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CCLME Eco-GIS viewer development: an overview from idea to product

Luis Valdés

**Hands-on Workshop on “The use
of the CCLME Eco-GIS Viewer”**

11-13 July 2017

Five steps for turning an idea into a product

1. Rapid prototyping
2. Seeking for expert guidance on the contents, needs and resources (1st Workshop, Praia CV)
3. Review by corporate “labs/orgs” (FAO)
4. Case studies for internal validation and corrections
5. Getting the product into the hands of interested users (2nd Workshop, Tenerife Sp)



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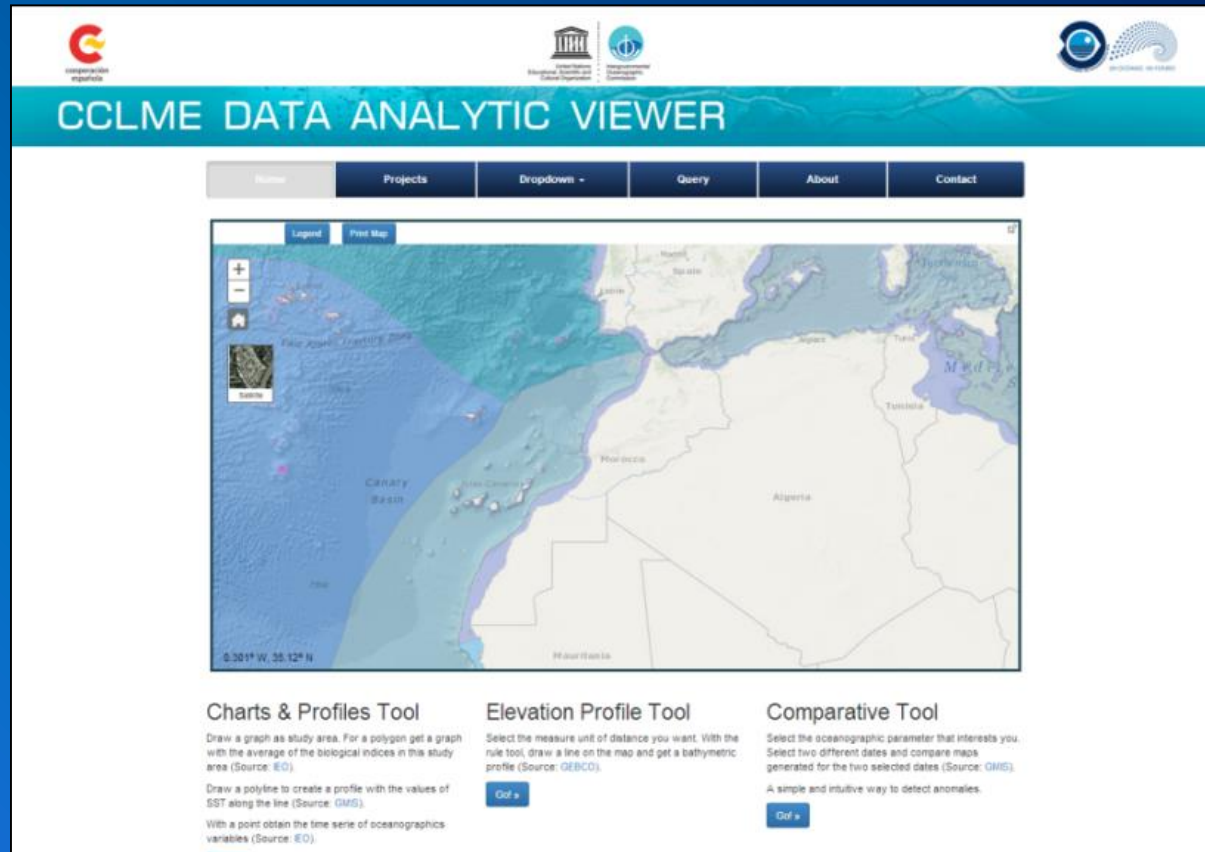


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1. Rapid prototyping

Prototype of a CCLME Data Analytic Viewer (bonus 1st phase)



Developed to **test the feasibility** of the initiative:

- > to use **most recent advances in GIS geo-technology** and
- > to develop a **dynamic application** tailored to do concrete analysis and **to produce new scientific knowledge**

2. Seeking for expert guidance on the contents, needs and resources (1st Workshop, Praia CV)

Workshop on the “Data availability and application needs for a CCLME Eco-GIS viewer” held in Praia, Cabo Verde (3-5 November 2015)



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WS Cabo Verde (Praia, 3-5 November 2016)



| Activity (identified at the workshop) | Priority <i>High-medium-low</i> | Geographic Scope | Feasibility Yes/No/Maybe, it is necessary to study it | Scale | Representation | Comments |
|---|------------------------------------|---|--|-----------|--|--|
| Upwelling Index Tool (based on wind and pressure data) | High | CCLME-Country Disaggregated by regions | Yes | | XY Graphs, Map with isolines, Profiles | |
| Juvenile Ratio (using samples from IEO surveys) to detect potential nursery areas | High | Disaggregated by regions | Maybe | | Map | To be further evaluated. It depends on countries engagement |
| Anomalies detection over different oceanographic parameters | High | CCLME Region | Yes | | XY Graphs, Maps | |
| Spatial-temporal dynamic models | Medium | CCLME Region | Maybe, it is necessary to study it | | Map | |
| Delimit special areas (Hot spot special sensibility) | Low | CCLME Region | | | Map | |
| Time series interface for Correlation | Medium | CCLME Region | Maybe, it is necessary to study it | | | Based on IGMETS experience and methods |
| Buffer tool/Clip tool | Medium | CCLME Region | Yes | | Graphic | |
| Bathymetric transects | | | | Mesoscale | XY Graph | Already available |
| Oceanographic transects | High | Disaggregated by regions | Yes | | XY Graph | Only one interface Depth/Surface. Put a button to select another depth |
| User interface to generate biological Index | High | CCLME Region | Yes | | Map | Dynamic legends (necessary study) |
| Drag and Drop facilities | High | CCLME Region | | | | For temporary visualization of user GIS data |
| Interpolation functions | Medium | CCLME Region | Maybe, it is necessary to study it | | Map | |
| Metadata manager interface (ORCID) | High | CCLME Region | | | | Data policy, validation, workflow, share |
| Upload map result | High | CCLME Region | | | | |

Analytic models

Development tools

Data management

3. Review by corporate “labs/orgs” (FAO)

**Joint meeting between FAO and IOC-UNESCO on a CCLME
ECO-GIS VIEWER: *Needs, Experiences, Options, and
Opportunities***

June 28-30, 2016, Rome, Italy

Organized by FAO and the IOC-UNESCO

Hosted by FAO



FAO meeting 28-30 June 2016

| Activity (identified at the workshop) | Priority | Geographic Scope | Feasibility | Scale | Representation | Comments | Current status |
|---|-----------------|--------------------------|---|-----------|--|--|-------------------------------|
| | High-medium-low | CCLME-Country | Yes/No/Maybe, it is necessary to study it | | XY Graphs, Map with isolines, Profiles | | |
| Upwelling Index Tool (based on wind and pressure data) | High | Disaggregated by regions | Yes | | XY Graphs, Map with isolines | | On track |
| Juvenile Ratio (using samples from IEO surveys) to detect potential nursery areas | High | Disaggregated by regions | Maybe | | Map | To be further evaluated. It depends on countries engagement | Facing important difficulties |
| Anomalies detection over different oceanographic parameters | High | CCLME Region | Yes | | XY Graphs, Maps | | On track |
| Spatial-temporal dynamic models | Medium | CCLME Region | Maybe, it is necessary to study it | | Map | | Facing some difficulties |
| Delimit special areas (Hot spot special sensibility) | Low | CCLME Region | | | Map | | Not to be developed |
| Time series interface for Correlation | Medium | CCLME Region | Maybe, it is necessary to study it | | | Based on IGMETS experience and methods | Facing some difficulties |
| Buffer tool/Clip tool | Medium | CCLME Region | Yes | | Graphic | | On track |
| Bathymetric transects | | | | Mesoscale | XY Graph | Already available | On track |
| Oceanographic transects | High | Disaggregated by regions | Yes | | XY Graph | Only one interface Depth/Surface. Put a button to select another depth | On track |
| User interface to generate biological Index | High | CCLME Region | Yes | | Map | Dynamic legends (necessary study) | Facing some difficulties |
| Drag and Drop facilities | High | CCLME Region | | | | For temporary visualization of user GIS data | On track |
| Interpolation functions | Medium | CCLME Region | Maybe, it is necessary to study it | | Map | | On track |
| Metadata manager interface (ORCID) | High | CCLME Region | | | | Data policy, validation, workflow, share | Not to be developed |
| Upload map result | High | CCLME Region | | | | | |

Analytic models



On track

Development tools



Facing some difficulties




Not to be developed

Data management



Facing important difficulties

4. Case studies for internal validation and checklist for corrections




CASE STUDY:
The Canary Current Large Marine Ecosystem Upwelling Index and complementary analysis and data by using the IOC application CCLME Data Analytic Viewer & Check list

Belén DÍEZ-GONZÁLEZ
Consultant
Intergovernmental Oceanographic Commission of UNESCO

Project developed in partnership with the Instituto Español de Oceanografía (IEO)

With the support of the Spanish Agency for International Development Cooperation (AECID)





CASE STUDY:
Representation and Analysis of Benthic Biodiversity data in the Canary Current Large Marine Ecosystem using the IOC application CCLME Data Analytic Viewer

Luis Miguel AGUDO BRAVO
Consultant
Intergovernmental Oceanographic Commission of UNESCO

Project developed in partnership with the Spanish Institute of Oceanography (IEO)

With the support of the Spanish Agency for International Development Cooperation (AECID)



Spatiotemporal data viewer

The tool was used to consult sampling stations and extract temperature data, represented as temperature-depth profiles for each station selected. Data are extracted from the World Ocean Database (WOD – Boyer et al., 2013). <https://www.cgd.ucar.edu/cas/catalog/surface/wod.html> (accessed 19 December 2018).

Under: °C.

Oceanographic research

The application uses a 11-year series (2009-2010) of monthly mean SST available at the EU Environmental Marine Information System - EMIS <http://marine.basins.europa.eu/emis/> (accessed 20 December 2018).

Under: °C.

RESULTS

In Benazzou et al. (2014), the area was divided in 5 regions, called: Portugal, North Morocco, Central Morocco, South Morocco, and Senegal-Mauritania. In Fig. 1 the reference points preselected by the IOC and corresponding to these areas are surrounded. Their coordinates are shown in Table 1, as well as their equivalence in the area in Benazzou et al. (2014). The 3 points indicated for the Senegal/Mauritania area were considered as they were created by the IOC specifically for this project.

It must be pointed out that Benazzou et al. (2014) publication zooms on Canary Current Upwelling System which extends from the Iberian Peninsula (43°N) to the South of Senegal (3°N).







Figure 1. Upwelling index reference points used in this study are surrounded by a pink circle. The upwelling index in the orange points is calculated using PAROS2 sensor (U_{PAROS2}), while the upwelling index in the green points uses MeteoGalicia data. From the North to the South, the reference points surrounded by circles correspond to: Figure de Pto. Cavallero, Canarias; Mauritania, Deser and Guinea; Map extracted from the CCLME Data Analytic Viewer: Data Source: IOC.



Automatically below the map, a graph with the biological index (if this info is available) is added. The user can do new selections and a new graph will added below the map, in this way it's possible to compare the results of each consult. For example is possible the comparison of two different survey at same time.

When the user click over one entity a popup is displayed.



Click over the arrow button  to show the metadata information of the selected sample.

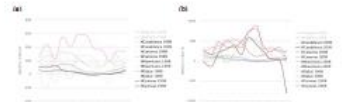


Figure 4. Comparison of the U_{PAROS2} (in $m^2 s^{-1} km^2$) in the 4 points in NW Africa during: (A) 1989-1992 (B) 2009-2008. Extracted from the CCLME Data Analytic viewer: Data source: IOC.

High upwelling index indicates a high flux of water upwelled to the coast using the surface water volume covered by the wind, indicating the presence of high productive areas with high chlorophyll concentrations, provoked by the upwelling of cold deep waters, which are rich in nutrients.

In addition to this, Figure 5(a) shows the SST for May while Figure 5(b) shows the SST for August 2008. In Fig. 5(a) it can be appreciated that the cold waters of the upwelling are present in the coast of Mauritania and northwards at that moment, which corresponds to spring. This is coherent with the high upwelling index obtained for Mauritania reference point in Fig. 4(b), for May 2008, and it could confirm the general behaviour of the upwelling in Mauritania area in spring, observed in Figures 1 and 2.

In Fig. 5(b), the cold waters are only present in Morocco-Western Sahara coasts at that moment, which is summer (August 2008). It is coherent with the low upwelling index obtained for Mauritania reference point in Figure 4(b) for the same month as well as with general behaviour observed in Fig. 3, Fig. 4 and Fig. 5, confirming the spatiotemporal variability described by Benazzou et al. (2014).

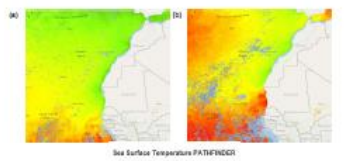


Figure 5. SST (in °C) in: (a) May 2008, and (b) August 2008. Maps extracted from the CCLME Data Analytic Viewer: Data source: NOAA AVHRR.

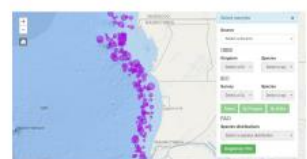


Figure 6. Detail of Mauritania area. Purple points - *Ophiroides Bonasus* (kilograms by 0.1 km^2) (source: GOSIAH database). To render this layer was used proportional symbol representation.






Figure 7. Detail of Morocco area. Purple points - *Ophiroides Bonasus* (kilograms by 0.1 km^2) (source: GOSIAH database). To render this layer was used graduated symbols representation using five different classes.



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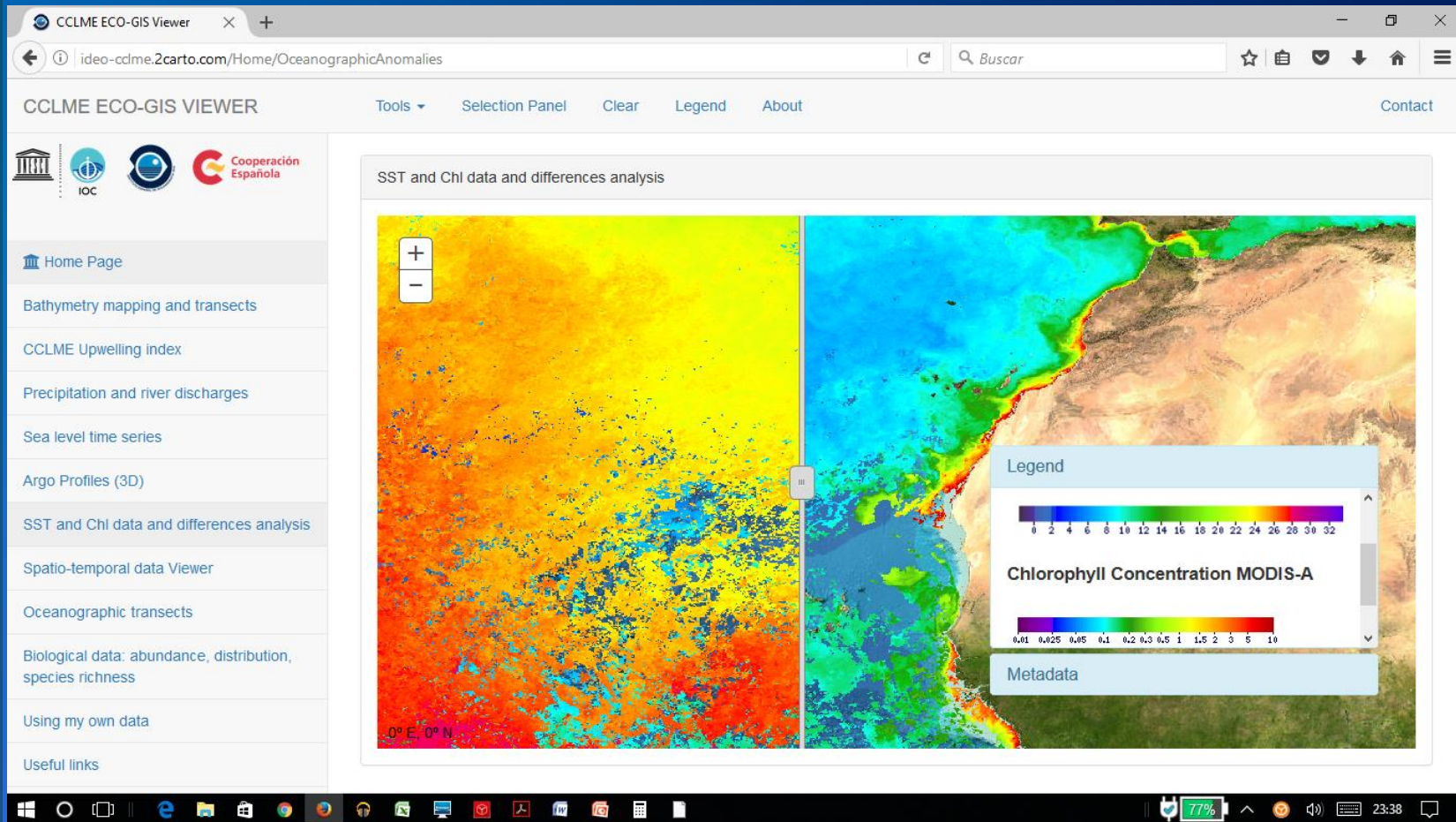


radiación

Checklist (Dec 2016)



5. Getting the product into the hands of interested users (2nd Workshop, Tenerife Sp, July 2017)



5. Getting the product into the hands of interested users (2nd Workshop, Tenerife Sp, July 2017)

I would like to encourage all the participants to be active in this workshop. During the next three days we will have the opportunity to exchange experiences, share new ideas, identify synergies, and build new bridges, and I hope that the result of the discussions will be successful and the conclusions fruitful

And please use the application and help us to disseminate it in your countries!

Thank you very much for your help and support!



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