# Development of the automatic data processing system of the Instituto Español de Oceanografía surface water sampling network

Gonzalo González-Nuevo, Jose Manuel Cabanas, Manuel Ruiz Villarreal, Elena Tel, Pablo Otero, Jesus Gago and Alicia Lavin

Raia
www.marnaraia.com

# Presentation Outline

- RAIA project
- Surface Water Sampling Network
  - Vessels
  - Processing system
  - OGC data servers
- Data examples
- Work in progress and future

Raia
www.marnaraia.com

# RAIA observatory

## RAIA Project

meteogalicia

INSTITUTO ESPAÑOL DE OCEANOGRAFÍA

intecmar
INSTITUTO TECNOLOXICO PARA O CONTROL DO MEDIO MARIÑO DE GALICIA

CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS

inegi driving innovation

CETMAR
CENTRO TECNOLÓGICO DEL MAR

INESCPORTO®
LABORATÓRIO ASSOCIADO

Universidade do Porto
FEUP Faculdade de Engenharia

hidrográfico
marinha · portugal

U.PORTO
FACULDADE DE CIÊNCIAS
UNIVERSIDADE DO PORTO

universidade de aveiro

Gofuvi

CIMAR
LABORATÓRIO ASSOCIADO

Raia
www.marnaraia.com

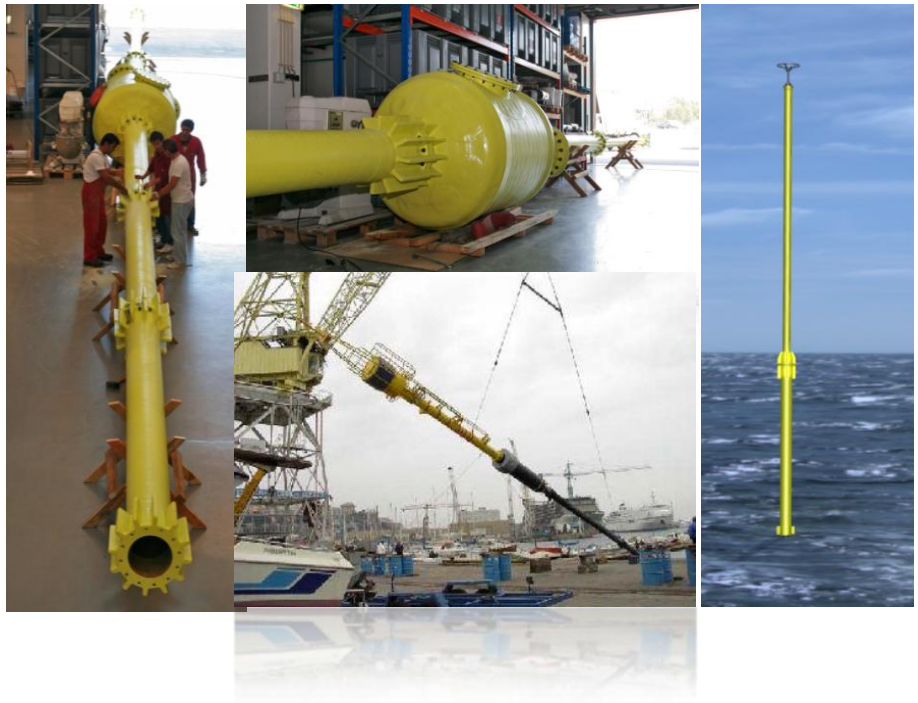
# RAIA project

- Consolidate oceano-meteorologic observation network Galicia and north Portugal
- Development of new technologies in the field of oceanography monitoring
- Operational implementation of the hydrodynamic and wave models for the continental shelf and littoral
- Creation of common data infrastructure platform to feed a common viewer.
- Development of specific final user products


Raia
www.marnaraia.com

# RAIA project

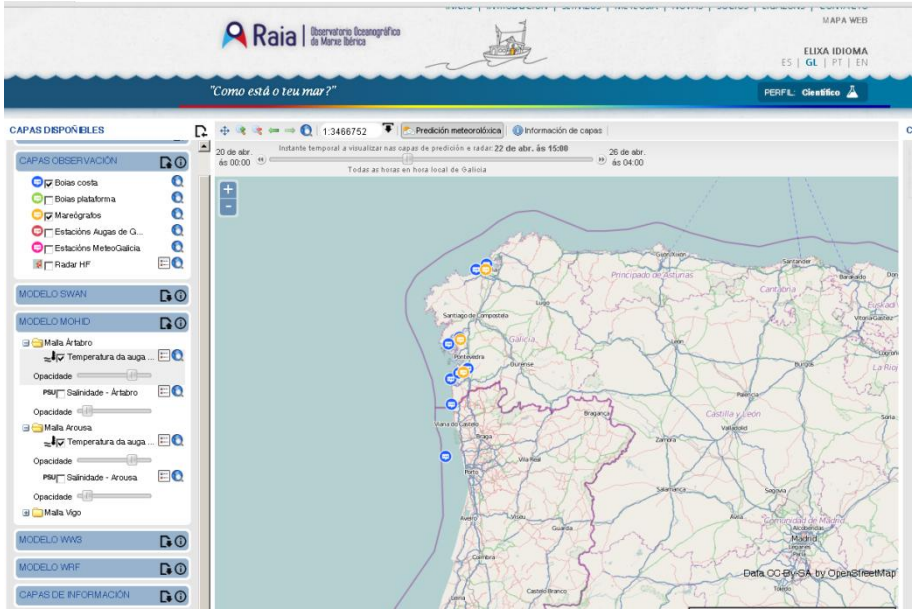
- Consolidate oceano-meteorologic observation network Galicia and north Portugal
- Development of new technologies in the field of oceanography monitoring
- Operational implementation of the hydrodynamic and wave models for the continental shelf and littoral
- Creation of common data infrastructure platform to feed a common viewer.
- Development of specific final user products



Raia
www.marnaraia.com

# RAIA project

- Consolidate oceano-meteorologic observation network Galicia and north Portugal
- Development of new technologies in the field of oceanography monitoring
- Operational implementation of the hydrodynamic and wave models for the continental shelf and littoral
- Creation of common data infrastructure platform to feed a common viewer.
- Development of specific final user products




www.marnaraia.com

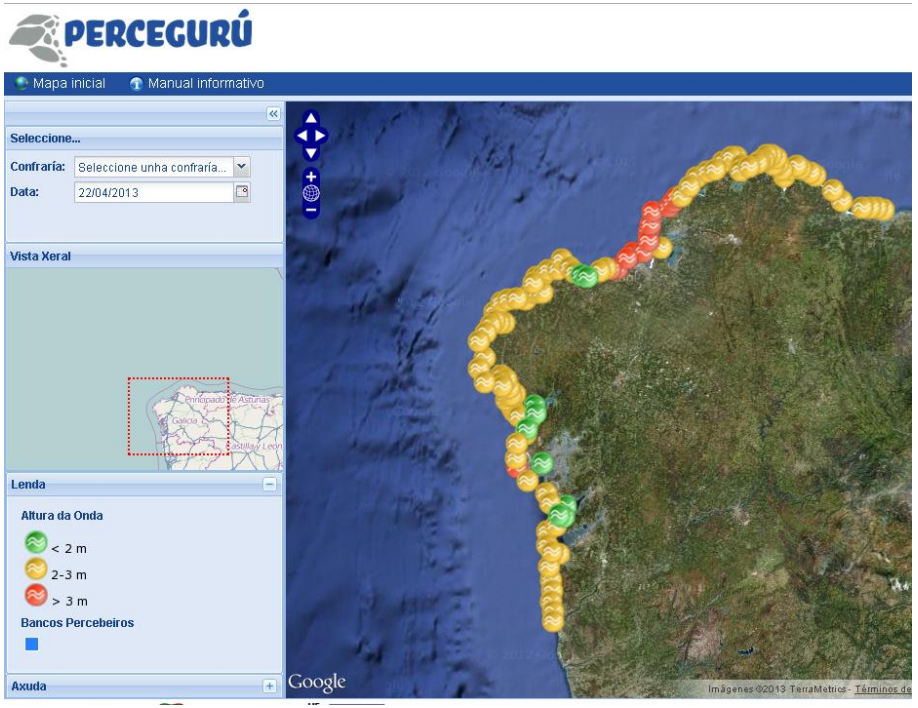
# RAIA project

- Consolidate oceano-meteorologic observation network Galicia and north Portugal
- Development of new technologies in the field of oceanography monitoring
- Operational implementation of the hydrodynamic and wave models for the continental shelf and littoral
- Creation of common data infrastructure platform to feed a common viewer.
- Development of specific final user products


Raia
www.marnaraia.com

# RAIA project

- Consolidate oceano-meteorologic observation network Galicia and north Portugal
- Development of new technologies in the field of oceanography monitoring
- Operational implementation of the hydrodynamic and wave models for the continental shelf and littoral
- Creation of common data infrastructure platform to feed a common viewer.
- Development of specific final user products




Raia
www.marnaraia.com

# Surface Sampling Network

## General Overview

Vessels

Data Processing

OGC Data servers

THREDDS

GeoServer

Final Users

Raia

www.marnaraia.com

# Vessels






Raia
www.marnaraia.com

# Vessels

## Sensor description

SBE 21 Thermosalinograph


Turner 10- AU fluorometer


Raia
www.marnaraia.com

# Vessels

## Calibration Program

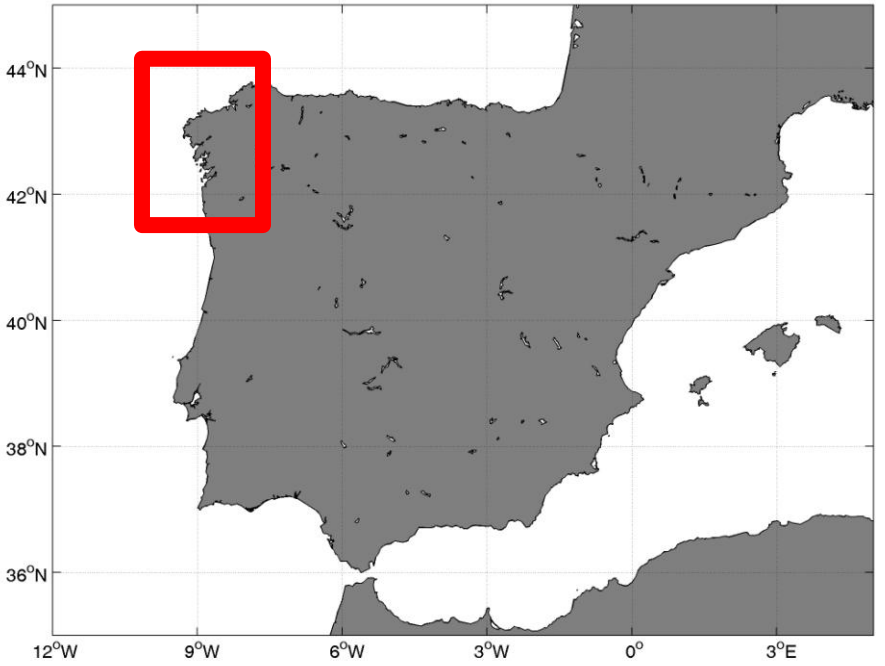


**http://webs.cetmar.org/utmar**

Raia
www.marnaraia.com

# Vessels

Jose María Navaz

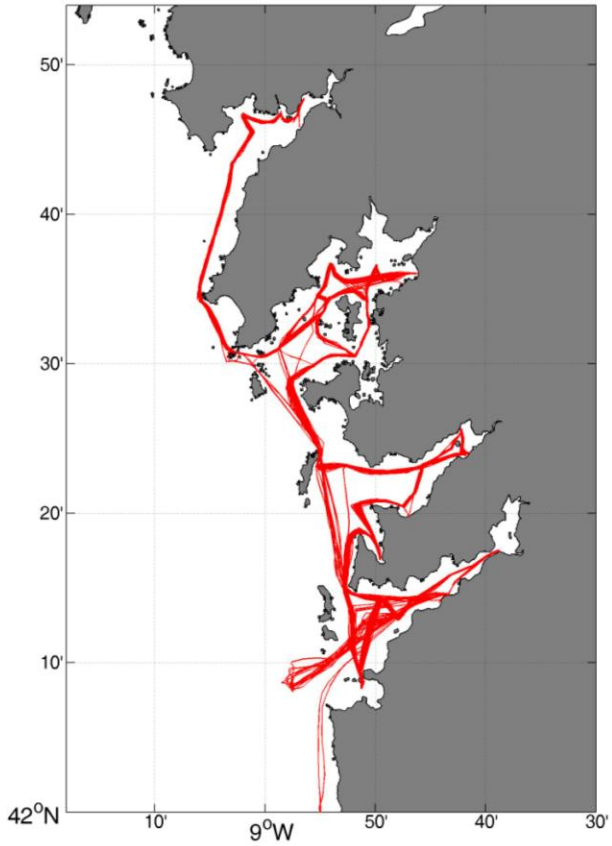



- Coastal ship (16 m)
- HAB monitoring
- RADIALES section

Raia
www.marnaraia.com

# Vessels

Jose María Navaz



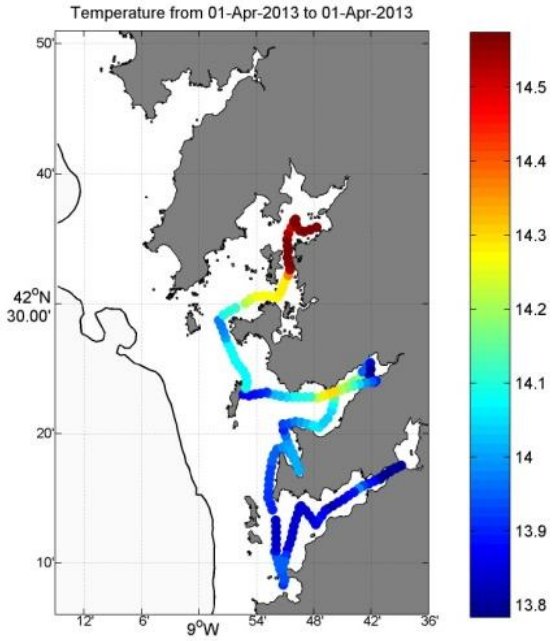

- Coastal ship (16 m)
- HAB monitoring
- RADIALES section

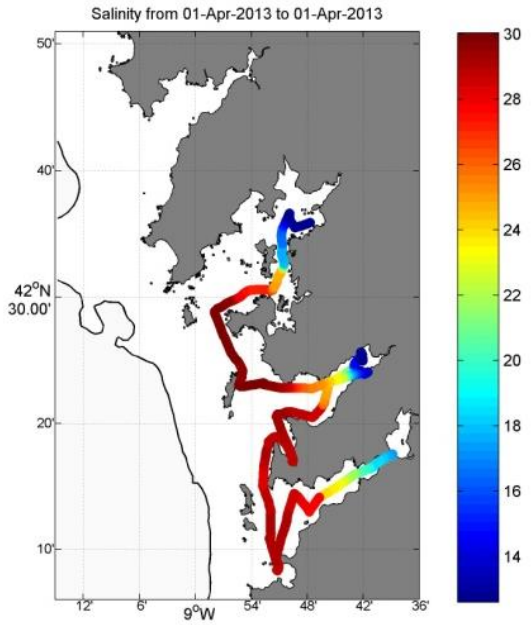
Raia
www.marnaraia.com

# Vessels

## Jose María Navaz

- Coastal ship (16 m)
- HAB monitoring
- RADIALES section

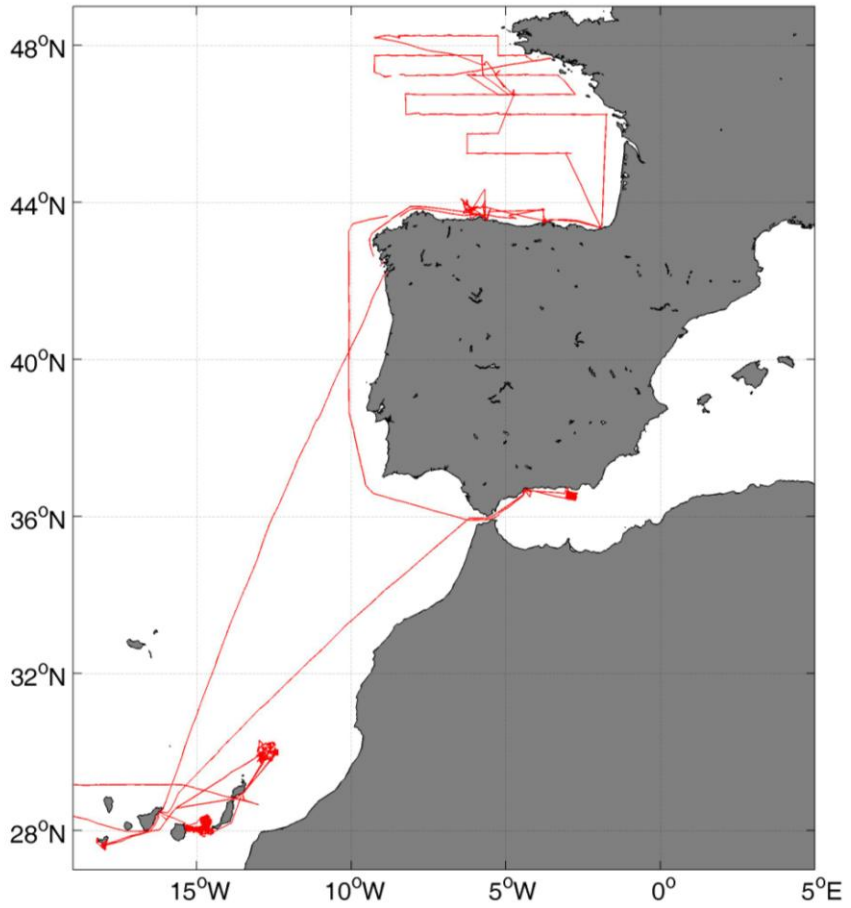



Raia
www.marnaraia.com

# Vessels

## Angeles Alvariño

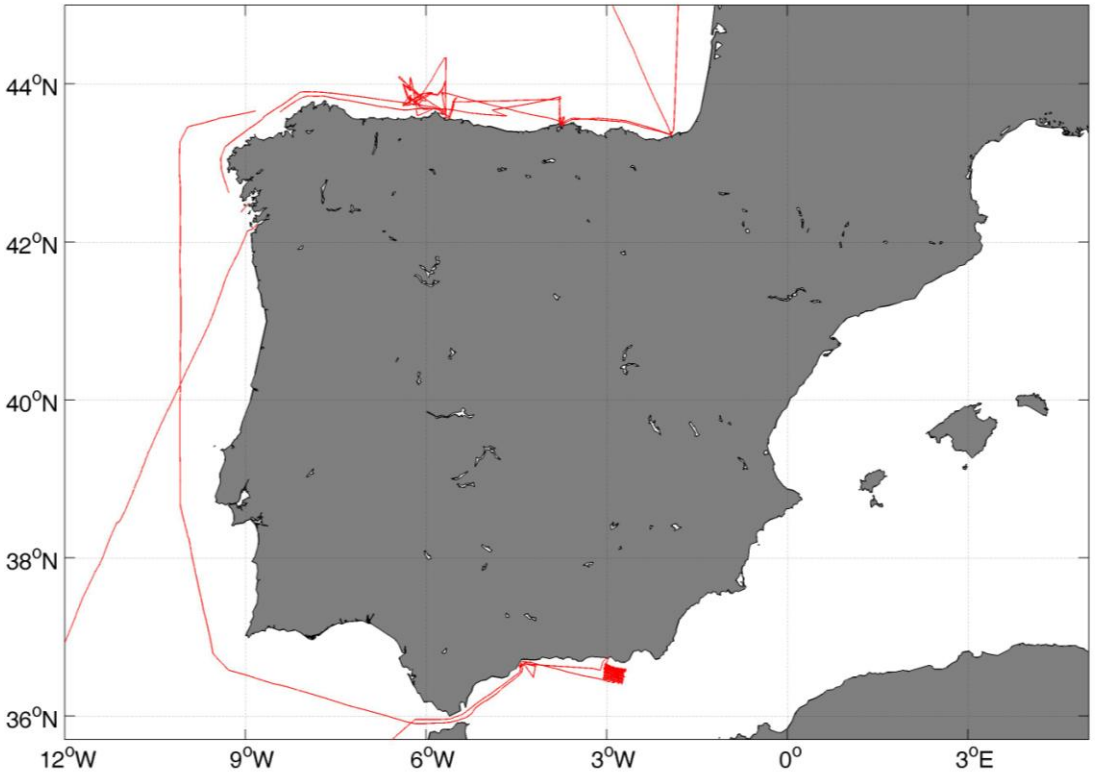



- Regional ship (46 m)
- Multidisciplinary campaign
- El Hierro

Raia
www.marnaraia.com

# Vessels

## Angeles Alvariño

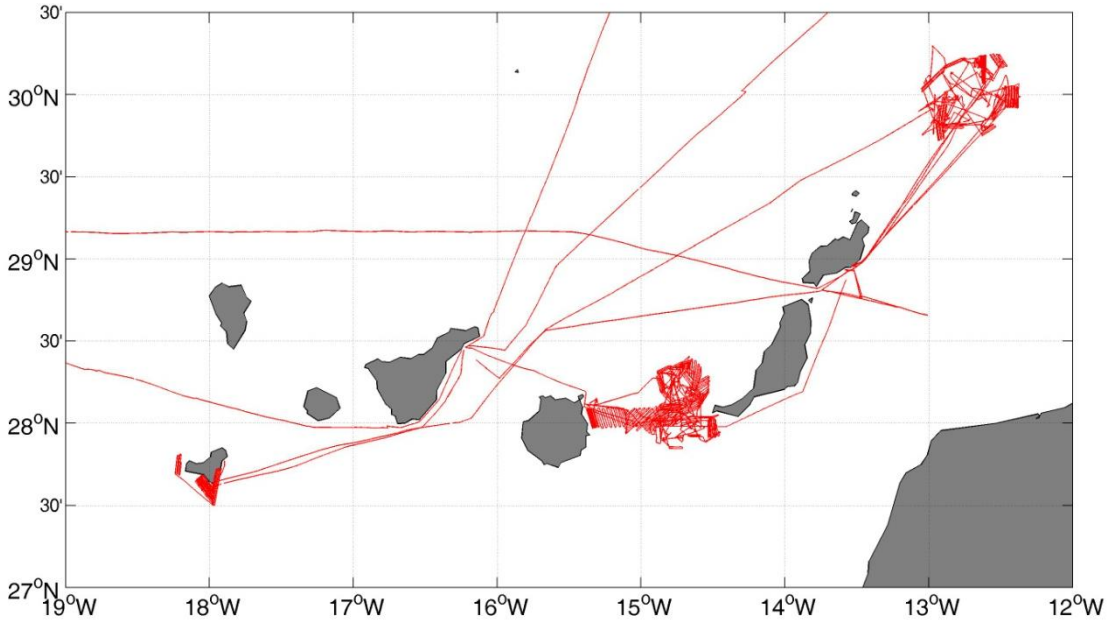



- Regional ship (46 m)
- Multidisciplinary campaign
- El Hierro

Raia
www.marnaraia.com

# Vessels

## Angeles Alvariño



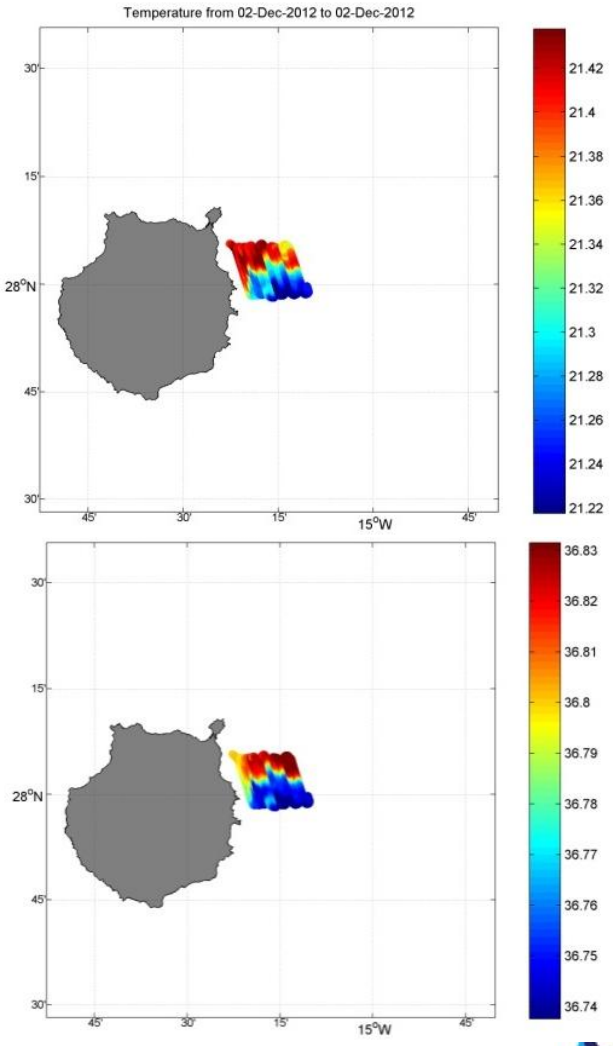

- Regional ship (46 m)
- Multidisciplinary campaign
- El Hierro

Raia
www.marnaraia.com

# Vessels

## Angeles Alvariño

- Regional ship (46 m)
- Multidisciplinary campaign
- El Hierro

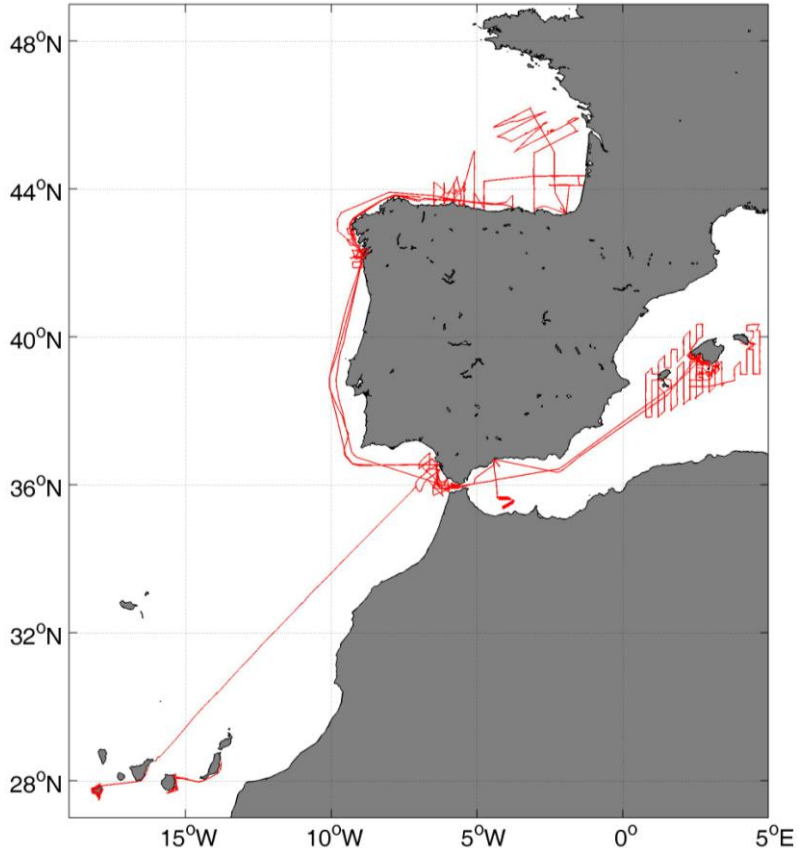



Raia
www.marnaraia.com

# Vessels

## Ramón Margalef

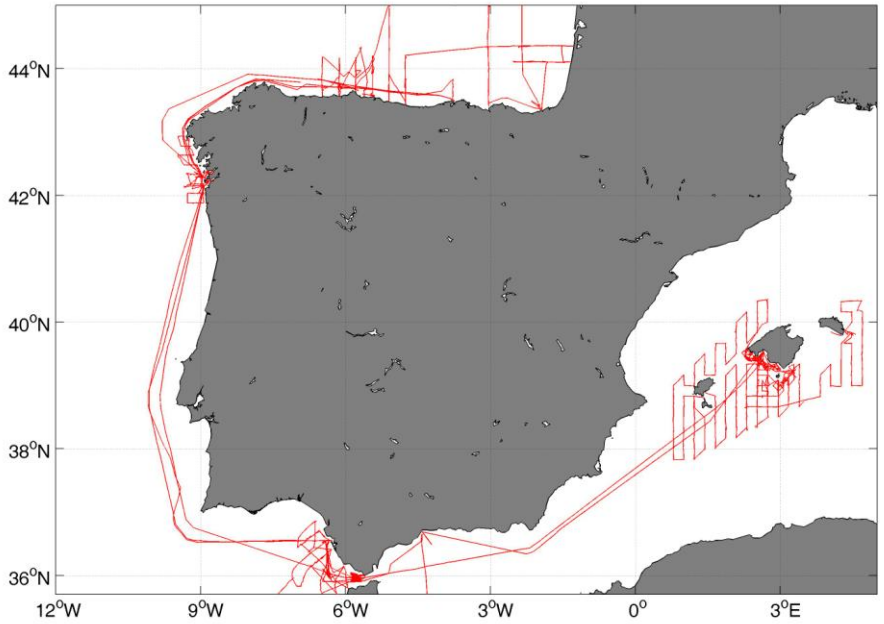

- Regional ship (46 m)
- Multidisciplinary campaign
- RADIALES




Raia
www.marnaraia.com

# Vessels

## Ramón Margalef

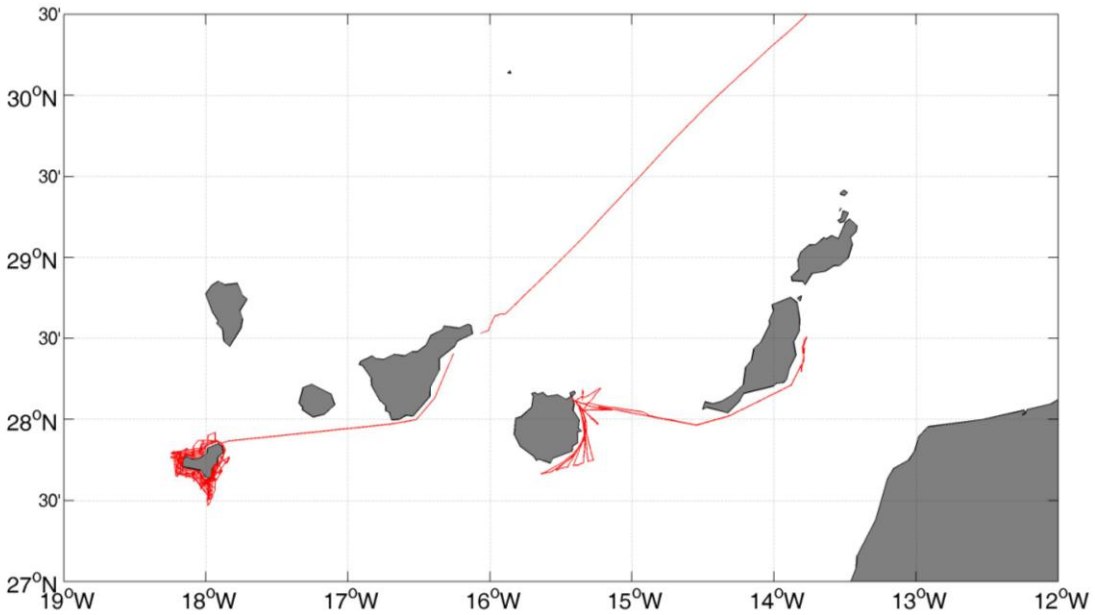




- Regional ship (46 m)
- Multidisciplinary campaign
- RADIALES

Raia
www.marnaraia.com

# Vessels

## Ramón Margalef

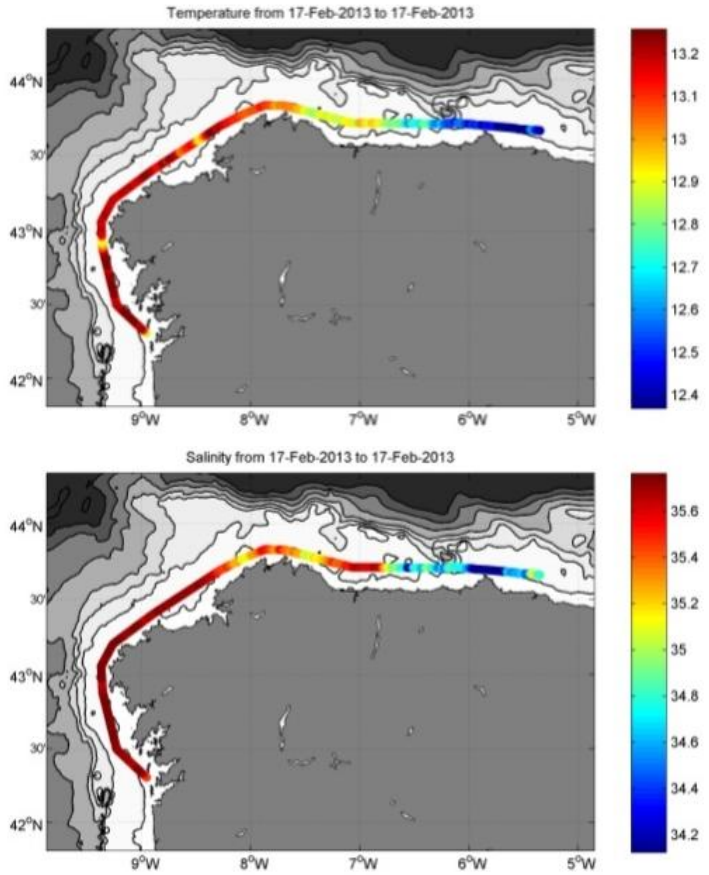




- Regional ship (46 m)
- Multidisciplinary campaign
- RADIALES

Raia
www.marnaraia.com

# Vessels

## Ramón Margalef

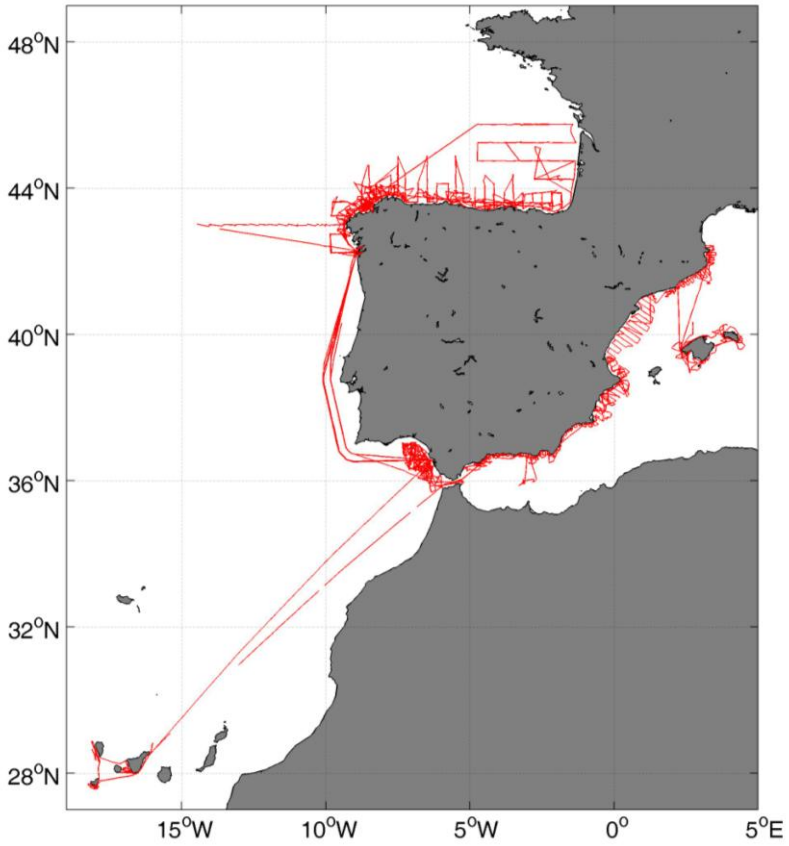

- Regional ship (46 m)
- Multidisciplinary campaign
- RADIALES

Raia
www.marnaraia.com

# Vessels

## Cornide de Saavedra

- Oceanic ship (67 m)
- Multidisciplinary campaign
- Fisheries assessment

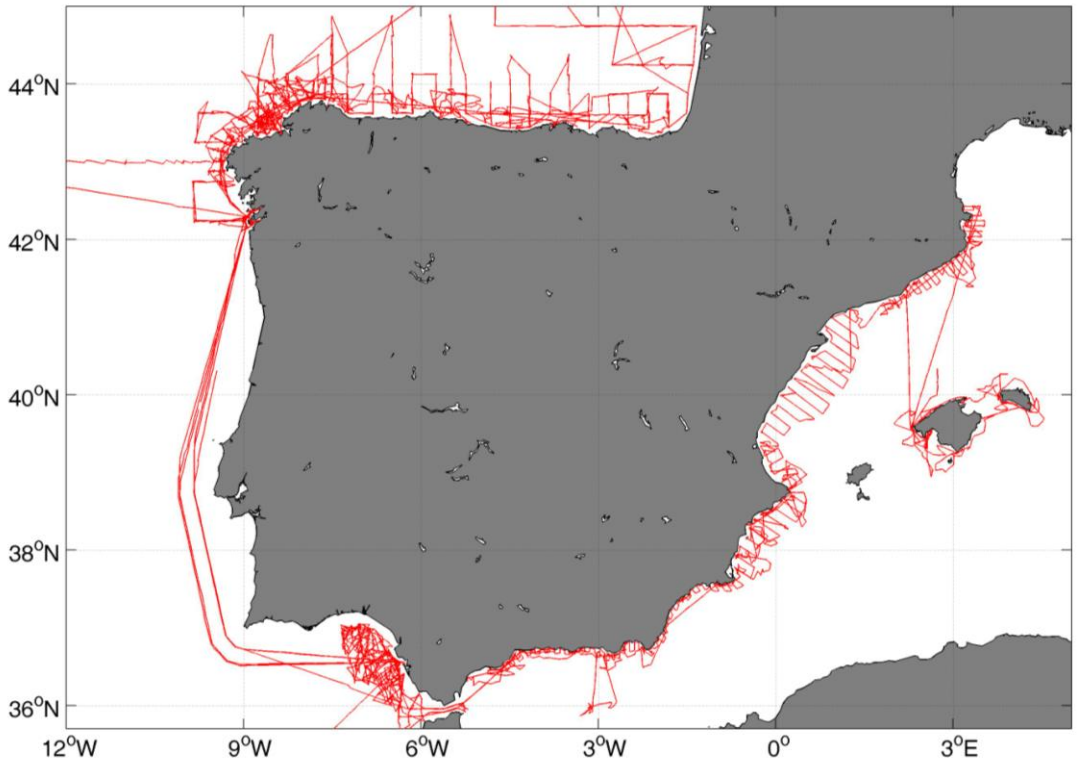



Raia
www.marnaraia.com

# Vessels

## Cornide de Saavedra

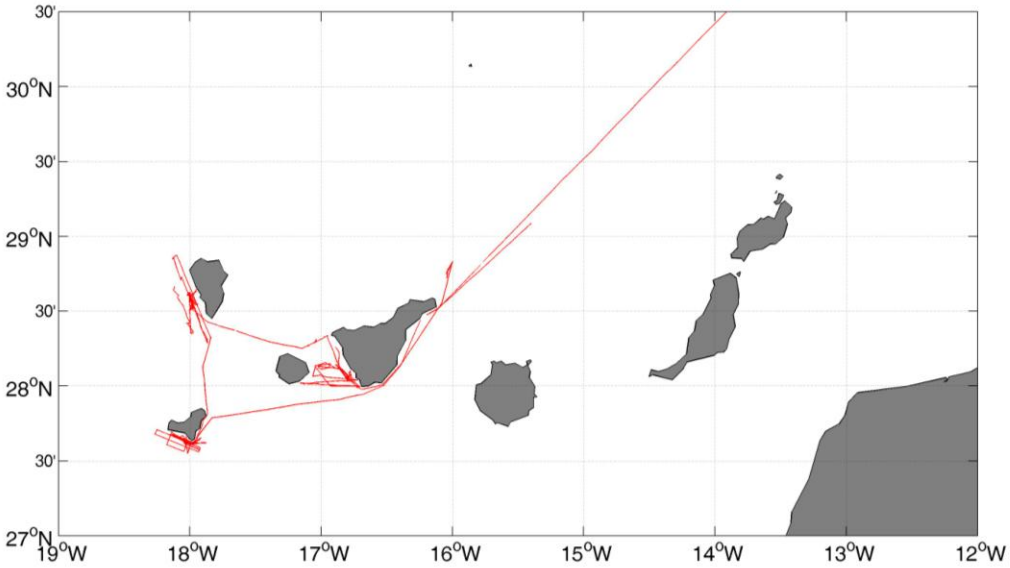
- Oceanic ship (67 m)
- Multidisciplinary campaign
- Fisheries assessment




Raia
www.marnaraia.com

# Vessels

## Cornide de Saavedra



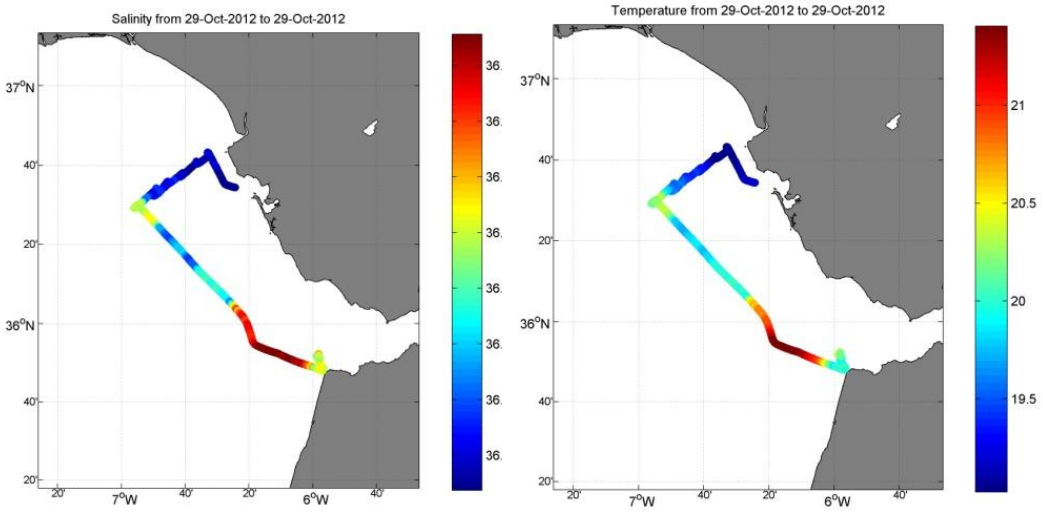

- Oceanic ship (67 m)
- Multidisciplinary campaign
- Fisheries assessment

Raia
www.marnaraia.com

# Vessels

## Cornide de Saavedra

- Oceanic ship (67 m)
- Multidisciplinary campaign
- Fisheries assessment

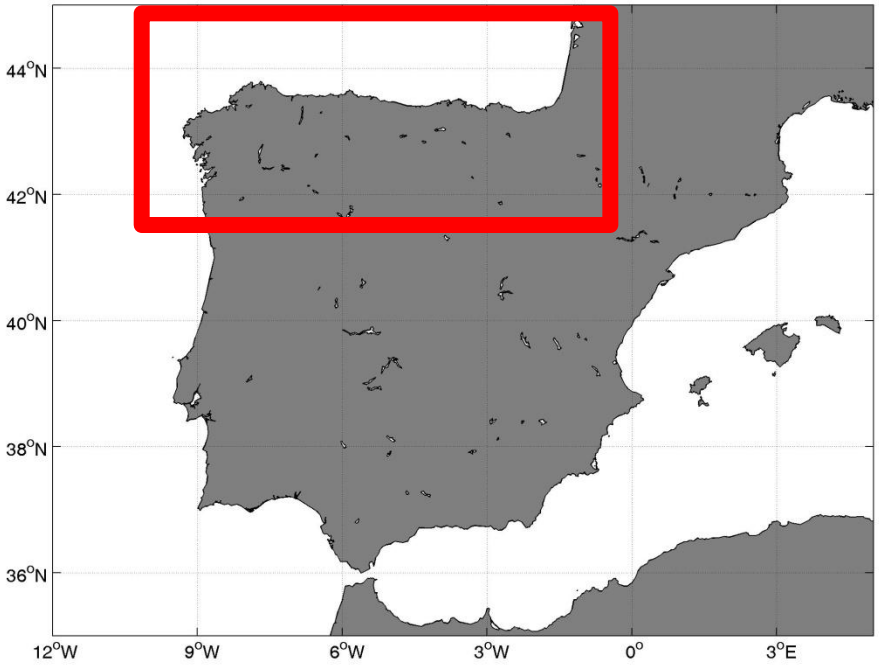



Raia
www.marnaraia.com

# Vessels

## Miguel Oliver


- Oceanic ship (70 m)
- Multidisciplinary campaign
- Fisheries assessment




Raia
www.marnaraia.com

# Processing System

## General Overview

Vessels

Data Processing

OGC Data servers

THREDDS

GeoServer

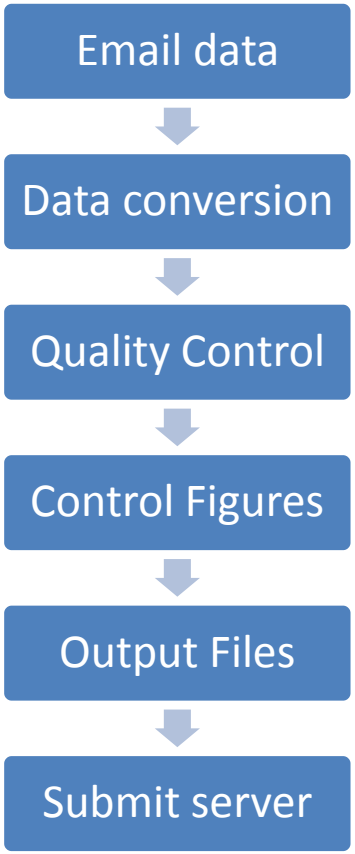
Final Users

Raia

www.marnaraia.com

# Data processing system

- Reception of vessel data by email
- Data conversion
- Quality Control
- Control figures.
- Convert  to output formats
  - netcdf
  - shapefiles  (GIS)
- Submit to data servers
  - Thredds
  - Geoserver

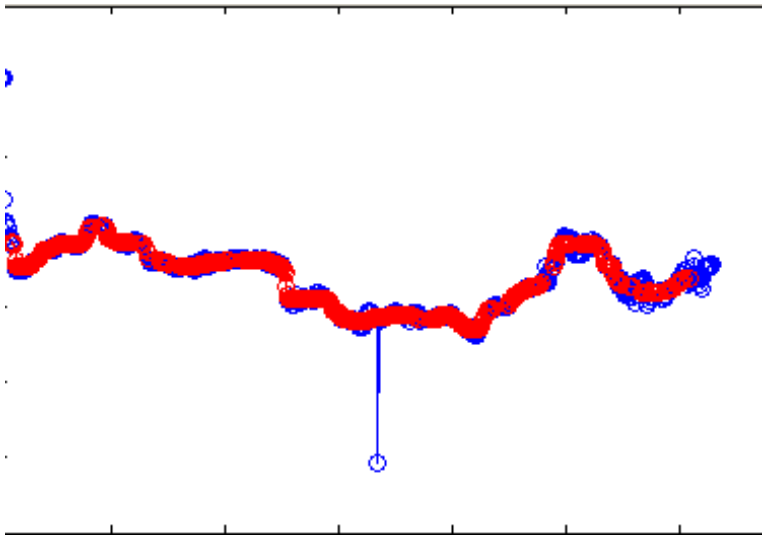



Raia
www.marnaraia.com

# Data processing system

Quality Control

- Range filter
- Spike filters.
- Position filters
- Vessel operation filters
  - Speed filters
  - Pump errors

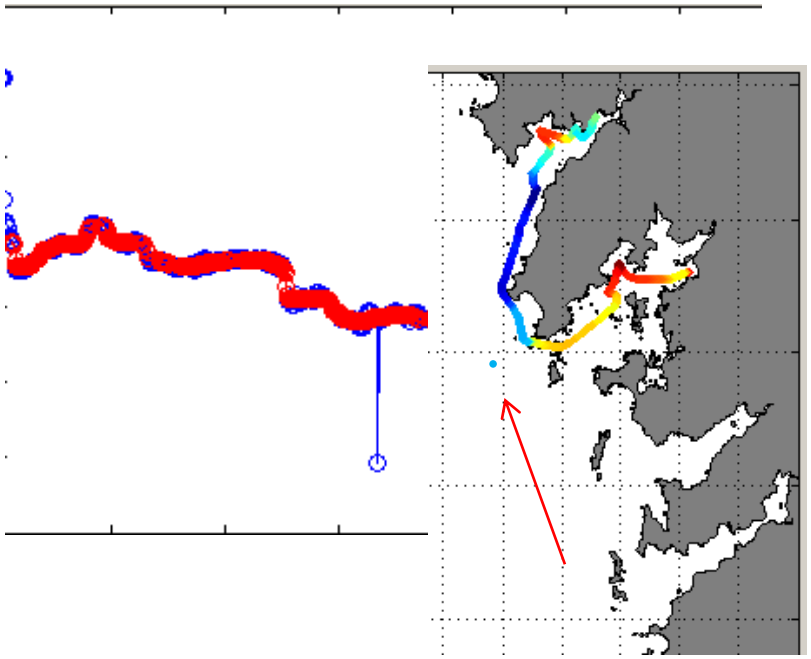


Raia
www.marnaraia.com

# Data processing system

Quality Control

- Range filter
- Spike filters.
- Position filters
- Vessel operation filters
  - Speed filters
  - Pump errors

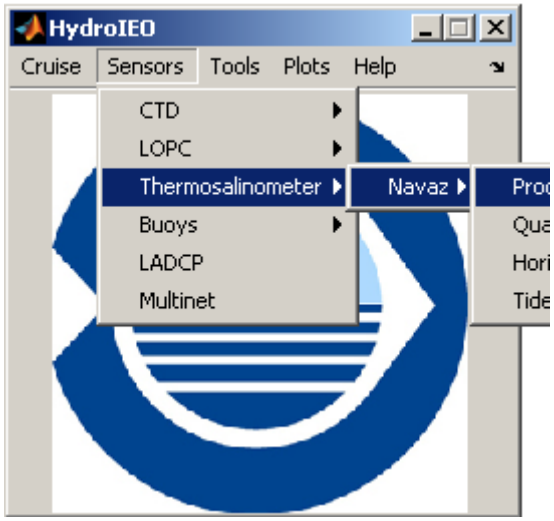


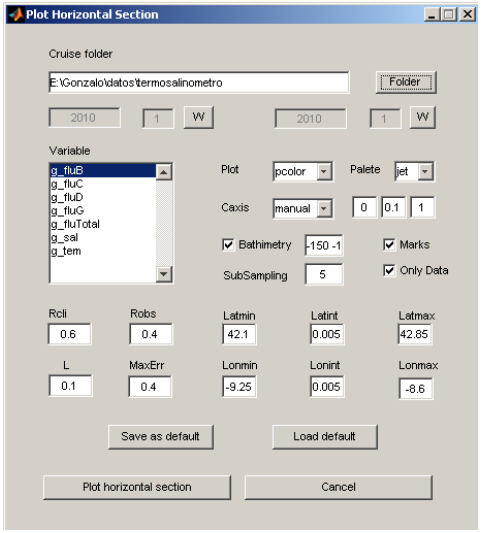
Raia
www.marnaraia.com

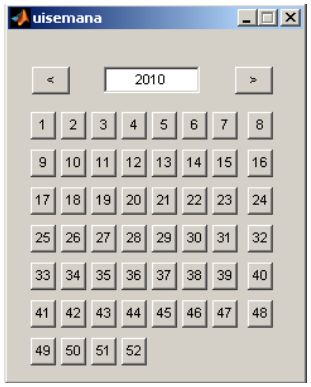
# Processing System

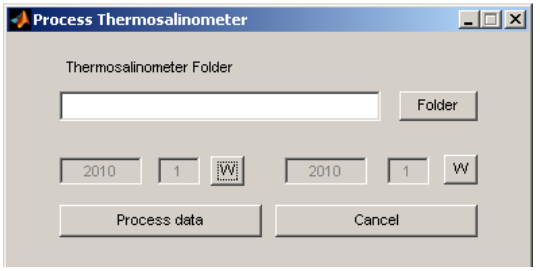
## Manual QC

- User friendly
- Check auto-QC
- Modify and flag data manually
- Resend data to data servers



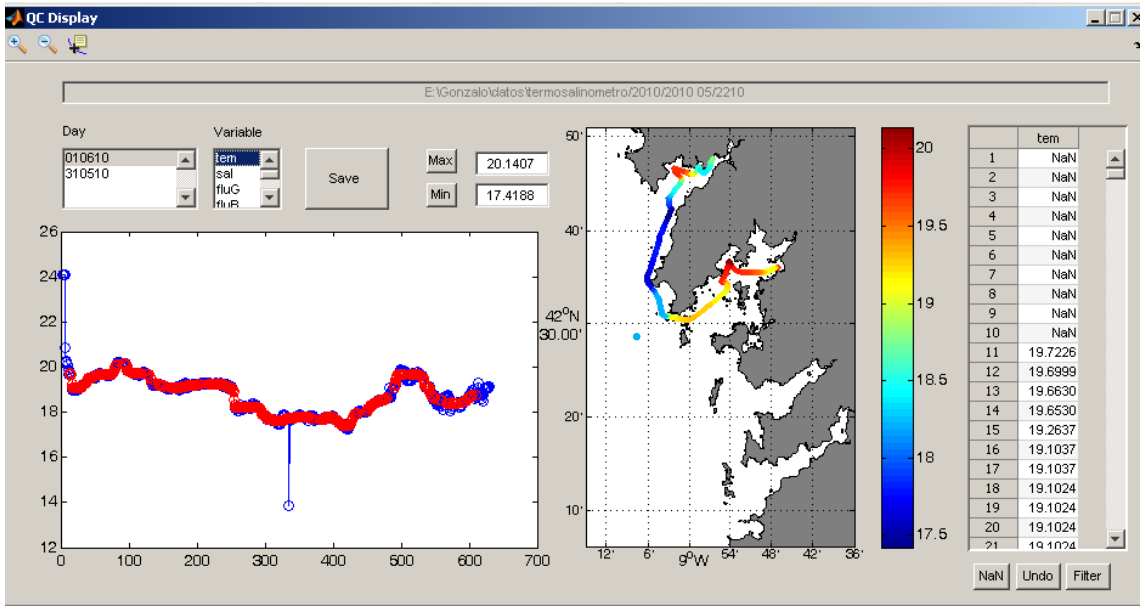




Raia
www.marnaraia.com

# Processing System

## Manual QC

- User friendly
- Check auto-QC
- Modify and flag data manually
- Resend data to data servers

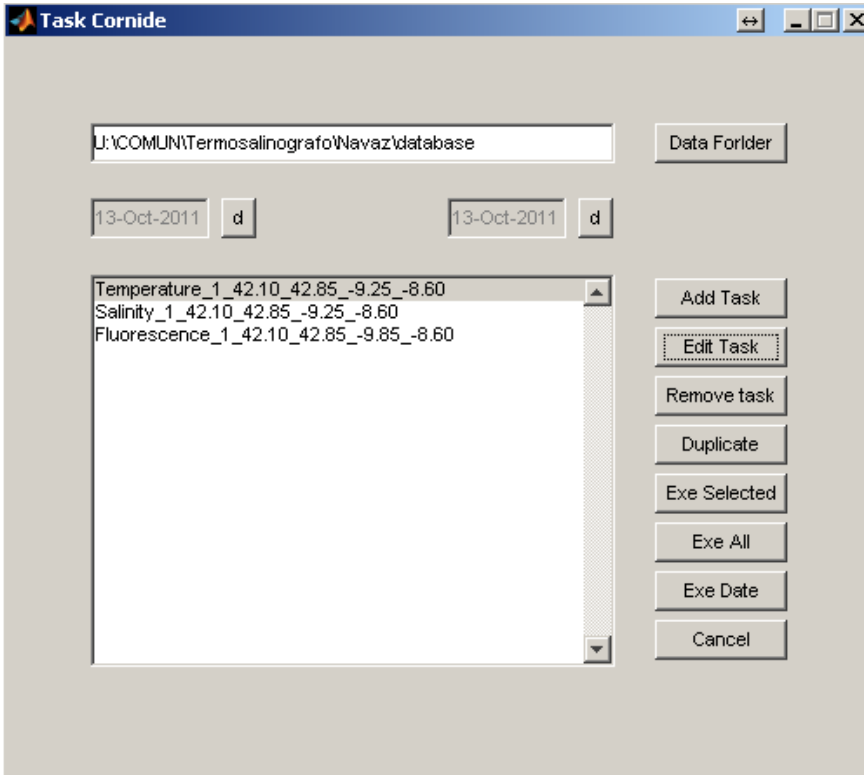



www.marnaraia.com

# Processing System

## Tasks

- User Friendly
- Modular
- Configurable tasks
  - Aggregation frequencies
  - Quick figures
  - Output Formats

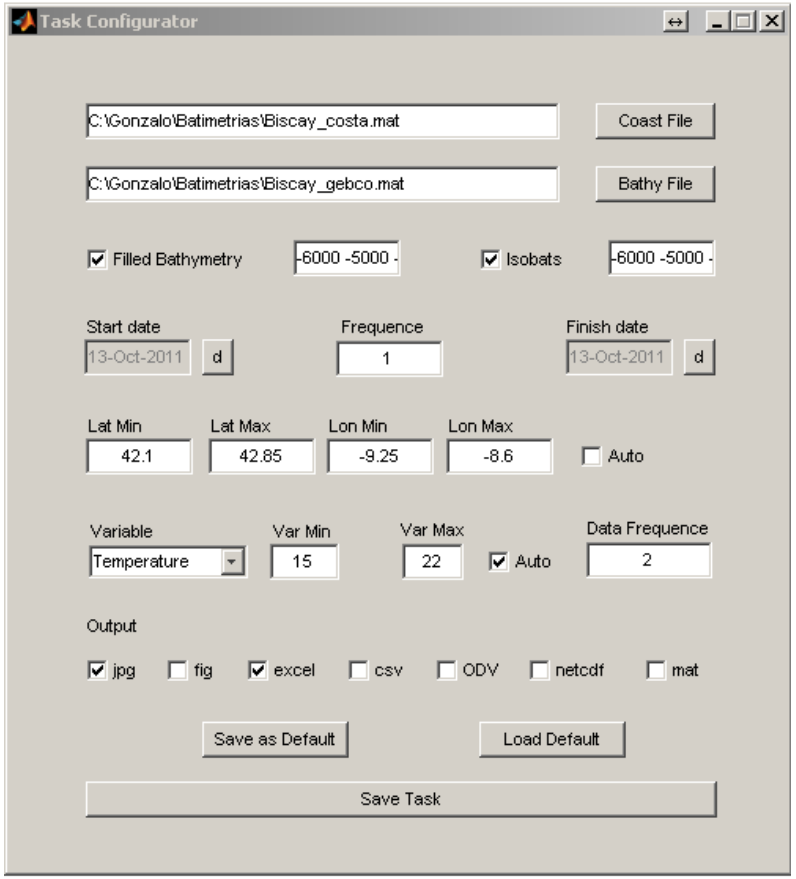



Raia
www.marnaraia.com

# Processing System

## Tasks

- User Friendly
- Modular
- Configurable tasks
  - Aggregation frequencies
  - Quick figures
  - Output Formats




Raia
www.marnaraia.com

# Data servers

## General Overview

Sampling Network

Data Processing

OGC Data servers

THREDDS

GeoServer

Final Users

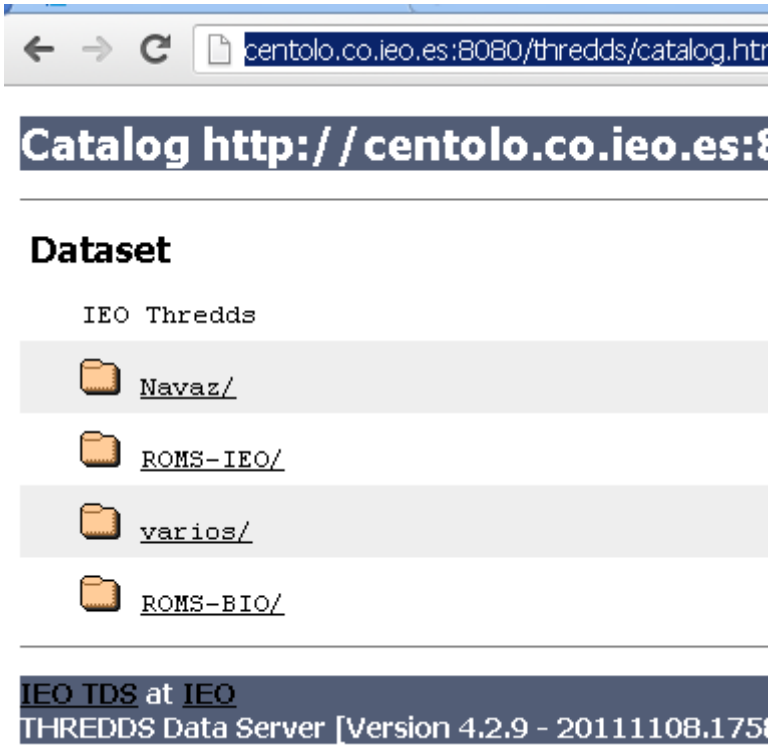
Raia

www.marnaraia.com

# Data servers

Thematic Realtime Environmental Distributed Data Services (Thredds)

- netCDF CF compliant
- Catalog
- OGC services
  - Data access
  - Visualization
- Ad hoc viewer
  - Openlayers
  - Google maps api



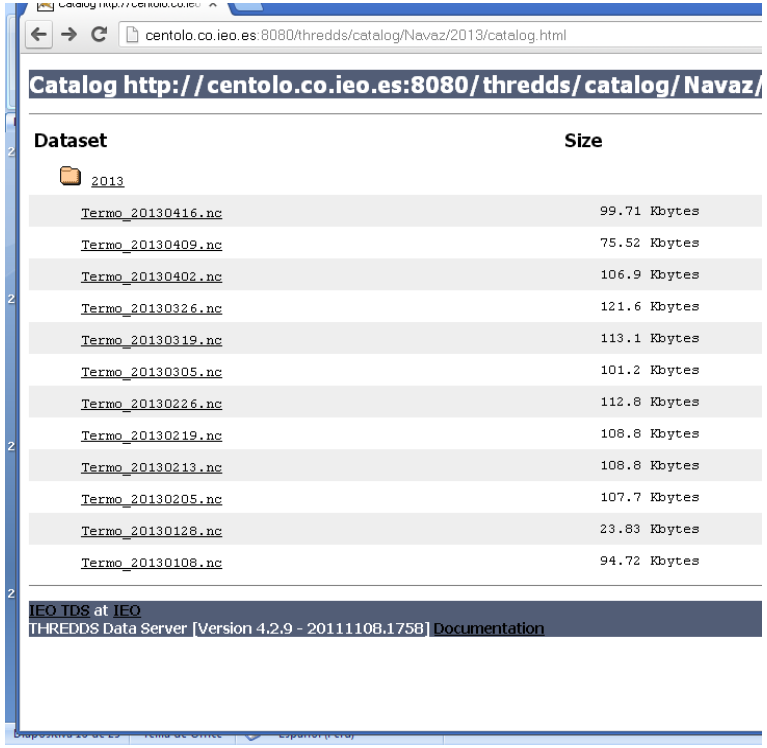

**http://centolo.co.ieo.es:8080/thredds**

Raia
www.marnaraia.com

# Data servers

Thematic Realtime Environmental Distributed Data Services (Thredds)

- netCDF CF compliant
- Catalog
- OGC services
  - Data access
  - Visualization
- Ad hoc viewer
  - Openlayers
  - Google maps api




**http://centolo.co.ieo.es:8080/thredds**

Raia
www.marnaraia.com

# Data servers

## Thematic Realtime Environmental Distributed Data Services (Thredds)

- netCDF CF compliant
- Catalog
- OGC services
  - Data access
  - Visualization
- Ad hoc viewer
  - Openlayers
  - Google maps api

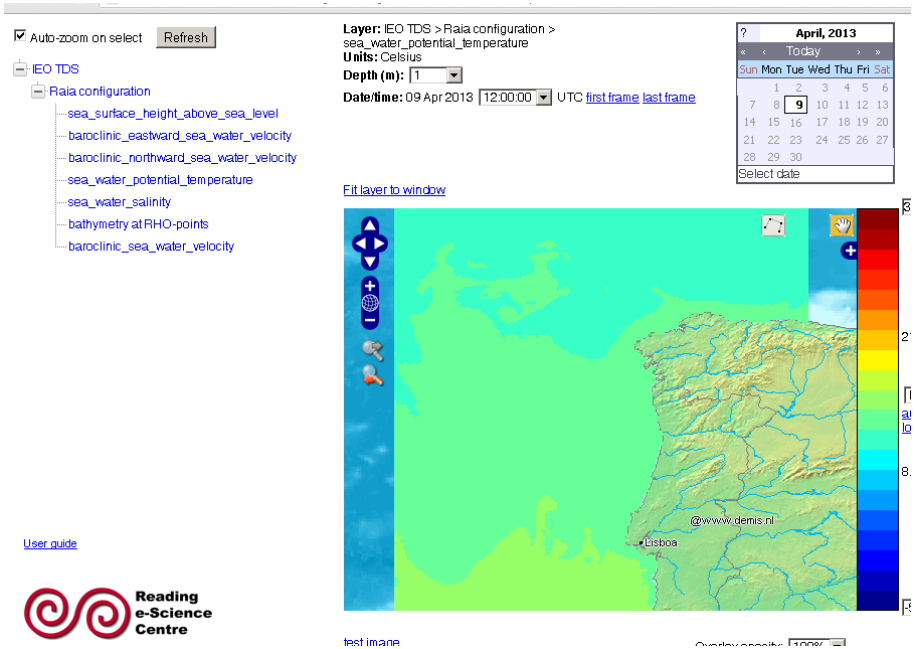

**http://centolo.co.ieo.es:8080/thredds**

Raia
www.marnaraia.com

# Data servers

## Thematic Realtime Environmental Distributed Data Services (Thredds)

- netCDF CF compliant
- Catalog
- OGC services
  - Data access
  - Visualization
- Ad hoc viewer
  - Openlayers
  - Google maps api




**http://centolo.co.ieo.es:8080/thredds**

Raia
www.marnaraia.com

# Data servers

## Geoserver

- Shapefile (GIS)
- OGC services
  - Visualization
    - Google earth
    - Openlayers
- Ad hoc viewer
  - Openlayers
  - Google maps api

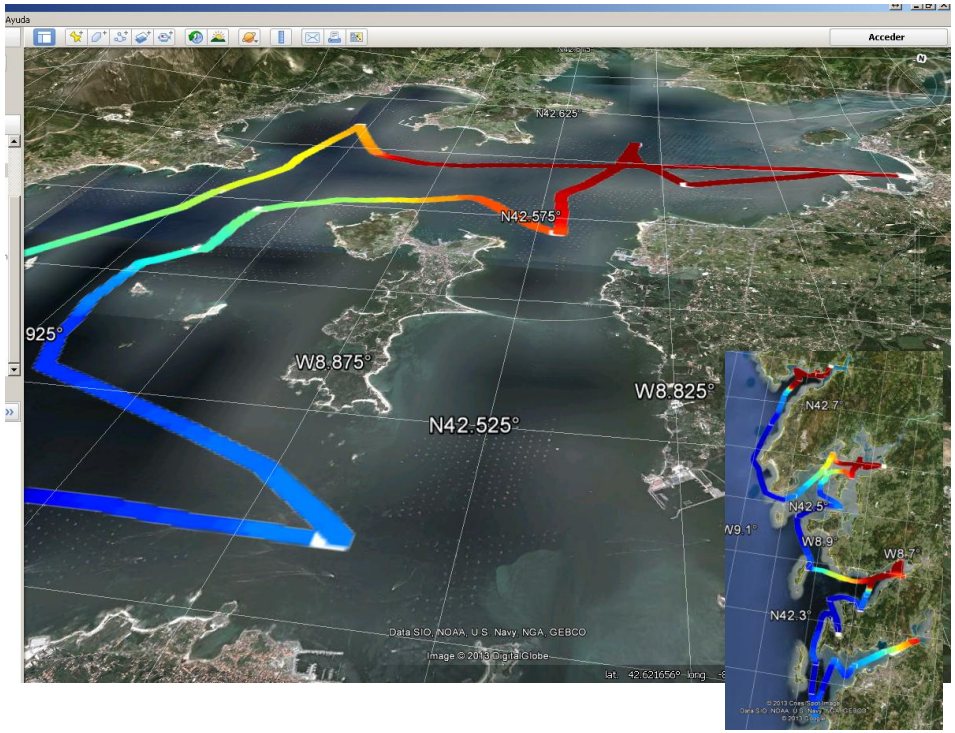

**http://centolo.co.ieo.es:8080/geoserver**

Raia
www.marnaraia.com

# Data servers

## Geoserver

- Shapefile (GIS)
- OGC services
  - Visualization
    - Google earth
    - Openlayers
- Ad hoc viewer
  - Openlayers
  - Google maps api



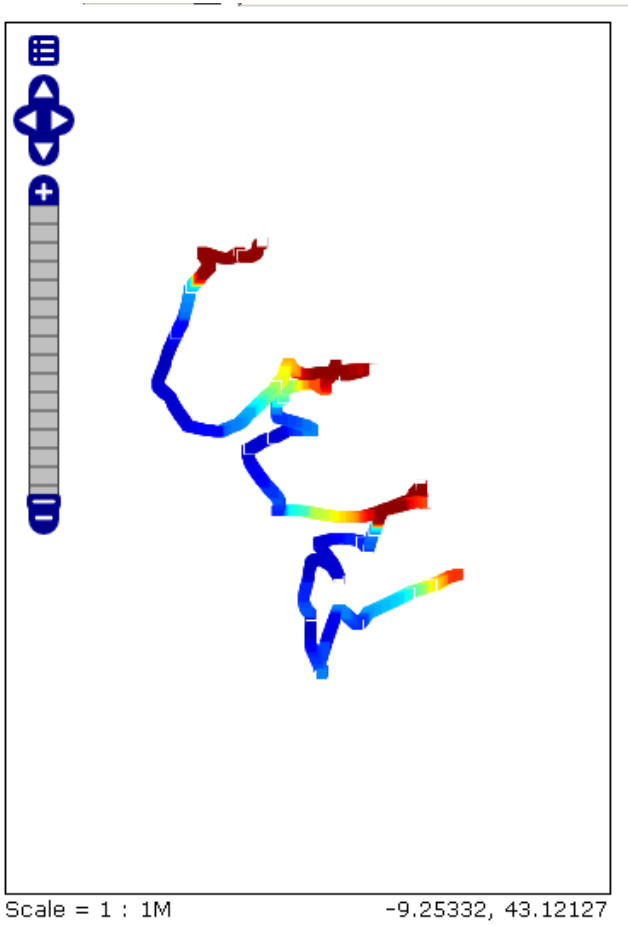

**http://centolo.co.ieo.es:8080/geoserver**

Raia
www.marnaraia.com

# Data servers

## Geoserver

- Shapefile (GIS)
- OGC services
  - Visualization
    - Google earth
    - Openlayers
- Ad hoc viewer
  - Openlayers
  - Google maps api




**http://centolo.co.ieo.es:8080/geoserver**

Raia
www.marnaraia.com

# Data examples

## General Overview

Sampling Network

Data Processing

OGC Data servers

THREDDS

GeoServer

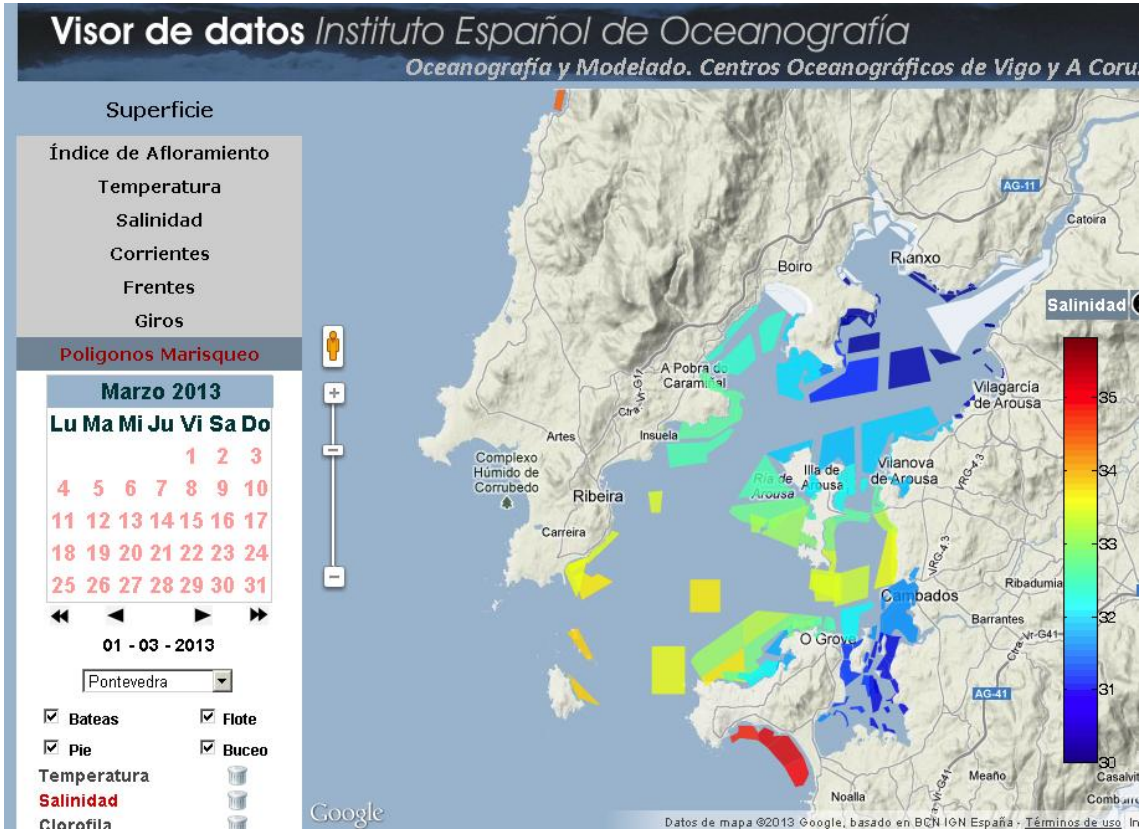
Final Users

www.marnaraia.com

# Data examples

## Shellfishing Environmental Data Information System

- Operational ROMs
- Daily update
- Present data and predictions
- Historic data
- Vessels data to validate



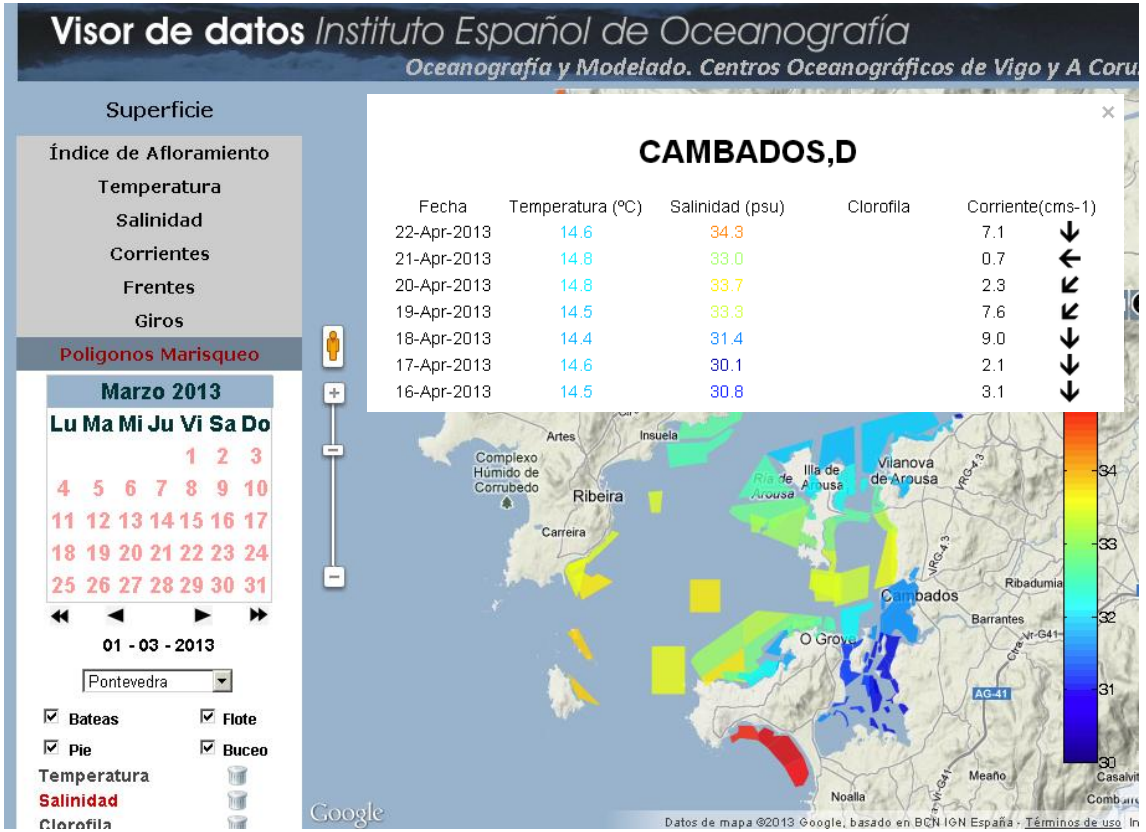

**http://www.indicedeafloramiento.ieo.es**

Raia
www.marnaraia.com

# Data examples

## Shellfishing Environmental Data Information System

- Operational ROMs
- Daily update
- Present data and predictions
- Historic data
- Vessels data to validate



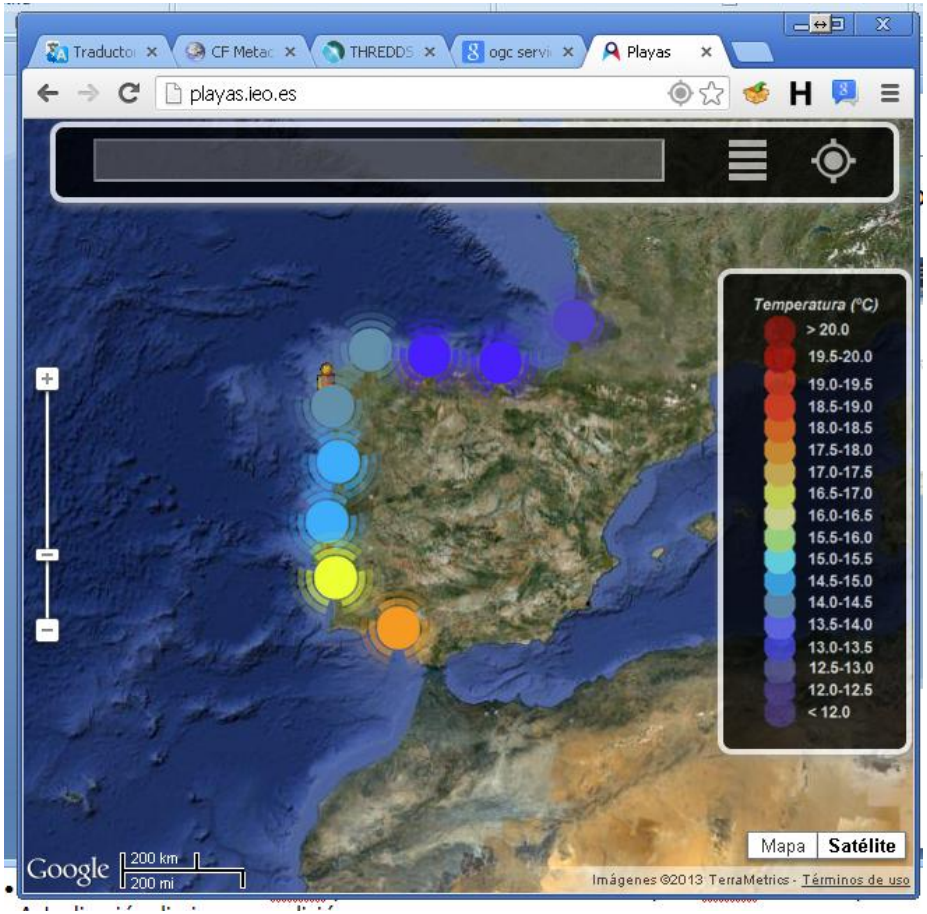

**http://www.indicedeafloramiento.ieo.es**

Raia
www.marnaraia.com

# Data examples

## Beach Environmental Data Information System

- Operational ROMs
- Daily update
- Present data and predictions
- Hourly enviromental information
- Vessels data to validate



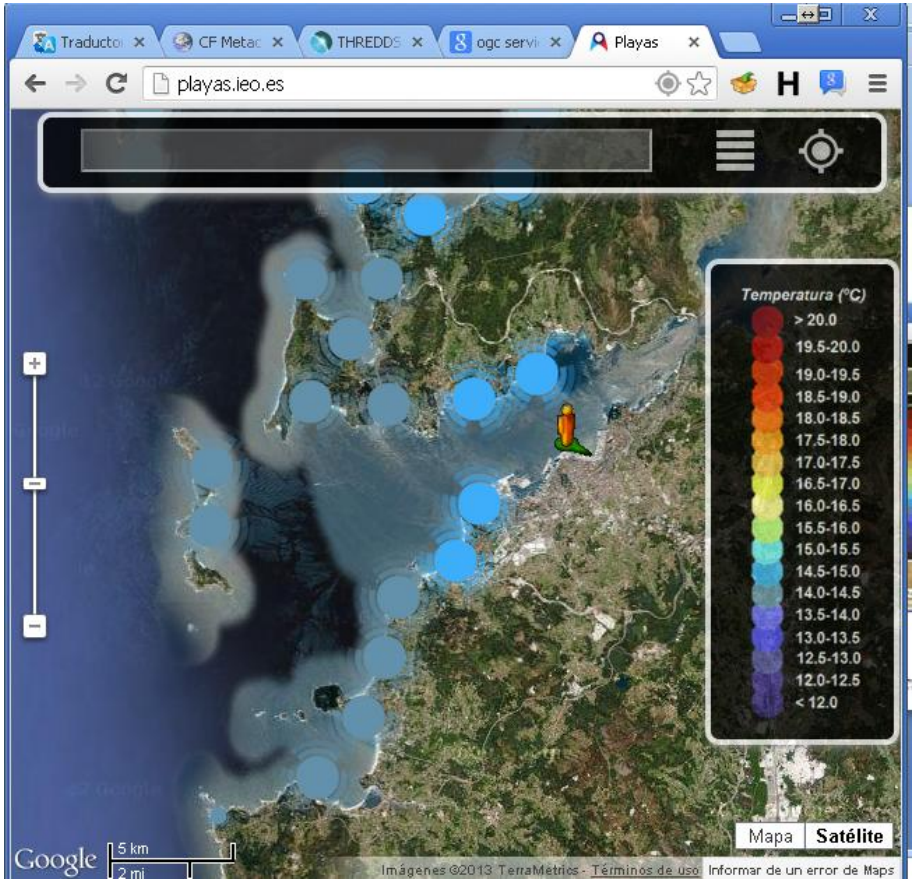

**http://playas.ieo.es**

Raia
www.marnaraia.com

# Data examples

## Beach Environmental Data Information System

- Operational ROMs
- Daily update
- Present data and predictions
- Hourly enviromental information
- Vessels data to validate



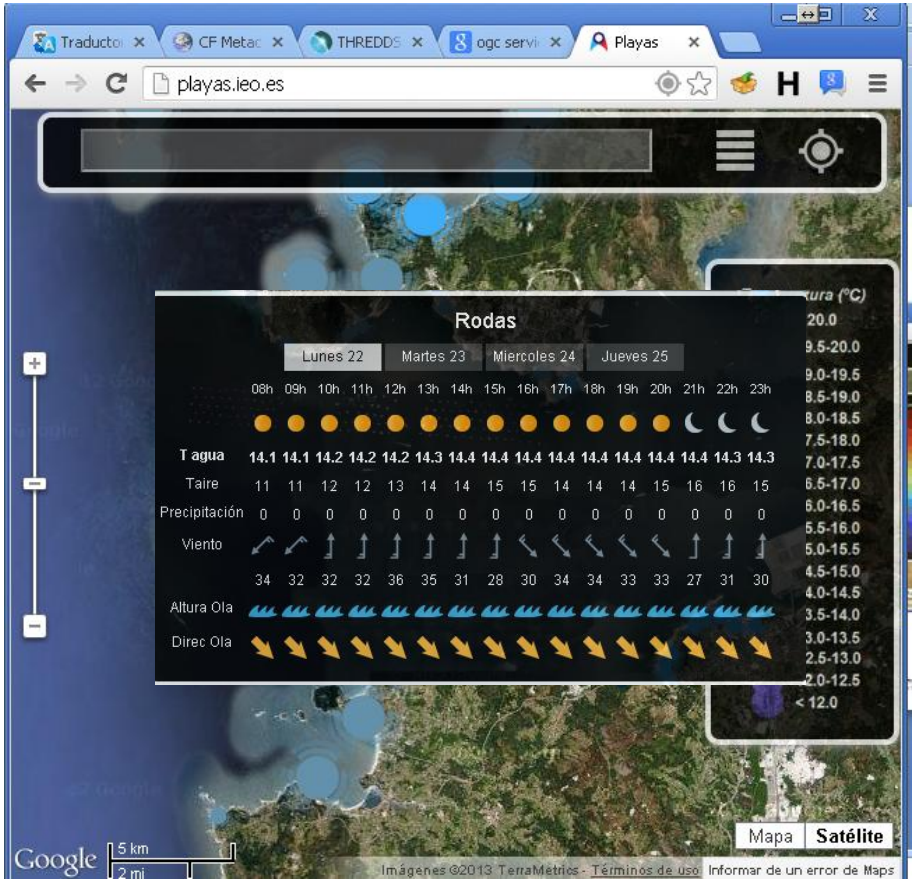

**http://playas.ieo.es**

Raia
www.marnaraia.com

# Data examples

## Beach Environmental Data Information System

- Operational ROMs
- Daily update
- Present data and predictions
- Hourly enviromental information
- Vessels data to validate



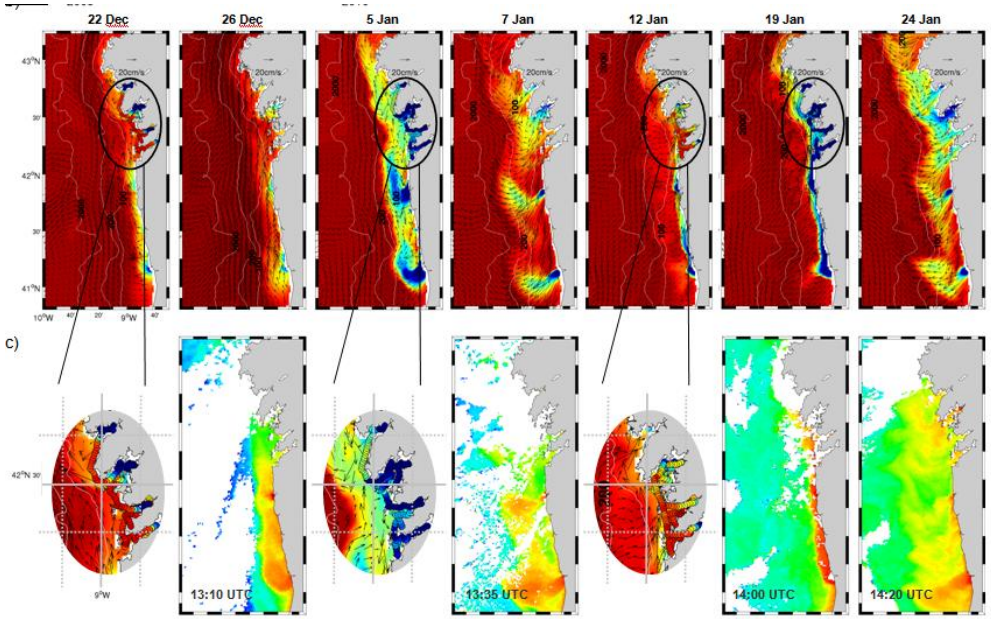

**http://playas.ieo.es**

Raia
www.marnaraia.com

# Data examples

## Validation of River Plume Expansion-Contraction event

- Expansión contraction of Iberian Bouyant plume 2011
- Validation of ROMs model with thermosalinograph and satellite data




Otero et al. 2013

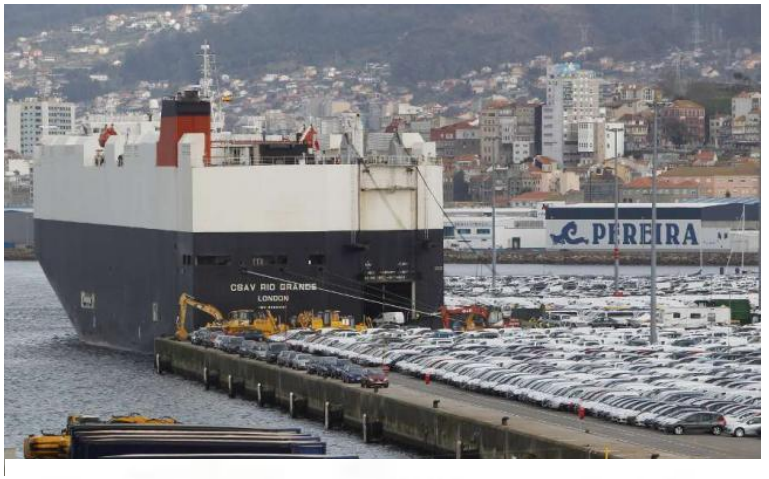
Raia
www.marnaraia.com

# Work In Progress

- Sampling Network is operative.
- The Data processing system is 90 % developed
  - Finish Data server updating
- Adapt the software and data servers to implement Inspire metadata format
- Development of ad hoc viewer

Raia
www.marnaraia.com

# Future?



N42.625°
N42.575°
925°
W8.875°
W8.825°
N42.525°
Thank you
for your attention
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image © 2013 DigitalGlobe
Google earth
lat. 42.621656° long. -8.947970° elev. 95 m alt. ojo 5.59 km