“Operational oceanography and coastal forecasting” Joint Research Activity Project in JERICO-NEXT, the European Coastal Observatory Network

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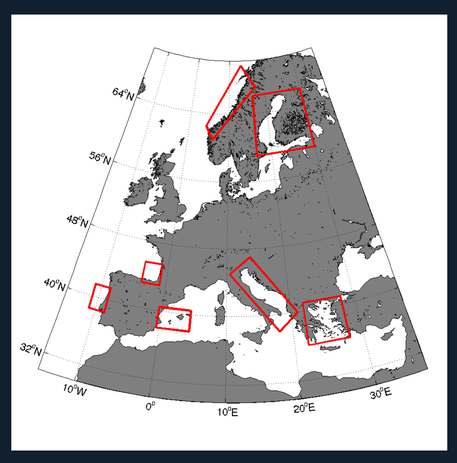
JERICO-NEXT is a research infrastructure project (2015-2019) from the European Commission H2020 programme, aiming to strengthen and enlarge a solid and transparent European network of coastal observatories as initiated in the framework of the JERICO project (FP7 – 2011-2015). The overarching objective is to provide operational services for the timely, continuous and sustainable delivery of high quality environmental (physical, biogeochemical and biological) data and information related to the marine environment in European coastal seas. As part of JERICO-NEXT, six Joint Research Activity Projects (JRAPs) have been defined to foster technology developments and demonstrate new methodologies. These JRAPs focus on: (1) pelagic and (2) benthic biodiversity, (3) chemical contamination, (4) hydrography and transports, (5) carbon fluxes and (6) coastal forecasting.
We present here the JRAP#6 project on operational oceanography and coastal forecasting. The specific objective is to show the importance of JERICO-NEXT coastal observations from HF radar, gliders, moorings and FerryBox for the assessment and improvement of operational coastal prediction systems.

1 Seven coastal areas in the European seas

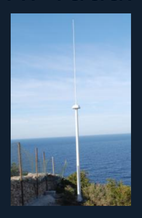


Oceanographic processes:

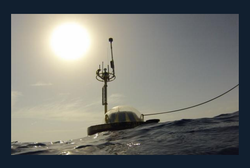
- Upwelling
- Slope currents
- Wind-driven circulation
- Mesoscale
- Water mass formation and spreading
- River plumes and fjords
- Flow deformation by submarine canyon
- Wave-induced turbulence

Coastal observing platforms

HF radar

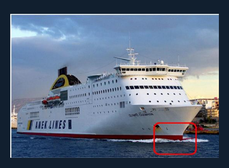


Mooring



Glider

FerryBox



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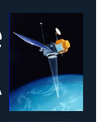
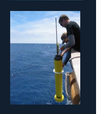
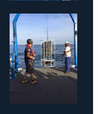
Satellite SST, SLA



Argo



CTDs



Models and data assimilation

Models: ROMS, HOPS, NEMO, POM, WAM → spatial resolution ~1km
Data assimilation: OI, EnOI, EnKF, SEEK

3 Observing System Experiments

OSEs will be performed in 2018, evaluating the impact of:

- HF radar in the Ibiza Channel
- HF radar and buoys in the Adriatic Sea
- Glider and FerryBox in the Aegean Sea
- HF radar and buoys off the West coast of Portugal

4 Observing System Simulation Experiments

Calibrated OSSEs will be performed when possible, using parallel OSEs experiments, to study of the impact of :

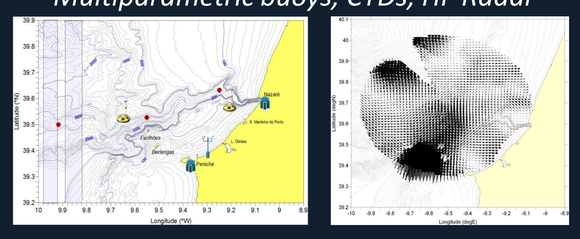
- different deployment strategies for HF radar in Ibiza Channel and Adriatic Sea
- T-S profiles from a cruise in a large area off the West coast of Portugal

2 Model assessment: examples

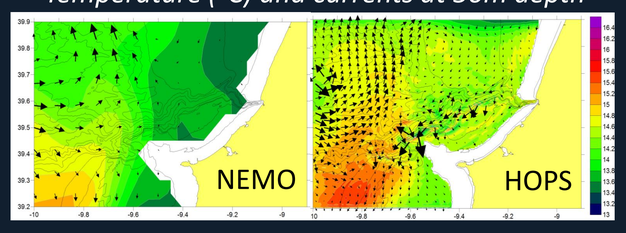
1 Atlantic Iberian margin

Impact of changing winds and influence of the Nazare canyon on the upwelling and slope current

Multiparametric buoys, CTDs, HF Radar

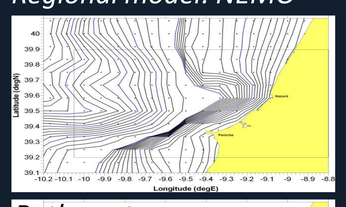


Temperature (ºC) and currents at 50m depth

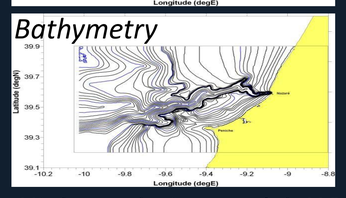


Acknowledgment: Mercator-Océan, Puertos del Estado, CMEMS

Regional model: NEMO



Bathymetry

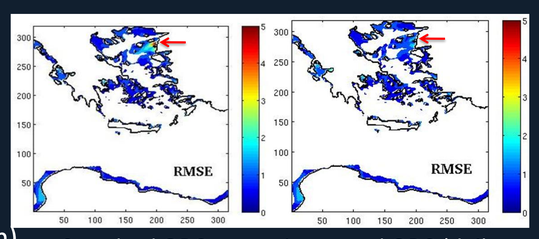


High-resolution model: HOPS

2 Aegean Sea

Impact of POM model open boundary conditions at Dardanelles Strait

Surface temperature RMSE (ºC, color limited to areas with depth of the first model level <1m)



Standard OBC

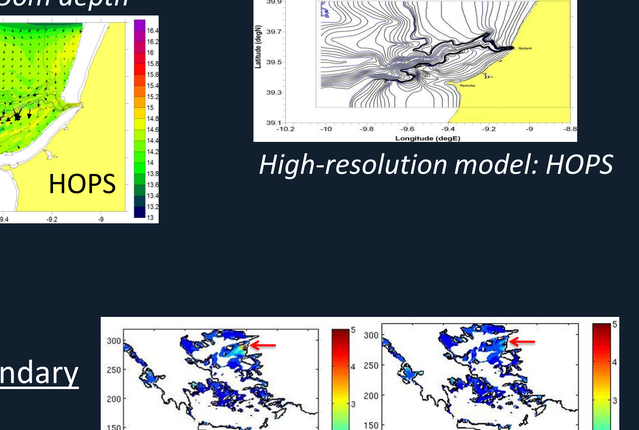
Improved OBC (daily, Maderich et al., 2015)

3 Balearic Sea

Meridional exchanges through the Ibiza Channel

Mooring, glider, HF radar

Hovmöller diagram of meridional velocities (m/s) at 38.7ºN (positive northward)



5 Conclusions

The ongoing JERICO-NEXT JRAP6 project, ending in August 2019, will provide coastal model assessment, OSEs and OSSEs experiments in seven European coastal areas. The project is expected to show the importance of coastal observation platforms for the assessment of coastal prediction systems, leading to recommendations both in terms of modelling strategies and optimal observation sampling.