Search and Rescue

Copernicus Environment Monitoring Service

Copernicus
Europe's eyes on Earth

Space

Copernicus EU
Copernicus EU
Copernicus EU
www.copernicus.eu

Sea Situational Awareness : Why? For whom?

Marine Monitoring

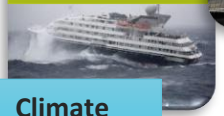
Search & Rescue

Coastal protection & erosion

Pollution emergency

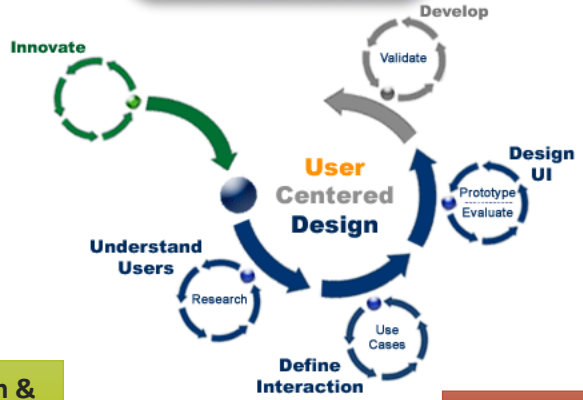
Law enforcement & civil protection

Safety of navigation



Climate Change

Fishery & aquaculture



Renewable energy

Harbours

Protection & management of marine ecosystems

Offshore activities

Tourism

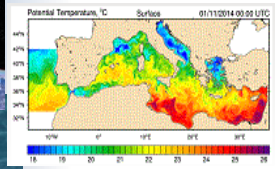
Copernicus Europe's eyes on Earth

European Commission

Sea Situational Awareness Services: how we produce them

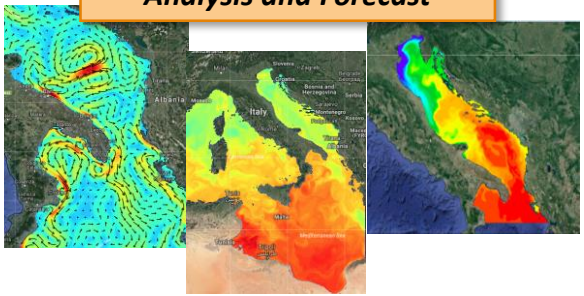
Marine Monitoring

COPERNICUS · MARINE ENVIRONMENT MONITORING SERVICE
CMEMS MEDITERRANEAN SEA MFC
Contract MED-MFC Until April 30 2018

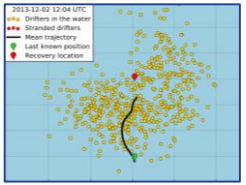


ECMWF

Downscaling
High Resolution
Analysis and Forecast

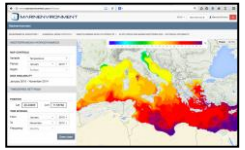


Informations and applications for end-users

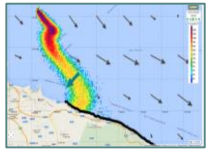


Search and Rescue

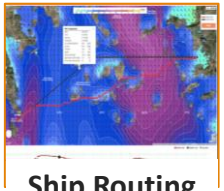
SeaConditions



Marine Environment



Oil Spill



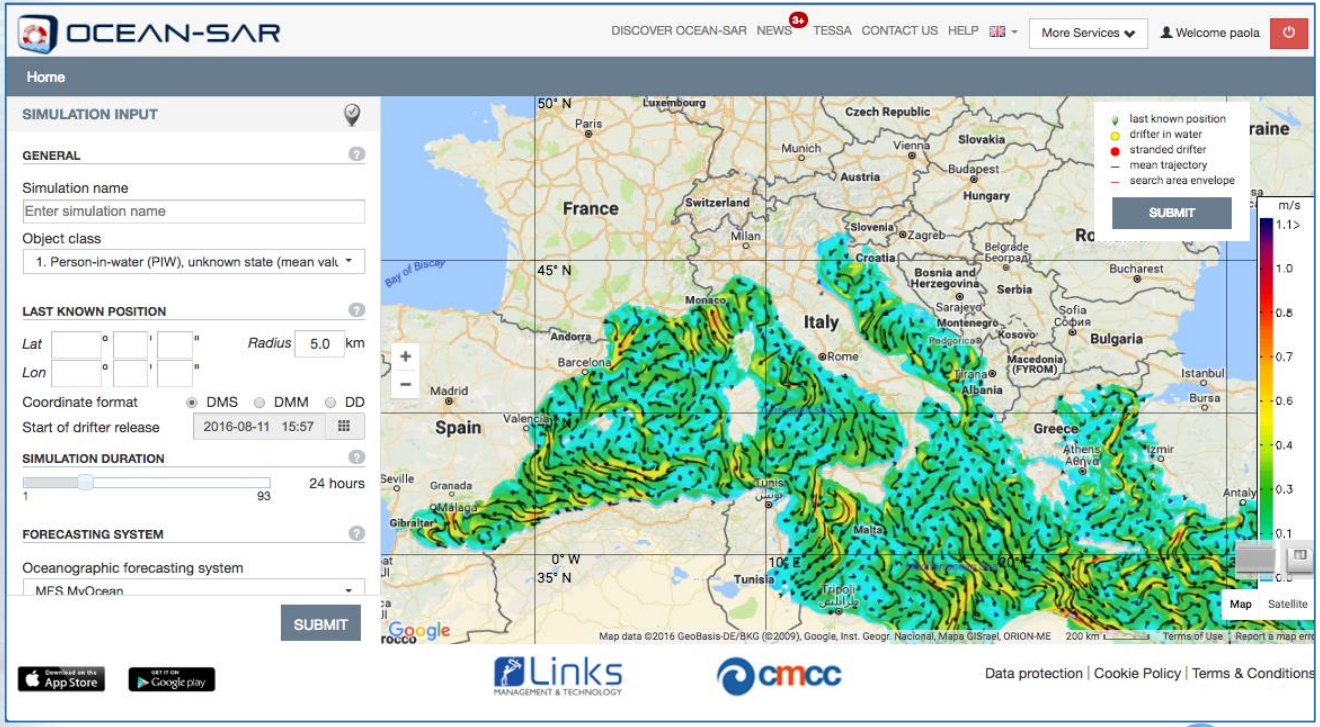
Ship Routing

Copernicus Europe's eyes on Earth
European Commission

The OCEAN-SAR service

Marine Monitoring

http://www.ocean-sar.com/en/join



Copernicus Europe's eyes on Earth

European Commission

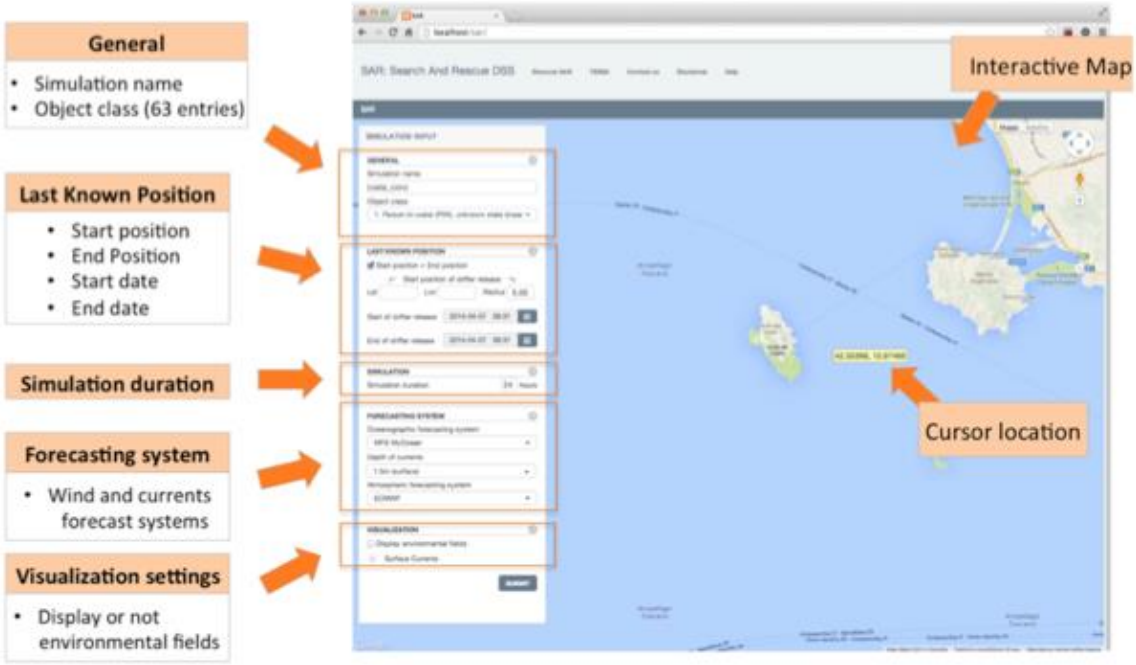
The OCEAN-SAR user interface

Marine Monitoring

The User Interface (UI) allows setting the parameters of the simulation, submitting requests and displaying the results of simulations on a map. The parameters can be grouped as follows:

- general parameters (simulation name, object category);
- last known position (start position, end position, start date, end date);
- simulation duration;
- forecasting system (wind and currents models);
- display settings (environmental fields on/off);

http://www.ocean-sar.com/en/join



Copernicus Europe's eyes on Earth

European Commission

Data and Model

Marine Monitoring

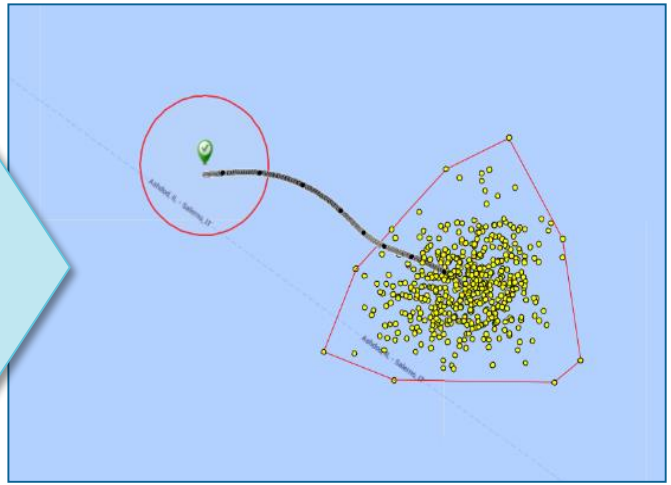
C
Currents with hourly resolution on a 1/16 degree

ECMWF
hourly resolution for the first 3 days after the analysis

Leeway Model

Search and Rescue

OCEAN-SAR



Copernicus Europe's eyes on Earth

European Commission

Data: CMEMS MED-MFC products

Marine Monitoring

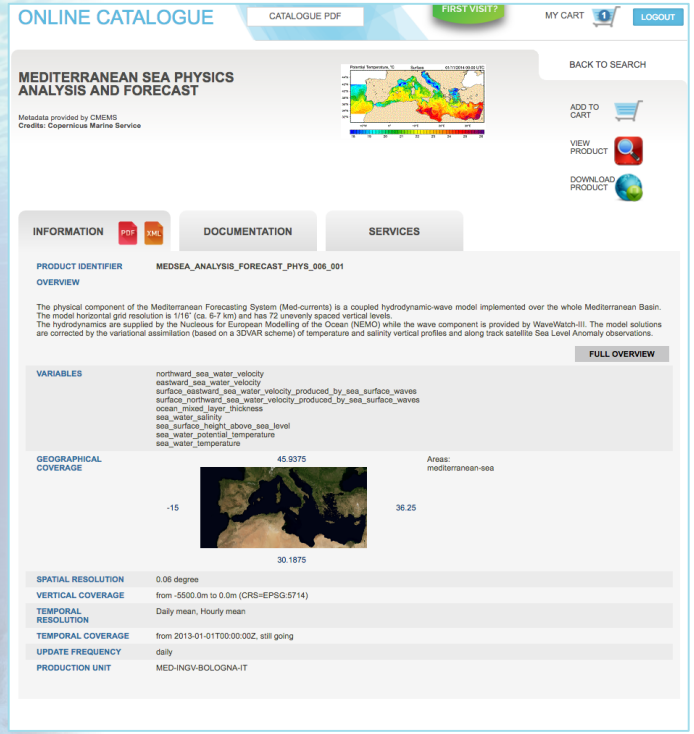
Online catalogue on ***http://marine.copernicus.eu/services-portfolio/access-to-products/***

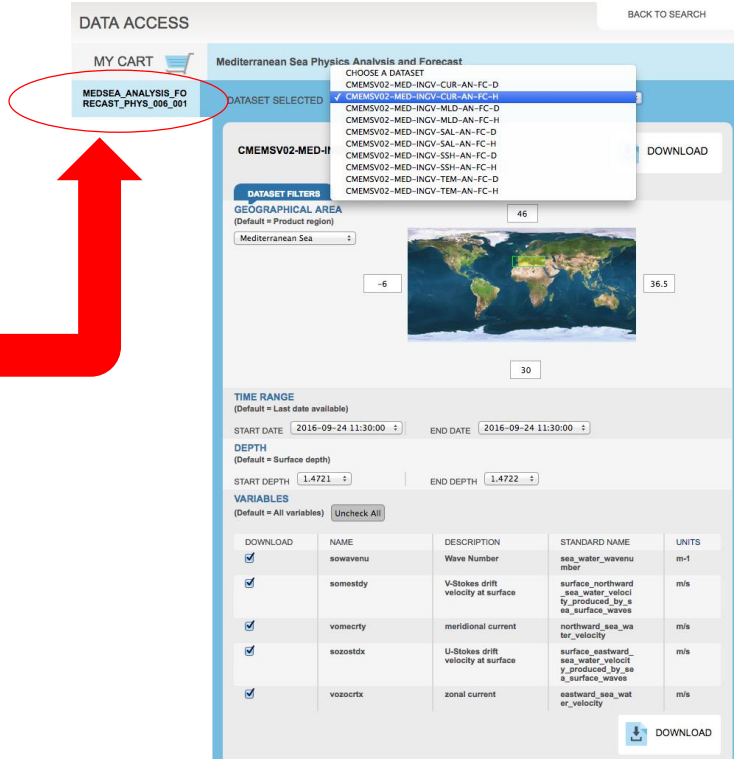
opernicus Europe's eyes on Earth

European Commission

Data: CMEMS MED-MFC products

Marine Monitoring





Copernicus Europe's eyes on Earth

European Commission

The OCEAN-SAR output

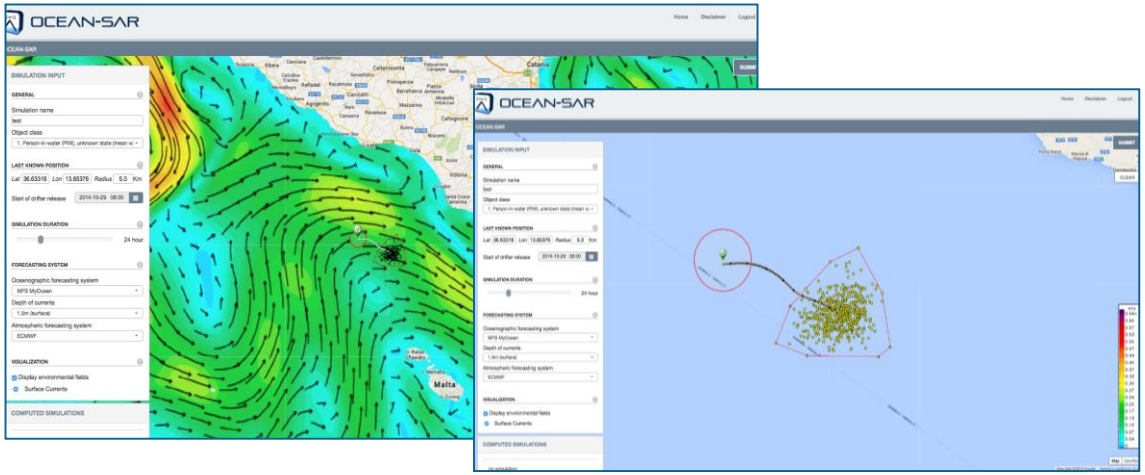
Marine Monitoring

http://www.ocean-sar.com/en/join

OCEAN-SAR provides the user with an intuitive interface to run simulations and to visualize their results using Google Maps.

The UI visualizes the following output/results of the model:

- Drifters final positions (yellow or red markers);
- Mean trajectory drift (black curve);
- Drifters stranded along the coast line (red markers).



REAL CASE SCENARIOS

- The Italian Coast Guard has been using our service to help guide search and rescue missions in the Med Sea
- Data from exercises and real missions is collected by us and used to test and further improve modeling

Copernicus Europe's eyes on Earth

European Commission

Mediterranean real case scenarios: Norman Atlantic Accident – 28 December 2014

Marine Monitoring

Date: 29/12/2014

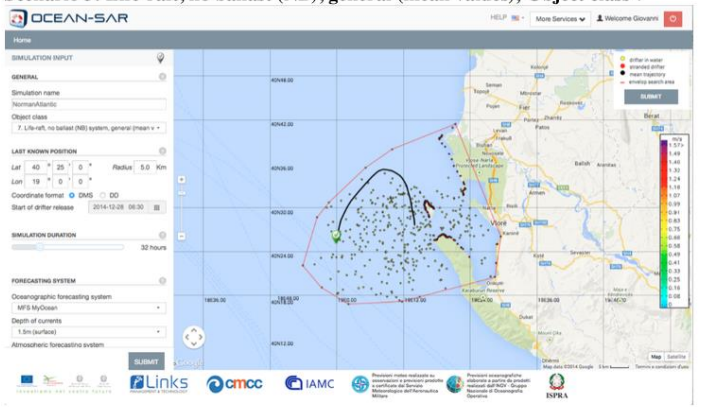
SaR Bulletin n° 3 29/12/2014 for: "*Norman Atlantic accident*"
Contents: SAR scenarios

The bulletin has been produced by CMCC team based on the system developed in the TESSA project (PON2007-2013 http://tessa.linksmt.it)

This bulletin is transmitted to the Italian Coast Guard (Comando Generale and Direzione Marittima Bari).

Ship Position: 40° 25' N 019° 00' E
All simulations starts at 6.30 Local time (IT) 28-12-2014
Simulation duration: **32 hours** (**until 12:30 29/12/2014**)
SAR Scenarios:
Scenario 1: PIW; Object class 1
Scenario 2: PIW horizontal, deceased; Object class 6
Scenario 3: Life-raft, no ballast (NB), general (mean values); Object class 7
Scenario 4: Life-raft, 4-6 persons capacity, deep ballast system with drouge; Object class 21
Scenario 5: Life-raft, 15-20 person capacity, deep ballast system, no drogue, light loading

Scenario 3: Life-raft, no ballast (NB), general (mean values); Object class 7

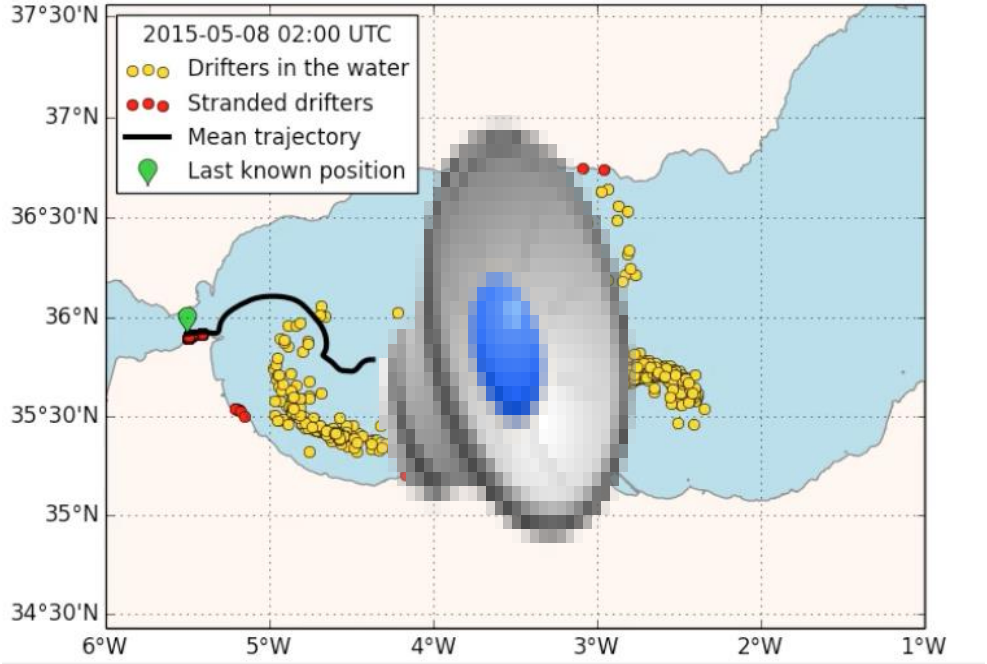


Europe's eyes on Earth

European Commission

Marine Monitoring

Example of a 10-day simulation over a distance of 400km

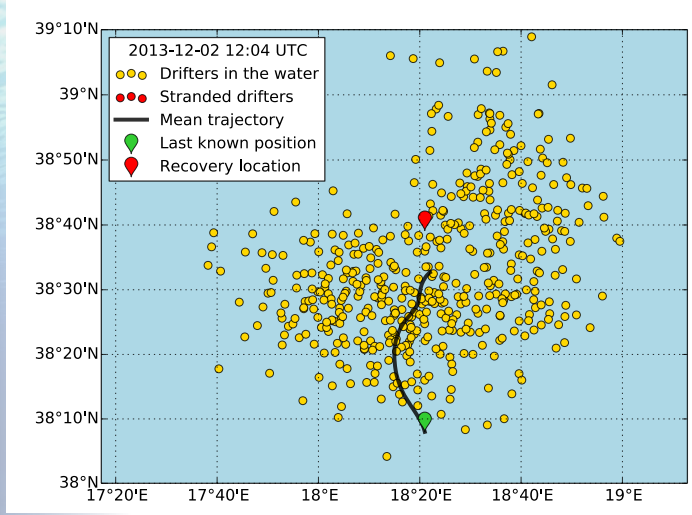


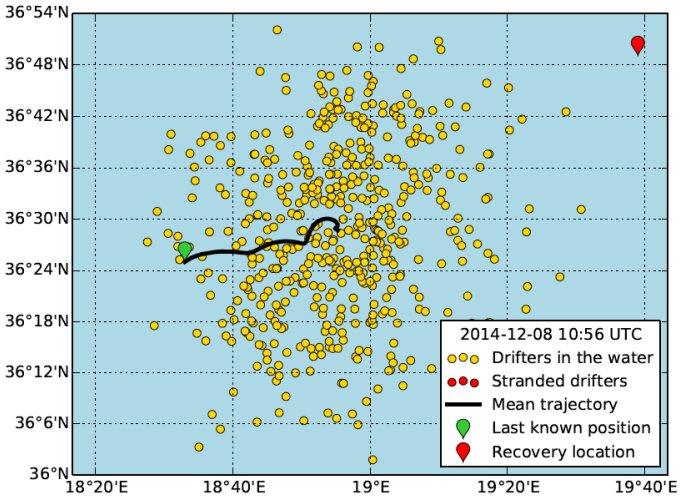
Copernicus Europe's eyes on Earth

European Commission

OCEAN-SAR model applied to real cases – migrant ships (2013/2014)

Marine Monitoring





- Fishing troller with migrants discovered by coast guard
- Ship drifted for 36 hours without engines in rough sea until evacuation was possible

- 60 m Coastal freighter with migrants in Ionian Sea
- Evacuated, but left adrift until it could be towed 3 days later

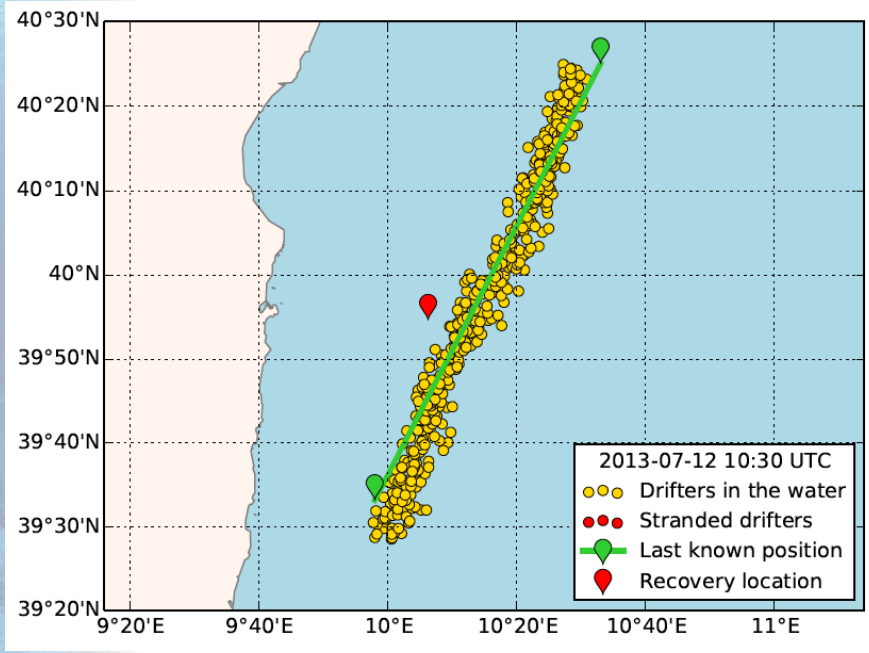
Copernicus Europe's eyes on Earth

European Commission

Marine Monitoring

OCEAN-SAR model applied to real cases – ferry accident (July 2013)

- A passenger went missing form a ferry en-route near Sardinia in the evening of 11-07-2013
- Person was last seen by other passengers around 20:30 UTC
- Reported missing to the crew at 23:30 UTC



- Initial position is set along the route of the ferry with 3-hour time window
- Simulation of 14 hours
- Body was found the next morning

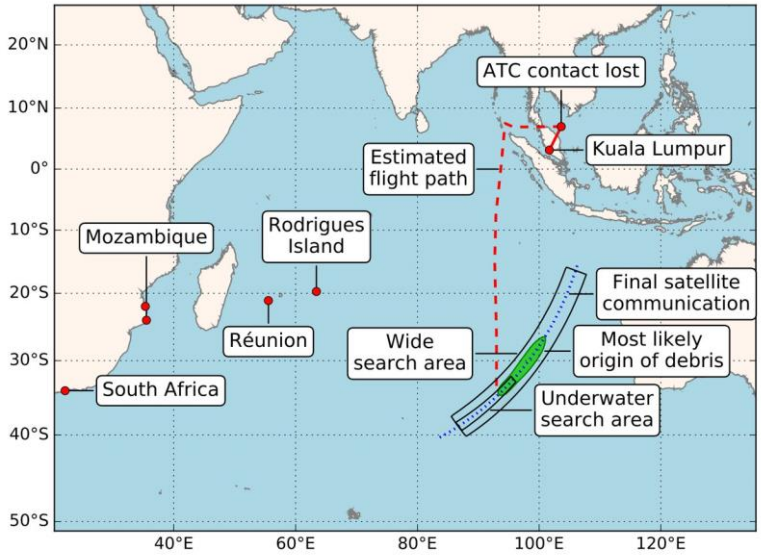
Copernicus Europe's eyes on Earth
European Commission

Marine Monitoring

Global real case scenarios: Malaysian Airlines Flight MH370

- On 7 March 2014 (UTC), Malaysia Airlines flight 370 vanished without a trace. The aircraft is believed to have crashed in the southern Indian Ocean, but despite extensive search operations the location of the wreckage is still unknown. The first tangible evidence of the accident was discovered almost 17 months after the disappearance.

- To find out how MH370 debris drifted since the crash, the researchers ran a computer model that used oceanographic data from the **EU Copernicus Marine Environment Monitoring Service**, including data of **global surface currents** and **winds over the past two years**. To improve their simulation, they used the locations of the five confirmed debris found to date**: two in Mozambique and one each in Réunion, South Africa and Rodrigues Island (Mauritius)**

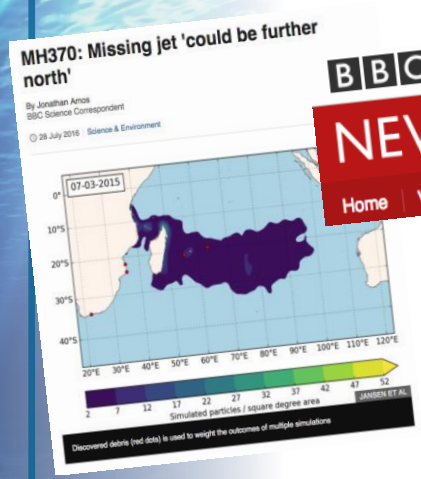


Copernicus Europe's eyes on Earth

European Commission

Marine Monitoring

Global real case scenarios: New Simulation Extends Possible Crash site of Malaysian Airlines Flight MH370

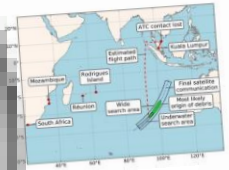


BBC NEWS
Home Video

THE Sun

FLOW OF DEBRIS Researchers p
MH370 search teams have been
looking in the WRONG place for
years
New study says plane is 300 miles further north that
search area

WIRED
Finding MH370: How algorithms are helping to hone in on the
issing plane



Dov'è scomparso l'aereo della Malaysia Airlines? Nuove ipotesi da una ricerca salentina
mercoledì 27 luglio 2016

theguardian
Flight MH370: modelling shows debris may be further north, say scientists

NEWS > WORLD
Missing MH370 wreckage may be further north, study suggests

Bangkok Post

The graphic that proves search teams have been looking in the WRONG place for missing flight MH370: Scientists show how debris spread from new crash site

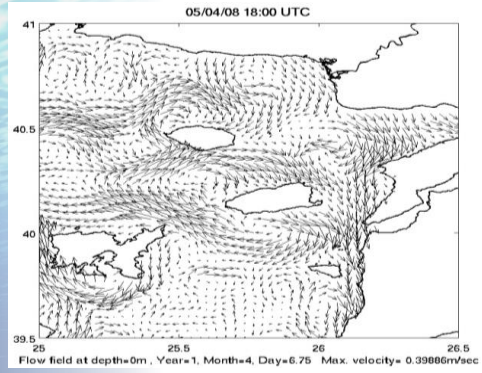
Mail Online

opernicus
Europe's eyes on Earth

European Commission

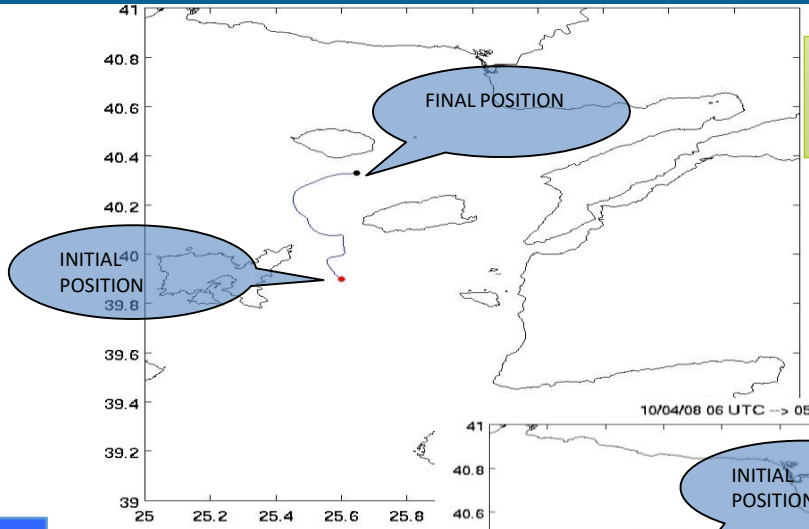
Marine Monitoring

Search & Rescue service developed by the POSEIDON team - Greek



Surface currents forecast from the POSEIDON system (NE Aegean)

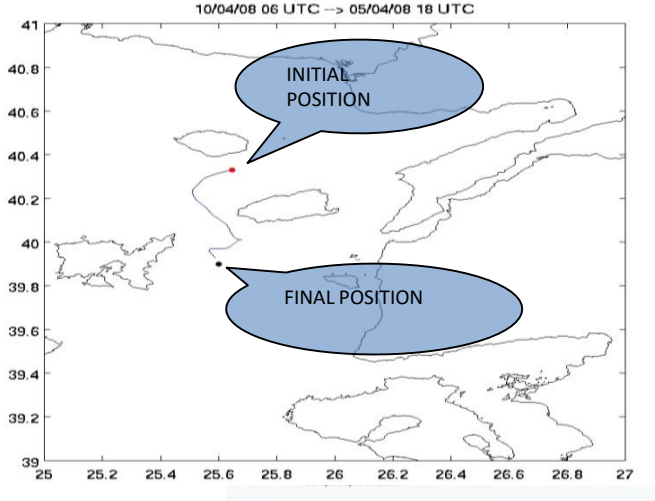
- The core of the service is the Leeway model a Monte Carlo-based stochastic ensemble trajectory model that calculates the motion of objects on the sea surface under the influence of wind (reference height 10m) and surface ocean currents
- On a daily basis, the service uses winds and surface currents 5-days forecasts from the POSEIDON system



Forward integration of SAR application for 12 hours

Inverse integration of SAR for 12 hours starting from final position of previous experiment

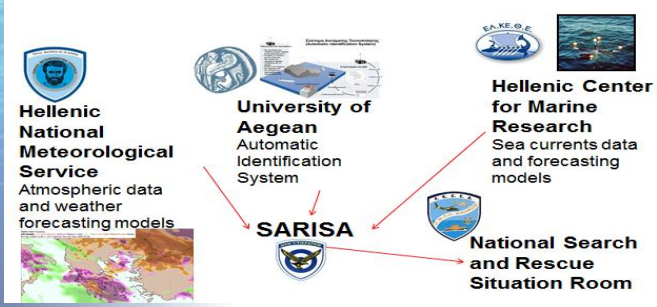
(backtracking)



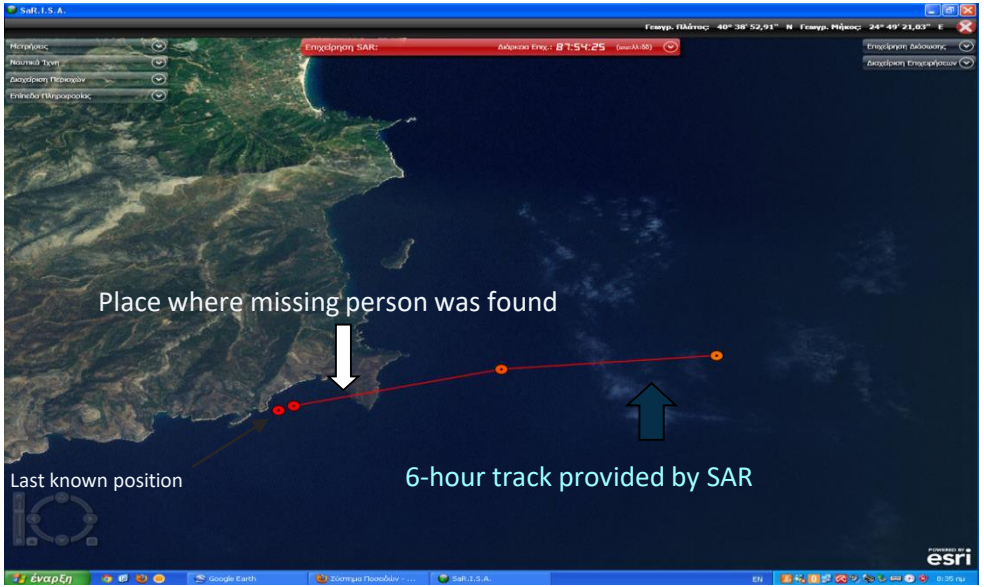
SARISA: The Greek Search & Rescue service

Marine Monitoring

Surface currents forecasts for the Aegean and Ionian Seas are provided by the POSEIDON system which downscales the Copernicus CMEMS Med-currents solution. The service is operational since Dec 2011



SARISA can use LEEWAY or MOTHY models



Real case - 29/10/2012: Fisherman reported missing SE of Thasos island

Missing fisherman found on land in the area indicated by the SAR system.

Copernicus Europe's eyes on Earth

European Commission