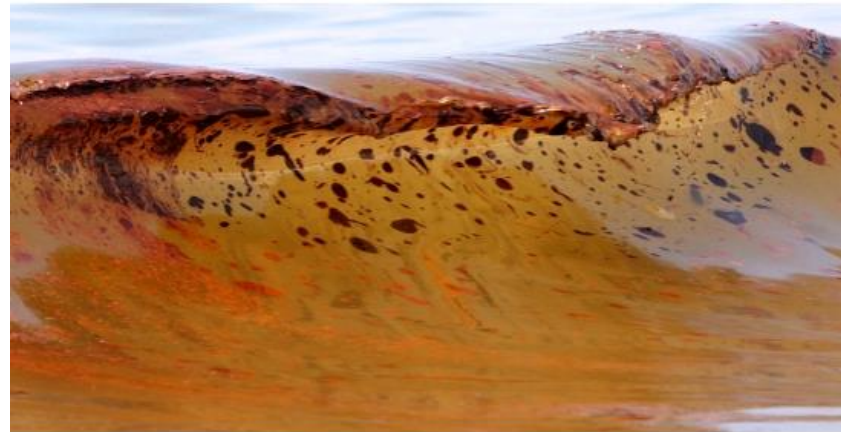


Υπηρεσία πρόγνωσης της διασποράς πετρελαιοκηλίδων για τις ελληνικές θάλασσες



Παρασκευή Μπουρμά
Λεωνίδας Περιβολιώτης

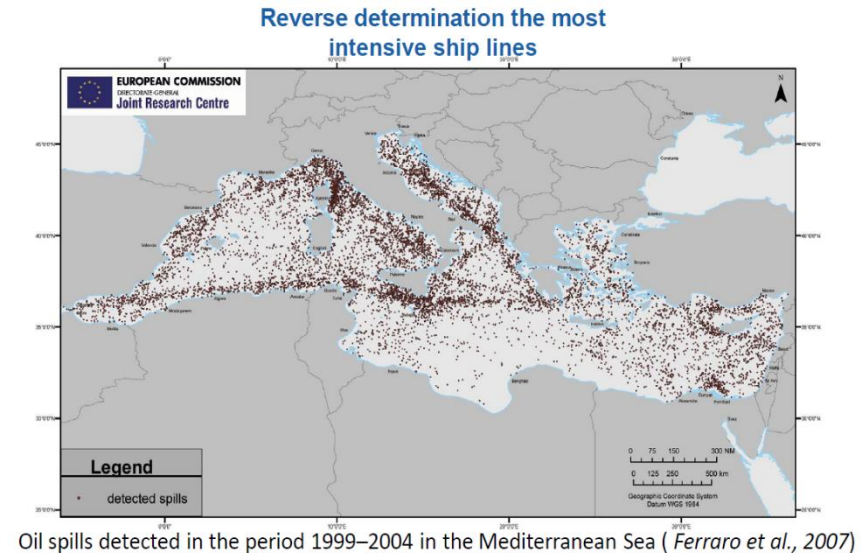
Ινστιτούτο Ωκεανογραφίας
ΕΛΛΗΝΙΚΟ ΚΕΝΤΡΟ ΘΑΛΑΣΣΙΩΝ ΕΡΕΥΝΩΝ

Overview

- Oil Spill Forecasting: the need for effective services
 - Oil spill pollution in the Mediterranean Sea
 - Environmental pressure increases
 - Decision Support Systems for Marine safety : The role of oil-spill forecasting services/ The Poseidon oil spill forecasting service
- The Poseidon Oil Drift Application
- POSEIDON OSM development and key implementations
 - Mediterranean Decision Support System for Marine Safety
 - BigDataOcean: Mare Protection Service
- Agia Zoni II shipwreck

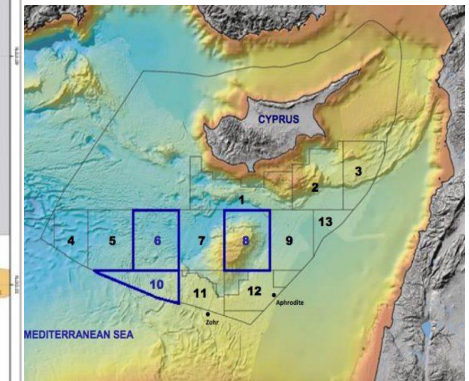
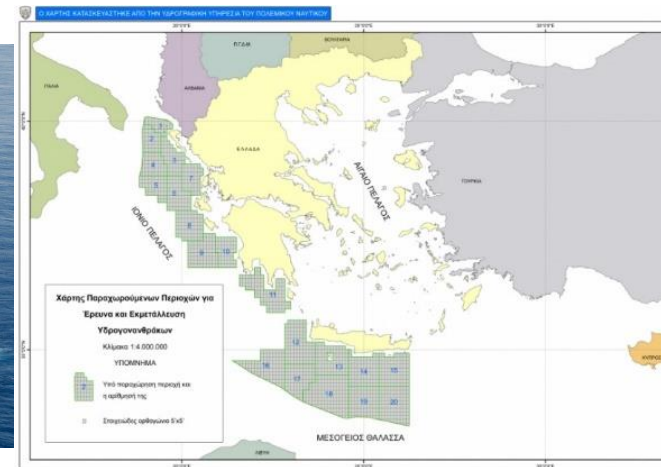
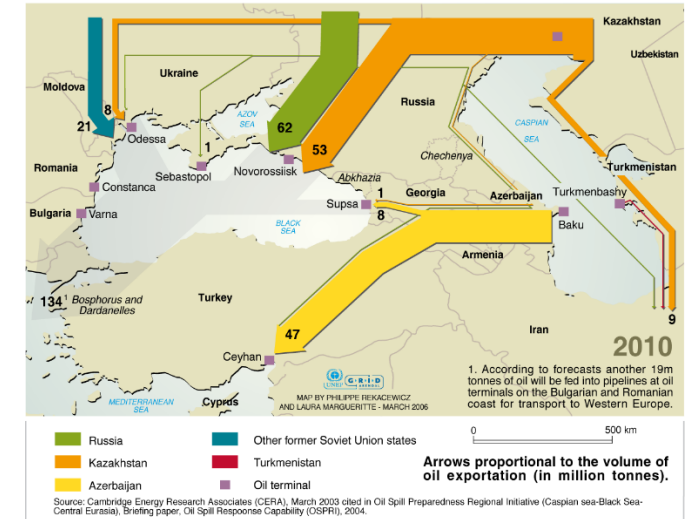
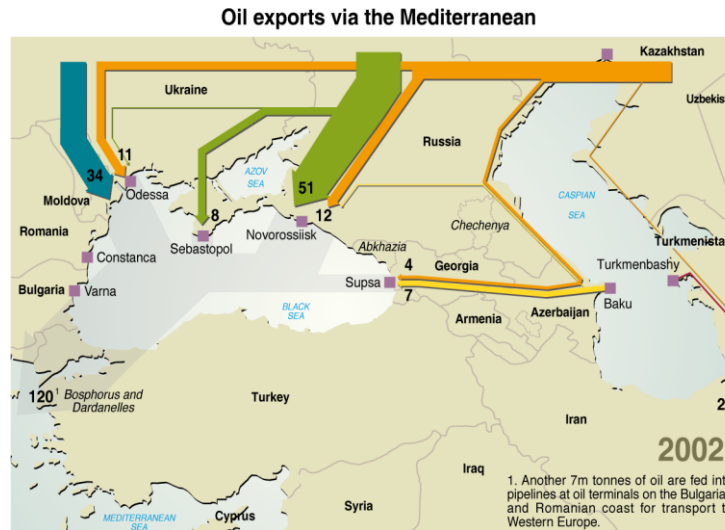
Oil spill pollution in the Mediterranean Sea

- An area of high-risk for oil pollution:
 - 252.000 vessels / year (>100 tn) (250-300 tankers / day)
 - 19% of global merchant shipping (15% of global shipping activity)
 - 20% of oil shipping
- SAR oil spill detections (illicit vessel discharges)
- The explosion and fire on board of the MT HAVEN off Genoa, followed by the sinking of the ship with its cargo of 44.000 tones of crude oil, in 1991, is considered the largest oil spill incident in the Mediterranean region.



Mediterranean Sea : Environmental pressure increases

- Overall vessel activity within the Mediterranean has been rising steadily over the past 10 years and is **projected to increase by a further 18 per cent over the next 10 years.** Transits through the Mediterranean are expected to rise by 23 per cent.
- Plans for future drilling activities in the EMED.

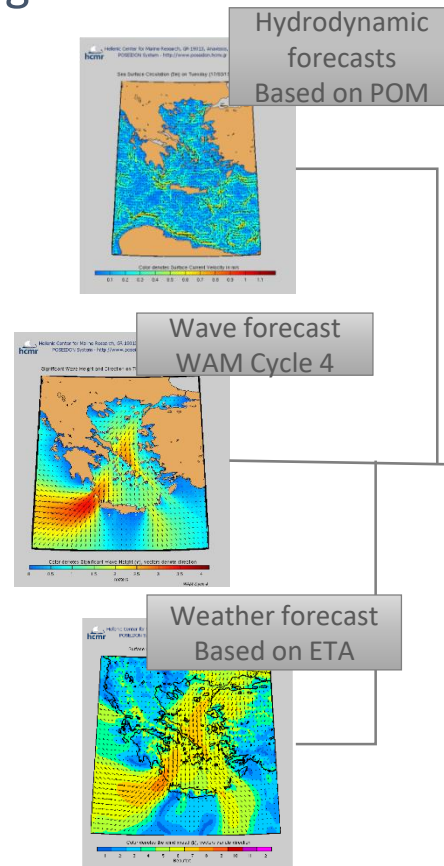


Decision Support Systems for Marine safety

The role of oil-spill forecasting services

The Poseidon oil spill forecasting service

- Possible oil spill accidents and operational pollution could have severe impacts on the coastal marine environment and habitats. It is crucial to provide decision makers, stakeholders, and the public with trustworthy DSS able to maintain the highest quality and near-real-time information during oil pollution response.
- The Poseidon Online Oil Drift Forecasting System offers to the end user predictions of oil spill 's fate and trajectory in case of accidents through a dedicated web page using the atmospheric, oceanographic and sea state forecasting results that are produced during the daily operation of POSEIDON System.

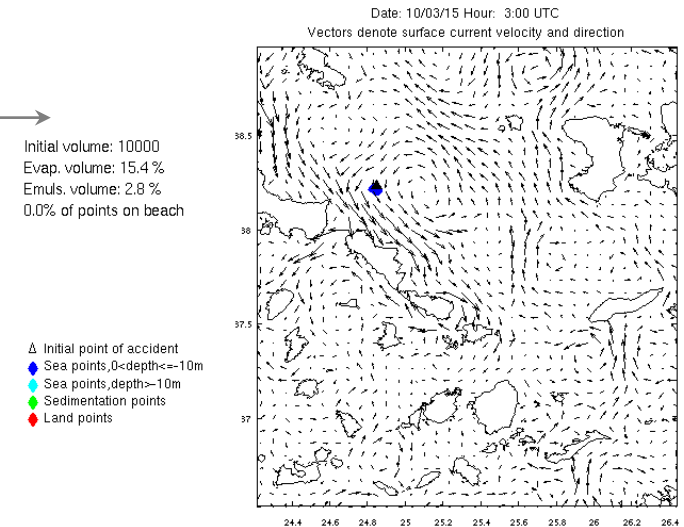


Oil Spill Model

A 3-D numerical model which simulates:

- the pollutant transport
- weathering (evaporation, emulsification, sedimentation, beaching)

The oil slick is represented as “parcels” with time dependent chemical and physical characteristics



The Poseidon Oil Drift Application

www.poseidon.hcmr.gr
<http://osm.hcmr.gr/>

The user submits a scenario:

- 'Event' position
- Date, time
- Simulation time
- Initial volume of the pollutant (if it is known)
- Evacuation time (if it is known)

Request for the Oil Spill Modeling Application

How to submit your request:

- Select the area of the oil spill event, either by dragging and dropping the pin into the desired position on the map or by filling manually the relevant fields of Latitude/Longitude (in this latter case you may click the "Set pin here" to move the pin into the relevant location)
- Select the date and time of the oil spill accident, the duration of oil spill model integration in hours and the frequency of the graphic output results.
- You can optionally provide the following information for the model run: The total oil volume that has been disposed into the sea (Default value: 10000m³) and the evacuation time in hours, i.e. the time frame where all the amount of oil will be disposed into the sea (Default value: 0-instant evacuation)
- Provide a valid e-mail address and press submit.



Initial point of the accident:

Latitude *: 38.7712
Longitude *: 24.5215
Combo box: 38.7712, 24.5215

Set Pin Here

Date of the accident *: 17/11/2011
Time of the accident *: 00:00 UTC
Duration of integration (in Hrs) *: 1 day (24 hours)
Output graph every *: 1 hours
Oil volume (m³) (if you know):
Evacuation time (in Hrs):

Your e-mail:

Submit Reset

* Required fields

About

The POSEIDON Oil Spill fate and trajectory model is based on PARCEL model (Pollani et al. 2001) which is able to simulate not only the drift of the oil but also the chemical transformations under the specific environmental conditions. more...

Links

Poseidon System
Hellenic Center for Marine Research
Ecoop project
Roses project
MarCoast network

The user receives email notification when the simulation is completed (average pending time 5 – 7 min).

The user can see and download the results:

Geographical position of each particle

- Depth
- Percentage of evaporation, emulsification volume, beached and bottom particles.

Online Oil Drift Forecasting System

Hellenic Center for Marine Research - Poseidon System

Login

Username:

Password:

Submit



© 2010 Hellenic Center for Marine Research - Poseidon Team

Designed by A. G. Chalkopoulos

Home Request Results About Contact

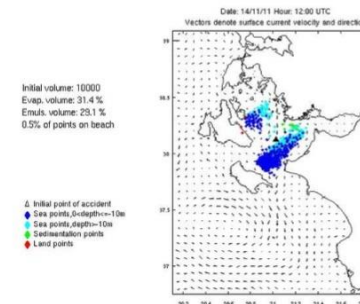
Results for the Oil Spill Modeling Application

Information about the oil spill event

Download KML

Date: 10/11/11
Time (UTC): 00:00
Initial Position: 21.0278 E 38.1216 N
Duration of Integration (Hrs): 168 (7 days)
Evacuation time (Hrs): Instant
Output graphic every (Hrs): 12

Initial volume: 10000
Evap. volume: 31.4 %
Emuls. volume: 29.1 %
0.5% of points on beach



14/11/11 Hour: 12:00 UTC Animation

All the graphical outputs with a summary text are available in .zip file.

Click here to download the .zip file (size: 482.19 KB)

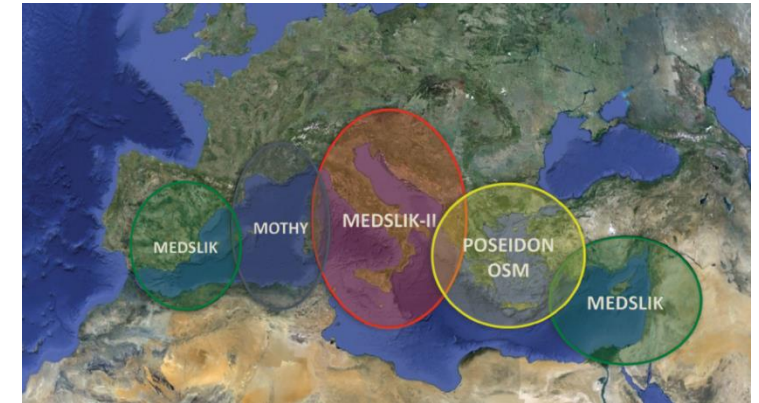
POSEIDON OSM development and implementations

- 2000 - developed and implemented for the needs of the POSEIDON operational oceanography system for the Aegean and the Ionian Seas (Pollani et al. 2001)
- 2003-2004 - further developed and upgraded during the ROSES ((Real Time Ocean Services for Environment and Security) ESA funded project (Perivoliotis et. al., 2006)
- 2005-2008 - further developed and upgraded during the MarCoast ESA funded project (Perivoliotis et. al., 2008)
- 2010 - active element of the European Decision Support System (EuroDeSS) ECOOP FP6 project (Perivoliotis et. al., 2011)
- 2015 - active module of the MEDESS-4MS service
- 2019 – Mare Protection Service through the BigDataOcean platform

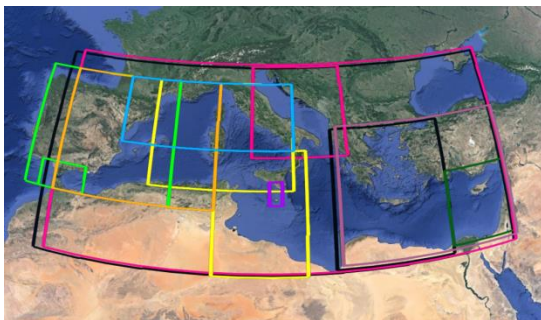
Mediterranean Decision Support System for Marine Safety

MEDESS-4MS- www.medess4ms.eu

- Connecting the standalone systems: The four already operational oil spill models (MEDSLIK, MEDSLIK-II, POSEIDON OSM and MOTHY) are connected to the multi model oil spill system of the MEDESS-4MS.
 - Coupling with a variety of environmental data
The MEDESS-4MS oil spill service are coupled with the environmental data from the MCS, the downscaled MS national ocean forecasting systems and the oil slick data from existing platforms (EMSA-CSN, REMPEC, HF-radars).
- **9** different Institutions and Centers along the Mediterranean Sea are providing marine and atmospheric forecasting data in real time
 - **28** different forecasting data sets are available

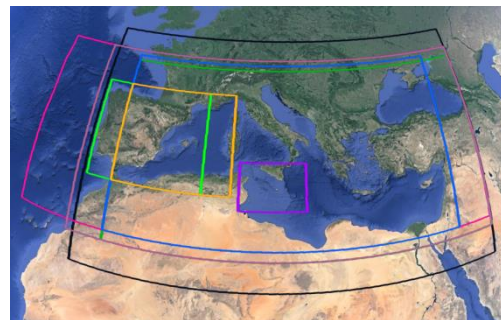


Hydrodynamic Forecasting Systems (14)



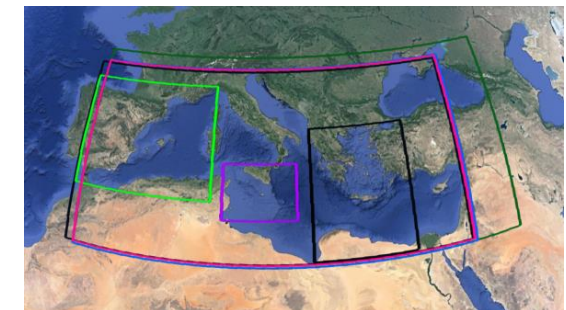
Basin scale models resolution approx. 6.5 Km
Regional/Coastal scale, resolution ranges between 1-3.5 Km

Atmospheric Forecasting Systems (7)



Basin scale models resolution ranges 5-25 Km
Regional/Coastal scale, resolution approximately 5 Km

Waves Forecasting Systems (7)



Three basin scale models resolution ranges 5-10 Km
Regional/Coastal scale, resolution ranges 3.5-5 Km

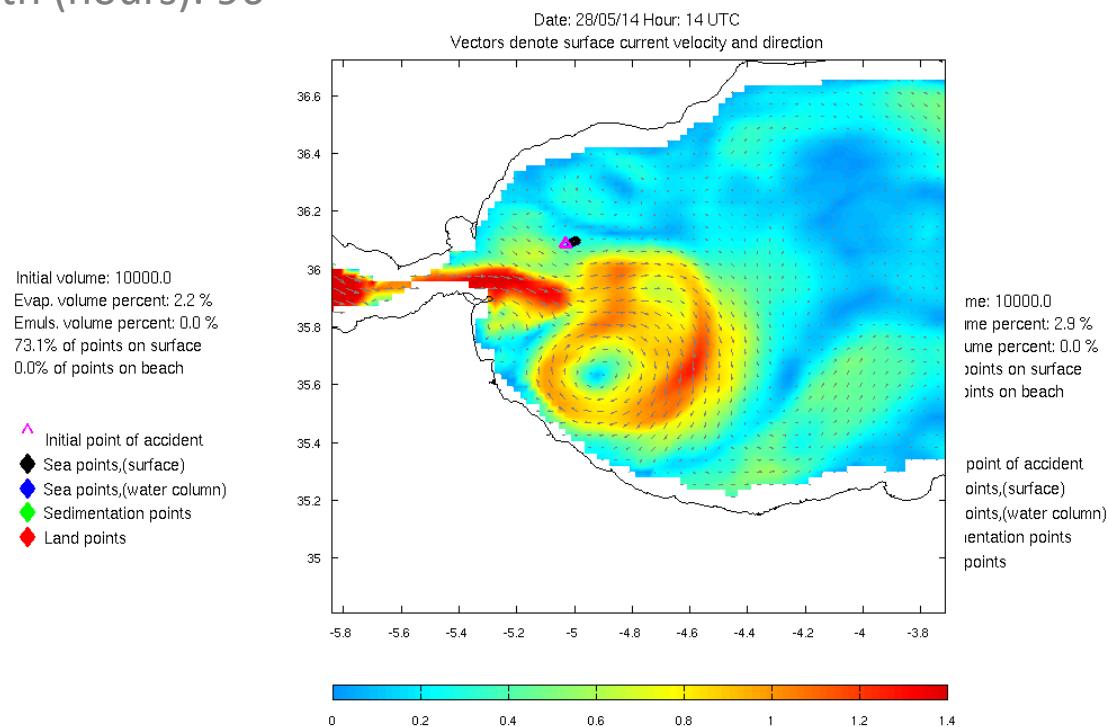
Experiment 1 – Oil spill in the Alboran Sea

Oil spill model : POSEIDON OSM

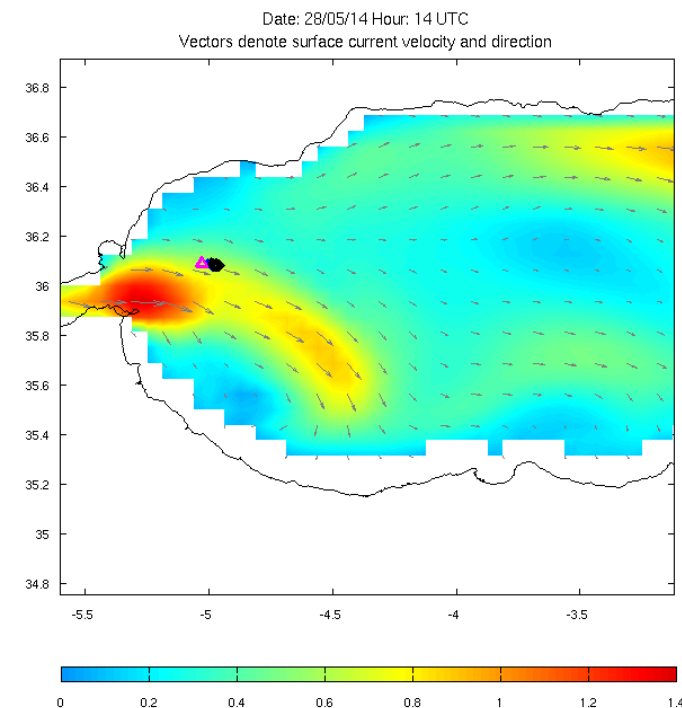
Date of event : 28/5/2014

Simulation length (hours): 96

Higher resolution forcing data



Lower resolution forcing data



OCEAN data	METEO data	WAVES data
SAMPA (2×2 km)	AEMET (12×12 km)	PdE-WAM (8×8km)

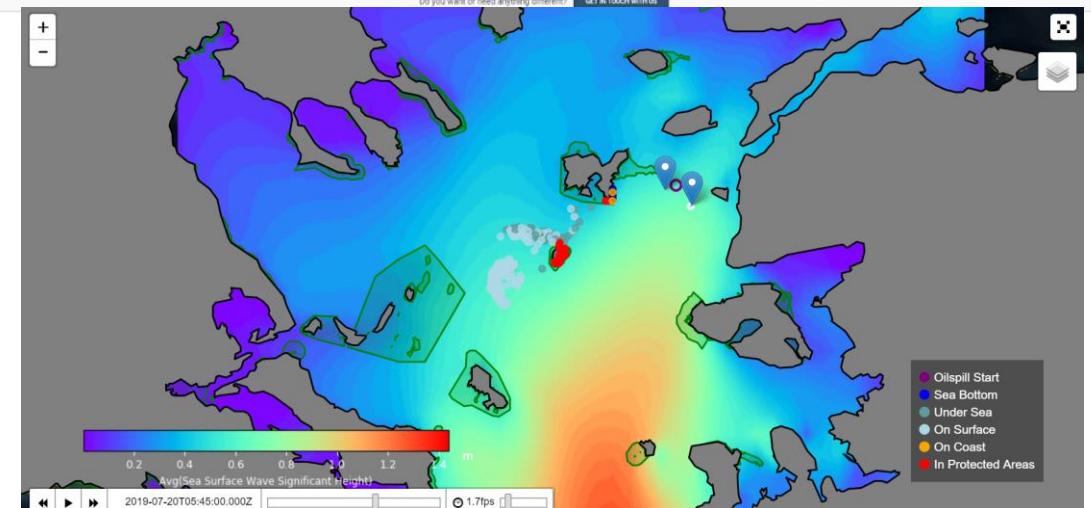
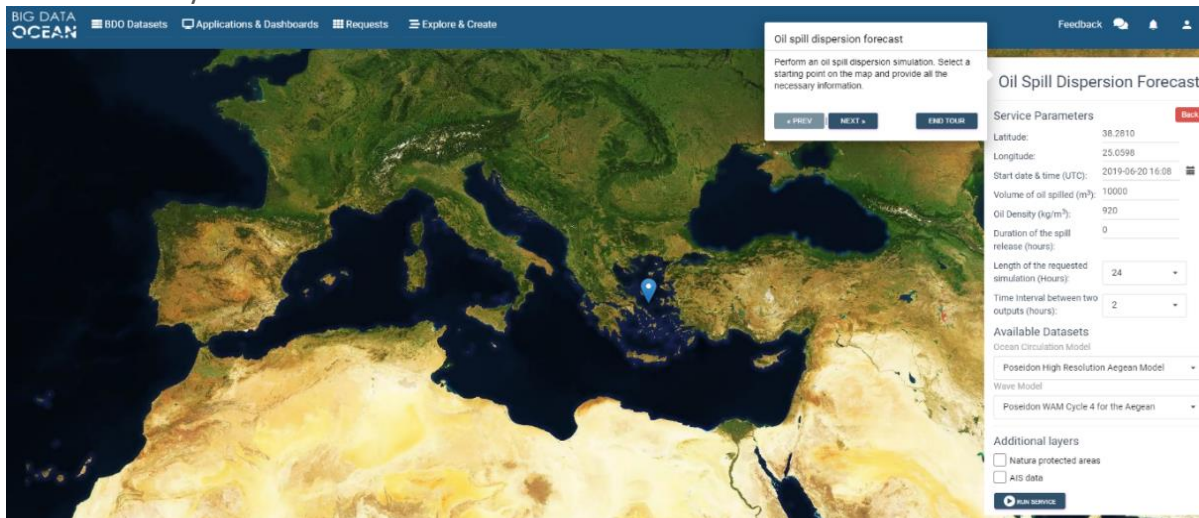
OCEAN data	METEO data	WAVES data
MFS (6.5×6.5 km)	ECMWF (25×25 km)	POSEIDON WAM Med (10×10 km)

BigDataOcean: Mare Protection Service

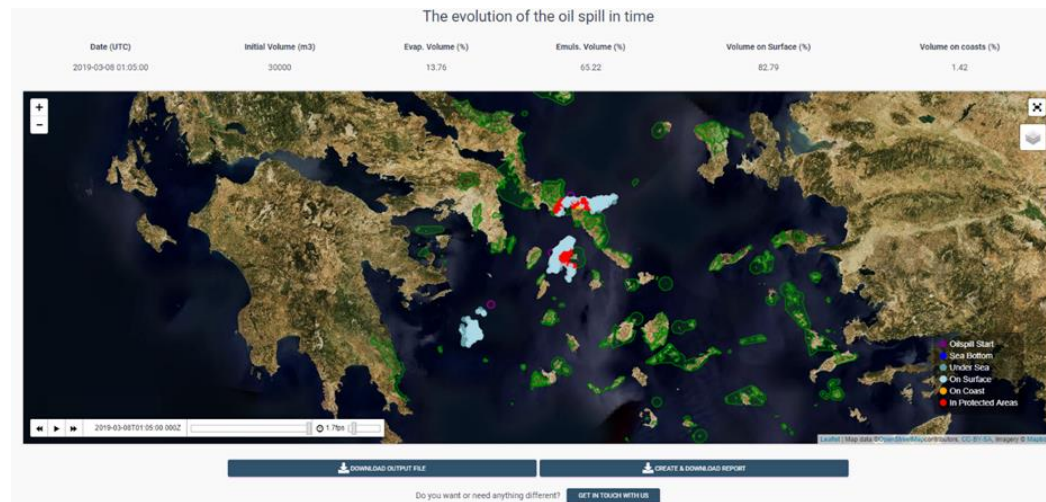
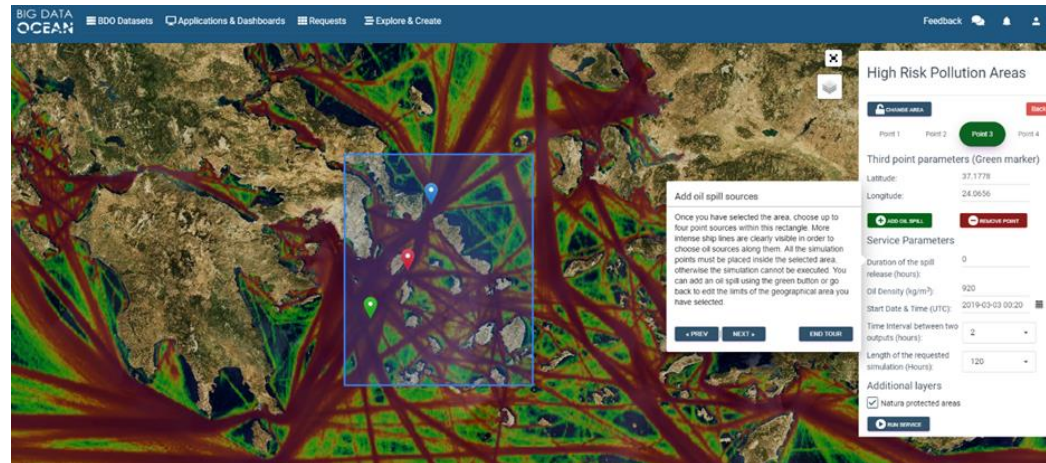
<https://platform.bigdataocean.eu/>

- Mare Protection Service provides a series of applications based on the POSEIDON Oil Spill Model.
- Simulation results are enhanced with various cross-sectoral marine data available in the BigDataOcean platform.
 - Application 1 - Oil Spill Dispersion Forecast Acquisition;
 - Application 2 – High Risk Pollution Areas;
 - Application 3 – Underwater Accident;
- BDO associated datasets:
 - POSEIDON – HCMR ocean circulation, wave and weather forecast – live (5 days forecast from present) and historical (one year back from present day);
 - Copernicus forecasting products for ocean circulation and waves in the Mediterranean Sea;
 - Natura 2000 protected areas;
 - Vessel tracking (AIS);
 - Bathymetric data

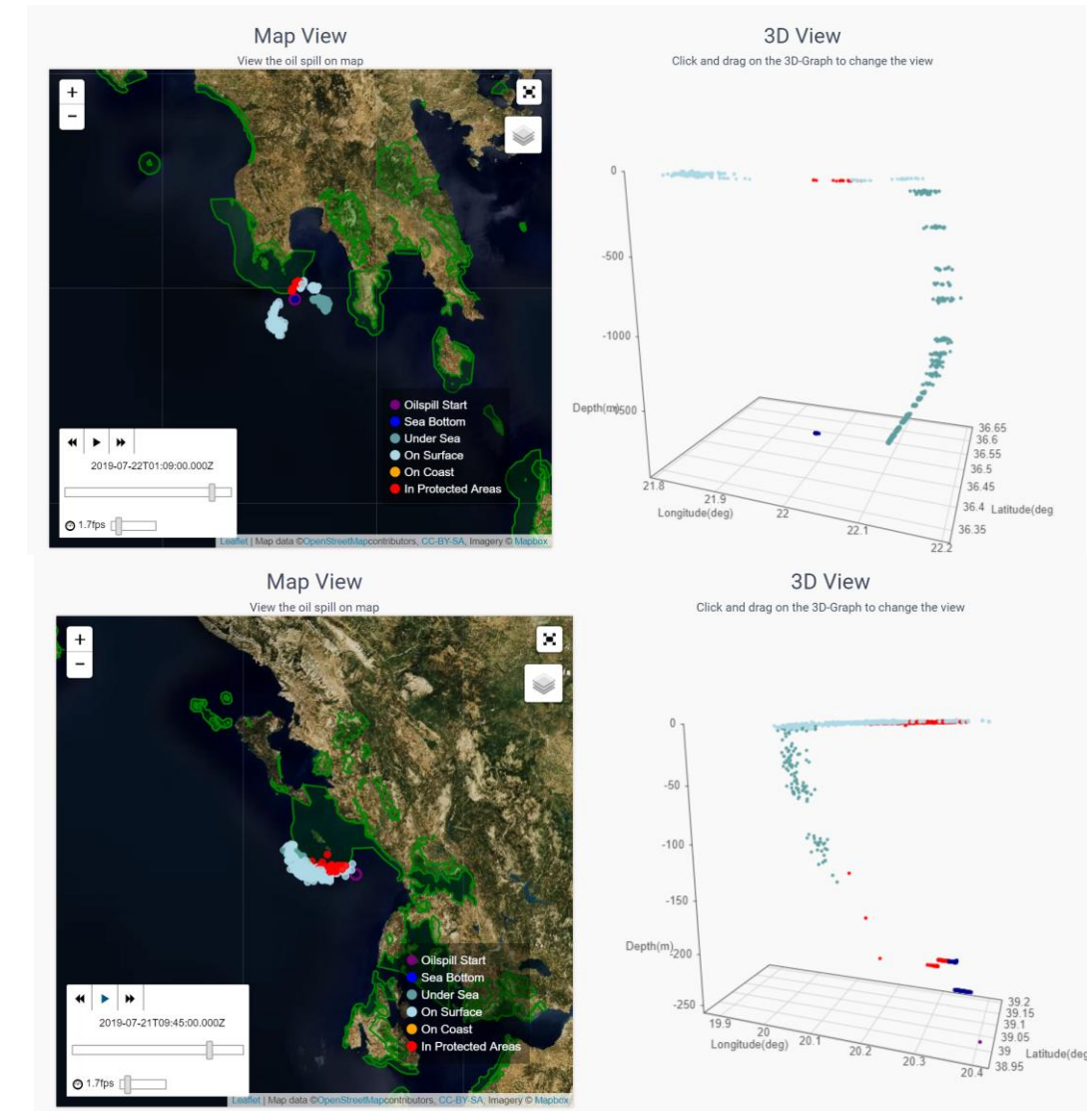
Application 1 - Oil Spill Dispersion Forecast



Application 2 – High Risk Pollution Areas

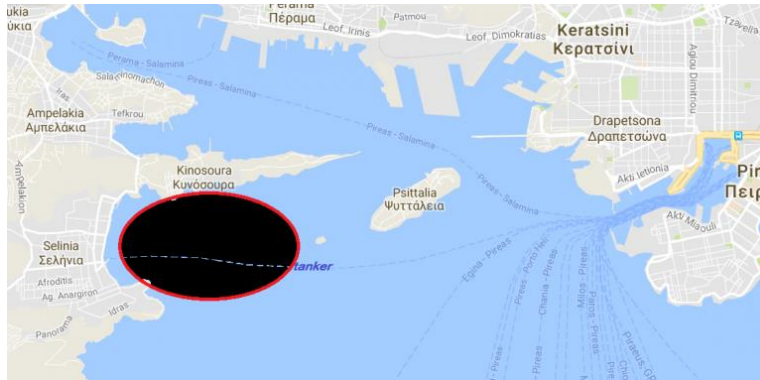


Application 3 – Underwater Accident



Agia Zoni II shipwreck, Saronikos gulf, 10th September 2017

- Tanker Ag. Zoni II sank at 2:45 a.m. Sunday, Sept 10th 2017. It was anchored south-west of the islet of Atalanti.
- Tanker Agia Zoni II was loaded with 2,200 tones of fuel oil and 300 tones of marine gas oil.
- ~ 500 tones spilled into the sea
- Sealing was completed after 72 h at 12/09 noon.
- The first spots of pollution were visible short after the sinking.



Agia Zoni II: POSEIDON OSM simulations

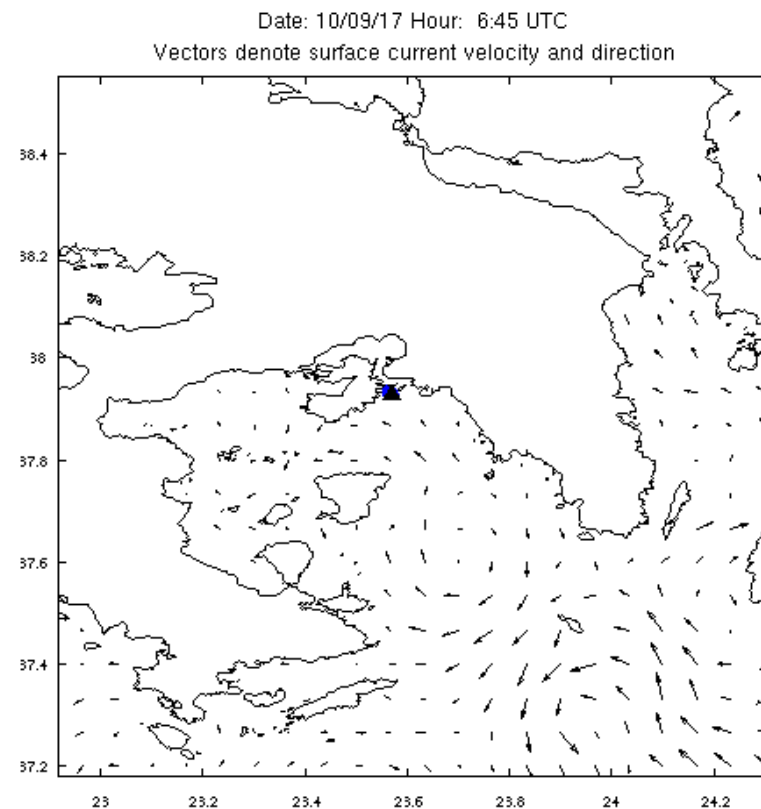
Affected Areas



Initial volume: 250
Evap. volume: 0.3 %
Emuls. volume: 0.0 %
0.0% of points on beach

△ Initial point of accident
◆ Sea points, $0 < \text{depth} \leq 10\text{m}$
◆ Sea points, $\text{depth} > 10\text{m}$
◆ Sedimentation points
◆ Land points

- Regions strongly affected: Salamina, Piraeus, Alimos, Glyfada.
- Signs of oil residues were observed after 5 days in Saronida coasts.
- Forecasts were provided to the Greek Ministry of Mercantile Marine and to REMPEC.



Σας ευχαριστώ για την προσοχή σας!