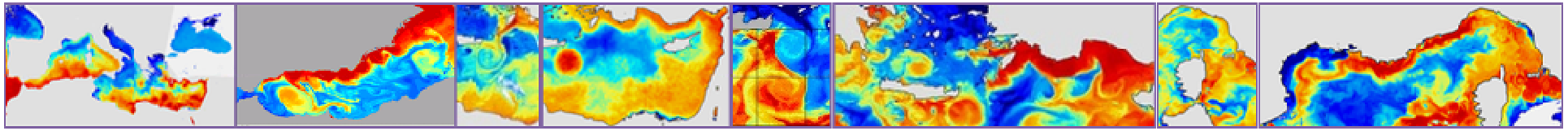

TRANSMED:
a (future) network of low cost thermosalinometers (ferryboxes?) in the Mediterranean

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www.ciesm.org

www.hymex.org

HyMeX
HYdrological cycle in Mediterranean EXperiment

dépasser les frontières

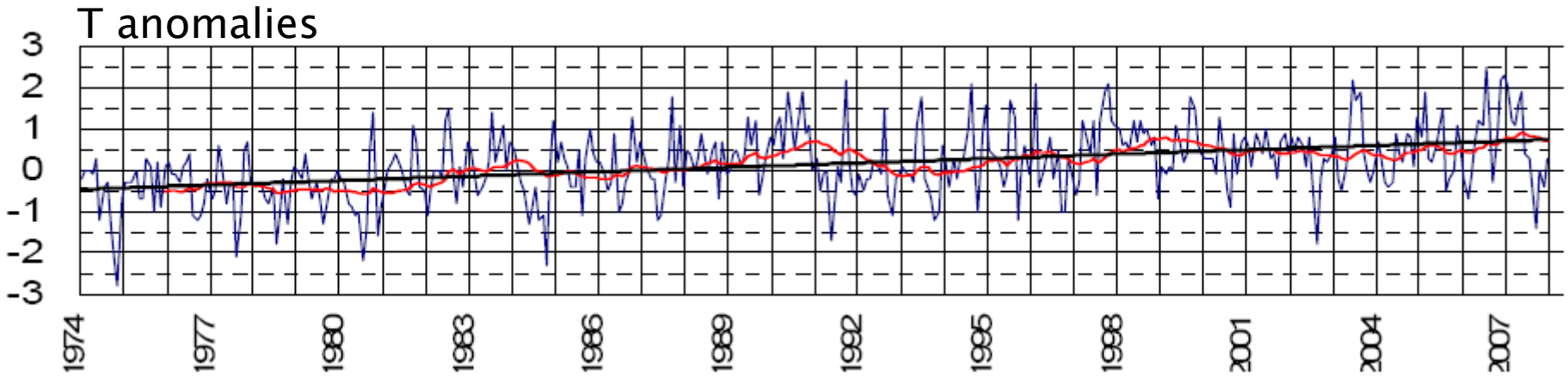
Division Technique UPS 855
Institut National des Sciences de l'Univers

CENTRE D'OCÉANOLOGIE DE MARSEILLE
UNIVERSITÉ DE LA MÉDITERRANÉE AIX-MARSEILLE II

LOPB

The Mediterranean: a sea to monitor

Weak climatological changes can be detected at the surface



Increase of the sea surface temperature:

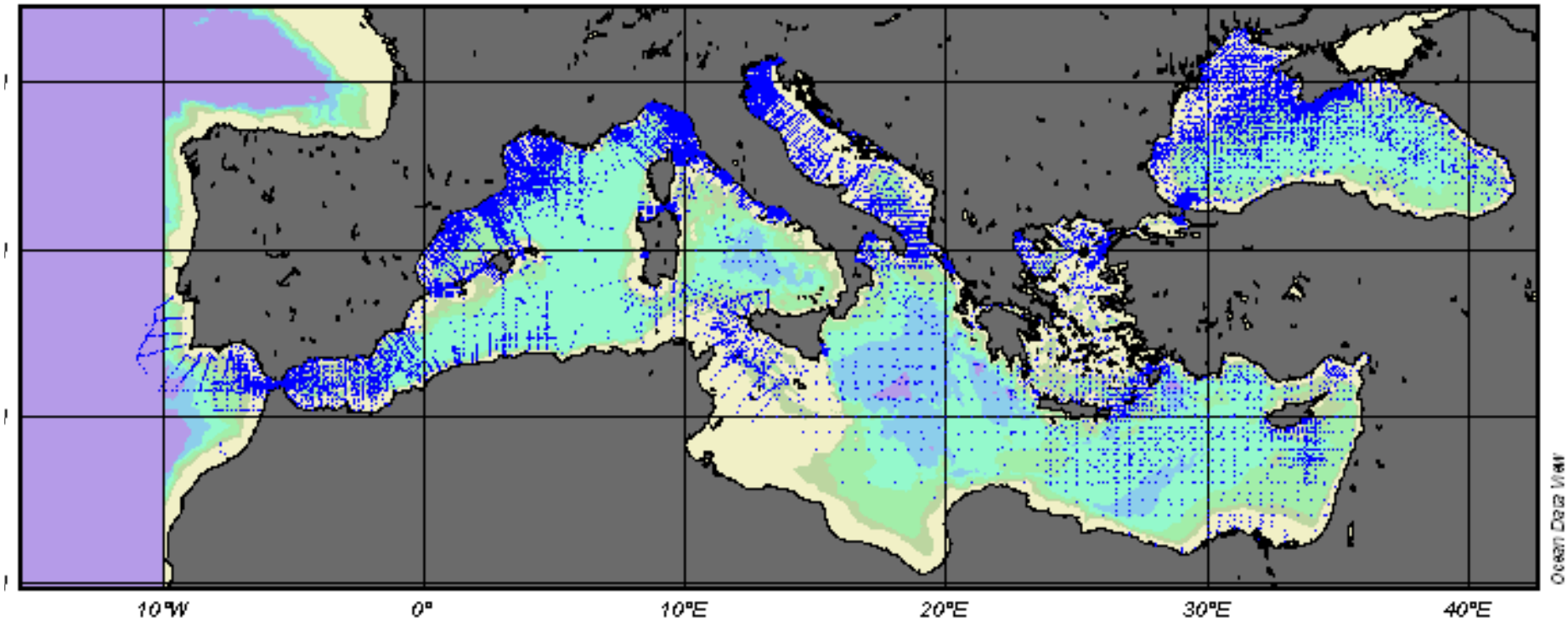
1.1°C / 27 years = 0.04°C / year

(from « manual » hydrology)

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

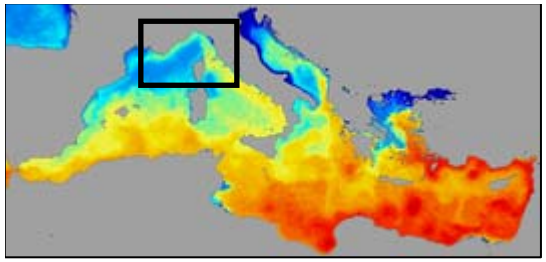
The Mediterranean: a sea to be explored yet

MedatlasII_good salinity data ~ 2000

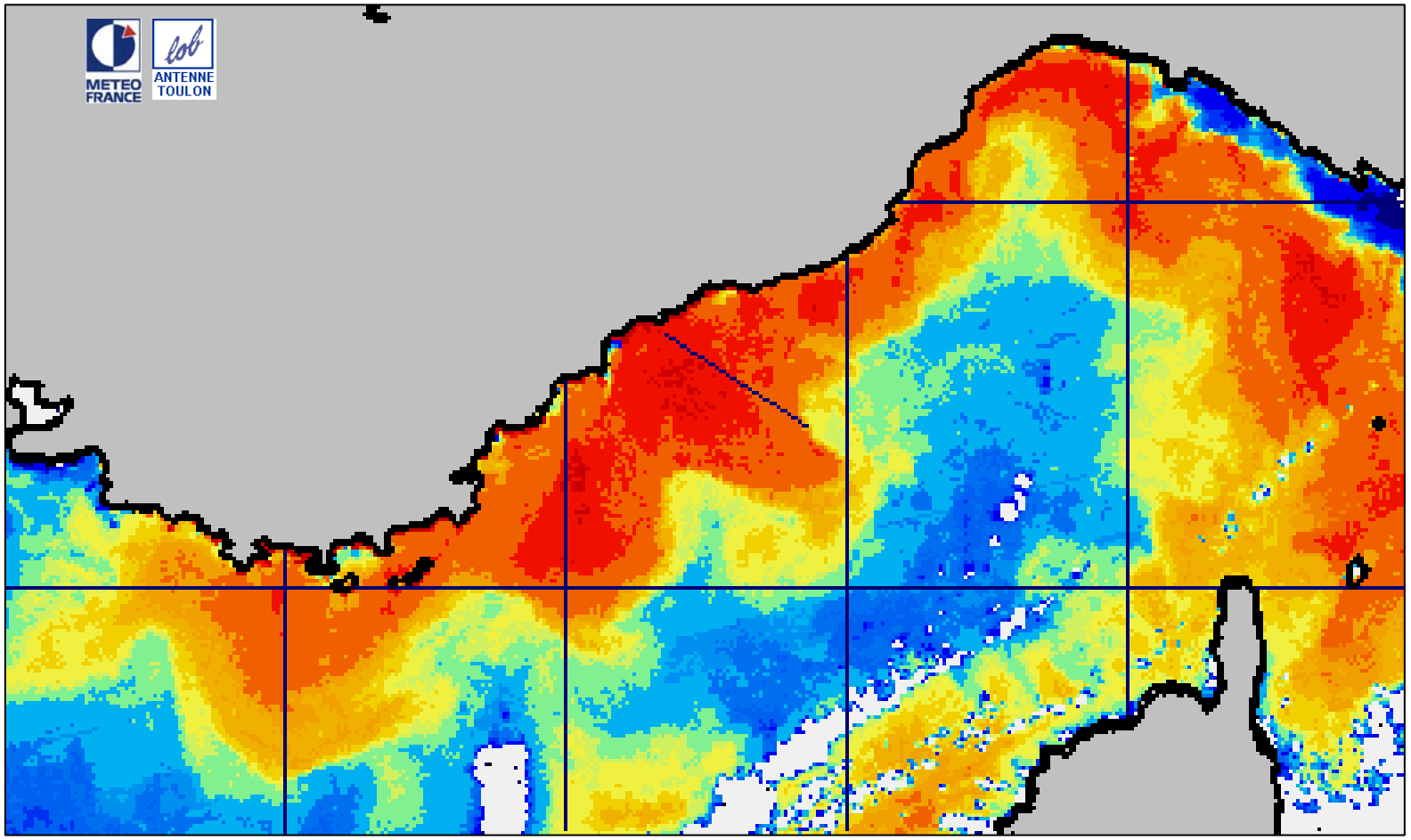


Data missing:

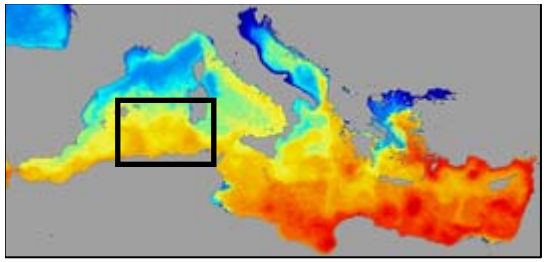
- central zones
- southern parts (Eastern basin)



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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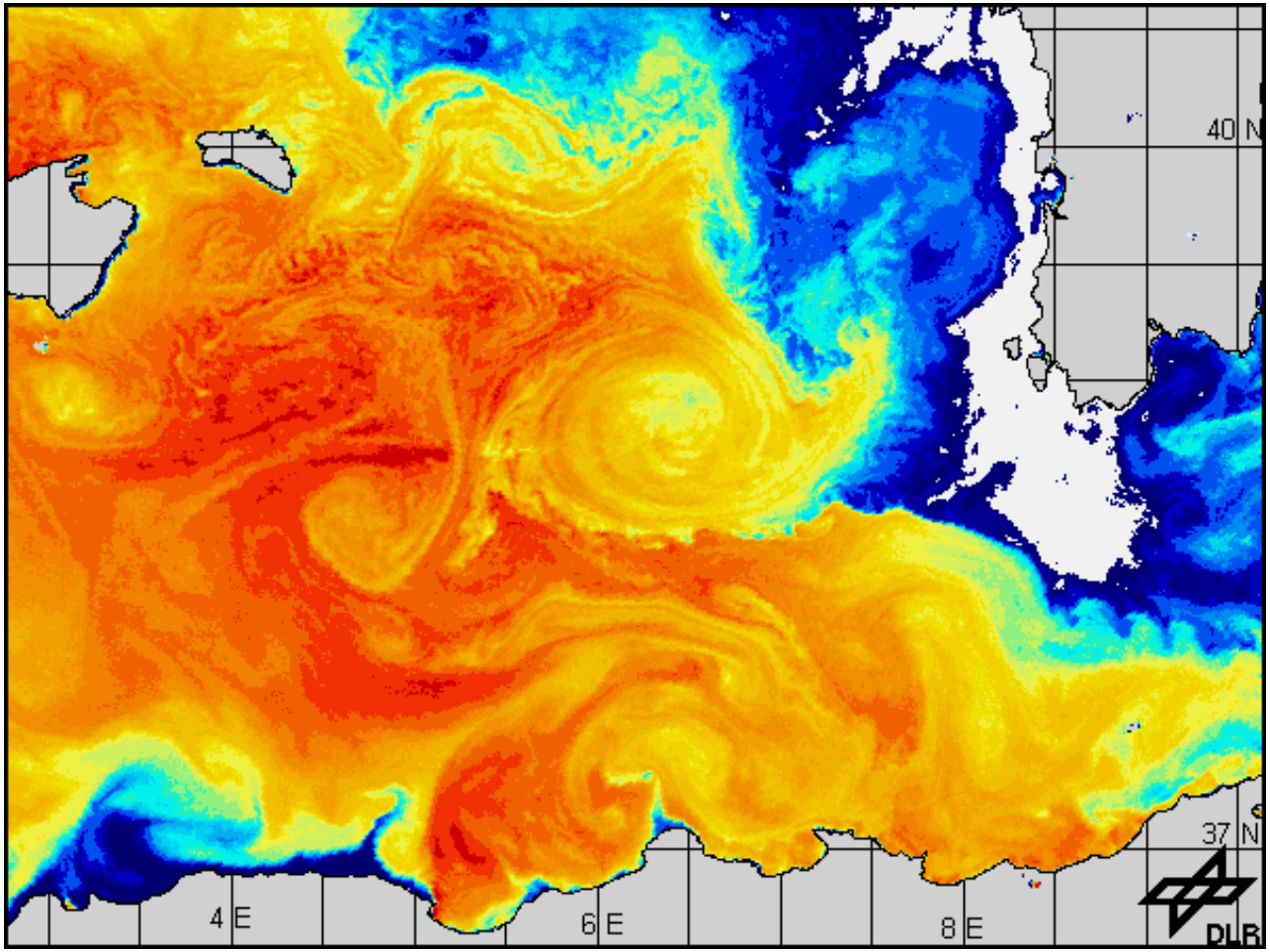
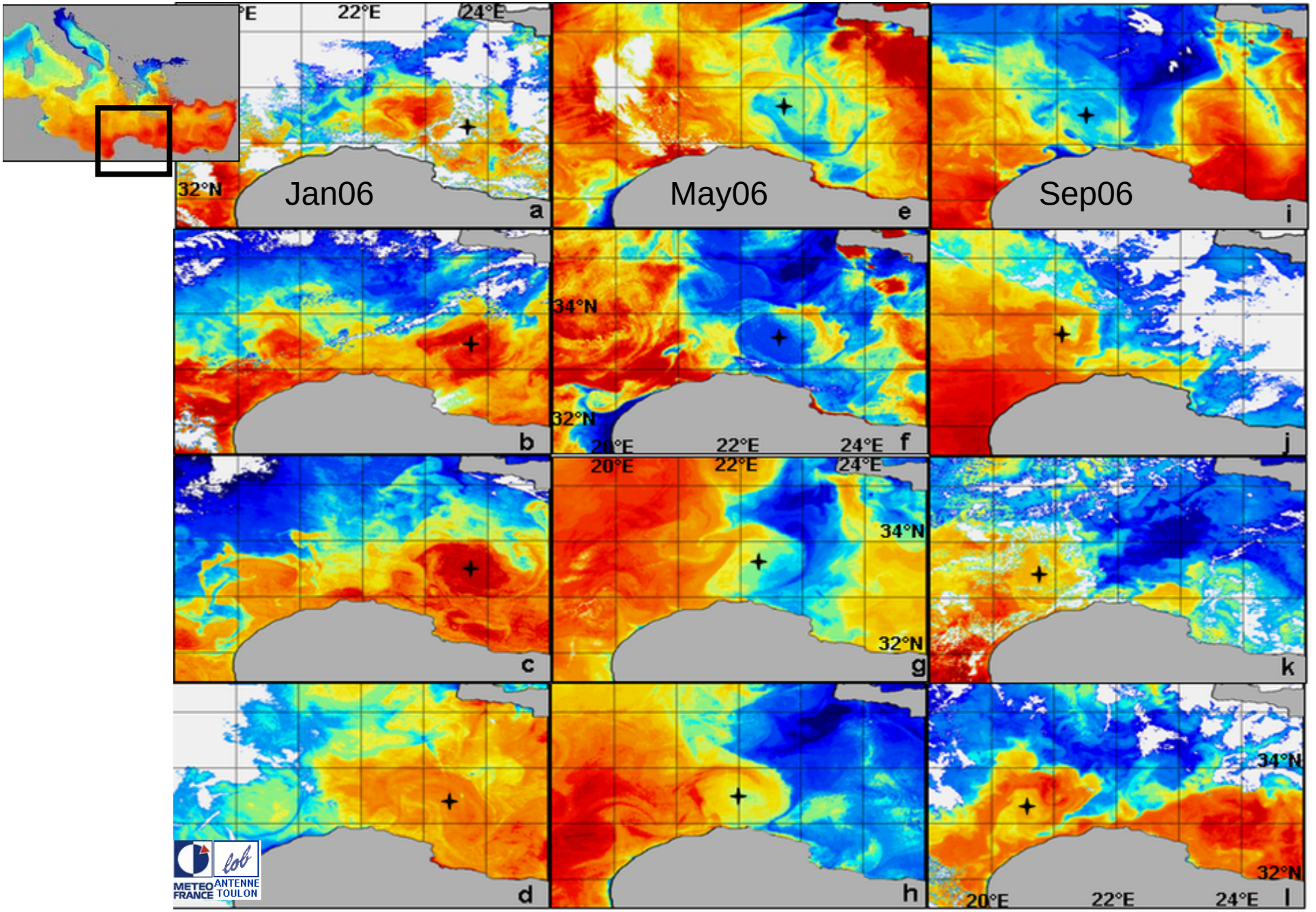
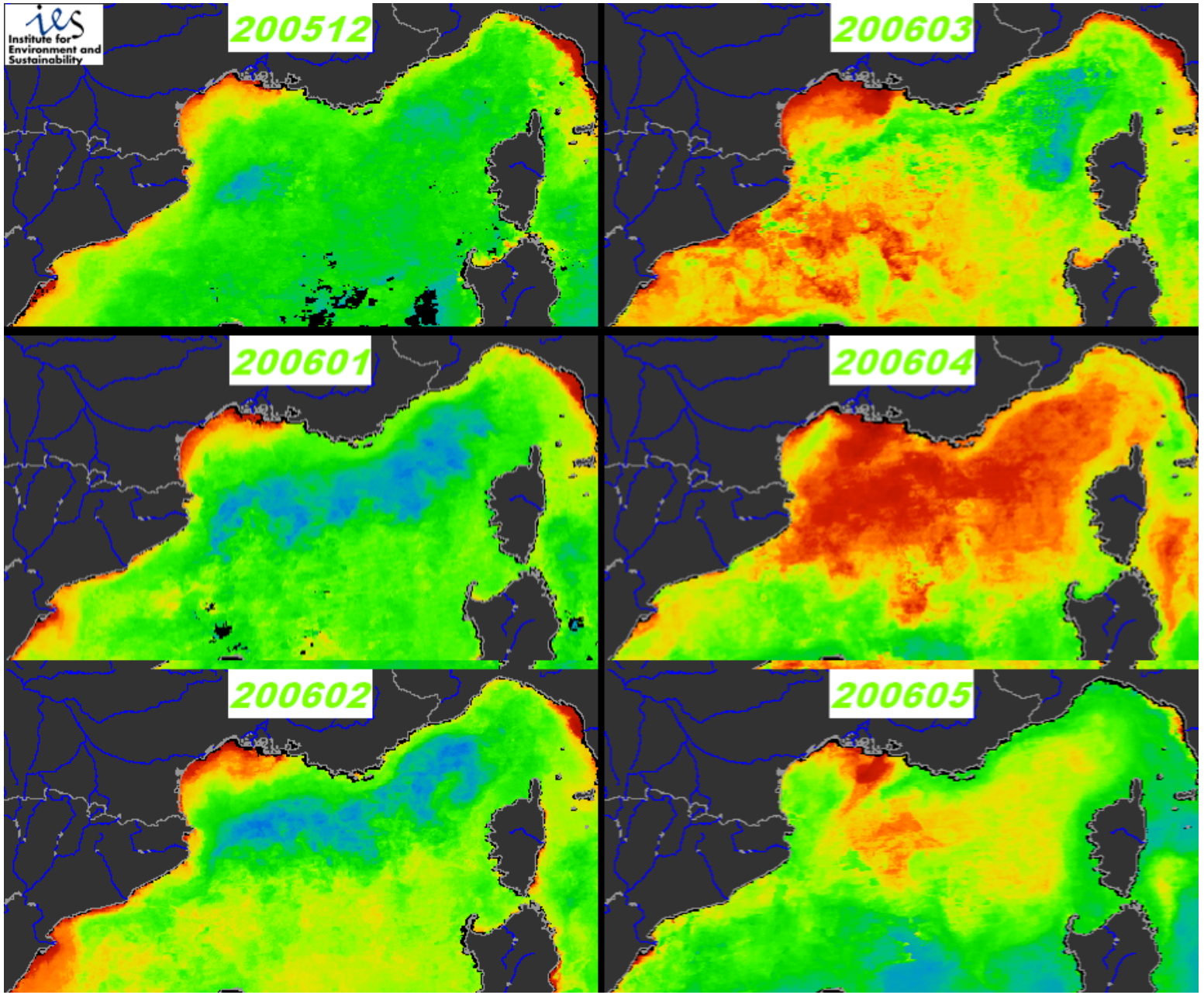
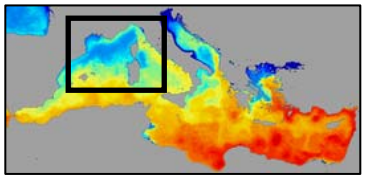


In the South: mesoscale variability => eddies that reach the bottom (reverse the general circulation during several months)



Long-lived (1-3 years) propagating eddies

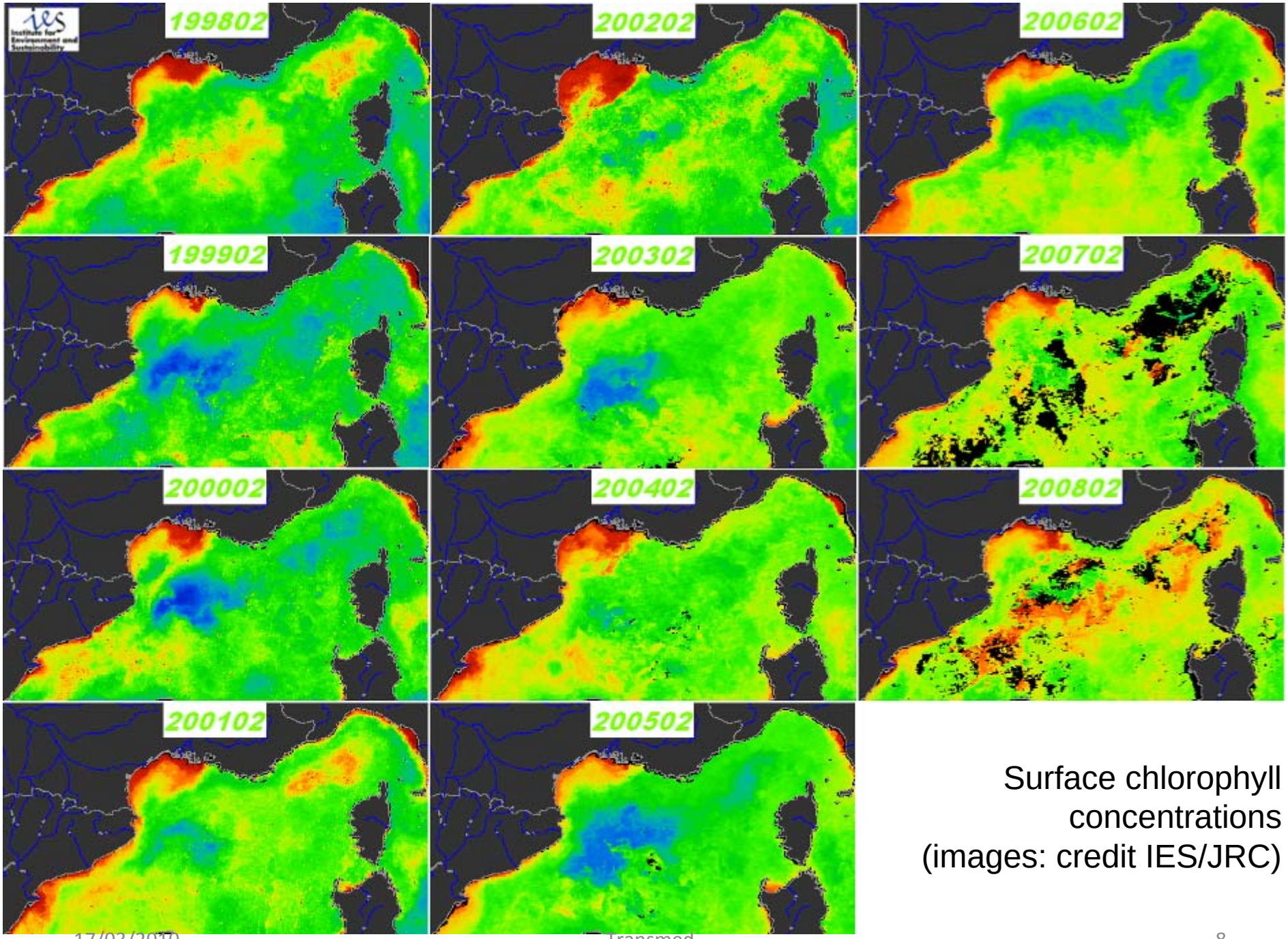




Chlorophyll surface concentrations

(concentrations increase from blue to red)

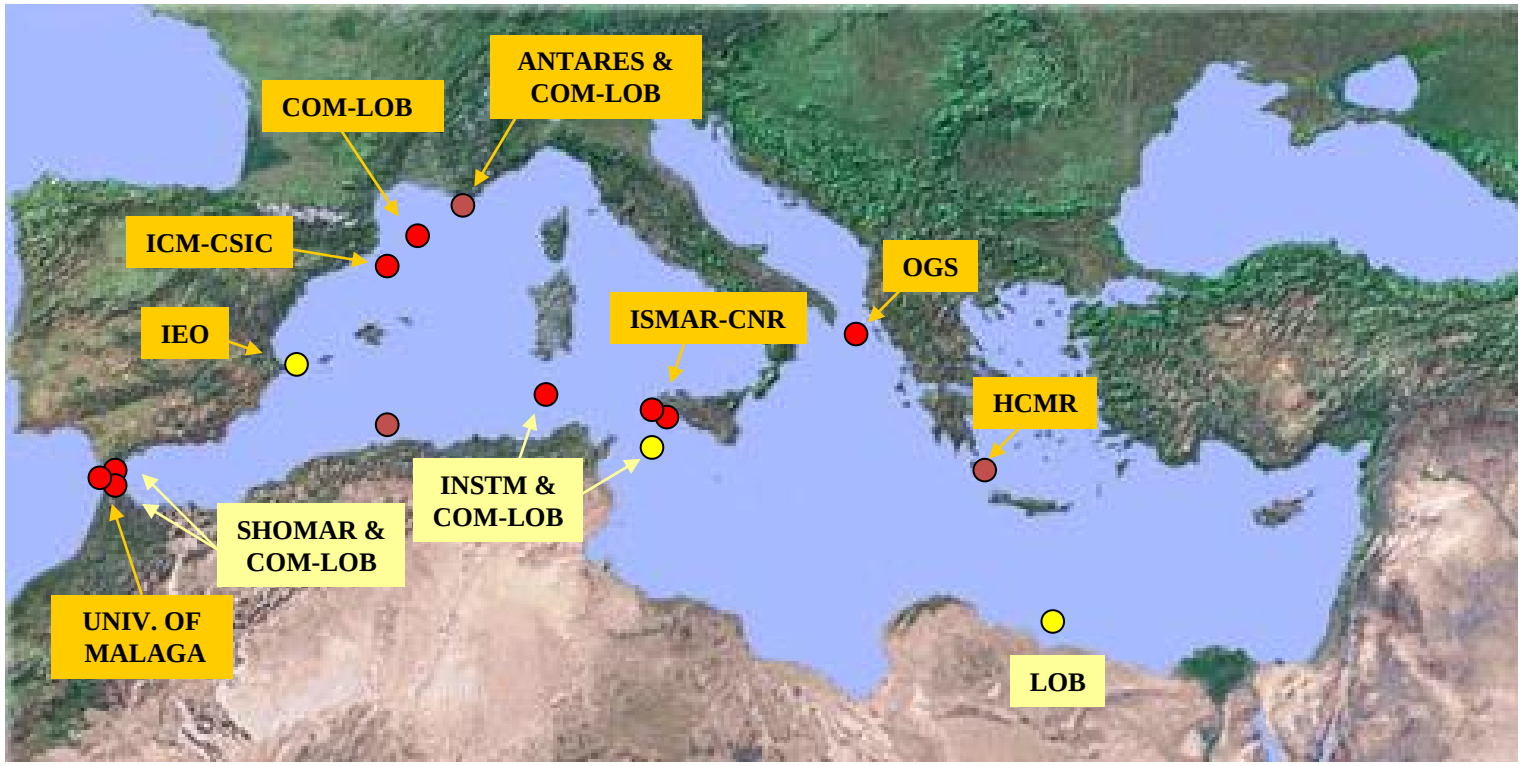
Seasonal variability: winter mixing in central zones, up to deep convection => DWF ⇒ phytoplancton bloom)



Surface chlorophyll concentrations
(images: credit IES/JRC)

=> Interannual variability (Dense Water Formation and chlorophyll concentrations)

PRESENT STATUS OF THE NETWORK AND INVOLVED INSTITUTES

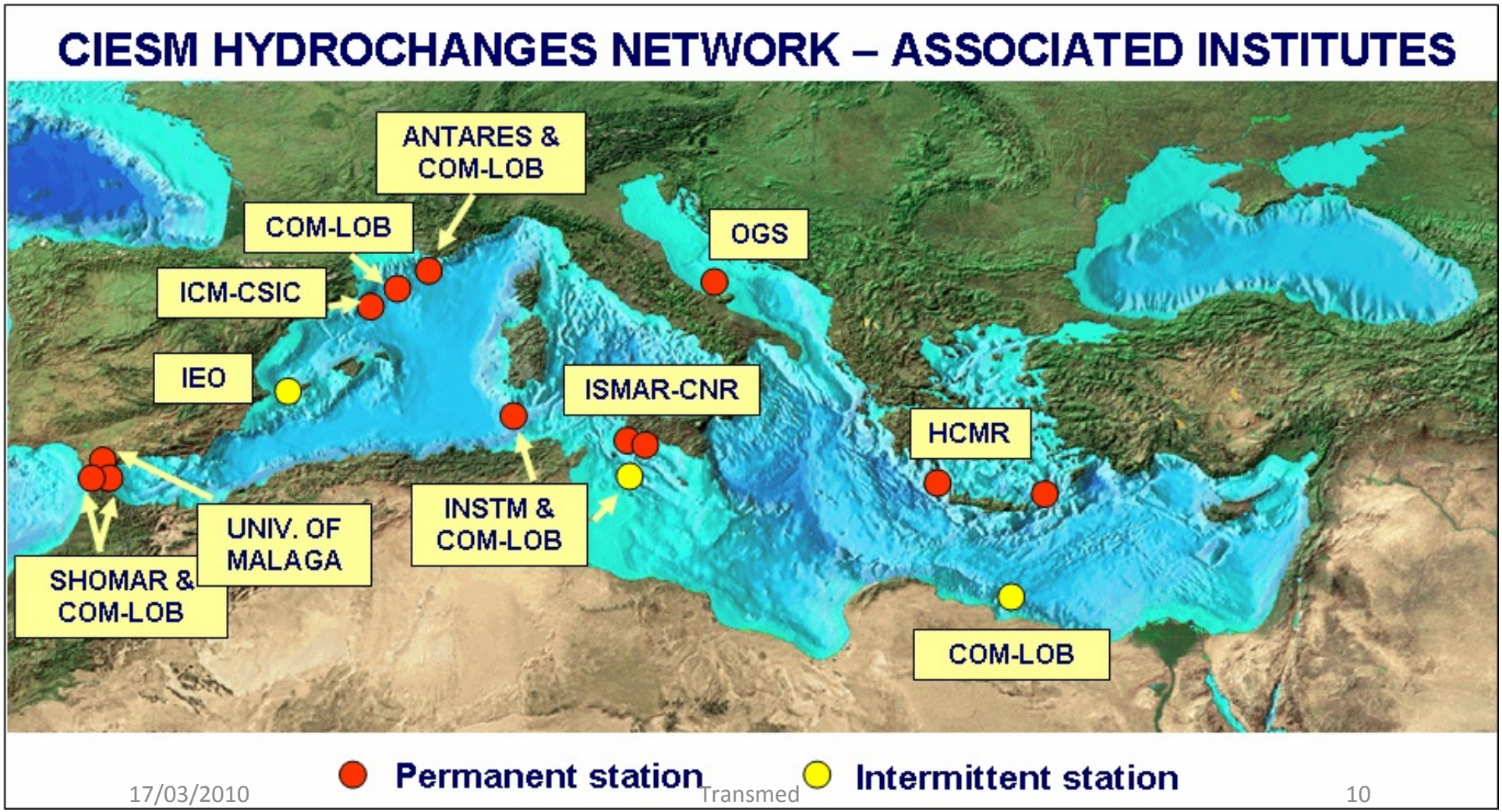


- In operation
- Temporarily interrupted
- Foreseen

NATIONAL INITIATIVE

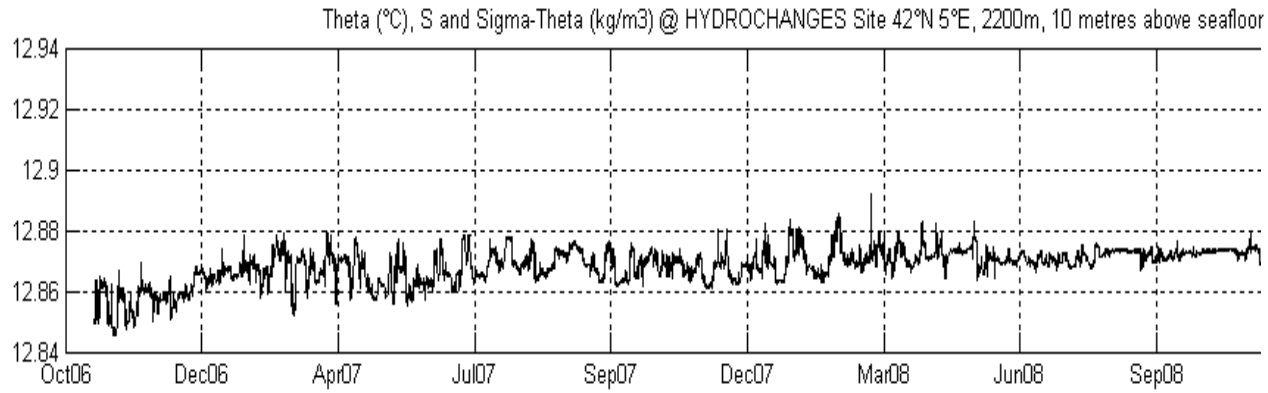
SPECIFIC CIESM SUPPORT

PRESENT STATUS OF THE NETWORK AND INSTITUTES INVOLVED



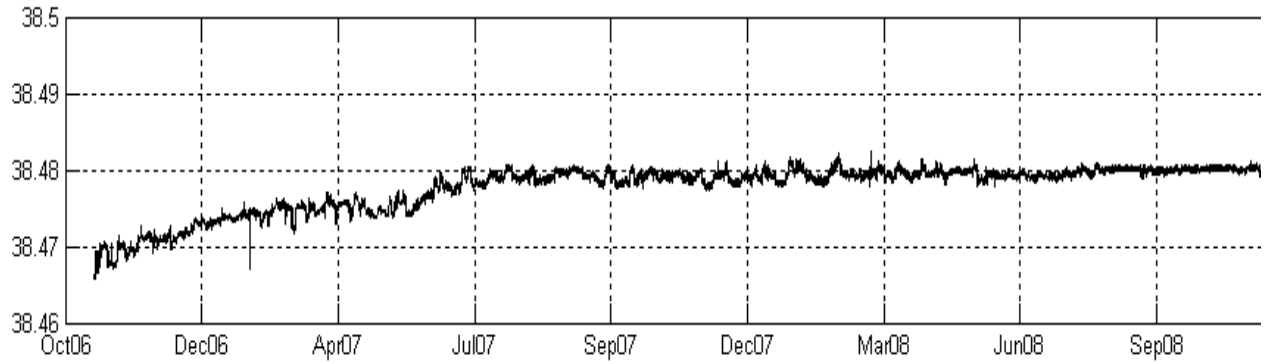
The DWF event of winter 2008-2009

θ (°C)



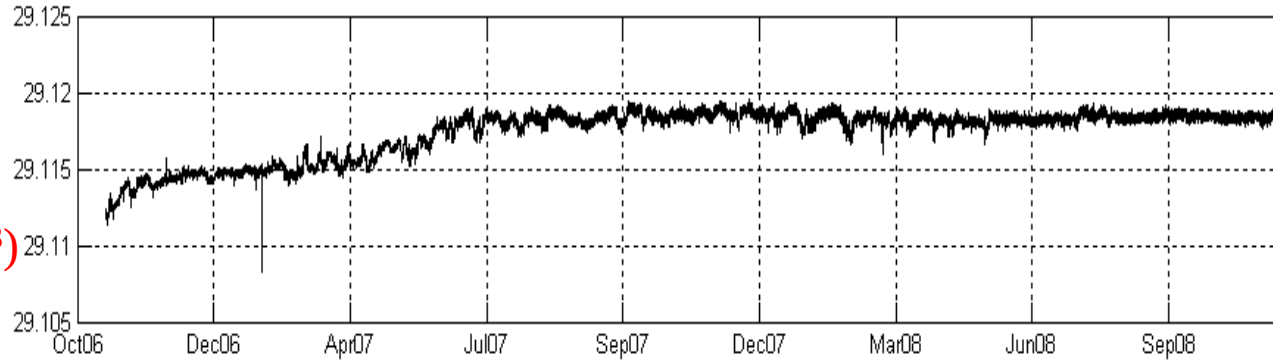
~ 12.87

S



~ 38.48

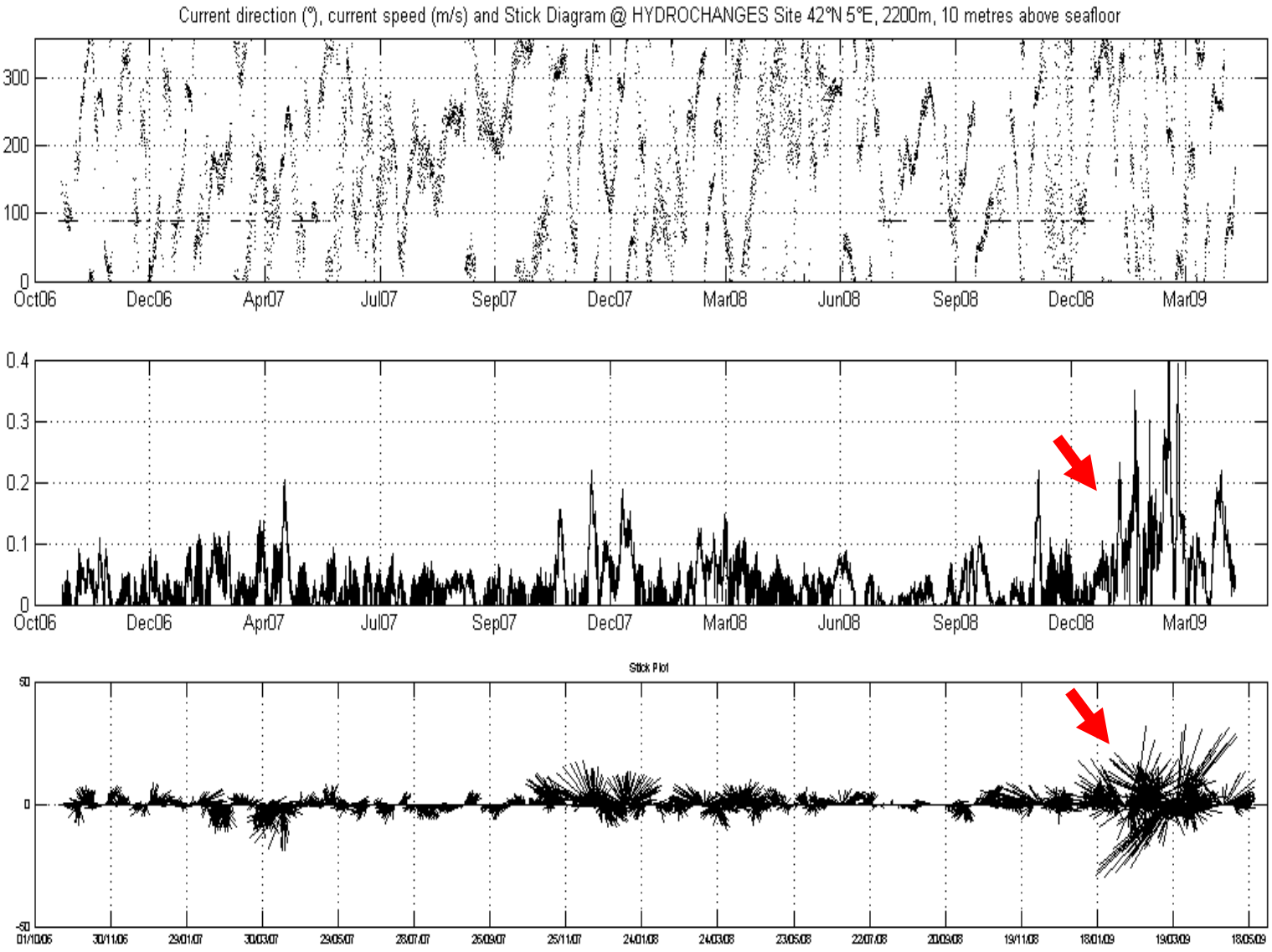
σθ (kg.m^{-3})



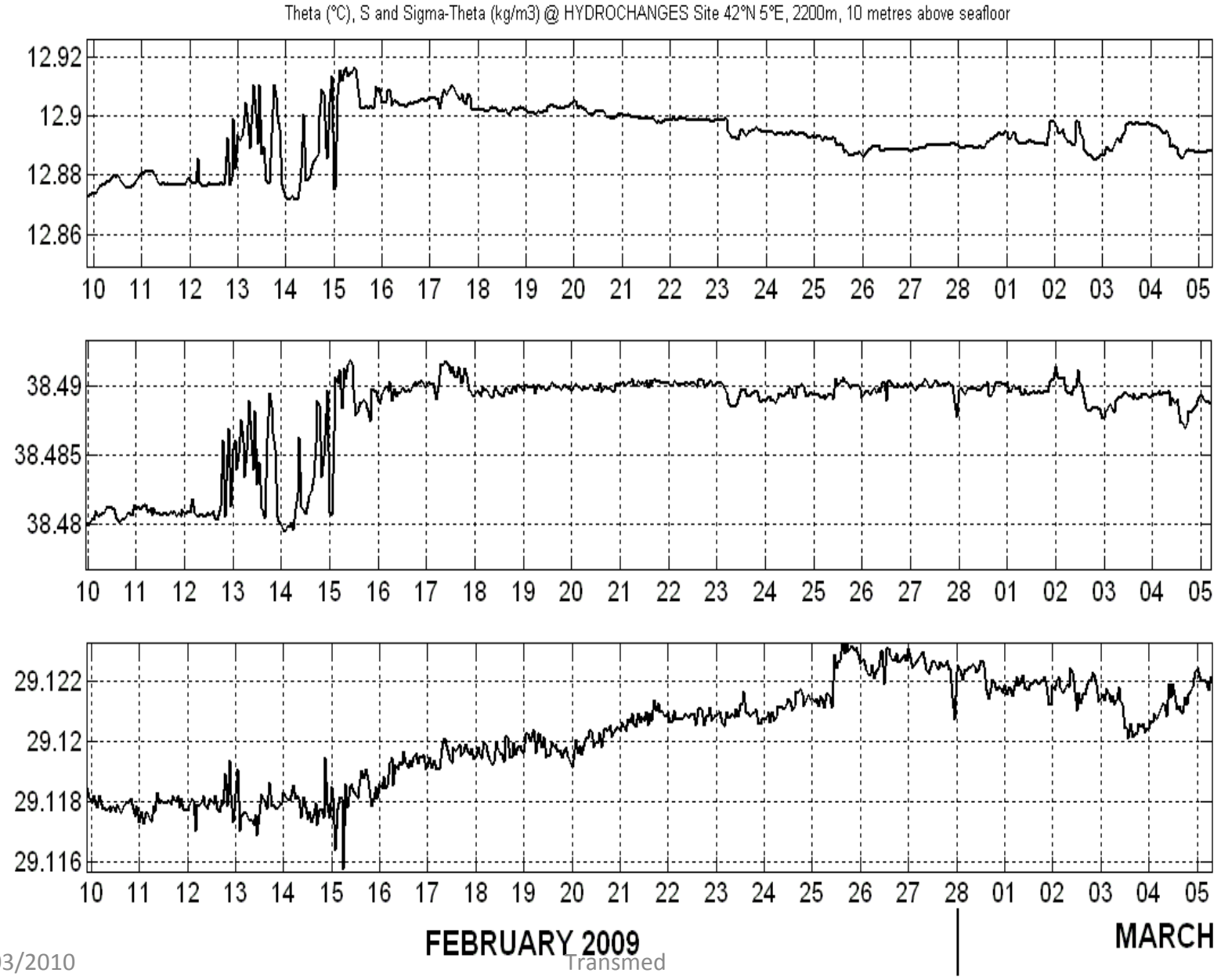
< 29.12

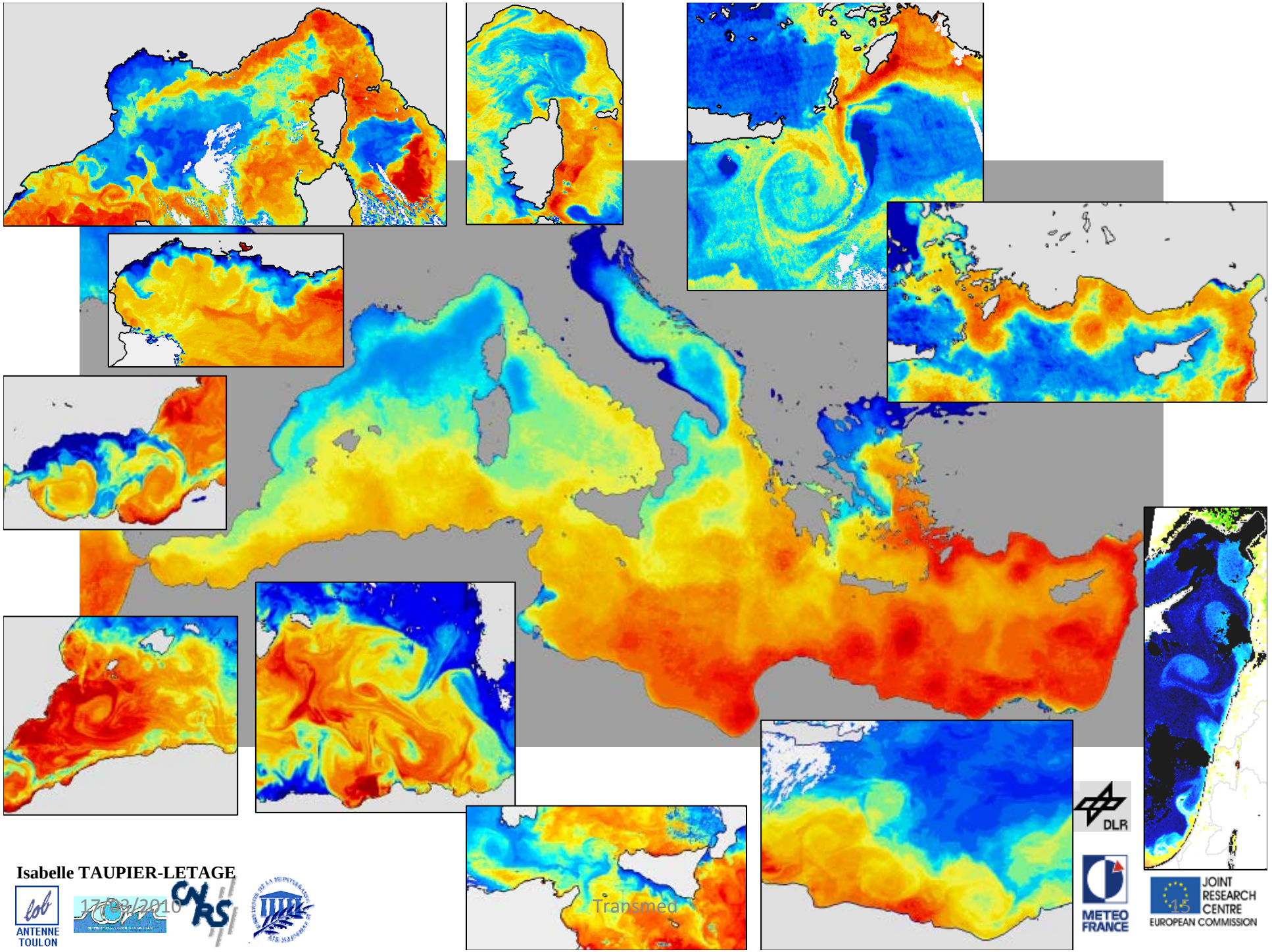
Direction (°)

Speed (m/s)



2007 **2008**


Theta (°C), S and Sigma-Theta (kg/m3) @ HYDROCHANGES Site 42°N 5°E, 2200m, 10 metres above seafloor
12.92
12.9
12.88
12.86
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 01 02 03 04 05
38.49
38.485
38.48
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 01 02 03 04 05
29.122
29.12
29.118
29.116
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 01 02 03 04 05
FEBRUARY 2009
MARCH 2009



Isabelle TAUPIER-LETAGE

ANTENNE TOULON

17-03-2010

DLR

METEO FRANCE

JOINT RESEARCH CENTRE
EUROPEAN COMMISSION

TRANSMED:

Main objective:
monitoring the surface water characteristics,
at fine spatial and temporal scales,
using time series of hydrological (and bio-x parameters),
along regular ferry or shipping routes,
over the whole Mediterranean

Coordination: Isabelle TAUPIER-LETAGE

www.hymex.org

TRANSMED:

Requirements:

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

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

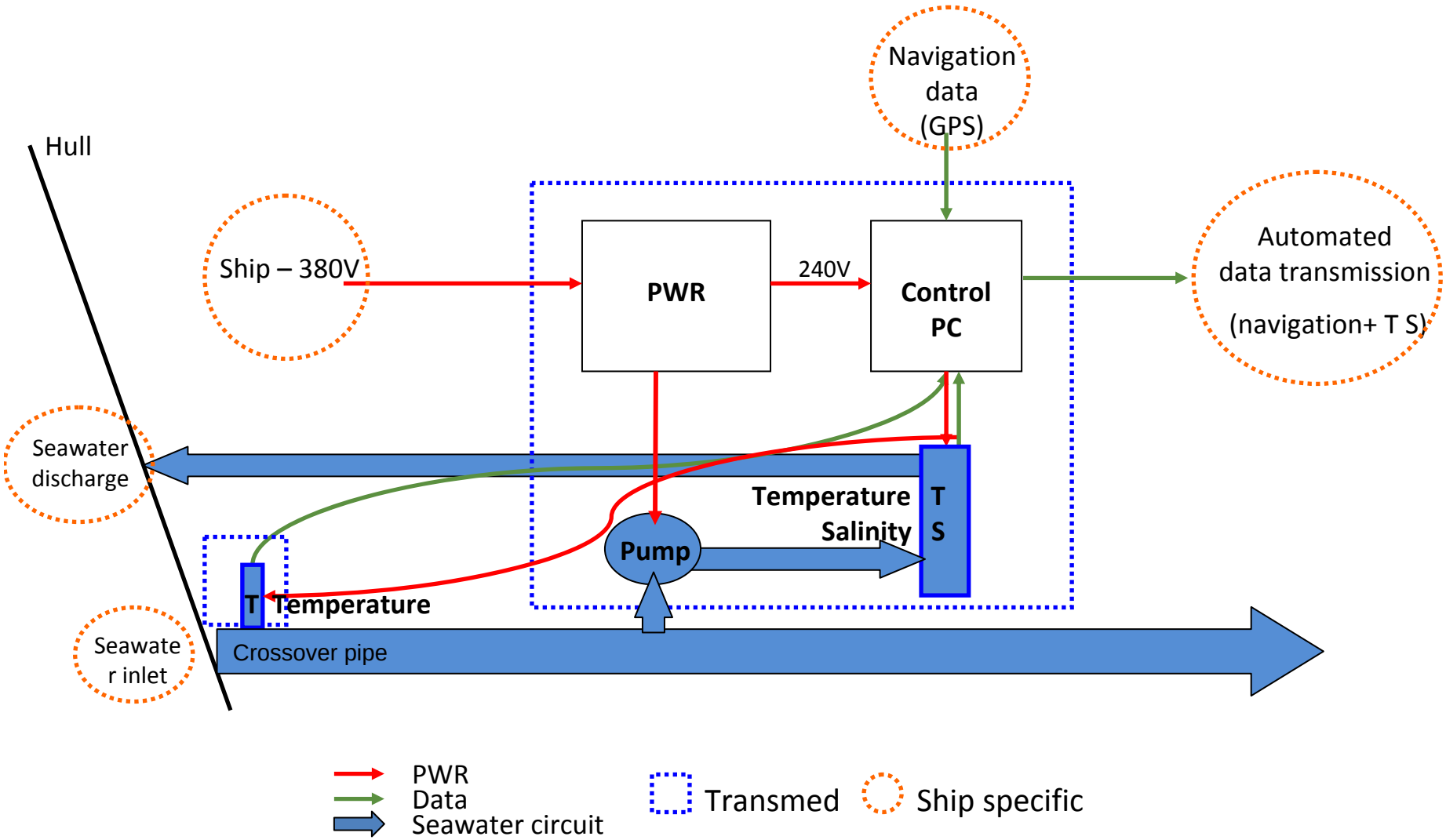
The module TRANSMED

- 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)
- Late March 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 tranmission in near real time (GSM, internet, Iridium SBDM)
- No requirement for freshwater, AF 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



1st prototype

PWR chest

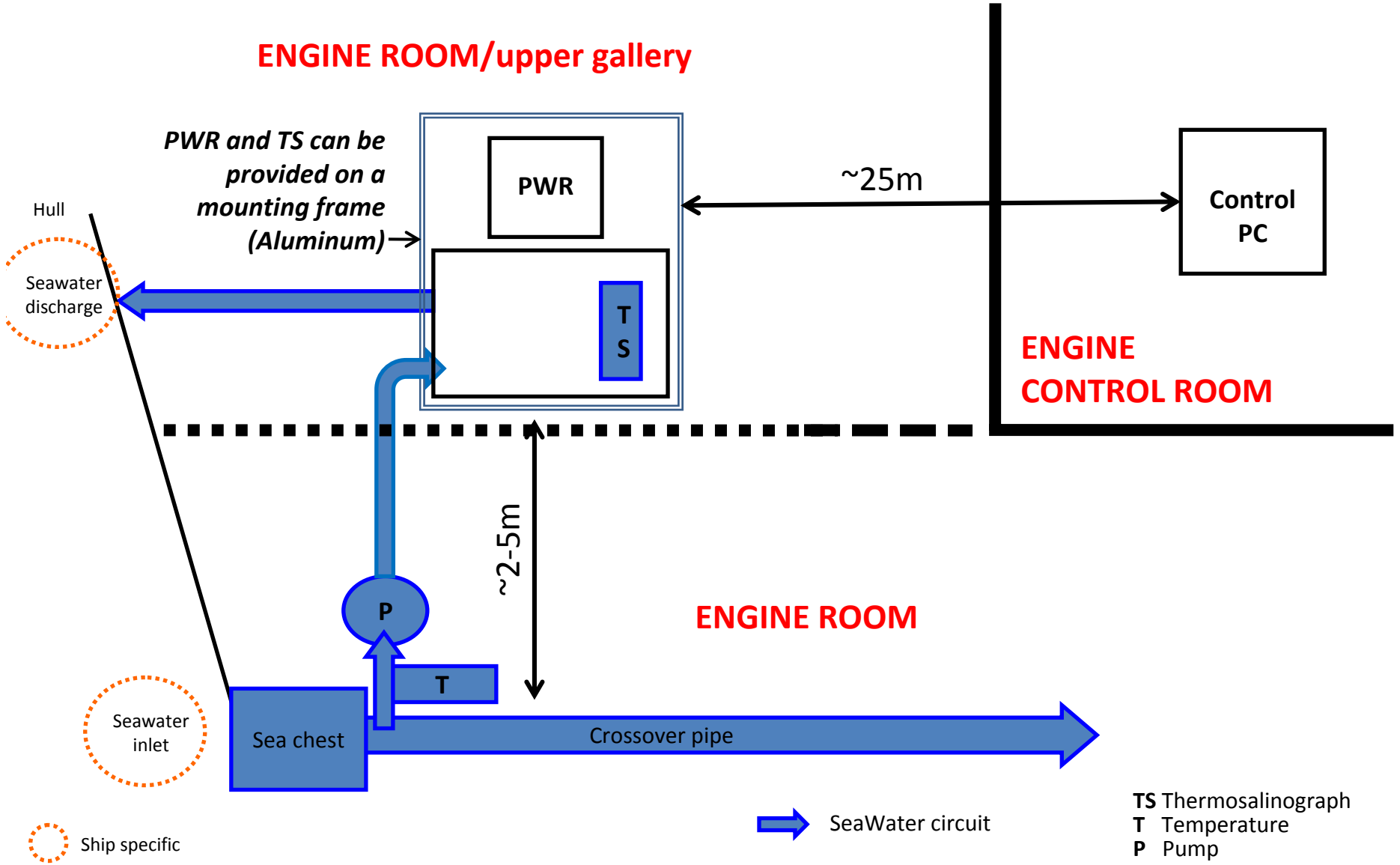
Control PC chest

Mounting frame

TS (SBE45)

pump

Localization (view facing bulkhead / stern)



pump

T (SBE38)

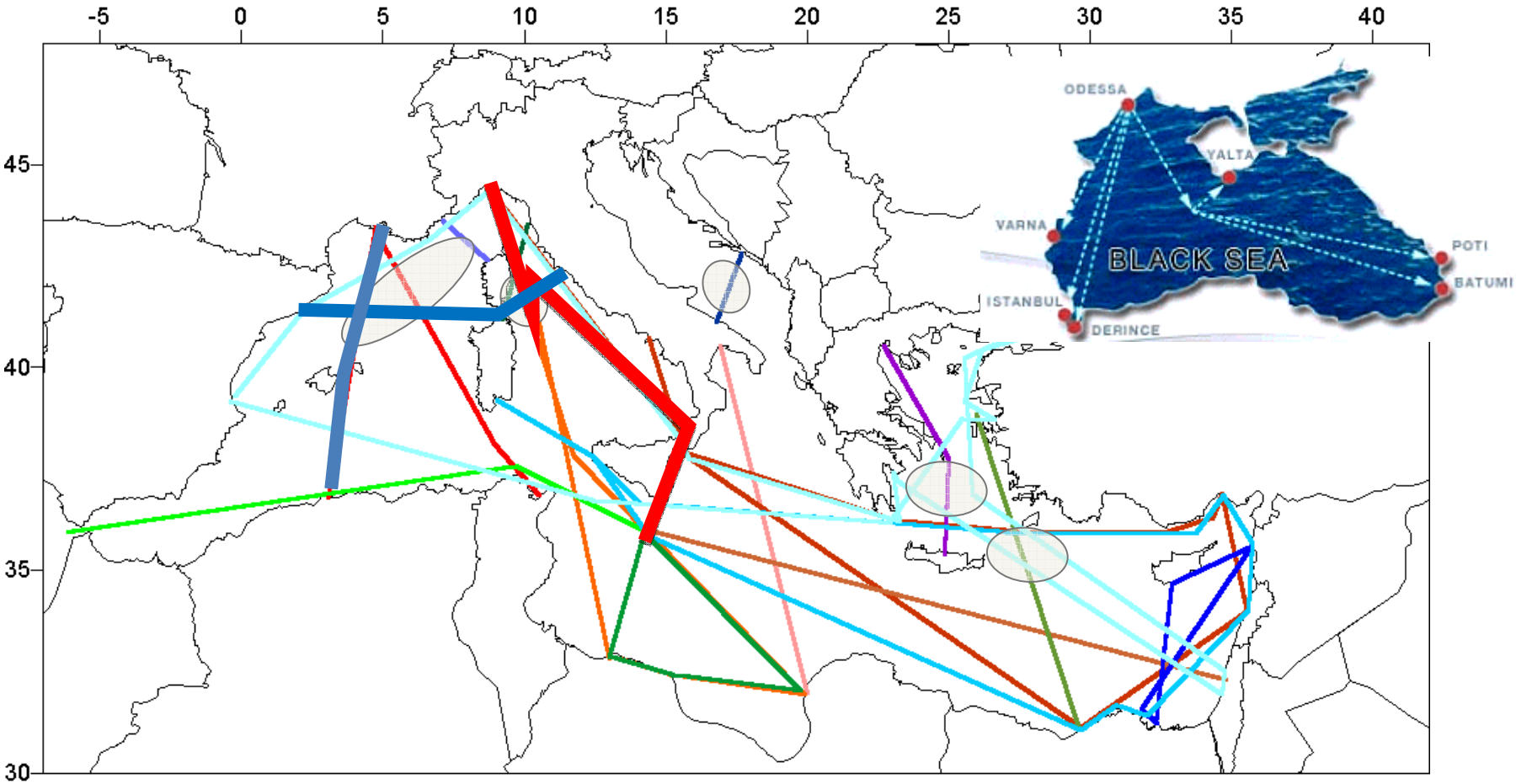
SBE45 bypassed for tests

Mediterranean - Service Table

Back

Algeria	**Algiers**	every 8 days
	Oran	on inducement
	Skikda	on inducement
	Annaba	on inducement
Tunisia	**Tunis**	every 7 days
	Sousse	on inducement
Lybia	**Tripoli**	every 10 days
	Benghazi	every 21 days
	Marsa el Brega	on inducement
	Misurata	every 10 days
Malta	**La Valletta**	every 7 days
Egypt	**Alexandria**	every 9 days
Lebanon	**Beyrouth**	every 9 days

TRANSMED POTENTIAL NETWORK



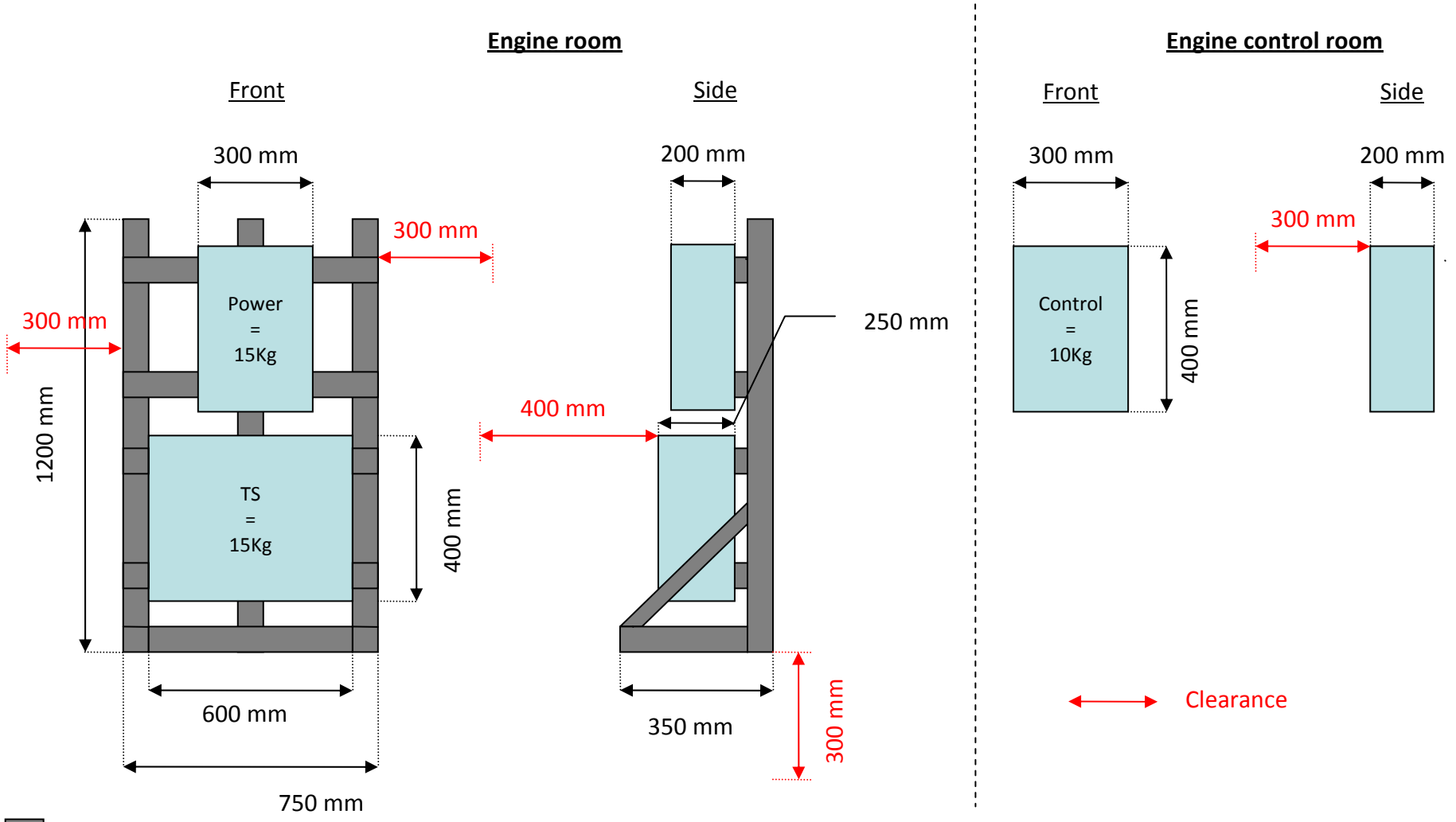
TS with MeteoFrance package

Dense Water Formation zone

Data : should be available through Coriolis (real-time and delayed mode for ARGO floats

One good reason to foster FerryBoxes: allow developping countries to easily get data « off their coasts »
(status of data?..)

Dimensions



Mounting frame can be provided on request

Total weight (frame + PWR + TS) : 50kg