

Observatorio Oceánico da Marxe Ibérica (RAIA)

Oceanic observatory for the Iberian shelf (RAIA)

Interreg IV-A (2009-2011-2013)

Galicia – North of Portugal

<http://www.observatorioraia.org>

Coordination: Consellería de Medio Ambiente. MeteoGalicia. Xunta de Galicia

Partners: 12

Budget: 3,6 M€ + 2,9 M€



Objectives

- Improve the oceanic observation at the Western Iberian Peninsula in terms of meteorological, oceanographical and water quality data. To that end, 5 new buoys will be located at the near-coast.
- Improve operational forecasting models; hydrodynamic and biogeochemical.
- Build up a new operational server www.observatorioraia.org where all the information will be served to the community.
- Prepare specific tools to end-users; harbors, renewable energies, fishermen, tourism, etc

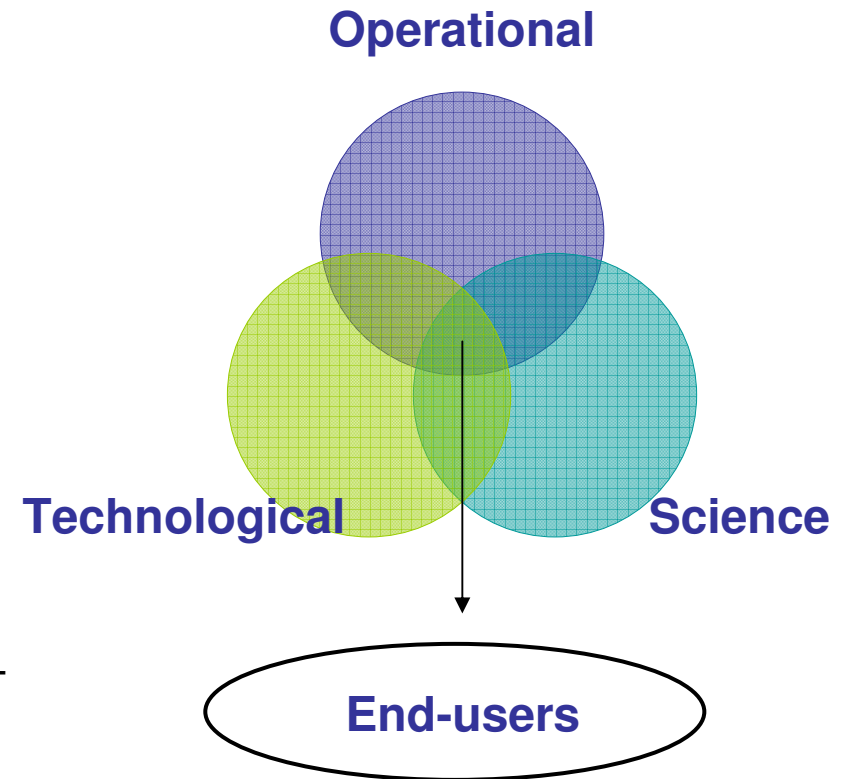
13 Partners

- **Portugal**

- Instituto Hidrográfico (IH)
- Universidade de Porto (UP); INEGI, INESCP, FEUP, FCUP
- Universidade de Aveiro (UA)
- CIIMAR (Porto)

- **Galicia**

- Instituto Español de Oceanografía (IEO)
- Universidade de Vigo (UVigo)
- Intecmar
- CETMAR
- Instituto de Investigaciones Mariñas (IIM-CSIC)
- Consellería de Medio Ambiente. MeteoGalicia. (**Lead partner**)



Oceanic Observatory NW Iberian Peninsula RAIA

It also incorporate on the same platform other sources of data:

- HF Radar from Marina Mercante (Fisterra-Silleiro)
- HF Radar from UVigo (Ría de Vigo)
- Tide Gauges from IH and Puertos del Estado
- Other buoys from Xunta de Galicia, IH and Puertos.
- River outflows (real time data and forecast)

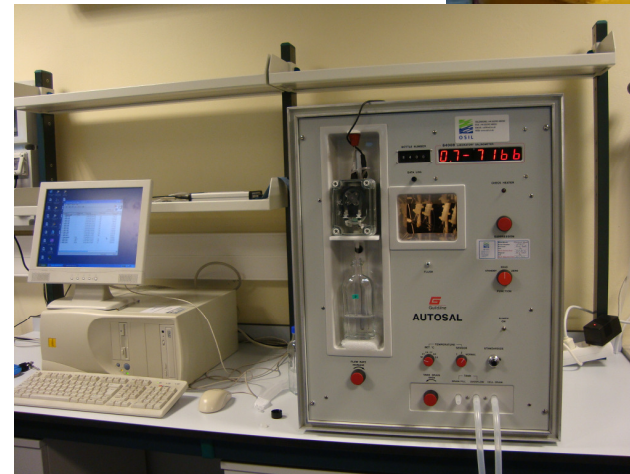
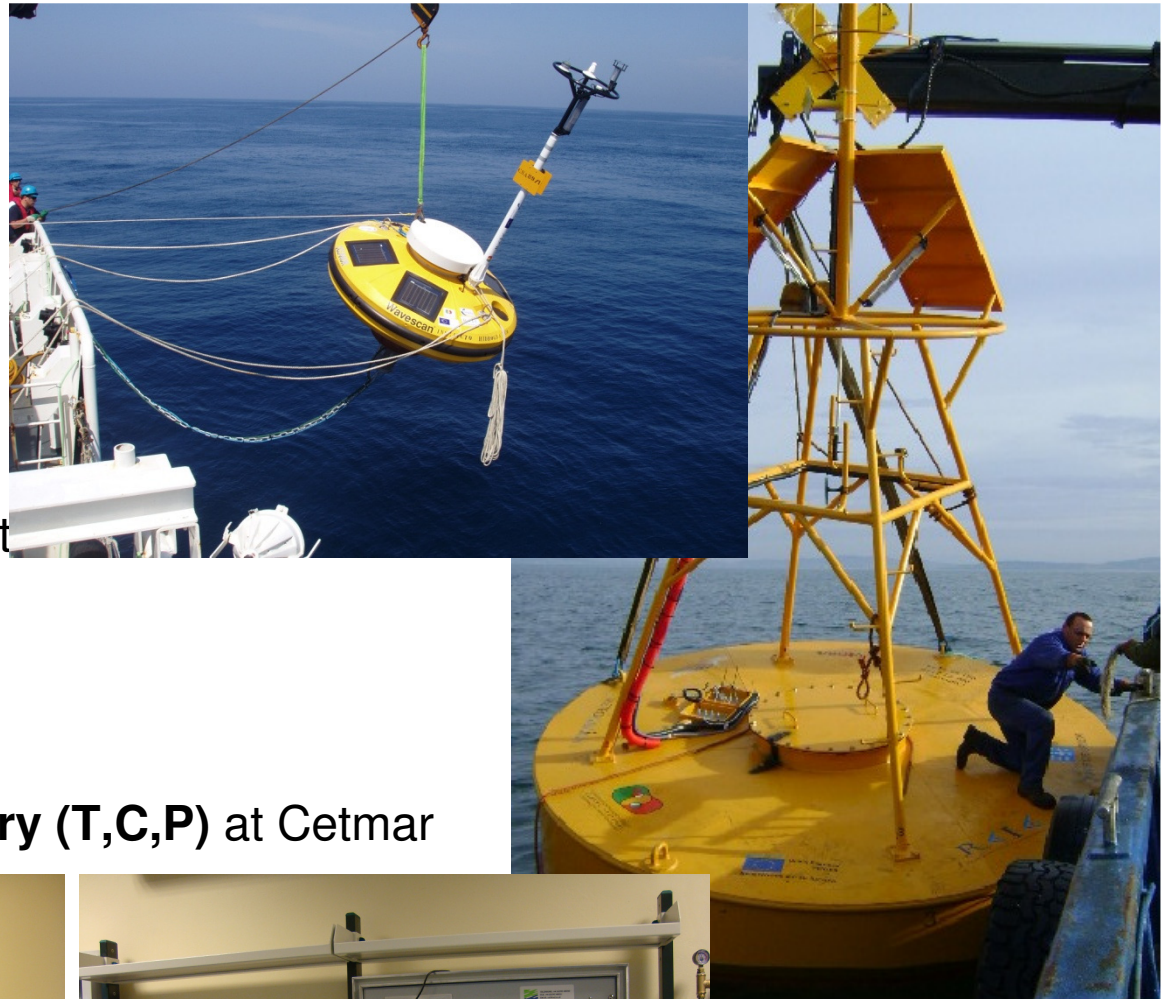


New oceanic infrastructure

New buoys at Ons, A Guarda, Silleiro and Leixoes off-shore (Alfredo M.- Ramalho).

All these buoys have similar instruments; wind, temperature, humidity, solar radiation, sea temperature and salinity at different levels, currents, as well as oxygen and chlorophyll concentrations. Same validation methods and data quality.

New Calibration Laboratory (T,C,P) at Cetmar



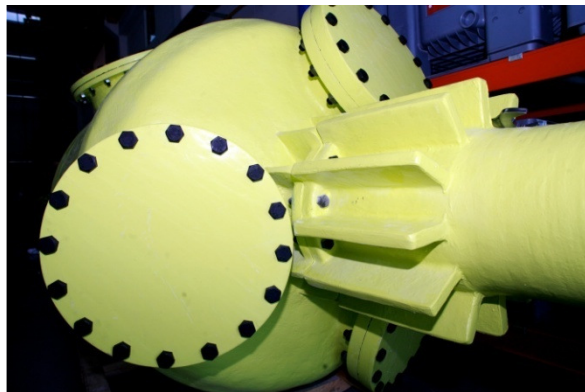
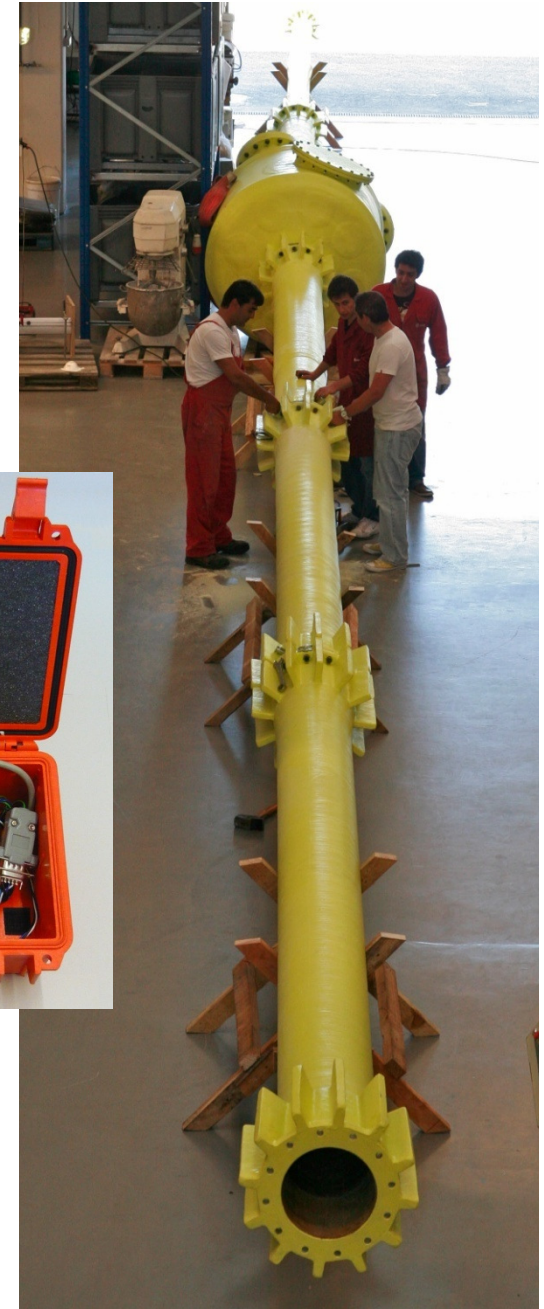
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RAIO
OBSERVATORIO OCEANOGRÁFICO



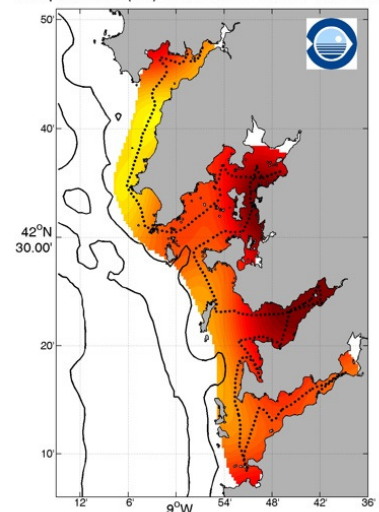
Own designs...

- Buoys at A Guarda and Ons designed and built at Galicia. Made to fit...
- Buoy at Leixoes (Porto) for renewable energy measurements (eolic off-shore). I
- Open source Datalogger Leviathan A1.

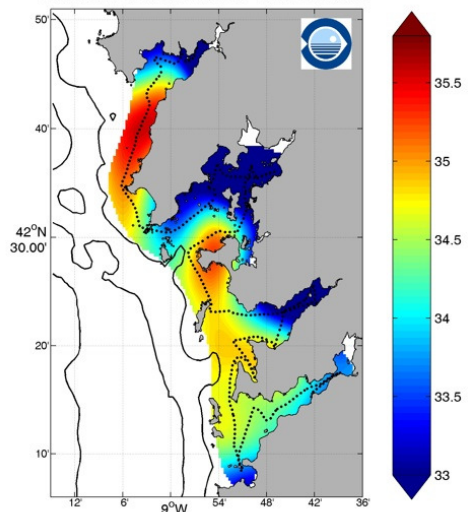


Termosalinómetro from Navaz

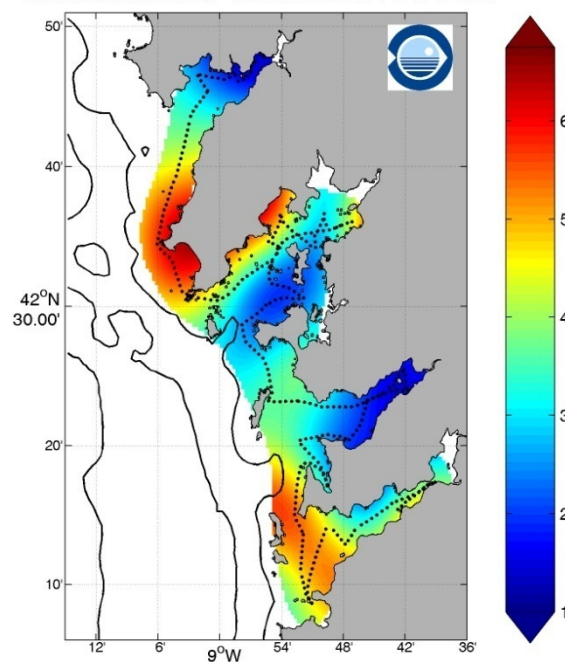
Temperatura (°C) del 31/05/2010 a 01/06/2010



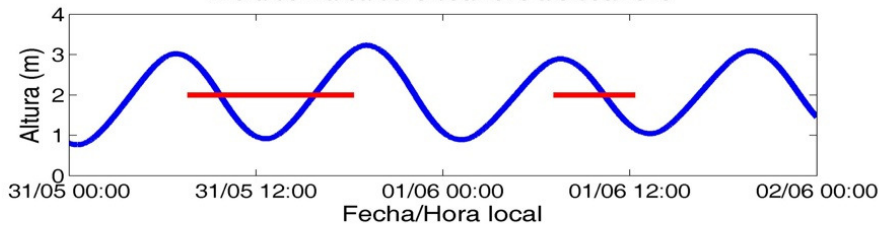
Salinidad del 31/05/2010 a 01/06/2010



Fluorescencia del 16/02/2009 a 17/02/2009



Altura de marea del 31/05/2010 a 01/06/2010



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HF Radar



RAIA

Capas Base

Capas Observación

- Boias Costa
- Boias Plataforma
- Mareógrafos
- Estacións Augas de Galicia
- Estacións MeteoGalicia

Capas Radar HF

- Radar HF - Vigo
- Radar HF - Galicia

Termosalinómetro

- Campana 2010-11-30
- Campana 2010-11-17

Capas Modelos - WRF

- Malla 36 km
- Malla 12 km
- Malla 04 km

Capas Modelos - WW3

- Malla Atlántico
- Malla Ibérico
- Malla Galicia

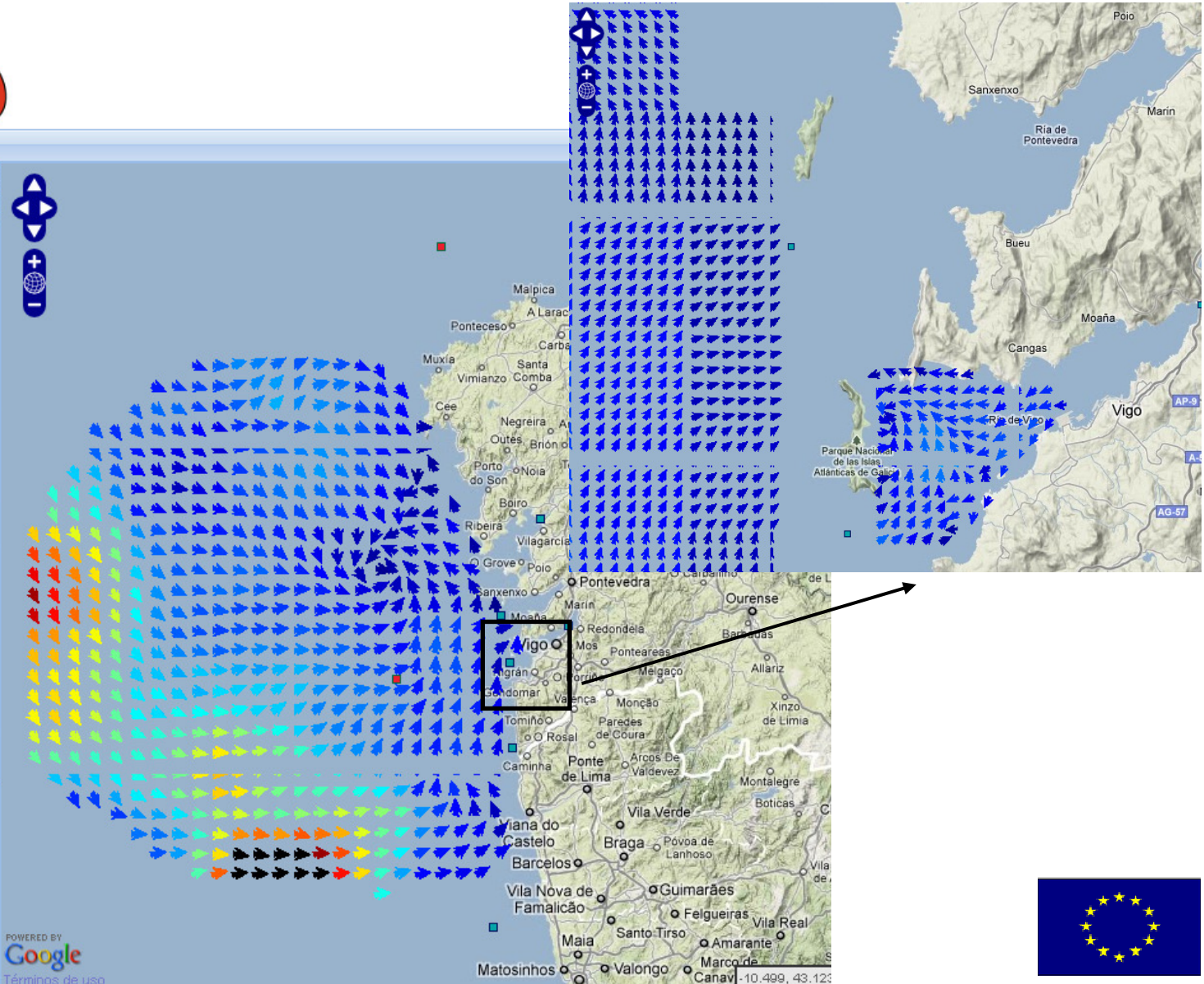
Capas Modelos - SWAN

- Malla Artabro
- Malla Rías Baixas

Capas Modelos - MOHID

- Malla Galicia
- Malla Rías Altas
- Malla Rías Baixas

Capas Modelos - ROMS



Data availability

- All data available through RAI A web site (www.observatorioraia.org) in real time.

The screenshot displays the RAI A web interface. At the top, there is a navigation bar with the RAI A logo and the text 'OBSERVATORIO OCEANOGRÁFICO'. Below this, there are language options: 'Galego', 'Castellano', 'Português', and 'English'. The main content area features a map of Galicia with several buoys marked. Two data pop-up windows are visible:

A Guarda

Velocidade do Vento:	0,84	m/s
Dirección do Vento:	158	graos
Temperatura Media do aire:	17,05	°C
Humidade Relativa Media:	71	%
Refacho:	1,4	m/s
Dirección do Refacho:	149	graos
Temperatura de Orballo:	11,84	°C
Clorofila:	0,83	ug/L
Osíxeno:	7,15	mg/L
Temperatura (Superficie):	15,86	°C
Datos das:	12:00:00(UTC)	

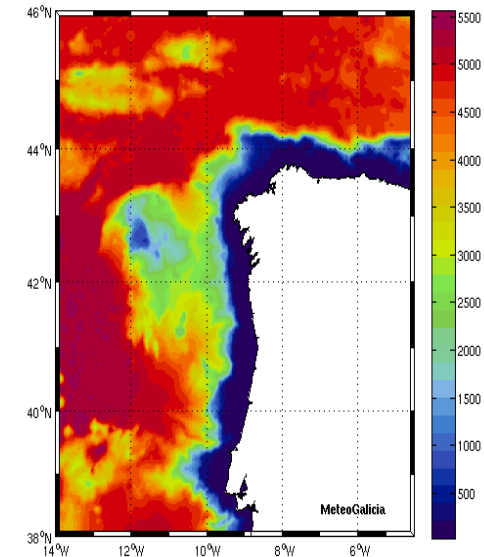
Boia de Ons

Velocidade do Vento:	1,94	m/s
Dirección do Vento:	287	graos
Temperatura Media do aire:	15,81	°C
Humidade Relativa Media:	76	%
Refacho:	2,78	m/s
Dirección do Refacho:	287	graos
Temperatura de Orballo:	11,51	°C
Temperatura (Superficie):	16,632	°C
Conductividade (Superficie):	44,631	mS/cm
Salinidade (Superficie):	35,087	
Anomalia da Densidade (Superficie):	25,673	kg/m3
Salinidade (Fondo):	35,888	
Temperatura (Fondo):	14,207	°C
Presión da Columna de Auga (Fondo):	26,426	db
Anomalia da Densidade (Fondo):	26,947	kg/m3
Conductividade (Fondo):	43,106	mS/cm
Salinidade (Nivel 1):	35,868	
Temperatura (Nivel 1):	14,988	°C
Anomalia da Densidade (Nivel 1):	26,704	kg/m3
Conductividade (Nivel 1):	43,83	mS/cm
Datos das:	12:00:00(UTC)	



Operational Oceanographic Models

- Operational models have been developed for the same area by IEO, MeteoGalicia, CIIMAR (Porto), Aveiro and IH.
- Forecasting 72 hours every day; Currents, temperature, salinity and waves.
- Redundancy. Different forcings (atmospheric, river outflows) and boundary conditions.
- Downscaling to harbors, estuaries, end-user applications etc.



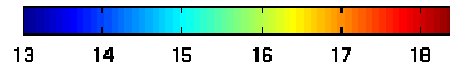
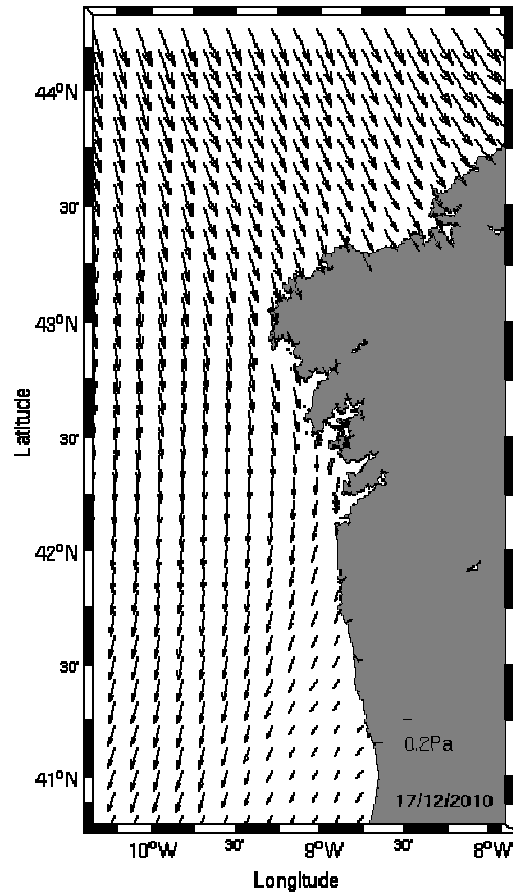
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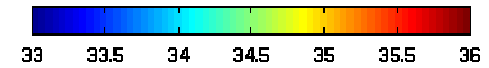
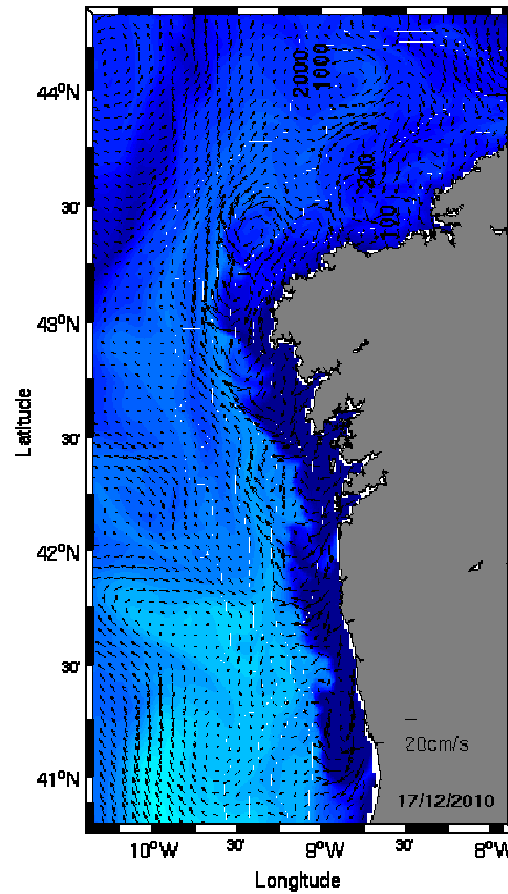
Output model ROMS



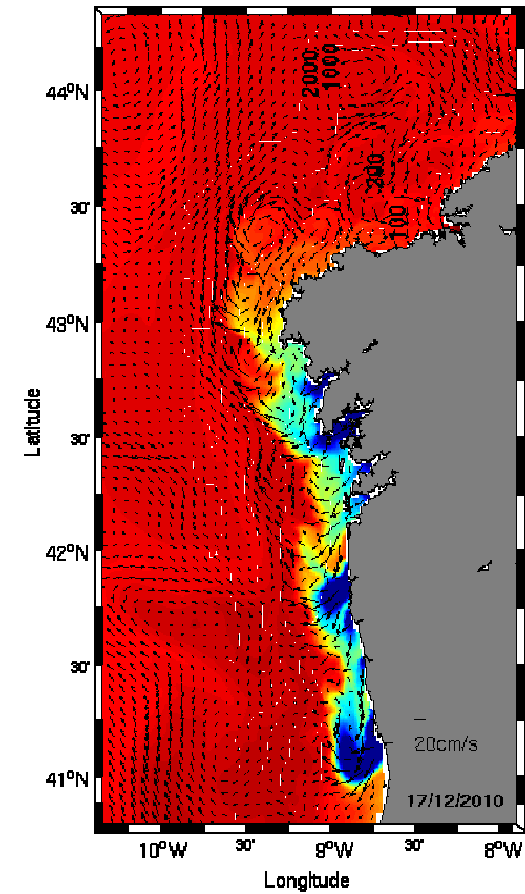
Mean Wind Stress



Mean Currents & Temperature - Surface



Mean Currents & Salinity - Surface

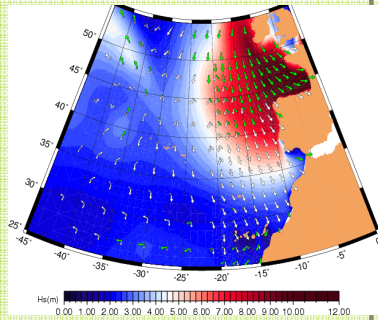


Forecasting models: Nesting

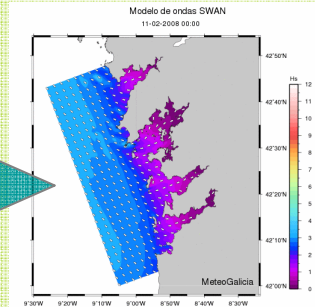
Coruña
Vigo
Viana
Leixoes

Regional scale

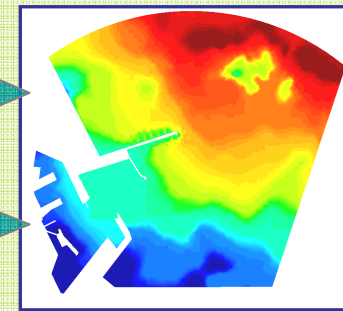
Local scales
Harbors



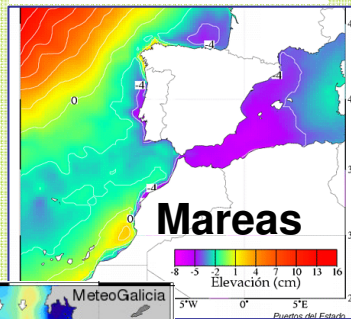
Waves



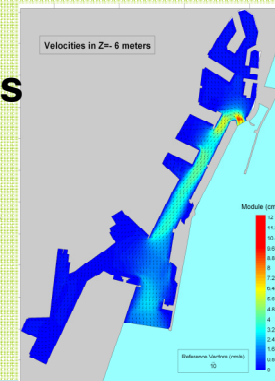
Waves



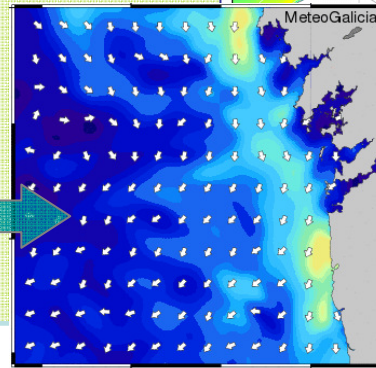
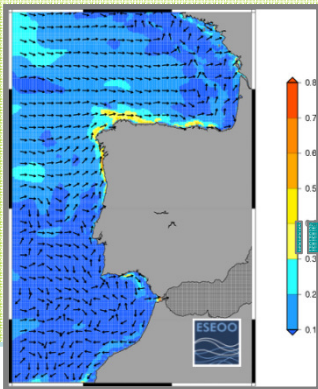
Currents



Currents



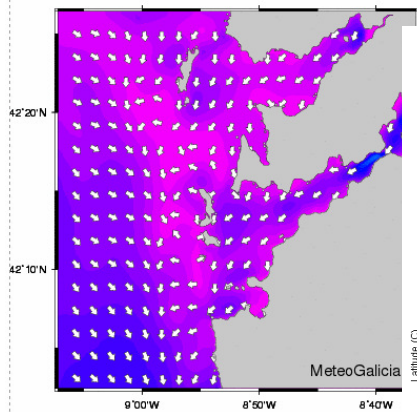
Water quality



Nesting - Vigo

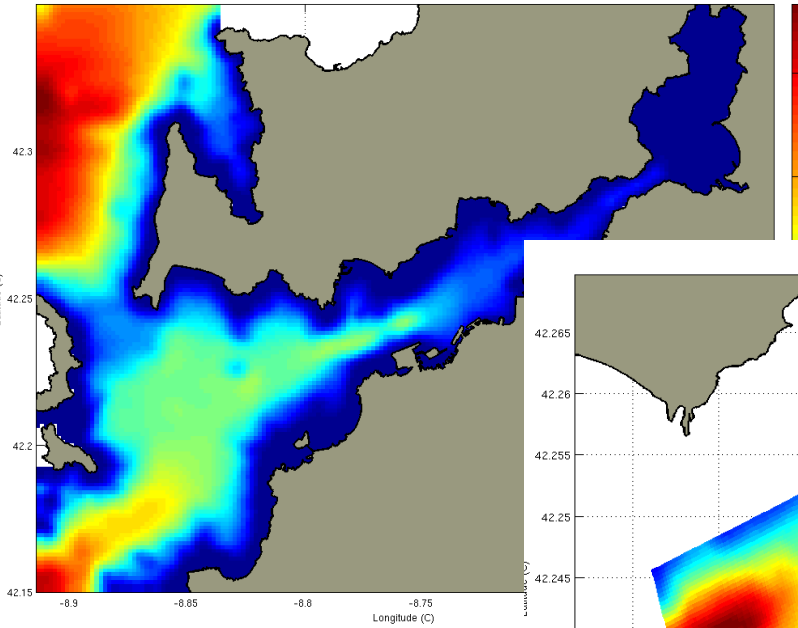
Nesting factor: $500/150$ (aprox.= 3,3)

Vigo/Pontevedra
(MeteoGalicia)
Dx=500m



m/s 1.0

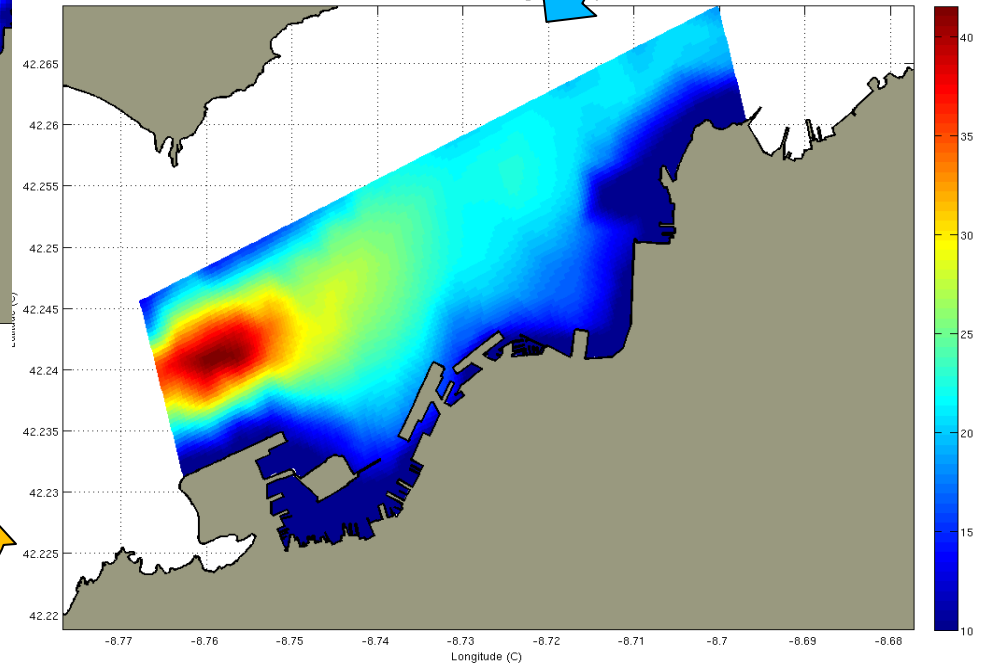
Batimetria Vigo FINAL(dx=150m), Linia Costa Final.mat



Nesting factor: $150/30$
(aprox.= 5)

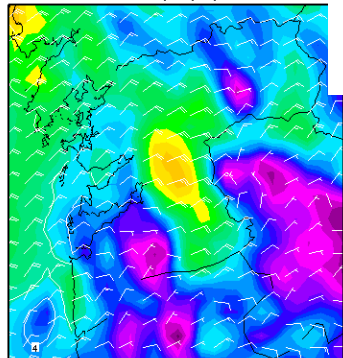
ROMS-Vigo_Puerto
Dx=30m

Batimetria Puerto de Vigo (dx=30m)



Galicia(MeteoGalicia)
Dx=4000m

wrf_arw - Vento a 10m (km/h) 2011-04-1



20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20

ROMS-Vigo_Ria
Dx=150 m

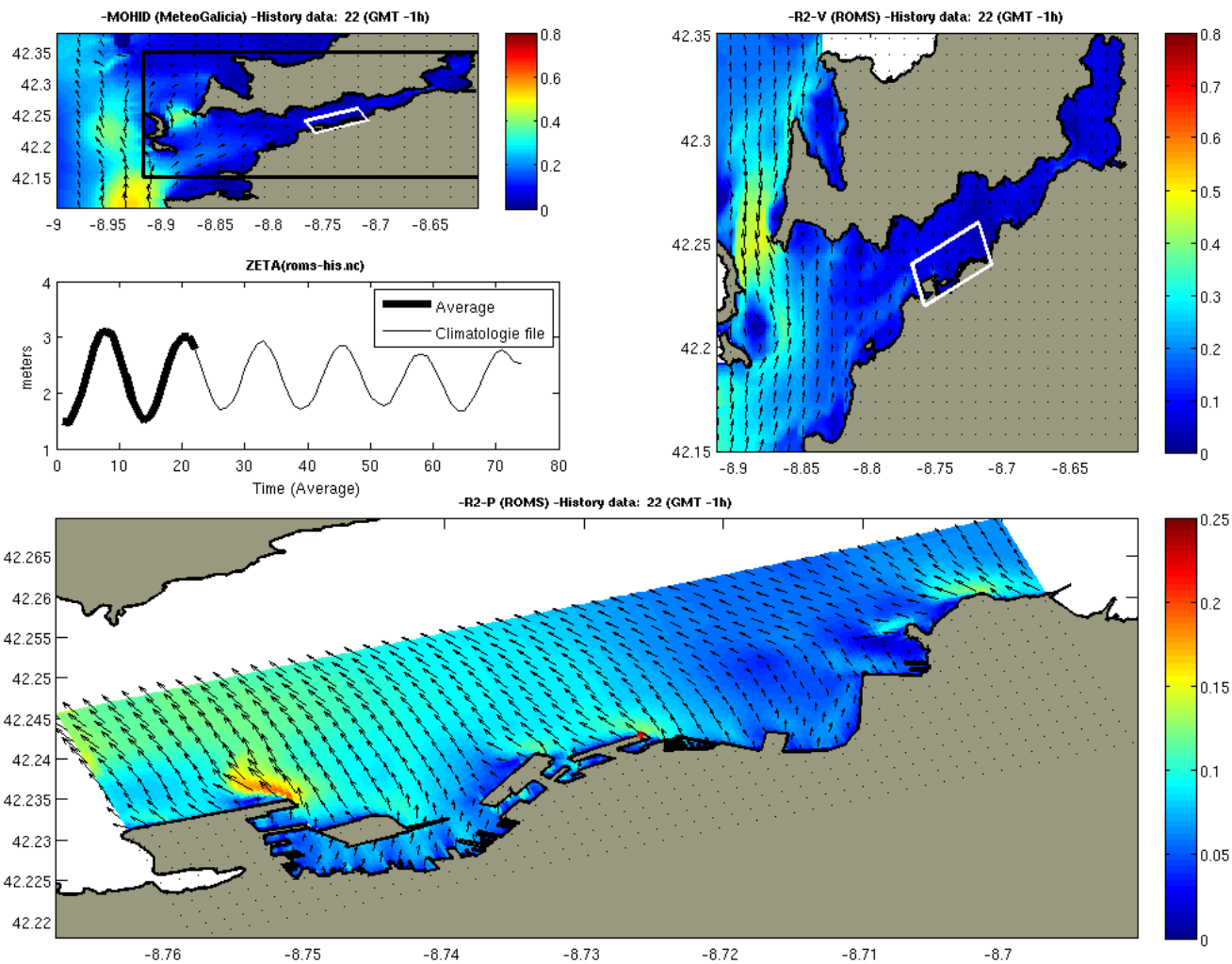
MeteoGalicia - Consellería de Medio Ambiente - Xunta de Galicia



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Results: Vigo



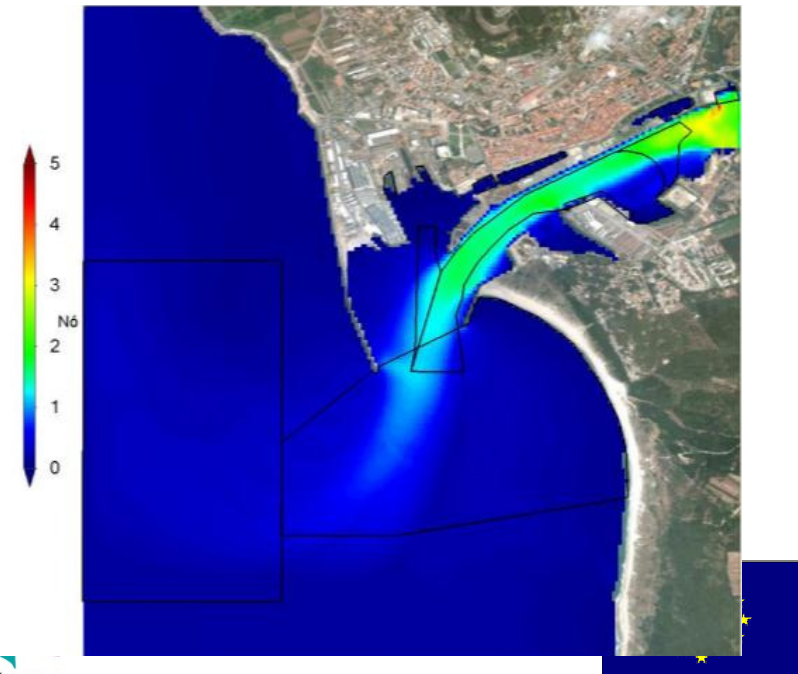
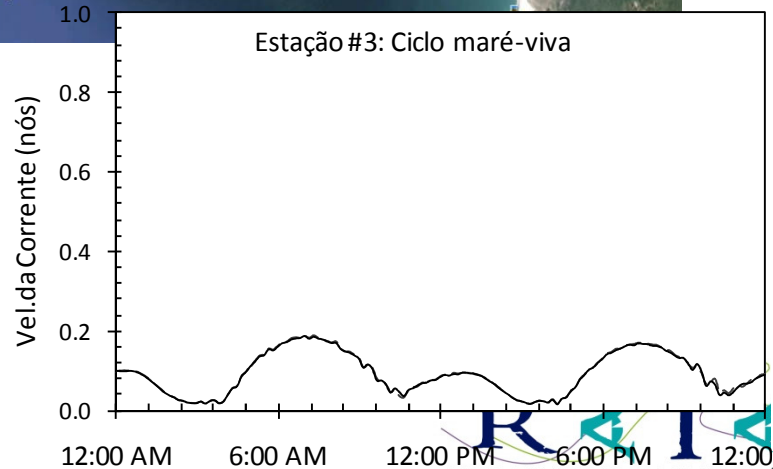
Implementação

Produtos

Porto de Viana do Castelo



- Séries temporais de nos pontos P1 a P5 (apoio à navegação)
- Mapas de Correntes
- Inclusão de outros parâmetros

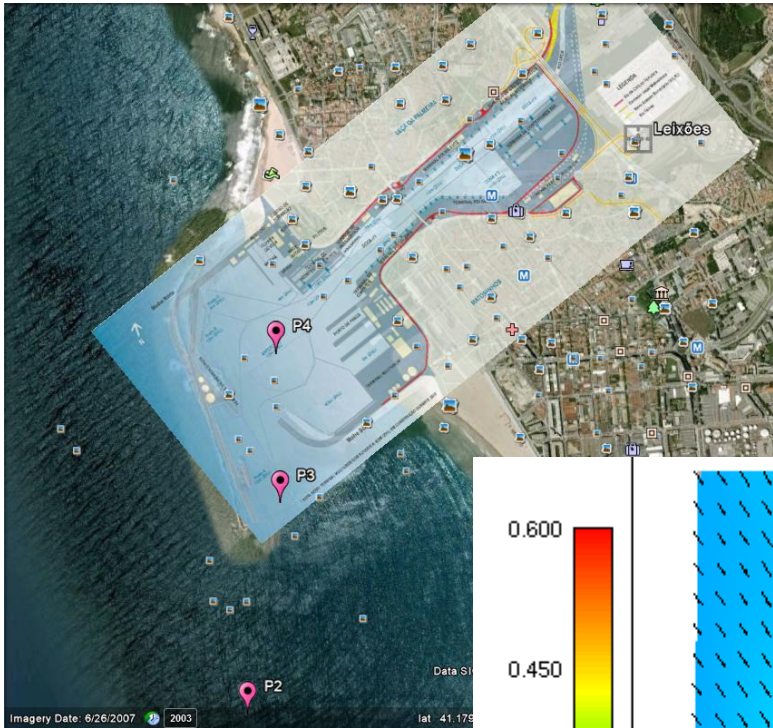


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ROA
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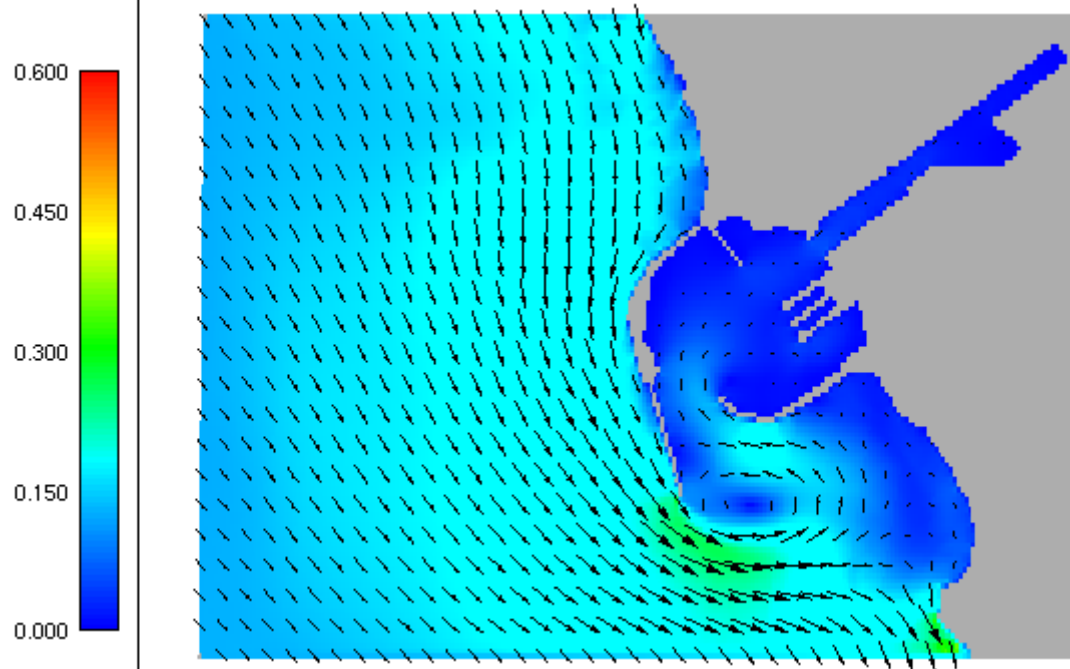
Implementação

Produtos



- Séries temporais de nos pontos P1 a P4 (apoio à navegação)
- Mapas de Correntes
- Inclusão de outros parâmetros

Porto de Leixões



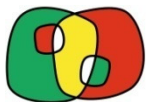
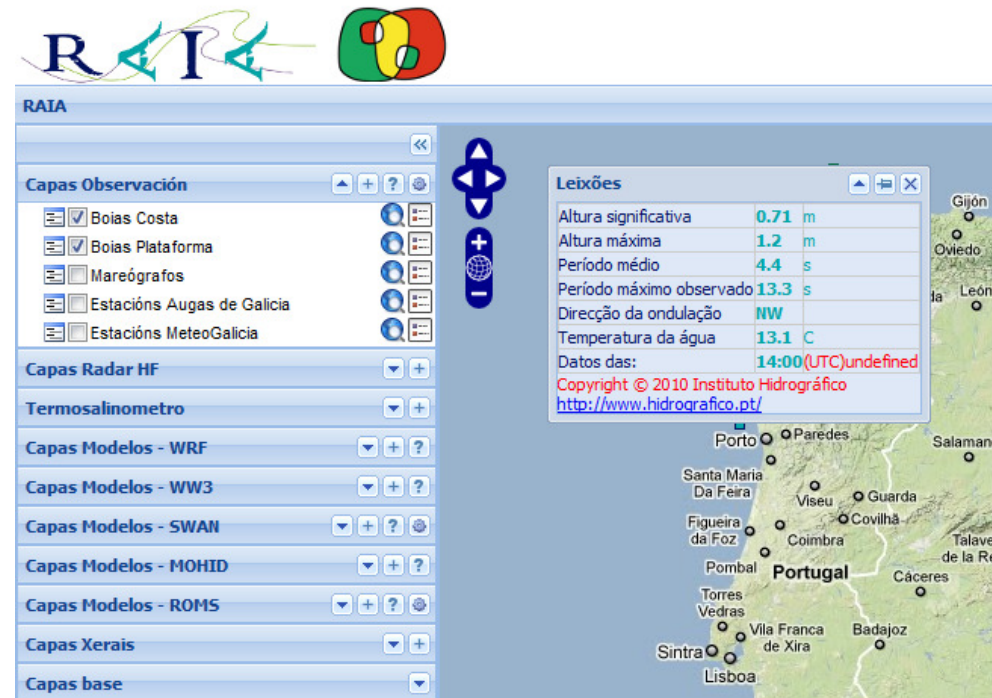
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OBSERVATORIO OCEANOGRÁFICO

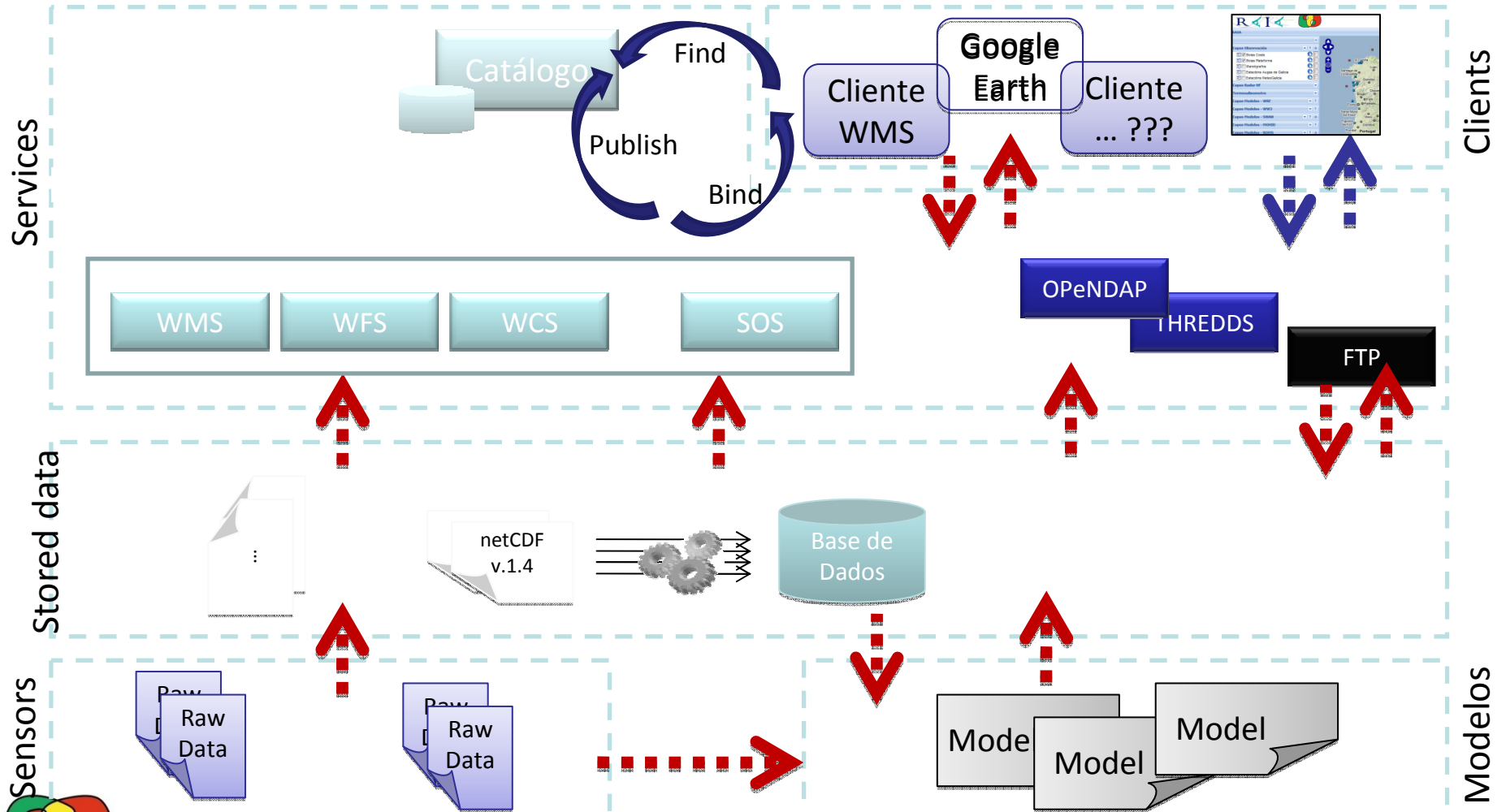


Data dissemination

- Both, observations and model forecasts, available through the web site. Real time data from buoys are sent each 10 min. Same criteria for data acquisition.
- Model and observational data are supplied on other operational useful formats through web based access and THREDDS server.



Data dissemination



Products for end users

Seleccione...

Data: 01/07/2011

Confraría: Cangas

Vista Xeral

Lenda

Predición

- < 2 n
- > 2 n

Toponimia

- ▲ Toponimos

Núcleos Población

Bancos Percebeiros

Rase

Axuda

Información

Cangas

Prognóstico para o día 01/07/2011
(Faga clic no semáforo para ver o prognóstico)

Mar de Fondo

Altura máxima das ondas (m) 1.2

Dirección

Periodo (s) 6

Mar de Vento

Vento máximo

Forza 6

Estado da mar

Temperaturas

Tª máxima aire (°C) 15

Tª auga (°C) 17

Táboa de mareas

	Hora	m
Preamar	04:38	3,27
Baixamar	10:40	0,85
Preamar	16:54	3,59
Baixamar	23:12	0,68

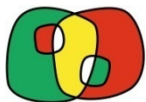
Esta predición véxase de forma automática a partir de modelos numéricos e estatísticos de predición meteorolóxica.

Aplicación Observatorio RAIA

intecmar INSTITUTO TECNOLÓXICO PARA O CONTROL DO MEDIO MARINO DE GALICIA

METEOGALICIA

XUNTA DE GALICIA



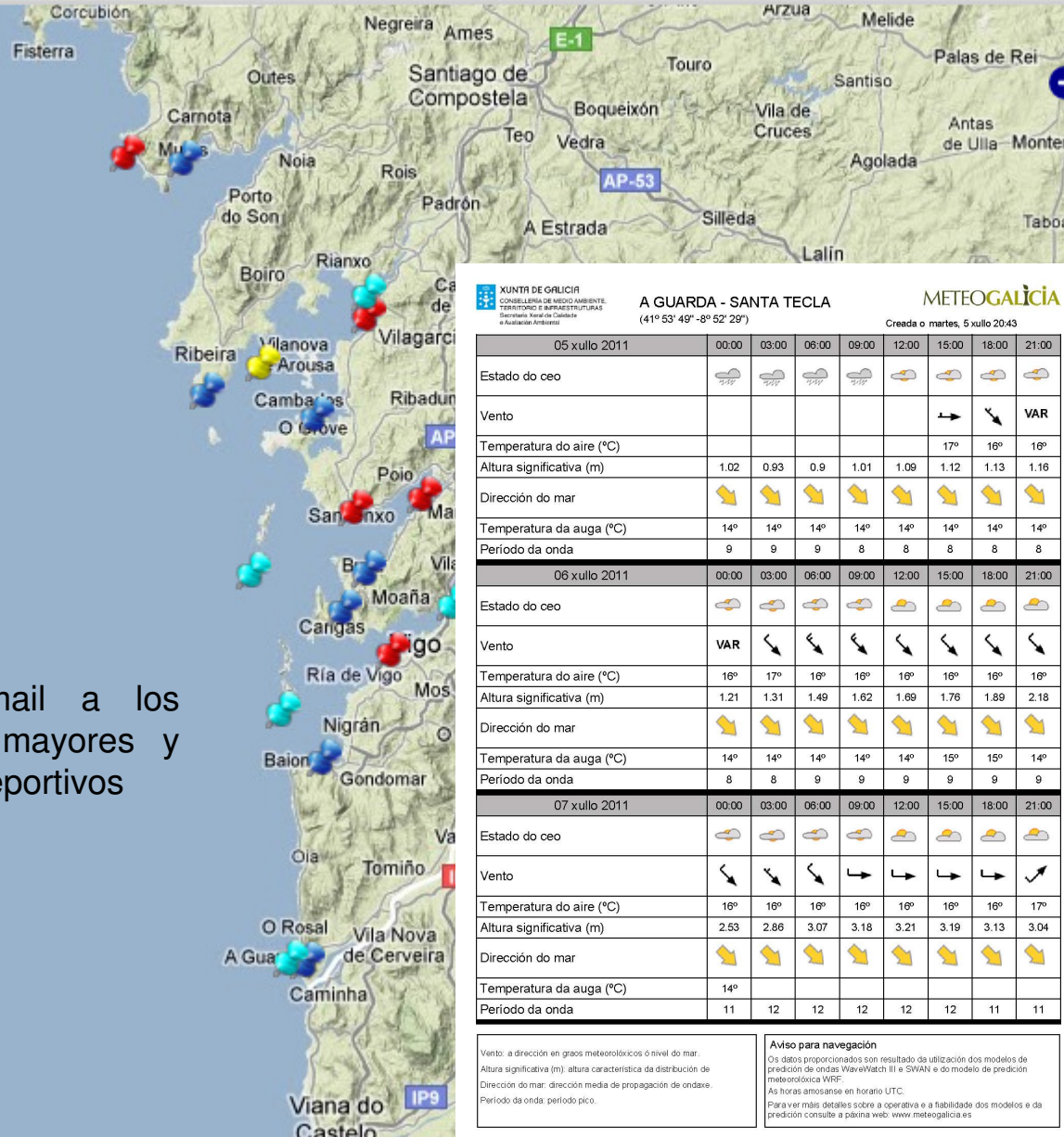
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Ver táboa de predición marítima



Confraría

- Burela - San Juan Bautista
- Celeiro - Santiago Apostol
- Malpica
- Corme
- Camelle
- Muros
- Carreira Y Aguiño
- O Grove - San Martiño
- Bueu - San Martiño
- Aldan - Hio - San Cipriano
- Baiona - La Anunciada
- A Guarda - Santa Tecla

Porto

- Coruña
- Vilagarcía
- Vigo
- Ferrol
- Viveiro
- Pontevedra
- Sanxenxo
- Lira

Boia

- Boia De A Guarda
- Boia De Ons
- Pilar De Rande
- Boia De Cies
- Plataforma De Cortegada

Outras

- Asociación Lajareu Por Barlovento



Envío por mail a los patrones mayores y puertos deportivos

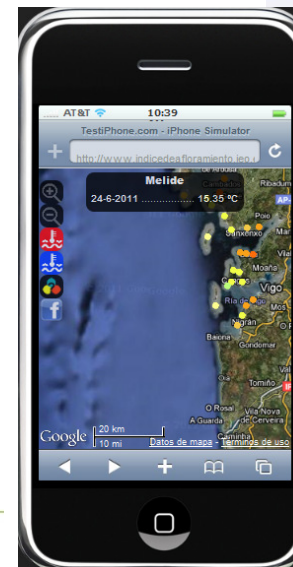
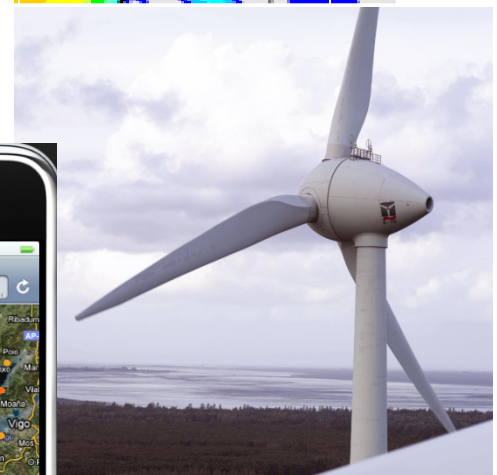
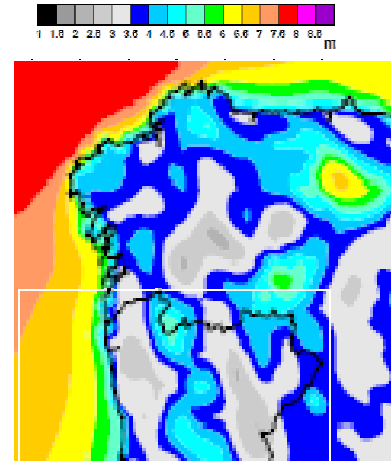


Vento: a dirección en graos meteorolóxicos ó nivel do mar.
Altura significativa (m): altura característica da distribución de
Dirección do mar: dirección media de propagación de ondaxe.
Período da onda: período pico.

Aviso para navegación
Os datos proporcionados son resultado da utilización dos modelos de predición de ondas WaveWatch III e SWAN e do modelo de predición meteorolóxica WRF.
As horas amosanse en horario UTC.
Para ver máis detalles sobre a operativa e a fiabilidade dos modelos e da predición consulte a páxina web: www.meteor Galicia.es

More end users applications

- Distribution of faecal pollution
- Dynamic maps for fronts and eddies.
- Prediction of avenues and their influence for shell fishing areas.
- Predictions of wind and wave energy offshore (Portugal)
- Models of sediment transport.
- Prediction of episodes of coastal pollution from residual waters improperly debugged.
- Forecast of waves and wind in the defeats of entrance and exit of the estuaries and ports.
- Apps for smartphones and smartTVs.



Conclusions

- The Euroregion Galicia-North of Portugal has at present an infrastructure of oceanic measurement of very high density; points of measurements, number of observations, etc.
- The network of observation provides reliable information and of quality.
- The operational models allow to give forecastings up to 72 hours of the state of the sea.
- We have developed specific applications for end users using the capacity of the Observatory to provide forecastings and observations in real time; harbors, fishermen, percebeiros, etc.
- The web **www.observatorioraia.org** pretends to be the site of reference of the Euroregion in terms of observation and oceanic prediction.
- Improve the presence of RAIA in different socioeconomic sectors of activity (energy, fishing, recreational boating, tourism, etc) of the Euroregion North of Portugal – Galicia.
- RAIA will be the initial seed for a **future oceanic observatory at the Western Iberian Peninsula.**

Gracias, Obrigado, Thanks

