



cmcc

Centro Euro-Mediterraneo
sui Cambiamenti Climatici



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UNIVERSITÀ DI BOLOGNA

www.cmcc.it

www.unibo.it

Oil Spill Modeling Mission

REMPEC: Second Coordination Meeting on the Mediterranean Strategy

Igor Atake¹, Marco Seracini²

1 - CMCC Foundation – Euro-Mediterranean Center on Climate Change

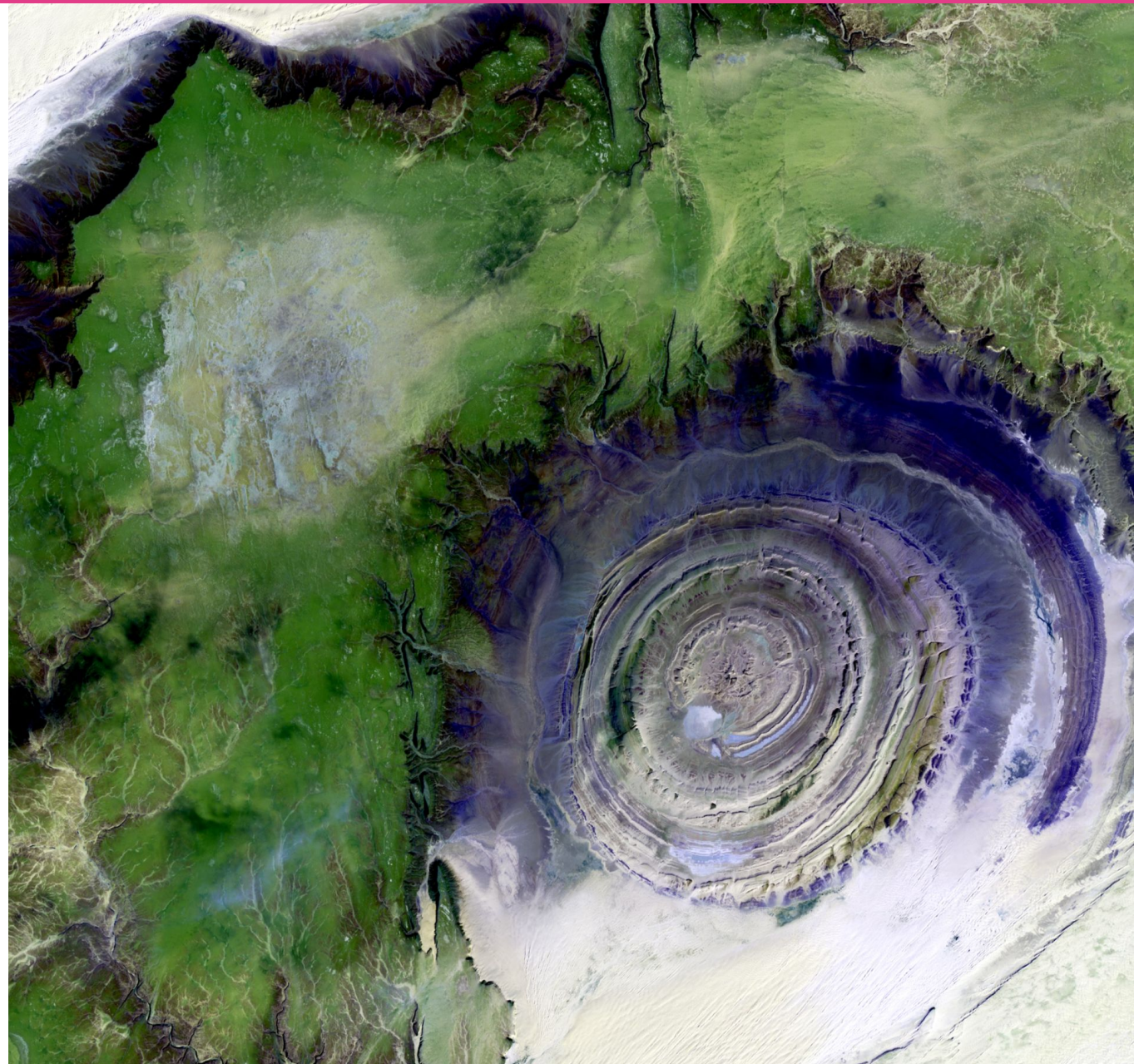
2 - University of Bologna



MISSION

To investigate and model our climate system and its interactions with society to provide reliable, rigorous, and timely scientific results to stimulate sustainable growth, protect the environment and develop science driven adaptation and mitigation policies in a changing climate.

To develop foresights and quantitative analysis of our future planet and society.





THE RESEARCH INSTITUTES

Climate science and social science researchers from all over the world collaborate in a highly multidisciplinary environment enhanced by the organization into three Institutes that collaborate, exploiting the advanced technology of the CMCC's computing infrastructure.





THE SUPER COMPUTING CENTER (SCC)

Since 2008, the CMCC Supercomputing Center (SCC) is the most powerful computational facility in Italy and among the most advanced in Europe, fully dedicated to Climate Change research.

In 2022 the CMCC Supercomputing Center changed its location at the new CMCC headquarters in Lecce. This also includes the upgrading of the computing and storage facilities.

24,769
cores

2,400
TFlops

Theoretical peak performance
(1TFlop = 1,000 billion operations per second)

32 PetaBytes *over* Storage
system capacity

40 PetaBytes Tape Library
(archiving system)





OFFICES

CMCC is organized in the form of a network distributed throughout Italy.

The network connects public and private entities working together on multidisciplinary studies concerning issues of interest to the climate sciences.





MEMBERS & INSTITUTIONAL PARTNERS

National Institute of Geophysics and Volcanology (INGV)

University of Salento

Ca' Foscari University Venice

University of Sassari

University of Tuscia

Polytechnic University of Milan

Resources for the Future (RFF)

University of Bologna



Università
Ca' Foscari
Venezia



POLITECNICO
MILANO 1863



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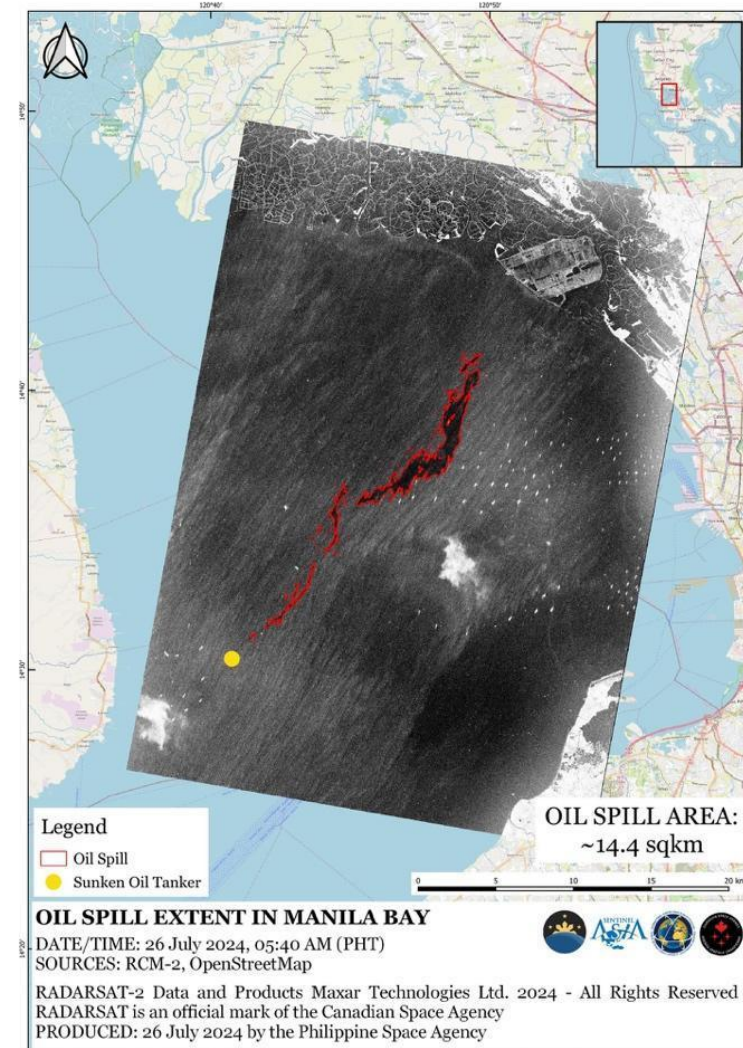


Oil Spill modeling capabilities and services

Manila Oil Spill accident

Recent accident 25/07/2024

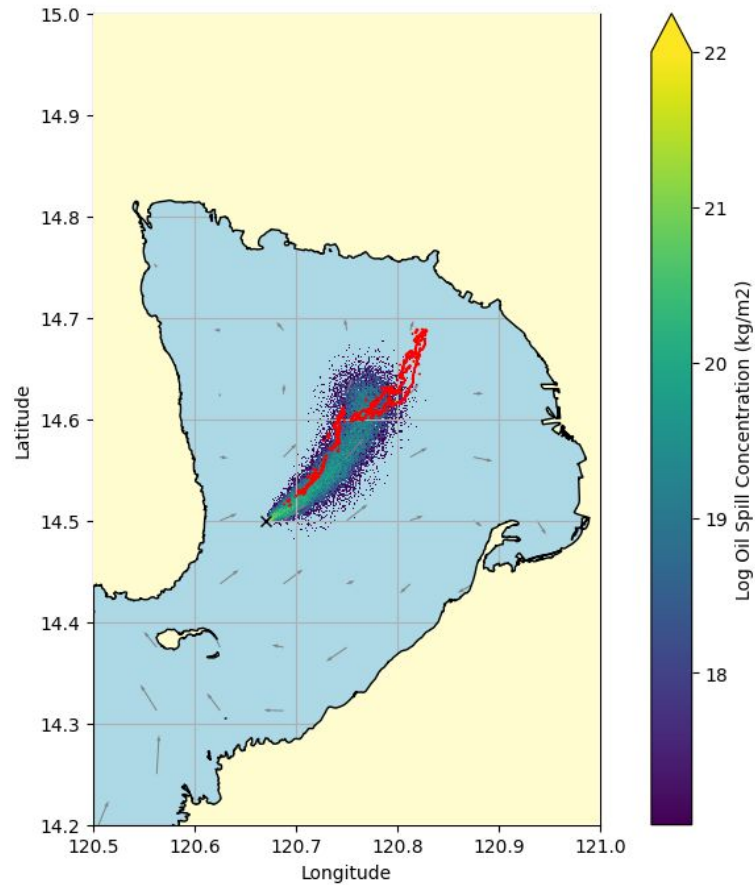
- Oil tanker sank in Manila bay
 - MT Terra Nova (1.5 million liters)
- Several Satellite Observations provided
 - Creation of initial conditions for WITOIL from these images
- Simulations
 - Testing with both Global CMEMS data and also SURF outputs



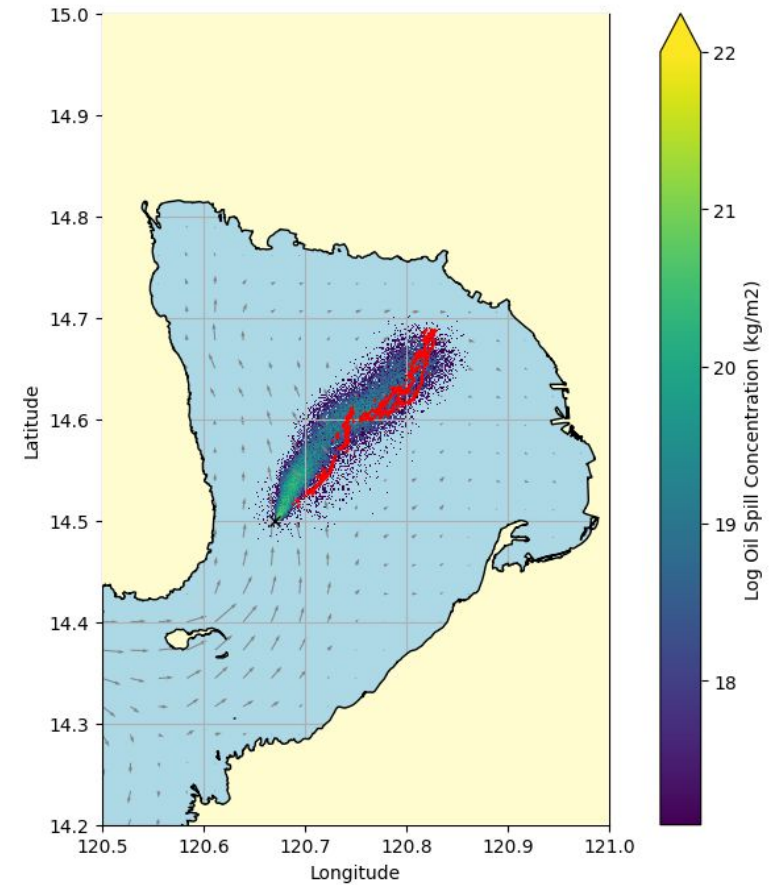
Manila Oil Spill accident

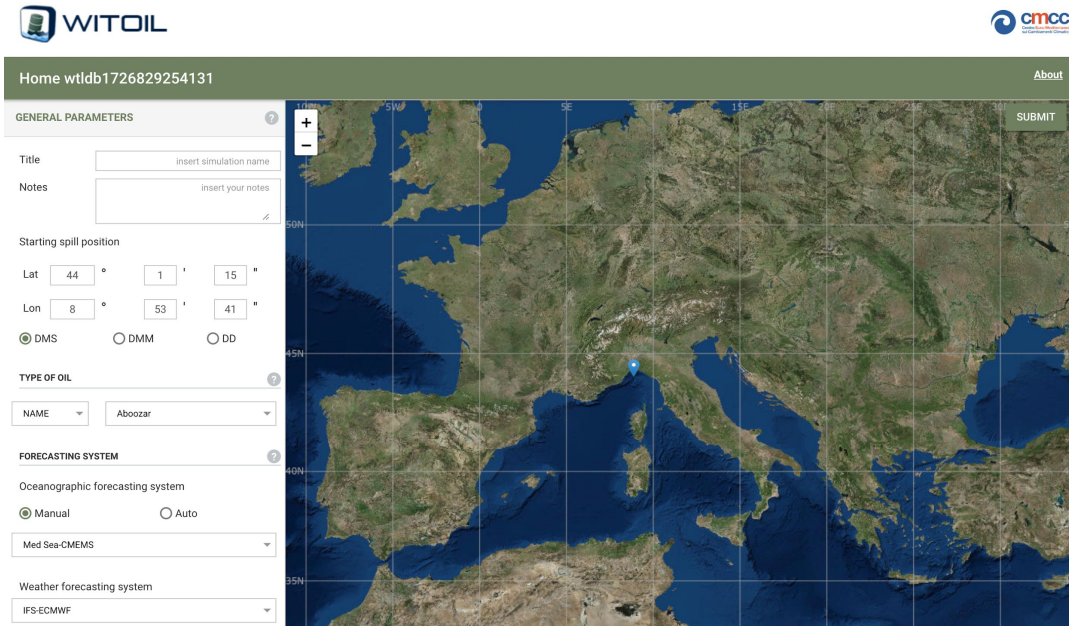
Models and observations on 26/07/2024 05:40 (PHT)

CMEMS-GLO (1/12 degree)



SURF (1/36 degree)





- The user selects a location, a date and the conditions of the spill, which can be one-off or continuous
- Simulations can be launched anywhere in the world, using the numerical forecasts provided by Copernicus and ECMWF
- The results appear on the same platform, allowing the user to observe the dynamics of the spill without having to download the data and manage it locally
- The concept of the platform is to be a "low code" space, where stakeholders with different backgrounds can launch simulations of oil spills to understand hypothetical scenarios or real accidents

**CMCC and UNIBO
developments
at**



EDITO: Oil spill Hazard Mapping

Landing page and GUI

HAZARD MAPPING HOMEPAGE

HAZARD MAPPING RESULTS



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HAZARD MAPPING on the CLOUD

Oil pollution hazard mapping for the Mediterranean Sea

Oil pollution hazard mapping is conducted to manage and minimize the effects of oil spills on coastlines in the critical first hours following a detected release. The key question it addresses is: where is the oil likely to go, and how quickly? To answer this, hazard mapping uses a probabilistic approach with multi-model ensemble simulations, which account for uncertainties such as the exact timing, location, type of oil, and variability in ocean currents.

The Edito-Lab oil spill hazard mapping offers a product based on an initial methodology developed over the years in the Atlantic basin (Sepp-Neves et al., 2017, 2021). This approach simulates oil transport and transformation from multiple coastal release points over several years and calculates oil trajectories and beaching events.

The resulting ensemble of oil concentrations is used to create different hazard maps and indices.

These products can be used by a oil spill emergency response teams.

The following section presents two main outputs, both derived from a set of release points: first, oil concentration after 10 days of release from various points in 2022, and second, oil concentration at the coasts, followed by an oil spill hazard index for different coastal segments.

These products can be used by users (normally emergency management teams) as an interactively explorable database. It allows users to actively engage with data, enabling them to filter, search, visualize, and analyze information in real time.

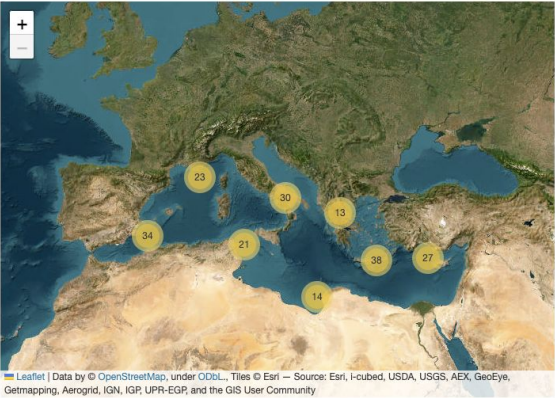


HAZARD MAPPING HOMEPAGE

HAZARD MAPPING RESULTS

OIL HAZARD MAPPING

In the map the coastal release points used to estimate the oil hazard are shown



To visualize the oil hazard in your area of interest click on the nearby oil spill location on the map



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EDITO: Oil spill Hazard Mapping

Release point and output selection

HAZARD MAPPING HOMEPAGE

HAZARD MAPPING RESULTS

OIL HAZARD MAPPING

In the map the coastal release points used to estimate the oil hazard are shown



To visualize the oil hazard in your area of interest click on the nearby oil spill location on the map

HAZARD MAPPING HOMEPAGE

HAZARD MAPPING RESULTS

OIL HAZARD MAPPING

In the map the coastal release points used to estimate the oil hazard are shown



To visualize the oil hazard in your area of interest click on the nearby oil spill location on the map

Selected Oil Spill Release Point

Latitude: 33.960404°

Longitude: 11.202642°

Please select the time interval or the climatology

Include years

☒ Select All

☐ 2022

☐ 2021

☐ 2020

☐ 2019

☐ 2018

or Include specific seasons

☐ Summer

☐ Autumn

☐ Spring

☐ Winter



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EDITO: Oil spill Hazard Mapping

Final products



Selected Oil Spill Release Point

Latitude: 33.960404° Longitude: 11.202642°

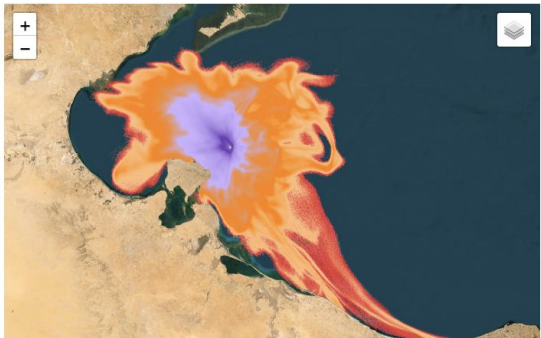
Selected time interval or climatology

Years: [2022]

Two main outputs are presented

☐ Choose palette (for colorblind)

Average oil surface concentration in time

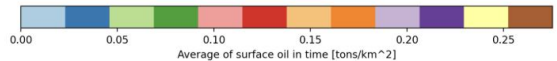
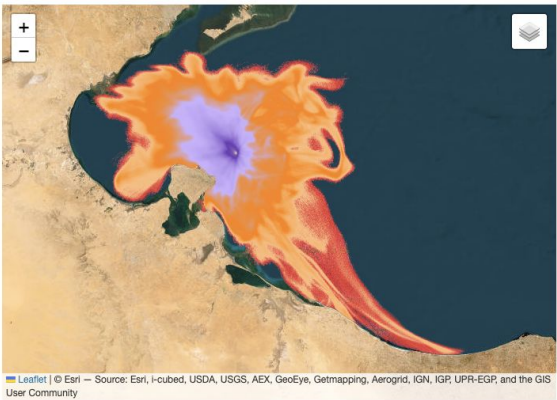


Years: [2022]

Two main outputs are presented

☐ Choose palette (for colorblind)

Average oil surface concentration in time



Hazard Index



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EDITO: WITOIL CLOUD

Using personal account to launch the service

EDITO Datalab

HomeTrainings and tutorialsDatalabViewerAbout EDITOSupportLogout

Reduce

My account

Project settings

Service catalog

My services

Process catalog

My processes

My secrets

My files

Data explorer

Service Catalog

You are about to deploy the witoil-cloud Helm chart that belong to the Playground Helm chart repository.

\$ helm install witoil-cloud-465750 playground/witoil-cloud -f values.yaml

Create your personal services

Witoil-cloud

Friendly name

witoil-cloud

Version

1.0.0

Cancel

Launch

Witoil-cloud configurations

Ingress

Service

Resources

Hostname

user-igoratake-465750-0.lab.dive.edito.eu

EU MISSIONS

EDITO

2022 - 2024 EDITO Infra

English

Terms of service

v8.21.2

WITOIL on Cloud

WITOIL SIMULATION

RESULTS



CMCC FOUNDATION

WITOIL on CLOUD for EDITO DATALAB

Welcome to WITOIL adapted to run on EDITO Infra. [↔](#)

The concept of this interface is to help users navigate through a simple user interface and launch oil spill simulations by providing date, location and dew characteristics of the oil spil. The system is still under development so caution is advised while performing simulations and using results for any given purpose

Info on Medslik-II, the backbone of the solution

The oil spill model code MEDSLIK-II (De Dominicis et. al 2013, Part 1 and Part 2), based on its precursor oil spill model MEDSLIK (Lardner and Zodiatis 1998; Lardner et al. 2006; Zodiatis et al. 2008) is a freely

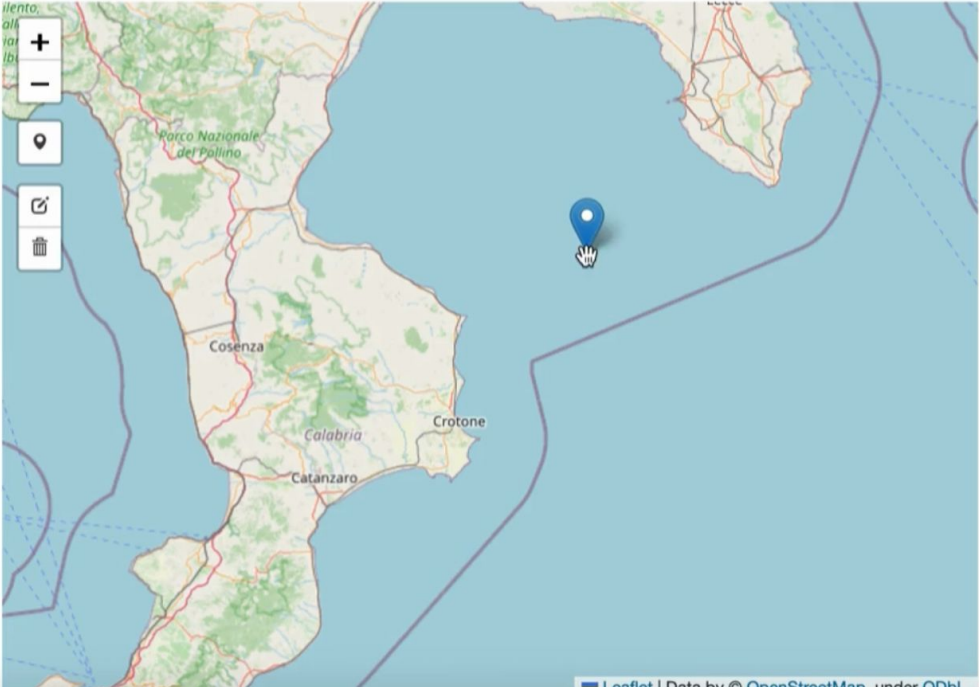
WITOIL on Cloud

WITOIL SIMULATION

RESULTS

WITOIL ON CLOUD FOR EDITO MODEL LAB

Please select the oil spill location or an area of interest



Leaflet | Data by © OpenStreetMap contributors, under ODbL

WITOIL on Cloud

WITOIL SIMULATION

RESULTS

Longitude

17.63 degrees

Latitude

39.59 degrees

Please select the simulation date:

Available Dates

2024/08/12

Please select the simulation hour:

Spill hour

12:00

Please insert simulaton duration in hours. Max value is 96 hours

Simulation Lengh (hours)

48

Coordinates lie within Mediterranean Sea

Use Local or global data?

☒ Med Sea Data
More Refined

☐ Global Forecast Data
Coarser

WITOIL on Cloud

WITOIL SIMULATION

RESULTS

Insert Simulation name

Taranto

Copernicus data downloaded

ERA5 data Downloaded

Data processed

Ocean inputs written

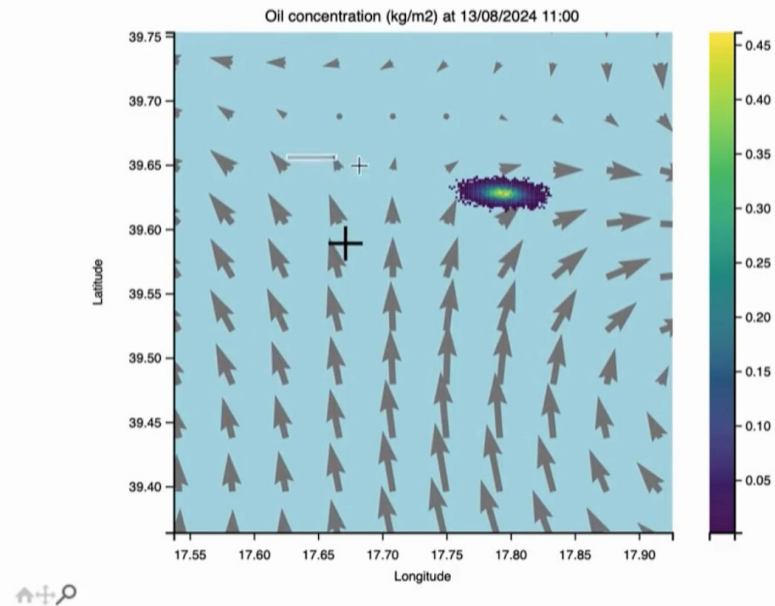
Meteorological inputs written

Bathymetry inputs written

WITOIL on Cloud
WITOIL SIMULATION
RESULTS

0 23

Oil Spill on Surface





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focused on **understanding the interaction**
between **climate change and society.**

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