

Sea Conditions and Marine Environment, ocean/weather forecasts and environmental indicators for the Mediterranean Sea

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**ClimaSouth Regional Workshop on
Methods and Tools for Vulnerability Assessment**

Milan, 3-4-5 February 2016



Introduction

- ❖ Sea Situational Awareness (SSA) is strategically important for management purposes at sea and along coastlines
- ❖ Lack of adequate dissemination of marine environmental data reduces the capacity of intervention leading to socio-economic impacts
- ❖ Integration of operational oceanography service with available technological platforms in order to disseminate information for the SSA
- ❖ SeaConditions: first end user oriented service



CMCC: The Supercomputing Center

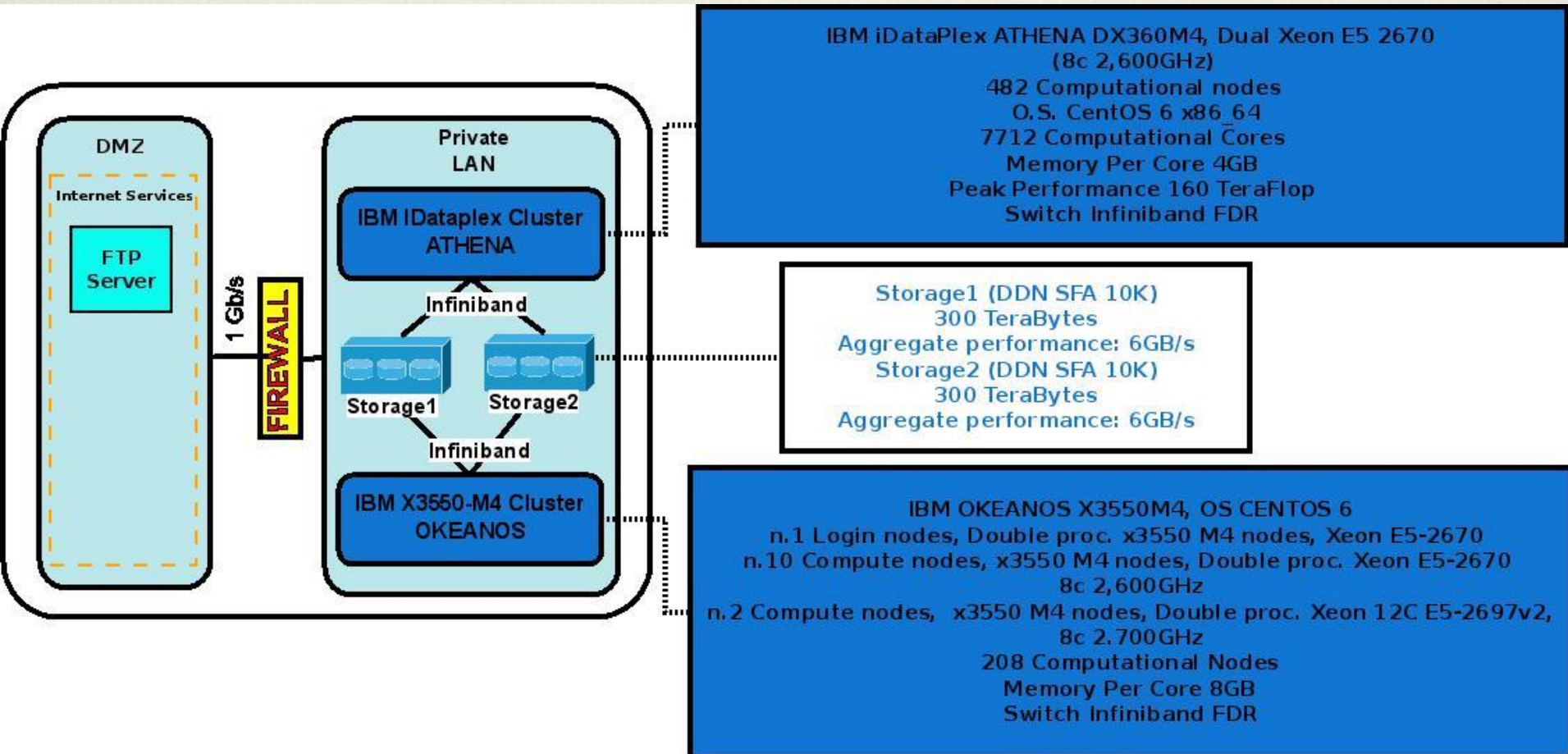


Athena

Okeanos



Super Computer Architecture

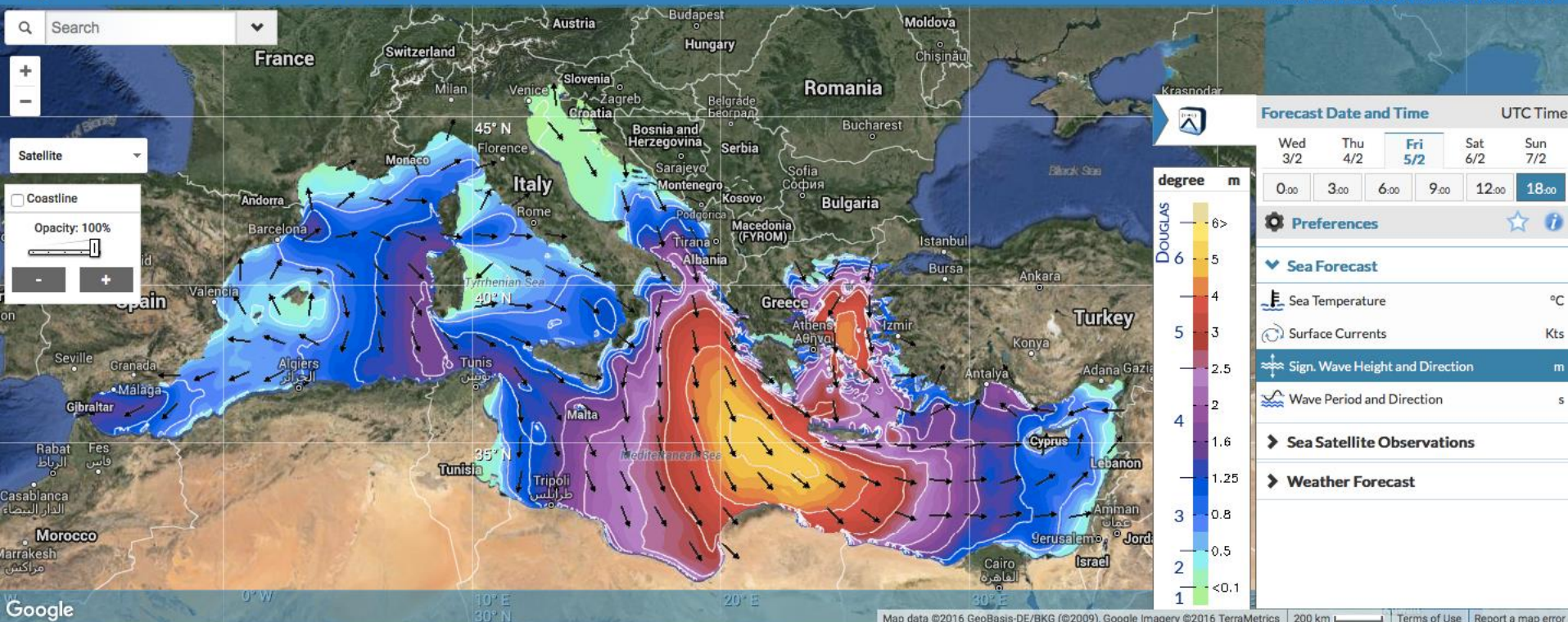


SeaConditions

(www.sea-conditions.com)

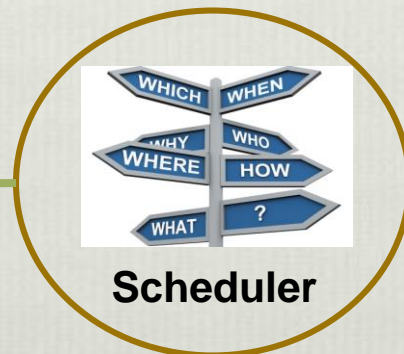
Significant wave height and direction

Forecast for the 5 February 2016 at 18:00 UTC
Forecast base time 12:00 AM UTC of 02/02/2016



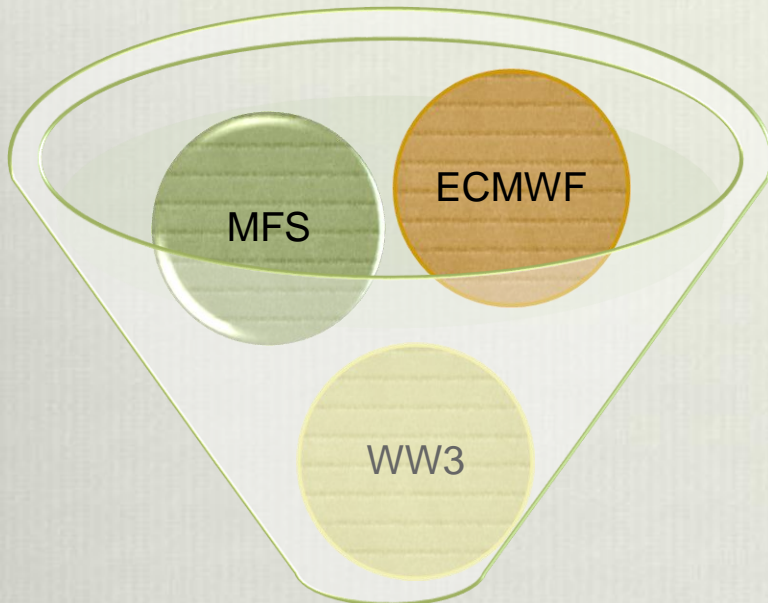
Public service providing oceanic and weather forecast and remote sensing data for the Mediterranean Sea, on the web and mobile channels.

Sea Conditions Operational Chain



SeaConditions: processing of input data

- ✓ **Temporal coverage:**
 - 5-days of forecast
- ✓ **Temporal resolution:**
 - 3h for first 3 days and 6h for the others
- ✓ **Input data:**
 - Sea Surface Temperature, Sea Surface Currents (MFS, ~6.5 km s.r.)
 - Waves (WW3, ~6.5 km s.r.)
 - Temperature at 2m, Winds at 10m, Cloud Coverage, Total Precipitation, Mean Sea Level Pressure (ECMWF, ~12.5km s.r.)
 - Observations from satellite: Chl-a concentration and Water Transparency (~1km s.r.)



1

• Pre-processing and stats

2

• Interpolation at 2km (vector var.) and 150m (scalar var.)

3

• Compression and upload on CMCC ftp server

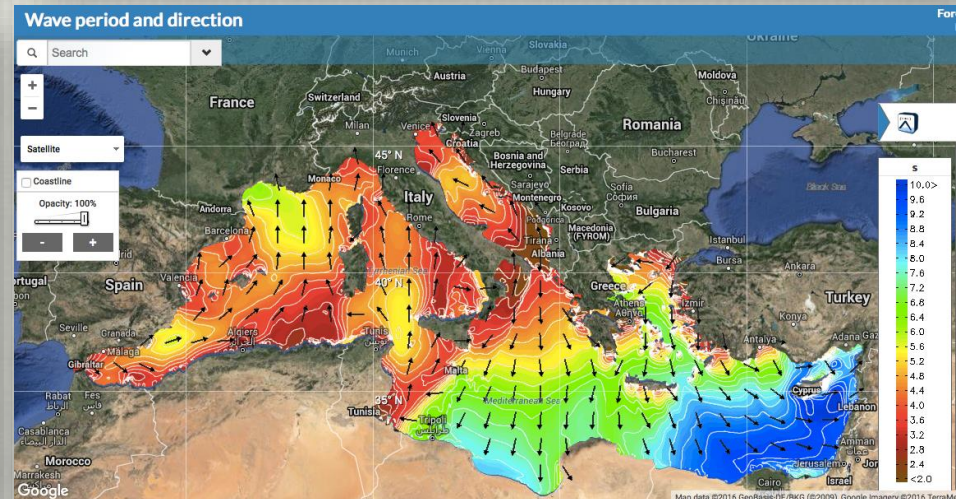
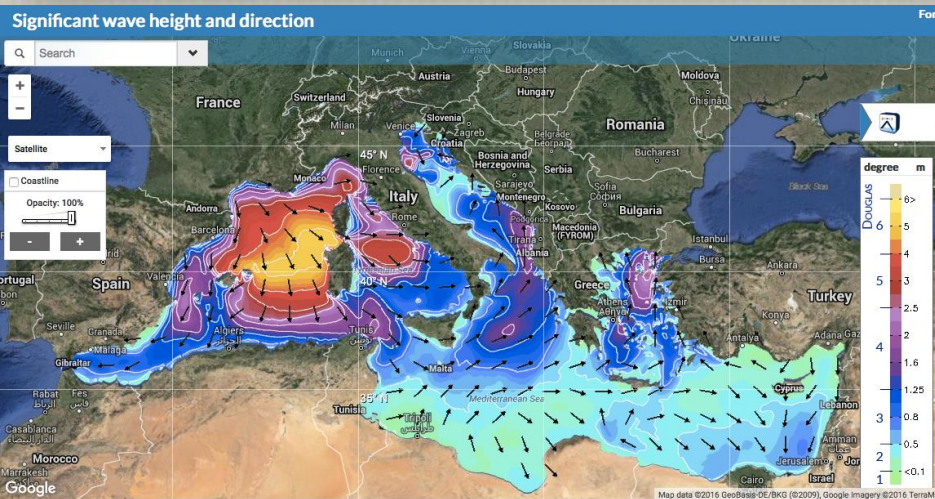
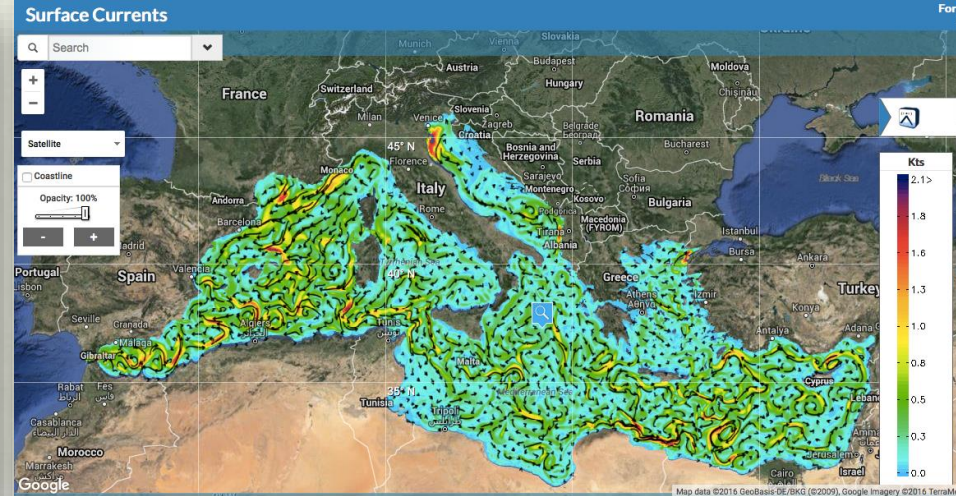
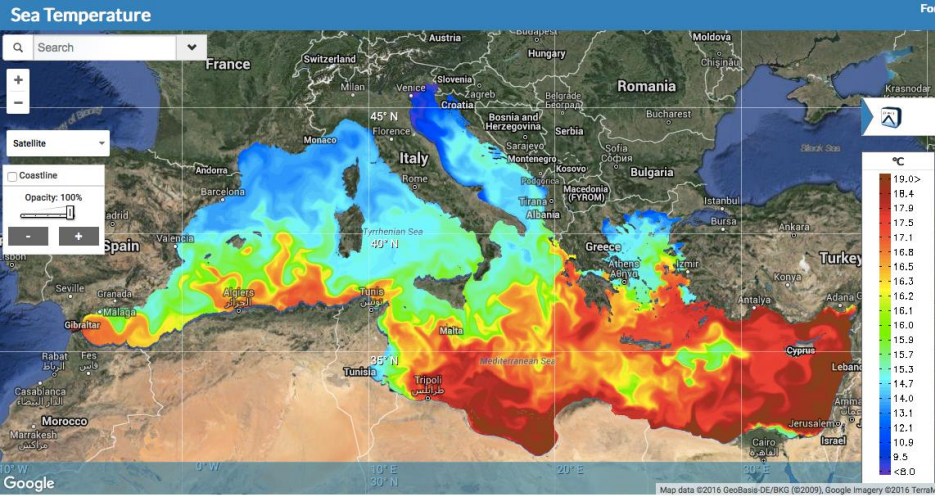
Sea Conditions



Satellite Chl-a and Transparency

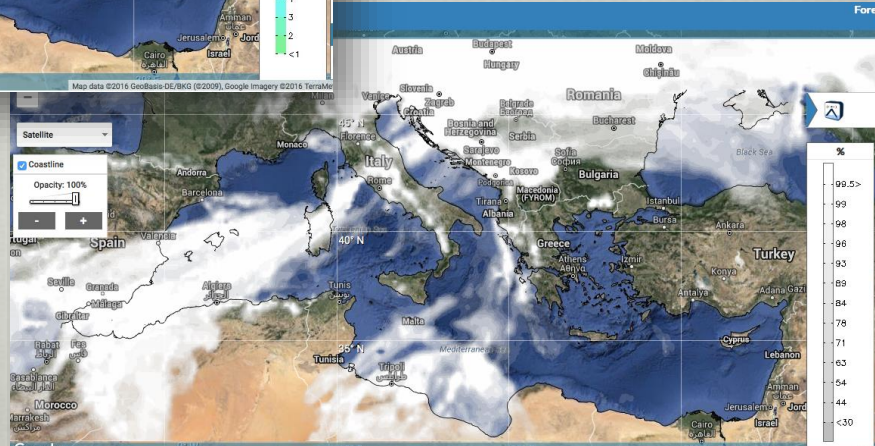
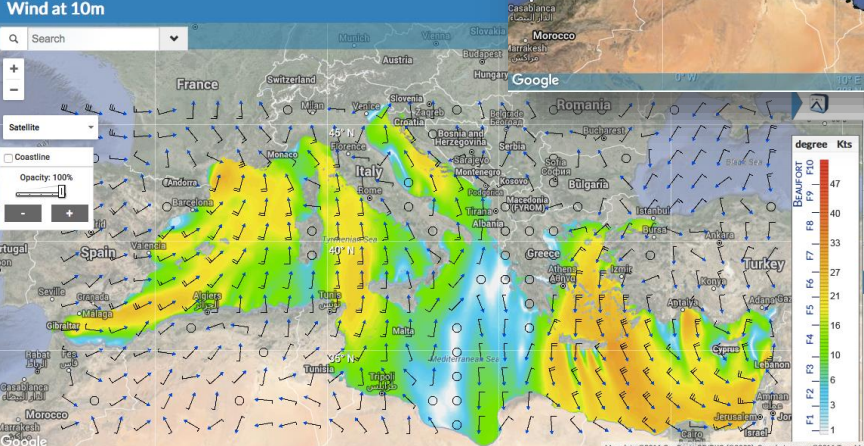
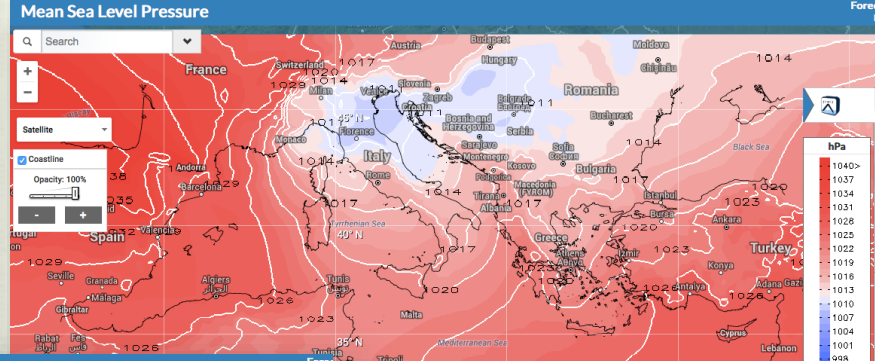
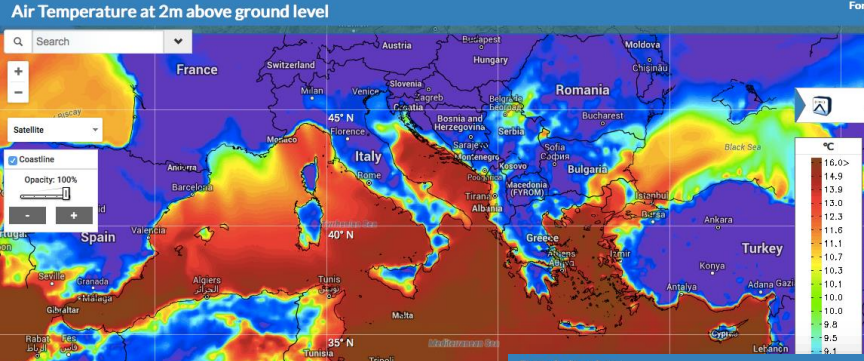
SeaConditions: ocean forecasts

(www.sea-conditions.com)



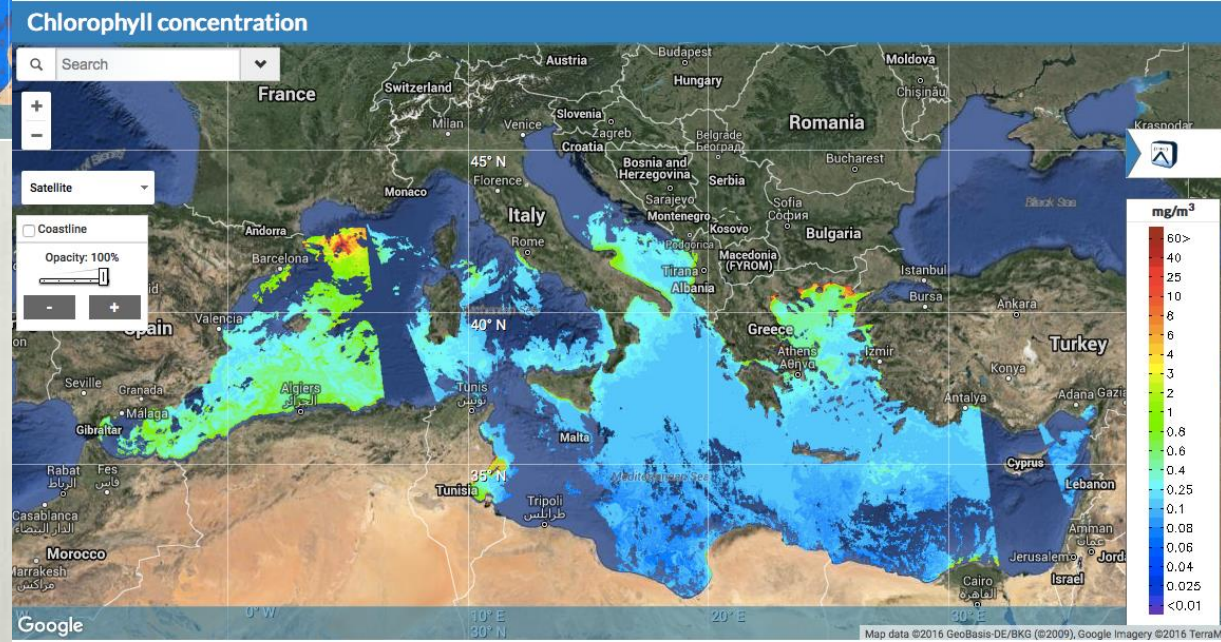
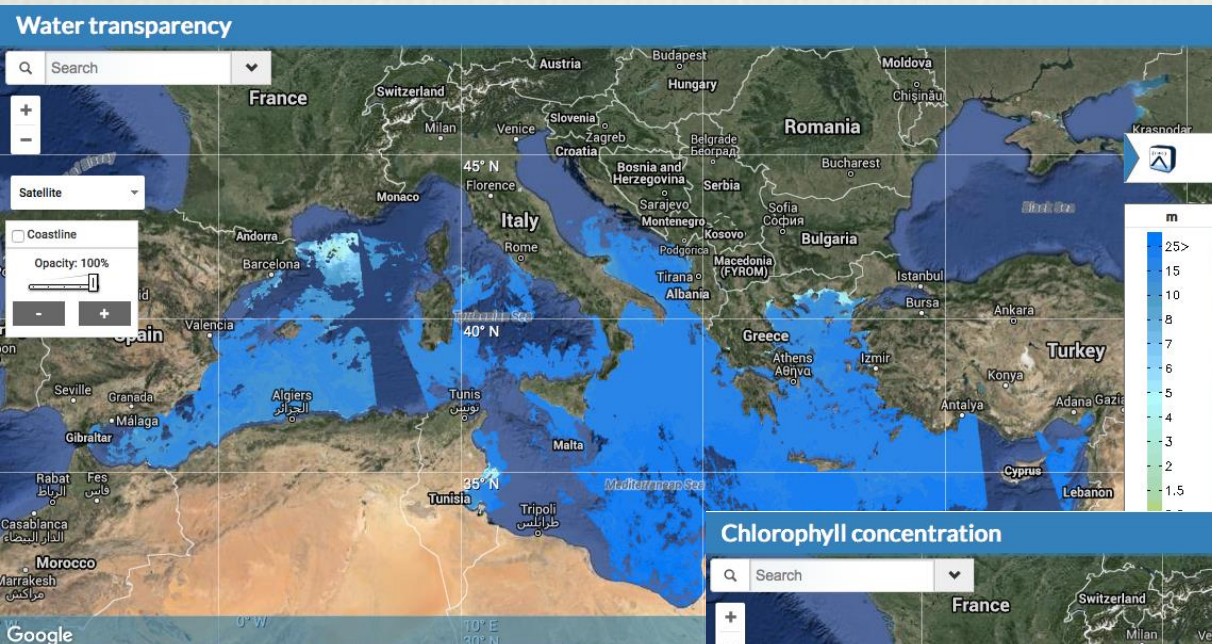
SeaConditions: weather forecasts

(www.sea-conditions.com)



SeaConditions: satellite observations

(www.sea-conditions.com)

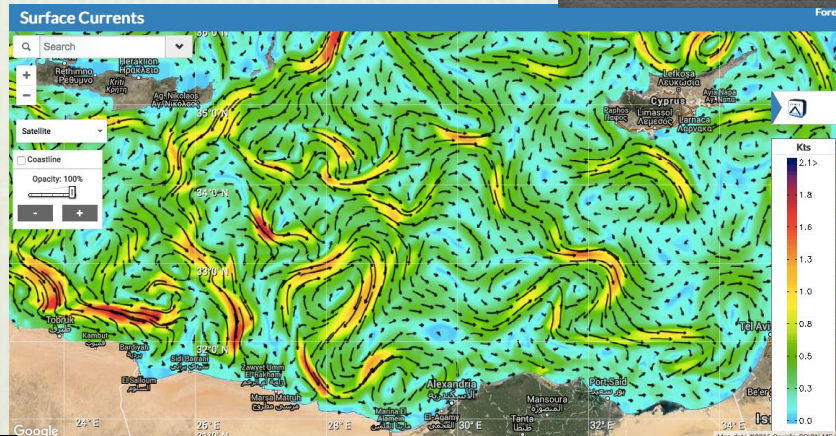
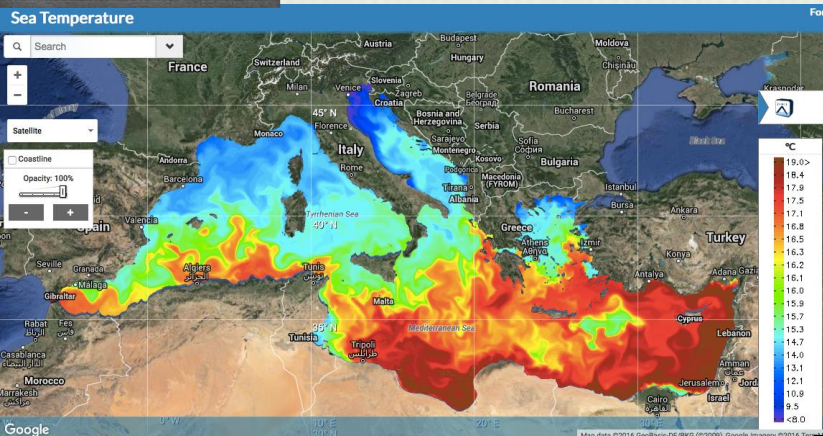


SeaConditions

(www.sea-conditions.com)

Level 5

Level 7



Forecast Date and Time UTC Time

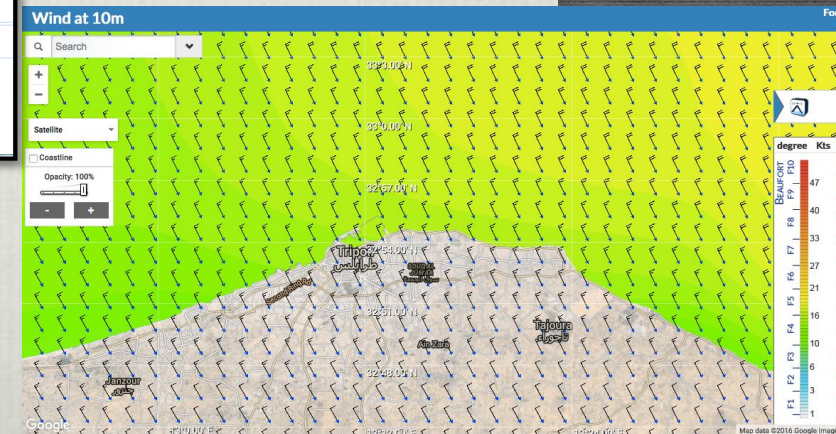
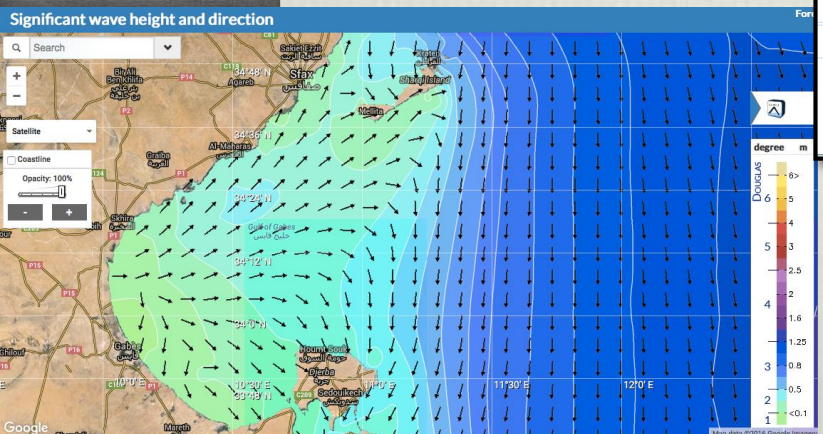
Wed 3/2	Thu 4/2	Fri 5/2	Sat 6/2	Sun 7/2
0:00	3:00	6:00	9:00	12:00
				15:00
				18:00
				21:00

Preferences

- Sea Forecast
 - Sea Temperature °C
 - Surface Currents Kts
 - Sign. Wave Height and Direction m
 - Wave Period and Direction s
- Sea Satellite Observations
- Weather Forecast

Level 9

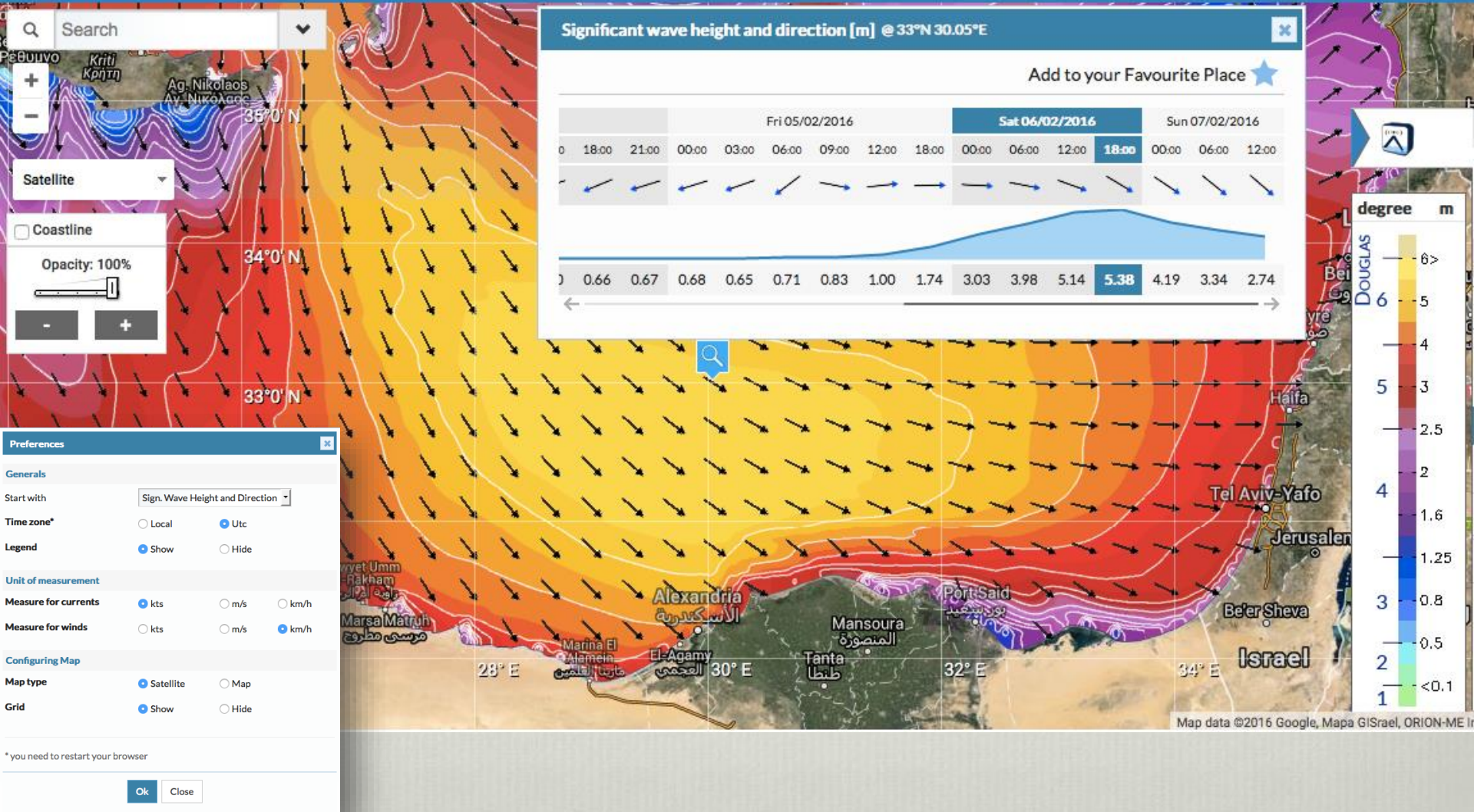
Level 11



SeaConditions

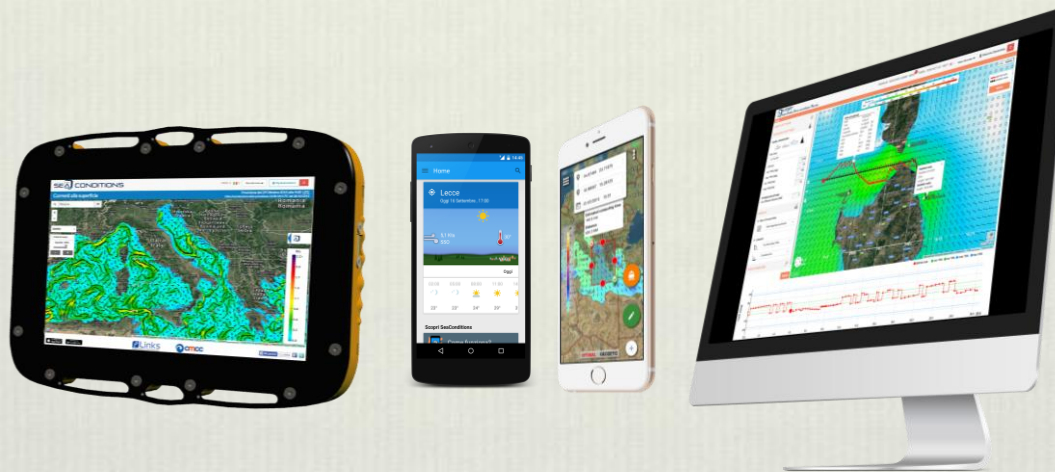
(www.sea-conditions.com)

Significant wave height and direction



Commercial exploitation

Service available both as web-application and mobile-app (iOS/Android)



- ***SeaConditions on the market since July 2012 : **60.000** downloads*** (updated on 30th October 2015)
- ***Commercial exploitation: SeaConditions Premium version on the market since mid July 2015***

Sea Situational Awareness User-centered Services

Why? For whom?

Safety of navigation



Coastal protection & erosion



Search & Rescue



Pollution emergency



Law enforcement & civil protection



Fishery & aquaculture



Climate Change



Harbours



Renewable energy



Protection & management of marine ecosystems



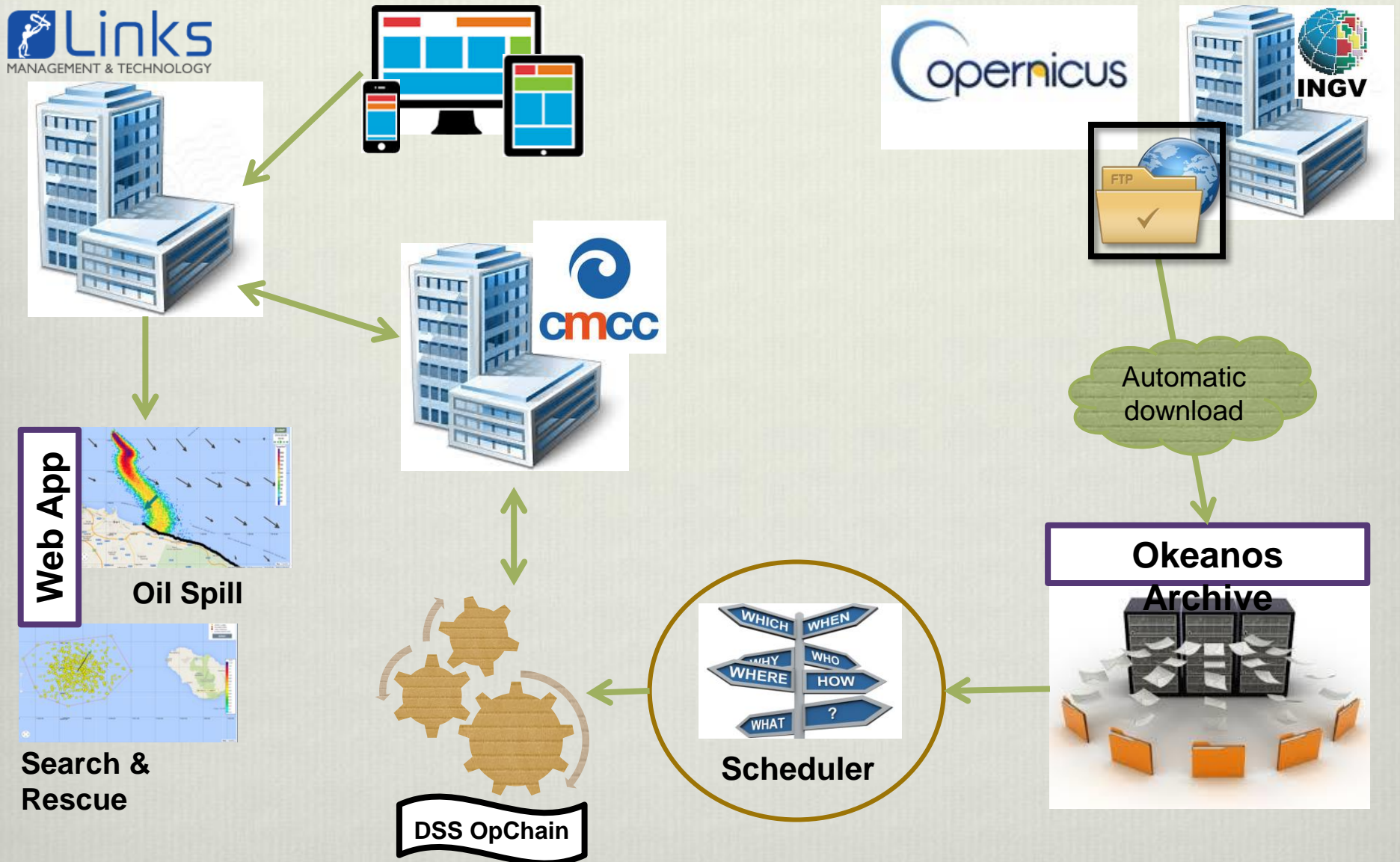
Tourism



Offshore activities



Decision Support Systems



Decision Support Systems (DSS)

- MARINE ENVIRONMENT**
- EARLY WARNING**
- WITOIL**
- VISIR**
- OCEAN-SAR**

Decision Support Systems (DSS)

MARINE ENVIRONMENT

EARLY WARNING

WITOIL

VISIR

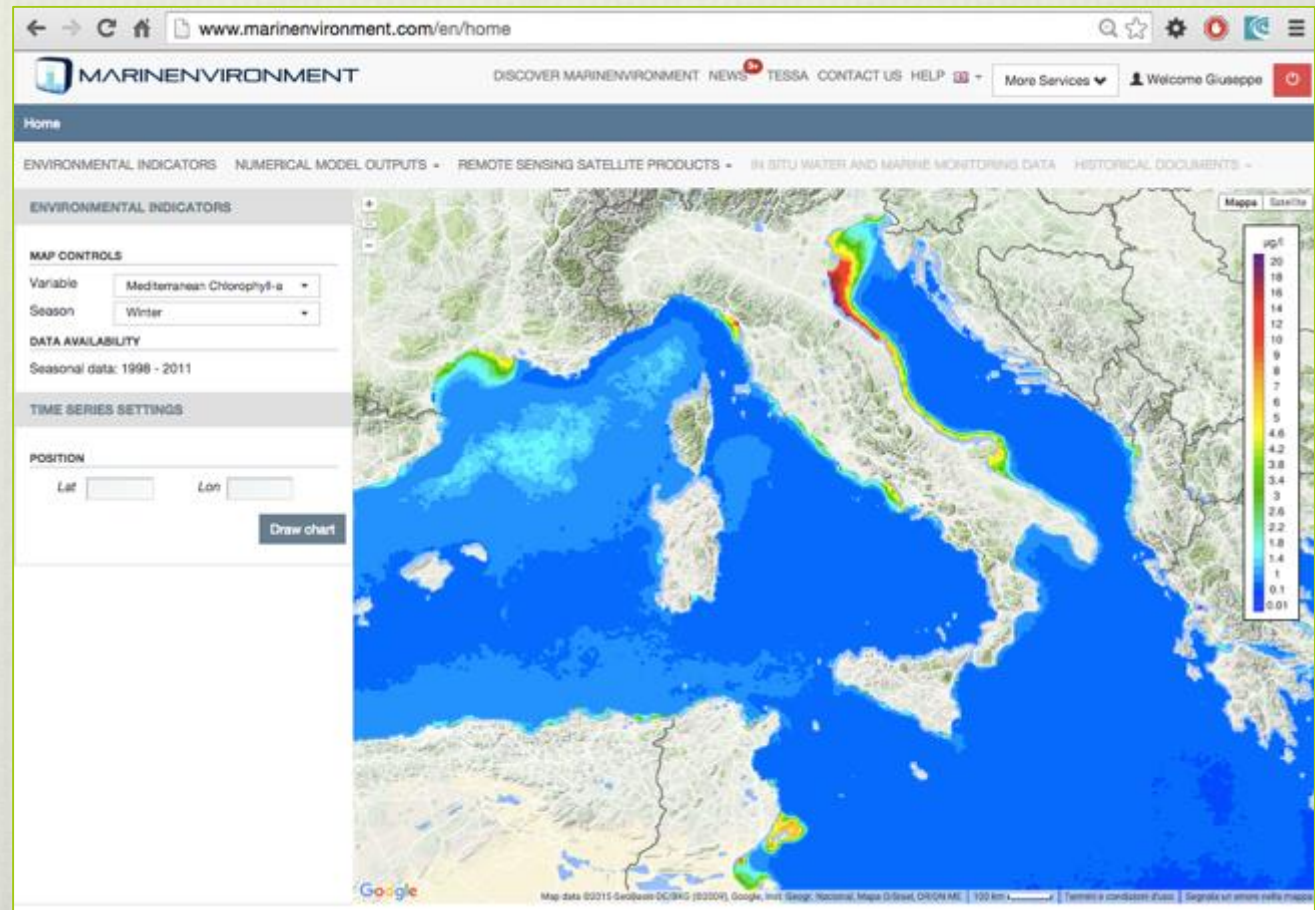
OCEAN-SAR

Marine Environment www.marinenvironment.com

MARINENVIRONMENT is a service to provide and display information on the environmental quality of the Mediterranean Sea.

Available for:

- Web
- Android
- iOS



✓ Visualized Data

■ Models

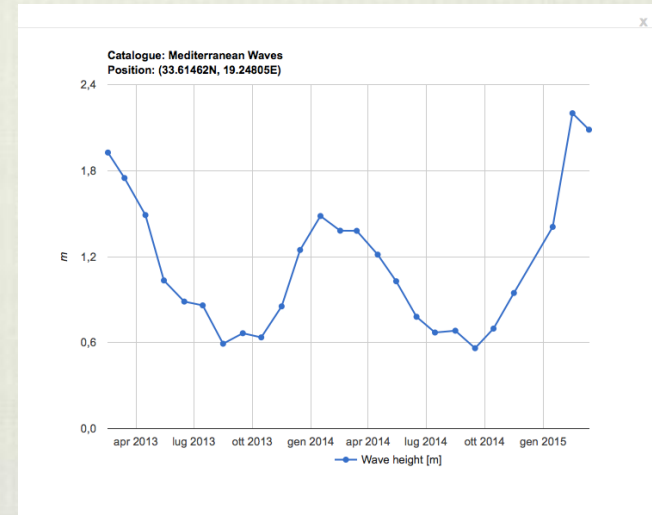
- Sea Surface Temperature (1987-2015)
- Sea Surface Currents (1987-2015)
- Salinity (1987-2015)
- Sea Surface Height (1987-2015)
- Waves Height (2013-2015)
- Waves Period (2013-2015)

■ Satellite

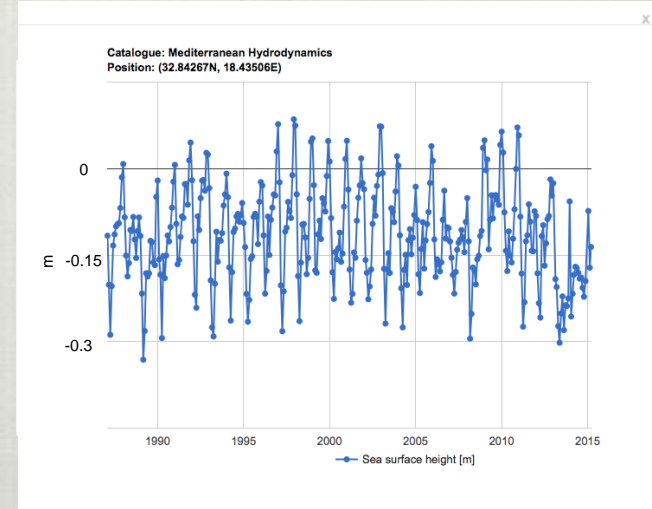
- Sea Surface Temperature (1988-2015)
- Chlorophyll-a (1998-2015)
- Transparency (2014-2015)

■ Environmental Indicators

- CSI023(+)
- TRIX



Wave Height time series
(2013-2015)



SSH time series
(1987-2015)

✓ Visualized Data

■ Models

- Sea Surface Temperature (1987-2015)
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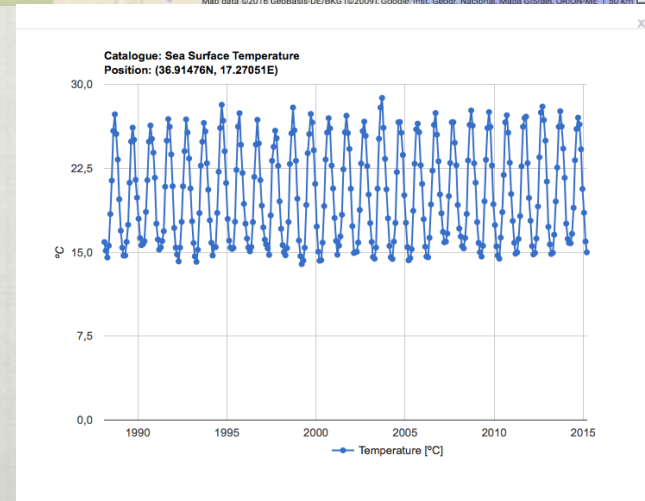
■ Satellite

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Chl-a concentration Autumn (1998-2011)



SST
(1988-2015)

✓ Visualized Data

■ Models

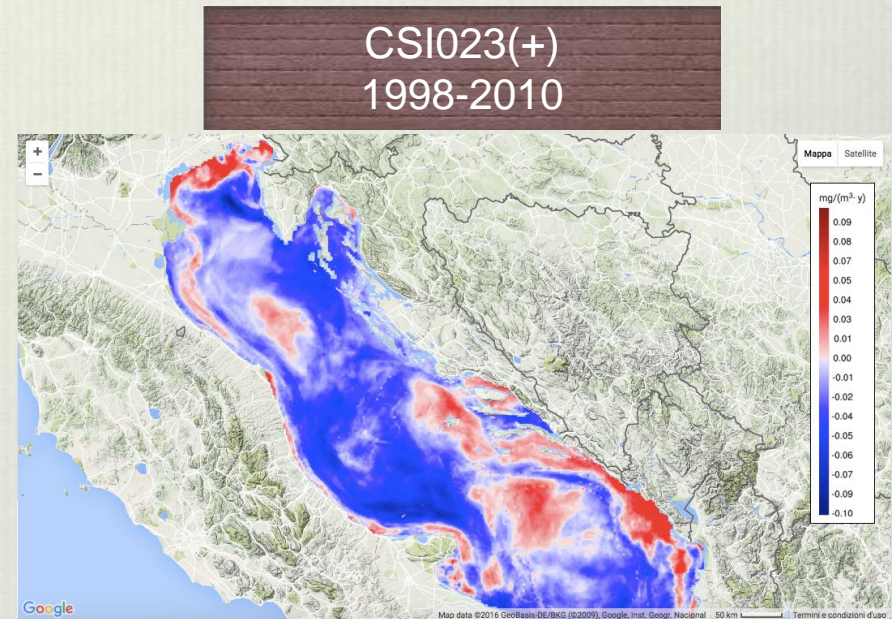
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Decision Support Systems (DSS)

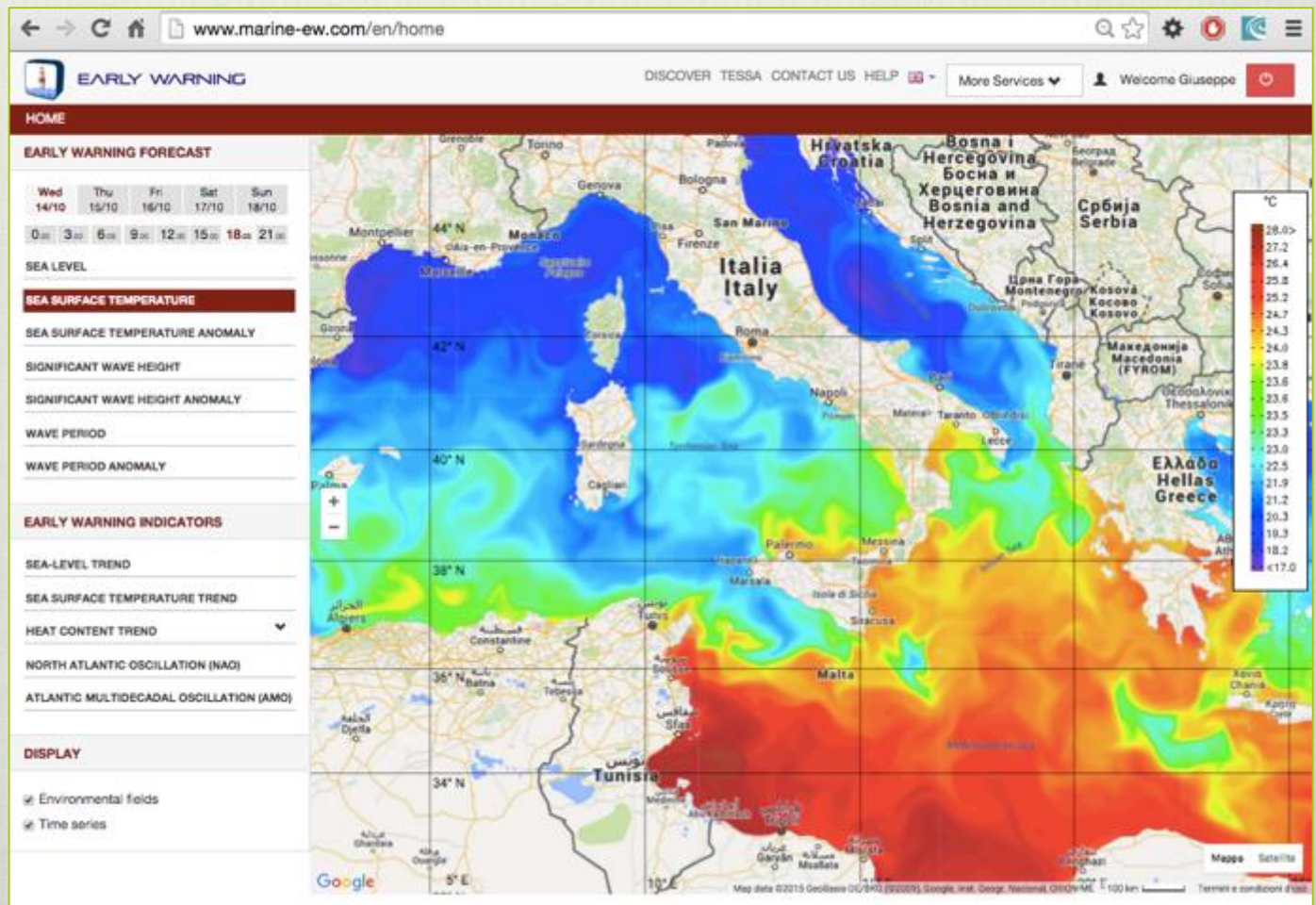
- MARINE ENVIRONMENT
- EARLY WARNING**
- WITOIL
- VISIR
- OCEAN-SAR

Early warning - www.marine-ew.com

Marine Early Warning is a service provided to decrease risk disaster at sea reducing loss of life and the economic and material impact.

Available for:

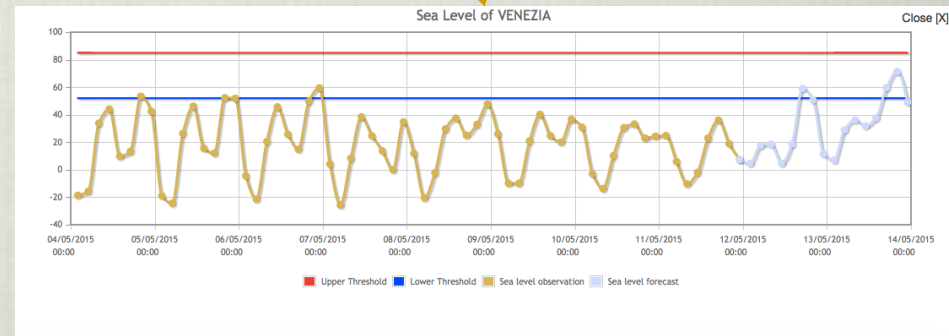
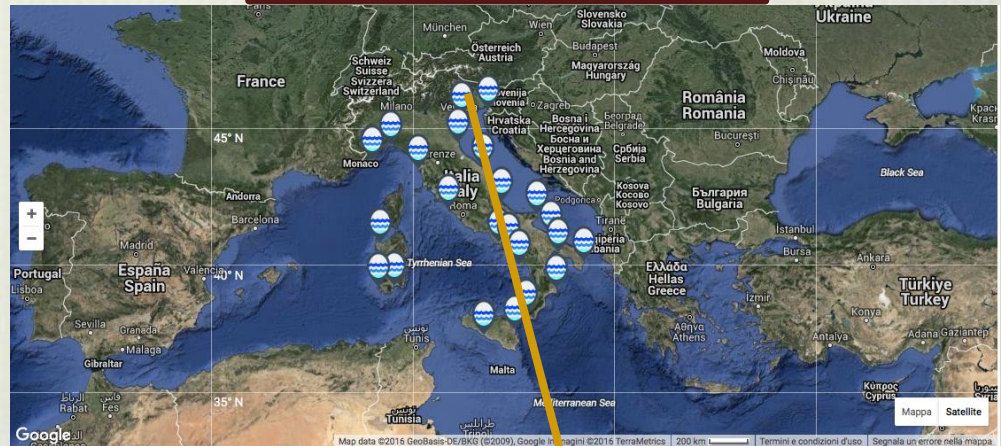
- Web
- Android
- iOS



✓ Visualized Data

- Model Forecasts (5 days)
 - Sea Surface Temperature
 - Sea Surface Temperature Anomaly
 - **Sea Level**
 - Significant Wave Height
 - Significant Wave Height Anomaly
 - Wave Period
 - Wave Period Anomaly
- Early Warning Indicators
 - Sea-Level Trend
 - Sea Surface Temperature Trend
 - Heat Content Trend
 - North Atlantic Oscillation (NAO)
 - Atlantic Multidecadal Oscillation (AMO)

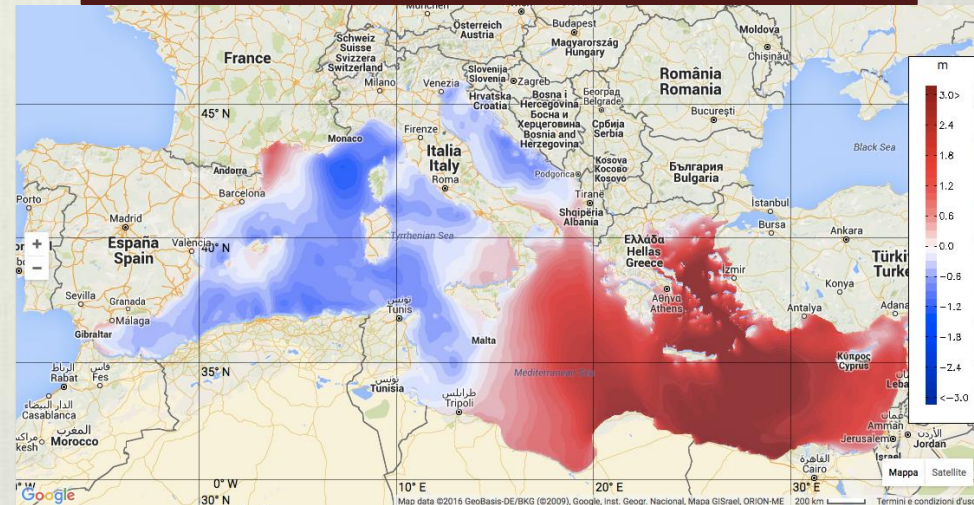
Sea Level



✓ Visualized Data

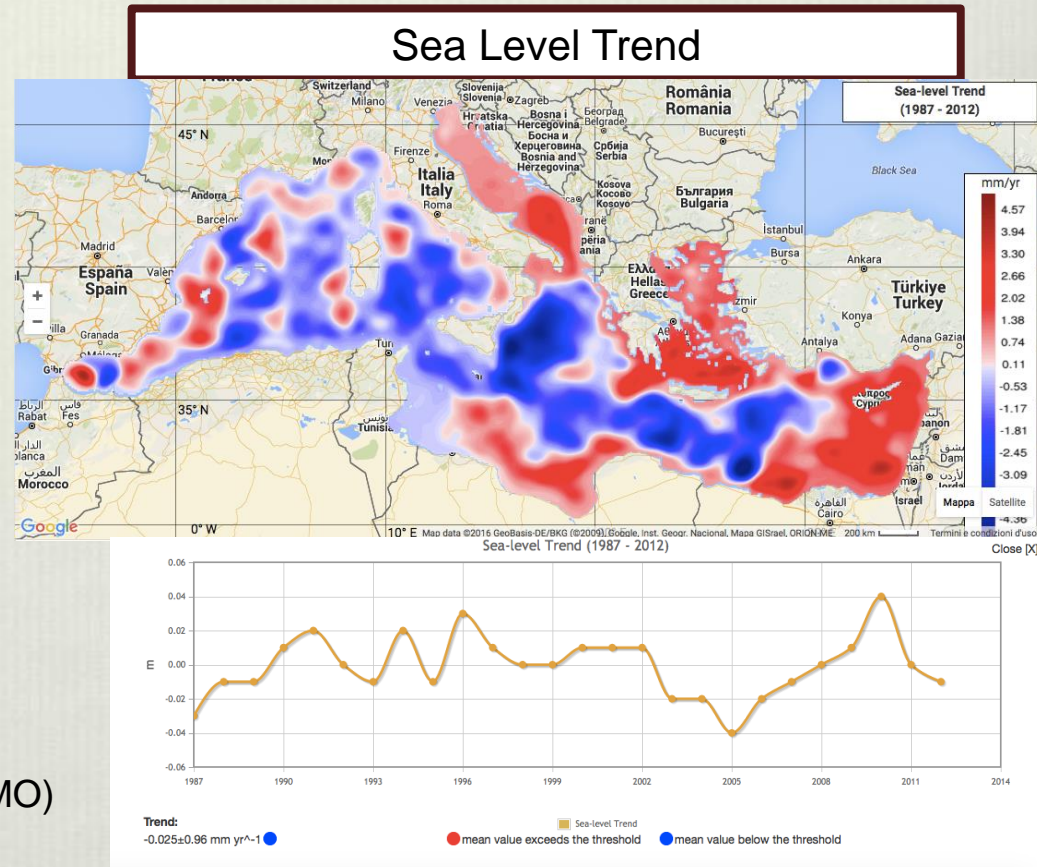
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Significant Wave Height Anomaly



✓ Visualized Data

- Model Forecasts (5 days)
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Decision Support Systems (DSS)

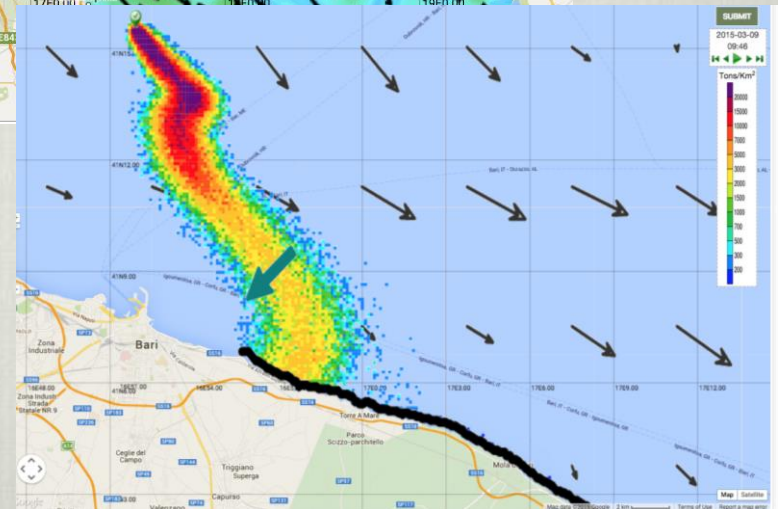
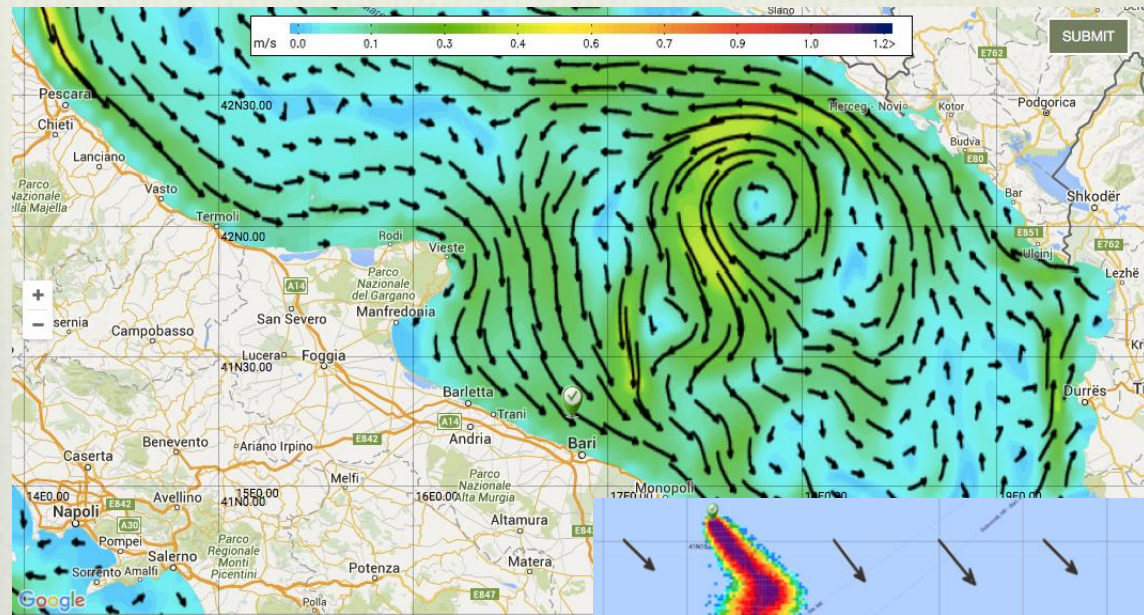
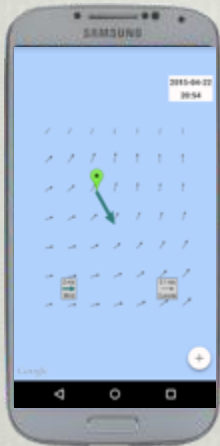
- MARINE ENVIRONMENT
- EARLY WARNING
- WITOIL**
- VISIR
- OCEAN-SAR

WITOIL - <http://www.witoil.com>

WITOIL, our service for predicting the fate and transport oil spills in the Mediterranean Sea.

Available for:

- Web
- Android



Decision Support Systems (DSS)

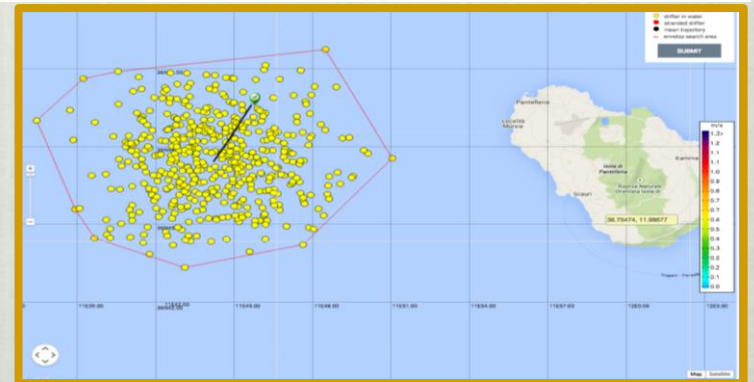
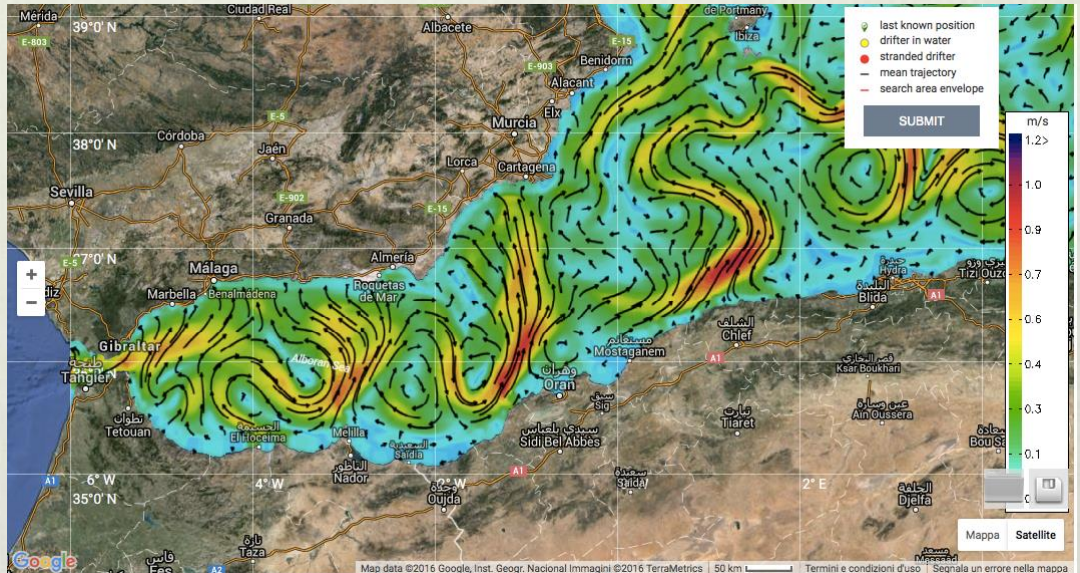
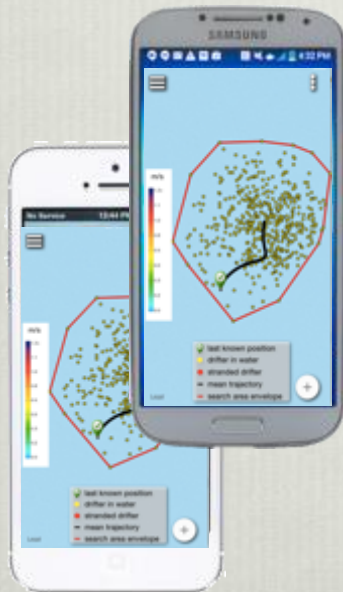
- MARINE ENVIRONMENT
- EARLY WARNING
- WITOIL
- OCEAN-SAR**
- VISIR

OCEAN-SAR - <http://www.ocean-sar.com>

OCEAN-SAR, the Maritime Search and Rescue Service in the Mediterranean Sea.

Available for:

- Web
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Decision Support Systems (DSS)

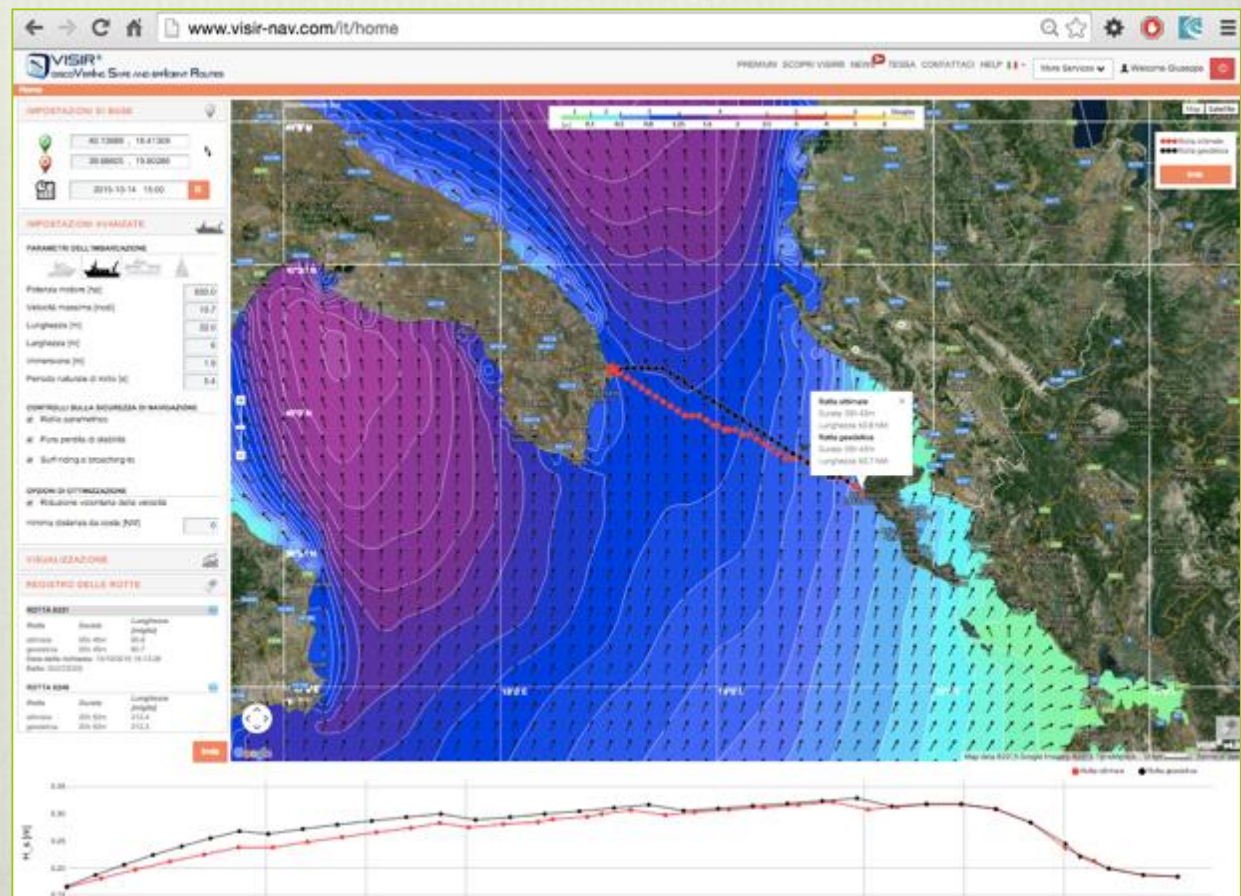
- MARINE ENVIRONMENT
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- OCEAN-SAR
- VISIR**

VISIR - www.visir-nav.com

VISIR® is a commercial service providing optimized nautical routes in the Mediterranean Sea. The optimization regards total navigation time, taking into account safety of navigation.

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Conclusion and Perspectives

- ❖ New approach to the dissemination to users of ocean/weather forecasting products in order to increase their sea situational awareness
- ❖ Result of continuous users involvement
- ❖ App: over 60.000 users download
- ❖ Future development:
 - ❖ enlargement to other regions out of Mediterranean Sea



Thanks for your attention

