

# TRANSMED: a (future) network of low cost thermosalinometers in the Mediterranean

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HyMeX

HYdrological cycle in Mediterranean EXperiment



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DE MARSEILLE

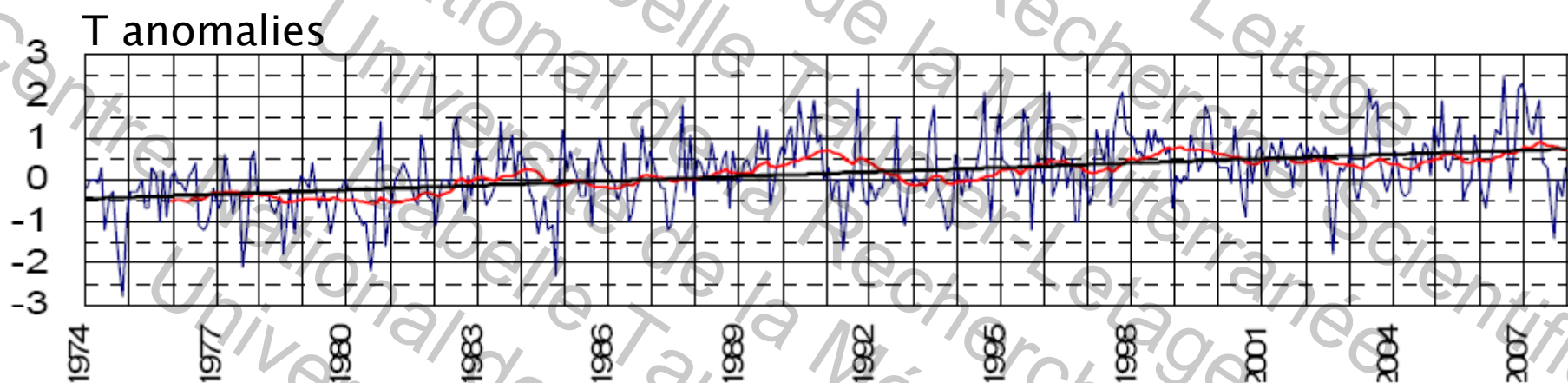
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Division Technique UPS 855  
Institut National des Sciences de l'Univers

## The Mediterranean: a sea to monitor

Weak climatological changes can be detected at the surface



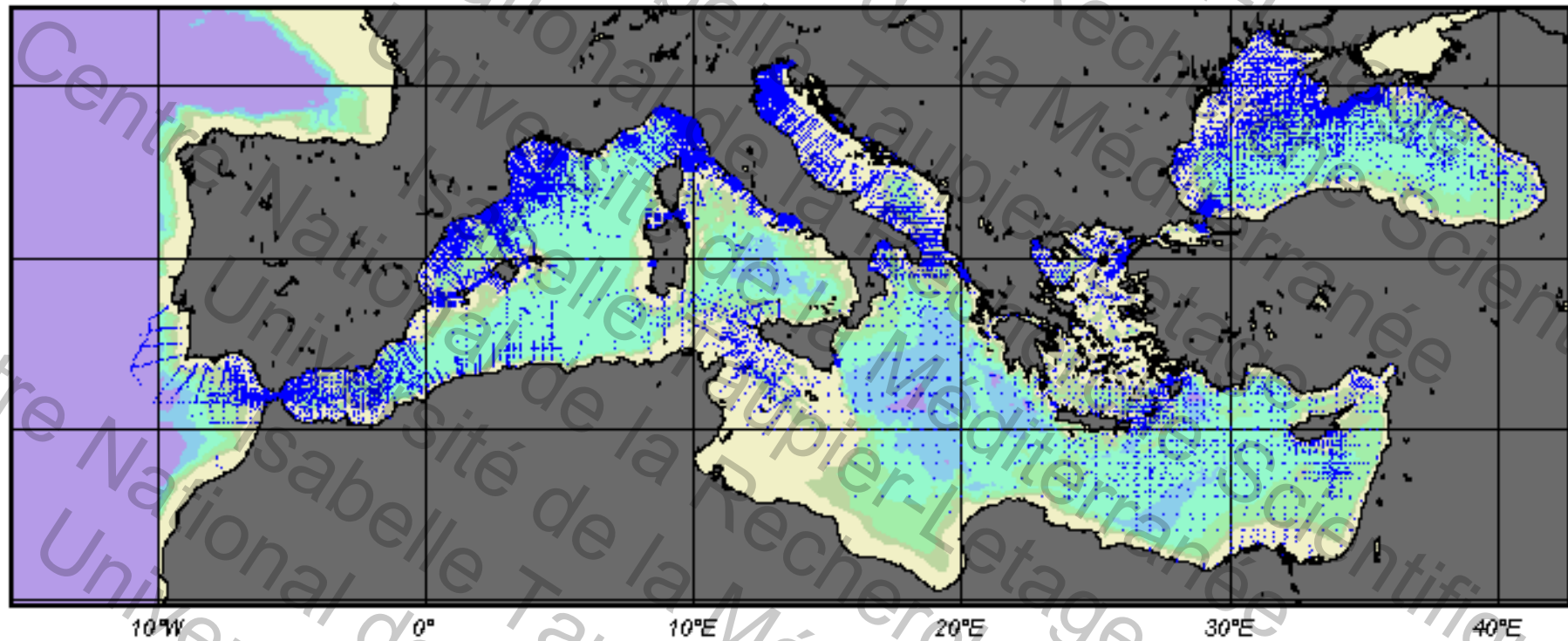
**Increase of the sea surface temperature:**

**$1.1^{\circ}\text{C} / 27 \text{ years} = 0.04^{\circ}\text{C} / \text{year}$**   
(from « manual » hydrology)

From Salat et Pascual, 2002. CIESM  
Workshop Series #16 on: « Tracking long-  
term hydrological change in the  
Mediterranean Sea »

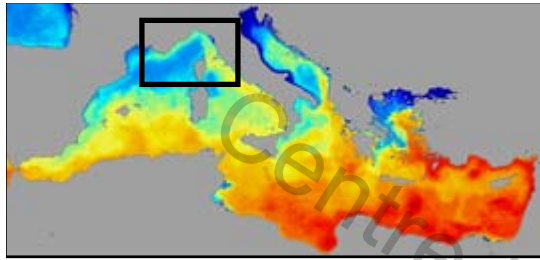
# The Mediterranean: a sea to be explored yet

MedatlasII\_good salinity data ~ 2000

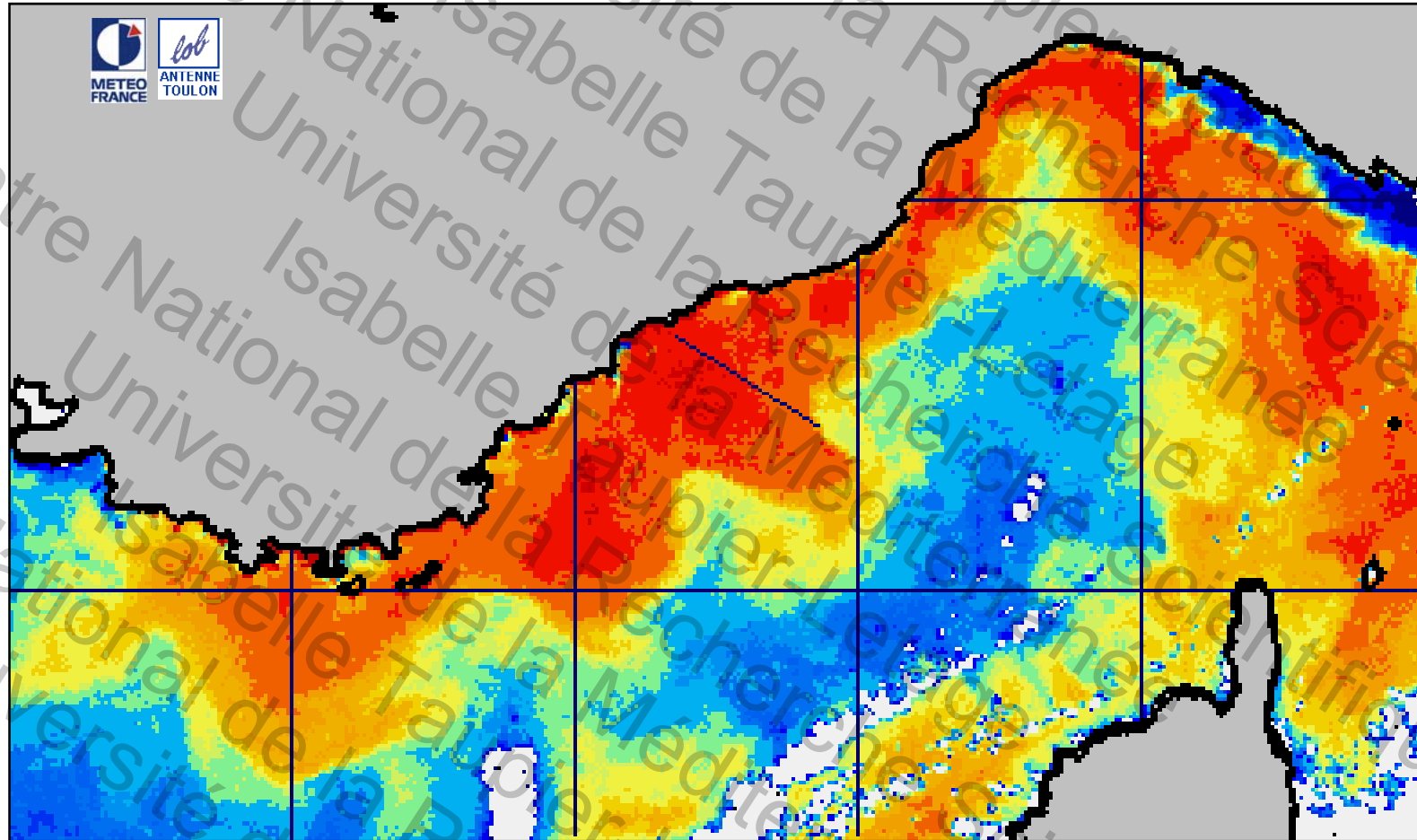


Data missing:

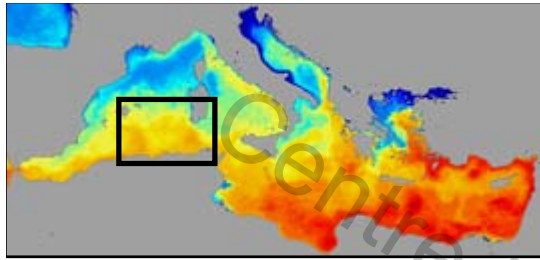
- central zones
- southern parts (Eastern basin)



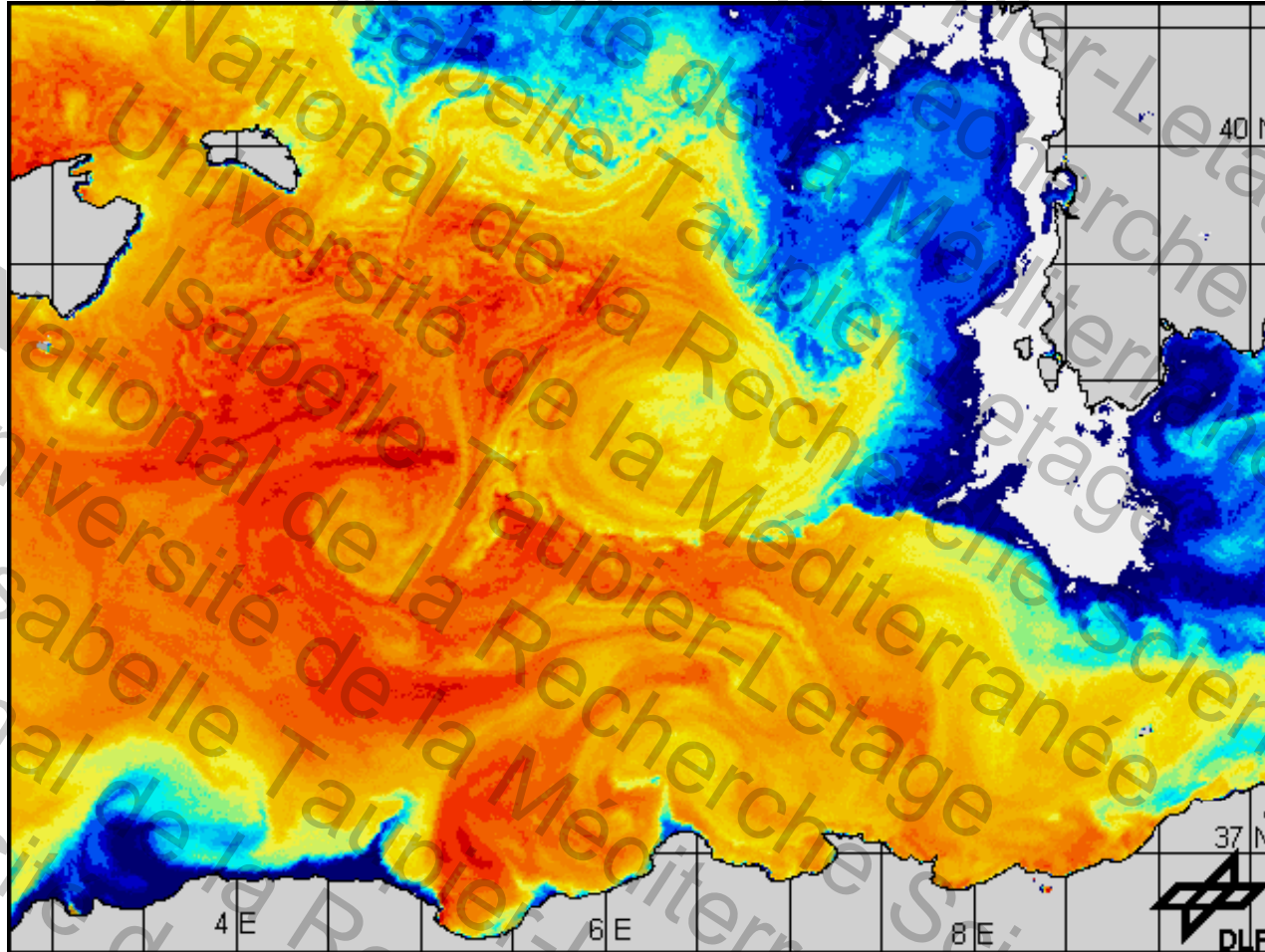
No continental shelf => the coastal circulation is directly influenced by the general circulation



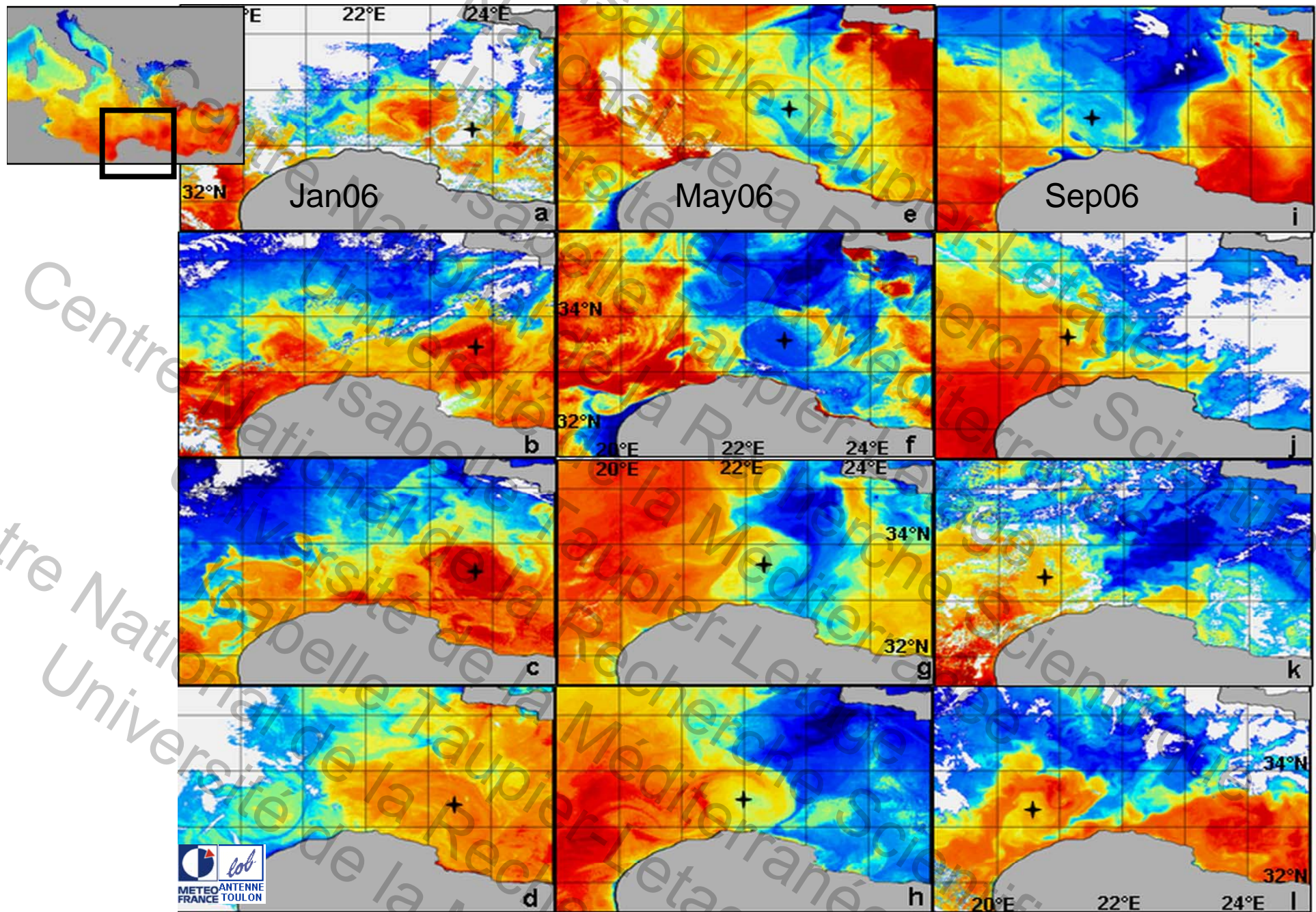
In the North: seasonal variability: instability during wintertime => Propagating meanders (up to vortex dipoles)



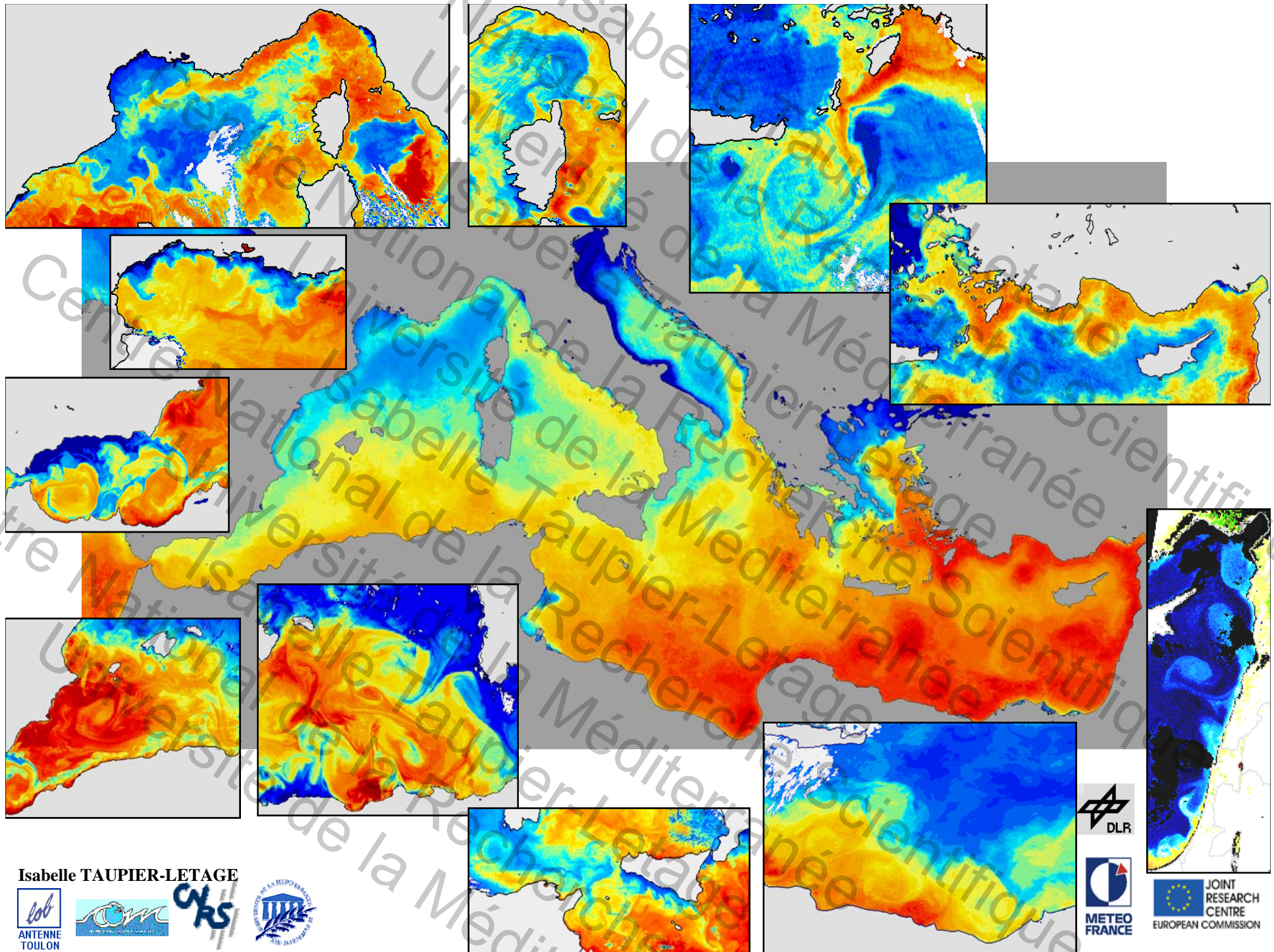
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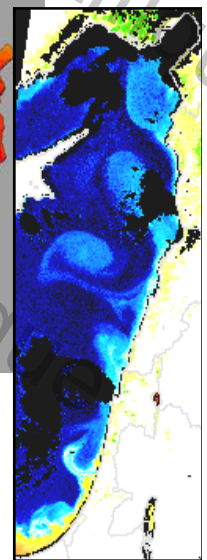
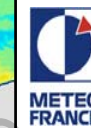
In the South: mesoscale variability => eddies that reach the bottom (reverse the general circulation during several months)



Long-lived (1-3 years) propagating eddies



Isabelle TAUPIER-LETAGE



# TRANSMED:

Main objective:

**monitoring the surface water** characteristics (T and S), with a fine spatial and temporal sampling interval (**=> sample extreme events**) along **regular ferry or shipping routes**, using **time series** (**=> relevant statistics**) of hydrological and bio-geochemical parameters), over the **whole Mediterranean** (**=> synopticity**)

Coordination: Isabelle TAUPIER-LETAGE

[www.hymex.org](http://www.hymex.org)





# TRANSMED:

Requirements:

- run several routes simultaneously (network)
- system fully autonomous (short routes /duration ~24h =>no crew involvement)
- portable system (ship assigned to an other route with (ultra)short notice)
- support this effort on the long term (>10 years)
- Economical and geographic context => cheap
- Southern/southeastern countries involvement

THE solution: simple stupid\* LOW COST system (T S only)

\*: see multiparametric systems used in northern seas ([www.ferryboxes.org](http://www.ferryboxes.org))



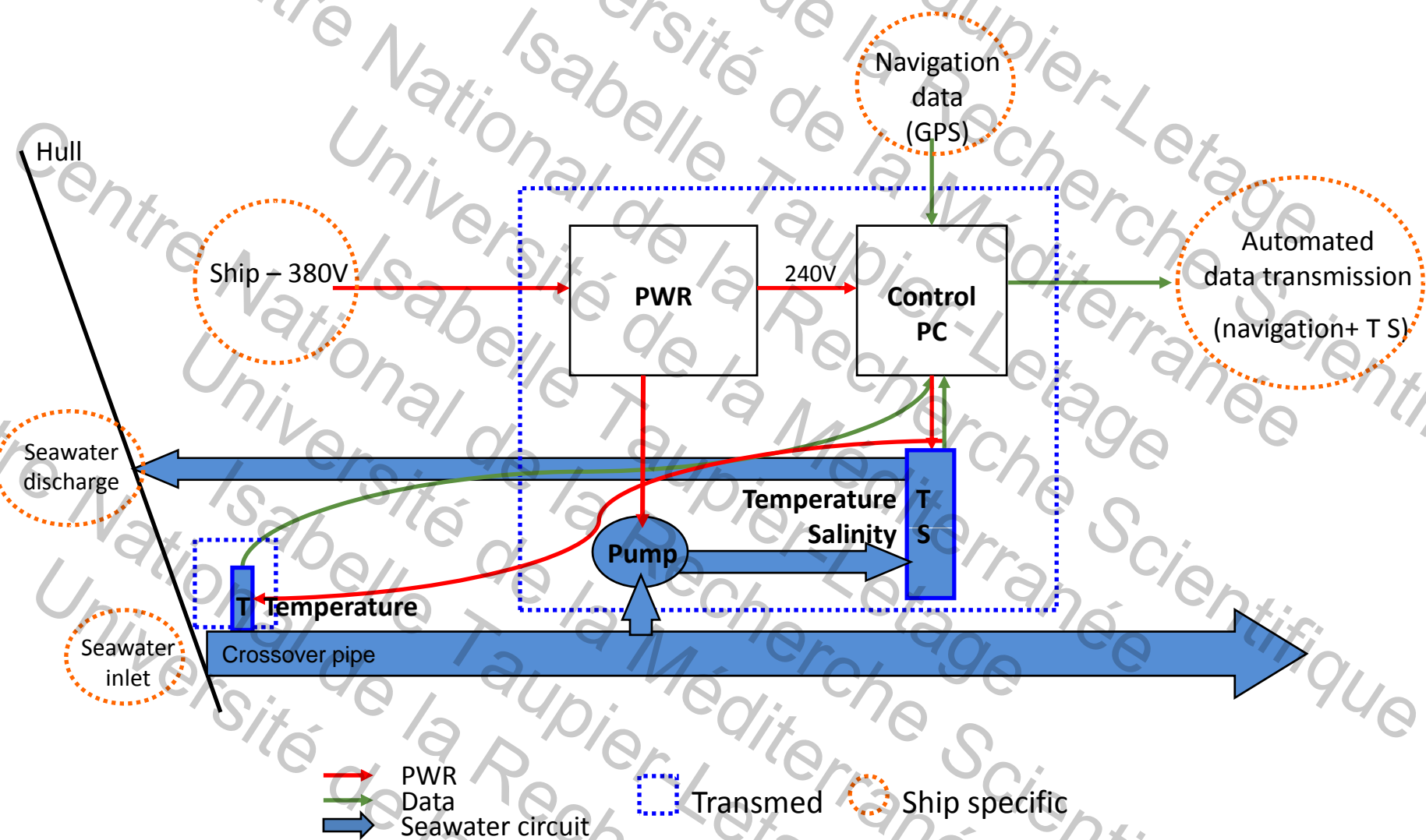
# The module TRANSMED

- Funding : CIESM (the Mediterranean Science Commission), Division Technique INSU(CNRS), Program HYMEX (MISTRALS, CIO Environment)
- Conception phase : late 2005
- 1st Prototype available and successfully tested on RV « *Tethys 2* » in 2006
- .....
- Late 2009: Prototype update (funding for engineer's salary: program HYMEX (MISTRALS, CIO Environment)
- Mid-May 2010: installation on a container ship

# From 1 system to a network

- ▶ ON/OFF of the pump autonomous (data acquisition/stop in function of the speed, auto reboot after PWR failure)
- ▶ START/STOP of data acquisition in function of the speed or geographical areas, automatic proc. if PWR failure
- ▶ Automated full resolution data transmission in near real time. (GSM, internet, Iridium SBDM)
- ▶ No requirement for freshwater, anti-fouling solution
- ▶ Basic system, interchangeable, all identical, 1 configuration standard file (but adaptations to each ship)
- ▶ Cheaper installation: no through-hull valves
- ▶ Softs in open source

# Schematic operating diagram





T (SBE38)

pump



SBE45 bypassed for tests

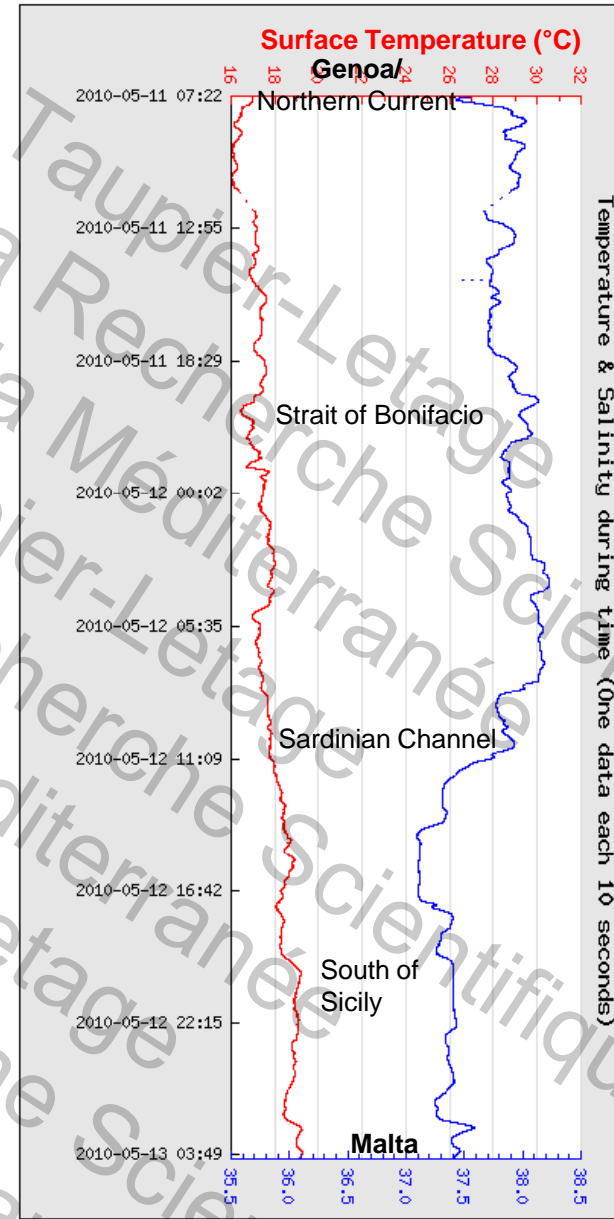
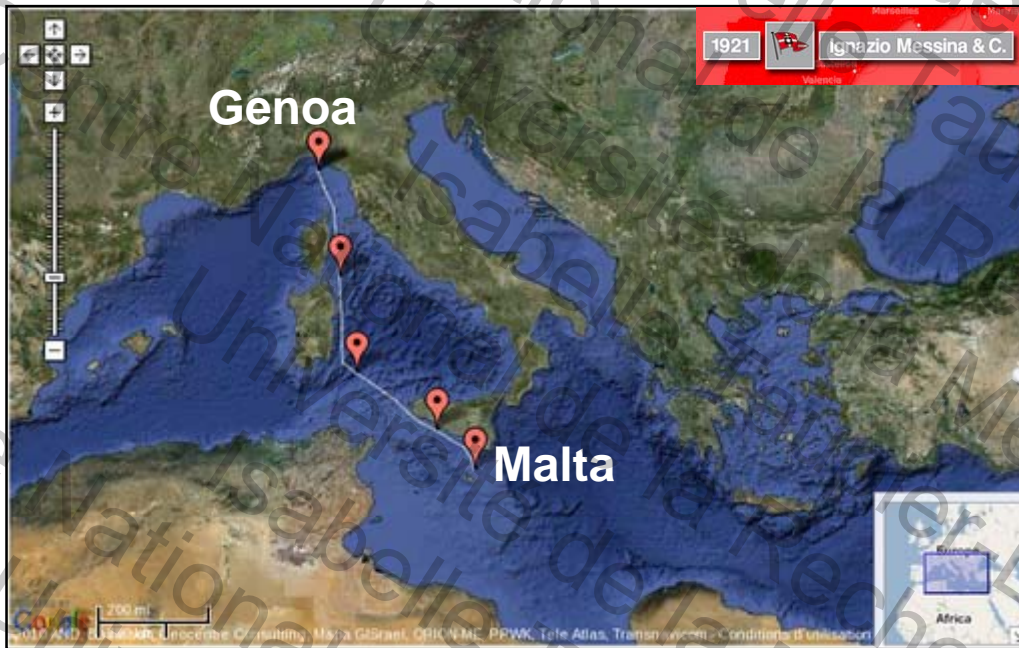


PWR chest

Control PC chest

TS (SBE45)

First trip **TRANSMED** May 2010  
(Genoa, Malta, Tripoli, Genoa)



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- . Transmed
- . Map
- . Data
- . Users
- . Ships

Veuillez remplir les informations ci-dessous pour procéder à l'affichage des graphiques:

Bateau

Mai 2010							
sm.	Lu	Ma	Me	Je	Ve	Sa	Di
17	26	27	28	29	30	1	2
18	3	4	5	6	7	8	9
19	10	11	12	13	14	15	16
20	17	18	19	20	21	22	23
21	24	25	26	27	28	29	30
22	31	1	2	3	4	5	6

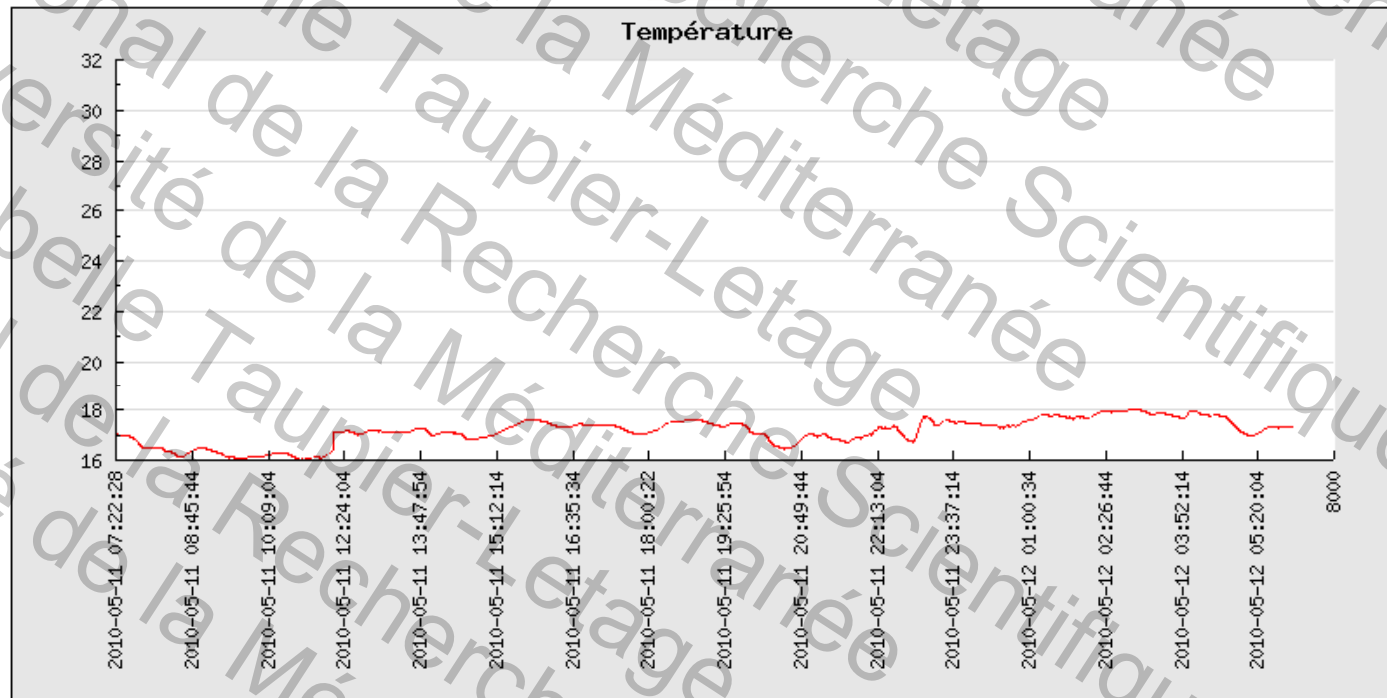
Aujourd'hui 01:03 am

Mai 2010							
sm.	Lu	Ma	Me	Je	Ve	Sa	Di
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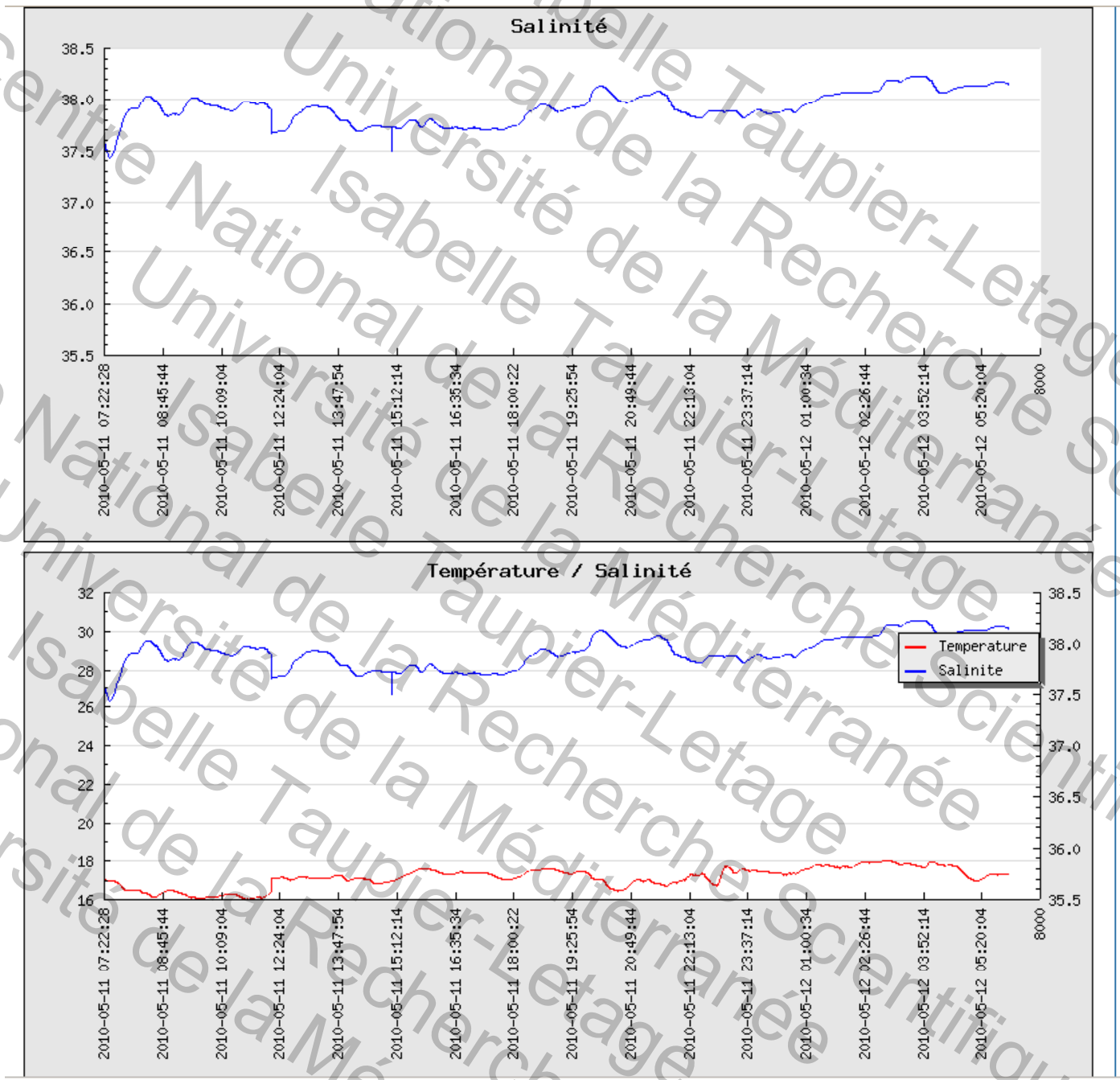
Aujourd'hui 11:58 pm

Date de début

Date de fin







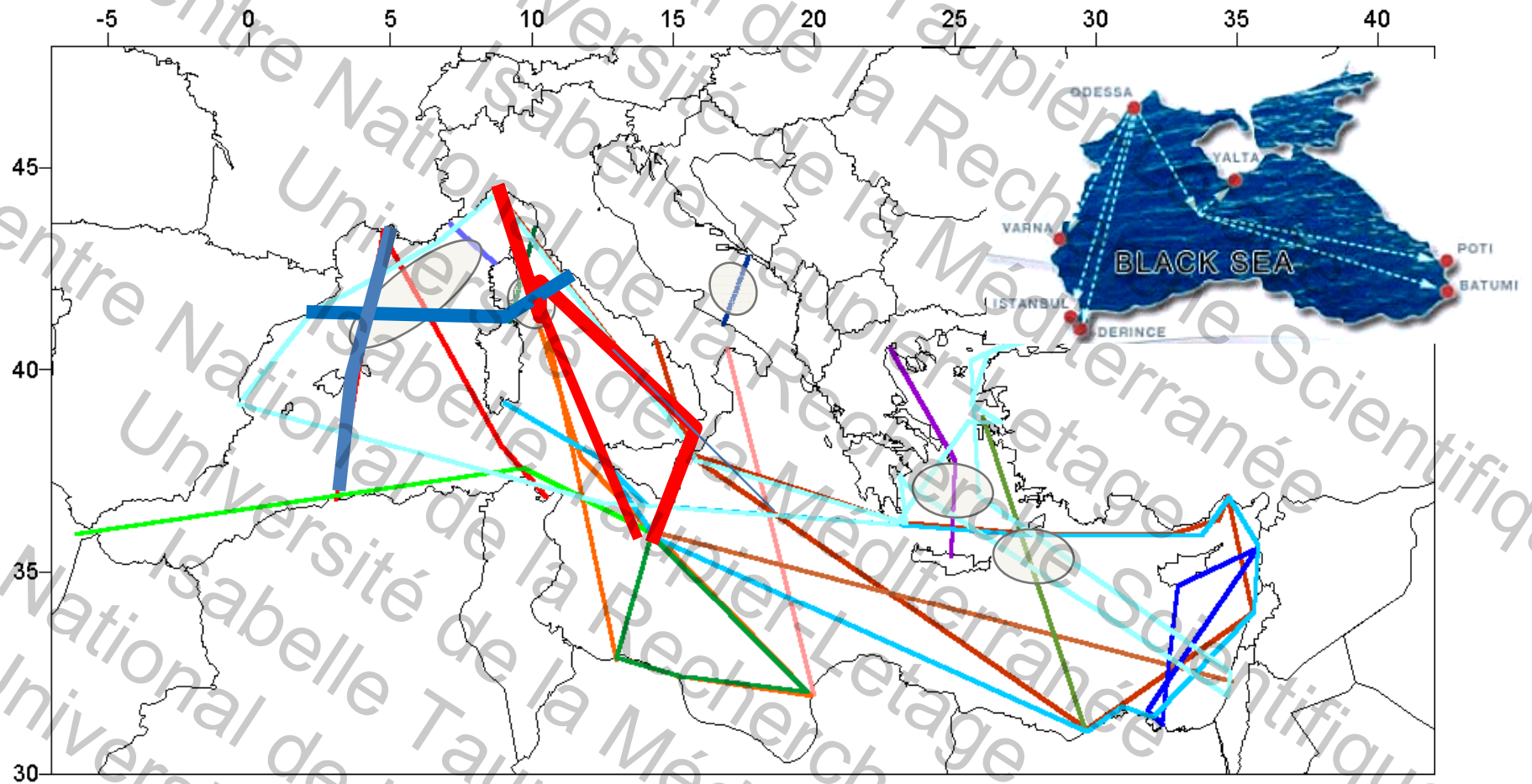
## **Major advantages of such a strategy:**

- provides synoptic data at basin-scale (limited to the surface)
- provides data both in coastal and open sea areas (allowing to link both areas)
- direct and rapid involvement of all riparian countries: data are sent and shared in (near)real-time through internet

# Next steps

- Implement QA/QC protocols, links with Coriolis
- Implement database
- Replicate/industrialize the prototype?
- Contact the maritime companies
- From one system to a network:

# TRANSMED POTENTIAL NETWORK



Data synoptic at basin-scale

Samples both coastal and open sea



TS with MeteoFrance package



Dense Water Formation zone

## **In the (very near) future:**

- Link with meteorological sensor package (MeteoFrance/HYMEX)
- HYMEX priority line (and MOON too, discussions underway):  
Marseilles-Algiers (by the end of 2010/early 2011)=> collaboration  
with the RASMER Algerian network?  
(+... staff issues)

## **In the future:**

- Add multiparametric sensors (cf FerryBoxes in the northern seas)
- Request to the maritime industry: from the conception stage of a new ship dedicate a space and facilities to marine sciences (through-hull valves and wells to fit ADCP currentmeter and acoustic devices, freshwater supply, PWR and network cables, communication facilities...)

## **Special thanks to:**

- The maritime companies managers
- The crews
- The technical staff from our lab
- ... and the CIESM staff (fully involved in real time issues of « nearly operational oceanography »...)