

# Act 4.3 OIL SPILLS AND OTHER MARINE HAZARDS PILOTS DEPLOYMENT

PP11 - ARPA FVG APPROACH TO THE PILOT

PP11 | ARPA FVG | Enrico Ballaben - Dario Giaiotti

TF2/WP4 Coordination Meeting | Zoom platform | 30th March 2021

# Act 4.3 OIL SPILLS AND OTHER MARINE HAZARDS PILOTS DEPLOYMENT (from Application Form)

Activity number	3
Title	OIL SPILLS AND OTHER MARINE HAZARDS PILOTS DEPLOYMENT
Description	Activities refer to the development of methodology for risk assessment for oil spills in the Adriatic Sea providing data collection on maritime traffic, possible sources of pollution, exposure, environmental sensitivity, impacts on human life, environment, and economy etc. Simulation of oil spill scenarios using oil spill trajectory models for tracking the movement of the oil slick, and oil spill dispersion model for predicting possible impacts to the environment are foreseen. Capitalization of existing simulation models for oil spills and its upgrade with new functionalities will be available to all partners through web interface and interoperable services and development of oil spill operational prototype and hazard mapping capacities relevant for all partners. Equipment to act in case of oil spills and other marine hazards will be improved, as well as specialized exercises and simulations for coast guards and civil protection units, with at least one exercise having a CBC dimension.
Start date	01/02/2021
End date	30/06/2022
Activity deliverables	D.4.3.1 - n° 1 Pilot deployment of "Oil spills and other marine hazards" (4 separate activities) that will consist of: - n° 1 Methodology/guidelines for risk assessment for oil spills in the Adriatic Sea developed (PP4) - n° 1 Oil spill operational prototype and hazard mapping capacities developed (PP9) - n° 2 Enhanced simulation models for oils spills and other marine hazards (PP9, PP11) - n° 5 Specialized exercises implemented (with usage of personal protective equipment and specialized equipment: floating booms, boats, drones, ...) (1 exercise per PP) All FP2 PPs will contribute to the achievement of pilot deployment deliverables.
Activity budget	€ 2.011.652,70

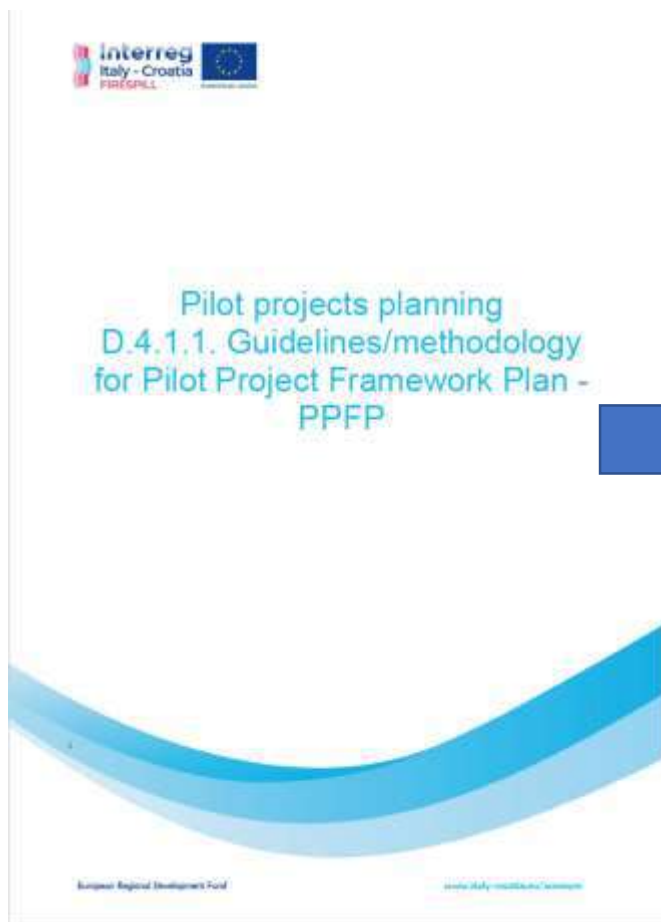
## Deliverables refer to:

- N° 1 Methodology/guidelines for risk assessment for oil spills in the Adriatic Sea developed (PP4)
- N° 1 Oil spill operational prototype and hazard mapping capacities developed (PP9)
- N° 2 Enhanced simulation models for oils spills and other marine hazards (PP9, PP11)
- N° 5 Specialized exercises implemented (with usage of personal protective equipment and specialized equipment floating booms, boats, drones,..) (1 exercise per PP)

## Activities refer to:

- the development of **methodology for risk assessment** for oil spills in the Adriatic Sea
- the use of **oil spill trajectory models** for tracking the movement of the oil slick and oil spill dispersion model for predicting possible impacts to the environment
- the **specialized exercises and simulations**, with at least one having a CBC dimension

## The contribution of PP11 – ARPA FVG to the D.4.3.1



The PFP is already available

PP11 planned the contribution to the Pilot following the PFP guidelines

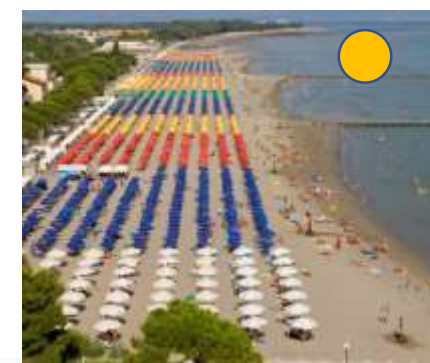
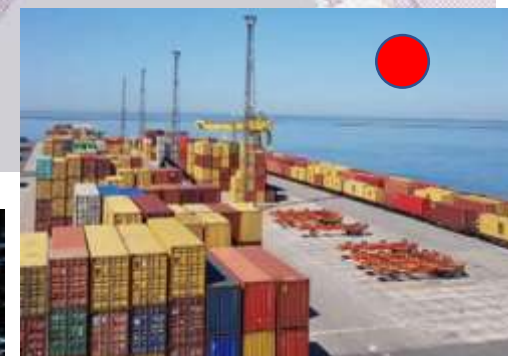
so far

PP11 focused on the gulf of Trieste

next

harmonization with other partners

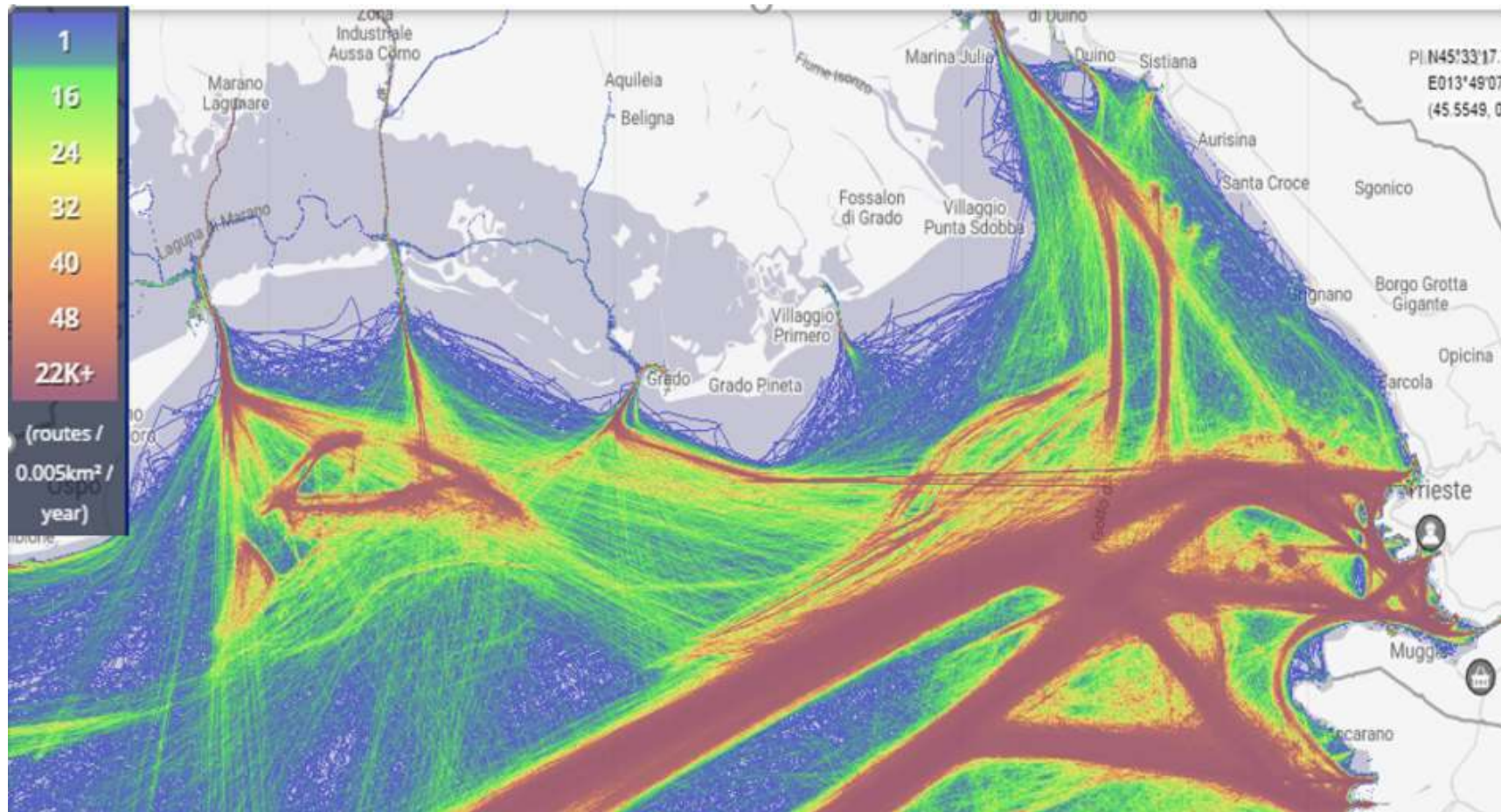
## Act 4.3 GEOGRAPHICAL AREA (Brief description of involved area and its substance in terms of oil spills and other marine hazard risks) – Exposed and vulnerable targets



### Pilot area features

- Env. type: coastal areas, lagoon and open sea
- Relevant ecosystems: [Natura 2000 sites](#)
- Important anthropic activities: **harbors**, **tourism**, **historical sites**

## Act 4.3 GEOGRAPHICAL AREA *(Brief description of involved area and its substance in terms of oil spills and other marine hazard risks ) – hazard sources*



## Oil-Spill modelling approach for Pilot

According to project action 4.3 objectives and deliverables, during the pilot, modeling activities are distinguished in two complementary classes of oil-spill response, namely:

### a) pollutant dispersion evolution forecast

Emergency response and restoration support  
(**tactic** approach)

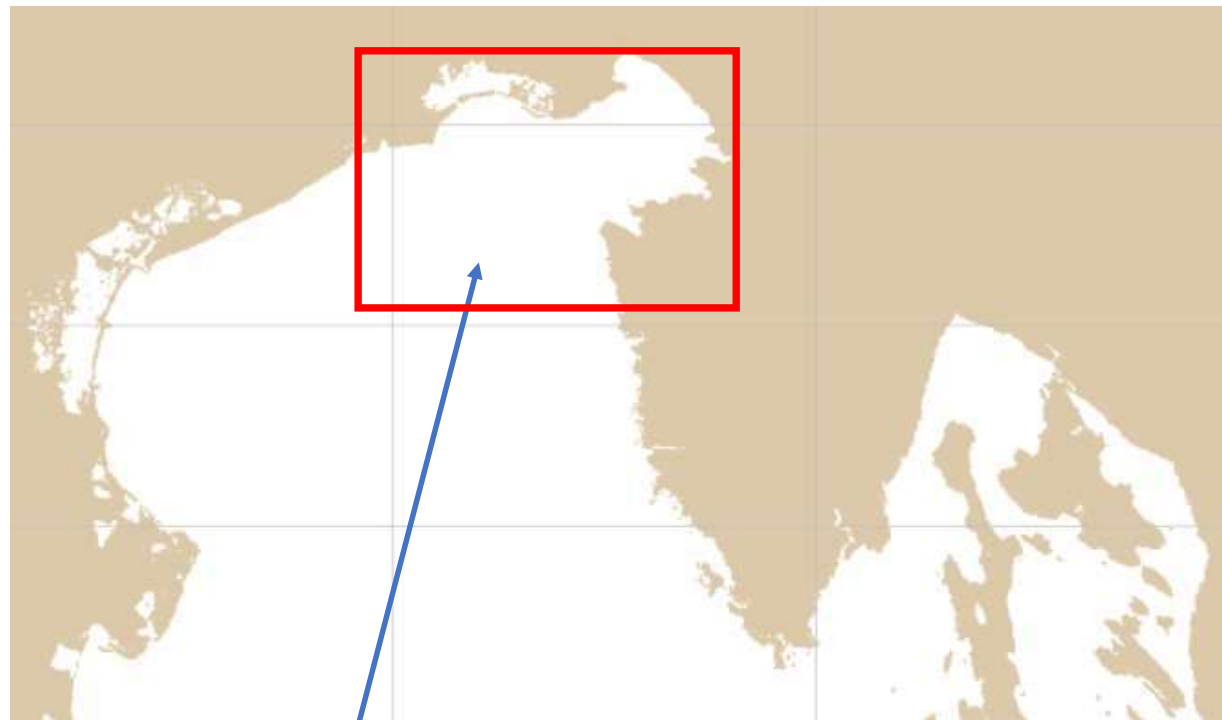
### b) oil-spill impacts risk assessment

Risk reduction plans information support  
(**strategic** approach)

# Oil-spill forecasting models to be run during emergencies - **tactic** approach

## Low spatial resolution – wide areas

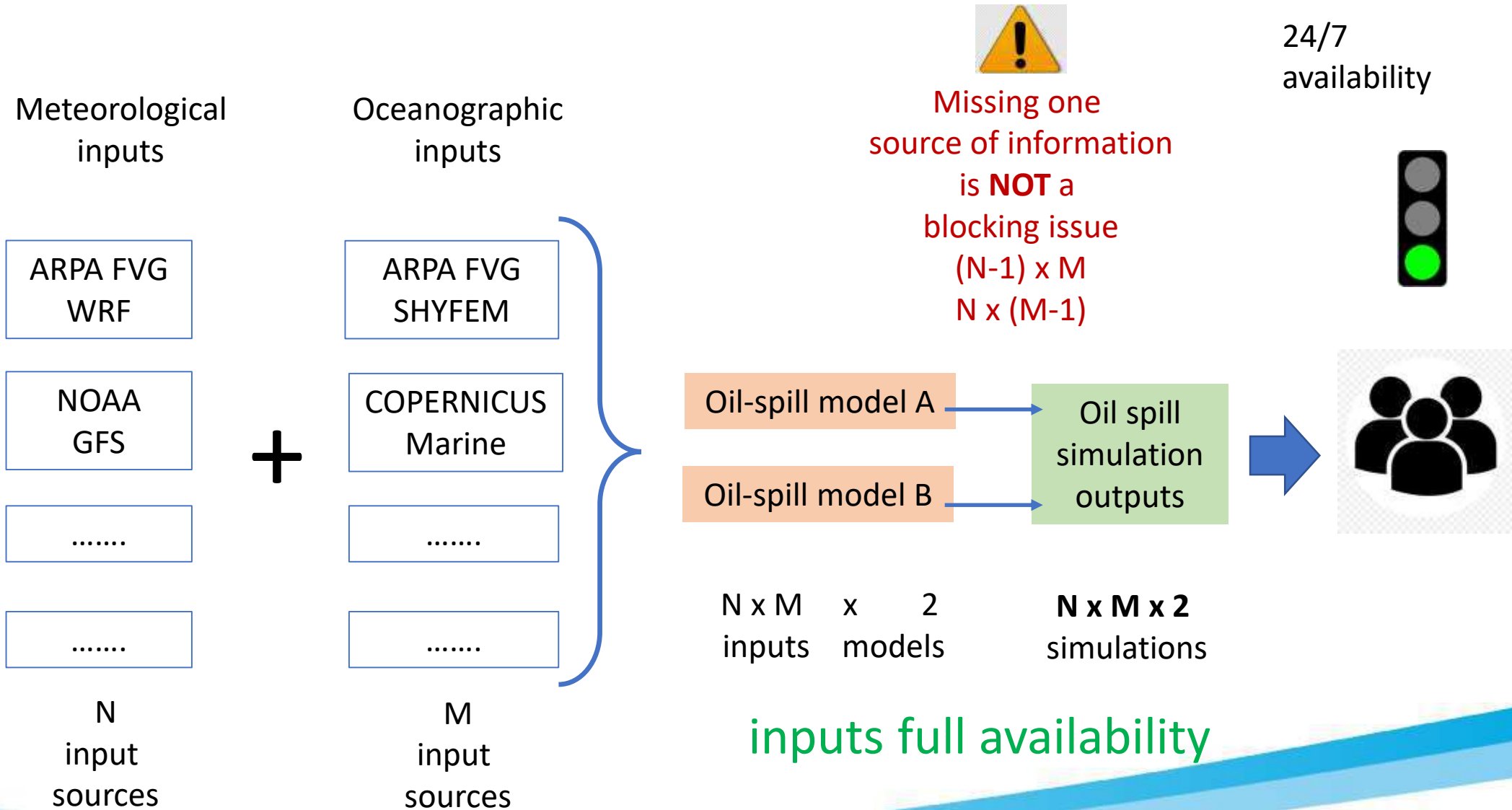
- 4 km x 4 km sea surface currents
- 10 km x 10 km sea surface winds
- 3 hourly evolution



## High spatial resolution limited area

- 1 km x 1 km sea surface currents
- 2 km x 2 km sea surface winds
- Hourly evolution

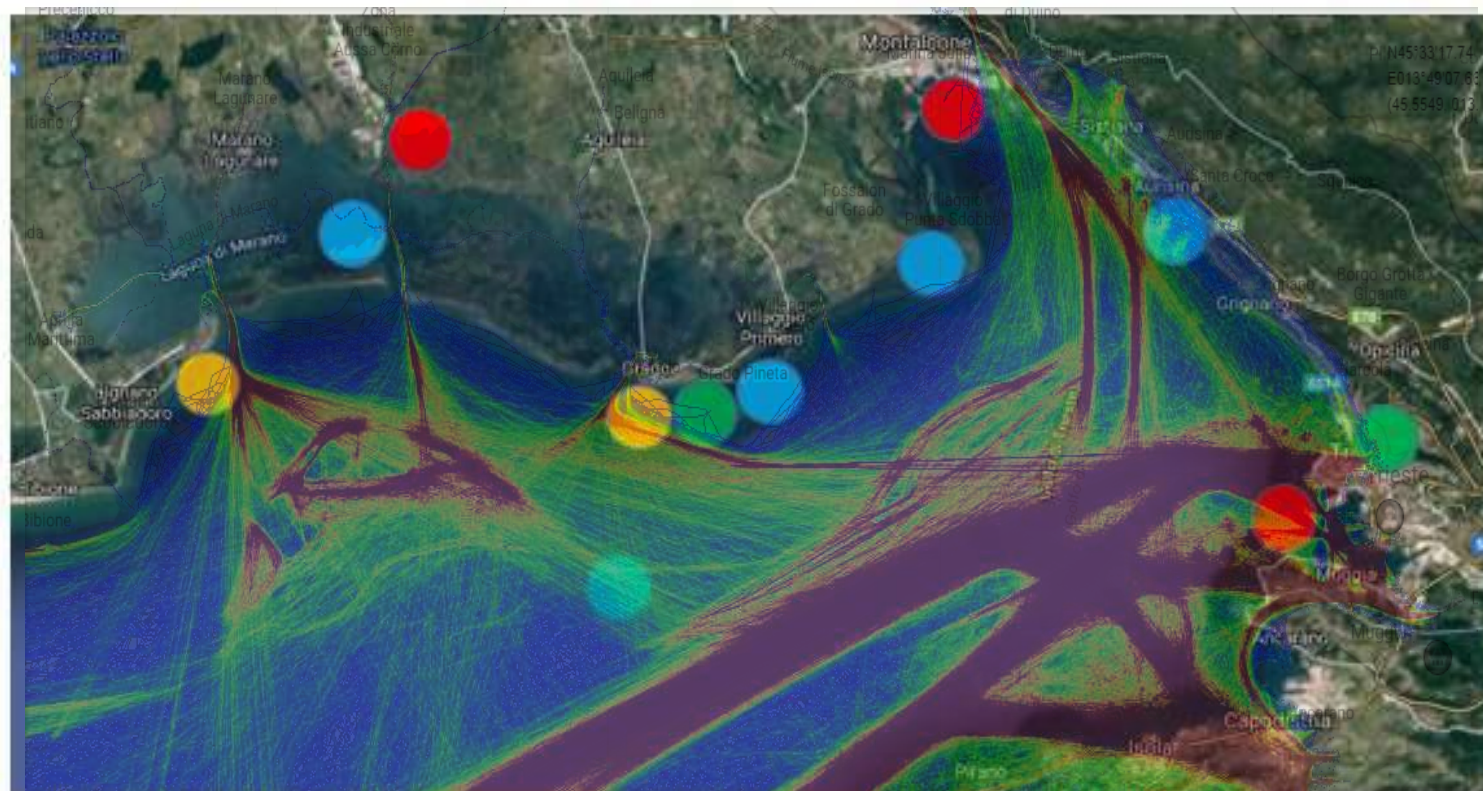
# Oil-spill forecasting models: Input data and model runs redundancy





# Oil-spill simulations for impact risk mapping - strategic approach

$$\text{Risk} = \text{hazard} \times \text{exposure} \times \text{vulnerability}$$



# Oil-spill simulations for impact risk mapping - ensembles and uncertainties

## Meteo-Marine inputs

Input for day 001 - 00 UTC  
Input for day 001 - 01 UTC  
Input for day 001 - 02 UTC  
Input for day 001 - 03 UTC  
Input for day 001 - ..... UTC  
Input for day 002 - 00 UTC  
Input for day 002 - 01 UTC  
Input for day ..... - ..... UTC  
.....  
.....  
Input for day 365 - 22 UTC  
Input for day 365 - 23 UTC

X

## Pollution source inputs

Oil-spill scenario 001  
Oil-spill scenario 002  
Oil-spill scenario 003  
.....  
.....

Oil-spill model

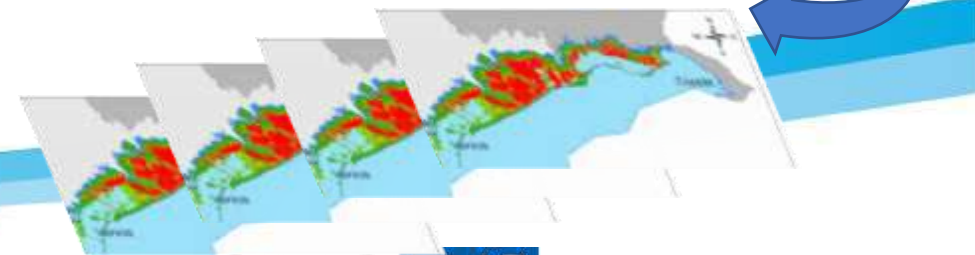
Oil spill simulation outputs

Large number of simulations

Output 0001  
Output 0002  
Output 0003  
Output 0004  
.....  
.....  
Output 0999  
.....

At least 365 x 24

## Risk scenario maps



# Numerical models: already available and further enhancements

NOAA  
Gnome Model



(On demand)

Ridondanza attuale  
servizio emergenze

ROMS + LAMI

ROMS + WRF

MEDSEA + GFS

MEDSEA + WRF

pyGNOME

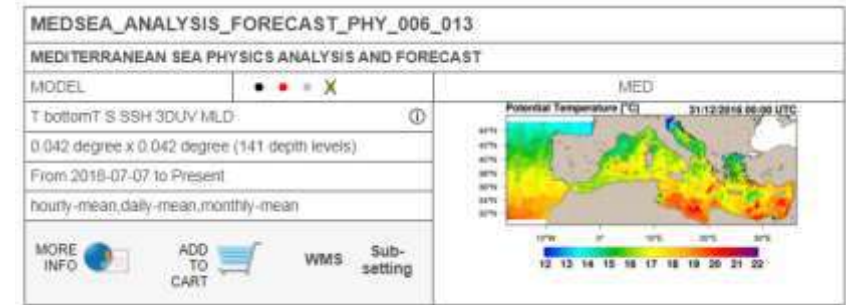
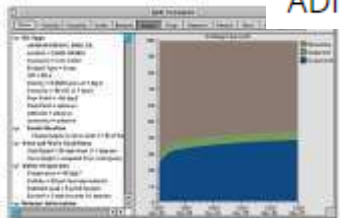
(batch simulations)

Pianificazione

(almeno 1 anno di simulazioni)

MEDSEA + WRF (Nausica)

ADIOS® (Automated Data Inquiry for Oil Spills)



Formerly the National Climatic Data Center (NCDC)... [more about NCEI](#)

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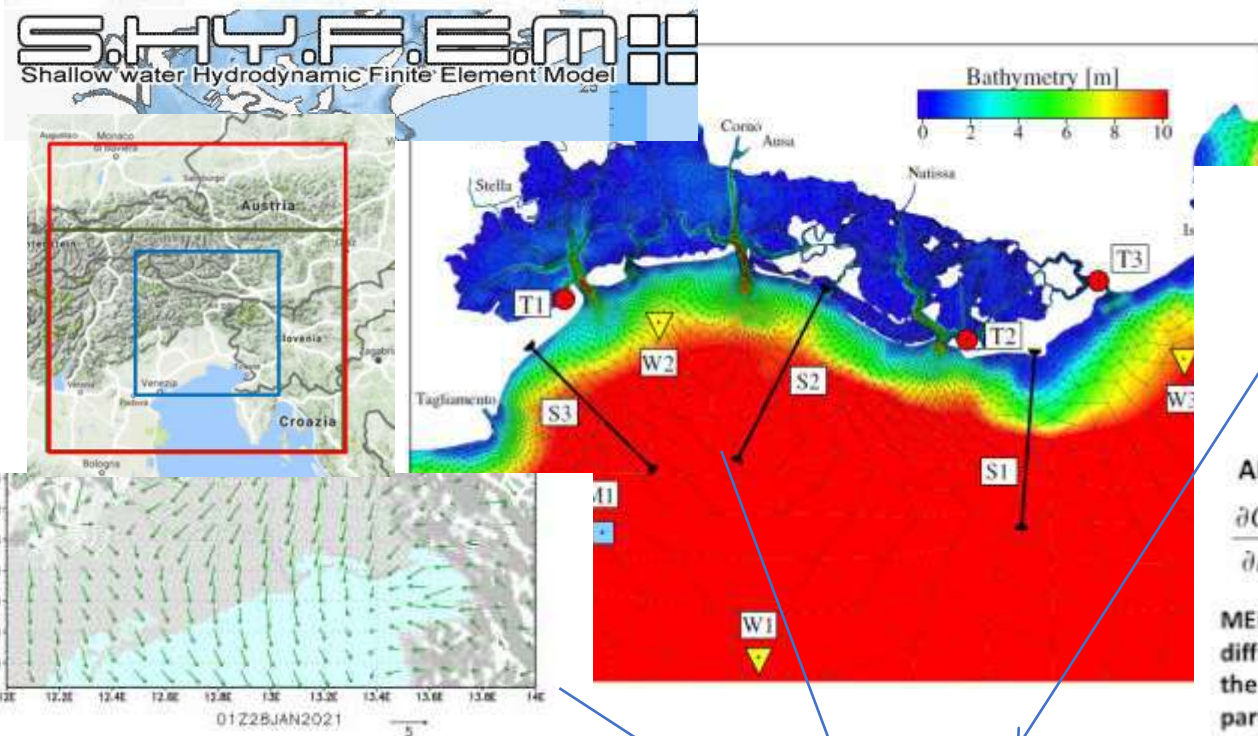
Home > Data Access > Model > Datasets > Global Forecast System (GFS)

Quick Links

Global Forecast System (GFS)



# Numerical models: new implementations and collaborations



## MEDSLIK-II Model

$$\frac{\partial C}{\partial t} + \mathbf{U} \cdot \nabla C = \nabla \cdot (\mathbf{K} \nabla C) - \sum_{j=1}^M r_j(C)$$

The model splits the active tracer equation into two component equations

### ADVECTION - DIFFUSION

$$\frac{\partial C}{\partial t} = -\mathbf{U} \cdot \nabla C + \nabla \cdot (\mathbf{K} \nabla C)$$

MEDSLIK-II solves the advection-diffusion equation using particles: the oil slick is discretized by particles, which are TRANSPORTED by the water currents and the turbulent diffusion.

### TRANSFORMATION


$$\frac{\partial C_i}{\partial t} = \sum_{j=1}^M r_j(C_i)$$

MEDSLIK-II solves the transformation equation considering the total oil slick volume, which is TRANSFORMED by the physical and chemical processes.


# CONTACT INFORMATION


Partner Name **PP11: ENVIRONMENTAL PROTECTION AGENCY OF FRIULI VENEZIA GIULIA (ARPA FVG )**

**Enrico Ballaben - Dario Giaiotti**

 Via Cairoli, 14 I-33057 Palmanova (UD) - ITALY

 enrico.ballaben@arpa.fvg.it

 0432 191 8286

 [www.italy-croatia.eu/firespill](http://www.italy-croatia.eu/firespill)