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# Technical description of the CCLME Eco-GIS Viewer; geoprocessing development on the web application

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

11-13 July 2017

# ABOUT ME

IOC/UNESCO Consultant



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JRC/CE Consultant



2Carto



WHERE PROJECTS TAKE PLACE

IEO GIS Technical



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- Deliver a product that can be integrated in regular national, regional and global regular assessments of the status, trends and key drivers of marine and coastal ecosystems
- Expected result: Deliver a dynamic GIS tool to **explore, analyse** and **compare data** with the aim to produce new scientific knowledge

Easy

Fast

Fun

Web Apps

Simple

Smart

Freemium



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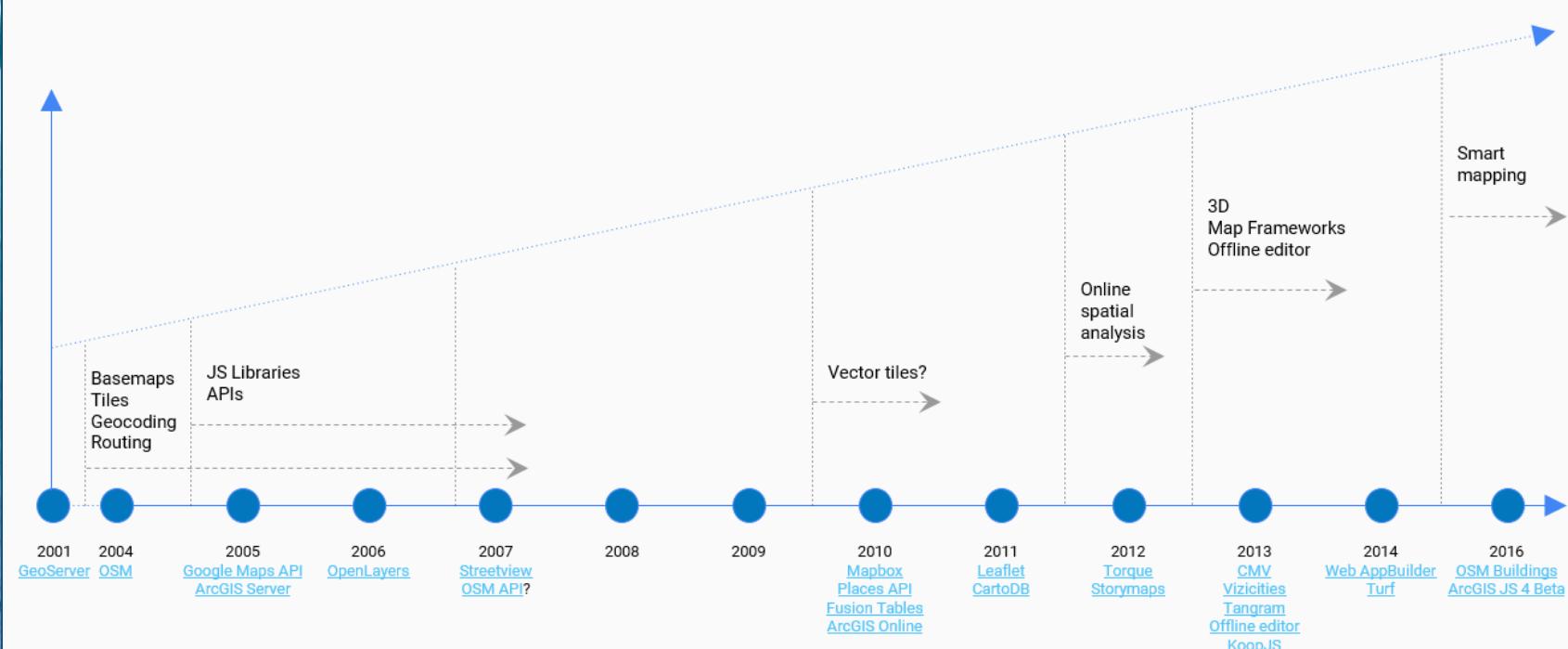


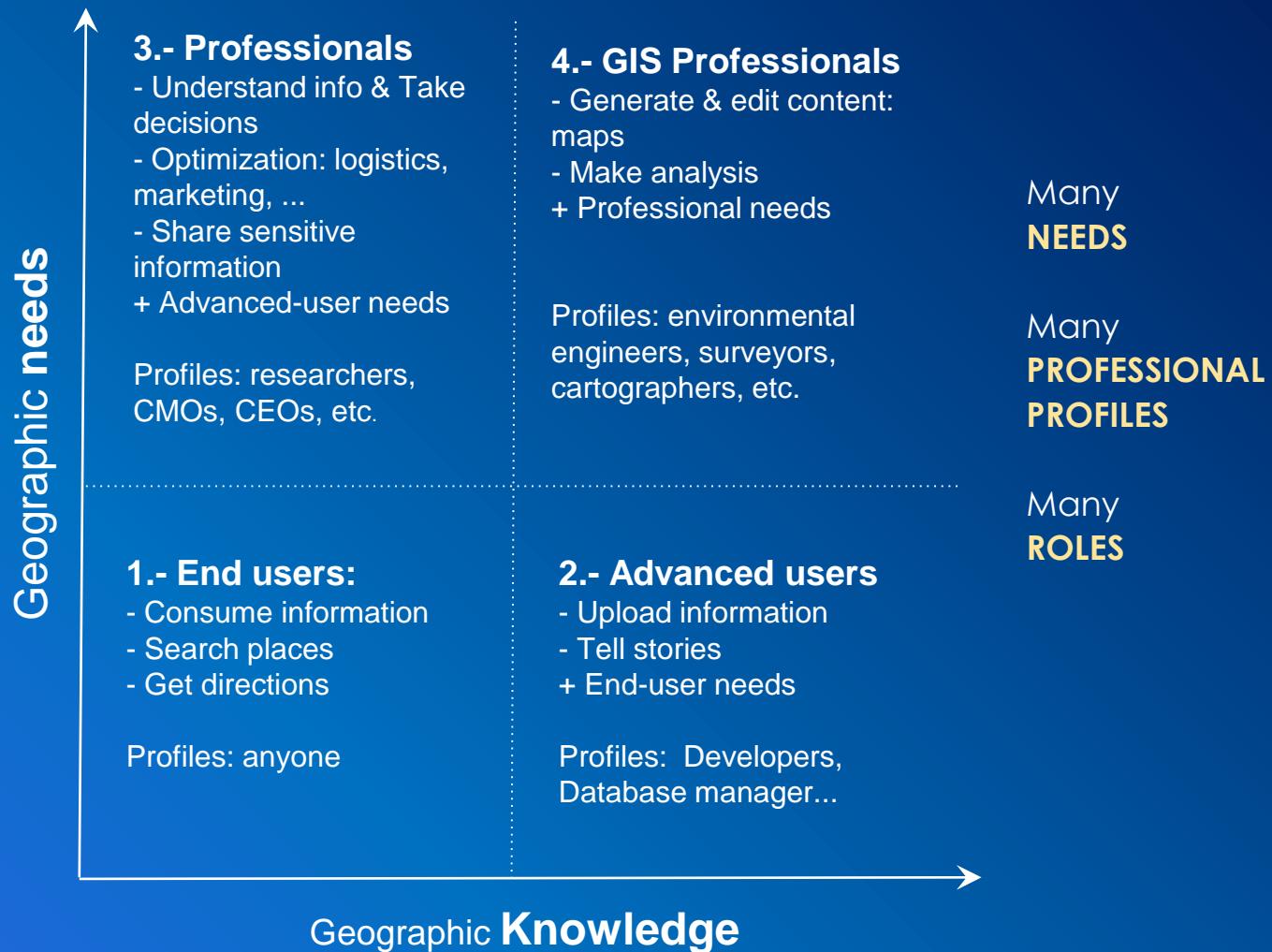
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# Web mapping: The history





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# Front End and Back End

## Web Development Comparison: What's the difference?



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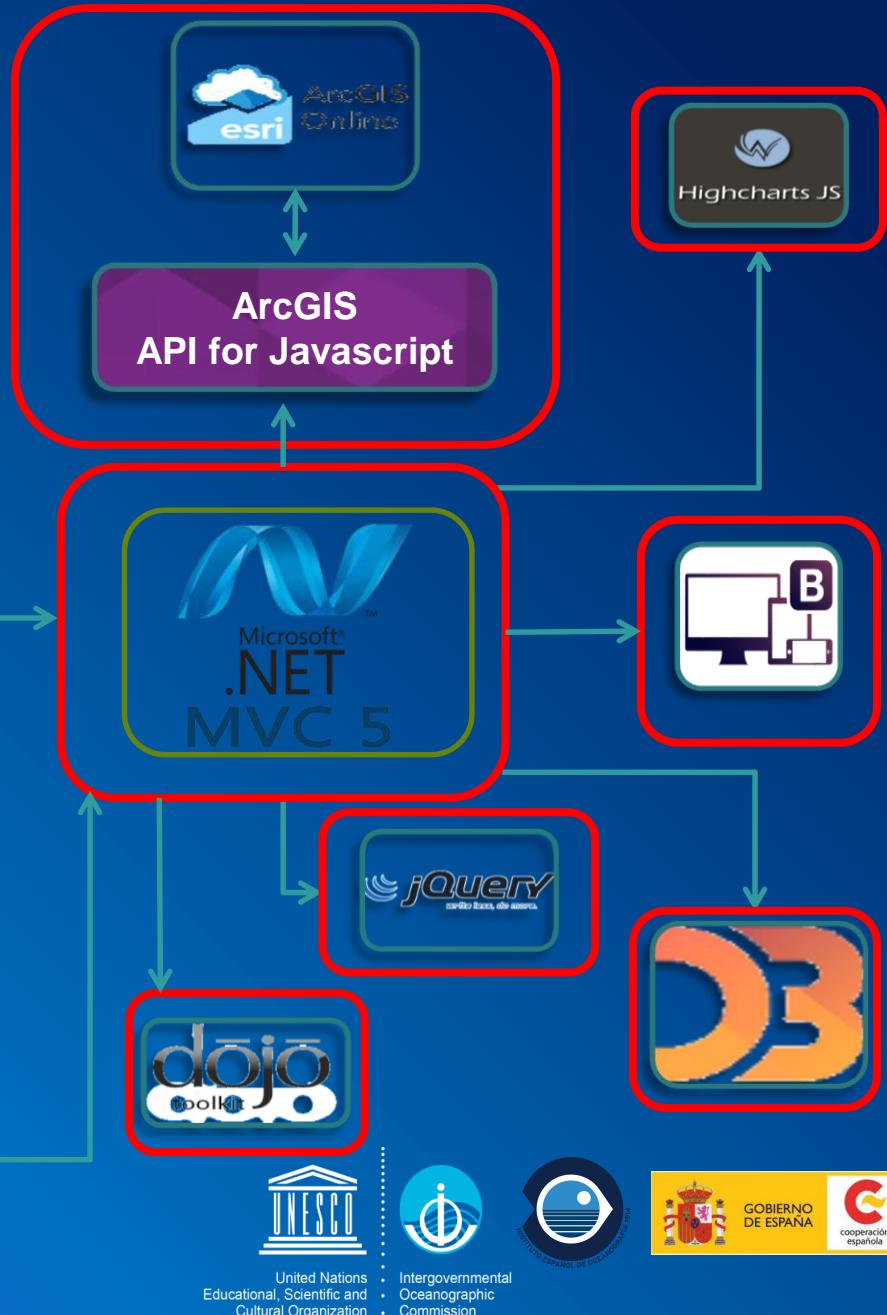


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# SERVER SIDE



# CLIENT SIDE

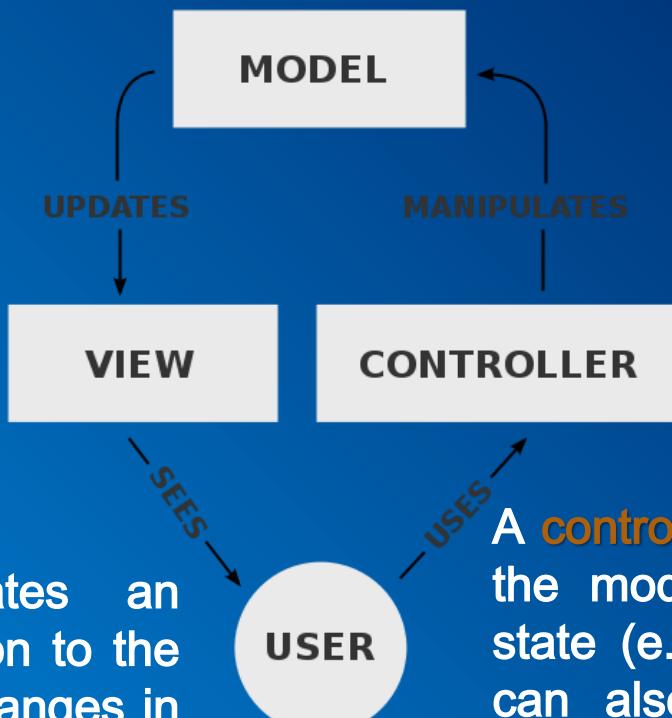


**Model–view–controller (MVC)** is a software architectural pattern for implementing user interfaces. It divides a given software application into three interconnected parts, so as to separate internal representations of information from the ways that information is presented to or accepted from the user

<https://github.com/lvasquez/sb-admin-2-bootstrap-template-asp-mvc>



A **model** stores data that is retrieved according to commands from the controller and displayed in the view.



A **view** generates an output presentation to the user based on changes in the model.

A **controller** can send commands to the model to update the model's state (e.g., editing a document). It can also send commands to its associated view to change the view's presentation of the model.



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## NODE.JS SERVICES

**Node.js® is a JavaScript runtime built on Chrome's V8 JavaScript engine. It's a server framework.**

**Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient.**

**Node.js' package ecosystem, npm, is the largest ecosystem of open source libraries in the world.**



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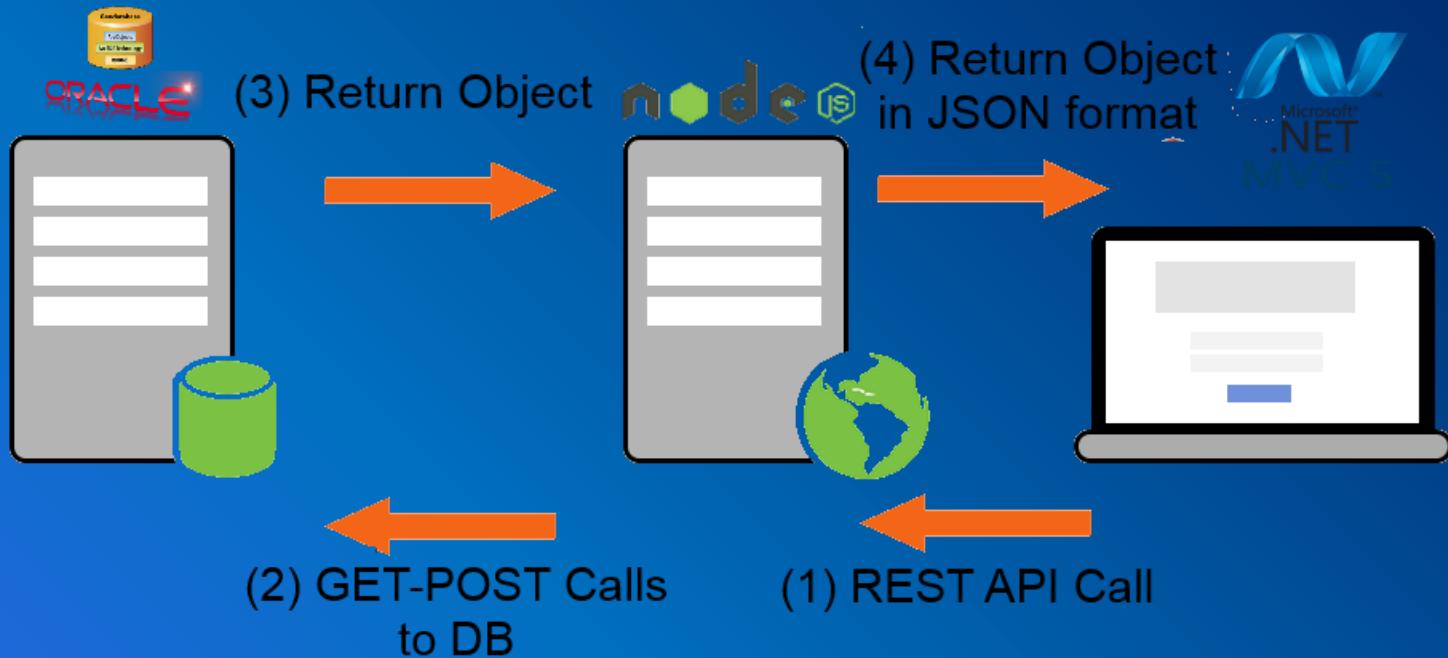


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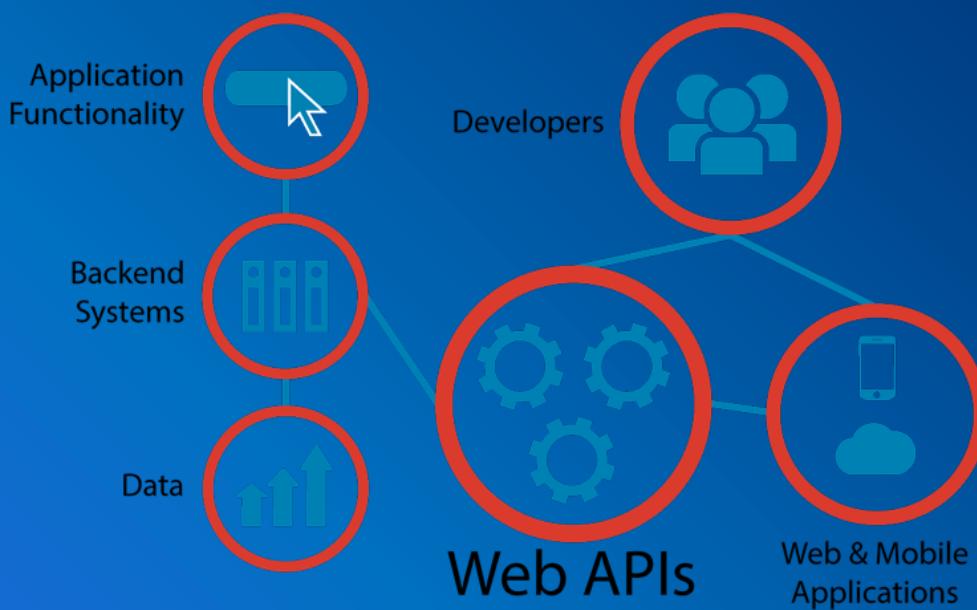
# NODE & MVC5 .NET – Model View Controller (MVC)





# API RESTful SERVICES

An **API** (Application program interface) for a website is code that allows two software programs to communicate with each other



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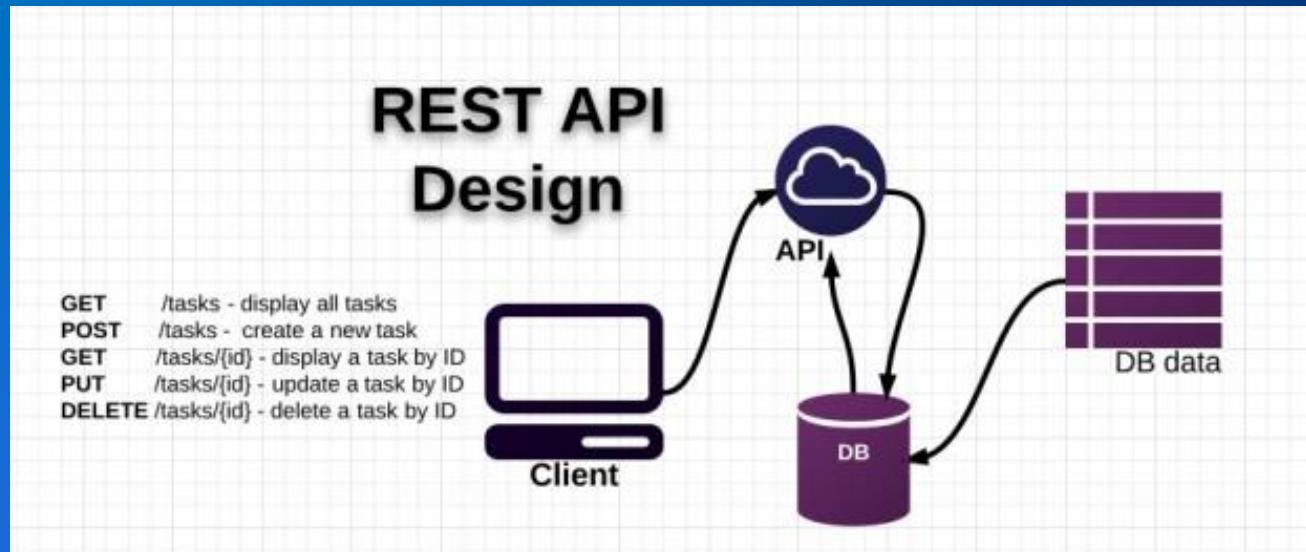




# API RESTful SERVICES

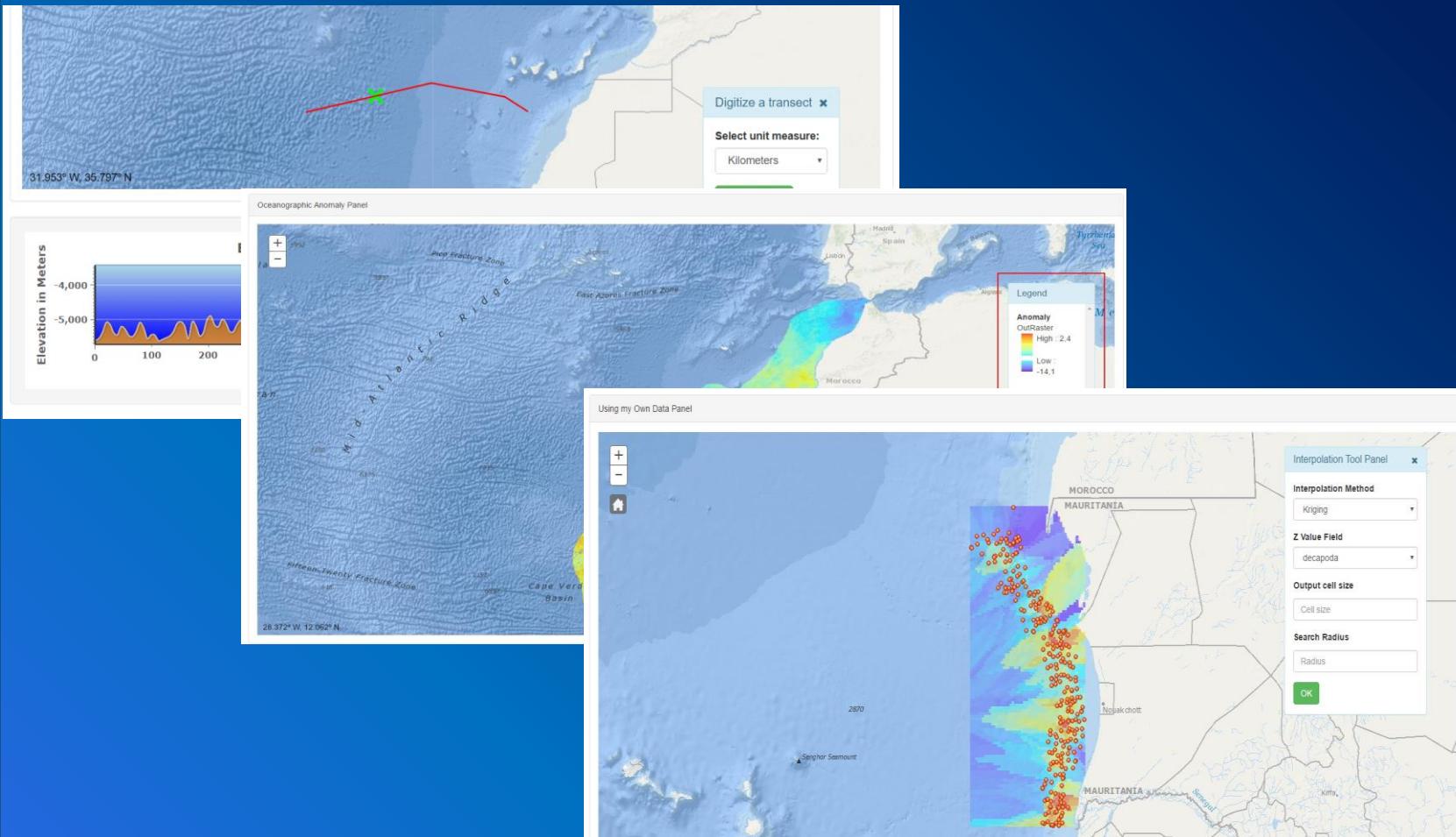
**Representational state transfer (REST)** or **RESTful** web services is a way of providing interoperability between computer systems on the Internet. REST-compliant Web services allow requesting systems to access and manipulate textual representations of Web resources using a uniform and predefined set of stateless operations

REST is a logical choice for building APIs that allow users to connect and interact with cloud services.





# API RESTful SERVICES



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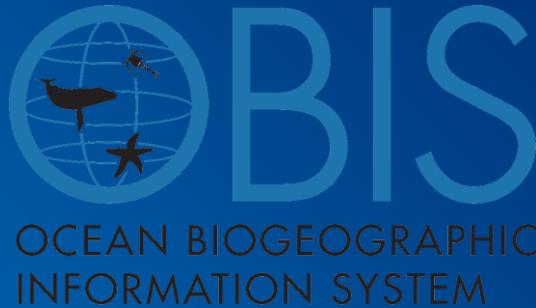


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# API RESTful SERVICES



<http://www.iobis.org/manual/api/>

## Occurrence

URL	Description	Parameters	Example
/occurrence/{id}	Get single occurrence		
/occurrence	Find occurrences	scientificname, obisid, aphiaid, resourceid, areaid, year, startdate, enddate, groupid, startdepth, enddepth, geometry, qc, fields, offset, limit	<a href="http://api.iobis.org/occurrence?year=2005&amp;scientificname=Cetacea&amp;limit=100">http://api.iobis.org/occurrence?year=2005&amp;scientificname=Cetacea&amp;limit=100</a> <a href="http://api.iobis.org/occurrence?&amp;scientificname=Abra,Lanice,Pectinaria&amp;year=2005,2006">http://api.iobis.org/occurrence?&amp;scientificname=Abra,Lanice,Pectinaria&amp;year=2005,2006</a>

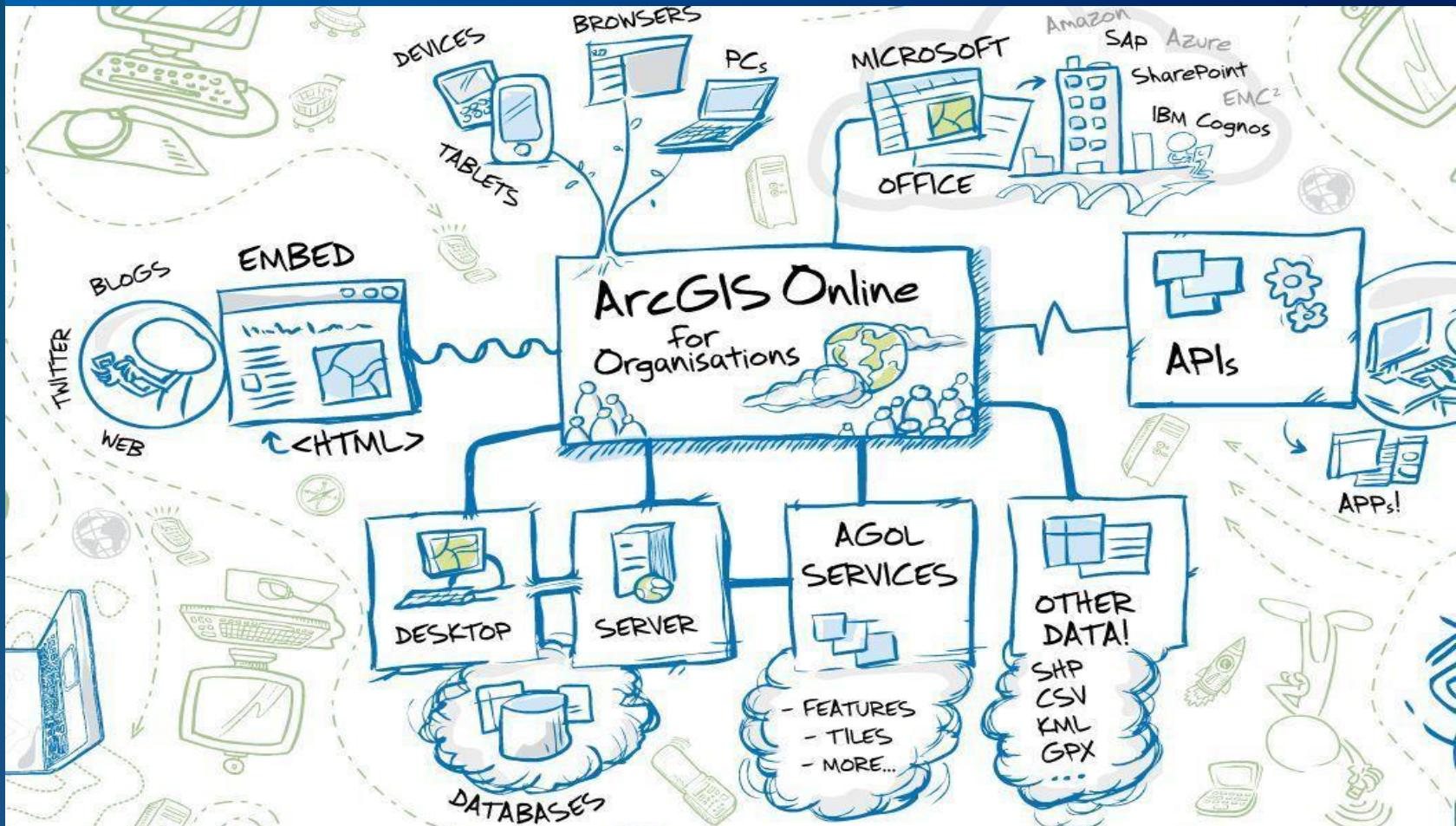


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ArcGIS Server is the primary platform to create, manage, and distribute maps and capabilities. An ArcGIS application asks what it need, through a rest service.

We can use the software ArcGIS for Desktop when publishing web services to ArcGIS for Server. We can author maps, geoprocessing models, mosaic datasets, and other GIS resources in ArcGIS for Desktop and use a simple wizard to share them as RESTful web services.

ArcGIS REST Services Directory

Home > services > UNESCO

Login | Get Token

Help | API Reference

JSON | SOAP

**Folder: UNESCO**

Current Version: 10.31

View Footprints In: [ArcGIS Online map viewer](#)

Services:

- [UNESCO/Argo\\_Trajectory](#) (MapServer)
- [UNESCO/CCLME\\_Region](#) (MapServer)
- [UNESCO/CTD\\_NOAA\\_Layers](#) (MapServer)
- [UNESCO/DifferenceRaster2](#) (GPServer)
- [UNESCO/DifferenceRaster2](#) (MapServer)
- [UNESCO/DifferenceRaster3](#) (GPServer)
- [UNESCO/DifferenceRaster3](#) (MapServer)
- [UNESCO/DifferenceRaster](#) (GPServer)
- [UNESCO/DifferenceRaster](#) (MapServer)
- [UNESCO/DRB\\_NOAA\\_Layers](#) (MapServer)
- [UNESCO/ExtractDataTask2](#) (GPServer)
- [UNESCO/ExtractDataTask](#) (GPServer)



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If you put the url into the browser, you can see the service documentation. When the javascript api call this url, it add additional parameters .

<http://barretosm.md.ieo.es/arcgis/rest/services/UNESCO/RivDisStations/MapServer>

ArcGIS REST Services Directory      Login | Get Token

Home > services > UNESCO > RivDisStations (MapServer)      Help | API Reference

[JSON](#) | [SOAP](#)

### UNESCO/RivDisStations (MapServer)

**View In:** [ArcGIS JavaScript](#) [ArcGIS Online map viewer](#) [Google Earth](#) [ArcMap](#) [ArcGIS Explorer](#)

**View Footprint In:** [ArcGIS Online map viewer](#)

**Service Description:** River Discharge Stations

**Map Name:** Layers

[Legend](#)

[All Layers and Tables](#)

**Layers:**

- [River\\_Discharges\\_Stations \(0\)](#)

**Description:**

**Copyright Text:** River Discharge, CCLME, UNESCO

**Spatial Reference:** 102100 (3857)

[http://barretosm.md.ieo.es/arcgis/rest/services/UNESCO/RivDisStations/MapServer?f=json&dpi=96&transparent=true&format=png8&callback=dojo.io.script.jsonp\\_dojol%20oScript6.\\_jsonpCallback%20HTTP/1.1](http://barretosm.md.ieo.es/arcgis/rest/services/UNESCO/RivDisStations/MapServer?f=json&dpi=96&transparent=true&format=png8&callback=dojo.io.script.jsonp_dojol%20oScript6._jsonpCallback%20HTTP/1.1)



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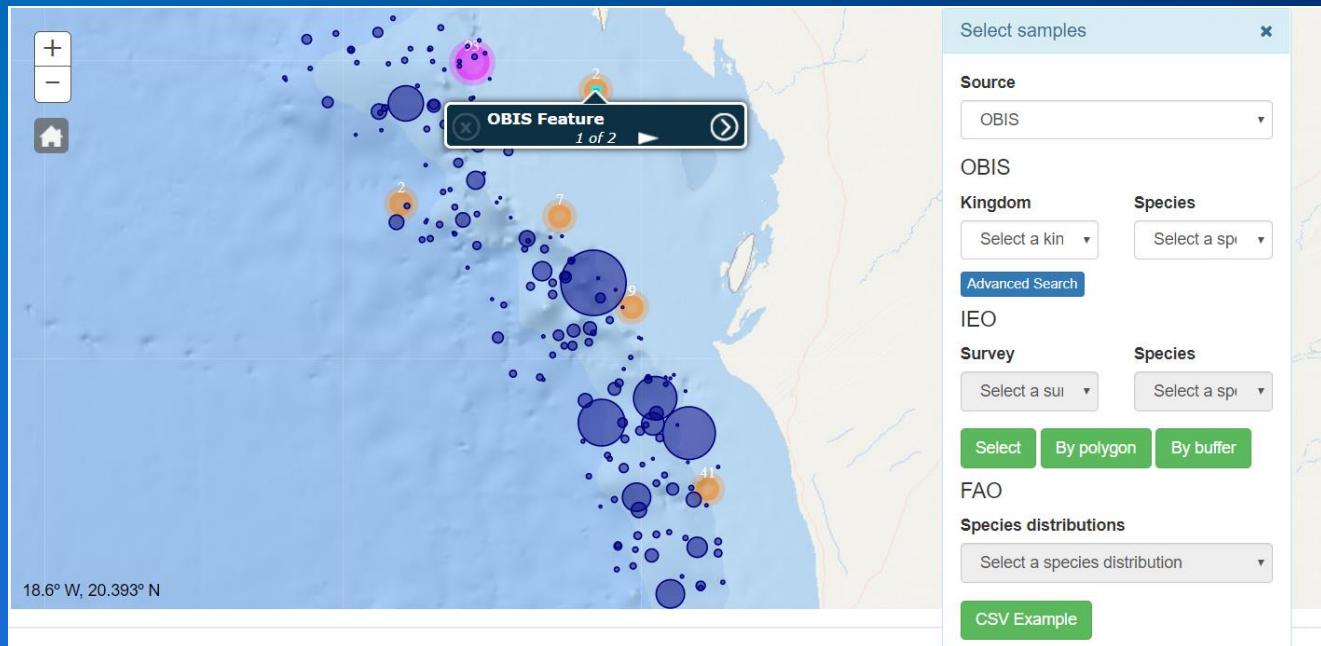




# API for Javascript

ArcGIS API for JavaScript is a browser based api for developing highperformance mapping applications and the api allows you to easily embed maps in your web pages. An ArcGIS application utilizes a layer-based geographic information model for characterizing and describing our world.

<https://developers.arcgis.com/javascript/3/>





# dojo Javascript libraries

## jQuery & Dojo:

Are an open source modular JavaScript libraries designed to ease the rapid development of cross-platform, JavaScript/Ajax-based applications and web sites



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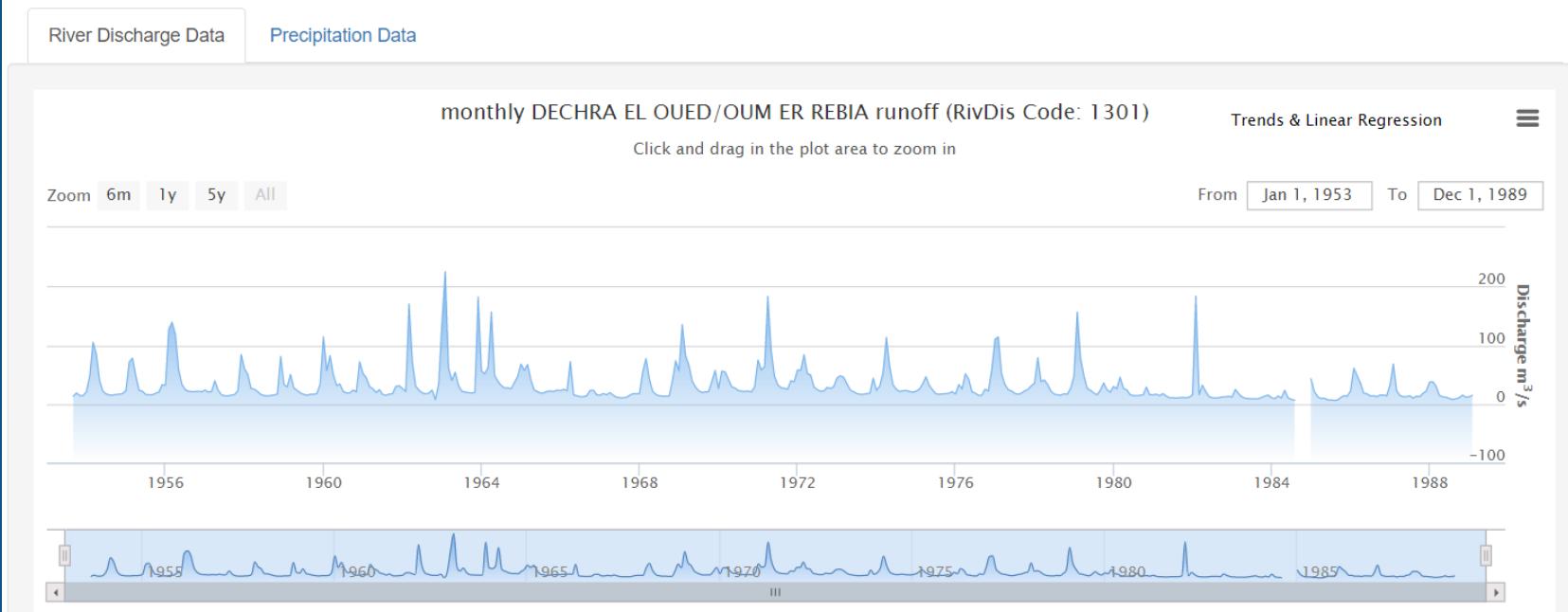
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# Javascript libraries

HIGHCHARTS

```
$(function () {
    Highcharts.chart('graphicRiverDischargeAnom', {
        chart: {
            zoomType: 'x'
        },
        title: {
            text: 'monthly DECHRA EL OUED/OUM ER REBIA runoff (RivDis Code: 1301)'
        },
        subtitle: {
            text: 'Click and drag in the plot area to zoom in'
        },
        x-axis: {
            type: 'datetime'
        },
        y-axis: {
            title: {
                text: 'Anomaly Discharge m3/s'
            }
        },
        legend: {
            items: [
                {
                    name: 'River Discharge Data',
                    checked: true
                },
                {
                    name: 'Precipitation Data',
                    checked: false
                }
            ]
        },
        series: [
            {
                name: 'River Discharge Data',
                data: [...]
            }
        ]
    });
});
```



```
yAxis: {
    title: {
        text: '<b>Anomaly Discharge m<sup>3</sup>/s</b>',
        useHTML: true,
    }
},
```



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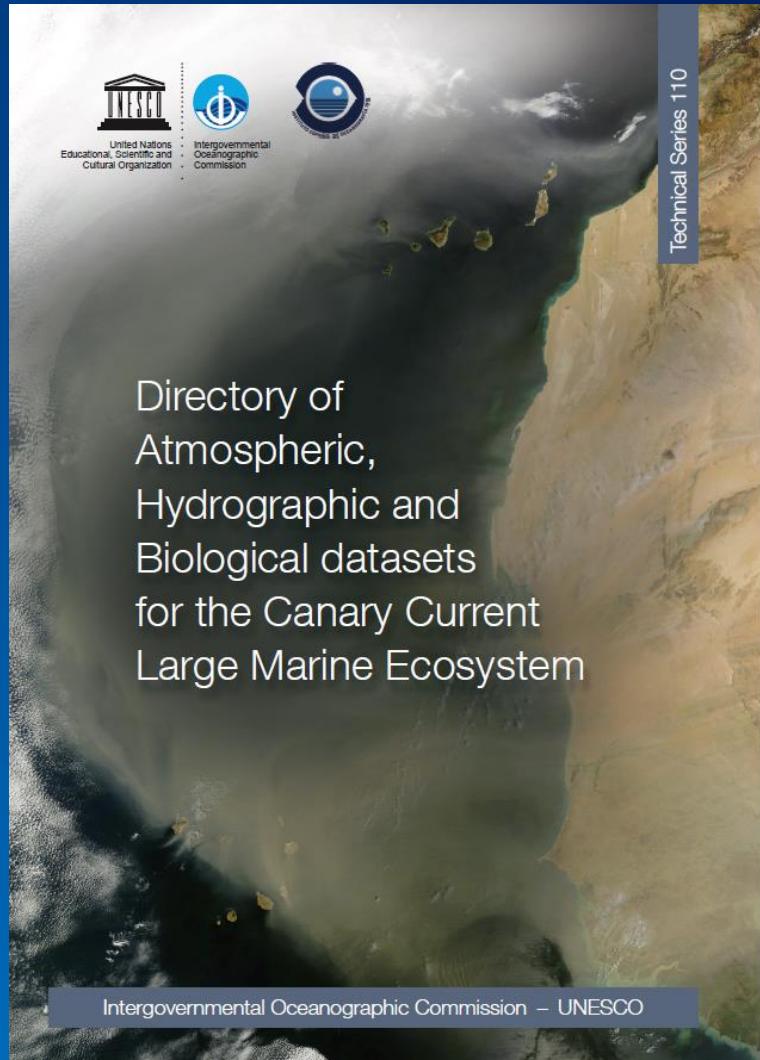
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# DATA SOURCES

**Available online (pdf format) on an annual basis** in 2016 and 2017 at:

[http://www.unesco.org/  
new/ioc\\_ts110](http://www.unesco.org/new/ioc_ts110)



# DATA SOURCES



SIRENO



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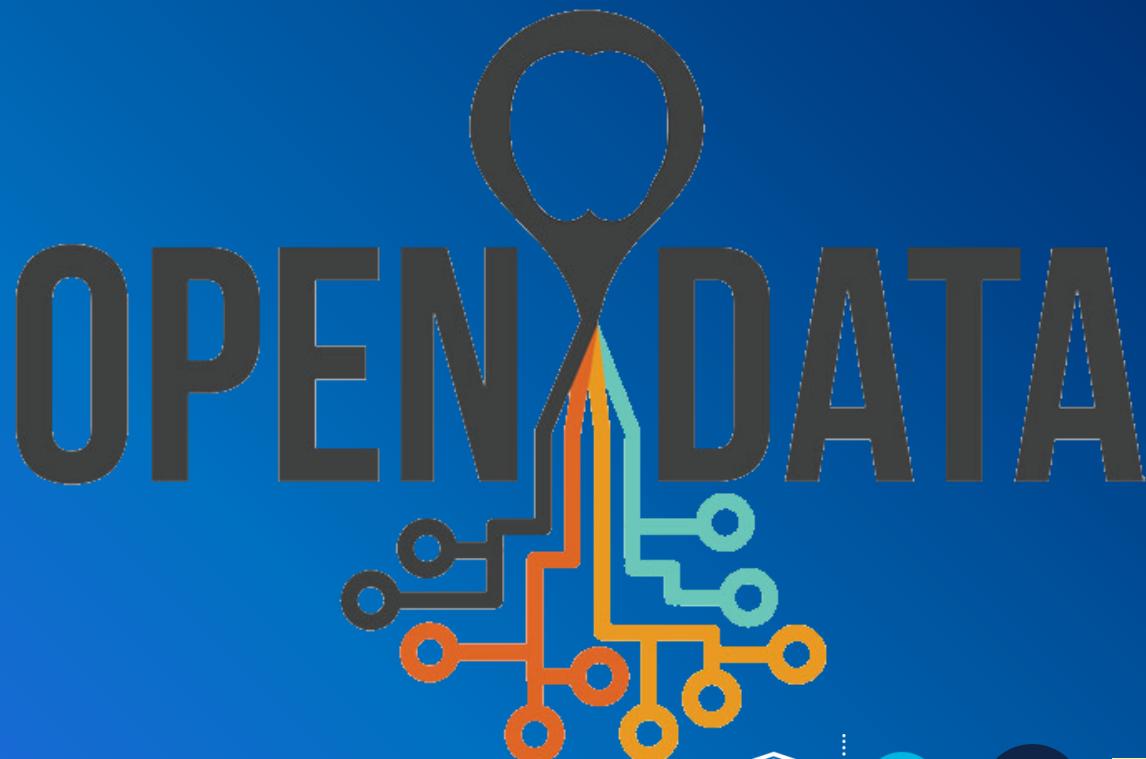


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# DATA SOURCES

Use open source data available from different webs and APIs.



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# DATA SOURCES

Two problems:

- Formats Available
- Cross-origin resource sharing (CORS) Domain:** is a mechanism that allows restricted resources (e.g. fonts) on a web page to be requested from another domain outside the domain from which the first resource was served. **PROXY File**



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# DATA SOURCES

Formats available:

- WMS
- ESRI Maps Services
- Get Ajax Call, txt format
- Embed website using iframe



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# Web Map Service (WMS)

A Web map service (WMS) is a standard protocol that describes how to serve any georeferenced map images over the Internet, which is usually generated by a map server that uses data from a geographic information system database. The protocol standard was developed by the Open Geospatial Consortium (OGC) and first published in 1999. WMS provides a simple way of requesting geo-registered map images using an HTTP interface.

**<http://emis.jrc.ec.europa.eu/webservices/4km/wms/modist/?DATASET=sst&SERVICE=WMS&VERSION=1.3.0&REQUEST=GetCapabilities>**



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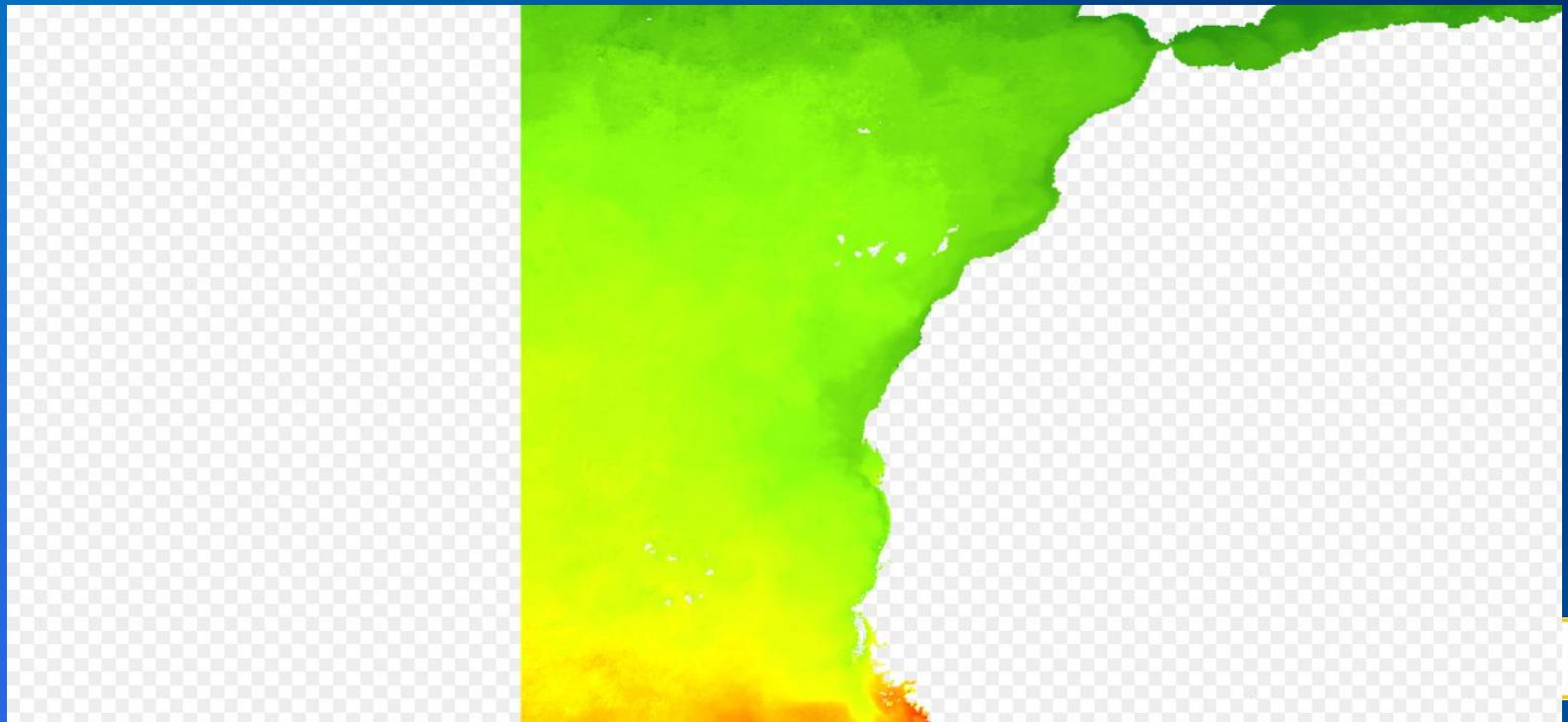
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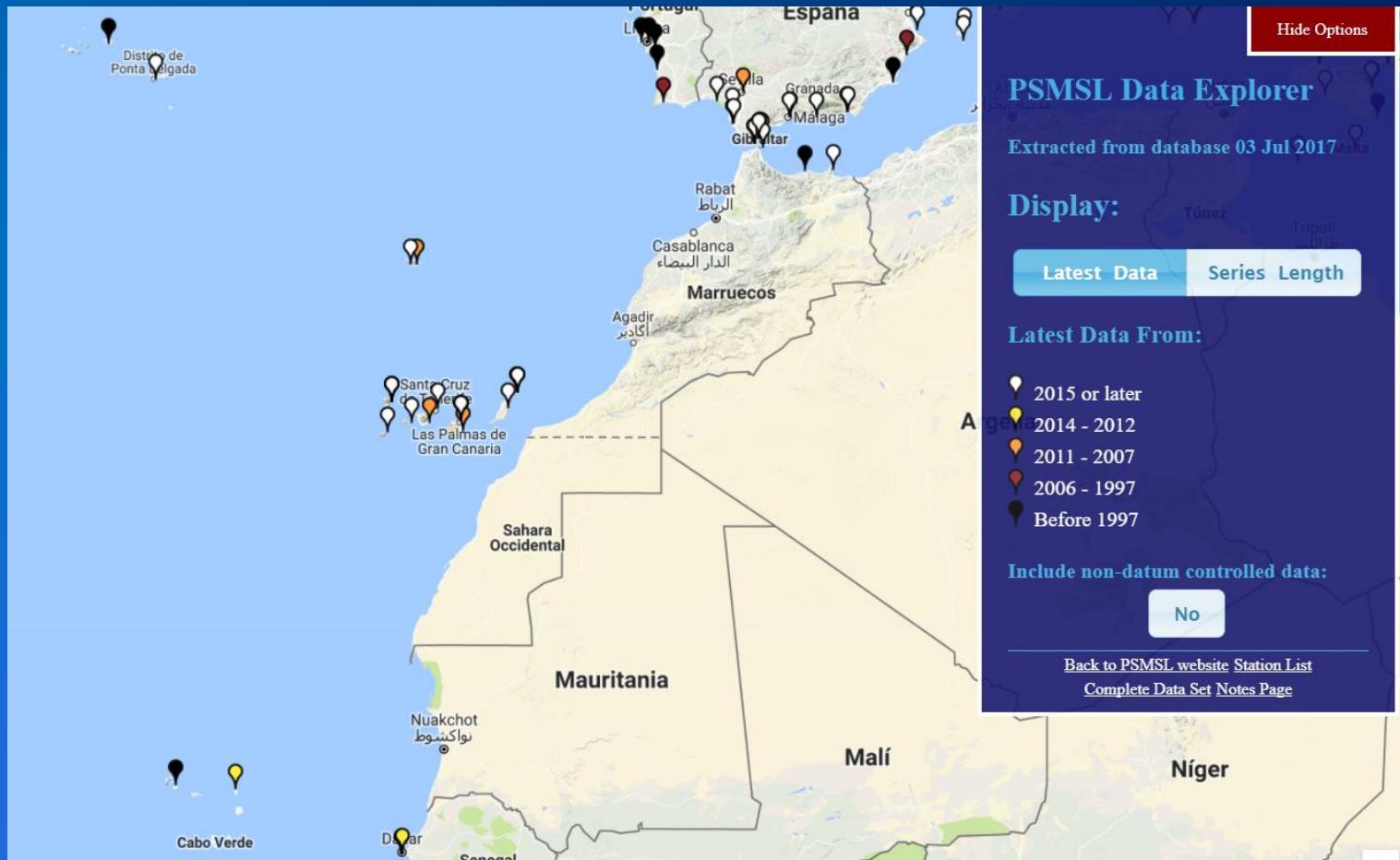
# Web Map Service (WMS)

[http://gmis.jrc.ec.europa.eu/cgi-bin/mapserv?map=/srv/www/htdocs/wms/wms\\_4km\\_pathfinder-sst.map&SERVICE=WMS&REQUEST=GetMap&FORMAT=image/png&TRANSPARENT=TRUE&STYLES=&VERSION=1.3.0&LAYERS=GMIS\\_P\\_SST\\_03\\_1999&WIDTH=1144&HEIGHT=564&CRS=EPSG:4326&BBOX=8.5,-49.4113475177305,37.5,9.411347517730498](http://gmis.jrc.ec.europa.eu/cgi-bin/mapserv?map=/srv/www/htdocs/wms/wms_4km_pathfinder-sst.map&SERVICE=WMS&REQUEST=GetMap&FORMAT=image/png&TRANSPARENT=TRUE&STYLES=&VERSION=1.3.0&LAYERS=GMIS_P_SST_03_1999&WIDTH=1144&HEIGHT=564&CRS=EPSG:4326&BBOX=8.5,-49.4113475177305,37.5,9.411347517730498)





<http://www.psmsl.org/data/obtaining/map.html>



SeaLevelStations - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

130.000.000 Editor

Table Of Contents

Layers

- C:\IEO\CCLE\CCLM
- Info\_Oceanograph
- Sea\_Level\_Sta

Table

Sea\_Level\_Stations

ID	Station	GLOSS ID	Name	Long	Lat	Supplier	Year Start	Year End	Count
	2024	250	FUNCHAL II	-17.117778	32.651111	INSTITUTO HIDROGRAFICO, LISBON	2003	2014	Portugal
	1030	250	FUNCHAL	-16.913067	32.644	INSTITUTO HIDROGRAFICO, LISBON	1963	2008	Portugal
	585	-9999	SANTA CRUZ DE LA PALMA	-17.75	28.683333	INSTITUTO ESPANOL DE OCEANOGRADIA	1949	1960	Spain
	2064	-9999	LA PALMA	-17.6795	28.6778	PUERTOS DEL ESTADO	2007	2015	Spain
	568	-9999	SANTA CRUZ DE LA PALMA B	-17.7687	28.672	INSTITUTO ESPANOL DE OCEANOGRADIA	1949	2016	Spain
	2051	-9999	HIERRO	-17.90163	27.784408	PUERTOS DEL ESTADO	2004	2015	Spain
	2065	-9999	LA GOMERA	-17.10831	28.08777	PUERTOS DEL ESTADO	2007	2015	Spain
	303	-9999	SANTA CRUZ DE TENERIFE I	-16.233333	28.483333	INSTITUTO GEOGRAFICO NACIONAL	1927	1990	Spain
	1803	-9999	TENERIFE	-16.233333	28.483333	PUERTOS DEL ESTADO	1992	2015	Spain
	2050	-9999	GRANADILLA	-16.48964	28.08528	PUERTOS DEL ESTADO	2003	2011	Spain
	590	251	LAS PALMAS, PUERTO DE LA LUZ	-15.416667	28.166667	INSTITUTO ESPANOL DE OCEANOGRADIA	1949	1955	Spain
	565	251	LAS PALMAS C (PUERTO DE LA LUZ)	-15.4075	28.1466	INSTITUTO ESPANOL DE OCEANOGRADIA	1949	2016	Spain

(0 out of 21 Selected)

Sea\_Level\_Stations



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# <http://barreto.md.ieo.es/arcgis/rest/services/UNESCO/SeaLevelStations/MapServer>

ArcGIS REST Services Directory [Login | Get Token](#)

[Home](#) > [services](#) > [UNESCO](#) > [SeaLevelStations \(MapServer\)](#) [Help](#) | [API Reference](#)

[JSON](#) | [SOAP](#)

## UNESCO/SeaLevelStations (MapServer)

**View In:** [ArcGIS JavaScript](#) [ArcGIS Online map viewer](#) [Google Earth](#) [ArcMap](#) [ArcGIS Explorer](#)

**View Footprint In:** [ArcGIS Online map viewer](#)

**Service Description:** Sea Level Stations. Source: <http://www.psmsl.org/>

**Map Name:** Layers

[Legend](#)

[All Layers and Tables](#)

**Layers:**

- [Sea\\_Level\\_Stations \(0\)](#)

**Description:**

**Copyright Text:** Sea Level, CCLME, UNESCO

**Spatial Reference:** 102100 (3857)

**Single Fused Map Cache:** false

**Initial Extent:**

```
XMin: -7619065.363437755  
YMin: 1172560.2390865013  
XMax: 3549019.4727319167  
YMax: 5657256.70847944  
Spatial Reference: 102100 (3857)
```

**Full Extent:**



<http://www.ideo-cclme.ieo.es/Home/TideGauge>

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[Home Page](#)

Bathymetry mapping and transects

CCLME Upwelling index

Precipitation and river discharges

Sea level time series

Argo Profiles (3D)

SST and Chi data and differences analysis

Spatio-temporal data Viewer

Oceanographic transects

Biological data: abundance, distribution, species richness

Using my own data

Useful links

Tide gauge time series

28.7° W, 34.84° N

Show / Hide Data   Insert

Tide Gauge Stations

Country	Name	Cod	Years
Portugal	FUNCHAL II	2024	2003-2014
Portugal	FUNCHAL	1030	1963-2008
Portugal	PORTO GRANDE (ST. VINCENT) 2	1769	1990-1995
Senegal	DAKAR	476	1942-1966
Spain	SANTA CRUZ DE LA PALMA	585	1949-1960
Spain	LA PALMA	2064	2007-2015
Spain	SANTA CRUZ DE LA PALMA B	568	1949-2016
Spain	HIERRO	2051	2004-2015

Showing 1 to 21 of 21 entries



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# Get Ajax Call, txt format

```
$.ajax({  
    url: "/discharges/getData2?datacode=" + stationCodeUrl + "_a.txt",  
    type: "GET",  
    dataType: 'text',  
    success: function (data) {  
        console.log(data);  
    }  
});
```



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# AJAX Get Ajax Call, txt format

```
# ./bin/plotdat anomalous ./data/r01301.dat
1953.6666 -2.93143
1953.7500 -0.599995E-01
1953.8334 -7.09429
1953.9166 -21.9029
1954.0000 -19.4389
1954.0834 -12.3945
1954.1666 52.6371
1954.2500 34.8486
1954.3334 9.36000
1954.4166 0.151430
1954.5000 -0.457134E-01
1954.5834 -0.400000
1954.6666 -1.23143
1954.7500 -2.66000
1954.8334 -4.69429
1954.9166 -18.5029
1955.0000 -17.3389
1955.0834 11.9055
1955.1666 25.5371
1955.2500 -2.45142
1955.3334 -6.84000
1955.4166 0.451431
1955.5000 -0.845713
1955.5834 -0.999994E-01
1955.6666 -1.03143
1955.7500 -0.360001
1955.8334 -1.19429
1955.9166 -3.70286
1956.0000 -8.03889
1956.0834 67.3055
1956.1666 86.6371
1956.2500 69.2486
1956.3334 28.2600
1956.4166 11.9514
1956.5000 7.25429
1956.5834 6.00000
1956.6666 4.66857
1956.7500 2.14000
1956.8333[...]
```

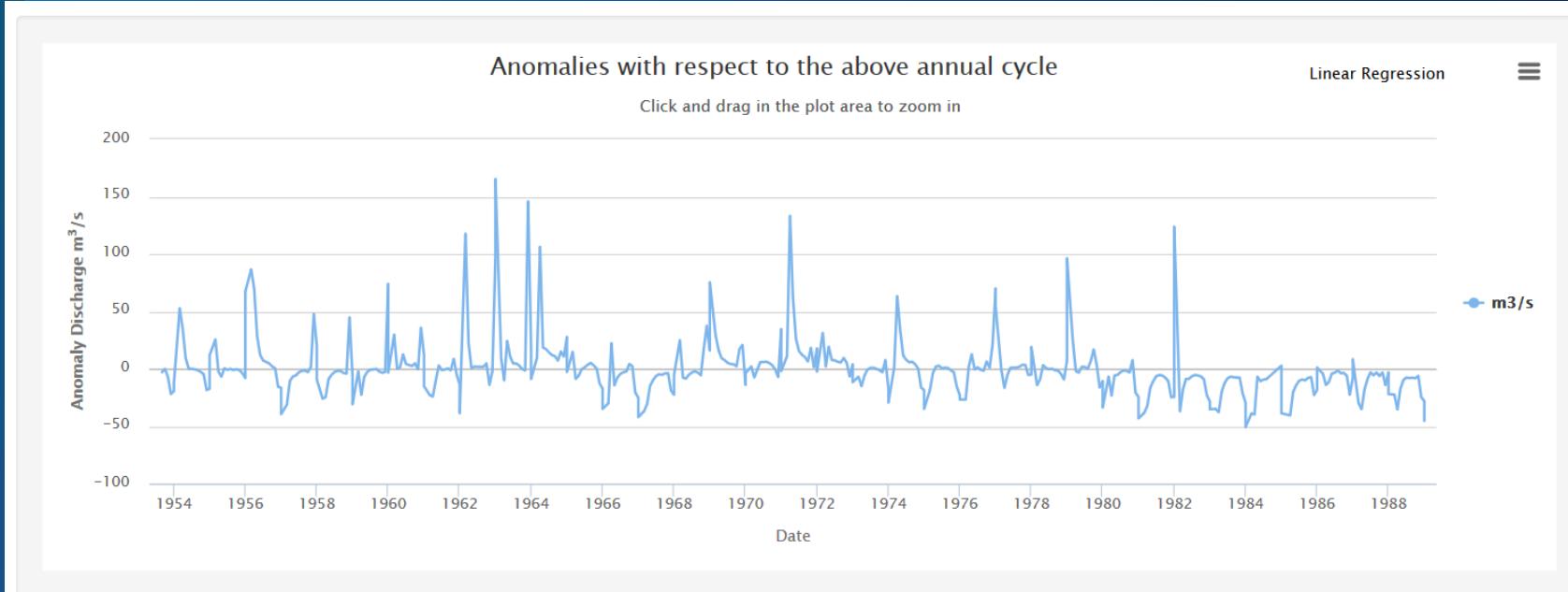
# Ajax

## Get Ajax Call, txt format

Parse the data received/Transform in a JSON format



# Get Ajax Call, txt format



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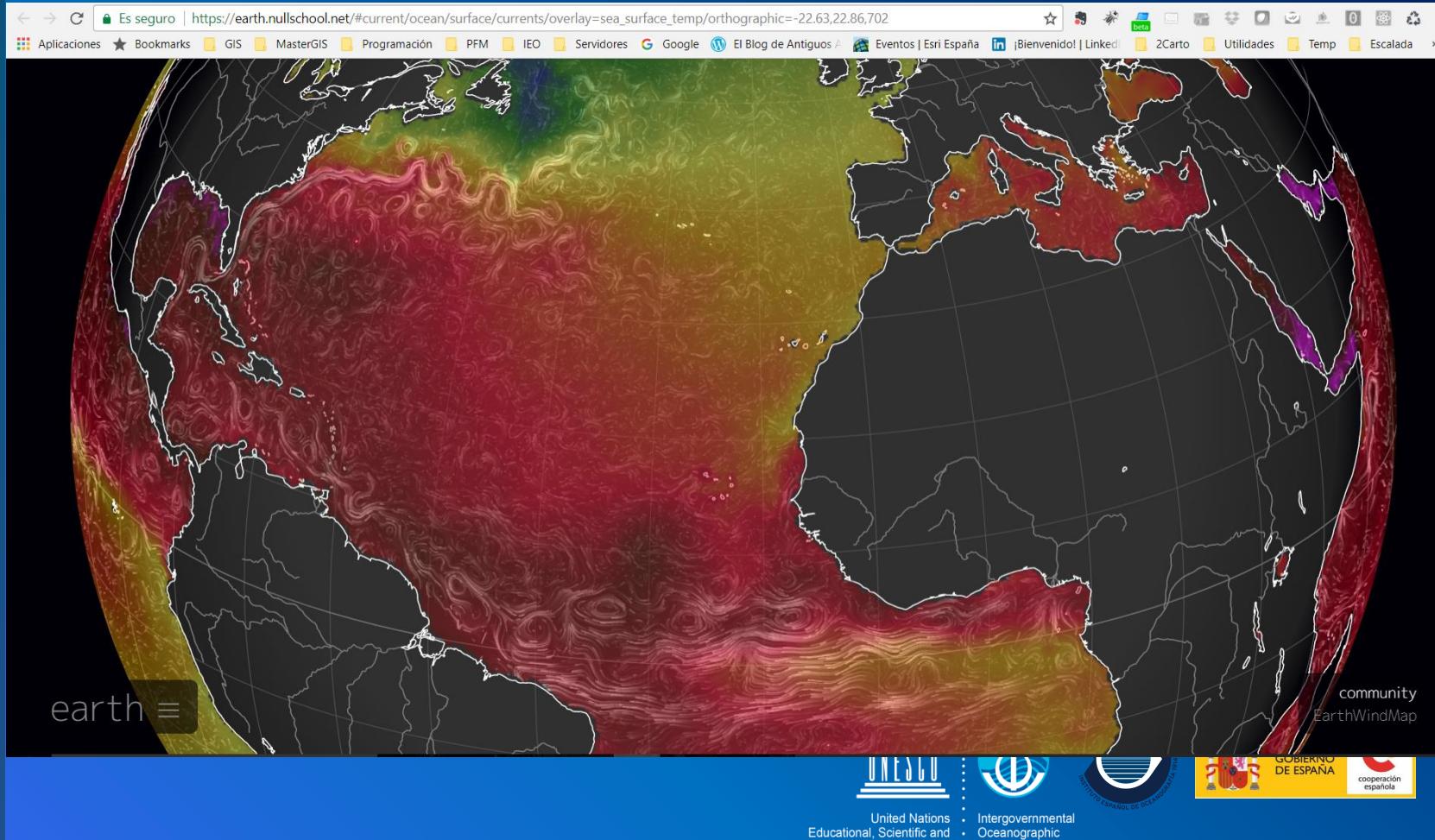


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# Embed website using iframe

<https://earth.nullschool.net/>





# Embed website using iframe

<http://www.ideo-cclme.ieo.es/Home/SpatioTemporalViewer>

CCLME ECO-GIS VIEWER

Tools ▾ Selection Panel Clear About Contact

Spatio-temporal data Viewer

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# CCLME ECO-GIS VIEWER

CCLME ECO-GIS VIEWER

Tools ▾

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Legend

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The Project



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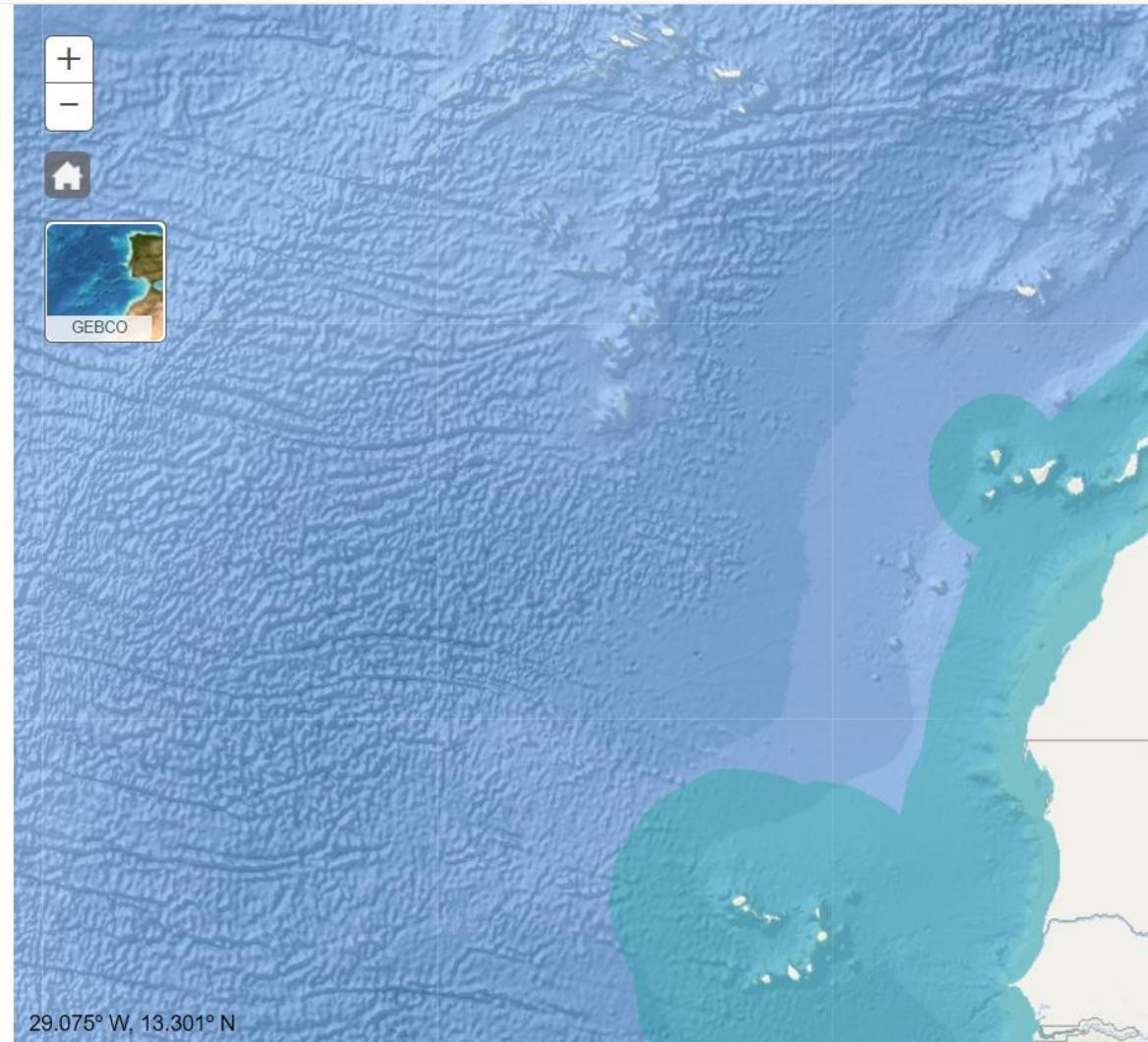
Biological data: abundance, distribution,  
species richness

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GEBCO



29.075° W, 13.301° N

# CCLME ECO-GIS VIEWER

<http://www.ideo-cclme.ieo.es/>

<http://ideo-cclme.2carto.com/>



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This application allow you to:

- Download tailored maps and graphs
- Download tables and raw data.
- Use your own data
- Compare data from different sources

# Home Page

CCLME ECO-GIS VIEWER

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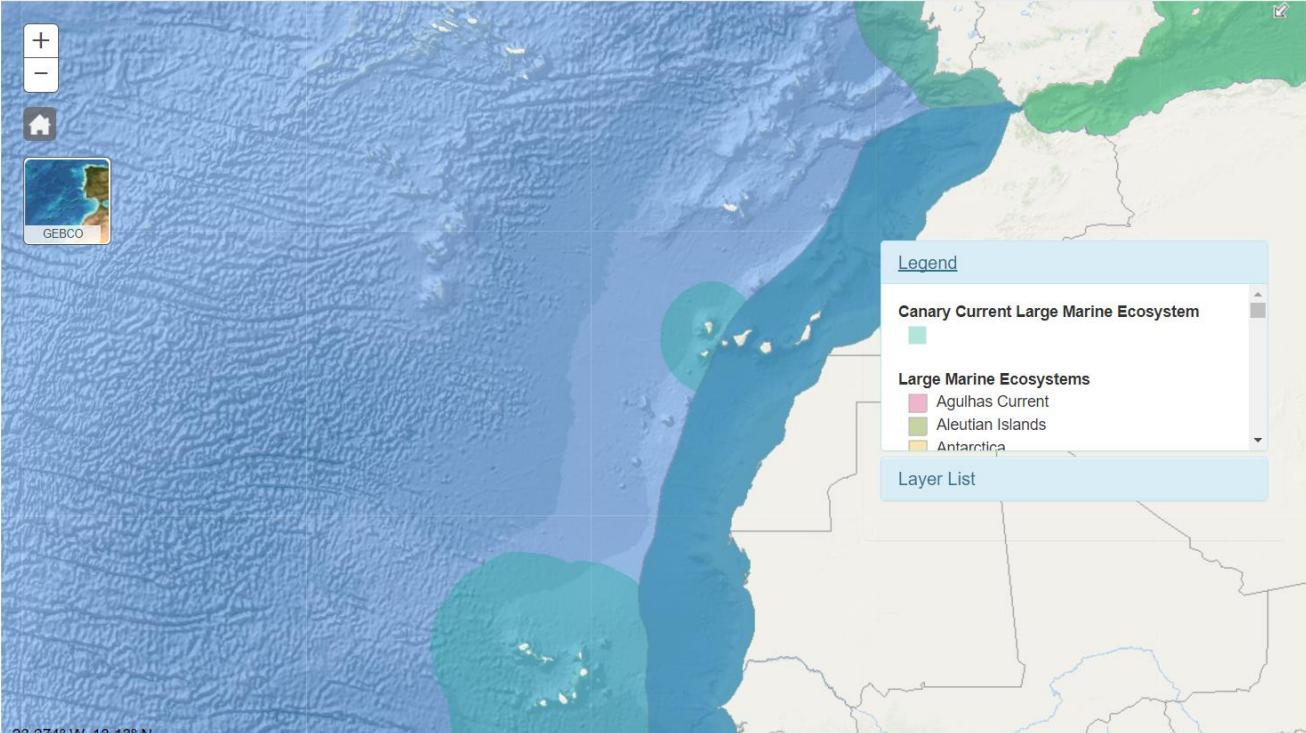
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23.274°W, 13.13°N



**Legend**

Canary Current Large Marine Ecosystem

Large Marine Ecosystems

- Aguilhas Current
- Aleutian Islands
- Antarctica

Layer List



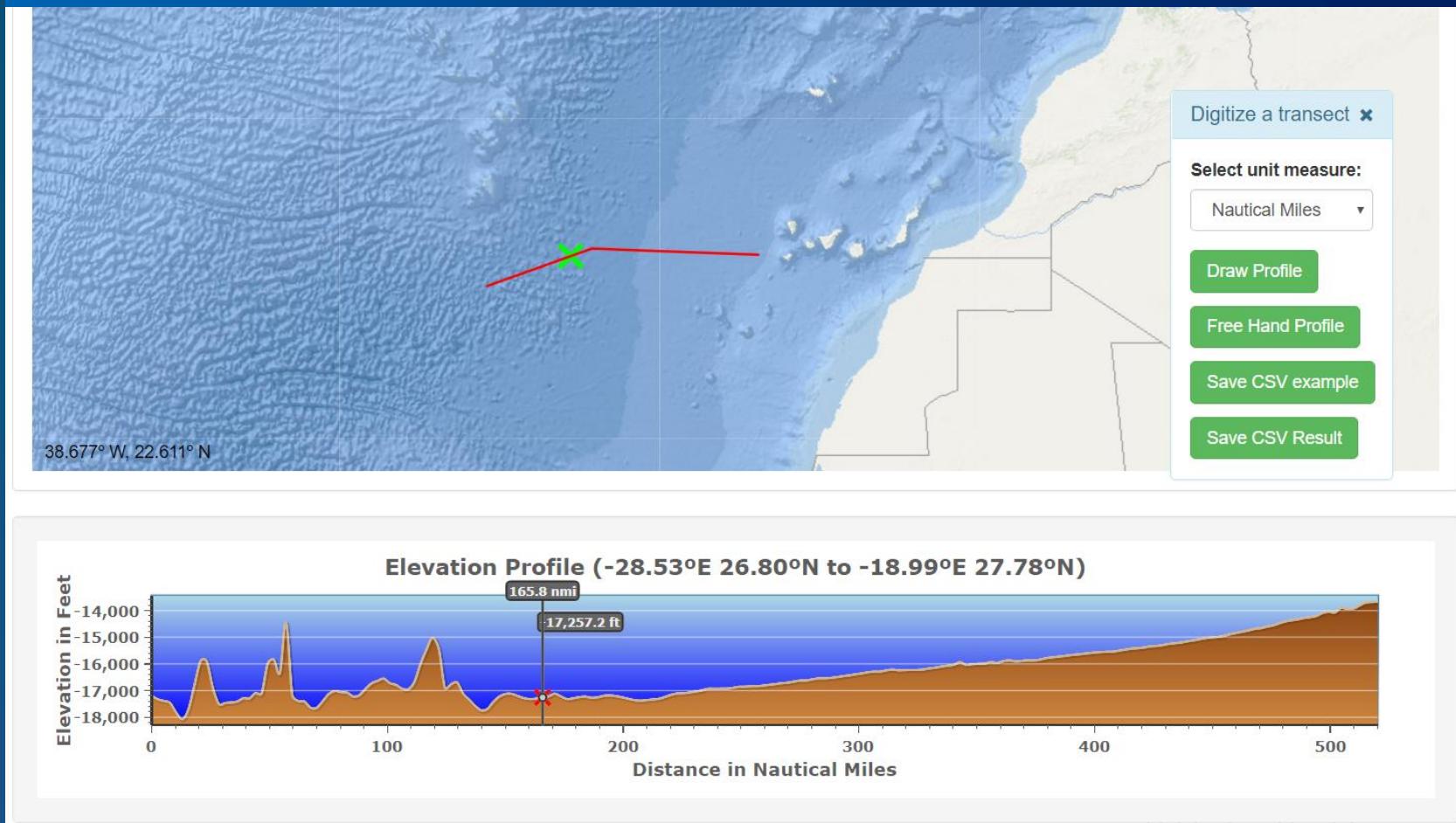
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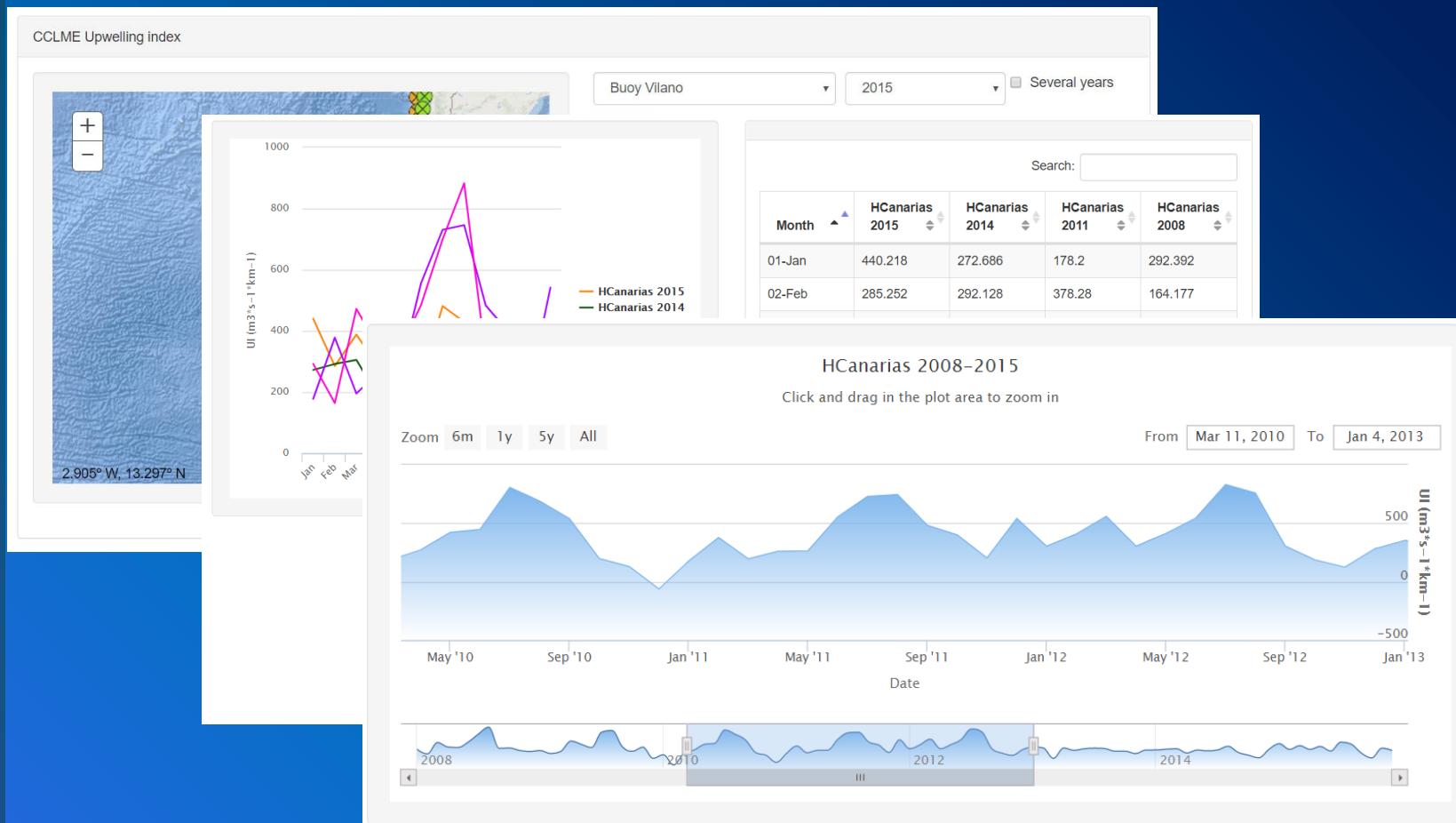
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# Bathymetry mapping and transects

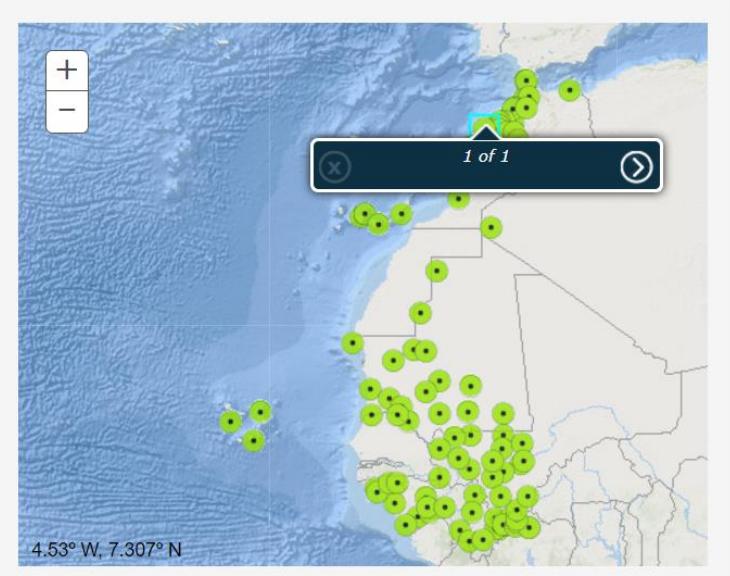


# CCLME Upwelling index



# Precipitation and river discharges

Precipitation and river discharges



A map of the Moroccan coastline and interior showing numerous green circular markers representing precipitation and river discharge stations. A coordinate overlay shows 4.53° W, 7.307° N. Below the map are two buttons: 'Show / Hide Data' and 'Insert'.

Country	Name	Cod	Years
MOROCCO	CASABLANCA MOROCCO	60155	1902-2016
MOROCCO	NOUASSEUR	60156	1951-1963
MOROCCO	SETTAT MOROCCO	60156.1	1909-1996
MOROCCO	EL JADIDA MOROCCO	60165.1	1918-1984
MOROCCO	KHOURIBGA MOROCCO	60178.1	1925-1981
MOROCCO	OUED ZEM MOROCCO	60178.2	1925-1981
MOROCCO	SAFI MOROCCO	60185	1900-1996

Showing 1 to 101 of 101 entries

River Discharge Stations      Precipitation Stations

Search:

The table lists river discharge stations across Morocco, with the last entry (El Jadida) highlighted in green. The columns are labeled: Country, Name, Cod, and Years. The years column shows the period of record for each station.



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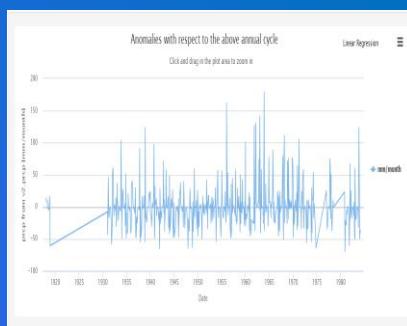
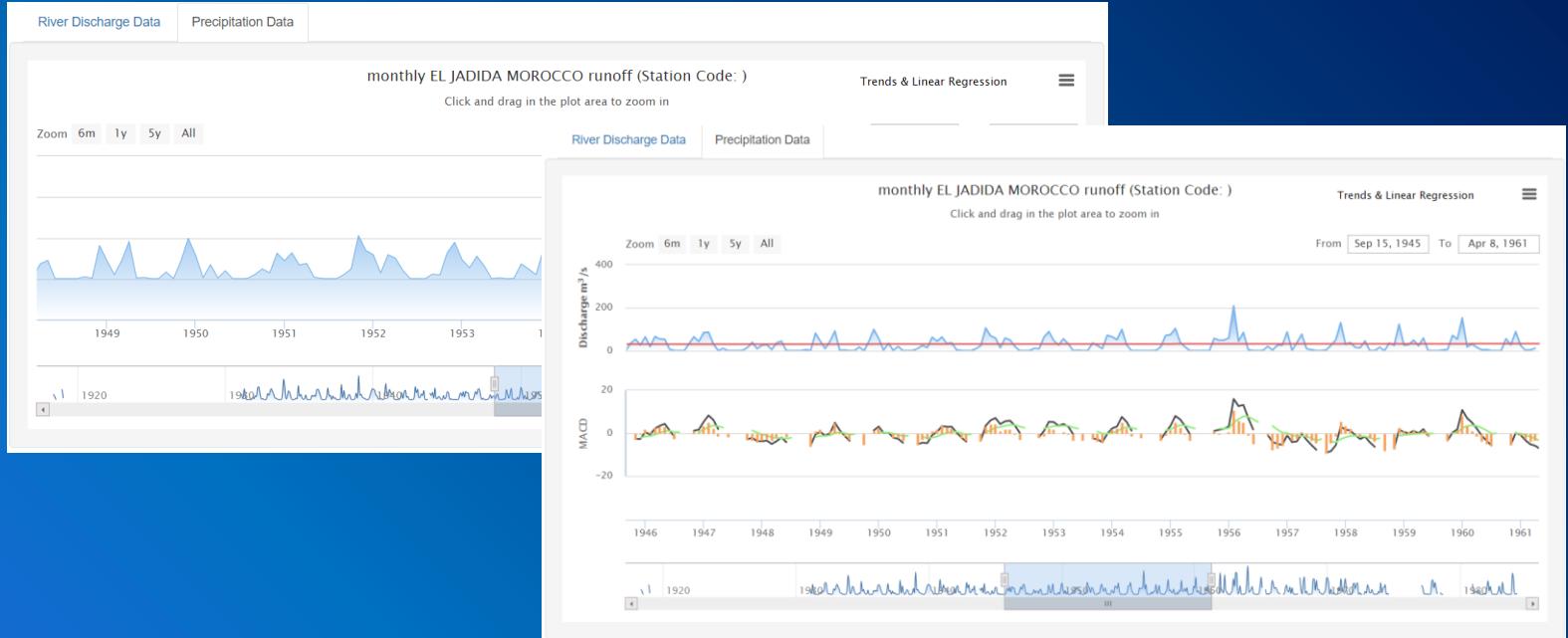


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# Precipitation and river discharges



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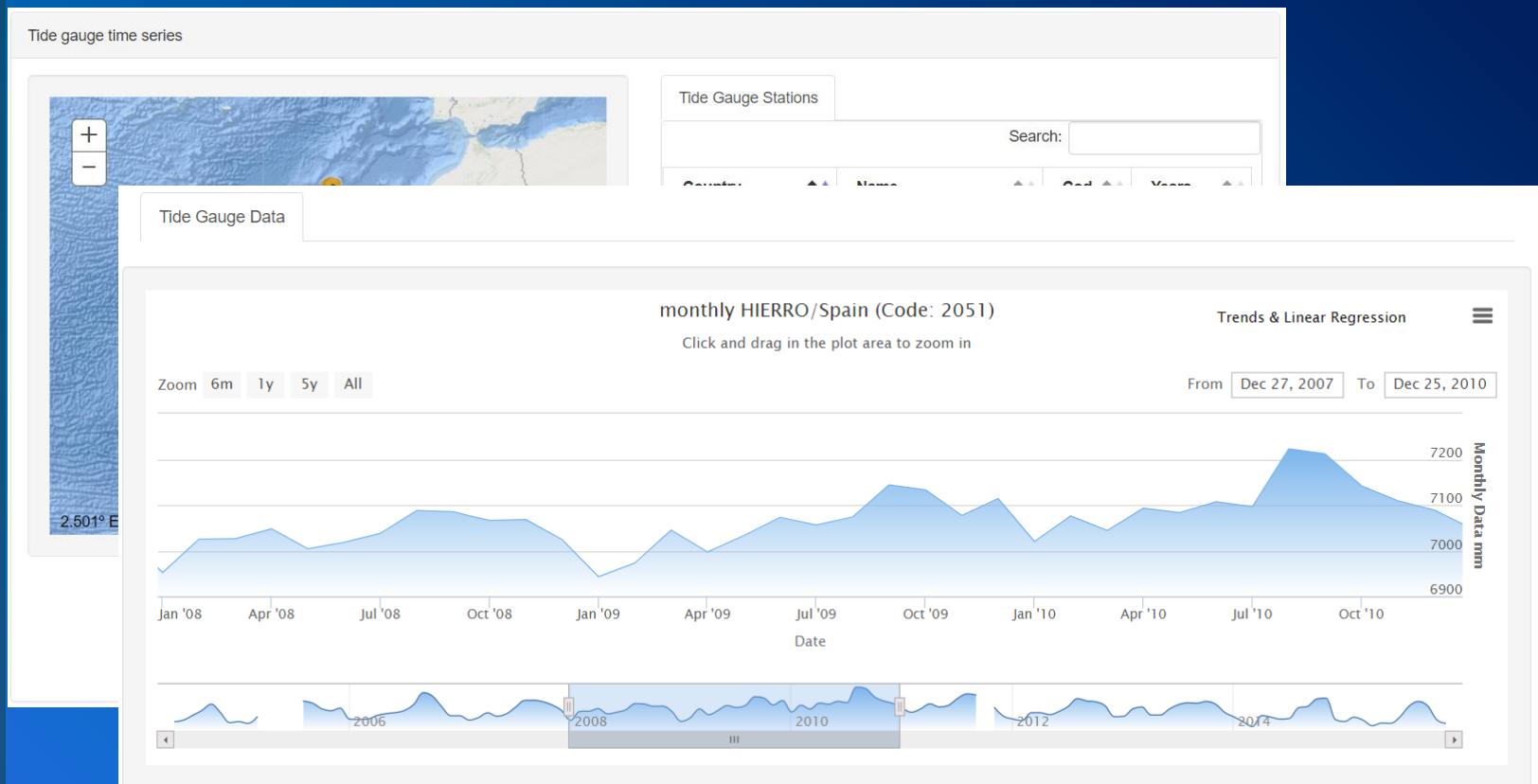
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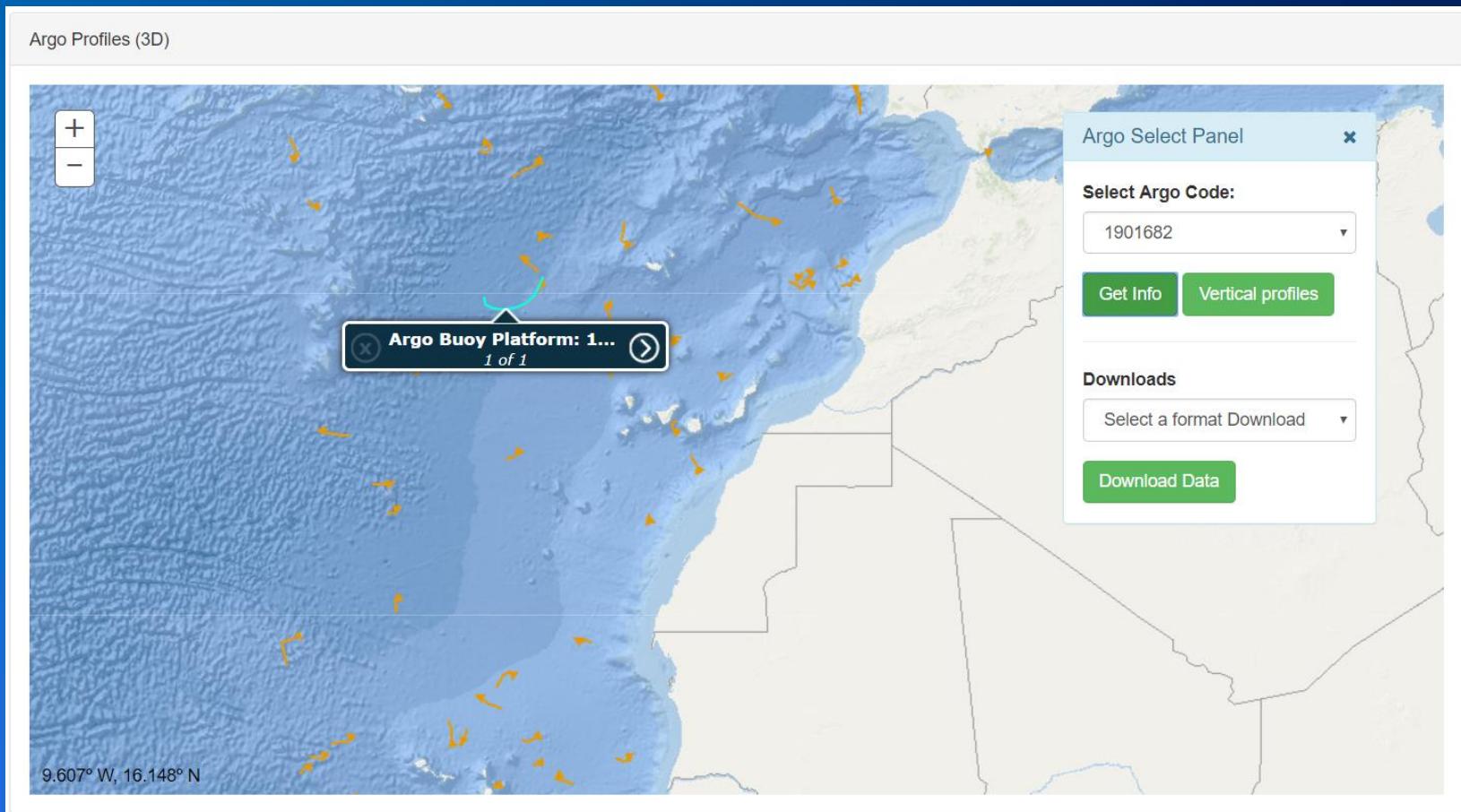
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# Sea Level (monthly) time series



# Argo Profiles



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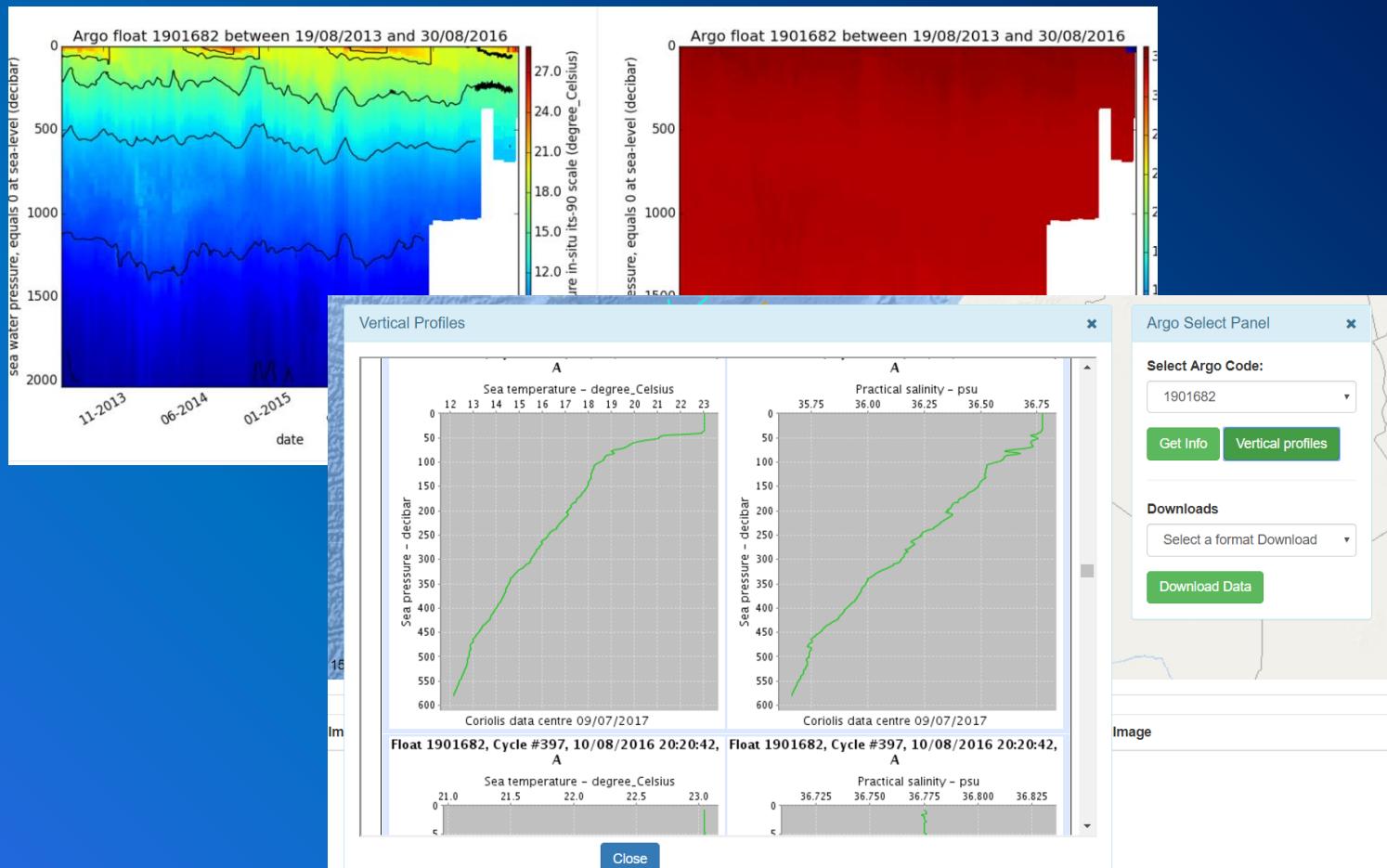
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# Argo Profiles



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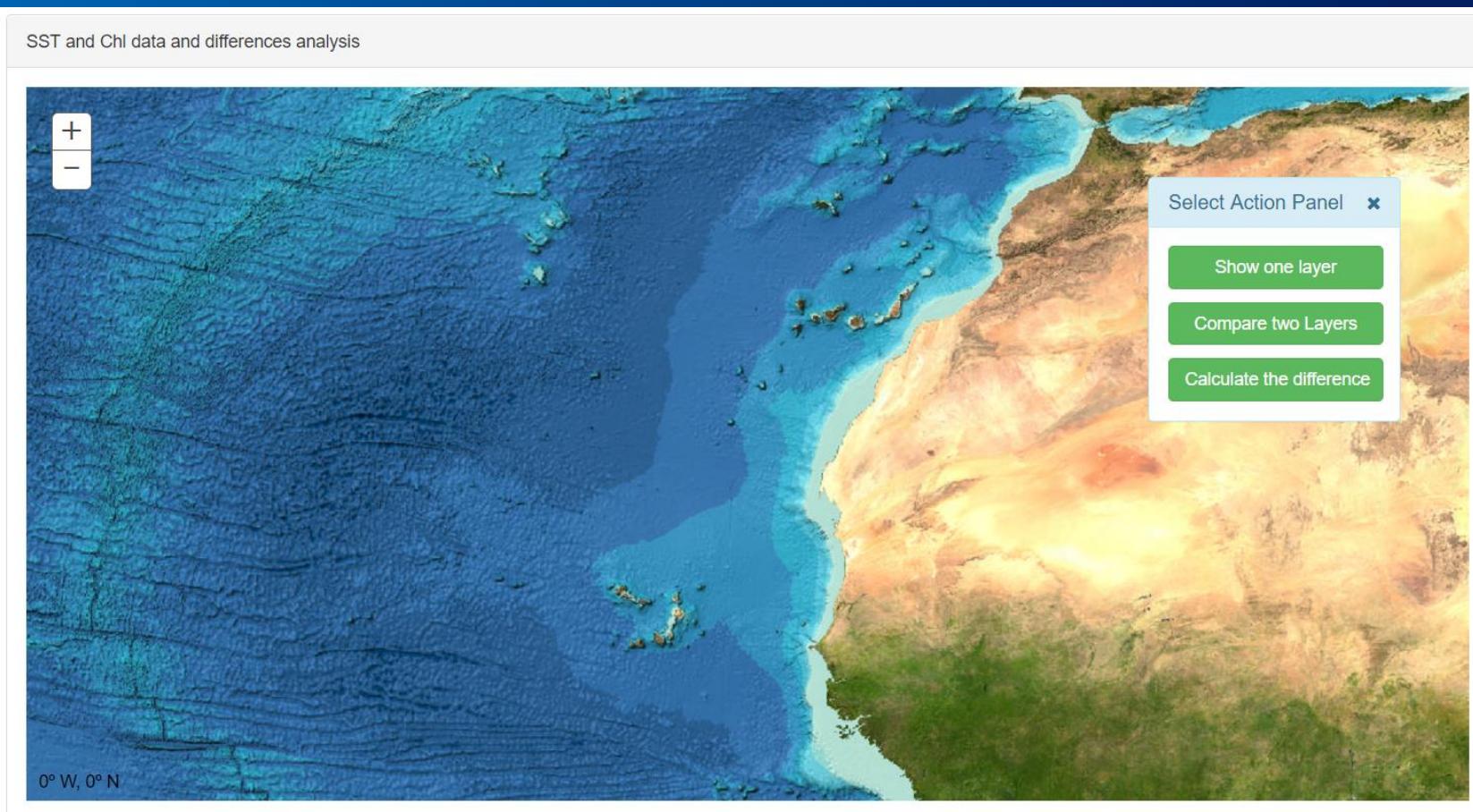
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# SST and Chl data and differences analysis



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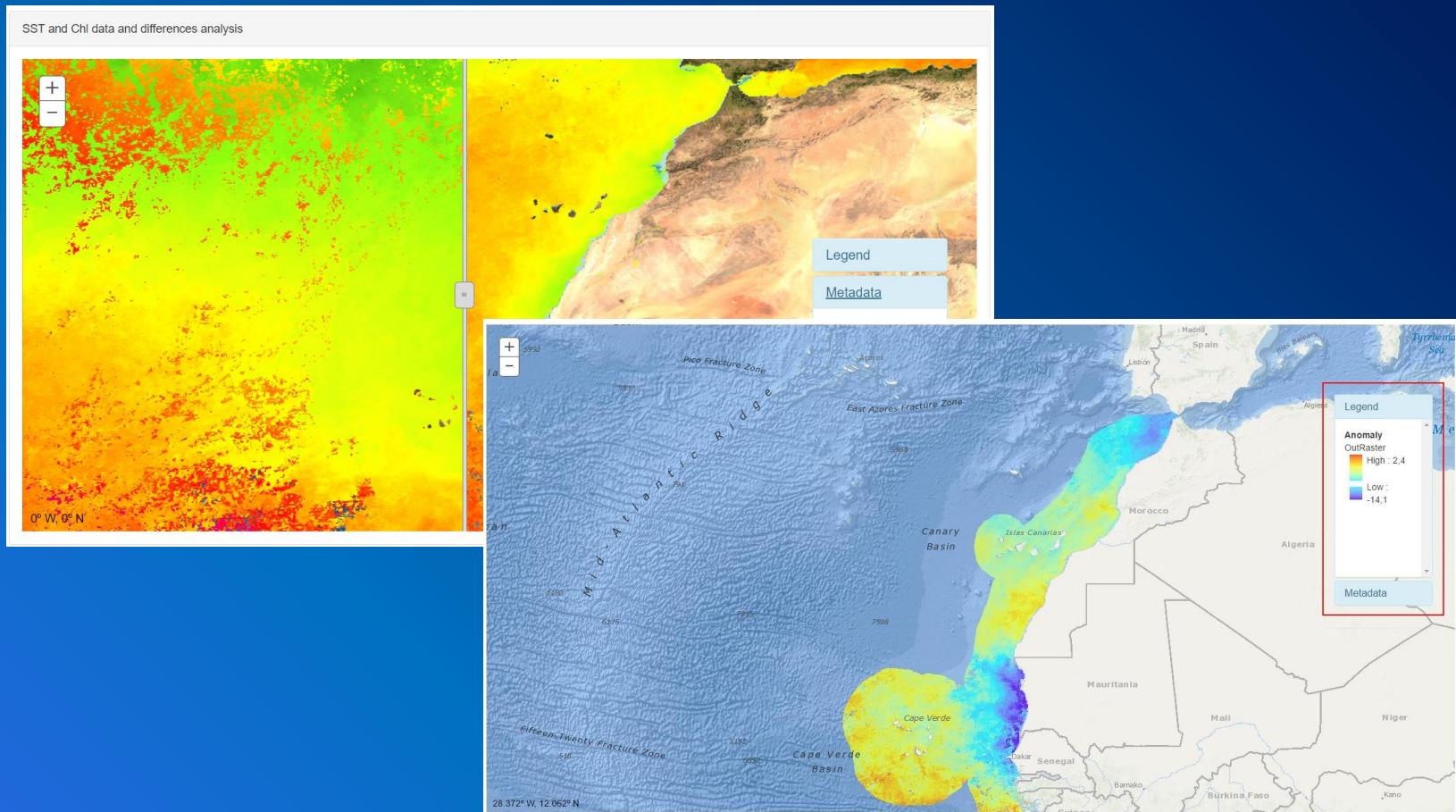


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# SST and Chl data and differences analysis



# Spatio-temporal data Viewer

Spatio-temporal data Viewer

CTD 1 of 1  
23.24° W, 26.819° N

Parameter

Temperature Profile  
Position: 26.3480 N – 18.333 W / Date: January - 1998

Values

0m 2.5m 5m 7.5m 10m 12.5m 15m 17.5m 20m 22.5m

Depth 2000m

Temperature °C

Temperature Profile  
Position: 27.2340 N – 15.5° W

Values

0m 2.5m 5m 7.5m 10m 12.5m 15m 17.5m 20m 22.5m

Depth 2000m

Temperature °C

Find Panel

Layer: CTD

Parameter: Temperature

Month: January

Year: 1998

Find Export Result

Select Action Panel

Find Data

Show Orto Projection

Weather

Monthly averaged SST and Chi-a

25.032° W, 15.429° N



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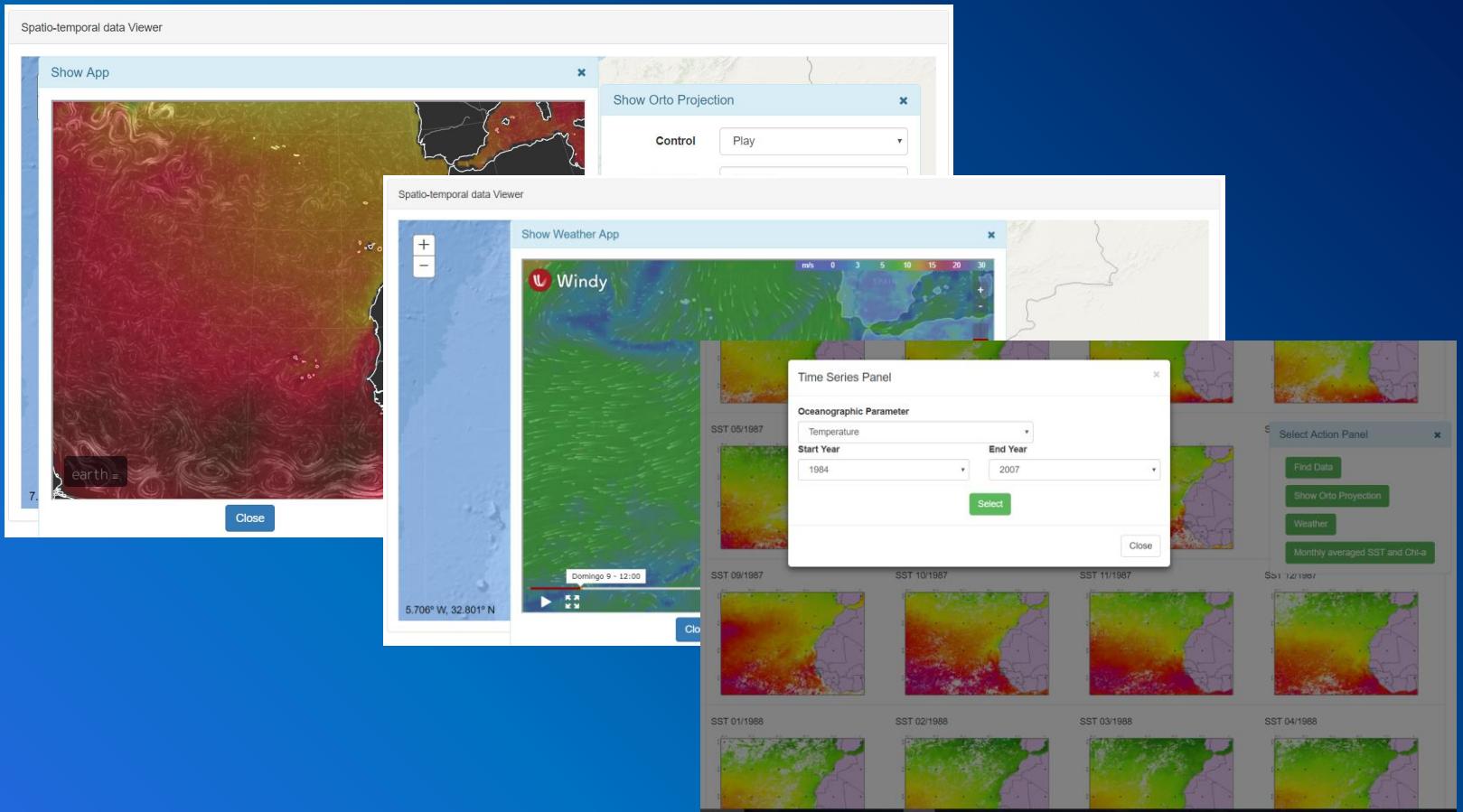
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# Spatio-temporal data Viewer



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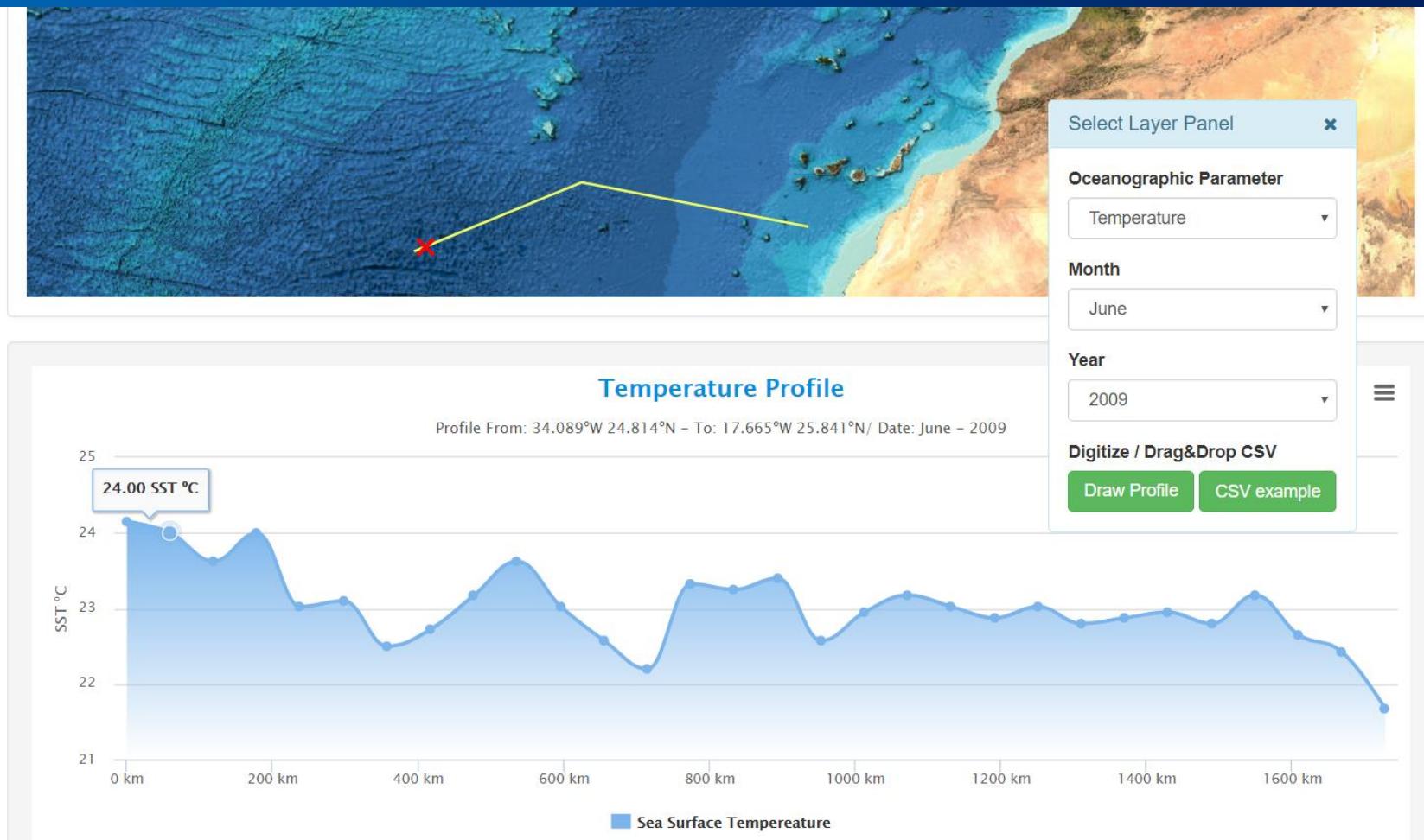
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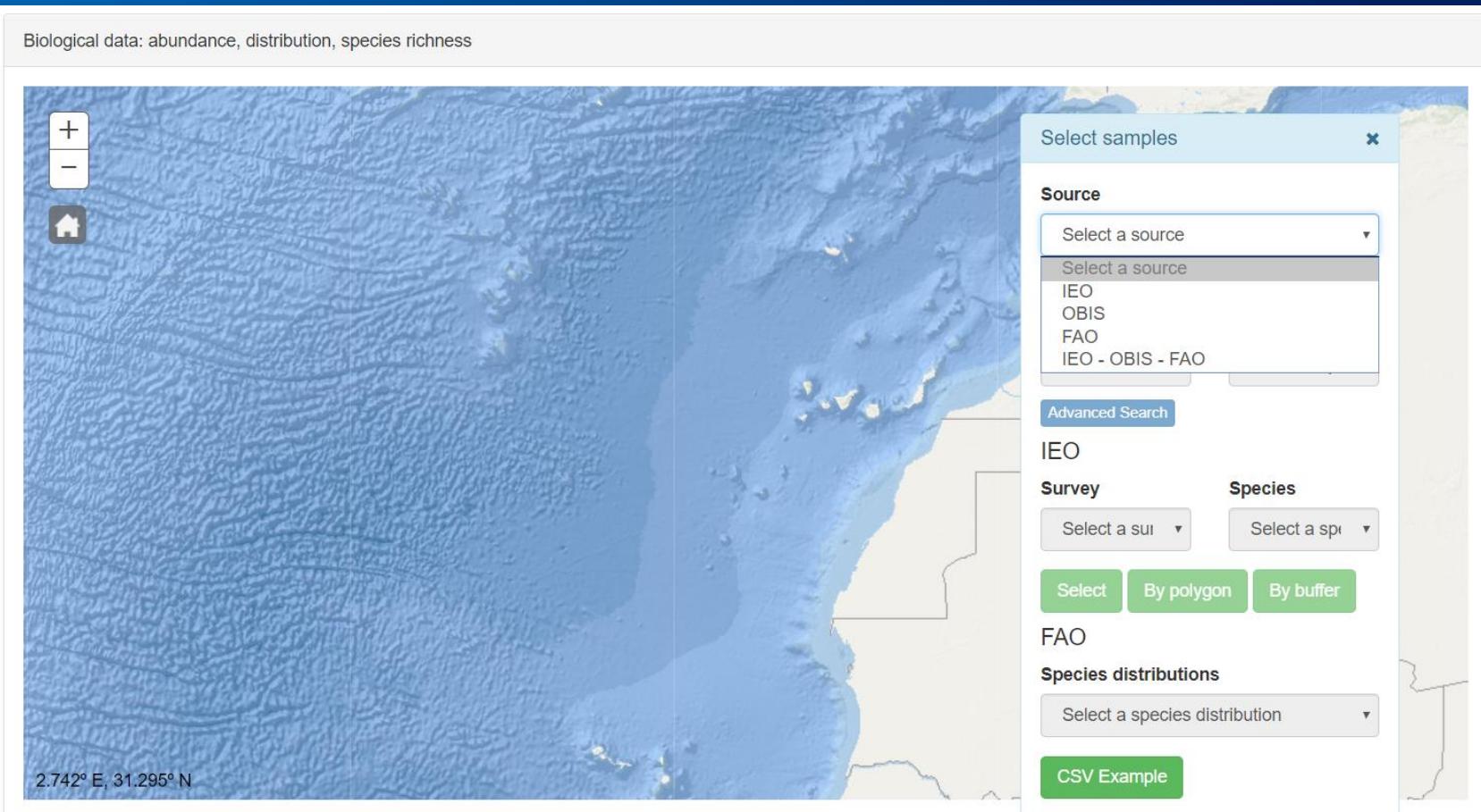
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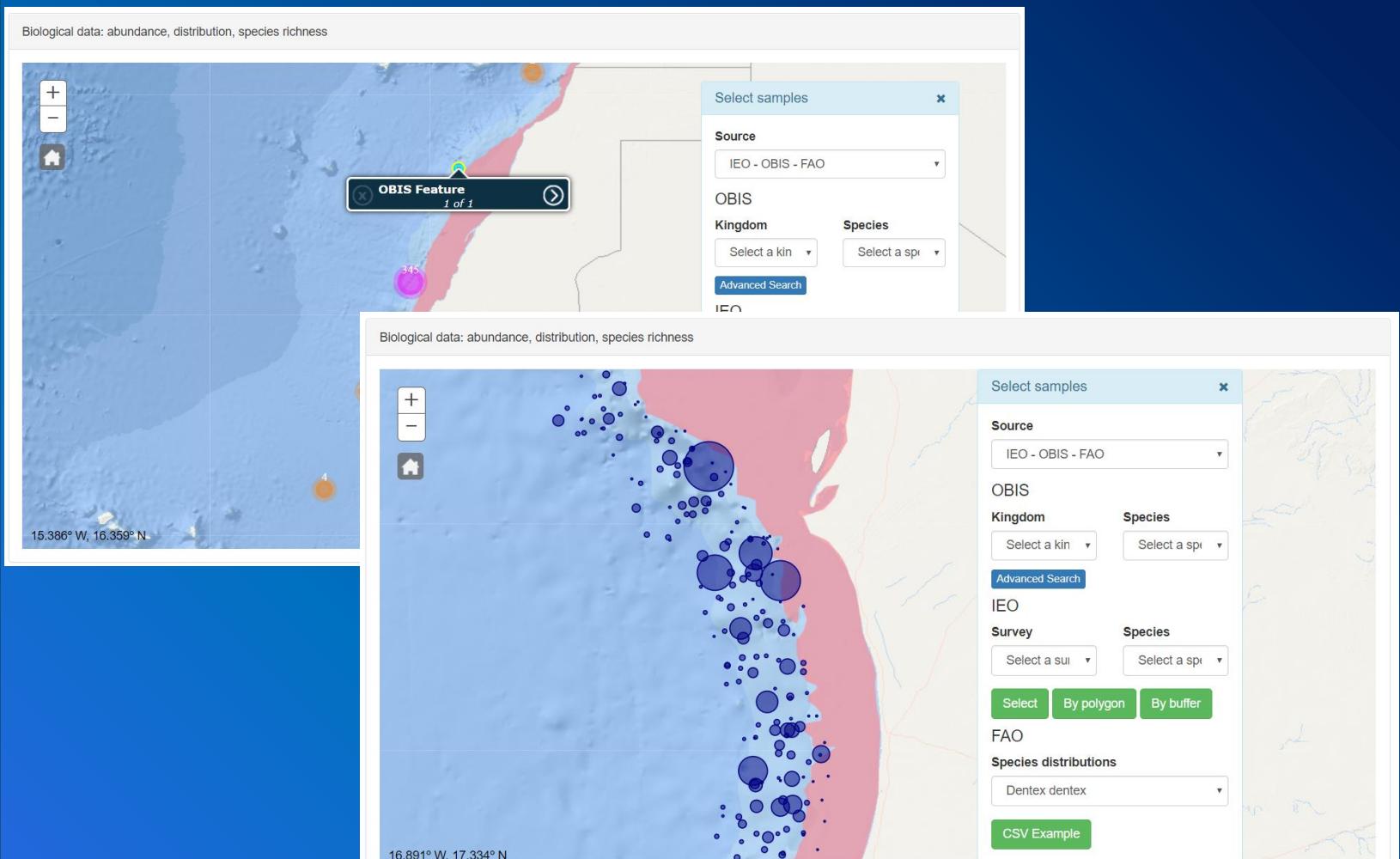
# Oceanographic transects



# Biological data



# Biological data



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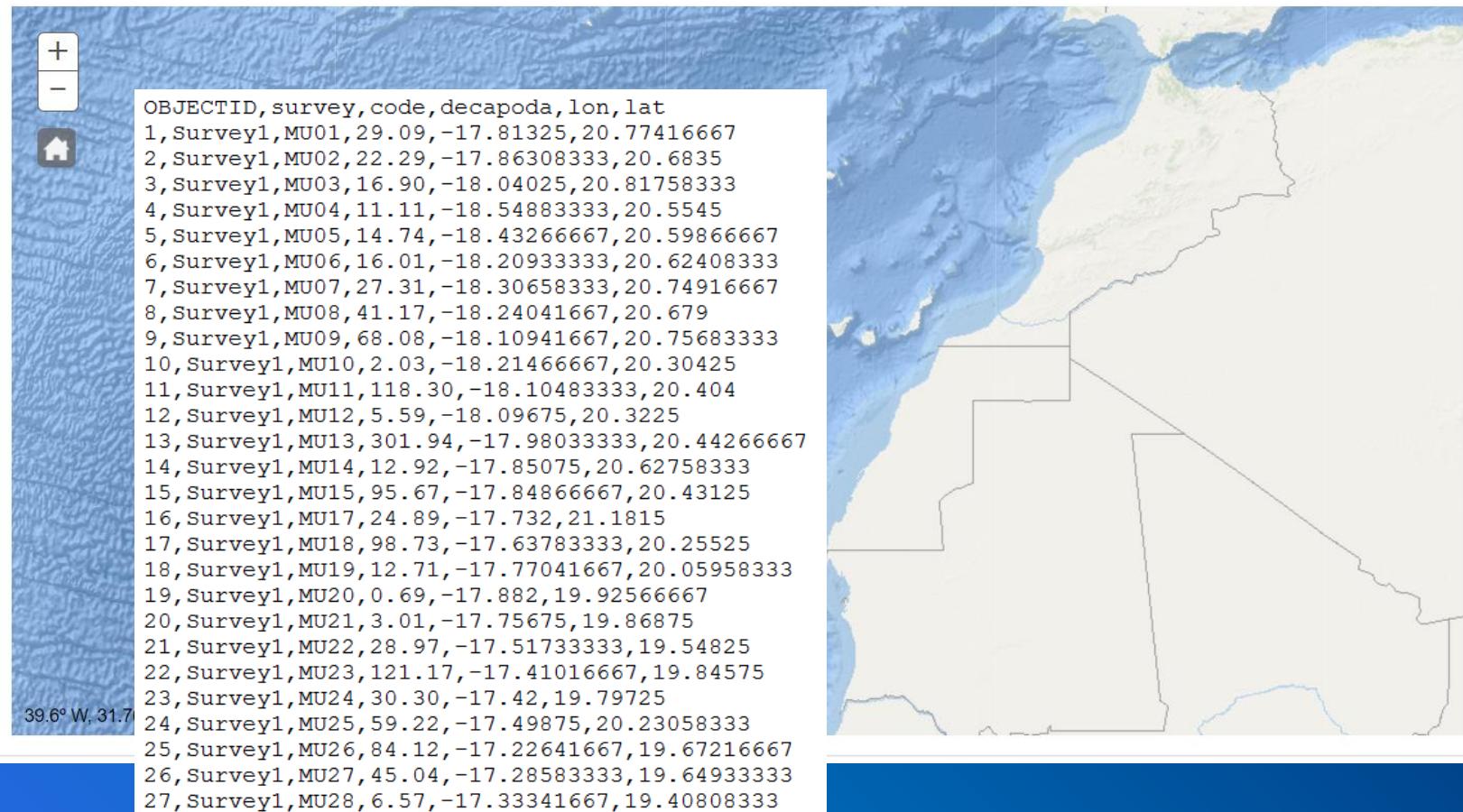


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# Using my own data

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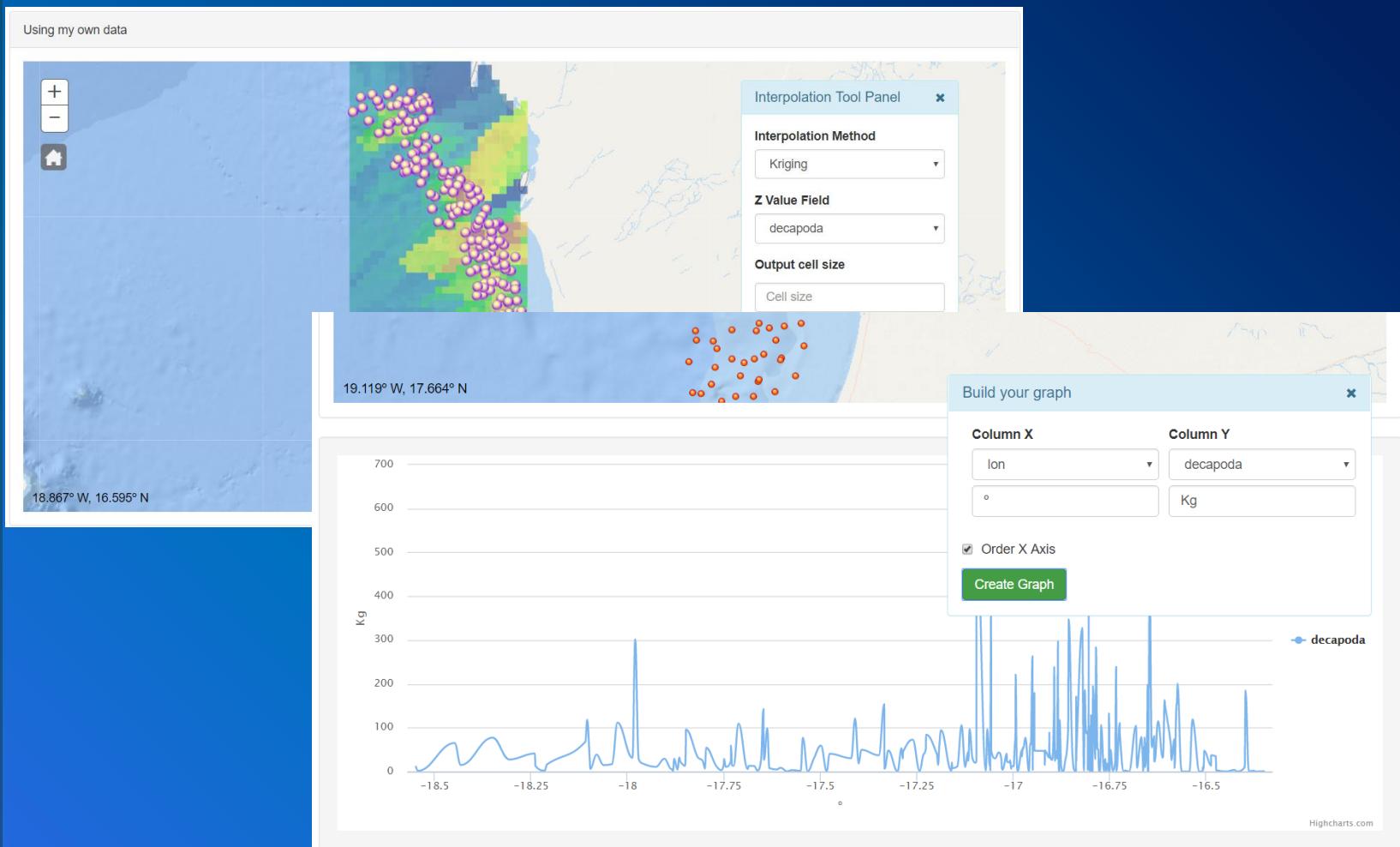


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# Useful Links

Factsheets	Useful Links	Search:
One Shared Ocean Factsheets	<a href="#">One Shared Ocean - Canary Current Factsheet</a>	
NOAA Factsheets	<a href="#">NOAA's Climate Change Web Portal</a>	
IndiSeas Factsheets	<a href="#">Guinean EEZ IndiSeas Factsheets</a>	
IndiSeas Factsheets	<a href="#">Mauritanian EEZ IndiSeas Factsheets</a>	
IndiSeas Factsheets	<a href="#">Sahara Coastal IndiSeas Factsheets</a>	
IndiSeas Factsheets	<a href="#">Senegalese EEZ IndiSeas Factsheets</a>	
FAO Factsheets	<a href="#">Cabo Verde FAO Factsheets</a>	
FAO Factsheets	<a href="#">Gambia FAO Factsheets</a>	
FAO Factsheets	<a href="#">Guinea FAO Factsheets</a>	
FAO Factsheets	<a href="#">Guinea-Bissau FAO Factsheets</a>	
FAO Factsheets	<a href="#">Mauritania FAO Factsheets</a>	
FAO Factsheets	<a href="#">Morocco FAO Factsheets</a>	
FAO Factsheets	<a href="#">Senegal FAO Factsheets</a>	
agrocampus-ouest	<a href="#">Senegal agrocampus-ouest Factsheets</a>	
agrocampus-ouest	<a href="#">Gambia agrocampus-ouest Factsheets</a>	



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# During these days

- You are here to help us to test the application. Please feel free to share with us any comment and help us to find any bugs.



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