


# Data processing and visualization at SOCIB


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**Make available  
as much good data as possible  
to the maximum number of users**

 Data acquisition


 Data acquisition

 Processing  
(including Quality Control )

 Data acquisition

 Processing  
(including Quality Control )

 Distribution &  visualisation

⇔ Distribution &  visualisation

# TimeDimension plugin for Leaflet library



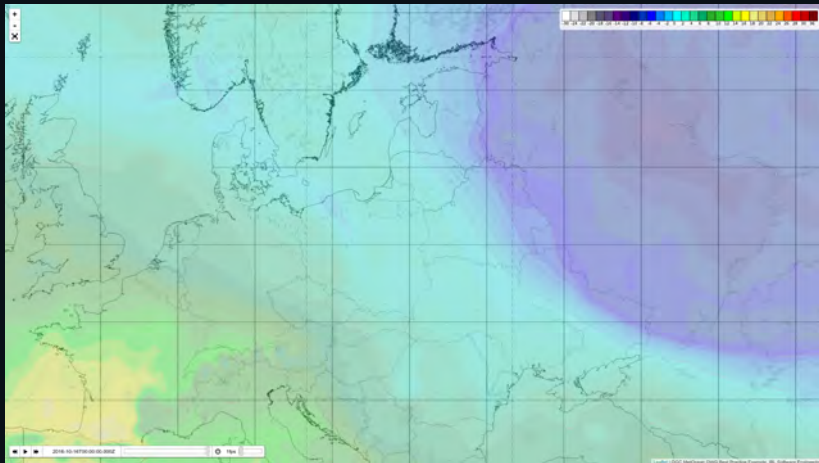
WMS

NOAA nowCOAST weather radar

<https://github.com/socib/Leaflet.TimeDimension>



# TimeDimension plugin for Leaflet library

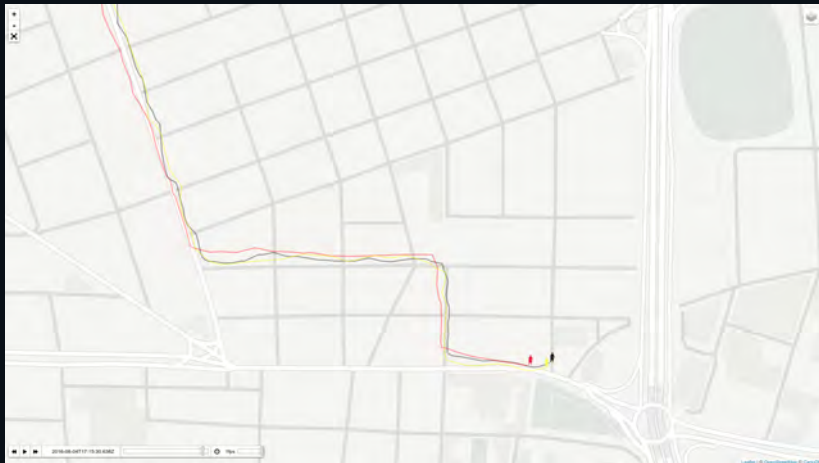


WMS

Temperature from IBL Software Engineering

<https://github.com/socib/Leaflet.TimeDimension>

# TimeDimension plugin for Leaflet library



GPX or KML

GPS tracks comparison

<https://github.com/socib/Leaflet.TimeDimension>

# TimeDimension plugin for Leaflet library



GeoJSON

Oil spill model

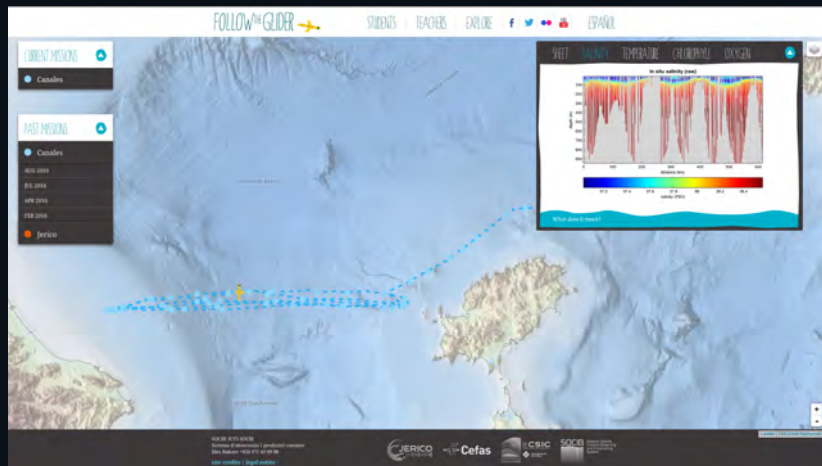
<https://github.com/socib/Leaflet.TimeDimension>

# TimeDimension plugin for Leaflet library

Possible topic for ODIP  
toward standardisation of date format  
in GeoJSON files

<https://github.com/socib/Leaflet.TimeDimension>

# Follow-the-Glider



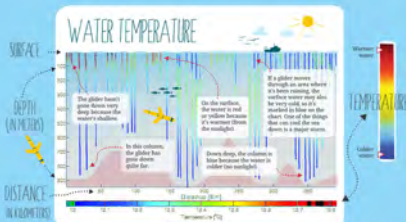
<http://followtheglider.socib.es>

# Follow-the-Glider

## HOW DO WE READ THE DATA WE RECEIVE FROM A GLIDER?

We use the data we receive from a glider to put together charts. They aren't hard to read, but it's actually easier than you think.

This is a chart showing the water temperature each column shows the glider's course over several kilometers. Some columns are deeper than others. That's because the glider doesn't always reach the same depth. You know why? Because the sea floor isn't flat. Sometimes there are mountains, and the glider can't go any deeper: it would crash against the bottom.



<http://followtheglider.socib.es>

# Medcllic: scientific and outreach project



MEDCLIC | Ocean Observing Initiative | IODE

EN / CA / ES

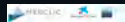
THE PROJECT | EXPLORE | DIVERSIFICATION | NEWS

MEDCLIC. THE MEDITERRANEAN IN ONE CLICK

We invite you to immerse yourself in a sea of information thanks to the multiple operating systems which are currently monitoring the Western Mediterranean, collecting real-time data which is accessible to all of society.

**Explore** the different observation systems, **learn** about temperature and wave forecasting and **discover** the importance of oceanographic research.

<http://www.medcllic.es>



# Medclíc: scientific and outreach project

EN / CA / ES

THE PROJECT | EXPLORE | DIVERSIFICATION | NEWS

**MEDCLIC**  
MEDICIÓN DE LA CALIDAD DEL AGUA


**Observatorio del Canal**

**SOCS**  
SISTEMA DE OBSERVACIÓN DE CALIDAD DEL AGUA



### BEACH MONITORING PLAYA DE PALMA

AIR TEMPERATURE AT 40 M 23.80 °C	WIND DIRECTION AVE. AT 40 M NW
WIND GUST AT 40 M 2.50 m/s	AIR PRESSURE (SEA LEVEL) 1017.80 hPa
WIND SPEED AVE. AT 40 M 1.70 m/s	AIR PRESSURE AT 40 M 1052.80 hPa

1 2



### PLAYA DE PALMA



<http://www.medclíc.es>



# Medcliv: scientific and outreach project

The screenshot displays the Medcliv website interface. At the top, there are logos for MEDCLIV, Observatoire Méditerranéen de Climat, and SOCI. The navigation menu includes 'THE PROJECT', 'EXPLORE', 'DIVERSIFICATION', 'NEWS', and social media icons. The main content area features a map of the Mediterranean region with several yellow icons representing monitoring stations. A sidebar on the left provides real-time data for 'FIXED STATIONS' at 'STATION PARC BT'. The data includes:

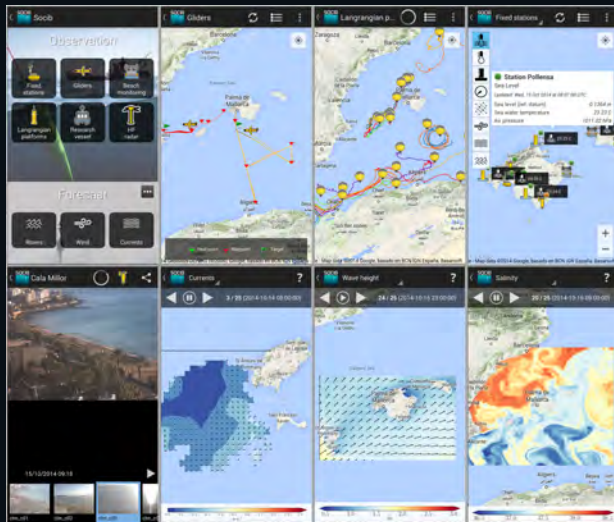
AIR TEMPERATURE AT 120 M	23.70 °C	WIND GUST AT 120 M	1.90 m/s
WIND GUST DIRECTION AT 120 M	SSW	WIND SPEED AVG. AT 120 M	1.30 m/s
WIND DIRECTION AVG. AT 120 M	SSE	AIR PRESSURE (SEA LEVEL)	1018.10 hPa

The map includes a legend for 'OCEANOGRAPHIC BUOY', 'SEA LEVEL STATION', 'COASTAL STATION', and 'WEATHER STATION'. Below the map, the text describes the 'SOCIB FIXED STATIONS' as a real-time monitoring system for oceanographic and meteorological parameters. A section titled 'INNOVATION FOR IMPROVED FORECASTING' is partially visible at the bottom, accompanied by a small image of a coastal structure.

<http://www.medcliv.es>



# Apps for smartphones



Android: <https://play.google.com/store/apps/details?id=com.socib>  
iOS: <https://itunes.apple.com/us/app/socib/id482542716?mt=8>

# Apps for smartphones



## Augmented reality

- Points of interest
- Nearby observing platforms
- Reporting observations
- Access to real-time data

What do they have in common?

# What do they have in common?

Data Discovery

RESTful web services  
to provide information and data  
of SOCIB platforms

# What do they have in common?

## Data Discovery

- Give me the list of active fixed stations
- Tell me the last measurements from a given station
- List the stations providing sea level measurements
- ...

# What do they have in common?

Data Discovery 

"It was quite easy  
you did a very good job and  
your services were really easy to integrate!"

# What do they have in common?

## Data Discovery

"It was quite easy  
you did a very good job and  
your services were really easy to integrate!"

"We had to create a specific database  
only to manage your data  
because of the way you organise them internally."



# What is next?

## New data API



1

**Easier data access for any type of users**

general public, developers, data managers, scientists, ...

# What is next?

## New data API

1

**Easier data access for any type of users**

general public, developers, data managers, scientists, ...

2

**Easier developments of external applications**

visualisation, apps, data analysis ...

# What is next?

## New data API

- 1 Easier data access for any type of users**  
general public, developers, data managers, scientists, ...
- 2 Easier developments of external applications**  
visualisation, apps, data analysis ...
- 3 Data provided in different formats**  
NetCDF, CSV, JSON, ...

# What is next?

## New data API and new data catalog

The screenshot displays the SOCIB Data products catalog interface. At the top, the SOCIB logo is visible on the left, and navigation links for 'Inicio', 'SOLICITUD', 'Servicios', 'News', 'Outreach', and 'Contacto/Help/Access' are on the right. The main heading is 'Data products catalog'. Below this is a 'Filter' section with various search criteria: 'Name' (text input), 'From date' (calendar icon), 'To date' (calendar icon), 'Status' (dropdown menu), 'Variable' (text input), 'Platform type' (dropdown menu), 'Instrument type' (dropdown menu), and 'Data type' (dropdown menu). There are also 'Bounding box' filters and a 'Show map' button. A 'Filter' button is prominently displayed in a teal box. Below the filters, a search bar contains the text '3 resultados encontrados' and a 'Clear' button. The first search result is 'Ainikak Turtle Tracking 2014', which includes a map thumbnail, a description 'Set of observations associated to Ainikak turtle tracking', a date range '26/07/2009 - 04/06/2015', and a 'LINK' button.

# What is next?

## New data API and new data catalog

The screenshot displays the SOCIB Data products catalog interface. At the top, the SOCIB logo and navigation menu are visible. The main heading is "Data products catalog". Below this, the "Alnitak TurtleTracking 2014" section is highlighted, with a subtitle "Set of observations associated to Alnitak turtle tracking". A "Sources overview" section shows a bar chart with two categories: "Turtles" (13) and "Total" (13). To the right is a map of the Mediterranean region with a yellow box indicating the tracking area. Below the overview, the "Data sources" section is shown, with a "Show filter form" button. Two data source cards are visible, both for "Turtle observational data". Each card includes a thumbnail map, a table of metadata, and buttons for "Download observations", "Download metadata", and "Data access".

**SOCIB** About Us + Organization + Services + News + Outreach + Contact Us + Careers +

### Data products catalog

#### Alnitak TurtleTracking 2014

Set of observations associated to Alnitak turtle tracking

##### Sources overview

Turtles	13
Total	13

Copyright: This is Free—Source: NOAA, NOAA ODS, Data User, USAR, National Geographic, Sources: NOAA, and USAR

##### Data sources

Show filter form

###### Turtle observational data

	<b>Platform type:</b> Turtle <b>Platform name:</b> Turtle_Ana <b>Instrument type:</b> Turtle <b>Instrument name:</b> SCB-TTR012 <b>Variables (34):</b> <a href="#">Download observations</a> <a href="#">Download metadata</a> <a href="#">Data access</a>	<b>Initial date:</b> 2009-08-07 <b>End date:</b> 2010-07-30 <b>Updated at:</b> 2015-09-25 16:30	<b>Source type:</b> Observational <b>Data type:</b> Trajectory <b>Entries:</b> 2
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###### Turtle observational data


	<b>Platform type:</b> Turtle <b>Platform name:</b> Turtle_Kuwaiti <b>Instrument type:</b> Turtle <b>Instrument name:</b> SCB-TTR003 <b>Variables (34):</b> <a href="#">Download observations</a> <a href="#">Download metadata</a> <a href="#">Data access</a>	<b>Initial date:</b> 2014-05-11 <b>End date:</b> 2014-08-23 <b>Updated at:</b> 2015-09-25 14:57	<b>Source type:</b> Observational <b>Data type:</b> Trajectory <b>Entries:</b> 2
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# What is next?


New data API and new data catalog



 Data acquisition

 Processing  
(including Quality Control )

 Distribution &  visualisation

 Processing  
(including Quality Control )



# SOCIB data processing



# SOCIB data processing



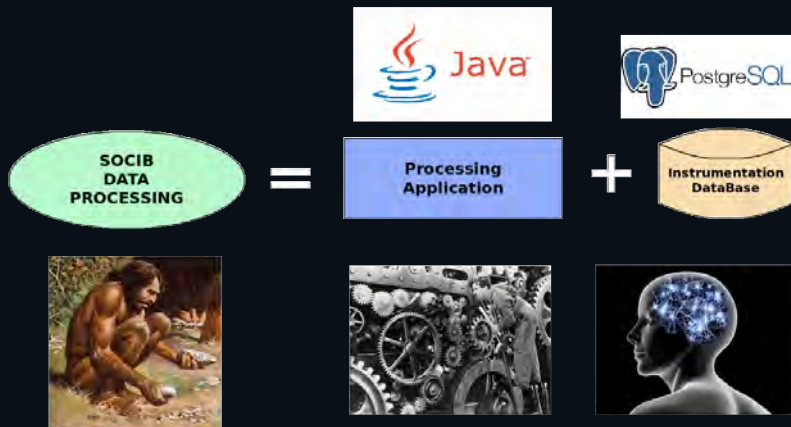
# Multi-platform observing system



# Multi-platform observing system



# Data processing at SOCIB

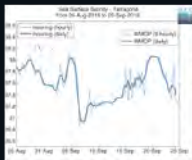


# Principles

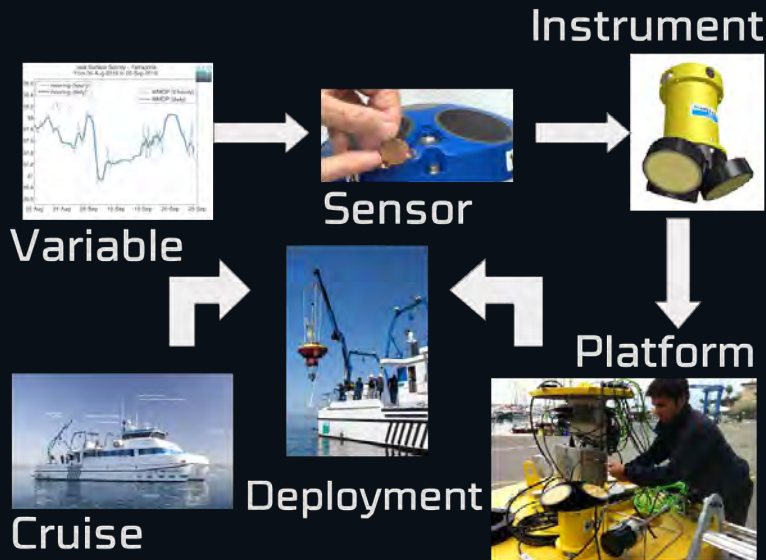
Emulating reality



# Principles



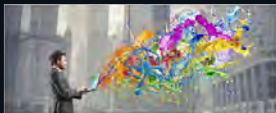
# Principles



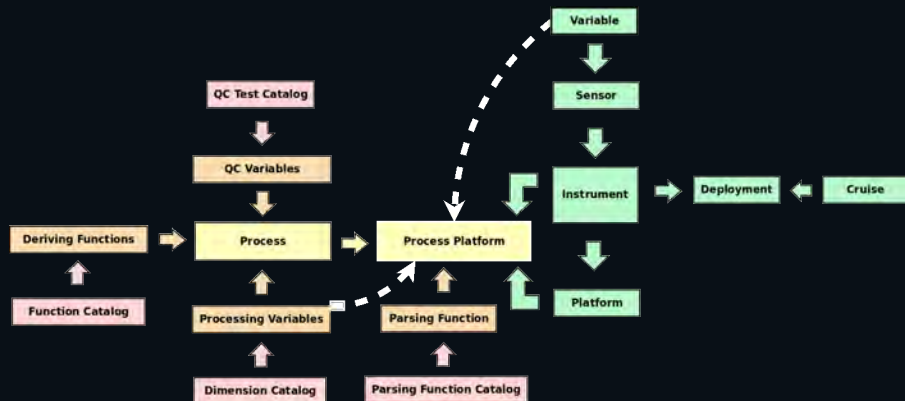


# Principles

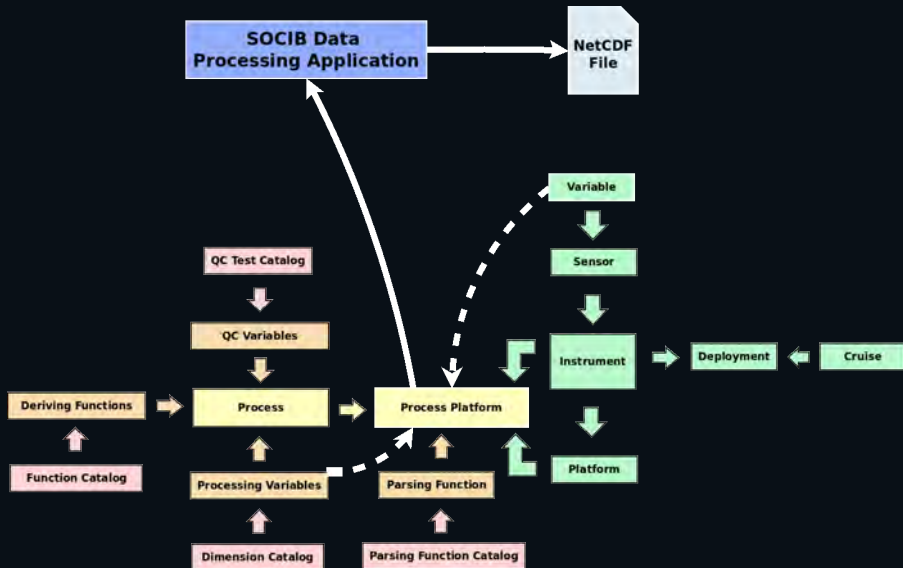
## Developing creativity



# Principles



# Principles



In a few words ...

**Robustness**

**Versatility**

**Quickness**

In a few words ...

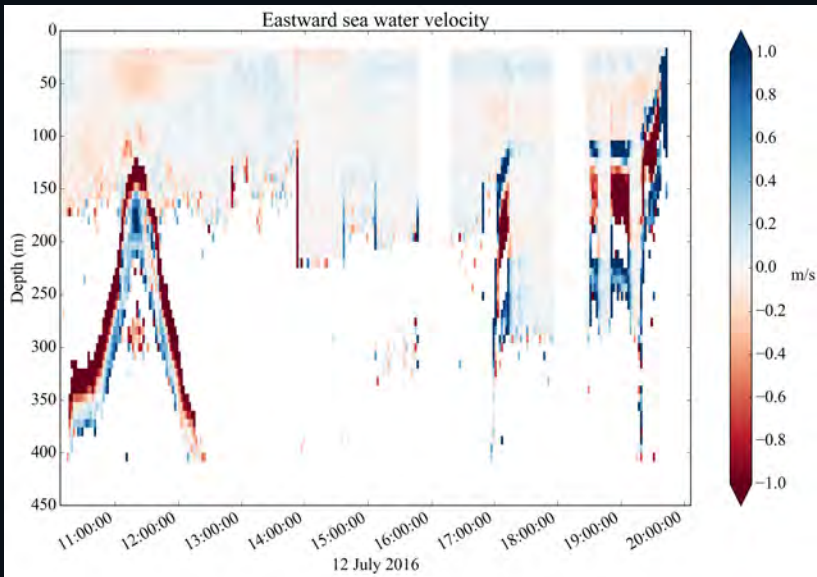
**Robustness**

**Versatility**

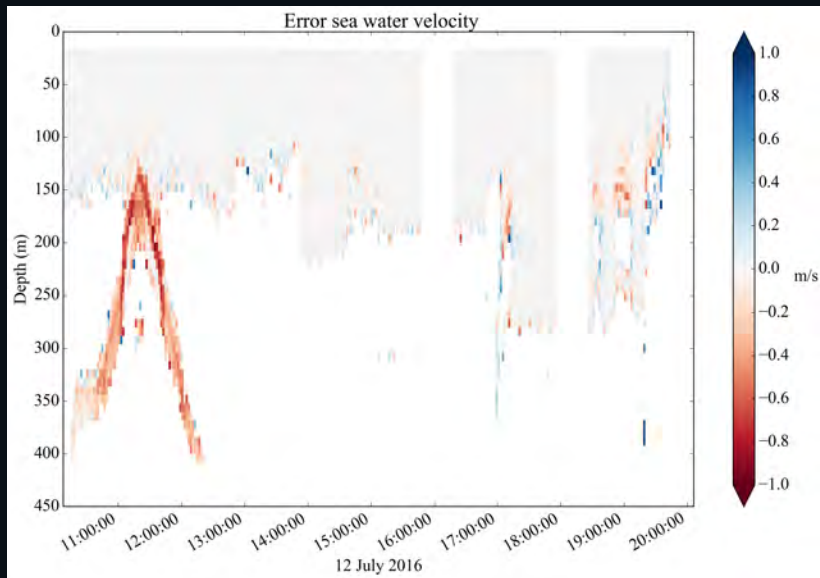
**Quickness**

**Need a proof?**

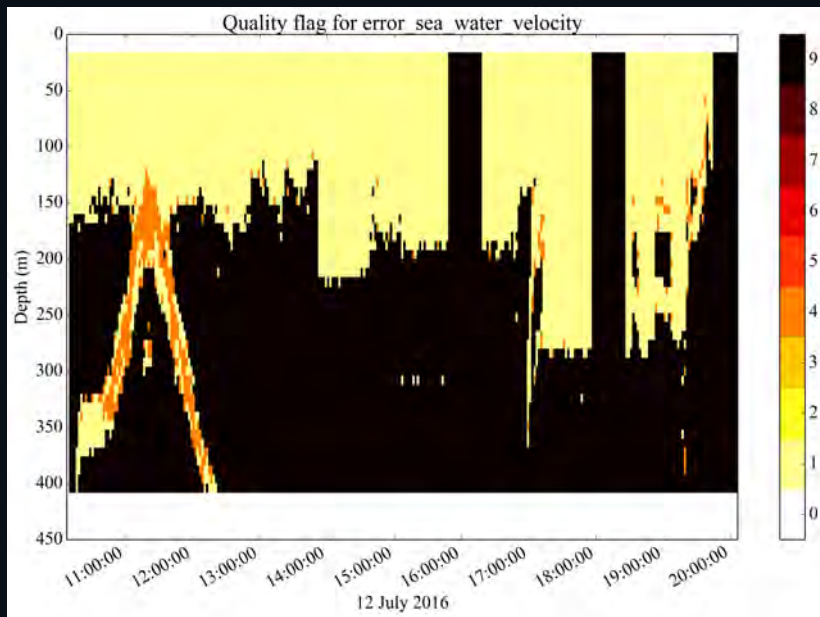
# R/V ADCP data processing



# R/V ADCP data processing



# R/V ADCP data processing





# Digital playground: Jupyter-notebook

# Digital playground: Jupyter-notebook

Text

markdown

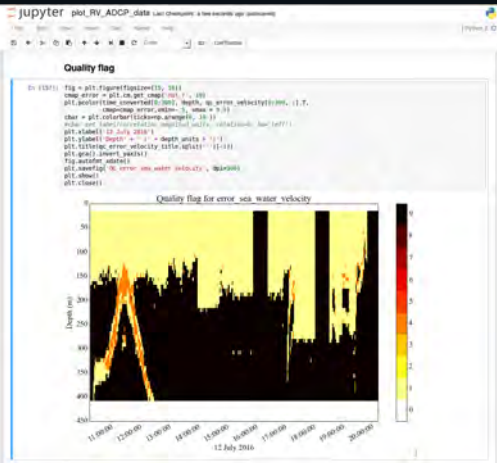
Code fragment

python, Julia, R, ...

Figures, animations or interactive maps

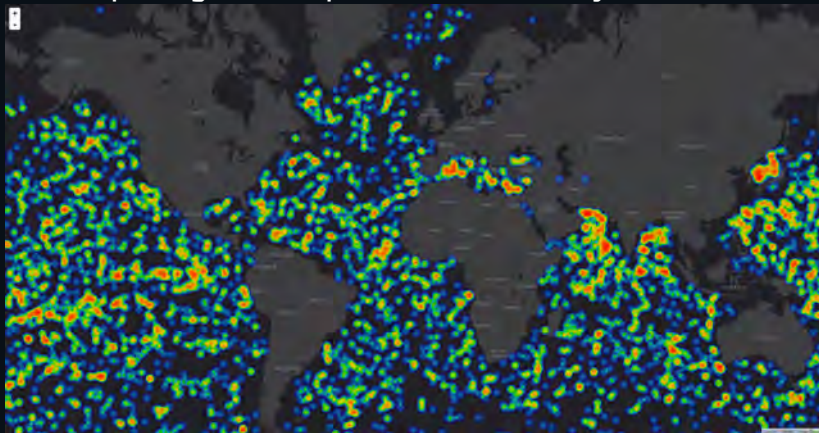
Data story telling

# Digital playground: Jupyter-notebook



# Digital playground: Jupyter-notebook

Heatmap using CMEMS profiler data, January 2016



Folium package in python to interact with Leaflet

# Future work

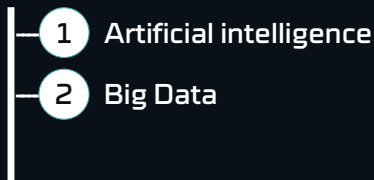


1

Artificial intelligence


Infer relevant information during the data processing in order to improve for example, the quality control

# Future work

- 
- 1 Artificial intelligence
  - 2 Big Data

Combining internal and external data  
(smartphone sensors, Automatic Identification System (AIS)  
data, ...)

# Future work

- 
- 1 Artificial intelligence
  - 2 Big Data
  - 3 Citizen science

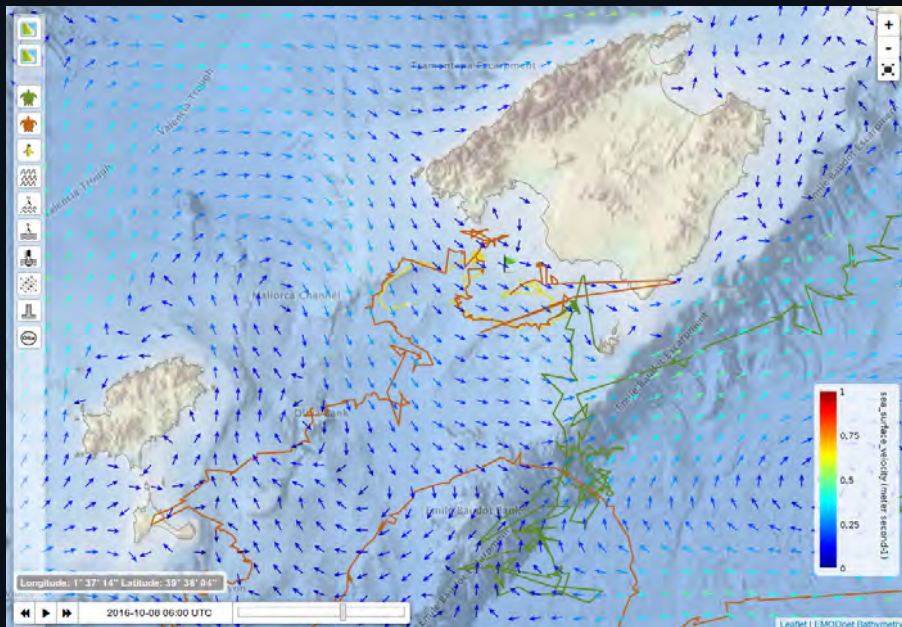
Collecting geo-localised photos shared through social media and link them to specific marine events

# Conclusions





# Conclusions



# Thanks for your attention



## Tools

<https://github.com/socib/Leaflet.TimeDimension>  
<https://jupyter.org/>

## Web

<http://medclie.es/>  
<http://followtheglider.socib.es/>

## Apps

<http://apps.socib.es/>  
 <https://play.google.com/store/apps/details?id=com.socib>  
 <https://itunes.apple.com/us/app/socib/id482542716?mt=8>

## Social media

 <https://github.com/socib>  
 [https://twitter.com/socib\\_data](https://twitter.com/socib_data)