EGU2016 Splinter Meeting

The EMODnet MedSea CheckPoint

Wednesday 20th of April 2016
12:15-13:15

organized by the EMODnet MedSea Checkpoint partnership

http://www.emodnet-mediterranean.eu/
Assessing observations capacity and data adequacy for users at the regional sea-basin level: the EMODnet Checkpoint concept

Nadia Pinardi

http://www.emodnet-mediterranean.eu/
The statement of the problem

- Change the present fragmented EU repositories of marine data with an interoperable sharing framework
- Move to a new paradigm where data are collected once and used for many purposes
- Optimize observation networks by showing how monitoring meets the needs of public and private users (CHECKPOINT)

The concept of a “Checkpoint” was developed
### Who is the CheckPoint target audience?

<table>
<thead>
<tr>
<th>Checkpoint activity/Audience</th>
<th>Institutional/ policy makers</th>
<th>Upstream providers</th>
<th>Intermediate users</th>
<th>End Users</th>
<th>General audience</th>
</tr>
</thead>
<tbody>
<tr>
<td>General project information</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Main driver</td>
</tr>
<tr>
<td>Checkpoint indicators for monitoring gaps</td>
<td><strong>Main driver</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checkpoint indicators for input datasets</td>
<td></td>
<td><strong>Main driver</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIS catalogue with links to upstream data</td>
<td></td>
<td></td>
<td><strong>Main driver</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GIS catalogue with Targeted Products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>Main driver</strong></td>
</tr>
</tbody>
</table>
Sea basin checkpoints – concepts

**Challenges**
- Wind farm siting
- MPAs
- Oil platform leaks
- Climate & Coasts
- Fishery management
- Marine Environment
- River inputs

**Data collection programs**
- Copernicus
- EMODNET TAGs
- Fisheries Framework
- National databases
- International DB

**CKPT INDICATORS**
- Inadequate
- Partially adequate
- Totally adequate
- Not relevant

**Data Adequacy Report**

http://www.emodnet-mediterranean.eu/
MedSea Checkpoint assessment concepts

- Producer
  - Purpose
  - Data production specifications
    - Quality evaluation
    - Quality evaluation

- Universe of discourse 1 (Challenge products)
  - Fitness for purpose

- Universe of discourse 2 (INPUT data sets)
  - Fitness for use
  - Data selection requirements

- World
  - WiND, WAVE, T, Depth, HABITAT EXTENT...

- Use
  - User
  - Datasets
    - creates
    - selects
Preliminary conclusions and way forward

- A new method to assess basin scale monitoring fitness for use/purpose was developed.
- Challenge outputs requires several tens of input data sets, from different environmental matrices, not only environmental variables but also human activities data sets, equally important.
- Way forward: develop the Checkpoint Service as a permanent authoritative structure and/or mechanism.
The MedSea Checkpoint Portal and Service

Eric Mussat on behalf of Frederique Blanc
The EMODnet MedSea Checkpoint evaluates the quality of the data from current monitoring systems in terms of their accessibility, availability, multipurpose, efficiency, reliability, time consistency, space consistency, as well as the planning of technological advancements, new accessibility, new assembly protocols and observational priorities required to meet Challenges described below.

### Challenges

<table>
<thead>
<tr>
<th>Challenge</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wind farm siting</td>
<td>Set of indicators /analyzed set of characteristics for wind farm sitting in the north-western Mediterranean</td>
</tr>
<tr>
<td>Marine protected areas</td>
<td>Inventory of existing network of Marine Protected Areas and Analysis of its adequacy with respect to the MSFD Art. 13</td>
</tr>
<tr>
<td>Oil platform leaks</td>
<td>Provide within 24 hours a Oil Spill Platform Bulletin containing fate and transport of oil and impacts</td>
</tr>
<tr>
<td>Climate and coastal protection</td>
<td>Spatial data layers on annual changes in temperature, sea level and coastal erosion for the past 10, 50 and 100 years if possible</td>
</tr>
<tr>
<td>Fisheries management</td>
<td>Excel and GIS layers of fish yearly catch by species and bycatch Bottom trawling disturbance assessment</td>
</tr>
<tr>
<td>Marine environment</td>
<td>Eutrophication trends in the Mediterranean Sea</td>
</tr>
<tr>
<td>River inputs</td>
<td>Assembled river runoff and loading database from station data and models</td>
</tr>
</tbody>
</table>
Climate and coastal protection

Objectives

The Climate and Coastal Protection Challenge addresses the desk-based database exploration, characterizations and assessment in order to calculate parameters such as annual change in sea temperature, annual sea level rise and sediment mass balance over the Mediterranean basin.

This Challenge will produce:

- Spatial data layers for sea surface, mid-water and bottom temperature change trend, sea energy change trends and sea level trend for the past 10, 50 and 100 years.
- Time series for sea surface, mid-water and bottom temperature, sea energy and sea level for the past 10, 50 and 100 years.
- Report on the existence of datasets, their availability, consistency and resolution for producing sediment mass balance parameters.

Methodology

First, an extensive literature review was carried out to determine the available datasets, their documentation, cost agreements, sources and appropriateness to derive the targeted products, among others. Second, each Challenge partner used the selected datasets to produce the specific parameters related to sea temperature, sea energy, sea-level change or sediment mass balance. Once these parameters have been obtained, spatial data layers and time plots have been produced for both, the sea basin and NUTS3 regions.

Data Sources

A wide range of data types and sources were identified and reviewed for the challenge. The primary sources of the larger datasets were: PSMSL, CMEMS, AVISO, HADISST or EEA. Additionally a detailed survey contacting National Coastal Agencies and Experts and two scientific literature reviews[JS1] have been carried out to establish and justify the lack of data on sediment mass balance.

[JS1]
Temperature of the water column | Skin temperature of the water body by advanced very high resolution radiometer (AVHRR) | ISAC - INSTITUTE OF ATMOSPHERIC SCIENCES AND CLIMATE | Mediterranean Sea monthly SST climatologies L4HR (1985-2007)
SST delayed time monitoring Map of SST trend and time series of SST anomaly

KEYWORDS
- Challenges: Climate and coastal protection
- Characteristics: Temperature of the water column
- Data Provider: Cnr-isac
- Environmental Matrix: Marine water
- Processing Level Of: High level analyzed
- Production Mode: Delayed
- Purpose Of Characteristic: Sea surface temperature monitoring

AVAILABILITY
- EU catalogue service
- Data Delivery Mechanism: Online discovery downloading viewing services (advanced services)
- Data policy: Unrestricted
- Pricing: Open and Free, No charge
- Data formats: Netcdf

Open full description | Data provider
**Scope of the Web**

<table>
<thead>
<tr>
<th>Why for – Who for</th>
<th>General audience</th>
<th>Intermediate users</th>
<th>End Users</th>
<th>Upstream providers</th>
<th>Institutional Policy makers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) General information</td>
<td>Emodnet familie</td>
<td></td>
<td></td>
<td>Clarify the observation landscape</td>
<td></td>
</tr>
<tr>
<td>2) Inventory of input data</td>
<td></td>
<td>Catalogue Gateway</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Discover, view, download products</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) <strong>How available</strong> are the input data sets to users</td>
<td>![Traffic Light Inadequate]</td>
<td></td>
<td></td>
<td>Main driver</td>
<td></td>
</tr>
<tr>
<td>5) <strong>How appropriate</strong> are they for challenge use?</td>
<td>![Traffic Light Adequate]</td>
<td></td>
<td></td>
<td>Main driver</td>
<td></td>
</tr>
</tbody>
</table>

**Main driver**

Identify gaps and priorities to optimize the monitoring systems

**Data Adequacy Report**
## What are the questions behind AVAILABILITY

<table>
<thead>
<tr>
<th>Visibility</th>
<th>Visibility on data policy adopted by data providers.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AV_VI_1</td>
<td>Easily found</td>
</tr>
<tr>
<td>AV_VI_2</td>
<td>EU Inspire catalogue service</td>
</tr>
<tr>
<td></td>
<td>Can the data sets or series of data sets be found easily?</td>
</tr>
<tr>
<td></td>
<td>Is the service catalogue EU Inspire compliant?</td>
</tr>
<tr>
<td>Accessibility</td>
<td>Data delivery mechanisms</td>
</tr>
<tr>
<td>AV_AC_1</td>
<td>Policy visibility</td>
</tr>
<tr>
<td></td>
<td>Visibility on data policy adopted by data providers.</td>
</tr>
<tr>
<td>AV_AC_2</td>
<td>Service delivery</td>
</tr>
<tr>
<td></td>
<td>Data delivery mechanisms</td>
</tr>
<tr>
<td>AV_AC_3</td>
<td>Data Policy</td>
</tr>
<tr>
<td></td>
<td>Data policy</td>
</tr>
<tr>
<td>AV_AC_4</td>
<td>Pricing</td>
</tr>
<tr>
<td></td>
<td>Cost basis / price policy</td>
</tr>
<tr>
<td>AV_AC_5</td>
<td>Formats</td>
</tr>
<tr>
<td></td>
<td>Readiness for use</td>
</tr>
<tr>
<td>Performance</td>
<td>How responsive is the delivery service for the available data?</td>
</tr>
<tr>
<td>AV_PE_1</td>
<td>Responsiveness</td>
</tr>
<tr>
<td></td>
<td>How responsive is the delivery service for the available data?</td>
</tr>
</tbody>
</table>
Browser
(List of input data and statistics)

Dashboard
(raw indicators on availability)
Who is behind the web portal

Responsible of web portal activities
(development, deployment, operation and service desk, maintenance)

Responsible of technical infrastructure
(CMS & Browser)

Responsible of technical infrastructure
(Sextant database, GIS & dashboard)

Responsible of external validation
The Data Adequacy Reporting

Giuseppe Manzella
Assessment Methodology

• Establish a framework for collection of information (input metadatabase) regarding input data sets required by the challenges → Checkpoint Information Database;

• Definition of assessment criteria for the production of Usability Indicators;

• Development of a CheckPoint Service (browser and dashboard) to perform assessment and make it available;

• Analysis of the Fitness for Use of the input data set with respect to specific Challenge Targeted Products.
Some Numbers

- 298 data sets for the seven challenges
- 126 identified data providers
### Territory 1: Appropriateness

- **Spatial information**
  - Extent
  - Resolution
- **Time information**
  - Extent
  - Resolution
- **Purpose**
- **Lineage**
- **Usage**
- **Completeness**
- **(logical) Consistency**
- **Accuracy**
  - Horizontal
  - Vertical
  - Temporal
  - Thematic

### Territory 2: Availability

- ✓ Visibility
- ✓ Accessibility
  - Service
  - Data policy
  - Pricing policy
  - Formats
  - Service interoperability
- ✓ Performance
  - Responsiveness
  - Reliability

The ‘fitness for use’ or ‘adequacy’ is established with indicators based upon these two assessment criteria.
## Indicators

<table>
<thead>
<tr>
<th>AV-VI-1</th>
<th>Easily found</th>
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<tr>
<td></td>
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<td>AV-AC-2</td>
<td>Delivery</td>
</tr>
<tr>
<td></td>
<td>Data delivery mechanisms</td>
</tr>
<tr>
<td>AV-AC-3</td>
<td>Data Policy</td>
</tr>
<tr>
<td></td>
<td>Data policy</td>
</tr>
<tr>
<td>AV-AC-4</td>
<td>Pricing</td>
</tr>
<tr>
<td></td>
<td>Cost basis / price policy</td>
</tr>
<tr>
<td>AV-AC-5</td>
<td>Readiness</td>
</tr>
<tr>
<td></td>
<td>Format for use</td>
</tr>
<tr>
<td>AV-PE-1</td>
<td>Responsiveness</td>
</tr>
<tr>
<td></td>
<td>How responsive is the delivery service for the available data?</td>
</tr>
</tbody>
</table>

To facilitate the reproducibility of indicators and other CheckPoint processes, an automated process was set-up to compute indicators from descriptors, which is directly accessible from the CheckPoint Dashboard (not yet available on-line). Indicators can be presented by challenge or for all challenges together.
• **Red** ➔ effective actions are required to provide datasets and services fitting for use
• **Yellow** ➔ limited actions are required to provide datasets and services fitting for use
• **Green** ➔ actions and services are fitting for use and must be maintained

**What are Checkpoint indicators?**

Two basic assessment Criteria or ‘Territories’

Fitness for use - or - Adequacy

**CKPT INDICATORS**

- inadequate
- partly adequate
- totally adequate

Scale to be adopted
| AV-VI-1 | Easily found | High visibility |
| AV-VI-2 | EU Inspire catalogue service | Totally adequate |
| AV-AC-1 | Policy visibility | Medium transparency |
| AV-AC-2 | Delivery mechanism | Partial Inspire function |
| AV-AC-3 | Data policy | Partially restricted |
| AV-AC-4 | Pricing | Free |
| AV-AC-5 | Readiness | Ready to be consumed |
| AV-PE-1 | Responsiveness | High response |
Challenge 1
Wind farm siting

G. Kallos

Team Involved:
Atmospheric Modeling and Weather Forecasting Group, National and Kapodistrian University of Athens (NKUA), Greece
Institut Français de Recherche pour l’Exploitation de la Mer (IFREMER), France
France Energies Matines (FEM), France
Challenge 1 Wind farm siting

Objectives

• Characterize the suitability of marine sites for wind farm development in particular:
  – on the border between Spain and France
  – on the border between France and Italy
  – on a French offshore wind turbine test site near Marseille

• Evaluate the accuracy and the suitability of the available data and quantify the associated uncertainties via statistical analysis

→ Contribution to the data collection framework for checkpoint information and report assessment results in the Literature Survey and Data Adequacy Reports
Challenge 1 Wind farm siting

Methodology

Database building
• Using of the 10-year database made by the AM&WFG of the University of Athens (under the framework of the FP-7 European project MARINA PLATFORM).

Database analysis
• The analysis of the database includes:
  • spatial statistical monitoring and
  • in situ analysis.

The suitability of areas for wind park installation has been quantified by taking into consideration criteria for
• The natural resources and
• Anthropogenic or not constrains
## CH1 Suitability index

<table>
<thead>
<tr>
<th>Grade</th>
<th>Level</th>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Very Low</td>
<td>Red</td>
<td>The presence of a variable makes the area unsuitable for wind farm development</td>
</tr>
<tr>
<td>4</td>
<td>Low</td>
<td>Orange</td>
<td>The promixity to a suitable receptor or marine activity is adversely affected by the new wind farm or may put the wind farm at risk</td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
<td>Yellow</td>
<td>The marine activity or sensitive receptor may be adversely affected by the installation and presence of a wind farm although the site may be suitable for development</td>
</tr>
<tr>
<td>2</td>
<td>High</td>
<td>Green</td>
<td>The site is suitable for development and there are only minor adverse impacts anticipated on the sensitive receptor or marine activity</td>
</tr>
<tr>
<td>1</td>
<td>Very High</td>
<td>Green/Red</td>
<td>The site is suitable for development and there are no adverse impacts anticipated on the sensitive receptor or marine activity</td>
</tr>
</tbody>
</table>

### Natural resources

<table>
<thead>
<tr>
<th>Mean wind speed (m/s)</th>
<th>Wind speed index of variation</th>
<th>Category</th>
<th>Characterization</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 3</td>
<td>-</td>
<td>5</td>
<td>Very low</td>
</tr>
<tr>
<td>3 - 3.25</td>
<td>&gt;70%</td>
<td>5</td>
<td>Very low</td>
</tr>
<tr>
<td>3 - 3.25</td>
<td>&lt;70%</td>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>3.25 - 5</td>
<td>-</td>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>5 - 5.25</td>
<td>&gt;70%</td>
<td>4</td>
<td>Low</td>
</tr>
<tr>
<td>5 - 5.25</td>
<td>&lt;70%</td>
<td>3</td>
<td>Medium</td>
</tr>
<tr>
<td>5.25 - 7</td>
<td>-</td>
<td>3</td>
<td>Medium</td>
</tr>
<tr>
<td>7 - 7.25</td>
<td>&gt;70%</td>
<td>3</td>
<td>Medium</td>
</tr>
<tr>
<td>7 - 7.25</td>
<td>&lt;70%</td>
<td>2</td>
<td>High</td>
</tr>
<tr>
<td>7.25 - 9</td>
<td>-</td>
<td>2</td>
<td>High</td>
</tr>
<tr>
<td>9 - 9.25</td>
<td>&gt;70%</td>
<td>2</td>
<td>High</td>
</tr>
<tr>
<td>9 - 9.25</td>
<td>&lt;70%</td>
<td>1</td>
<td>Very High</td>
</tr>
<tr>
<td>9.25 - ...</td>
<td>-</td>
<td>1</td>
<td>Very High</td>
</tr>
</tbody>
</table>

### Constrains

<table>
<thead>
<tr>
<th>Site availability</th>
<th>Water depth range (m)</th>
<th>Distance of shore (km)</th>
<th>Marine protected areas</th>
<th>Seabed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>&gt;500</td>
<td>&gt;200 or &lt;25</td>
<td>Included in the Natura 2000 that are Habitats and Birds Directive</td>
<td>Protected Seagrass: posidonia oceanica</td>
</tr>
<tr>
<td>Low</td>
<td>200-500</td>
<td>150-200</td>
<td></td>
<td>Coral presence, Hard substrate, Rock fragment, Seagrass</td>
</tr>
<tr>
<td>Medium</td>
<td>60-200</td>
<td>100-150</td>
<td></td>
<td>Silt, clay</td>
</tr>
<tr>
<td>High</td>
<td>25-60</td>
<td>50-100</td>
<td></td>
<td>Mud, gravelly sediment</td>
</tr>
<tr>
<td>Very high</td>
<td>0-25</td>
<td>25-50</td>
<td></td>
<td>Sand, Sediment</td>
</tr>
</tbody>
</table>
Challenge 1 Wind farm siting

Data sources

• High resolution meteorological analyses for various characteristics (winds, air temperature, etc.) from past EU FP7 projects (MARINA Platform)
• Shipping lines from AIS data made available by EMSA;
• Bathymetry (numerical values and maps) from the EMODnet thematic portal;
• Seafloor geology from the EMODnet thematic portal;
• Benthic ecosystem structure from the EMODnet thematic portal;
• Electric grid position from network operators and public bodies and from the EMODNET Human Activities thematic portal;
• Bird migratory patterns (from the literature).
CH1 Targeted Products

MEDSEA_CH1_product_1
A wind-wave data set
(SQL data base)

MEDSEA_CH1_product_2
Suitability index for wind farm installation in the NW Mediterranean based on the environmental resources
CH1 Targeted Products

MEDSEA_CH1_product_3

A suitability index of a wind farm in the NW Mediterranean concerning the environmental resources, the natural barriers, human activities, MPA and fisheries.
Challenge 2
Marine Protected Areas

S. Simoncelli

on behalf of C.P. Kyriakidou

Team Involved:
Sofia Reizopoulou (HCMR), Chara Kyriakidou (HCMR), Simona Simoncelli (INGV), Nadia Pinardi (INGV), Isidora Katara (HCMR), Marianna Giannoulaki (HCMR), Laura Bray (HCMR)
The objective is to draw a synthesis on large scale analysis of environmental and socio-economic knowledge in order to assess the Mediterranean network of MPAs, and achieve an holistic approach to environmental protection.

• analyze the existing Mediterranean network of MPAs
• determine whether the network constitutes a representative and coherent network (art.13 of Marine Strategy Framework Directive)

→ Contribution to the data collection framework for checkpoint information and report assessment results in the literature survey and Data Adequacy Reports
Challenge 2 Marine Protected Areas

Network of MPAs represent an integrated system of multiple protected areas, often designed to conserve regional biodiversity and ecosystem function.

Criteria for assessing the MPA network in the Mediterranean:

- Adequacy
- Representativeness
- Connectivity
- Replication
Challenge 2 Marine Protected Areas

Data Sources

- Med protection initiatives (management and conservation areas) containing information on MPAs extension areas and the different protection levels (CoCoNET project);
- Depth (biological) zones from EMODnet Seabed Habitats;
- Distribution of Mediterranean Cetaceans from International Union for Conservation of Nature (IUCN);  
- Temperature and surface currents from CMEMS reanalysis;
- Bathymetry, extent of priority species distribution (seagrass, coralligenous and marine caves), euphotic zone, Natura sites, Transitional water bodies, Habitats substrate from EMODnet thematic portals, EEA, scientific articles;
- biodiversity monitoring stations (IRIS-SES project)
Challenge 2 Marine Protected Areas

Methodology

• The necessary input characteristics and the available databases were identified
• The accessibility/availability of the data sets was analyzed and the data policy was strictly followed
• The data sets were downloaded and processed to be in the appropriate format for their conversion into GIS layers
• Each GIS layer corresponds to one data set and contains all the relative information. For instance, for the MPAs, an excel table is associated.
• For each Targeted Product an individual workflow was created in a GIS (mxd) file. In this way, the Targeted Product layers can be optionally combined and visualized
Challenge 2 Marine Protected Areas

Methodology

1. Data Collection
2. Data Processing
3. Thematic maps
4. Web services
## CH2 Targeted Products

<table>
<thead>
<tr>
<th>MEDSEA_CH2_Product_1</th>
<th>Med protection initiatives (management and conservation areas)</th>
<th>Excel file</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEDSEA_CH2_Product_2</td>
<td>Med conservation areas and biological zones</td>
<td>shapefile</td>
</tr>
<tr>
<td>MEDSEA_CH2_Product_3</td>
<td>Proposed regional conservation areas in the Mediterranean (Cetaceans, Fisheries Restricted Areas etc)</td>
<td>shapefile</td>
</tr>
<tr>
<td>MEDSEA_CH2_Product_4</td>
<td>Qualitative analysis of connectivity between MPAs</td>
<td>shapefile</td>
</tr>
<tr>
<td>MEDSEA_CH2_Product_5</td>
<td>Representativity of habitats/species/other features (bathymetry, seagrass, light, habitats substrate, Natura sites)</td>
<td>shapefile</td>
</tr>
<tr>
<td>MEDSEA_CH2_Product_6</td>
<td>The monitoring capacity of biodiversity in MPAs (combination MPA and monitoring stations for biodiversity elements)</td>
<td>shapefile</td>
</tr>
</tbody>
</table>
CH2 Targeted Products

MEDSEA_CH2_product_2
Med conservation areas (International and National) and depth biological zones
CH2 Targeted Products

MEDSEA_CH2_product_3
Proposed regional conservation areas in the Mediterranean and Cetaceans
Challenge 3
Oil Platform Leak

S. Simoncelli

Team Involved:
Simona Simoncelli (INGV)
Nadia Pinardi (INGV)
George Zodiatis (OC-UCY)
The **objective** is to give rapid information on the oil movement and coastal impacts after a DG MARE request. The **EMODNet Oil Platform Leak (OPL) Bulletin** has been implemented in order to:

- To produce oil spill predictions for the Mediterranean Sea making use of well-established oil spill modelling systems from oceanographic national services, of existing oil spill monitoring platforms and environmental data.

- To deliver an **OPL-Bulletin** within 24 hours from the time of receipt of an oil slick alert containing information on the likely oil spill trajectory and the statistical likelihood that coastal habitats and activities will be impacted.
CH3 Oil Platform Leak: Methodology

Input data:
- Oil platform position (lat, lon)
- Date and time of the leak
- Depth of the leak
- Type of oil (API or type name)
- Rate of leakage or amount of oil leaked
- Duration of leakage
- Forecast simulation length

OPL-Bulletin provided by e-mail within 24-72 hours using a pre-defined template. 2 oil transport and transformation models are used:
1. MEDSLIK run by OC-UCY
2. MEDSLIK-II run by INGV
CH3 Oil Platform Leak: Data Sources

The production of the **OPL-Bulletin** relies on the availability of high-resolution meteo-oceanographic forecasts/analyses available through **CMEMS** portal and other national forecasting systems → **Input characteristics:**

- Horizontal velocity of the water column (currents)
- Temperature of the water column
- Wind velocity components
- Wave direction (not compulsory)

Additional data sets are required to evaluate the spill impacts. Information from human activities, MPAs and coastal habitats provided through **EMODNet** portals were considered → **Input characteristics:**

- Seabed substrate
- Marine and coastal infrastructures
- Mariculture
- MPAs
- Transport routes
- Use of coastal areas
CH3 Targeted Products

MEDSEA_CH3_product_1 → OPL Bulletin produced after DG MARE request on 07/28/2014 containing the notification of two oil leaks. 2 bulletins produced by INGV for the 2 spills separately considering SCENARIO N.1

EMODNET_OPL_Bulletin_SPILLn1_SCENARIOn1.pdf
EMODNET_OPL_Bulletin_SPILLn2_SCENARIOn1.pdf

A third bulletin was produced in parallel by OC-UCY with predictions of the 2 spills and three different scenarios (SCENARIO N.2-3-4)

EMODNET_OPL_SPILLn1n2_SCENARIOn2n3n4.pdf

### INITIAL ASSUMPTIONS

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<th></th>
<th>SPILL n.1 Caliph prospect</th>
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<td>LON = 15° 54.30’ E</td>
<td>LON = 15° 37.94’ E</td>
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<td>Start date and time (UTC) of the leak</td>
<td>27th of July 2014 at 05:05:45</td>
<td>28th of July between 06:15:00 and 10:20:00</td>
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<td>Type of oil</td>
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<td>API 33 (SCENARIO 2-3-4)</td>
<td>API 33 (SCENARIO 2-3-4)</td>
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<td>Duration of spillage</td>
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<td>Oil spill from 6:15 up to 10:20 (4 hours)</td>
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<td>Rate of spillage</td>
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<td>Total amount of oil spilled</td>
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### PREDICTION SYSTEMS

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</table>
Challenge 4
Climate and Coastal Protection

D. March

Team Involved
Lluís Gómez-Pujol (SOCIB), Joan Vallespir (SOCIB), Joaquin Tintoré (SOCIB), Roland C. Garnier (IH Cantabria), Raúl Medina (IH Cantabria), Mauricio González (IH Cantabria), Antonio Bonaduce (CMCC), Fabio Raicich (CNR), Guillaume Valladeau (CLS), Rita Lecci (CMCC)
Challenge 4 Climate and Coastal Protection

The Climate and Coastal Protection Challenge addresses the desk-based database exploration, characterizations and assessment in order to calculate parameters such as annual change in sea temperature, annual sea level rise and sediment mass balance over the Mediterranean basin.

This Challenge will produce:

- **Spatial data layers** for sea surface, mid-water and bottom temperature change trend, sea energy change trends and sea level trend for the past 10, 50 and 100 years.
- **Time series** for sea surface, mid-water and bottom temperature, sea energy and sea level for the past 10, 50 and 100 years.
- **Report** on the existence of datasets, their availability, consistency and resolution for producing sediment mass balance parameters.
CH4 Climate and Coastal Protection Methodology

- Sea Temperature
- Sea Internal Energy
- Sea Level

International Databases → Trend Analysis (10, 50, 100 yrs) → Basin & NUTS 3

Literature Review → Expert Survey + Bibliographic Analysis → Shoreline Change
## Ch 4 Climate and coastal protection: Data Sources

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Data Sources</th>
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<td>Sea Surface Temperature</td>
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<tr>
<td>Mid-water Temperature</td>
<td><a href="#">Copernicus</a></td>
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<tr>
<td>Sea Bottom Temperature</td>
<td><a href="#">Copernicus</a></td>
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<tr>
<td>Sea Internal Energy</td>
<td><a href="#">Copernicus</a></td>
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<tr>
<td>Sea Level</td>
<td><a href="#">Copernicus</a>, <a href="#">PSMSL</a>, <a href="#">AVISO+</a></td>
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<td>Sediment Mass Balance</td>
<td><a href="#">EEA</a>, <a href="#">Scopus</a>, <a href="#">ISI Web of Science</a></td>
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</table>
### CH4 Targeted Products

#### BASIN MAPS

![BASIN MAPS](image1)

#### NUTS3 MAPS

![NUTS3 MAPS](image2)

#### TIME SERIES

![TIME SERIES](image3)

#### REPORT

![REPORT](image4)

<table>
<thead>
<tr>
<th>Product</th>
<th>Trend for the last 10 yr</th>
<th>Trend for the last 50 yr</th>
<th>Trend for the last 100 yr</th>
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<td>1 1 2</td>
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<td>Mid-water Temperature</td>
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<td>1 1 2</td>
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<td>Sea Bottom Temperature</td>
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<td>Sea Internal Energy</td>
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<td>Sea Level</td>
<td>1 1 2</td>
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<td>2 2 3</td>
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<td>Sediment Mass Balance</td>
<td>1 REPORT JUSTIFYING LACK OF DATA FOR PROJECT PURPOSES</td>
<td>1 REPORT JUSTIFYING LACK OF DATA FOR PROJECT PURPOSES</td>
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Challenge 5
Fishery Management

Gianna Fabi

Team Involved
Gianna Fabi, Giuseppe Scarcella, Nora Tassetti, Carmen Ferrà Vega, Giulio Pellini, Antonello Sala, Emilio Notti, Fabrizio Moro, Jacopo Pulcinella
(CNR-ISMAR)
Objectives have been divided in two main tasks:

**TASK 1**
Construct fishery datasets of fish landings, discard and by-catch for assessing the quality, extracting the synergies and identifying the gaps of the fishery data collection systems in the Mediterranean Sea.

**TASK 2**
Deliver maps showing the extent of the trawling fishing grounds for identifying the areas which are most disturbed by bottom trawling and the changes in level of disturbance over the past ten years and identifying the gaps of fishing vessels’ tracking systems in the Mediterranean Sea.
CH5 Fishery Management: Methodology

Input data **TASK1**
- Fishery collated datasets of landings, discards and by-catch gathered in the framework of DCR/DCF, FAO-FishStat and ICCAT databases

Input data **TASK2**
- Seabed habitats
- Seabed substrate
- Fishing vessels’ position and activity (VMS/AIS/ESIF systems):
  1. Processed data by MS (VMS system) after the Data call by DGMARE (May 2015)
  2. Raw data (AIS and ESIF systems)
CH5 Fishery Management: Data Sources

The production of Targeted Products is based on the following input characteristics:

**FISHERY COLLATED DATASETS:**
- Fish and shellfish catch statistics, Mass of landings of fish by species, country and year (excluding shellfish) from ICCAT Statistical Bulletin, DCR/DCF (European Commission) and FAO FishStat
- Fish and shellfish catch statistics, Mass of discards of fish by species, country, year (excluding shellfish), DCR/DCF (European Commission)

**HORIZONTAL PLATFORM MOVEMENT:**
- Maps by France, Slovenia, Cyprus, Greece, Malta, - VMS data from fishing vessels
- AIS raw data from fishing vessels
- GPS logger raw data from fishing vessels (ESIF system, CNR-ISMAR)

Additional data sets are required to evaluate the impact on the bottom.

Biota-biology and seabed layers provided by EMODnet Geology and Seabed Habitats portals:
- Map of Seabed substrate
- Map of Seabed Habitats
CH5 Targeted Products

**MEDSEA_CH5_Product_1**  →  Collated data set of fish **LANDINGS** by species and year, for mass and number (**.xlsx**, 68,116 rows)

**MEDSEA_CH5_Product_2**  →  Collated data set of fish **DISCARDS** by species and year, for mass and number (**.xlsx**, 730 rows)

**MEDSEA_CH5_Product_3**  →  Collated data set of fish **BY-CATCH** by species and year, for mass and number (**.xlsx**, 6 rows)

![Example Table](image-link)

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Scientific_name</th>
<th>Landings [Tonnage]</th>
<th>Landings [Number x 1000]</th>
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</table>
CH5 Targeted Products

MEDSEA_CH5_Product_4 → Impact of fisheries on the bottom from VMS data combined with seabed substrate and habitat vulnerability (estimated monthly)

*shapefile 0.05°x0.05° grid according to available data by country (different periods and GSAs of competence)*

MEDSEA_CH5_Product_5 → Change level of disturbance from VMS data combined with seabed substrate and habitat vulnerability (estimated yearly)

*shapefile 0.05°x0.05° grid according to available data by country (different periods and GSAs of competence)*

MEDSEA_CH5_Product_6 → Impact of fisheries on the bottom from AIS data combined with seabed substrate and habitat vulnerability (estimated monthly)

*shapefile 0.01°x 0.01° grid according to available data (2012/2014, whole Mediterranean basin)*

MEDSEA_CH5_Product_7 → Change level of disturbance from AIS data combined with seabed substrate and habitat vulnerability (estimated yearly)

*shapefile 0.01°x 0.01° grid according to available data (2012/2014, whole Mediterranean basin)*

MEDSEA_CH5_Product_8 → Impact of fisheries on the bottom from ESIF data combined with seabed substrate and habitat vulnerability (estimated yearly)

*shapefile 0.01°x 0.01° grid according to available data (2013/2015, up to 3 monitored vessels, central Adriatic sea)*
CH5 Targeted Products

Impact of fisheries on the bottom from VMS data
January 2010

Impact of fisheries on the bottom from AIS data
January 2013

Impact of fisheries on the bottom from Data Logger
2 Otter trawls
July 2014
CH5 Targeted Products

**TASK 1**

- **MEDSEA_CH5_Product_1** Collated data set of landings by species and year, for mass and number
- **MEDSEA_CH5_Product_2** Collated data set of discards by species and year, for mass and number
- **MEDSEA_CH5_Product_3** Collated data set of bycatch by species and year, for mass and number

**MEDSEA_CH5_Product_4** Impact of fisheries on the bottom from VMS data combined with seabed substrate and habitat vulnerability

**MEDSEA_CH5_Product_5** Change level of disturbance from VMS data combined with seabed substrate and habitat vulnerability

**MEDSEA_CH5_Product_6** Impact of fisheries on the bottom from AIS data combined with seabed substrate and habitat vulnerability

**MEDSEA_CH5_Product_7** Change level of disturbance from AIS data combined with seabed substrate and habitat vulnerability

**MEDSEA_CH5_Product_8** Impact of fisheries on the bottom from Data Logger combined with seabed substrate and habitat vulnerability

**TASK 2**

- **MEDSEA_CH5_Product_4** Impact of fisheries on the bottom from VMS data combined with seabed substrate and habitat vulnerability
- **MEDSEA_CH5_Product_5** Change level of disturbance from VMS data combined with seabed substrate and habitat vulnerability
- **MEDSEA_CH5_Product_6** Impact of fisheries on the bottom from AIS data combined with seabed substrate and habitat vulnerability
- **MEDSEA_CH5_Product_7** Change level of disturbance from AIS data combined with seabed substrate and habitat vulnerability
- **MEDSEA_CH5_Product_8** Impact of fisheries on the bottom from Data Logger combined with seabed substrate and habitat vulnerability
Challenge 6
Marine Environment

Federico Falcini

Team Involved
Antonio Cruzado (Oceans.cat), Nixon Bahamon (Oceans.cat), Federico Falcini (CNR)
Challenge 6 Marine Environment: Objectives

To assess eutrophication evolution in the Mediterranean Sea over the last decade based on available historical remote and in situ information of eutrophication indicators.

**Eutrophication**: excess of available inorganic and/or organic nutrients that enhances the primary production (PP)

River outflows Outfalls in coastal areas

High nutrient plumes in which PP enhances Chlorophyll-a levels

*Note*: other forms of oxygen consuming organic matter not related to phytoplankton that contribute to eutrophication *without* producing chlorophyll-a.
CH6 Marine Environment: Data Sources

TRIX

- Temperature/Salinity
  - Emodnet: http://www.emodnet.eu
  - PERSEUS: http://isramar.ocean.org.il/perseus_data

- Nitrate/Phosphate
- Dissolved Oxygen

Satellite products

- Chlorophyll
CH6 Marine Environment: Methodology

**In situ data:** chlorophyll-a, inorganic/organic nutrient concentrations, dissolved oxygen determinations, oxygen-consuming organic matter such as BOD5 or COD)

<table>
<thead>
<tr>
<th>Identification of eutrophication indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea surface chlorophyll</td>
</tr>
<tr>
<td>Sea surface TRIX parameters</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internet search and download of eutrophication indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite chlorophylls</td>
</tr>
<tr>
<td>In-situ nutrients, oxygen, temperature and salinity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maps creation of eutrophication indicators at available periods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climatological seasonal chlorophyll + chlorophyll trend (last decade)</td>
</tr>
<tr>
<td>5-year periods of TRIX + TRIX trend (last two decades)</td>
</tr>
</tbody>
</table>

**Satellite data**
Ocean-colour satellite products (1980 present): Availability, synoptic view, high sampling frequency, spatial resolution.

Assessment of eutrophication from ocean colour derived Chl-a complements the in situ derived EEA index CSI023 with ocean colour observations (CSI023+):  

\[
\text{TRIX} = \left( \log(\text{CHL} \times (100 - \%\text{DO}_{\text{SAT}}) \times \text{DIN} \times \text{TP}) + 1.5 \right) / 1.2
\]
CH6 Targeted Products

MEDSEA_CH6_Product_1 \(\rightarrow\) Maps of seasonal Chlorophyll (mg/m³) from L4 satellite ocean color data for the past 10 years (2005-2014) WINTER/SPRING/SUMMER/FALL

MEDSEA_CH6_Product_2 \(\rightarrow\) Map of Chlorophyll trends (mg/m³/year) from L4 satellite ocean color data for the past 10 years (2005-2014)

**Chl-a trend**

Chl-a trend \(\rightarrow\) relative concentration changes [mg/m³y¹] with respect to the climatological concentration values
CH6 Targeted Products

**MEDSEA_CH6_Product_3** ➔ Map of seasonal “eutrophication algorithm/indicator” from in situ data and for the past 10 years

**MEDSEA_CH6_Product_4** ➔ Map of trends of “eutrophication algorithm/indicator” from in situ data and for the past 10 years

**TRIX trend**

<table>
<thead>
<tr>
<th>TRIX annual mean</th>
<th>Trophic Status</th>
<th>Water quality Conditions</th>
</tr>
</thead>
</table>
| <4               | Elevated       | • Scarcely productive waters.  
                  |                 | • Good water transparency.  
                  |                 | • Absence of anomalous water colours.  
                  |                 | • Absence of Oxygen undersaturation in the bottom waters.  |
| 4-5              | Good           | • Moderately productive waters.  
                  |                 | • Occasionally water turbidity.  
                  |                 | • Occasionally anomalous water colors.  
                  |                 | • Occasionally bottom waters ipoxia episodes.  |
| 5-6              | Mediocre       | • Very productive waters.  
                  |                 | • Low water transparency.  
                  |                 | • Frequently anomalous waters colours.  
                  |                 | • Ipoxia and occasionally anoxia episodes in the bottom layers.  |
| >6               | Bail           | • Strongly productive waters.  
                  |                 | • High water turbidity.  
                  |                 | • Diffuse and persistent anomalous in the water colours.  
                  |                 | • Diffuse and persistent ipoxia/anoxia episodes in the bottom waters.  
                  |                 | • High mortality rate of benthic organisms.  
<pre><code>              |                 | • Alteration of the benthic communities and strong decrease of the biodiversity.  |
</code></pre>
<table>
<thead>
<tr>
<th>Target products</th>
<th>Last decade Seasonal</th>
<th>Last decade 1st half</th>
<th>Last decade 2nd half</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maps of chlorophylls</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Map of chlorophyll trends</td>
<td>Green</td>
<td>Green</td>
<td>Green</td>
</tr>
<tr>
<td>Map of TRIX</td>
<td>Red</td>
<td>Red</td>
<td>Yellow</td>
</tr>
<tr>
<td>Map of TRIX trends</td>
<td>Red</td>
<td>Red</td>
<td>X</td>
</tr>
</tbody>
</table>

x Compared to early half of previous decade

Estimating TRIX requires surface inorganic nitrogen, total phosphorous, oxygen saturation and chlorophyll concentration, available for all seasons, every year, for the whole Mediterranean Sea surface. This is hard to achieve from public databases.

Access to restricted databases and numerical modelling outputs may help to improve further TRIX calculations.
Challenge 7
River Inputs

Federico Falcini

Team Involved
Nikos Skoulikidis (HCMR), Dora Kouvarda (HCMR), Nektarios Kalaitzakis (HCMR), Federico Falcini (CNR)
Challenge 7 River Inputs

**Rivers...**

✓ major pathways for material fluxes (e.g., nutrients and sediment) from land to sea, contributing to the maintenance of coastal and marine ecosystem.

✓ boundary conditions for coastal and offshore circulation of oceanic systems.

**Objectives**

- provide an overview on the temporal and spatial variability of main riverine material fluxes and eels capture data.
- identify trends due to climate change and socio-economic development that threat coastal ecosystems.
- assess uncertainties and reliabilities due to limitations on modelling, algorithms, and input data sets.
- allow identification of major data and knowledge gaps which have to be closed by future research efforts.
CH7 River Inputs: Data Sources

River Discharge

✓ Model time series: SMHI - Hypeweb– Europe data source http://hypeweb.smhi.se/europehype
✓ In situ time series: CISL Research Data Archive http://rda.ucar.edu/datasets/

Global River Discharge-Rivdis https://daac.ornl.gov/get_data.shtml

SESAME data set (through PERSEUS project)

Nutrients (Total Nitrogen and Total Phosphorous)

✓ Model time series: SMHI - Hypeweb– Europe data source http://hypeweb.smhi.se/europehype
✓ In situ time series: SESAME data set

Total Suspended Matter (TSM)

✓ Satellite data: CoastColour Project http://www.coastcolour.org/ccprocessing/calvalus.jsp

Eels Production characteristic

✓ In situ time series: FAO database http://www.fao.org/fishery/statistics/collections
CH7 River Inputs: Methodology

Which rivers?

- Annual climatological discharge > 10 m³/s
- Contribute to about half of the total inputs (Struglia et al., 2004; Ludwig et al., 2009)

Water discharge and nutrients load (In-situ and model data)

- Station distance from the coast less than 100 km.
- River runoff greater than 10 m³/sec (0.315 km³/y)
- No stations influenced by sea water were included
CH7 River Inputs: Methodology

**Which rivers?**

*Total Suspended Matter concentration (Satellite data):*
Simulating single-stations from ~ 20 x 20 km² box (i.e., 2-3 times the river-induced Rossby radius of deformation) at each river mouth
Extracted TSM concentration daily data (CoastClour Project database) by choosing the max value within the range 0.001-1000 mg/l
CH7 River Inputs: Targeted Products

MEDSEA_CH7_Product_1 → Annual time series of Water Discharge ($Q_w$) [m$^3$/s]
MEDSEA_CH7_Product_2 → Monthly time series of Water Discharge ($Q_w$) [m$^3$/s]

MEDSEA_CH7_Product_3 → Annual time series of Total Suspended Matter (TSM) from satellite data [mg/l]
MEDSEA_CH7_Product_4 → Monthly time series of TSM from satellite data [mg/l]

MEDSEA_CH7_Product_5 → Annual time series of Total Nitrogen [mg/l]
MEDSEA_CH7_Product_6 → Monthly time series of Total Nitrogen from model data [mg/l]

MEDSEA_CH7_Product_7 → Annual time series of Total Phosphorous [mg/l]
MEDSEA_CH7_Product_8 → Monthly time series of Total Phosphorous from model data [mg/l]

MEDSEA_CH7_Product_9 → Annual time series of Eels Production per country [tons]
CH7 River Inputs: Targeted Products

Although coming from different databases and methodologies, the two products seem to agree well.

<table>
<thead>
<tr>
<th>Target products</th>
<th>Time series for the last 10yr</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In situ</td>
</tr>
<tr>
<td>Water Discharge</td>
<td>![Data available]</td>
</tr>
<tr>
<td>Total Suspended Matter</td>
<td>![Partial gaps in time and space]</td>
</tr>
<tr>
<td>Total Nitrogen</td>
<td>![Partial gaps in time and space]</td>
</tr>
<tr>
<td>Total Phosphorous</td>
<td>![Partial gaps in time and space]</td>
</tr>
<tr>
<td>Eels Production</td>
<td>![Partial gaps in time and space]</td>
</tr>
</tbody>
</table>
Web-Questionnaire

David March
Questionnaire: Objectives

The objective of the survey is to receive feedback from a large research community pool on the partial results of the MedSea Checkpoint (i.e. marine monitoring system assessment based upon Blue Growth applications). In particular we concentrate on the Checkpoint Service to test our capability to raise user awareness on it.

Focus on:
• web portal
• challenges web pages
• browser of the input data sets identified to produce the targeted products
• availability of the input data sets, the produced challenges targeted products and their visualization

The analysis of your response will allow the improvement of the checkpoint methodology and service.

The questionnaire is anonymous and it should take you around 15 minutes to complete it.
MEDSEA CKP QUESTIONNAIRE

The objective of the survey is to receive feedback from a large research community pool on the partial results of the MedSea Checkpoint (i.e. marine monitoring system assessment based upon Blue Growth applications). In particular we concentrate on the Checkpoint Service (web portal), challenges web pages, the browser of the input data sets (identified to produce the targeted products), the availability of the input data sets, the produced challenges targeted products and their visualization) to test our capability to raise user awareness on it.

The analysis of your response will allow the improvement of the checkpoint methodology and service.

The questionnaire is anonymous and it should take you around 15 minutes to complete it.

Before starting, please open the MedSea Checkpoint website in another window or tab:
http://www.emodnet-mediterranean.eu/

Never submit passwords through Google Forms.
Questionnaire: Sections

• About your work
• Your background knowledge about the Checkpoint
• General questions about the website: Web portal overview
• Challenge(s): Objectives, Methodology, Data sources, Targeted Products
• Data Browser
• General feedback
Questionnaire: Calendar

• April 25th → You will receive the first email with presentation and link to the survey

• April 28th → You will receive the first reminder

• May 2nd → You will receive the second and last reminder

• May 6th → Survey will be closed

The results will be analyzed and summarized in a report by June.
Thank you!

A special thanks to
Claudia Cesarini (CLU) and
Erwann Quimbert (Ifremer)
for the latest MedSea Checkpoint Service improvements