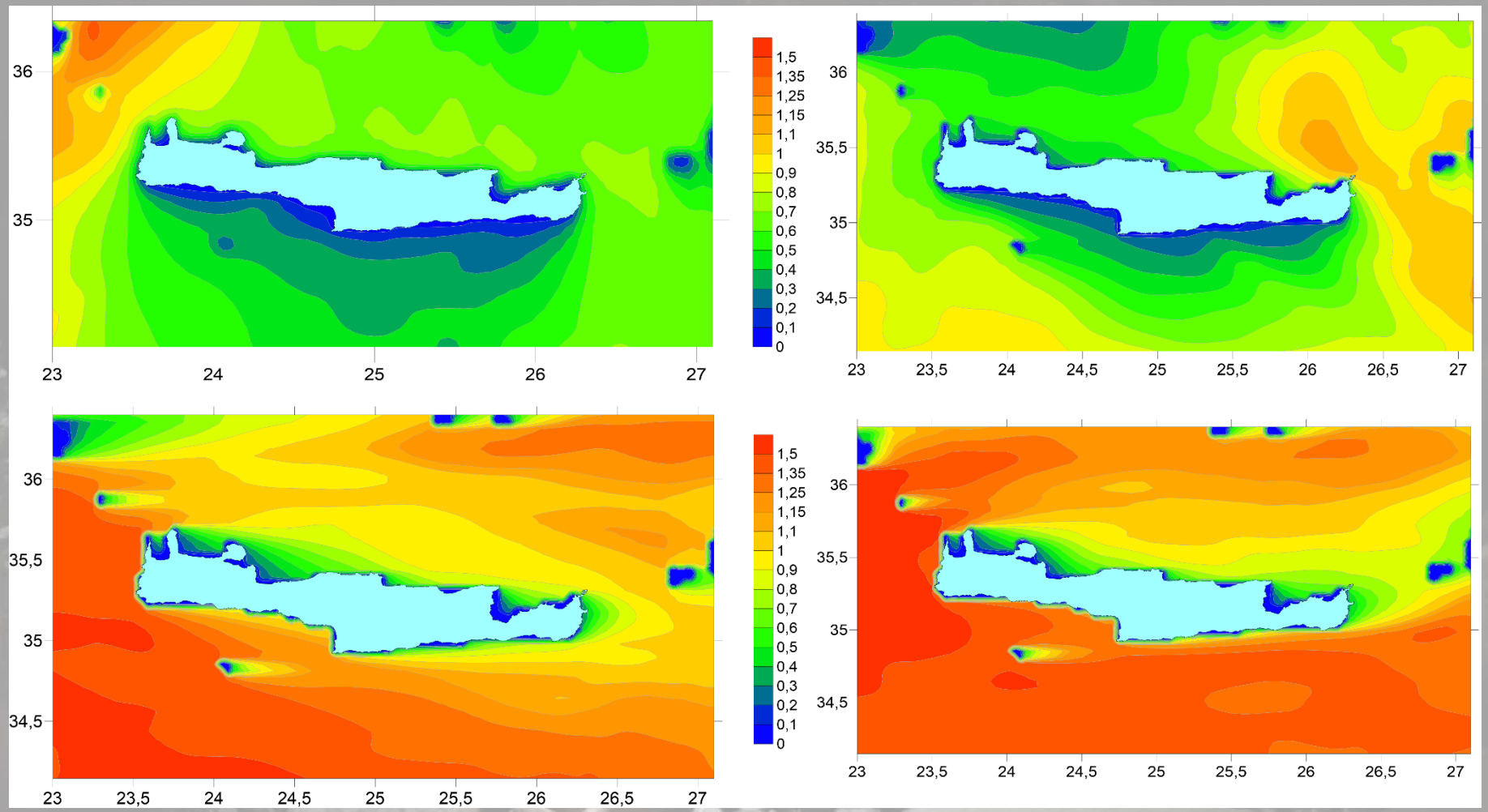




2nd grid, hindcast, comparison with HCMR buoy E1M3A data, 2017, ERA 5 wind forcing

COASTAL CRETE

context and description



2nd grid, hindcast, January 2017

(2017-1-1 00:00, 2017-1-2 12:00, 2017-15-1 12:00, 2017-19-1 00:00)

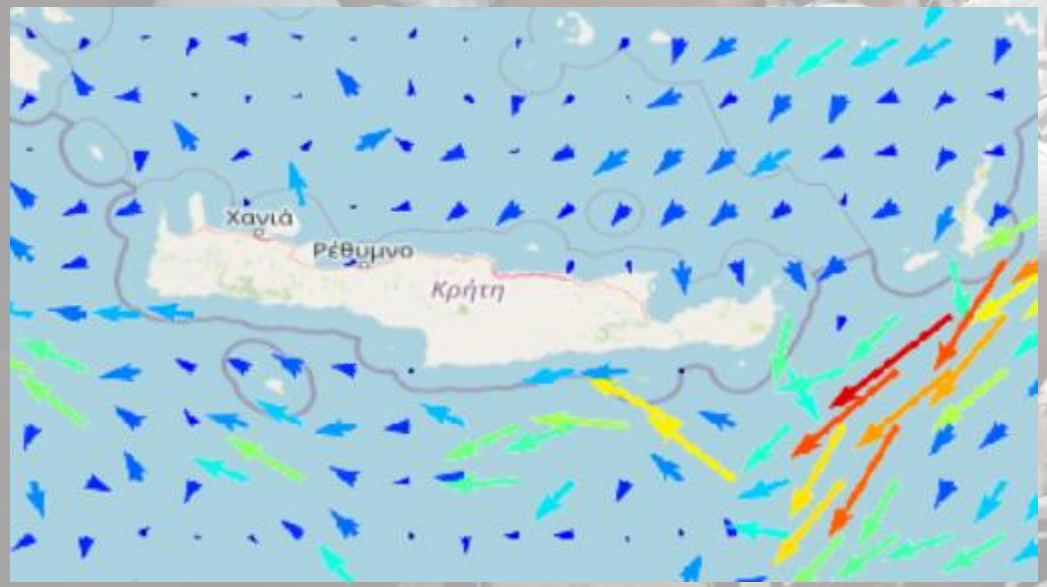
COASTAL CRETE

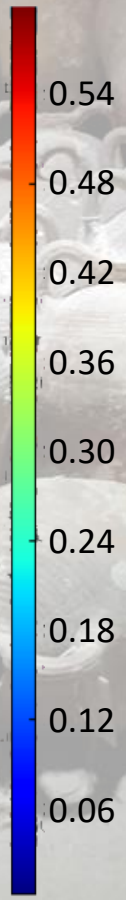
context and description

❖The COASTAL CRETE high-resolution (~1km) hydrodynamic model is based on a modified POM novel parallel code previously implemented by the CYCOFOS in the Eastern Mediterranean and the Levantine Basin

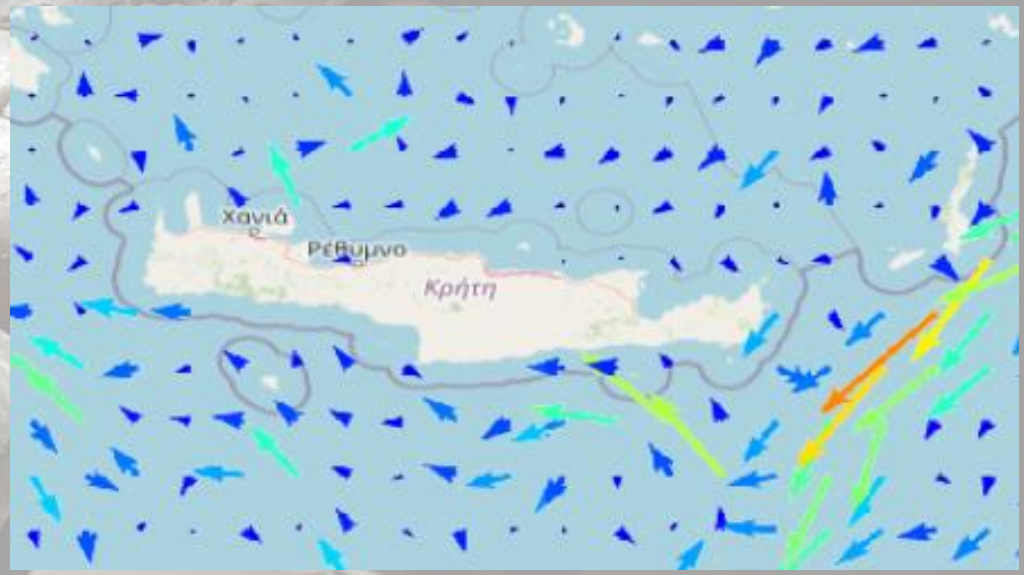
forecast

8-5-2020 03:00





9-5-2020 03:00

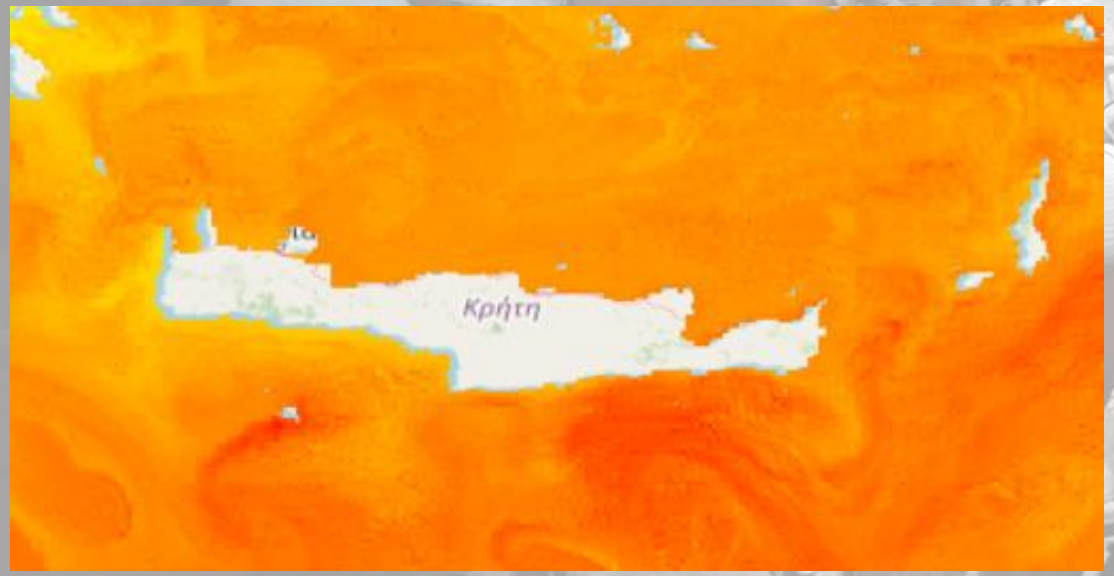


COASTAL CRETE

context and description

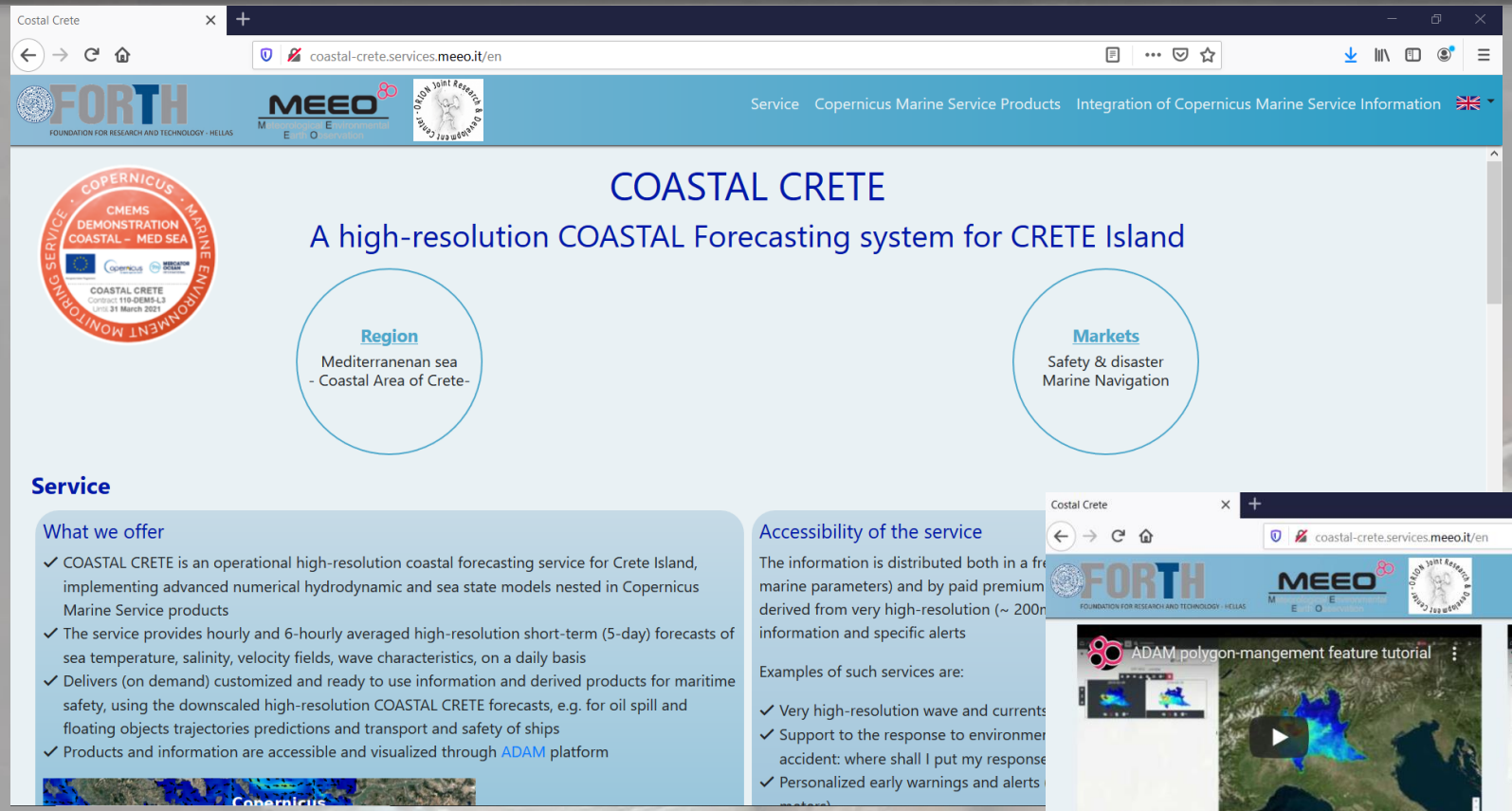
forecast

8-5-2020 03:00

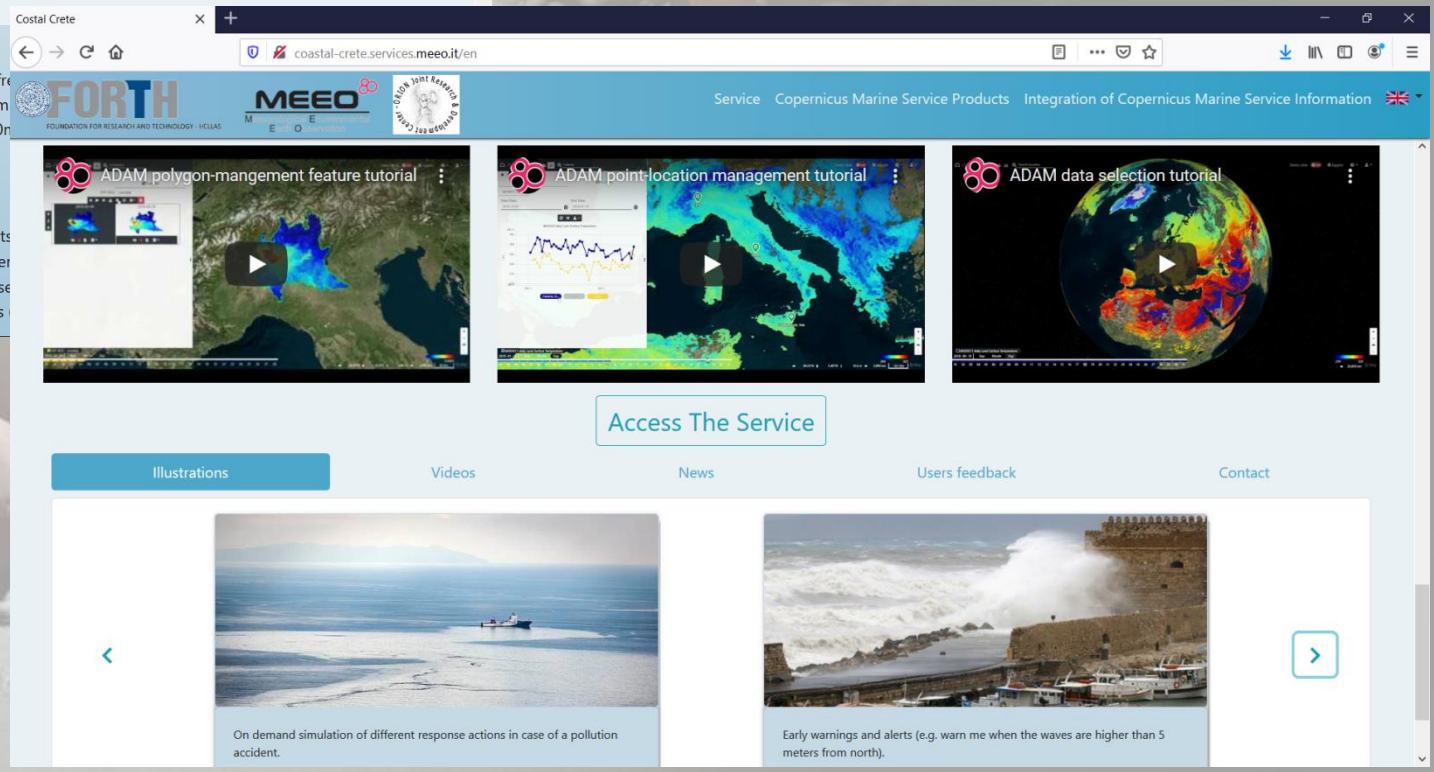


9-5-2020 21:00

COASTAL CRETE SERVICES



ADAM provides automatic data exchange management capabilities between the CMEMS Med MFC and the COASTAL CRETE models, enabling data visualization, combination, processing and download through the implementation of the Digital Earth concept.



The harvesting of the CMEMS Med MFC products has been set in an automatic way and managed through the EODATASERVICE technology developed by MEEO, i.e. **ADAM** (Advanced geospatial Data Management platform - https://adamplatform.eu/).

COASTAL CRETE SERVICES

On demand simulation of different response actions in case of a pollution accident.

Early warnings and alerts (e.g. warn me when the waves are higher than 5 meters from north).

Accesibility of the service

The information is distributed both in a free public basis (high-resolution short-term forecasts of marine parameters) and by paid premium services. Premium services may include information derived from very high-resolution (~ 200m) forecasts, non-public local data, user tailored information and specific alerts. Examples of such services are:

- ✓ Very high-resolution wave and currents forecasts
- ✓ Support to the response to environmental hazards such as oil spills (there was a pollution accident: where shall I put my response effort ?)
- ✓ Personalized early warnings and alerts (e.g. warn me when the waves become higher than 5 meters)

End users

COASTAL CRETE services are addressed both to the public and private sector. Examples of users in the coastal area of Crete are port authorities (e.g. Heraklion Port Authority S.A., Souda Port), the Hellenic Coast Guard, the shipping sector, oil and gas companies, the Region of Crete.

Acknowledgment: Copernicus Marine Environment Monitoring Service (CMEMS) DEMONSTRATION COASTAL-MED SEA. COASTAL-CRETE, Contract: 110-DEM5-L3.