→ ATLANTIC FROM SPACE WORKSHOP

23–25 January 2019
National Oceanography Centre
Southampton, UK

Rheticus® Marine: Sentinel and Copernicus data for operative and continuous monitoring of coastal waters and resources

Daniela Drimaco
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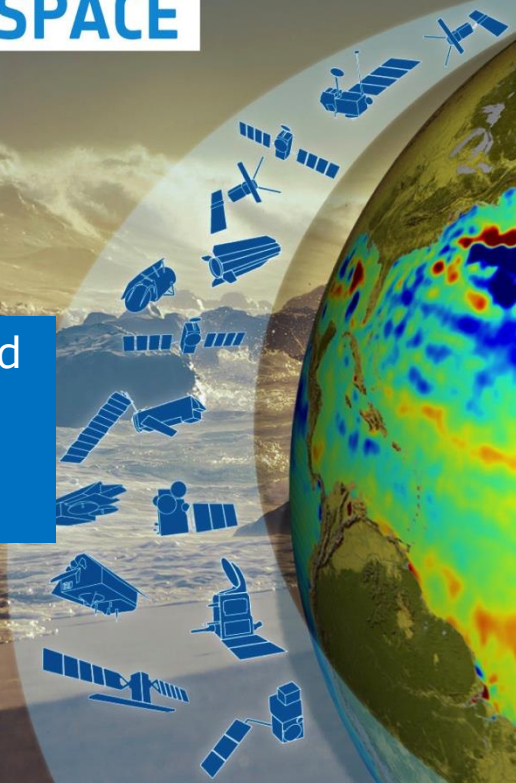
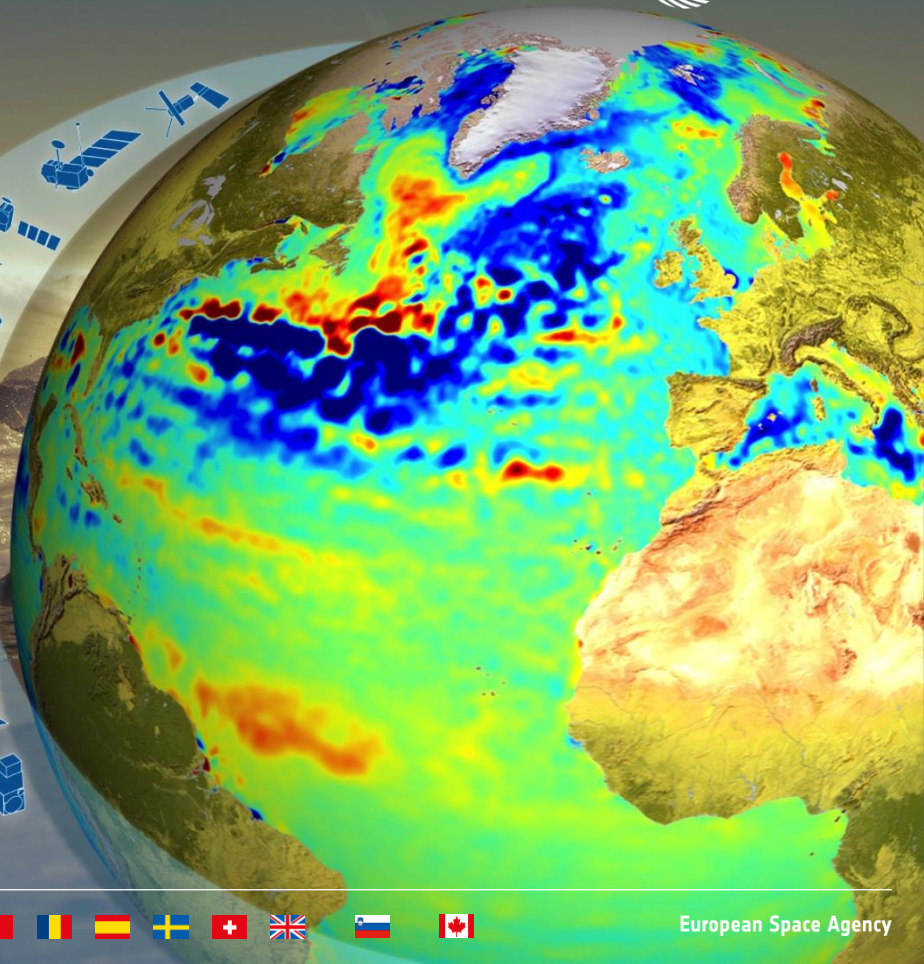
Planetek Italia s.r.l.





Overview

- Rheticus® Platform
- Rheticus® Marine Service
- Rheticus® Aquaculture Service
- Rheticus® for the European Regions
- Recommendations

Rheticus - Monitoring the evol

https://www.rheticus.eu

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Rheticus

ABOUT SOLUTIONS CONTACT

FREE TRIAL

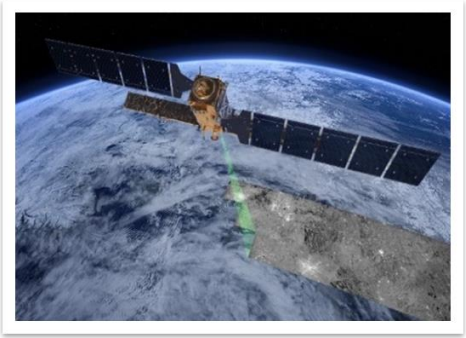
What Rheticus Does

From now on satellite-based information are at your fingertip. Simply login to the Web platform and get insightful geo-analytics, maps and alerts over your area of interest. Actionable information from continuous monitoring of Earth's surface, infrastructures, work sites, urban dynamics or marine coastal areas is ready to assist you in decision-making and operational activities.

- Cloud Based
- Indicators, maps reports and alerts
- Satellite derived information
- Subscription based
- Backward analysis and continuous update

Data Processing Workflow

Satellite Data



Cloud Architecture
Automatic Processing

Info as a Service

Rheticus®
is an automatic cloud-based geo-information service platform
for
Land, Water and Infrastructure monitoring

Rheticus® Services

UTILITIES

Oil&Gas, Energy, Mining, Sewerage, District heating, Desalination plants

ENGINEERING

Airport, Railways, Roads, Tunnels, Dams, Bridges, Subways, Offshore drilling, dredging

FOOD

Fishing, Aquaculture, Crop yeld forecasting, Precision farming

GOVERNMENT

Masterplan, Illegal crops, Wildfires, Coastal marine environment

Marine

Rheticus® Marine

Rheticus® Marine is a geo-information service for the continuous monitoring of coastal seawater quality and marine resources. From now on satellite-based information are at your fingertip.

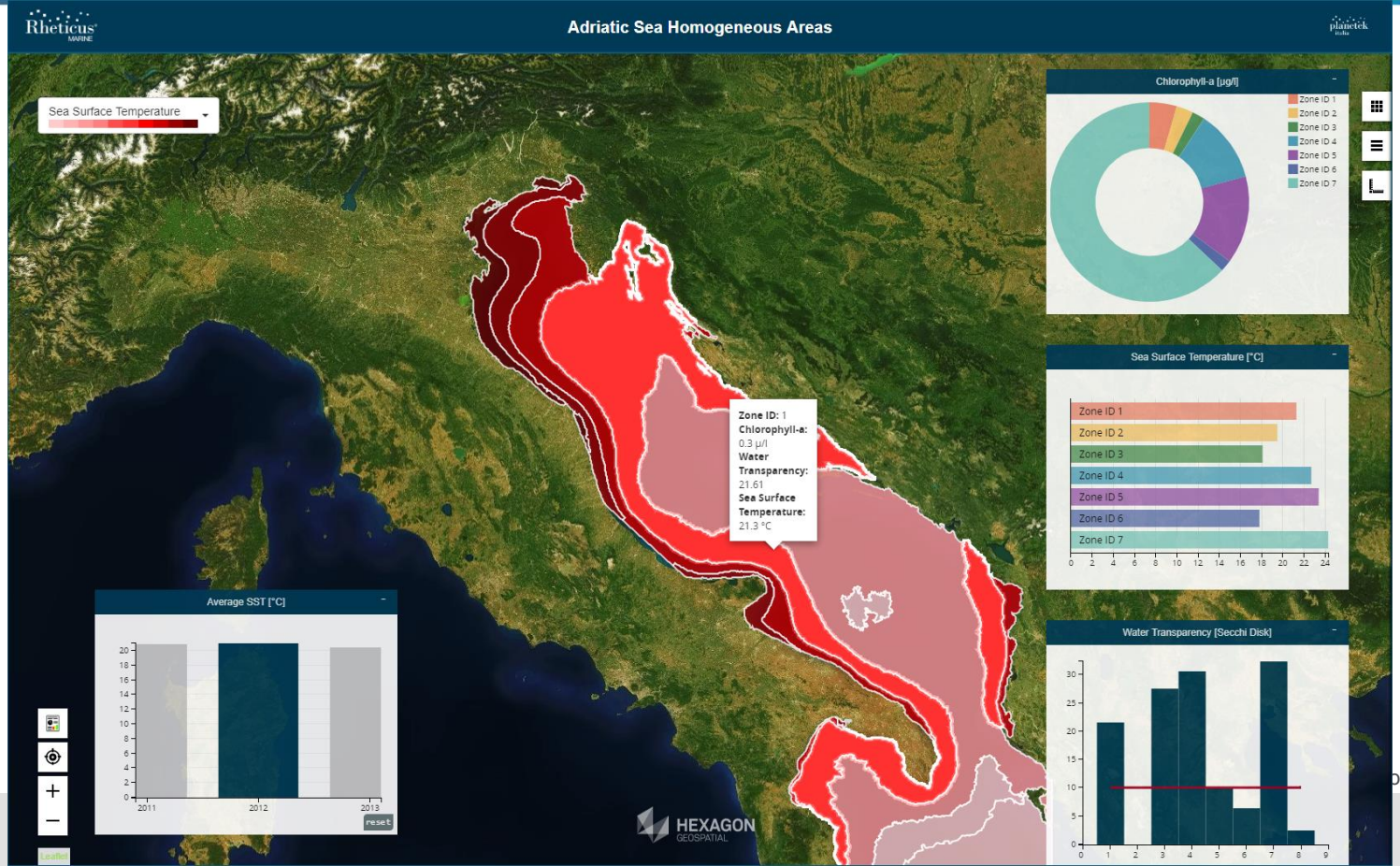
Marine Directive

The main goal of the Marine Strategy Framework Directive is to achieve Good Environmental Status of EU marine waters by 2020.

"**The environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive**"

11 Qualitative Descriptors

Support for EU Member States reporting duties



Target: Good Environmental Status

Descriptor 5: Eutrophication

Needs:

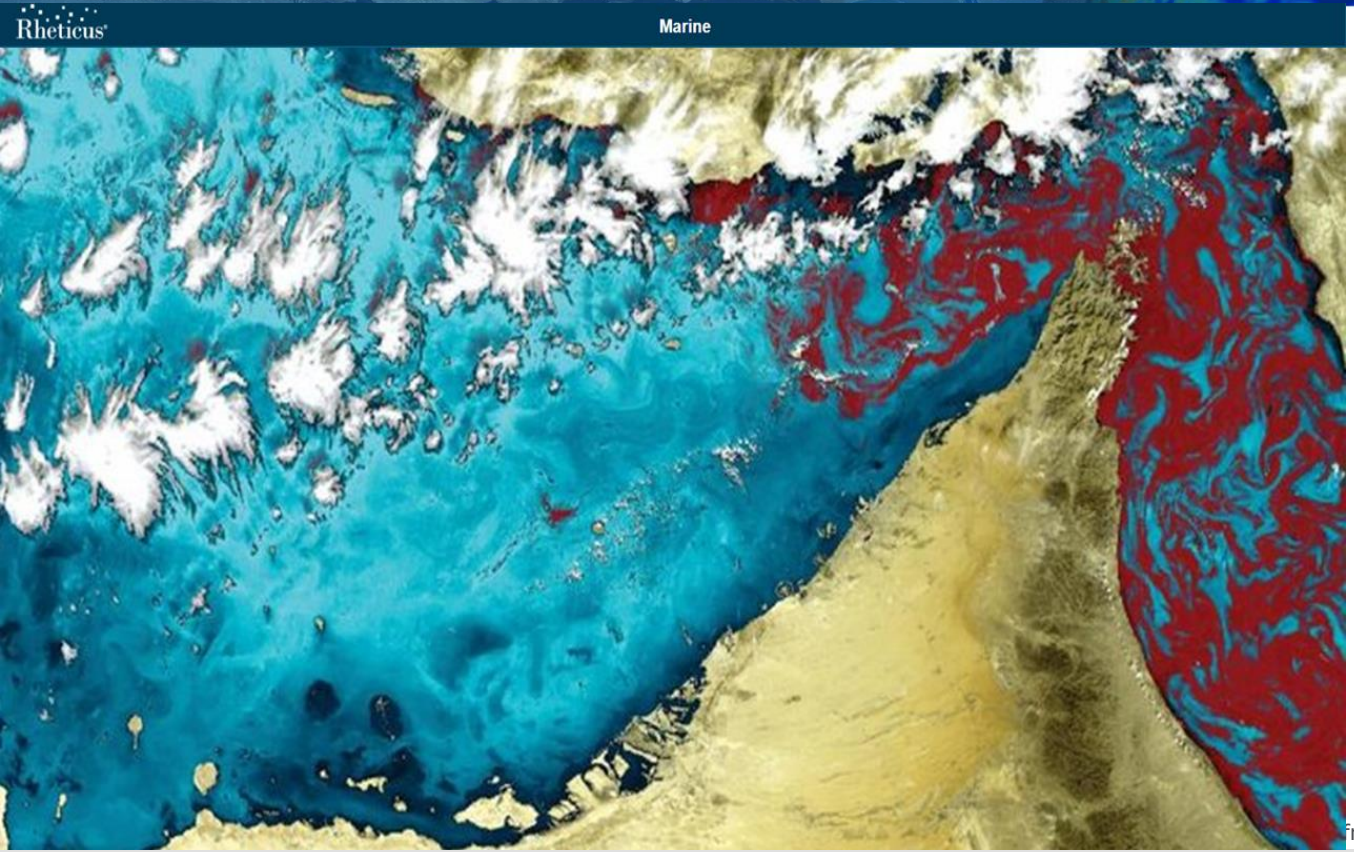
- Identification of homogeneous sea areas
- Yearly evaluation of eutrophication

Geo-analytics:

- Chlorophyll
- Temperature
- Transparency

Support for EU Member States reporting duties

Desalination Plants



Target: Algae blooms

Need: real time alerts to plants' operators about the occurrence of algae blooms

Pilot: United Arab Emirates

Seas and Oceans are drivers for the European economy

Aquaculture has a great potential for

- **Sustainable Innovation**
- **Jobs**
- **Growth**

Aquaculture

Rheticus® Aquaculture

Rheticus® Aquaculture provides aquaculture farmers with daily information designed for the optimal management of fish and shellfish farming activities in marine waters, aimed at

Rheticus AQUACULTURE

Product Length 87% of Optimal Market Size ▪ ▪ ▪ Dry Weight 60% of Optimal Market Weight

HEXAGON GEOSPATIAL

Marine Weather Conditions

Buoyweather The Global Marine Forecasting Solution

LOCATION: RIMINI

SUMMARY | FORECAST | SWELL | PERIOD | WIND

Marine Forecast: 44.10533762552548°N/12.58003234

	Fri 7am	Fri 1pm	Fri 7pm	Sat 1am	Sat 7am	Sat 1pm	Sat 7pm	Sun 1am
WIND RANGE (knots) GUST	11	7	5	3	4	11	8	5
AVG	8	5	4	2	3	8	6	4
WIND DIR	WNW	NNE	NE	WNW	NE	E	SE	SSE
SWELL HEIGHTS (ft) MAX	0.2	0.2	0	0	0.1	2.1	1.2	0.4
AVG	0.2	0.1	0	0	0.1	1.6	0.9	0.3
PERIOD	0	4	4	4	0	4	4	3
SWELL DIR	N	N	NNE	ESE	N	ENE	ENE	ENE

Model Cycle:2018 JUL 06 00Z TimeZone: GMT + 1

Daily Overview as of 01/07/2017

Parameter	Acronym	Value	Unit	State
Chlorophyll-a	CHL	0.67	mg/m3	●
Water Transparency	WT	10.00	m	●
Sea Surface Temperature	SST	20.14	°C	●
Product Length		6.1	cm	●
Product Dry Weight		0.6	g	●

HEXAGON GEOSPATIAL

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Rheticus AQUACULTURE

Product Length 87% of Optimal Market Size ▪ ▪ ▪ Dry Weight 60% of Optimal Market Weight

HEXAGON GEOSPATIAL

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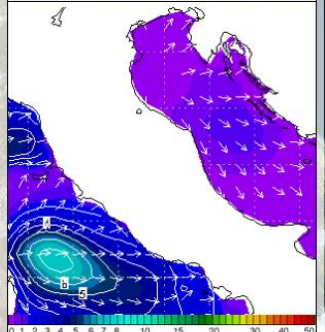


Swell (ft) valid Fri 7/6 at 4pm local time

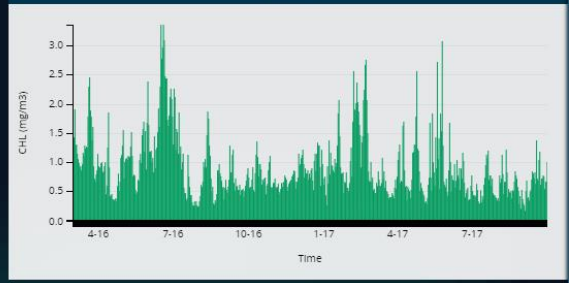
CLICK FOR 16-DAY FORECAST

Daily Overview as of 01/07/2017

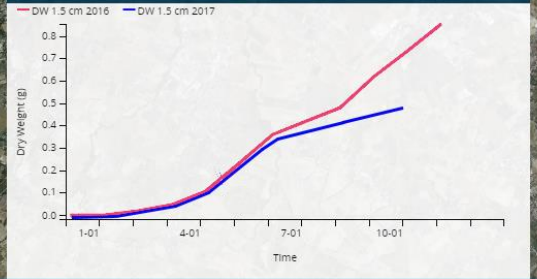
Parameter	Acronym	Value	Unit	State
Chlorophyll-a	CHL	0.67	mg/m3	●
Water Transparency	WT	10.00	m	●
Sea Surface Temperature	SST	20.14	°C	●
Product Length		6.1	cm	●
Product Dry Weight		0.6	g	●

Product Length per Seed

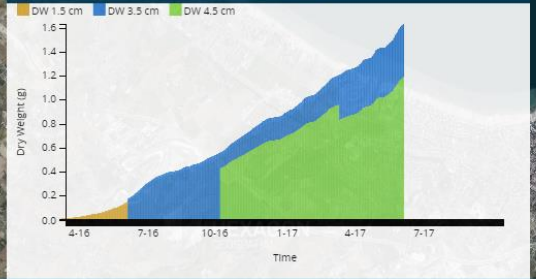
Chlorophyll



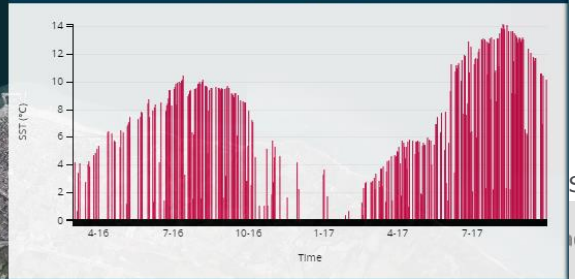
Dry Weight 2016 vs 2017



Dry Weight per Seed



Sea Surface Temperature



Leaflet

Rheticus® Marine within the EUGENIUS Project

EUGENIUS consists of Earth Observation SMEs group that provides **viable market based Earth Observation services** in different European regions

planetek italia

Responsible of the Marine Service Portfolio

Rheticus® Marine within the EUGENIUS Project

EUGENIUS

EUROPEAN GROUP OF ENTREPRISES FOR A NETWORK OF INFORMATION USING SPACE

Landslide Monitoring

EUGENIUS supports the landslide monitoring: The Sardinia case.

Water Quality Monitoring

EUGENIUS supports [illegible] monitoring of the water quality parameters.

OEnoview Quality Monitoring

Provides the state of the agriculture environment.

Flood Mapping

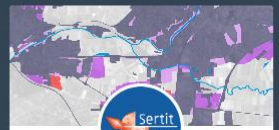
A dedicated service for local flood monitoring.

Precision Farming in Greece

Monitoring crops status and vigour.

Forest Dynamic Monitoring

A short description goes here.



Urban Growth Monitoring

Quantified expertise for the assessment of territorial development policies

Urban Dynamic Analytics

EUGENIUS supports urban dynamics monitoring: Bari pilot case

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 730150

http://eugenius.planetek.it/

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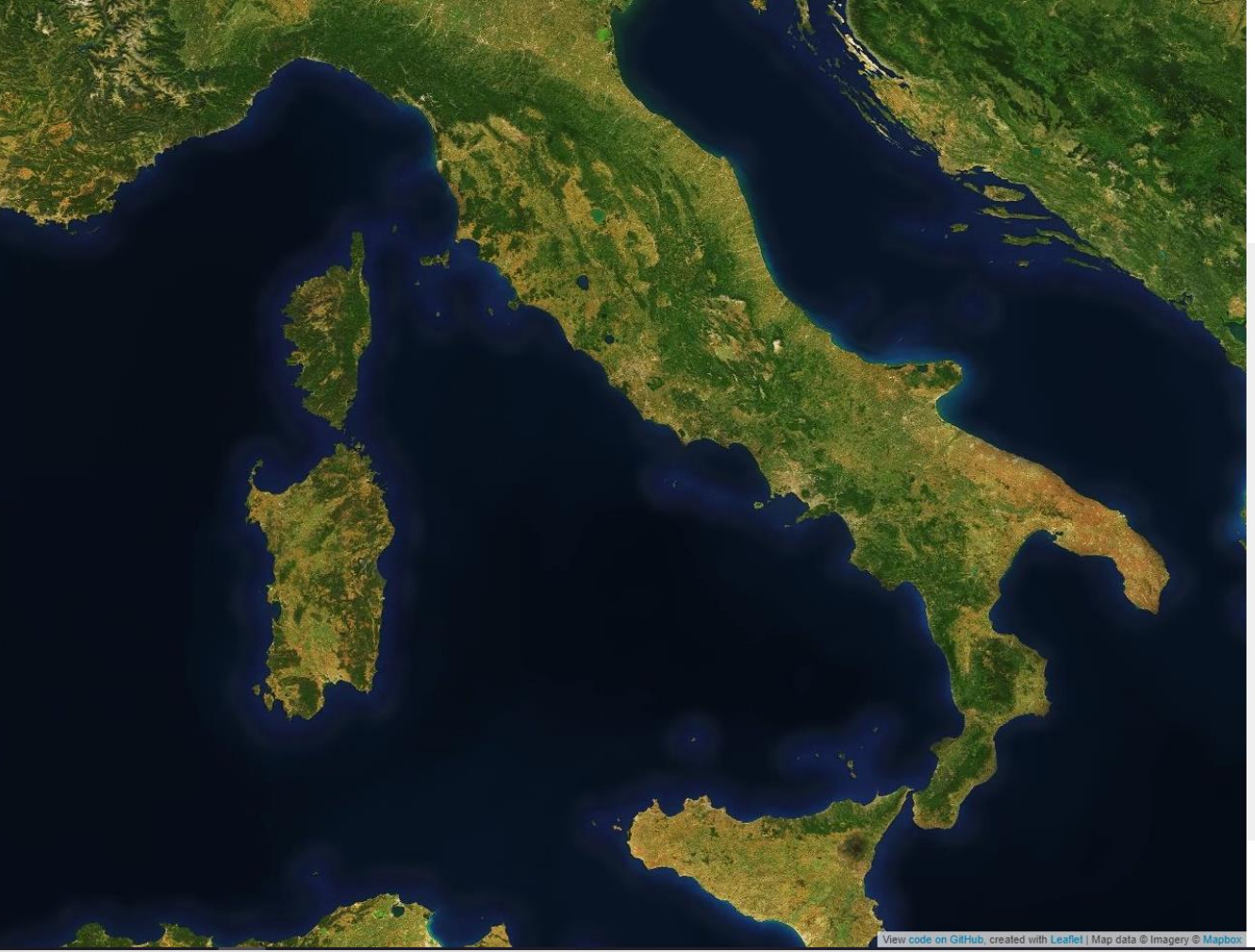

EUGENIUS

The Water Quality Monitoring provides information about the ecological state of the marine environment through a series of physical parameters.

Scroll

Welcome to the Water Quality Monitoring System

The use of satellite big data and other free and open data sources help detecting and continuously monitoring phenomena over coastal seawaters. The huge availability of data guarantees timely and regural intensive surveys enabling the continuous monitoring of a chosen area of interest. The service provides access to updated valuable information for classifying the status of water areas and infrastructures. The service also fits the needs of national and local authorities as well as fishing companies in terms of marine quality monitoring and preservation.
Physical parameters can be monitored such as:

- Chlorophyll-a(Chl) concentration,
- Total Suspended Matter (TSM),
- Water Transparency/Turbidity (WT),
- Sea Surface Temperature (SST).

Why to monitor the WQ?

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EUGENIUS

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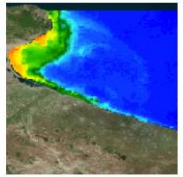
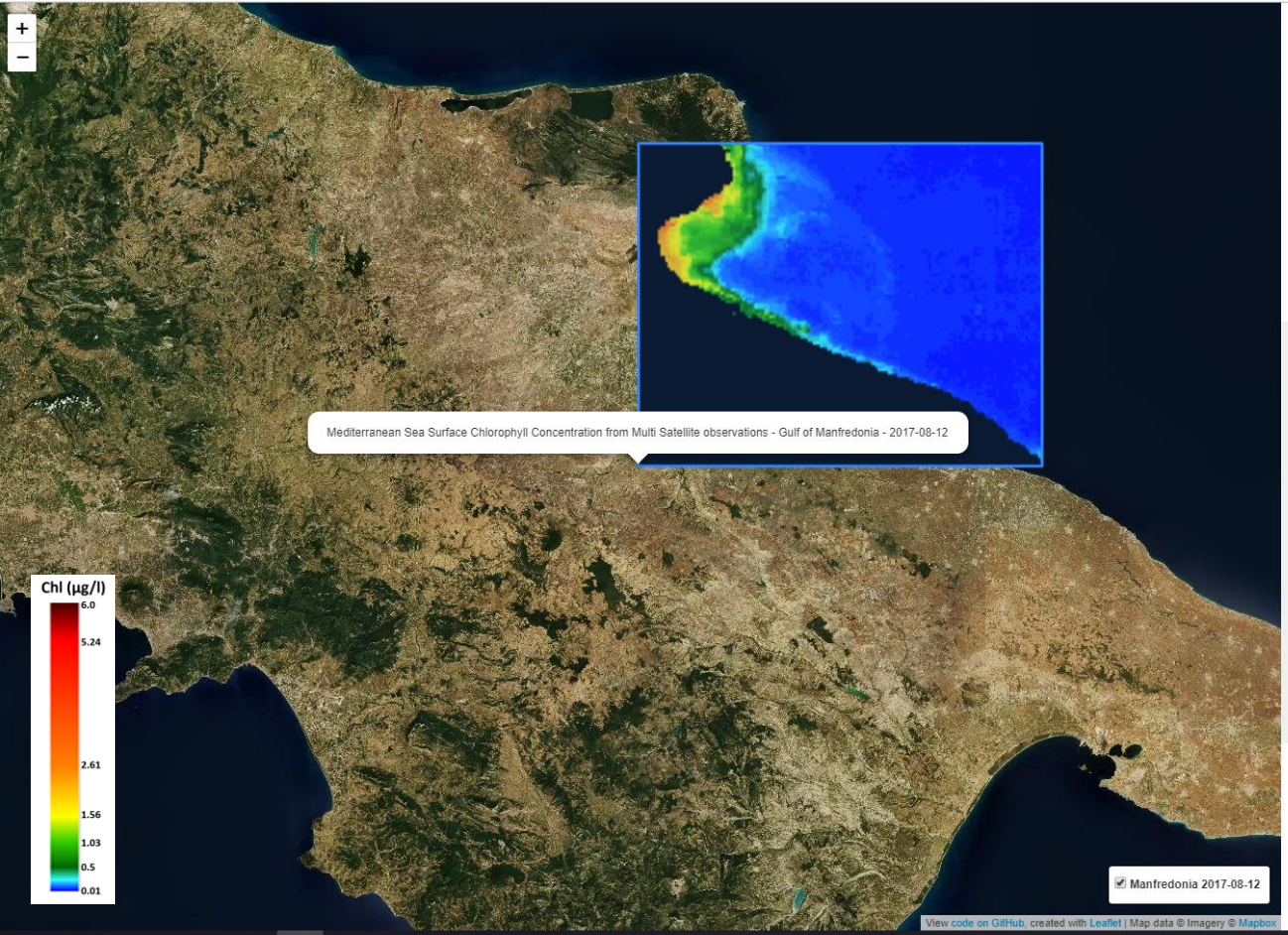
EU Water Framework Directive, UN Integrated Monitoring and Assessment Programme, and so forth).

The case of Apulian waters - Gulf of Manfredonia - 2017 August 12



This is the initial situation, chlorophyll concentration is typically low in the Gulf of Manfredonia (below 3µg/l), but sometimes such value increase due to waters rich in nutrients from the inland (moderate raining occurred in this day) or for favorable conditions like in summer with high temperatures and low currents. Here the area with higher chlorophyll value is in the western part of the gulf, mainly near the shore.

Gulf of Manfredonia - 2017 August 13



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In this days of for favorable conditions like in summer with high temperatures and low currents. Here the area with higher chlorophyll value is in the western part of the gulf, mainly near the shore.

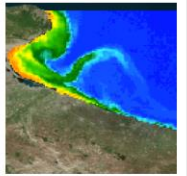
Mediterranean Sea Surface Chlorophyll Concentration from Multi Satellite observations - Gulf of Manfredonia - 2017-08-13

Chl (µg/l)
6.0
5.24
2.61
1.56
1.03
0.5
0.01

1km Manfredonia 2017-08-13

View code on GitHub, created with Leaflet | Map data © Imagery © Mapbox

Gulf of Manfredonia - 2017 August 13



Local conditions and winds from north west bring higher Chlorophyll (between 0.5 and 1.3µg/l) eastwards. At 1km spatial resolution a large plume far from the coast can be well distinguished. Furthermore slightly higher Chlorophyll can be seen moving all along the coast towards east.

Gulf of Manfredonia - 2017 August 14

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Scroll

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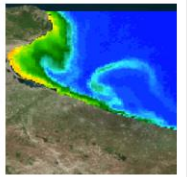
Mediterranean Sea Surface Chlorophyll Concentration from Multi Satellite observations - Gulf of Manfredonia - 2017-08-14

Chl (µg/l)
6.0
5.24
2.61
1.56
1.03
0.5
0.01

1km Manfredonia 2017-08-14
S3A Manfredonia 2017-08-14

View code on GitHub, created with Leaflet | Map data © Imagery © Mapbox

Gulf of Manfredonia - 2017 August 14



The expansion of the higher Chlorophyll area towards east continues in the main offshore plume and along the coast. Also on the western side the higher concentration Chlorophyll shows some evolutions. In the Sentinel-3 Chlorophyll map at 300m more details can be seen about the plume. the evolution on the western side and more important a better evaluation of the increase along the coast is possible. It can be noticed how at 300m resolution the harbor of Bari (in the southern part of the image) is visible.

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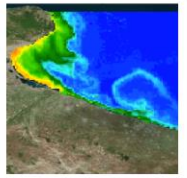
Mediterranean Sea Surface Chlorophyll Concentration from Multi Satellite observations - Gulf of Manfredonia - 2017-08-15

Chl (µg/l)
6.0
5.24
2.61
1.56
1.03
0.5
0.01

1km Manfredonia 2017-08-15

View code on GitHub, created with Leaflet | Map data © Imagery © Mapbox

Gulf of Manfredonia - 2017 August 15



Chlorophyll values are generally decreasing (values are below 0.6 µg/l), but the drift towards east in the plume and along the coast continues.

Gulf of Manfredonia - 2017 August 16

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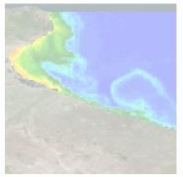
Gulf of Manfredonia - 2017 August 15



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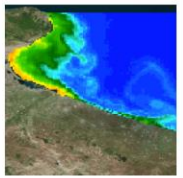
Gulf of Manfredonia - 2017 August 16



Looking at the **1km map**, while the plume almost disappeared, an increase of Chlorophyll can be noticed along the coast from the middle of the

Mediterranean Sea Surface Chlorophyll Concentration from Multi Satellite observations - Gulf of Manfredonia - 2017-08-16

Chl (µg/l)
6.0
5.24
2.61
1.56
1.03
0.5
0.01

1km Manfredonia 2017-08-16
S2A Manfredonia 2017-08-16

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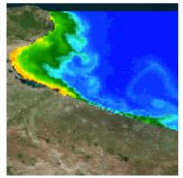
Gulf of Manfredonia - 2017 August 16



Looking at the **1km map**, while the plume almost disappeared, an increase of Chlorophyll can be noticed along the coast from the middle of the image towards east, where a small plume is forming around the Bari harbor.
The Sentinel-2 Chlorophyll map at 10m gives much more details on this area and also in the western part of the gulf even if a large area is masked due to sun glint which can be really impacting at such spatial scale. The harbor of Bari is well visible: here such high values of Chlorophyll are due to the sum of the effects of high Chlorophyll concentration (as confirmed by the map at 1km) and of sun glint.

Gulf of Manfredonia - 2017 August 17

Chl (µg/l)
6.0
5.24
2.61
1.56
1.03
0.5
0.01

1km Manfredonia 2017-08-16
S2A Manfredonia 2017-08-16

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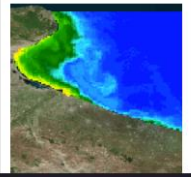
Gulf of Manfredonia - 2017 August 17



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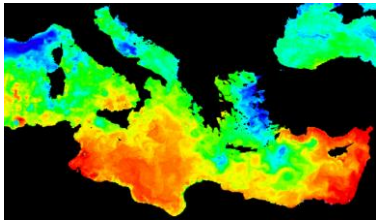
Market

MARKET SECTOR

Planetek develops services for Coastal and Marine Environment trough a proprietary platform called Rheticus®



INTERMEDIATE USER

Planetek is an intermediate user that uses Sentinel data together with Marine Copernicus Service to develop business for the final customers. Main application fields are WFD Reporting, Acquaculture and Desalination Plants

END USERS

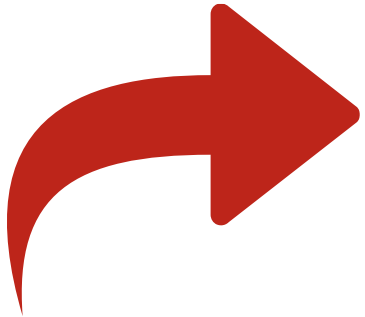
We target end users such as national and regional enviromental authorities, engineering companies, aquacolture cooperatives

Recommendations

- Support the transition from project/product approach to Info as a Service
- Define vertical services for selected user/market
- Connect with other ESA and European initiatives
- Strengthen the link with relevant Copernicus services (Mercator, EEA, Security)
- Address the issue of involvment of Atlantic users
- Establish permanet relations with relevant actors
- Provide requirements for future missions with a focus on Copernicus Evolution

Let’s keep in touch

Daniela Drimaco
drimaco@planetek.it



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