

Projects in CoastPredict:

- P9. NAVigating in the COASTal ocean
- P10. Support for marine pollution in coastal zones

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P9. NAVIgating in the COASTal ocean



P9. NAVIgating in the COASTal ocean

NAVICOAST will target the sector of **Short Sea Shipping (SSS)** from the standpoint of the **coastal ocean** framework



Large fishing vessels



ro-ro cargo ships



ferries



short-sea vehicle carriers



service vessels

NAVICOAST will involve three main interrelated activities:

Act. 1) Advanced meteo-oceanographic routing for SSS

High resolution and high accuracy (currents and waves) of coastal ocean modelling; safety of navigation (forecast for extreme events); coastal MPAs; vessel hydrodynamics (waves and wind); impact of CC on navigation (T&S, sea level).

Act. 2) Navigation in busy waterways

people mobility data; ship activity data; satellite and drones data; AI methods

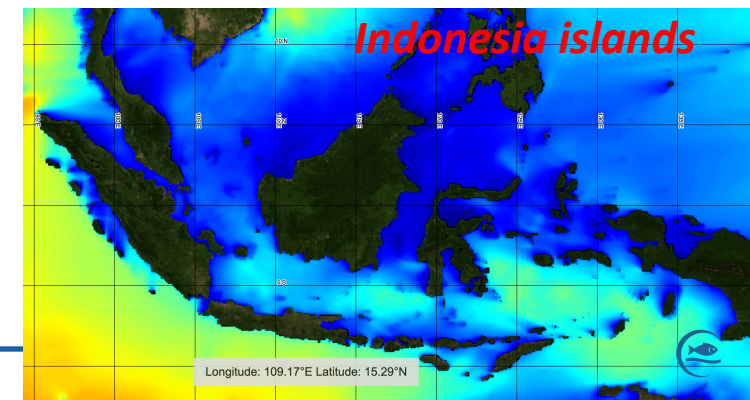
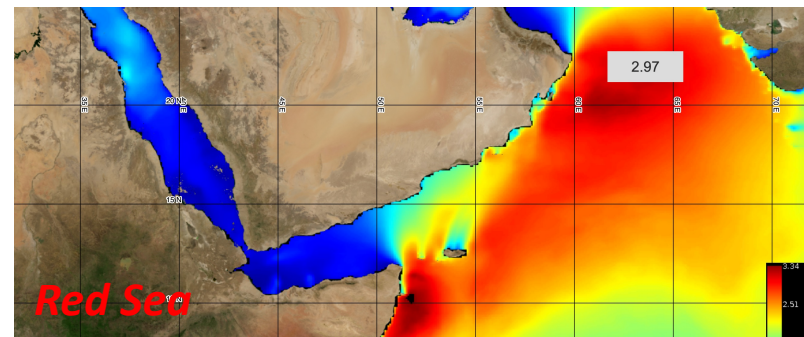
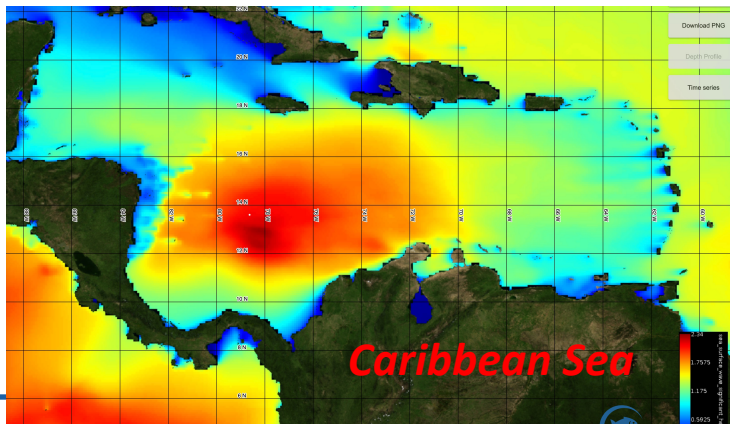
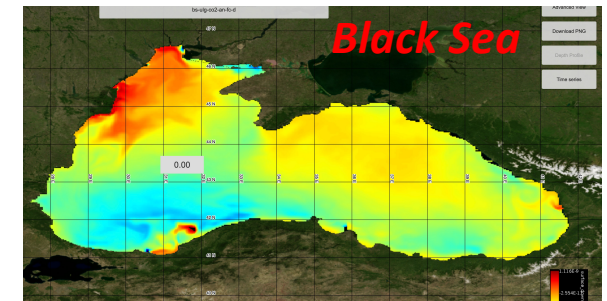
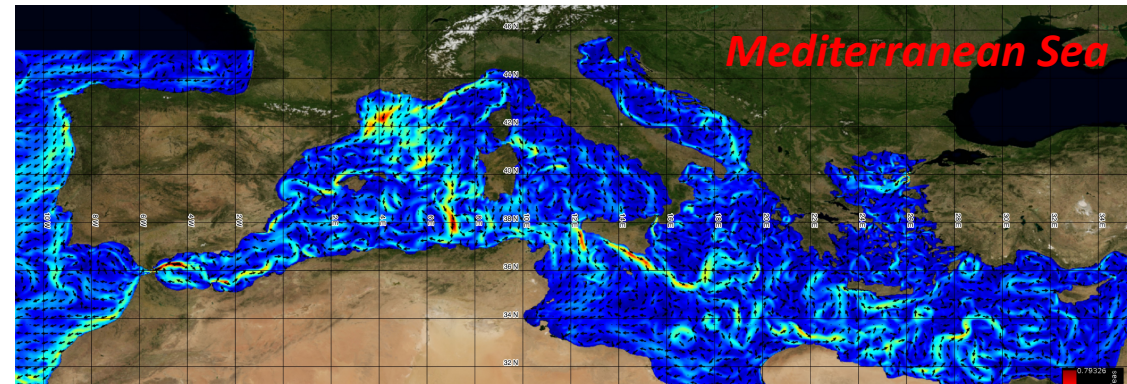
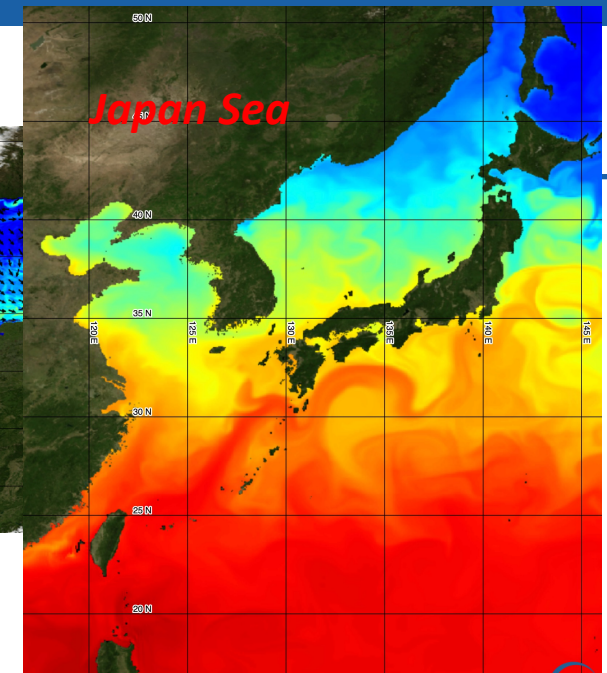
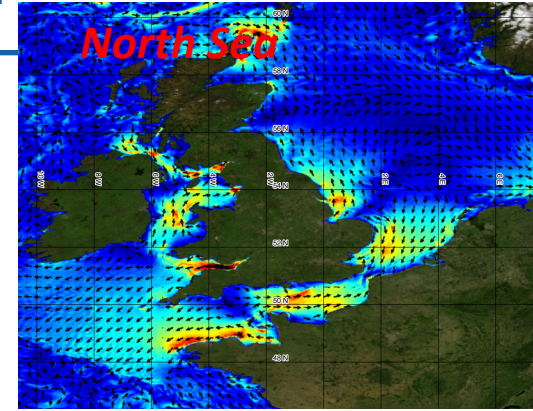
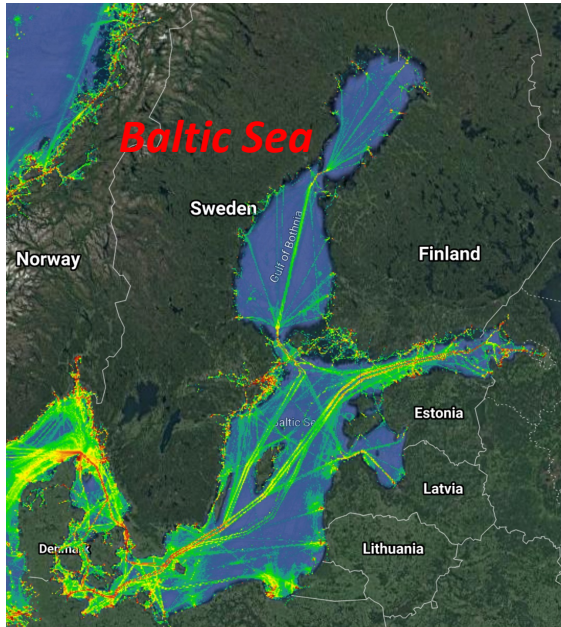
Act. 3) Emissions into both air and water

climate (all GHGs, not just CO₂); air quality (SO_x, NO_x, PM, etc.); emissions into water; underwater noise



P9. NAVIgating in the COASTal ocean

Geographical domains

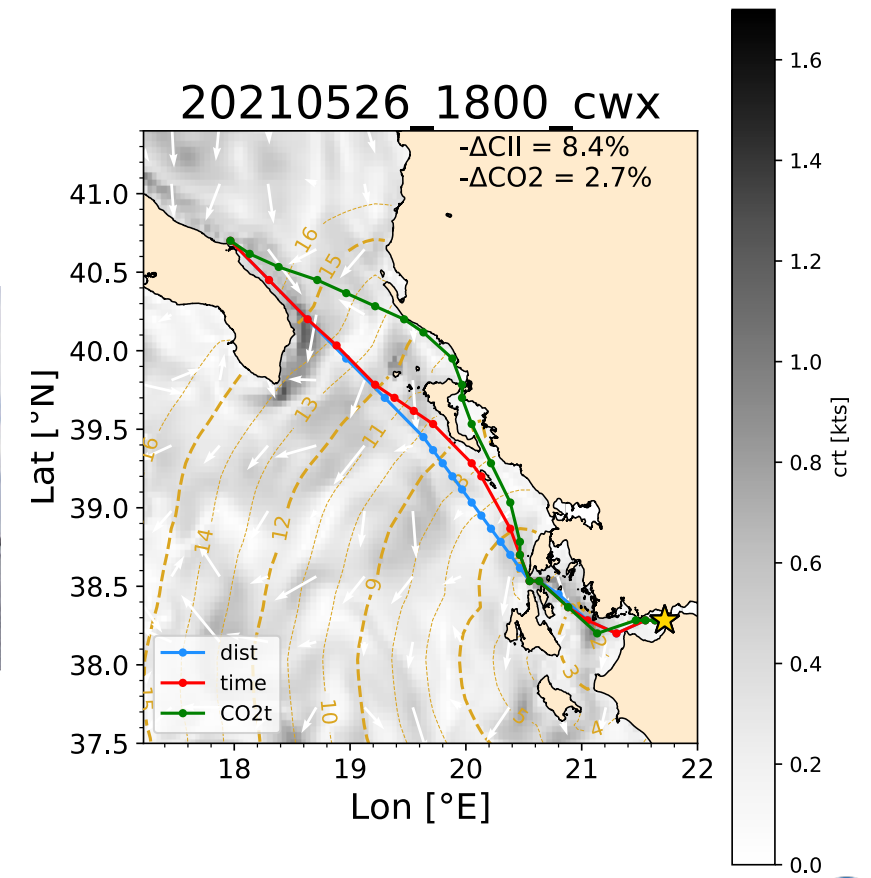
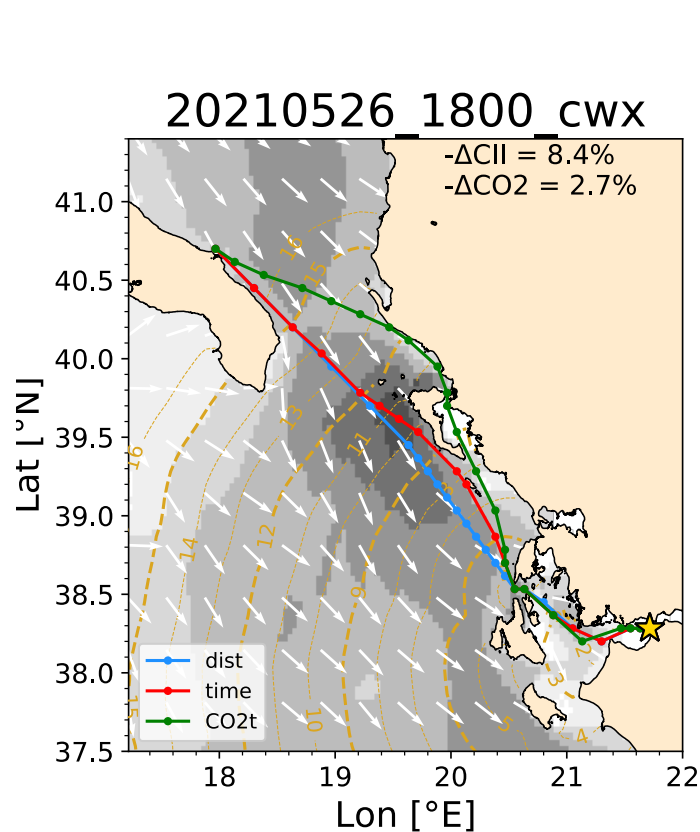


P9. NAVIgating in the COASTal ocean

Voyage optimization via VISIR visir-nav.com

Mannarini et al, 2021 JMSE

- Routes from Patras (Greece) to Brindisi (Italy) for a ferry of 125 m in length
- voyage color corresponds to the optimization objective (length, duration, CO2 emissions)



P10. Support for marine pollution in coastal zones



P10. Support for marine pollution in coastal zones

The Project will target the sector of **Marine Pollution** from the standpoint of the **coastal ocean** framework

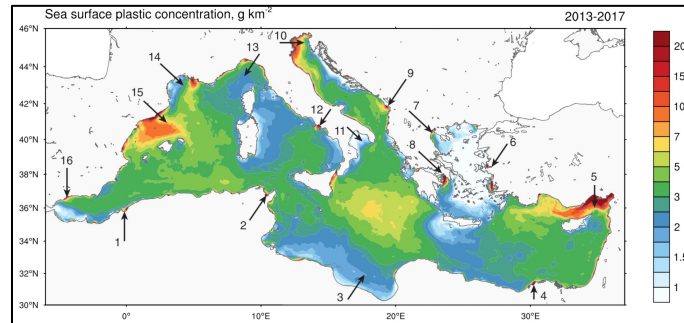
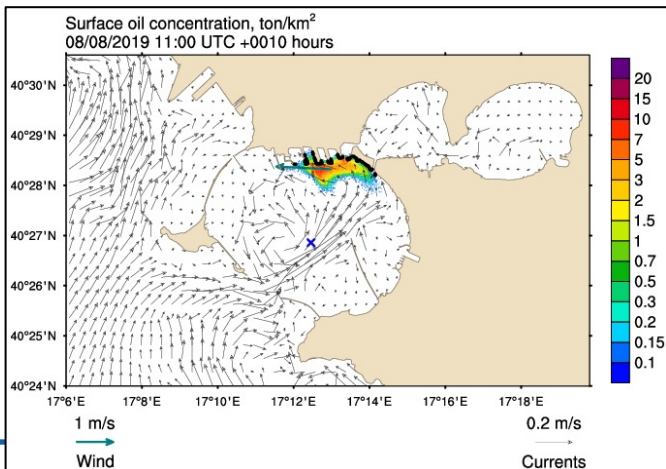
GOAL

Comprehensive marine environment status assessment with respect to **marine-relevant contaminants** (e.g. oil, plastic debris, HNS) to provide support for **marine pollution hotspots' screening in coastal zones.**

TOOLS

(i) Operational **tracking and prediction** of the drift and transformation of contaminants **from models** will be combined with the (ii) **hazard/risk mapping** in support of the **emergency management** and legislative measures.

Liubartseva et al., 2021



Liubartseva et al., 2018

The Project will involve four main interrelated activities:

Act. 1) Model-and-observation based tool for near-real time tracking the pollutants in coastal zones

Water surface characteristics (currents and waves), water column, and sediments. **Observations** will include in situ, citizen science, and remote sensing. **Model** will include coastal downscaling applications.

Act. 2) Unified methodology for hazard/risk mapping

State-of-the-art meteo-oceanographic models, Lagrangian particle tracking technique, and comprehensive **computational resources.**

Act. 3) Identification and quantification of uncertainties in the predictions of transport and fate of marine pollution in coastal zones.

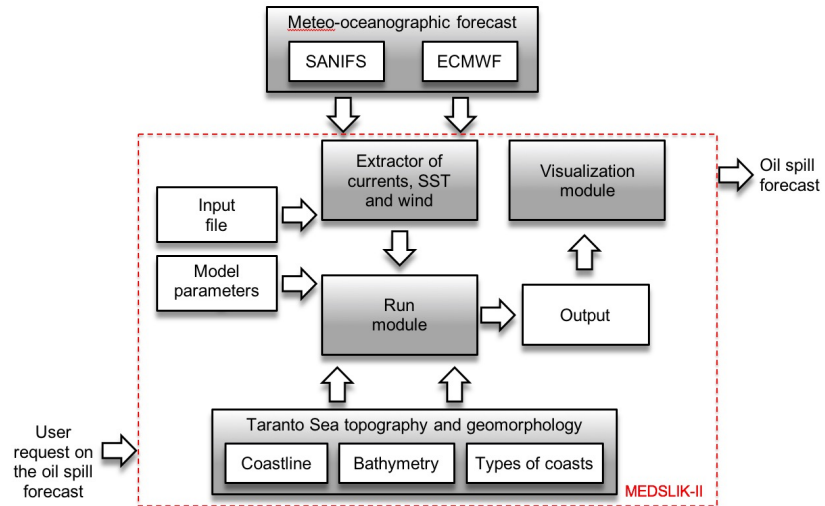
Act. 4) Developing mobile application

Citizens to report about marine and coastal pollutions and simulate where the pollution is coming from and where would go if not cleanup.



P10. Support for marine pollution in coastal zones

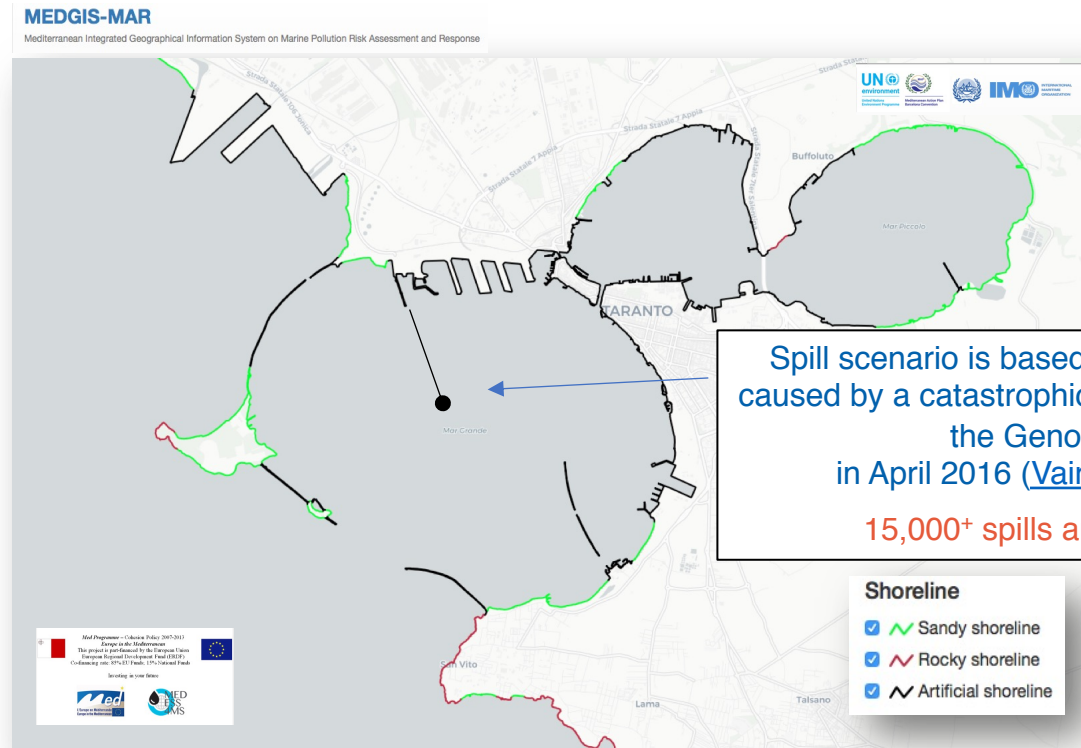
MEDSLIK-II – SANIFS coupling



Simplified scheme of the MEDSLIK-II coupled to SANIFS

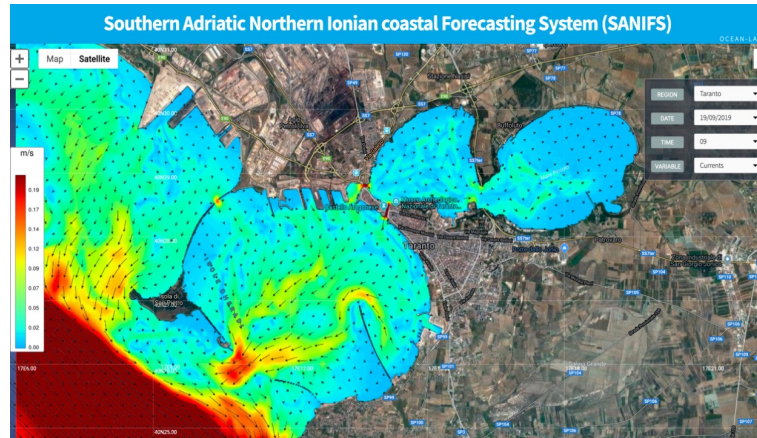
Liubartseva et al., 2021

- (1) Update of coastline types using [MEDGIS-MAR](#) by REMPEC
- (2) Horizontal diffusivity coefficient of $0.2 \text{ m}^2 \text{ s}^{-1}$
- (3) Integration time step of 5 min
- (4) 1% windage instead of JONSWAP

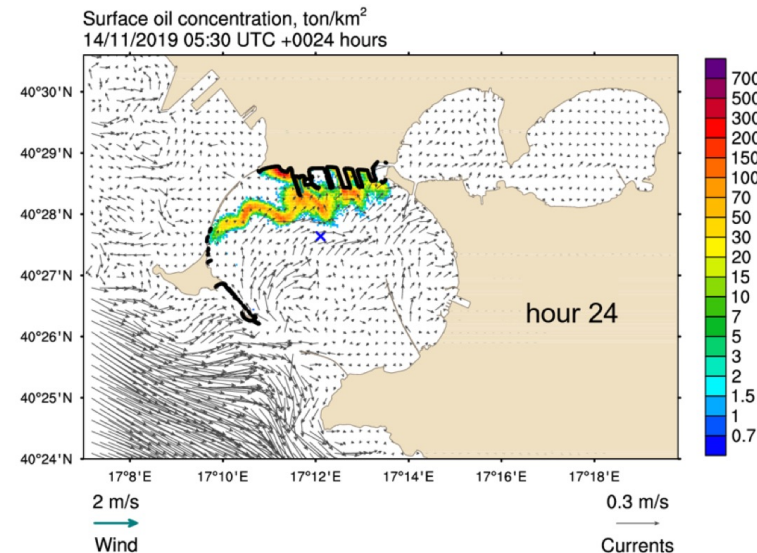


P10. Support for marine pollution in coastal zones

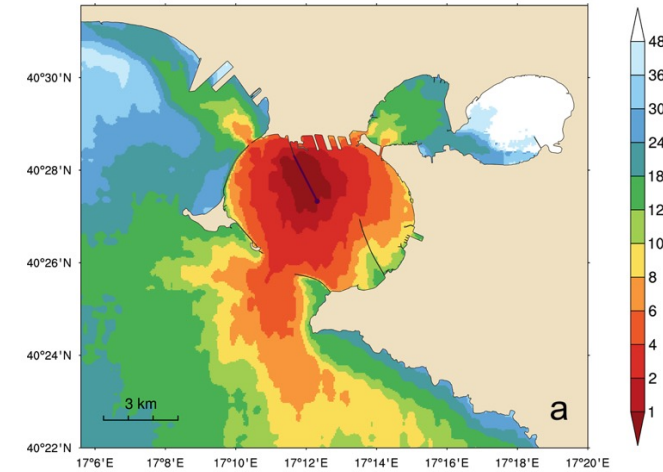
SANIFS provides ultra-hi-res hydrodynamics: 3 km – in the open sea, 100 m – in the coastal waters, 20 m – at the Port of Taranto



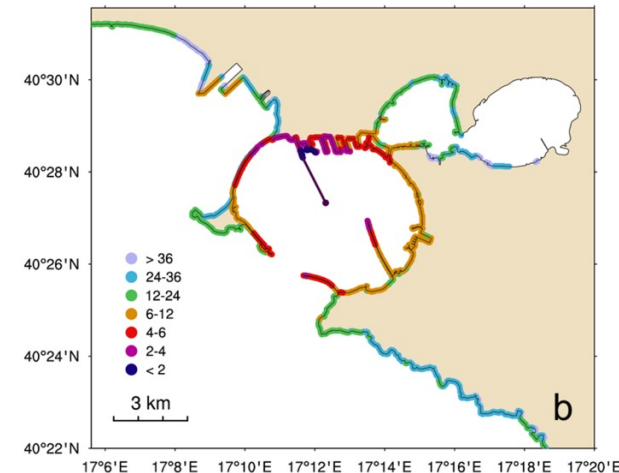
MEDSLIK-II provides robust statistics 2018 – 2020 on oil spills from oil terminal: buoy and subsea pipeline at the Port of Taranto



Arrival time (in hrs)
for sea surface (a) and coastline (b)



Arrival time plots, showing the minimum time (h) for the oil to exceed the pre-defined (a) sea surface threshold concentration of 0.01 g m^{-2} , and (b) coastline threshold concentration of 0.1 g m^{-1}



Some remarks

- *Hydrodynamic models for downstream applications (e.g. Navigation and Pollution)*
- *Improve accuracy of hydrodynamic (and wave) coastal forecast*
- *Role of coastal circulation*
- *Forecast time window*



Thanks

