Physical Oceanography off The Algarve…and beyond…

Physical oceanography of the W and SW Iberian ecosystem: facts and challenges

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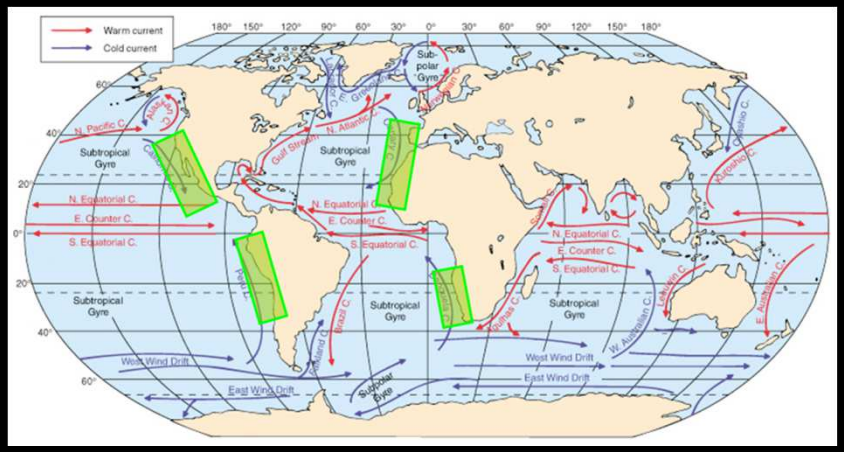
EMS2014
Environmental Monitoring and Surveillance
Challenges, Solutions and Opportunities

ICELAND
LIECHTENSTEIN
NORWAY
eea grants

December 4th & 5th
Porto Cálem, Gaia, Portugal

Physical settings

Four EBUS in the World

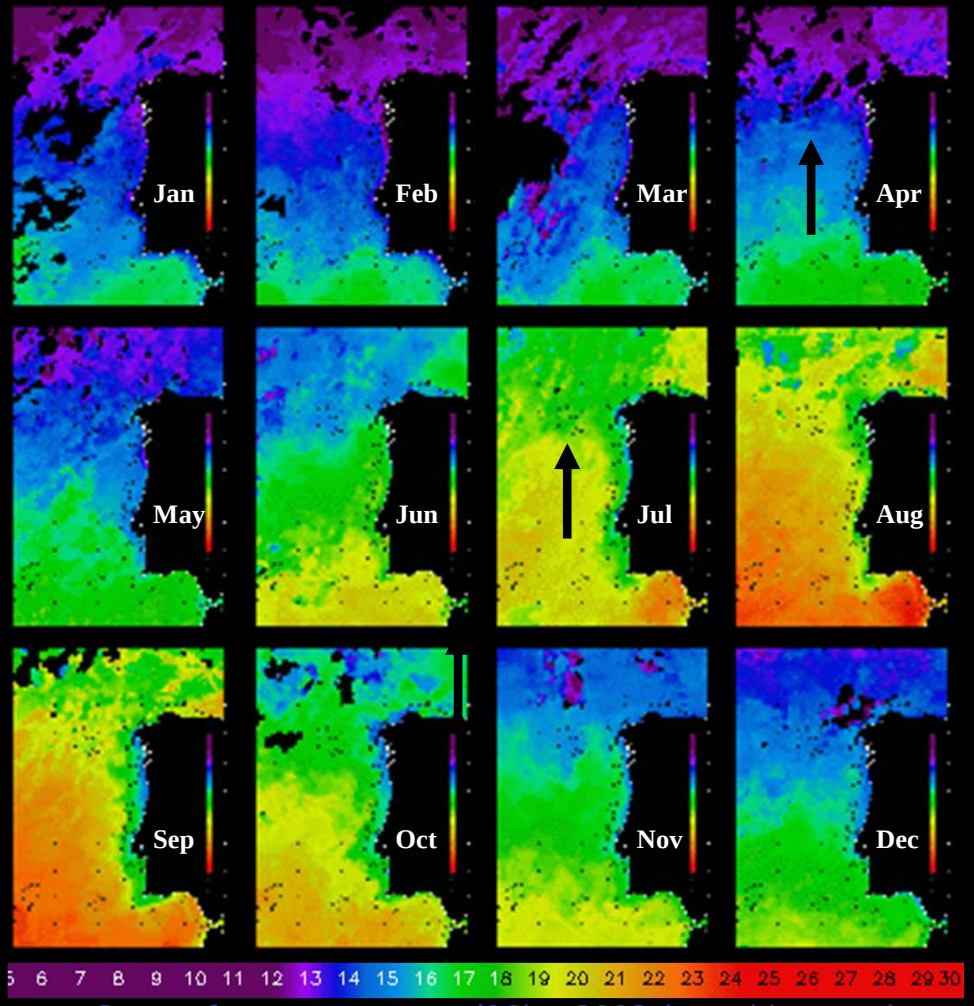


Iberian Peninsula is part of the Canary Current Upwelling System

Meridional density gradient

⇒

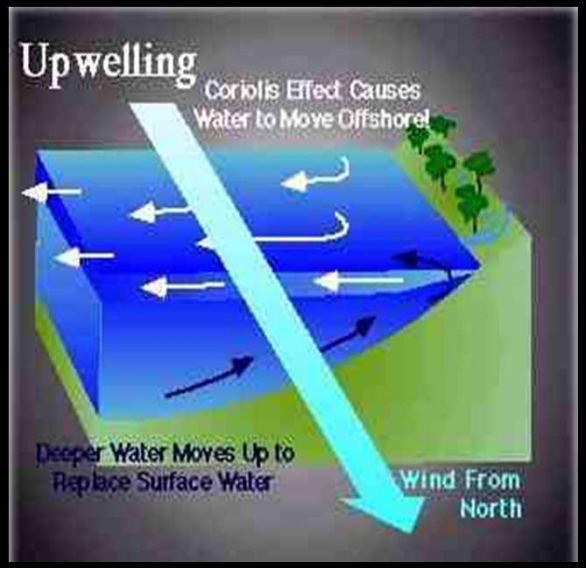
poleward current

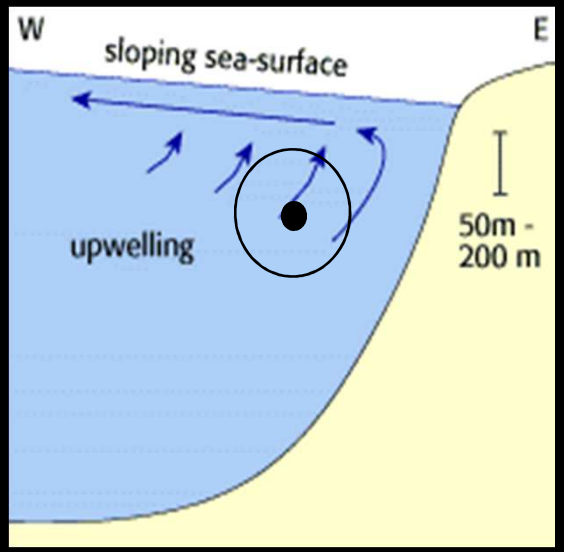


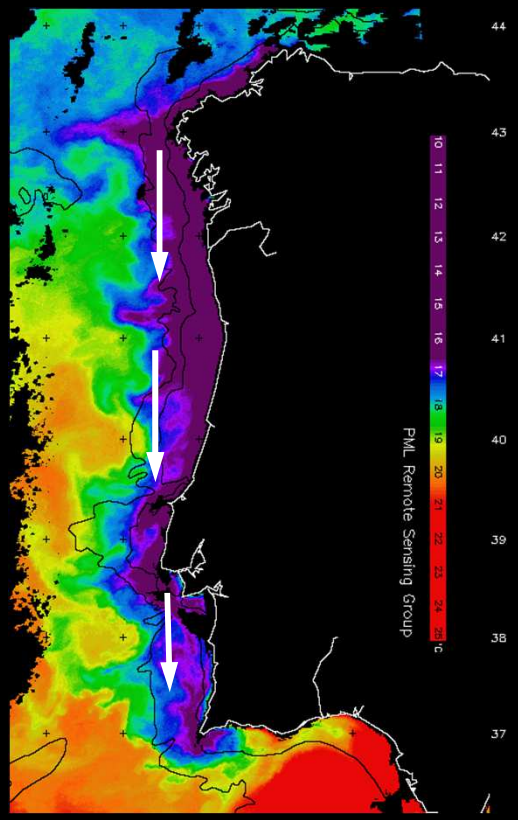
Sea surface temperature (ºC) – 2003 (monthly mean)

Physical settings

In these systems the exchange of energy between the wind and the ocean is the main driving mechanism







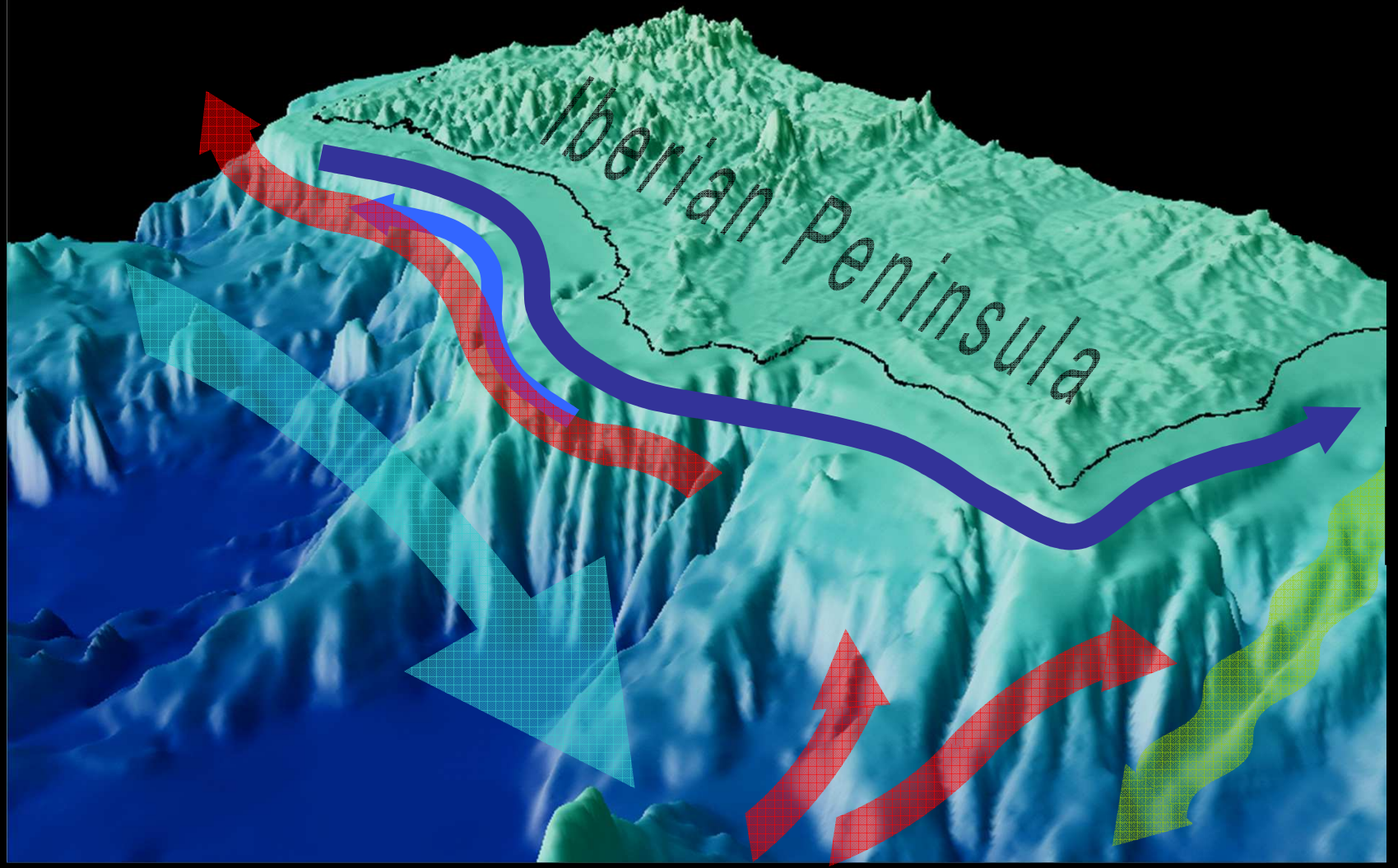
Wind forcing

$\Rightarrow$

equatorward coastal current

Physical settings

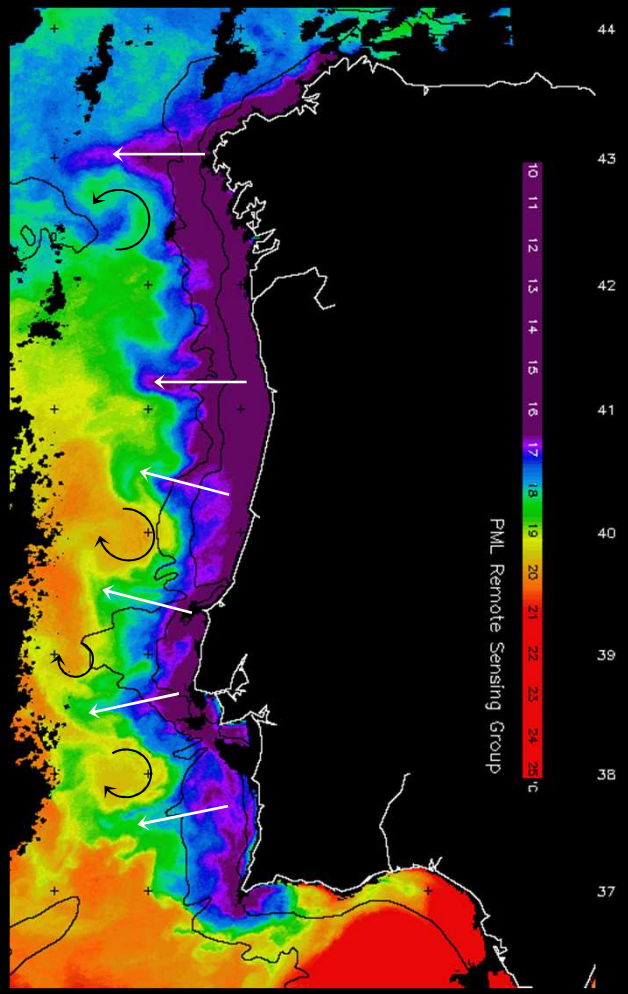
Classic conceptual circulation scheme ***(summer)***



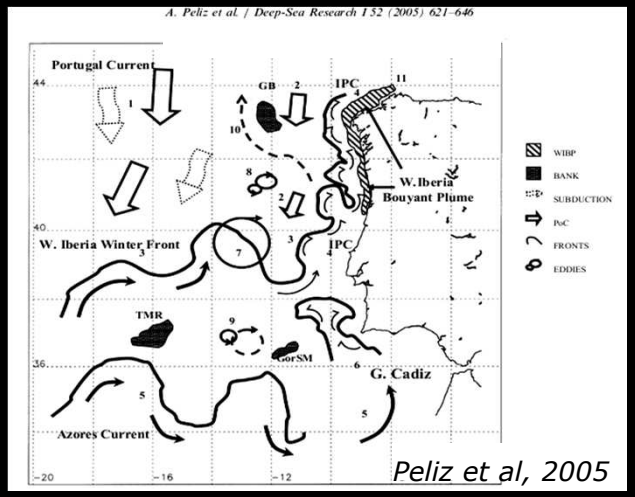
The mesoscale

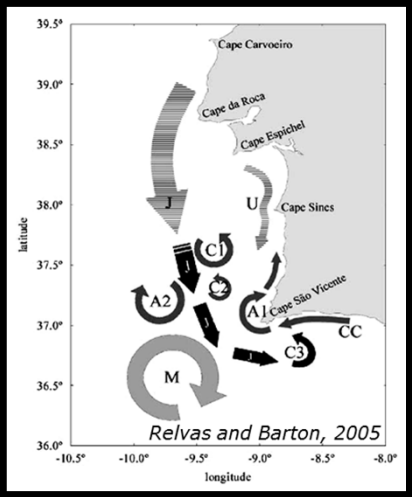
A “noisy” ocean where the mesoscale dominates

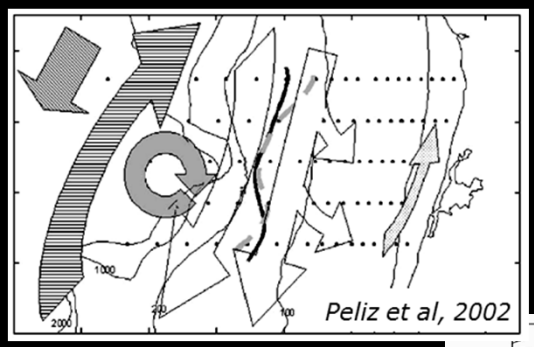
Filaments are the main mechanism of exchange between coastal and offshore waters

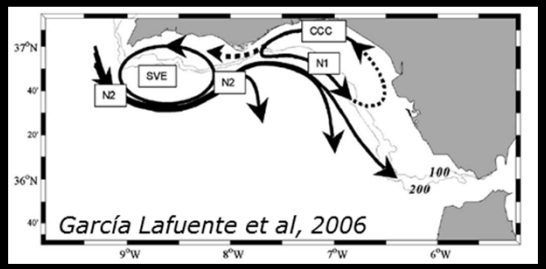


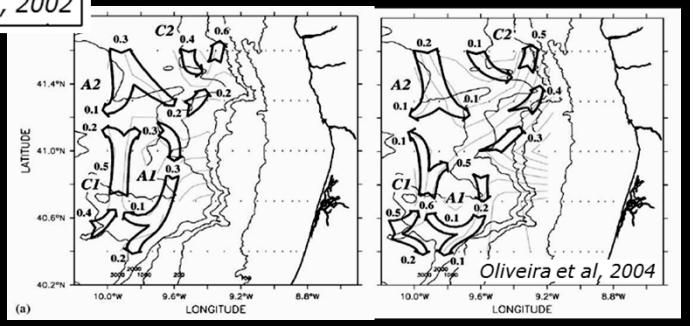
Cross shore fluxes (filaments) and interaction with the offshore eddy field





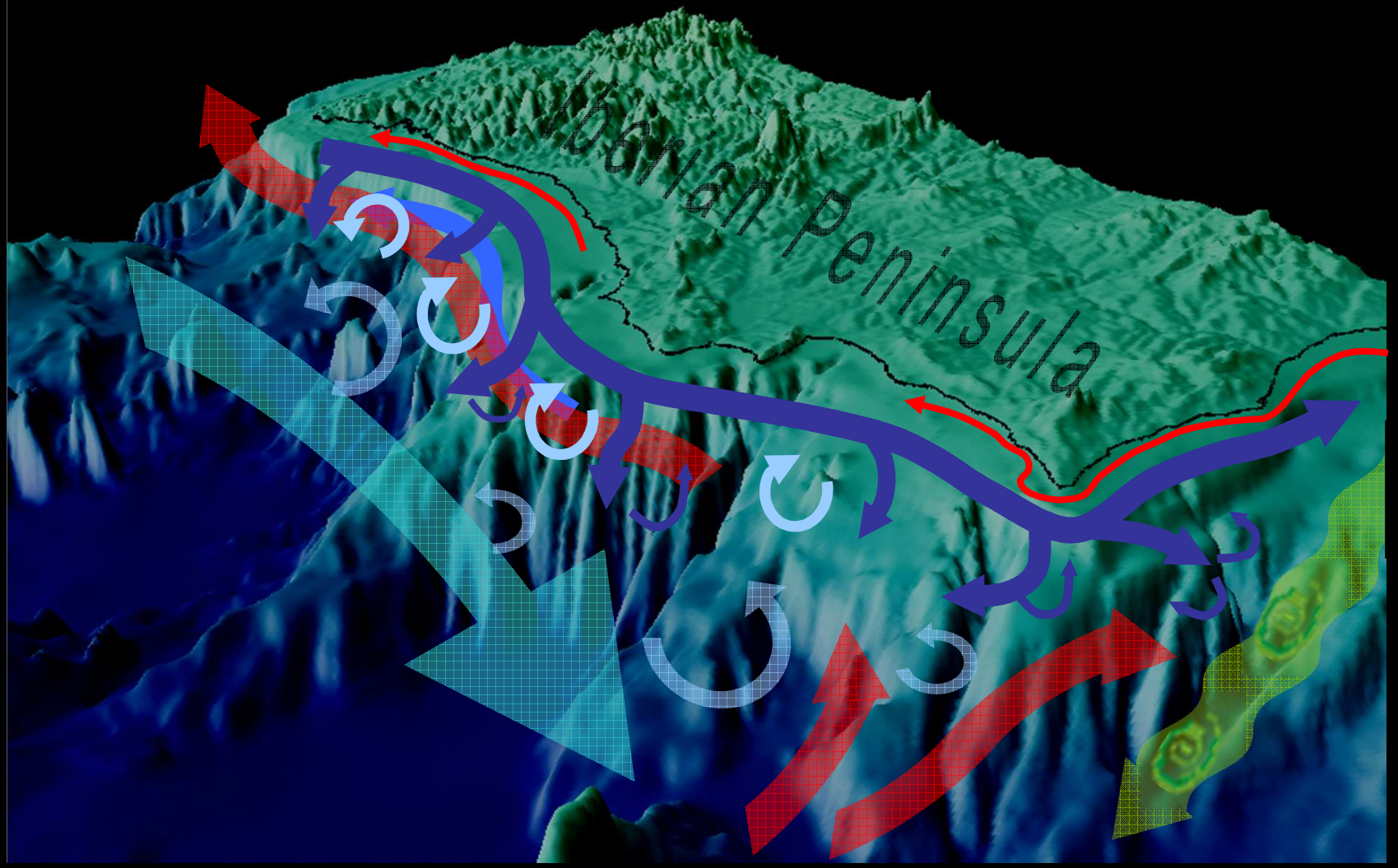




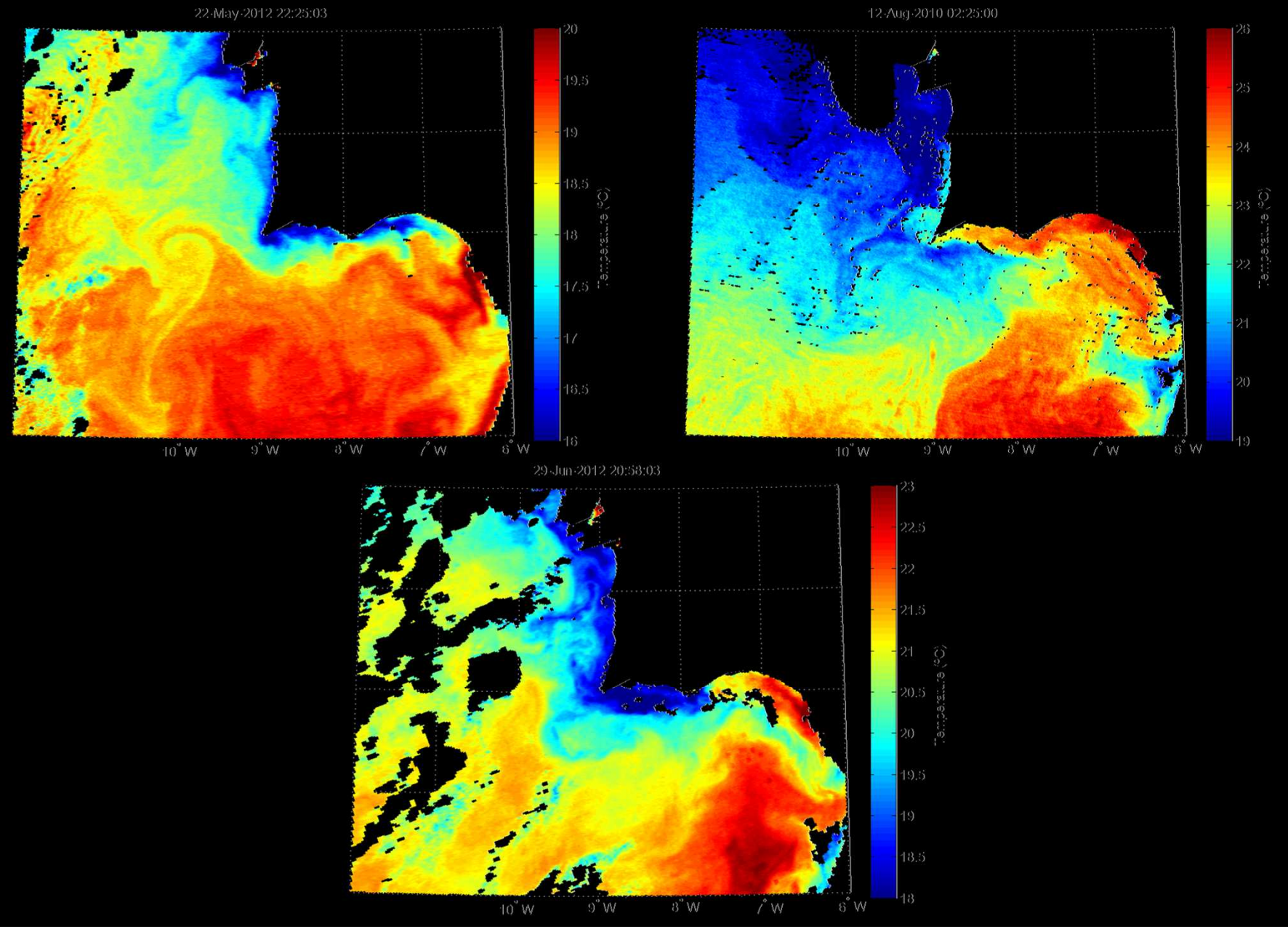


The mesoscale

Our understanding of the ocean "currents" is changing.....

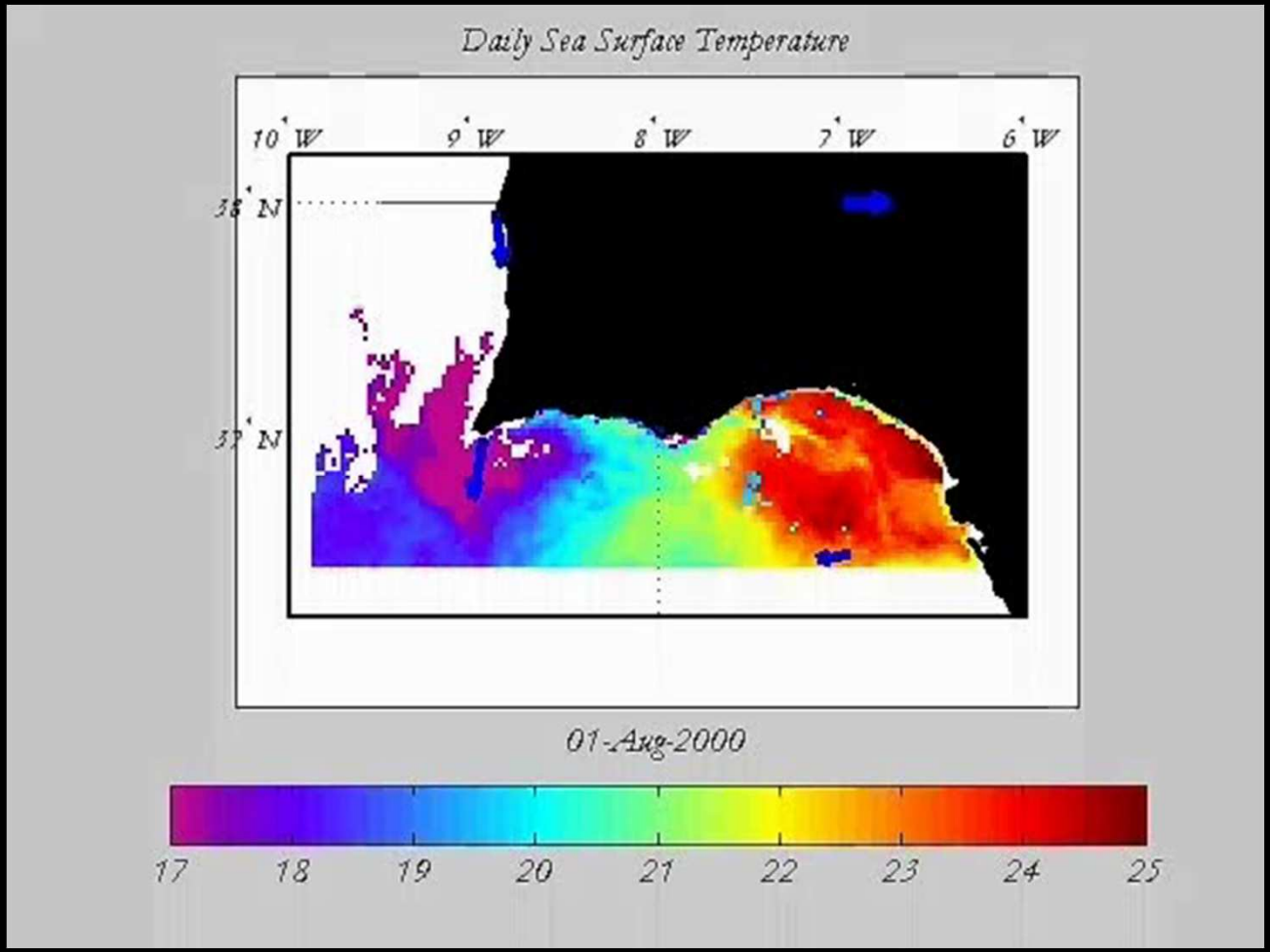


INNER SHELF CIRCULATION ON THE NORTH-WESTERN CONTINENTAL MARGIN OF THE GULF OF CADIZ



INNER SHELF CIRCULATION ON THE NORTH-WESTERN CONTINENTAL MARGIN OF THE GULF OF CADIZ

Evolution of the inshore countercurrent 1-13 Aug. 2000



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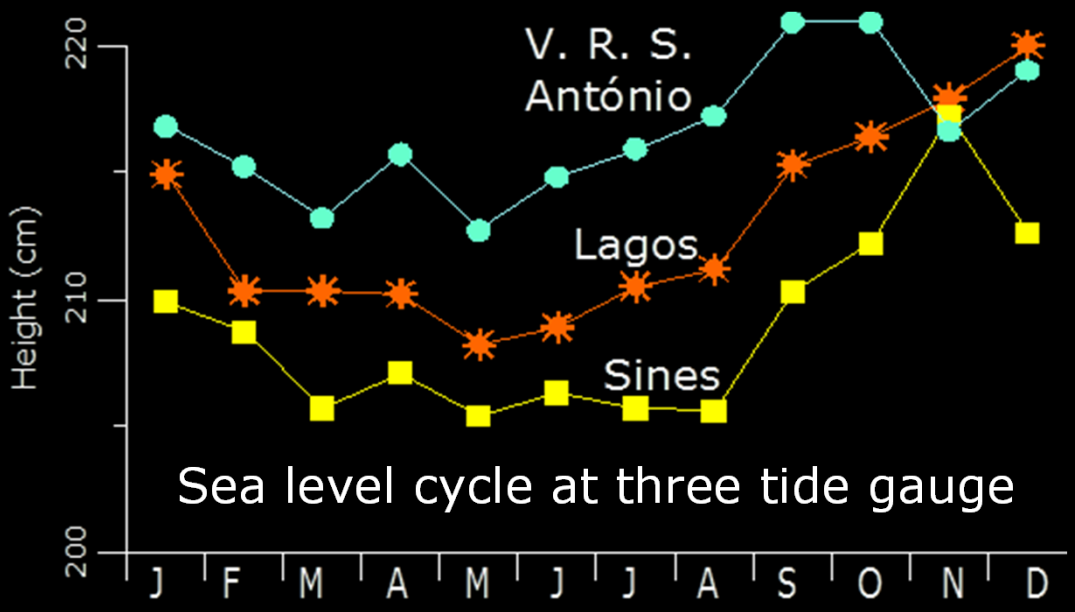
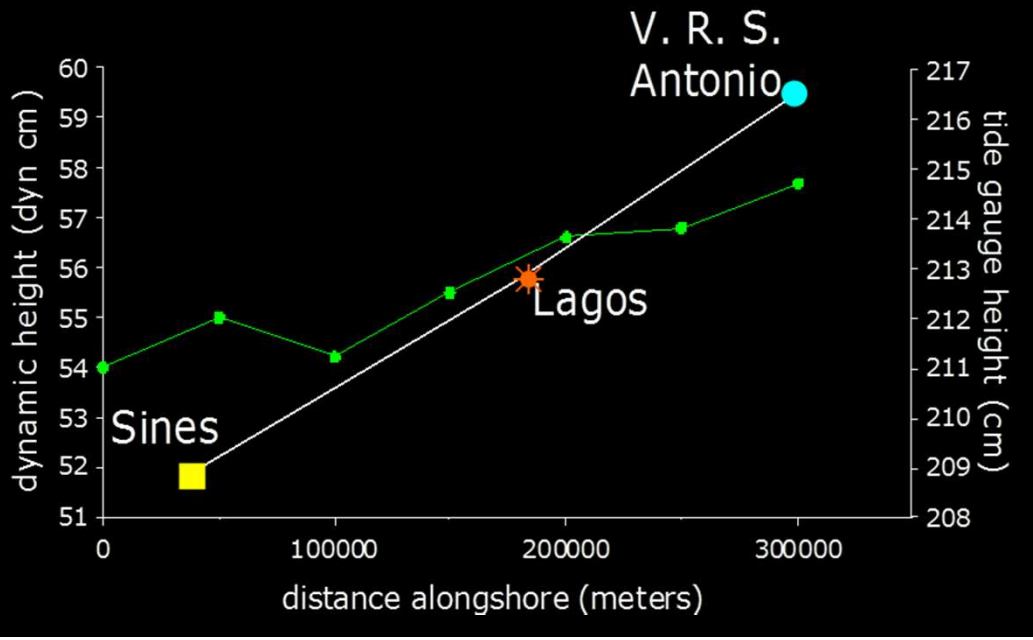


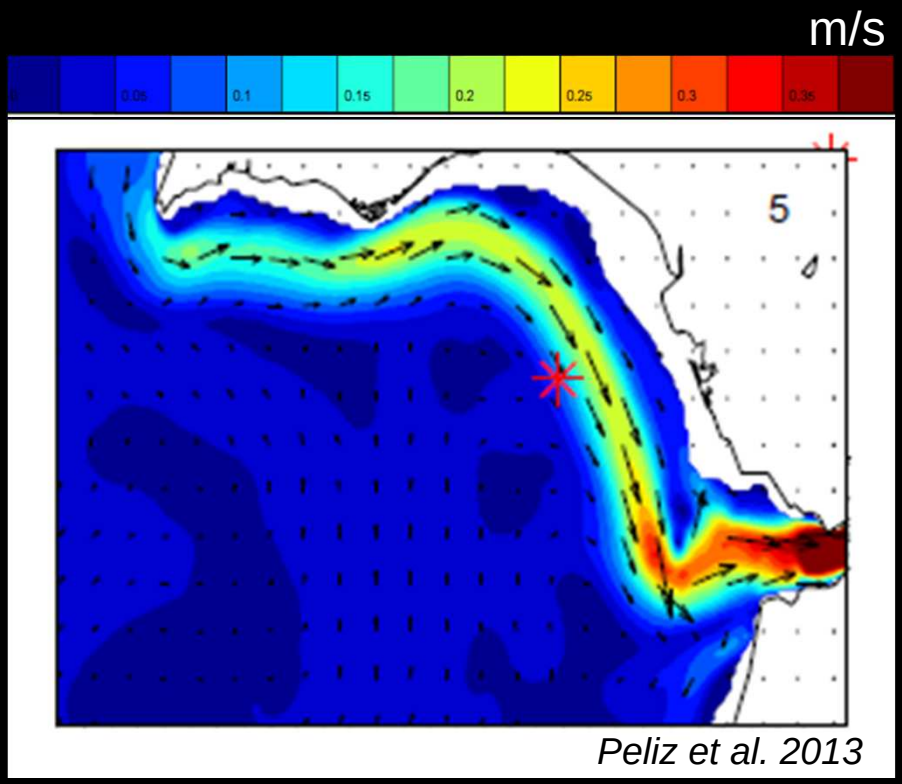
Sea level cycle at three tide gauge



Sea level consistently decline to the pole

Estimated magnitude of summer slope: ~10 cm in 240 km

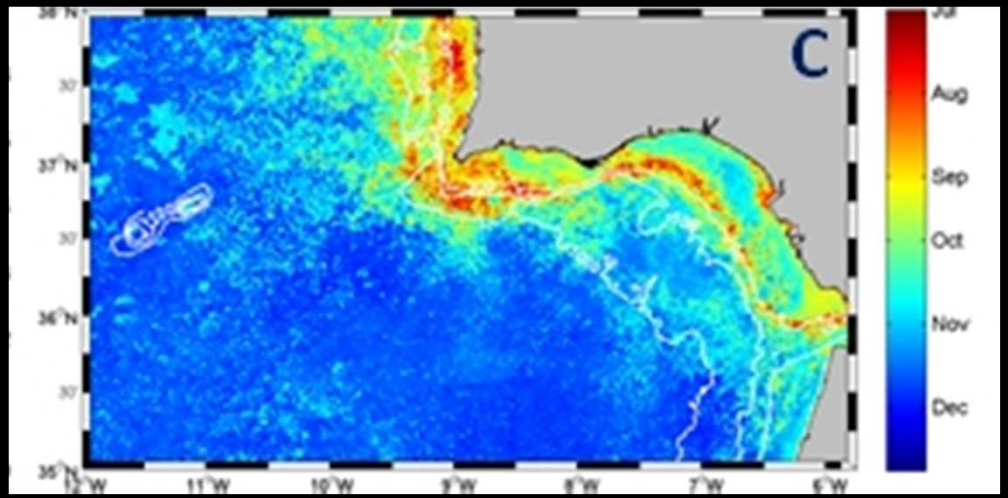
MEDITERRANEAN INFLOW



Peliz et al. 2013

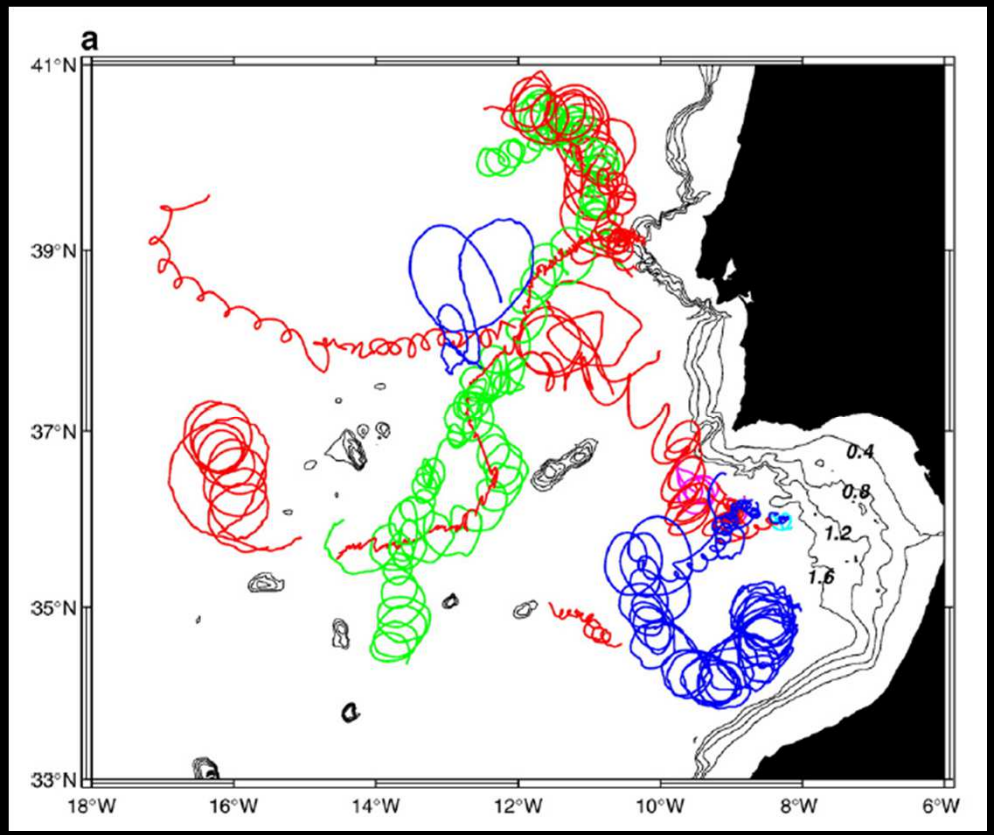
Simulated monthly mean circulation at 30 m depth – April (ROMS)

Occurrence of Chlorophyll *a* maximum (remote sensing) *(unpublished)*



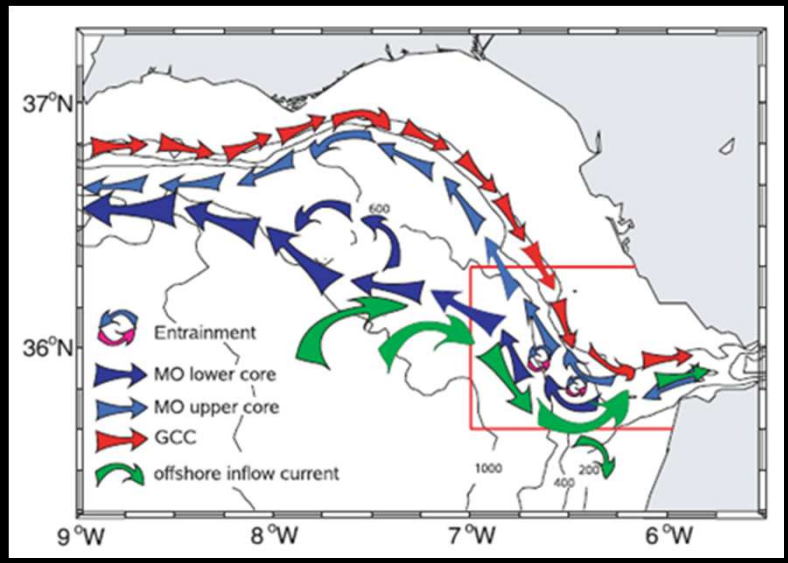
Subsurface Circulation

Mesoscale activity in the subsurface circulation:
Meddies



Trajectories of subsurface RAFOS floats that were caught by eddies
Ambar et al., 2008

Conceptual offshore circulation from model simulations
Peliz et al. 2009



SUMMARY - ALGARVE

We can summarize the circulation off soutwest Iberia as follows:

...with mesoscale features superimposed....

CHALLENGES

Published on *Maritime Forum* (https://webgate.ec.europa.eu/maritimeforum)

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Marine Knowledge 2020

Maria Damanaki, Commissioner for Maritime Affairs and Fisheries

Europe's 2020 strategy recognises that knowledge drives innovation, which in turn brings growth that is both sustainable and smart. For the maritime economy much of this knowledge depends on observations of the rhythms and cycles of the sea. However, the data collected through these observations can only generate knowledge and innovation if Europe's engineers and scientists are able to find, access, assemble and apply them efficiently and rapidly. At present this is often not the case.

The Commission's "Marine Knowledge 2020" initiative aims to unlock and assemble marine data from different sources and facilitate their use for purposes other than those for which they were originally intended. This will have three major benefits.

First, it will improve the efficiency of all those private bodies, public authorities and researchers which presently use marine data. Less time and effort will be spent assembling and processing incompatible data from heterogeneous sources.

Second, it will open up new opportunities and drive innovation in the maritime economy. I am confident that universal and reliable access to accurate marine data will enable European business to offer products and services that nobody could have anticipated beforehand.

And third, it will reduce uncertainties in our knowledge of the behaviour of the seas and oceans. This will not only benefit those living and working on the seas and at the coast. Circulation in the oceans drives the terrestrial climate. Improved knowledge of the sea is not a sufficient condition for better forecasting of the future severity or mildness of Europe's seasons. But it is a necessary one. Thus better marine knowledge can contribute towards Europe's adaptation to climate change.

Consortia of European bodies are already setting up a prototype European Marine Observation and Data Network (EMODnet) to facilitate access to data in a limited number of sea basins for those public and private bodies that need them. Users can download not only the data, but also information as to the reliability of the measurements. Gaps in the observation networks are highlighted.

The further measures that we propose will help us realise the potential of a resource that covers 71% of the planet. Together they represent a coherent set of contributions from different EU policy areas and as such this initiative is a concrete example of the benefits of the EU's fledgling integrated maritime policy.

Europe's 2020 strategy recognises that knowledge drives innovation, which in turn brings growth that is both sustainable and smart. For the maritime economy much of this knowledge depends on observations .....However, the data collected through these observations can only generate knowledge and innovation if Europe's scientists are able to find, access, assemble and apply them efficiently and rapidly.

Presented at the 2nd Marine Board Forum, 16 Sep 2010, Brussels: *Towards a European Network of Marine Observatories for Monitoring and Research*, by Hans Dahlin, EuroGOOS Director in his talk: European Marine Long-term Time-series Observatories: critical issues: Towards a network of Marine Observatories in Europe: what elements are missing?

CHALLENGES

Challenges:

1st Challenge – Observation…..!

2nd Challenge – Observation…..!

3rd Challenge – Observation…..!

Observe what?

Long term – built long time series! - climatic changes, ocean dynamics, Rossby waves, coastal trapped waves, alongshore dynamics, etc…

Mesoscale – event scale! – frontal dynamics, eddies, countercurrents, filaments, plumes, upwelling, retention zones, ecosystem function, etc….

Observe how?

Buoys, moorings, repeated transects, remote sensing,…..

Ships, autonomous or automated vehicles, remote sensing,……

THE END

Thank you for the attention

I will be happy to answer your questions

December 4th & 5th
Porto Cálem, Gaia, Portugal