TF2 – Technical Meeting

Enhanced simulation models for oil spills and other marine hazards and Specialized exercises

PP11 - ARPA FVG

FIRESPILL| WP4 TF2

4th April 2022

European Regional Development Fund

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 oils spills and its upgrade with new functionalities will be available to all partners though 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 TF2 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

PP11 planned the contribution to the Pilot following the PPFP guidelines

Phases of pilot training
List of the various phases and their brief description (max 2500 chars)

- Oil-spill numerical model identification and implementation
- Development and implementation of computational fluxes for numerical model runs
- Oil-spill response numerical models test and validation
- Exposure and vulnerability data retrieval on selected environmental and anthropic stakeholders
- Massive oil-spill scenarios simulations
- Risk assessment and risk maps summary

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 (***tactic approach***);

b) oil-spill impacts risk assessment (***strategic approach***).

The first (a) foresees the implementation of numerical workflows and oil-spill model run procedures to simulate the pollutant dispersion future evolution according to meteo-marine environmental condition and the oil-spill source features.

The second (b) class of simulations is voted to evaluate the risk of damaging impacts of oil spill in the gulf of Trieste area. That will be achieved running a large number of oil-spill scenarios using oil spill trajectory models for tracking the movement of the oil slick. High probability sources of accidental releases of pollutant are going to be identified and modelled according to maritime traffic data, while meteo-marine environmental condition will cover at least one year. Information on the exposure and the vulnerability of ecosystem and human activities will be downloaded from on line public data.

According to the large number of simulated cases, scenarios of impacts will be defined and ranked according to the risk, for a limited sets of stakeholders. Maps of risk will summarize the simulation results.

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)

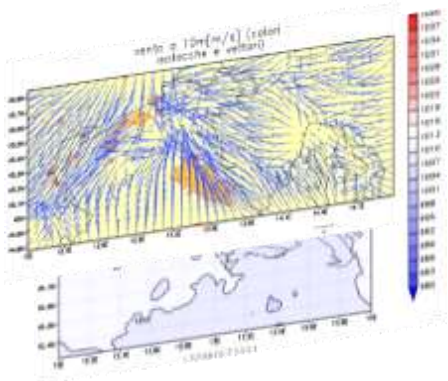
b) oil-spill impacts risk assessment

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

Oil-spill forecasting during emergencies – tactic approach - **Local generated services**

Computational fluxes retrieve required forecasts and they prepare model inputs
(daily updated + 72h forecasts)
(service available 24/24 7/7)

ARPA FVG HPC structure



Currents fields
Winds fields
Coastlines
…….

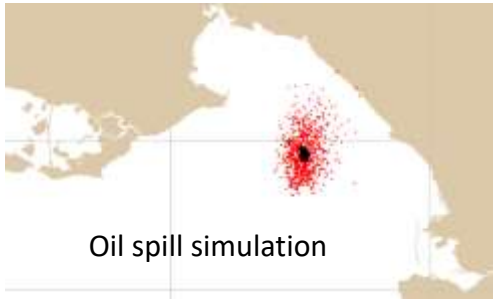
ZIP

http://www

1) Download the zip file

NOAA Gnome Model

2) Input source features
3) Run the model on your PC (Local generated service)



Oil spill simulation

Requested support

Environmental pressure

Response

Support supplied

The service is implemented operationally, for the whole Adriatic sea, and it is already accessible to the Project Partners.
Verification and validation period has been carried on.
http://interreg.c3hpc.exact-lab.it/FIRESPILL/

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

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Local generated service: inputs for emergency response

All project partners Project Partners can access the operational service: http://interreg.c3hpc.exact-lab.it/FIRESPILL/

Project Data Access Portal

Interreg IT-HR FIRESPILL @ ARPA FVG - CRMA

Links

GNOME model driving forces

Forecast data of driving forces for oil spill trajectory simulations with GNOME model; *daily updated*.

Daily oil spill simulations

Oil spill forecasting simulations via PyGNOME model; *daily updated*.

GNOME course

Material of the course on GNOME model held in September 2021.

Driving forces for oil spill simulations via GNOME model

Tools for GNOME model

Link	Description
GNOME website	GNOME (General NOAA Operational Modeling Environment) official website
Downloading/installing GNOME	GNOME download and manual webpage Current version is 1.3.11, available for • Windows 10, 2000, XP, Vista, 7, and 8, or • Mac OS 10.6 or higher.
GNOME how-to	Brief tutorial on how to run GNOME via command file
API gravity table	Table of API (American Petroleum Institute) gravity values

NOAA Gnome Model

The service is operational so we warmly invite the Partners to use it

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

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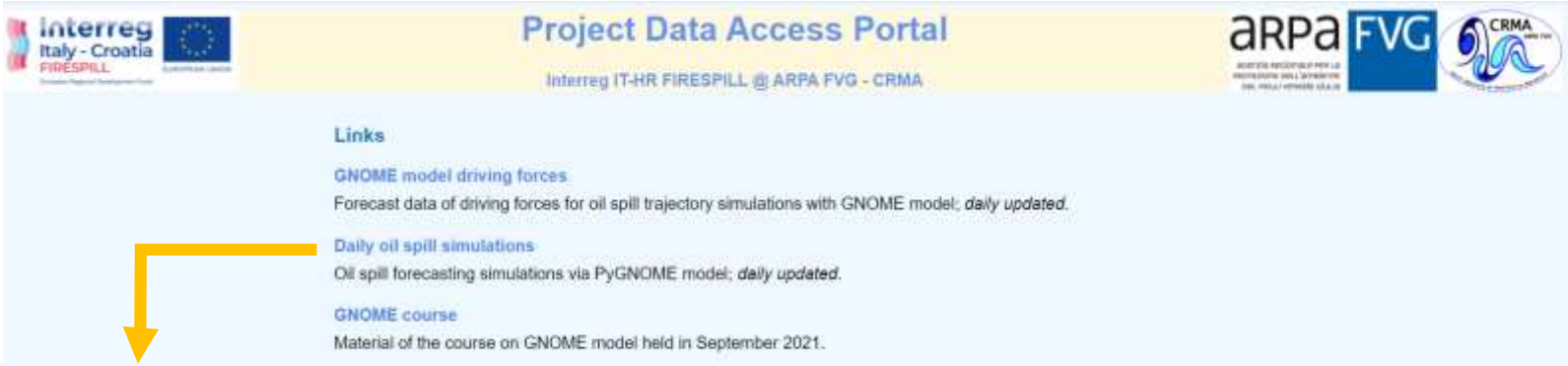
Server generated service: hourly dispersion forecasts for hot areas

All project partners Project Partners can access the operational service: http://interreg.c3hpc.exact-lab.it/FIRESPILL/



NOAA Gnome Model

ID	Spill start hour						Last update
18E0F10248_0000	00	01	02	03	04	05	2022-04-03
	06	07	08	09	10	11	
	12	13	14	15	16	17	
	18	19	20	21	22	23	

All sets consist of 24 forecasting simulations: each one refers to a spill starting at a specific hour (UTC) of the current day.

The service is available for the whole Adriatic Basin

The service is operational so we warmly invite the Partners to contact us to activate it on the hot areas they are interested in.
Give us the pollutant source details and we will run the model every day for you

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

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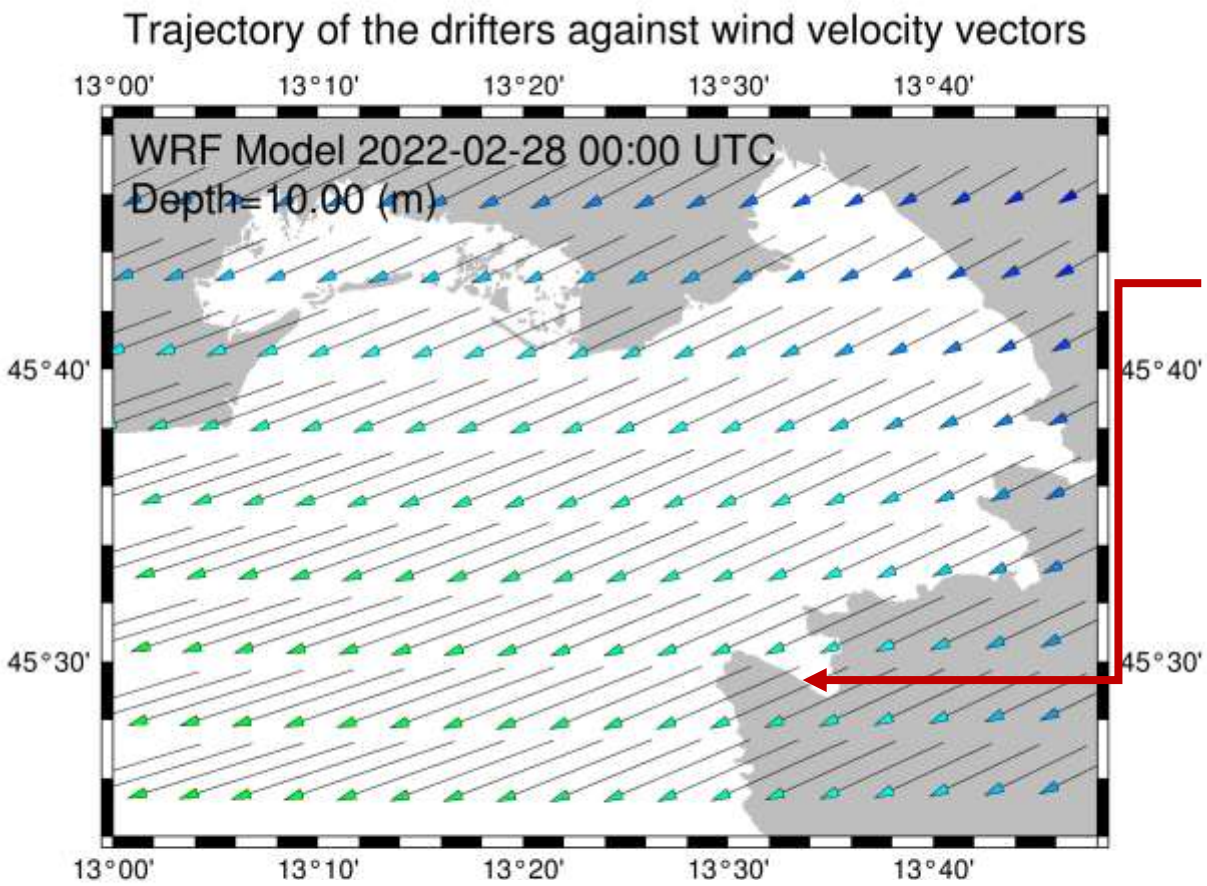
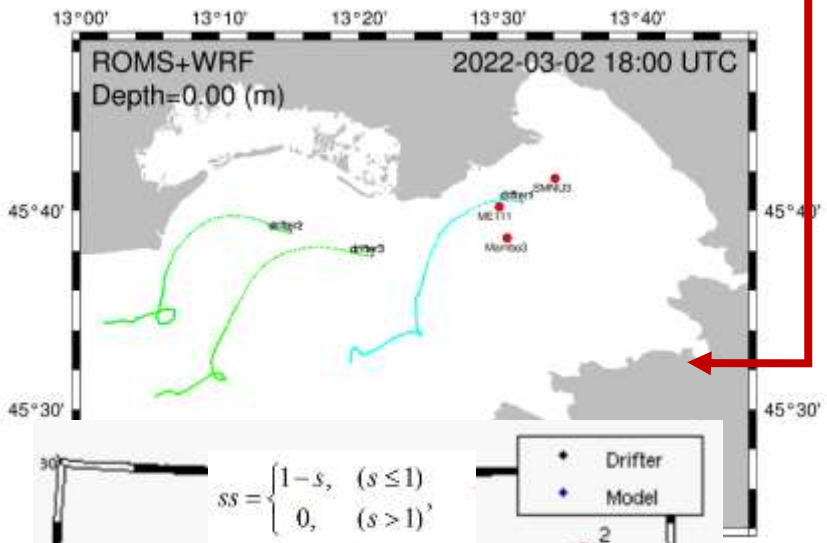
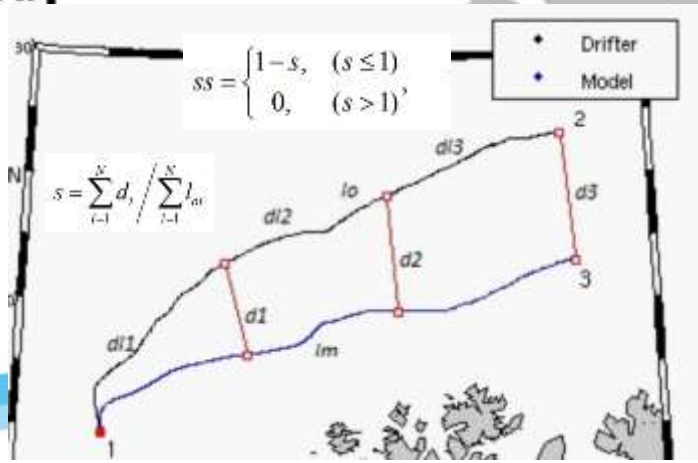
Work in progress: quality evaluation of oil dispersion simulation



Drifter tracks are used to evaluate the simulations quality

- Specialized exercises yield measurements.
- Skill scores are used to quantify the simulations quality.





The work is in progress

Preliminary results show:

- Gnome emergence response services are trustable
- Skill scores need a careful identification ad usage

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

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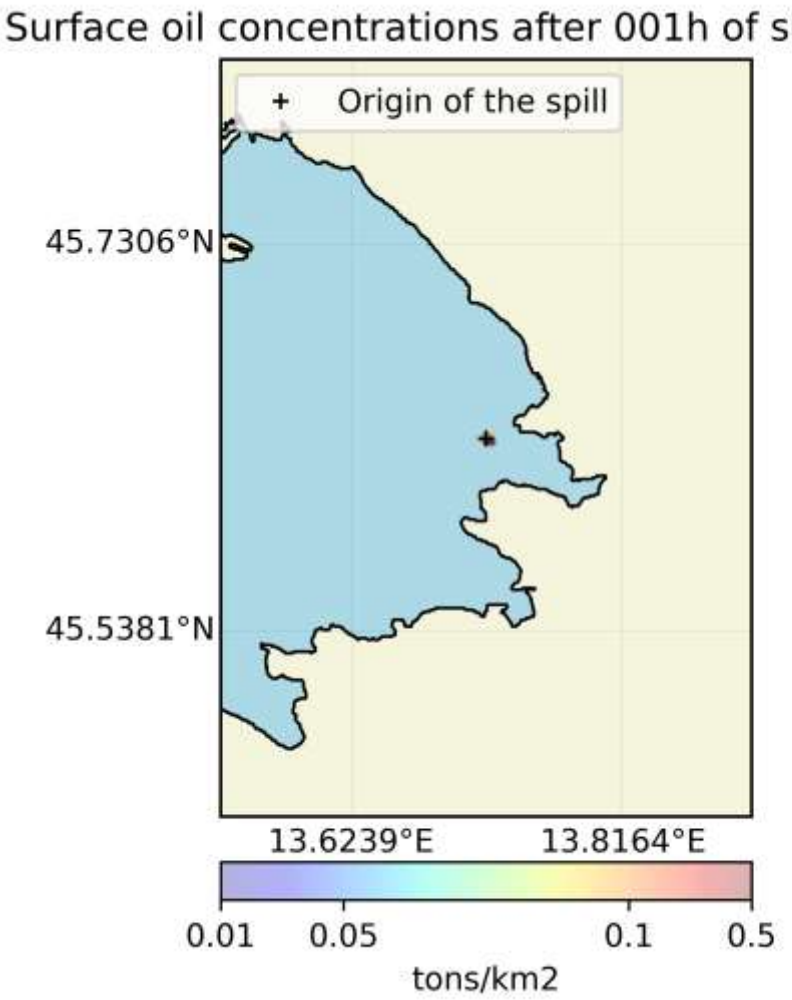
Work in progress: Implementation of MEDSLIK II numerical model service



Results achieved

The MEDSLIK II model has been installed and run tests performed.

Inputs

Currents: COPERNICUS Marine Service

Winds: ARPA FVG WRF

Coming soon

Currents: ARPAE ROMS

Winds: ARPA FVG WRF

Computational flow (ecFlow) for emergency response service activation

The work is in progress

- Comparison with Gnome emergence response services
- Operational services over the whole Adriatic basin

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

Meteo-Marine inputs
At least 365 x 24

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
……
……

Hazard simulation

Oil-spill model

Oil spill simulation outputs

Large number of simulations

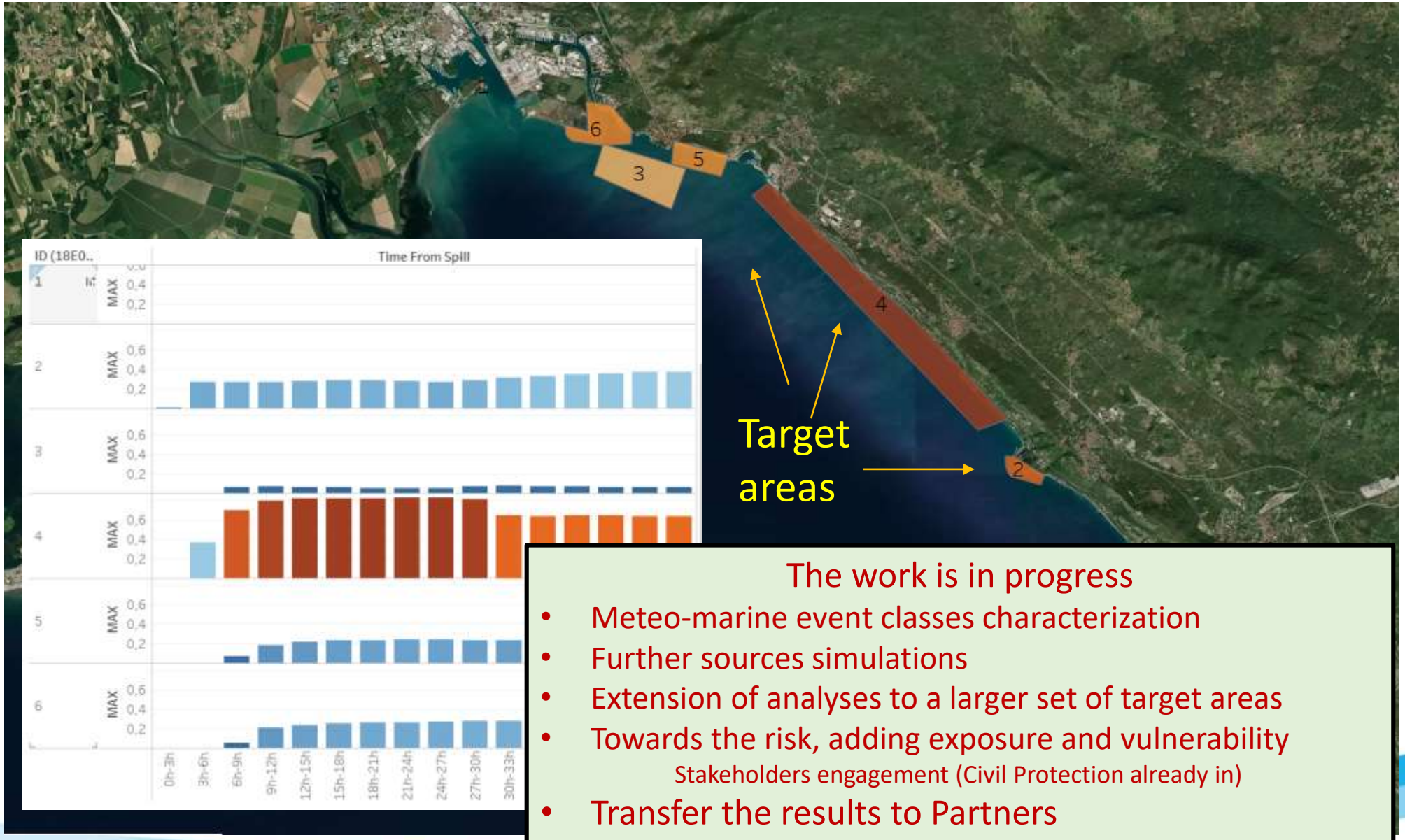
Output 0001
Output 0002
Output 0003
Output 0004
……
……
Output 0999
……

Risk scenario maps

- Generated the first set of **1 year of Meteo-Marine inputs over the whole Adriatic sea**.
- Generated the **1st set of dispersion simulations** of point source (**ships collision in Trieste harbor**)
- Hazard computation completed for **a set of sensible exposed areas**

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

Work in progress: Hazard assessment



The work is in progress

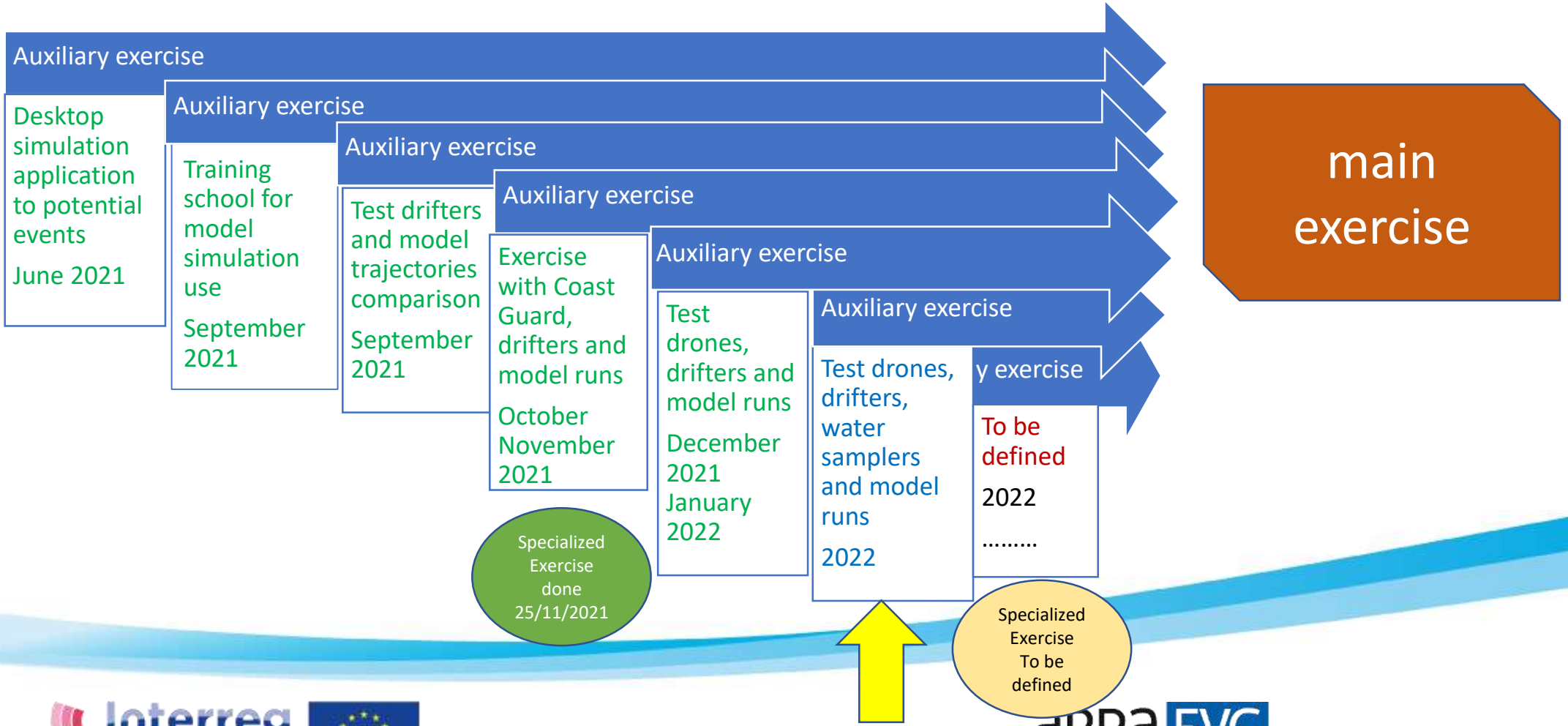
- Meteo-marine event classes characterization
- Further sources simulations
- Extension of analyses to a larger set of target areas
- Towards the risk, adding exposure and vulnerability
  Stakeholders engagement (Civil Protection already in)
- Transfer the results to Partners
  Data availability for BIFISIC inputs (PP1)

Act 4.3 Roadmap towards the main exercise

The **main exercise** is composed and supported by **auxiliary exercises** and training events

Our motto is: Get trained to be ready.

The **main exercise** is **not a training** event; **it is a test** for our readiness to support oil spill response

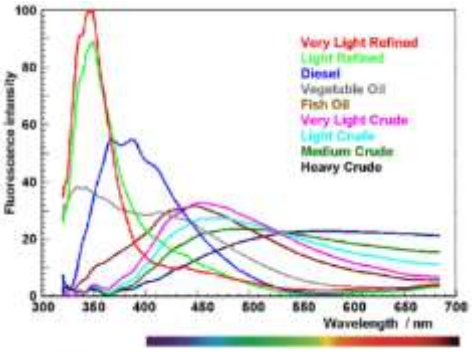


Work in progress: Auxiliary exercises with new devices

Field exercises

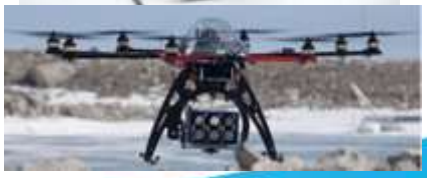
DRIFTER

UVILUX device



SCHOMAKER Sampler

DRONES monitoring



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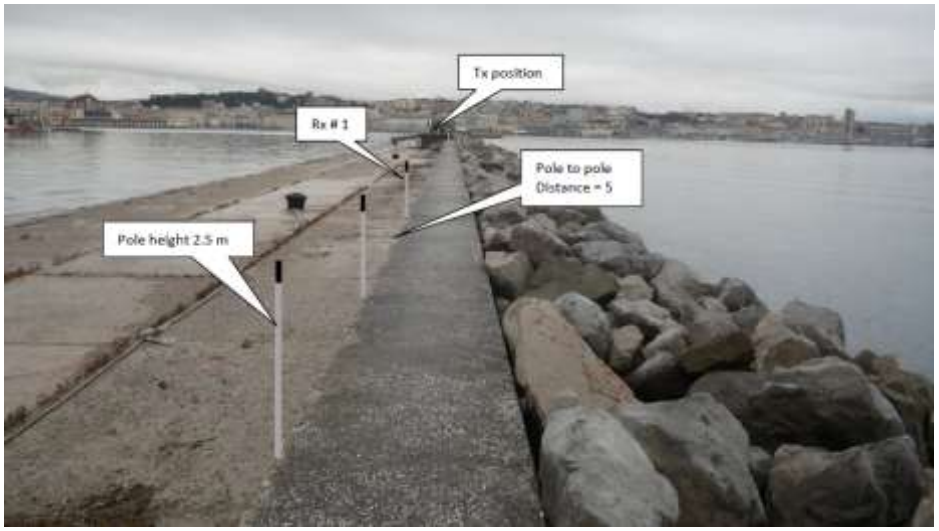
Work in progress: HF RADAR installation and data post processing



CONTACT INFORMATION

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