

Bordeaux, June 17-20, 2019

SWOT

Science Team Meeting
& Calval Workshop



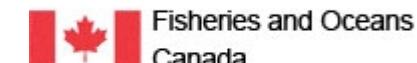
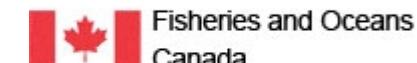
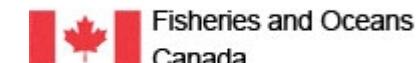
SW Mediterranean 2018: the PROTEVS-BIOSWOT campaign

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F.Dumas (*SHOM*), P.Garreau (*IFREMER*), A.Pascual (*IMEDEA, Spain*), F.Cyr (*DFO, Canada*)



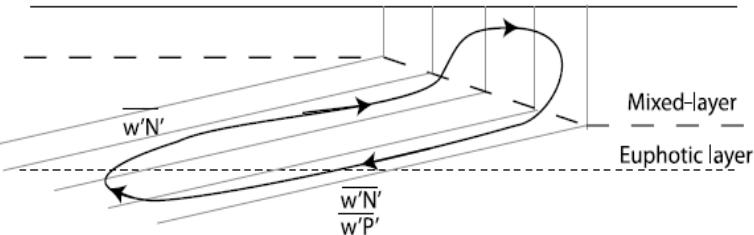
SWOT and fine scale biophysical processes

Fine scale circulation :

- impacts the carbon pump
adverting nutrients upward and organic matter downward



a) Transport at a submesoscale front

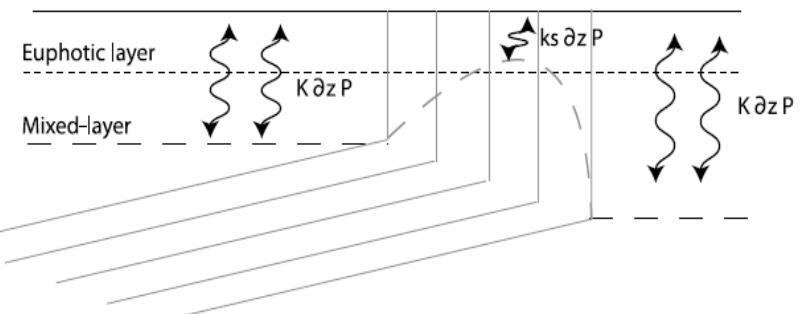


[Lévy, 2012]

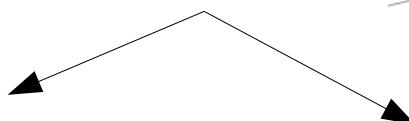
- controls the mixing
influencing primary production, grazing and predation



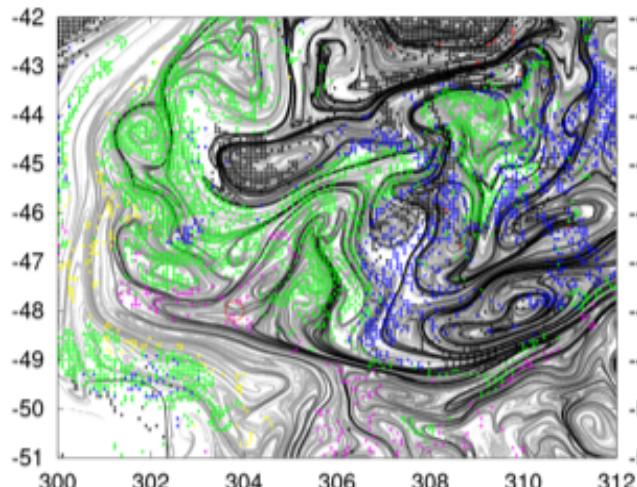
b) Vertical mixing at a submesoscale front



- drives the biodiversity
creating “fluid-dynamical niches”

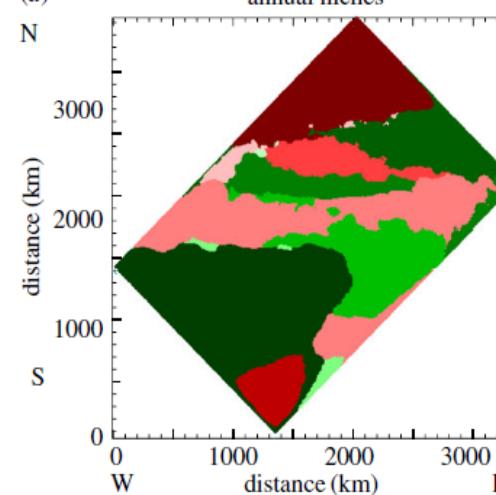


Satellite data (FSLE & Physat)

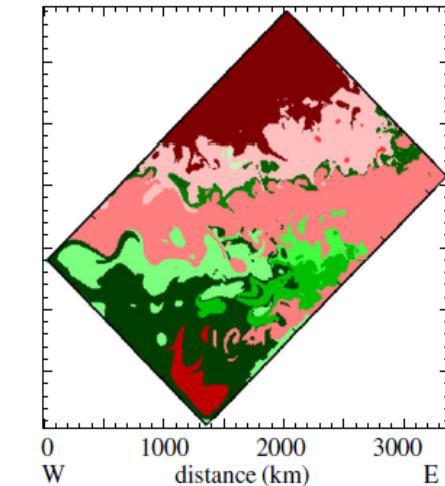


[d'Ovidio et al., 2010]

(a) annual niches

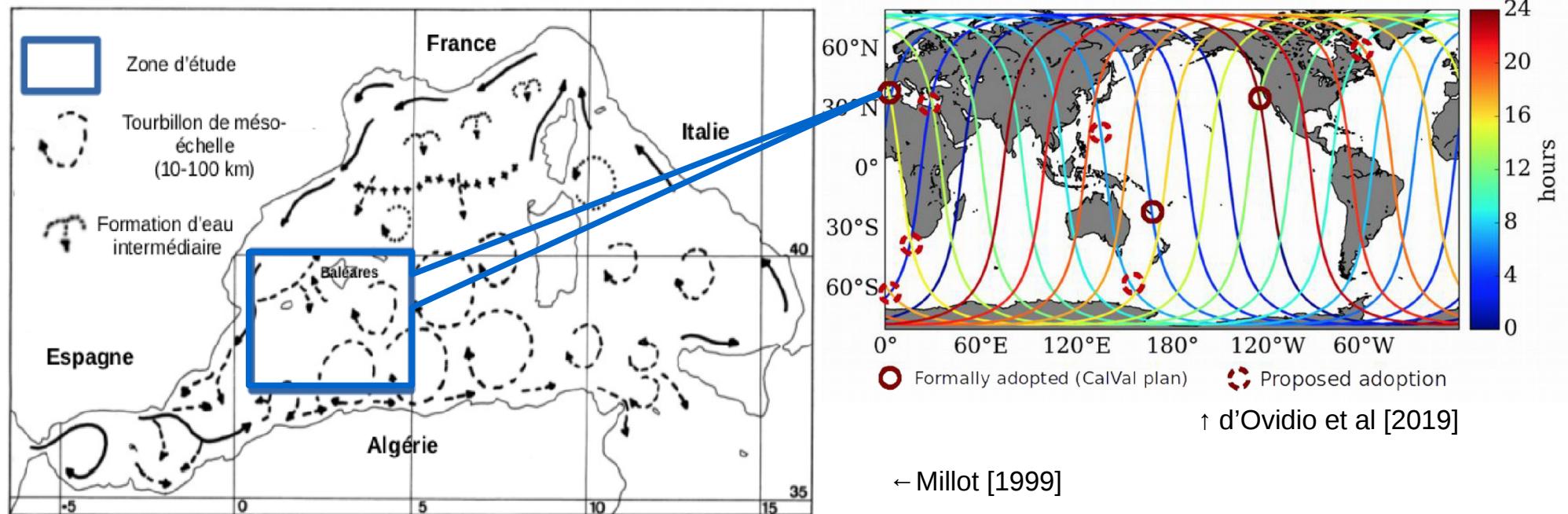


Numerical modeling (DARWIN)
(b) instantaneous niches

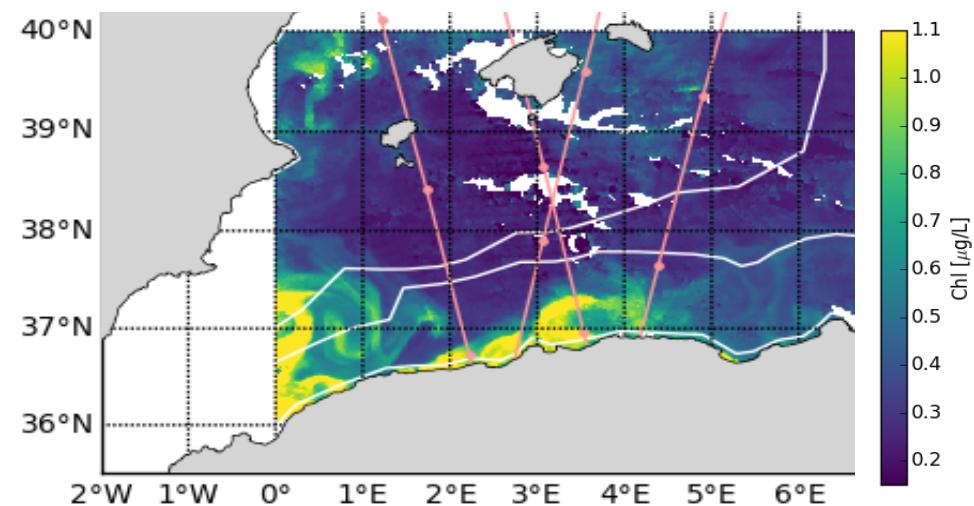
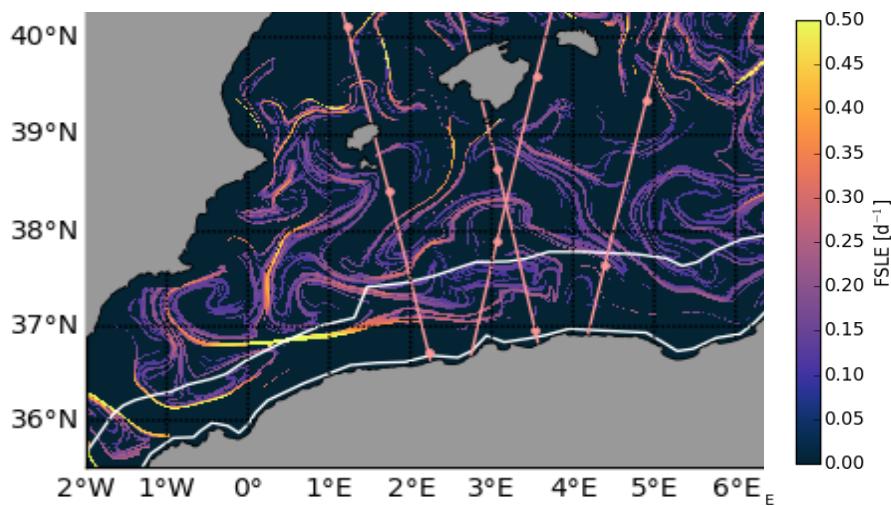


[Lévy et al. 2015]

The SW Mediterranean cross-over

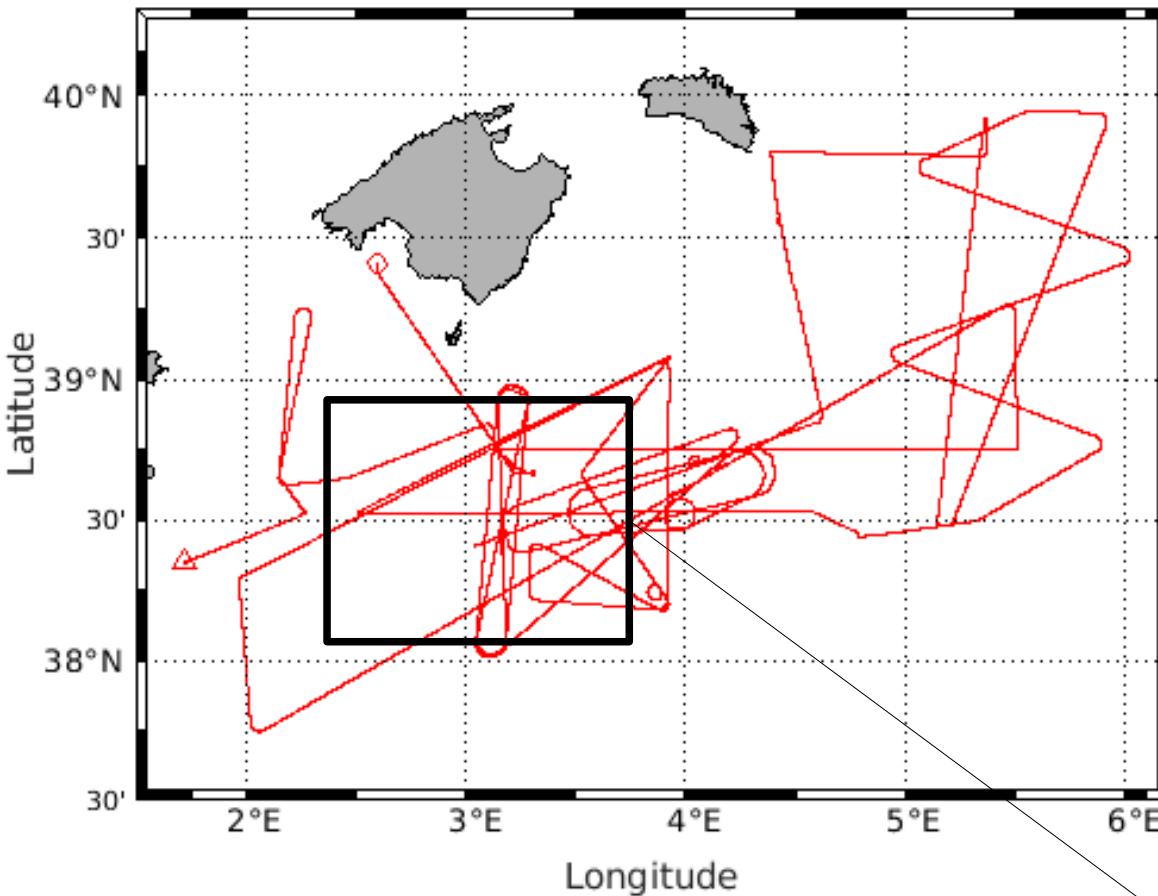


Intense mesoscale field with the meanders and the eddies of the Algerian current
Nice contrasts in hydrological properties and biology

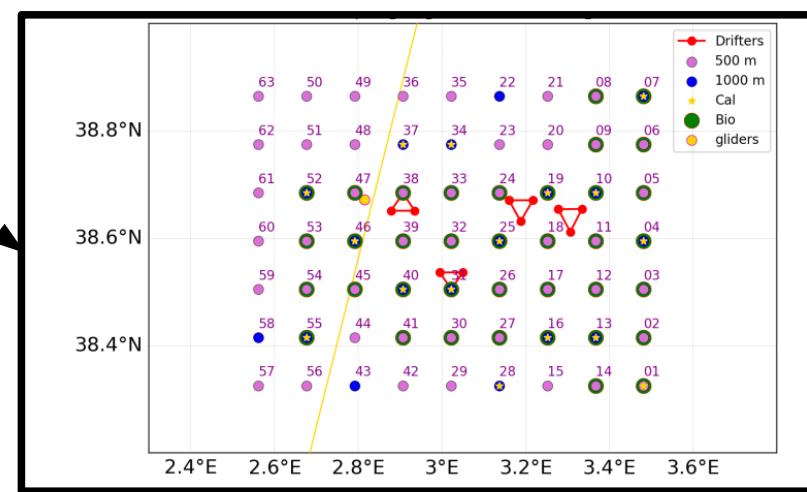


The 2018 campaign

BHO Beatemps-Beaupré from 30 April to 14 May
R/V Garcia del Cid from 5 May to 17 May



and 2 gliders
along a
Sentinel 3 track



Onboard of the BHO Beautemps-Beaupré



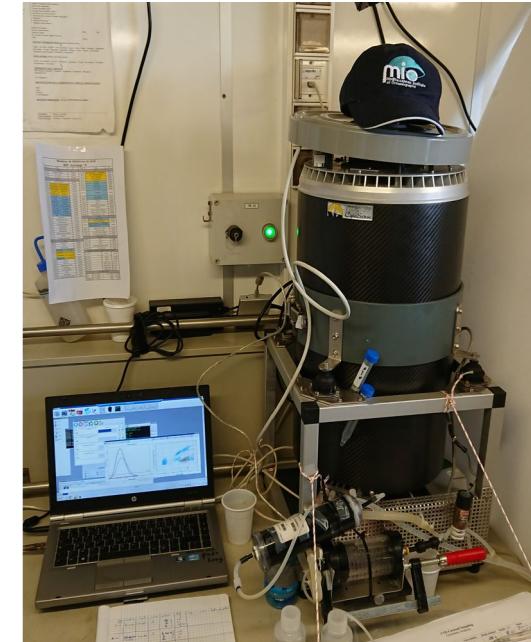
**ADCP 150 & 38 kHz, TSG,
SeaSoar (SHOM)**
~3 km resolution & 300 m depth



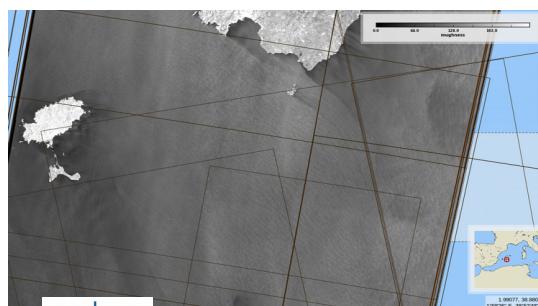
Flow Cytometer (MIO)

Identification of
microbes from size,
color, and shape.

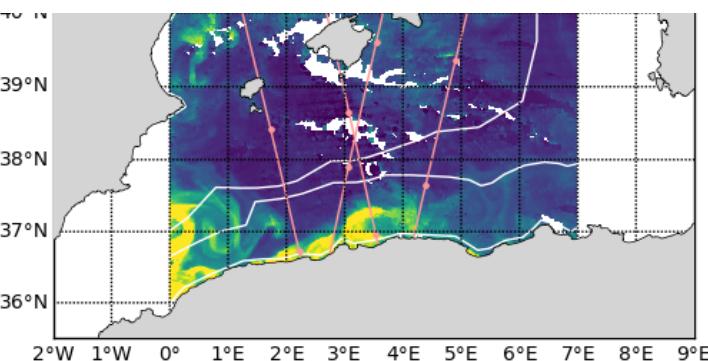
One point every 20'
@ 9 Knot ~ = 5.5 km



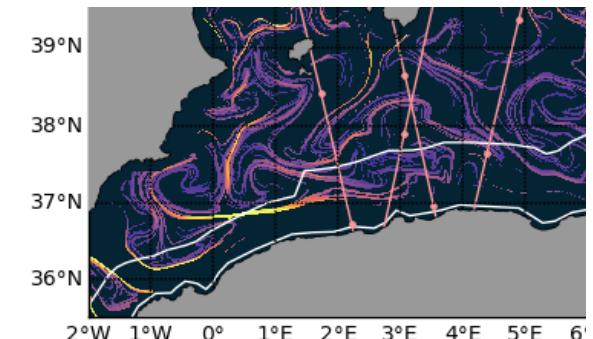
On land : multisatellite support



SAR



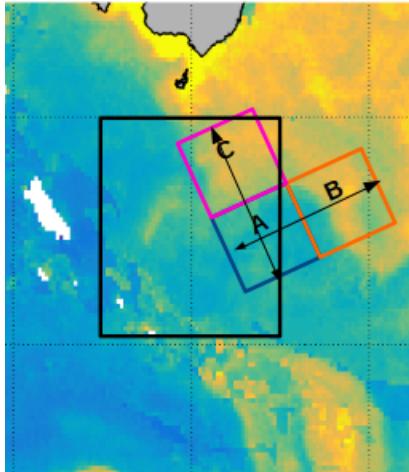
CLS data of SST and SCHL + Lagrangian analyses by
SPASSO <http://spasso.mio.univ-amu.fr>



Sampling strategy

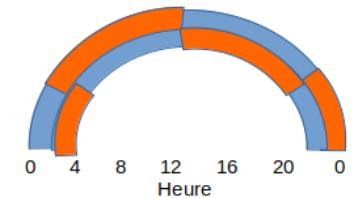
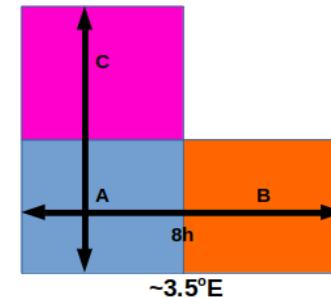
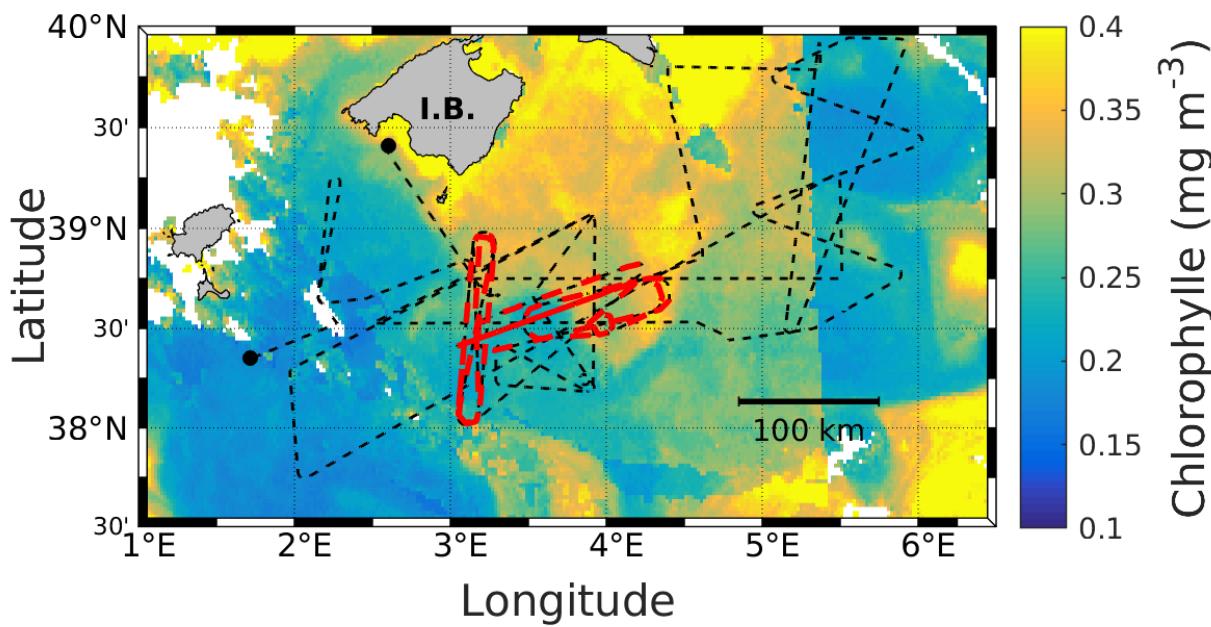


Adaptive & Lagrangian



NRT satellite images used to identify areas of interest
(fronts, contrasted water masses)

Vessel route designed to spend 4 hours
in each of the 3 areas
in order to reconstruct the daily cell cycle



Seasat Buoys +CTD	08 Mai 16:00
	09 Mai 08:00
	10 Mai 00:00
	10 Mai 16:00
	11 Mai 08:00
	11 Mai 16:00
	12 Mai 00:00
	12 Mai 16:00
	13 Mai 08:00

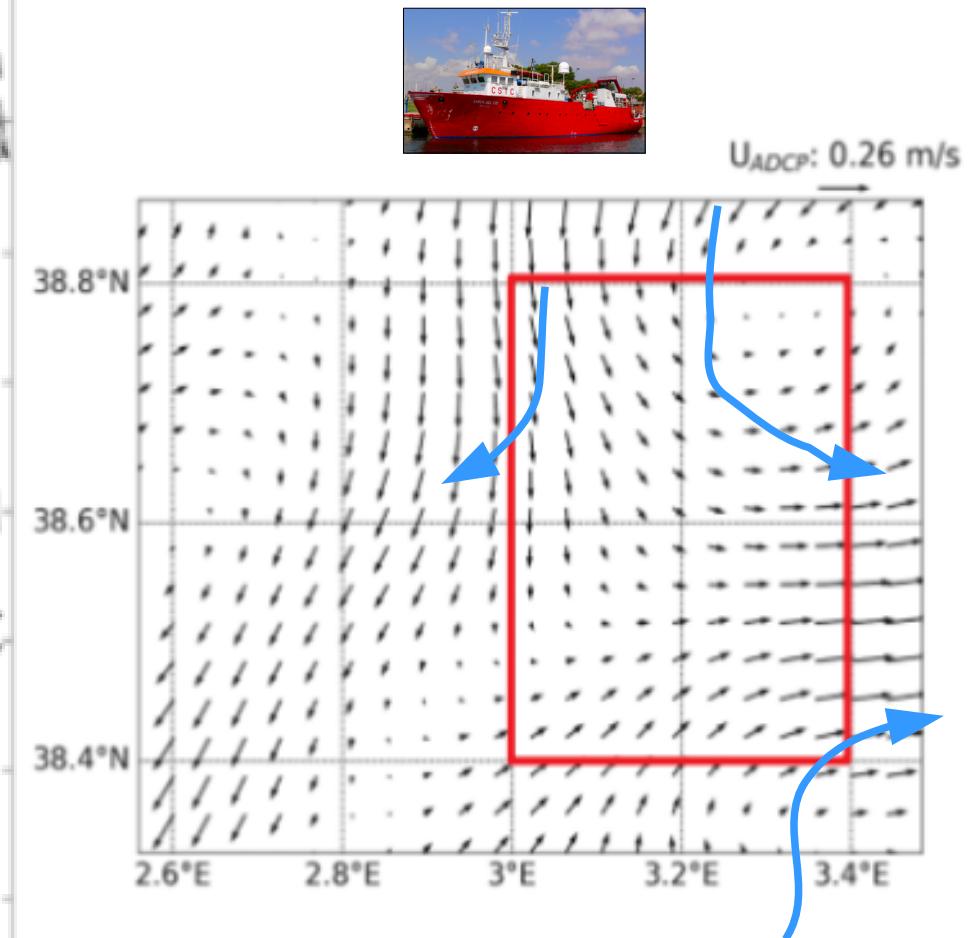
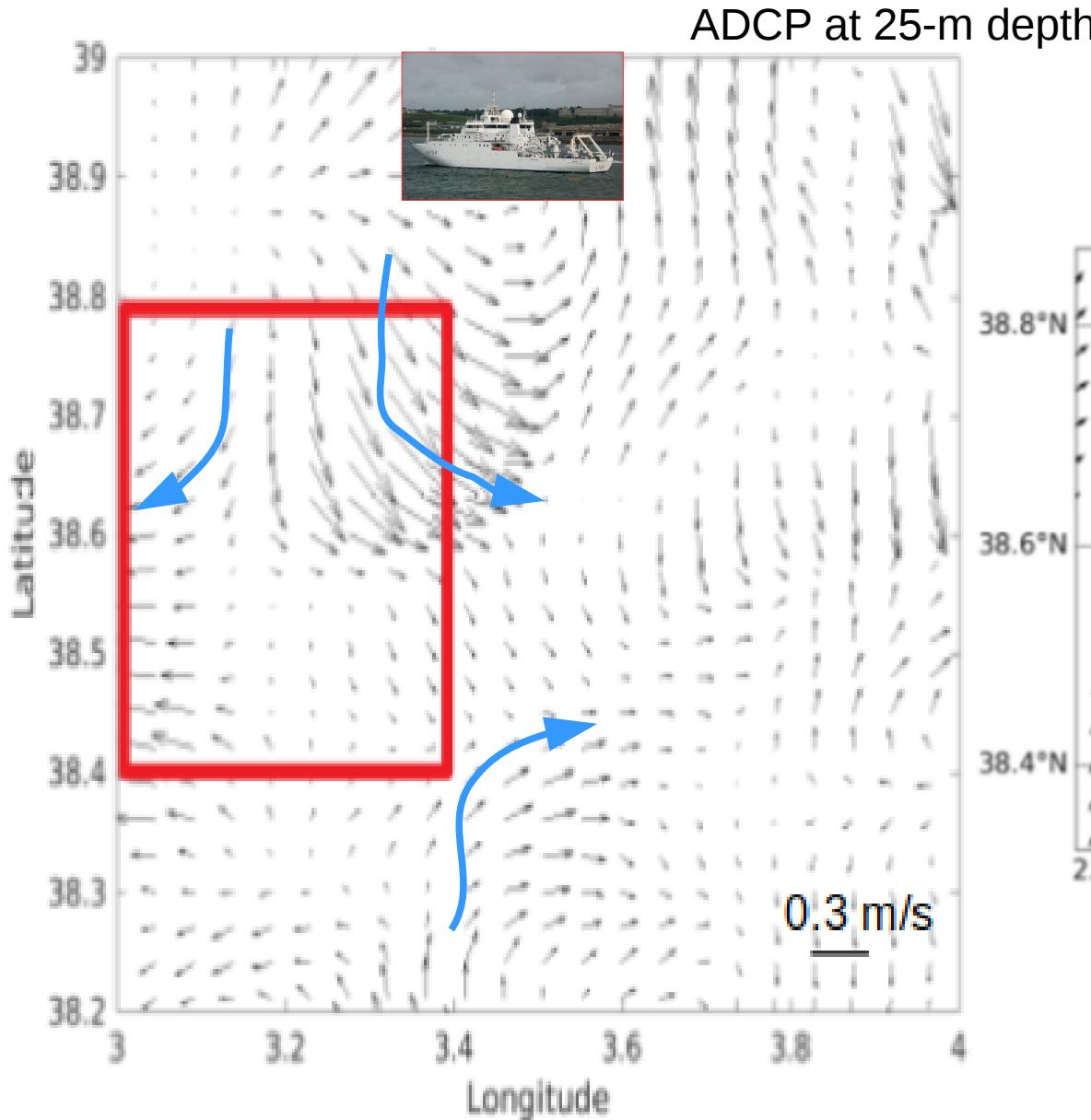
Preliminary results

*R.Tzortzis and L.Izard
Master studentships @ MIO*

*B.Barcelò-Lull
post-doc @ IMEDEA*

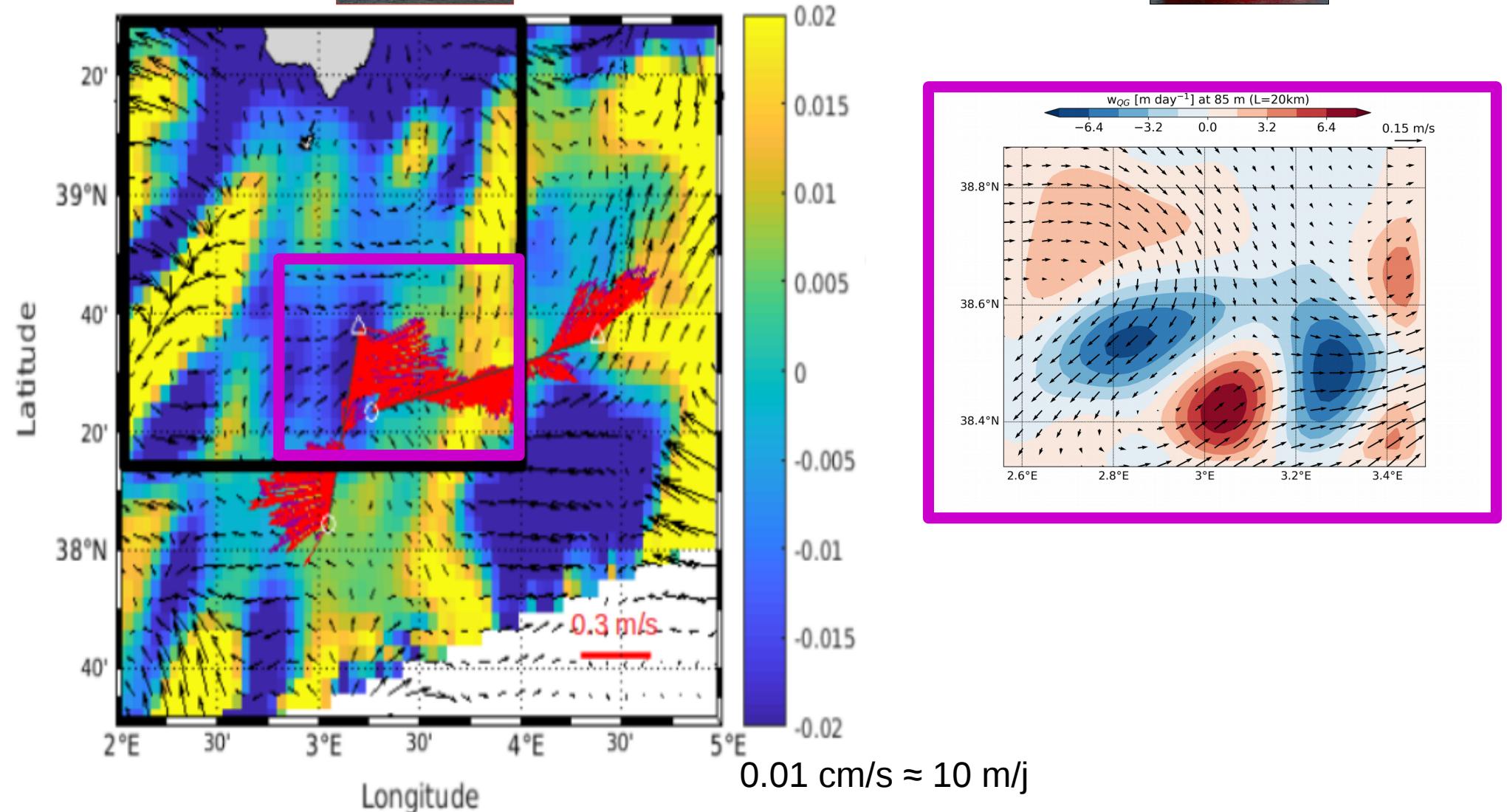
Preliminary results

Horizontal-velocities objective mapping



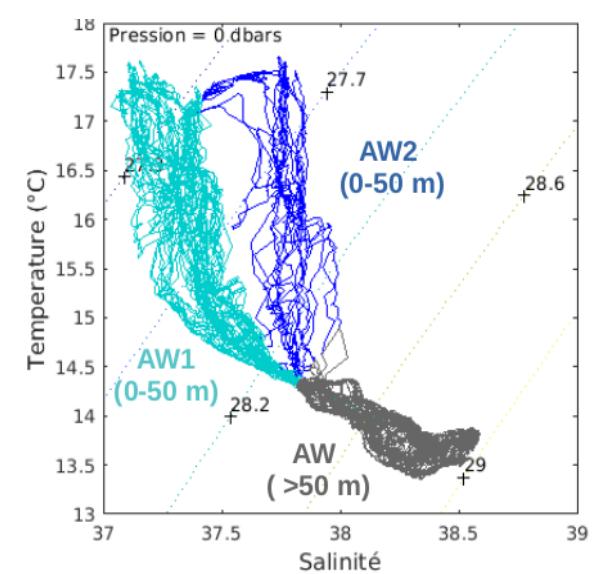
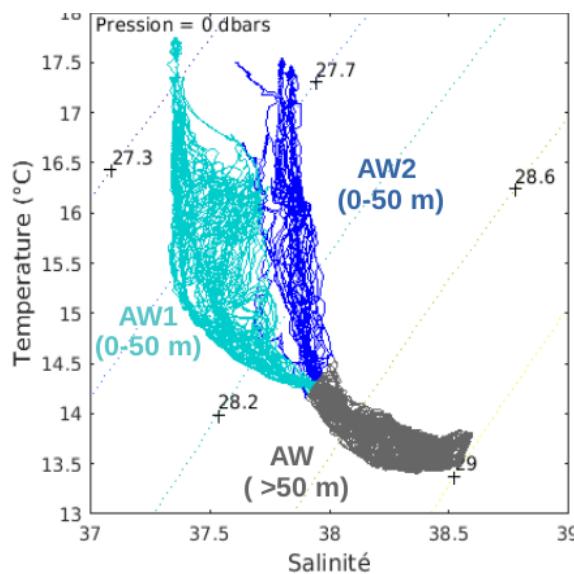
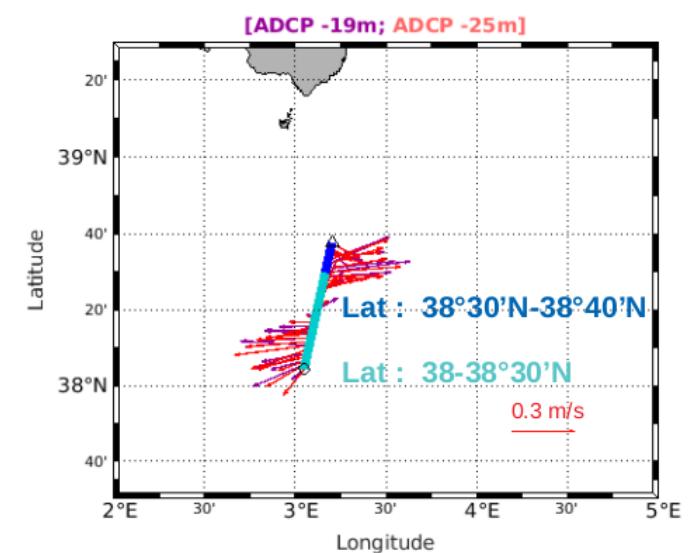
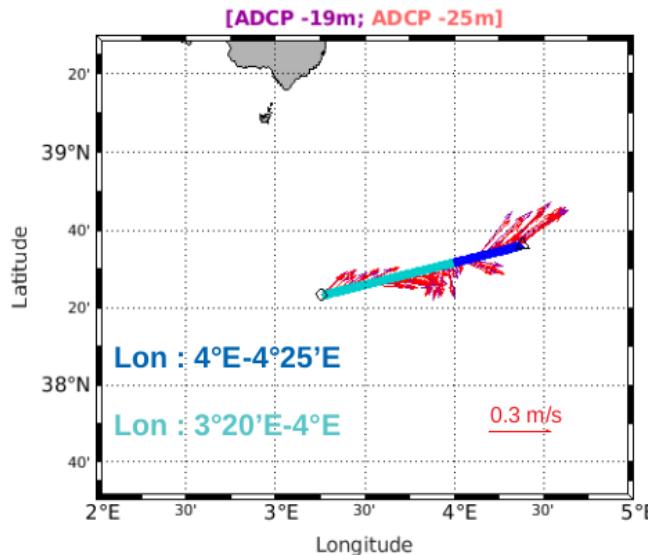
Preliminary results

QG vertical velocities estimation



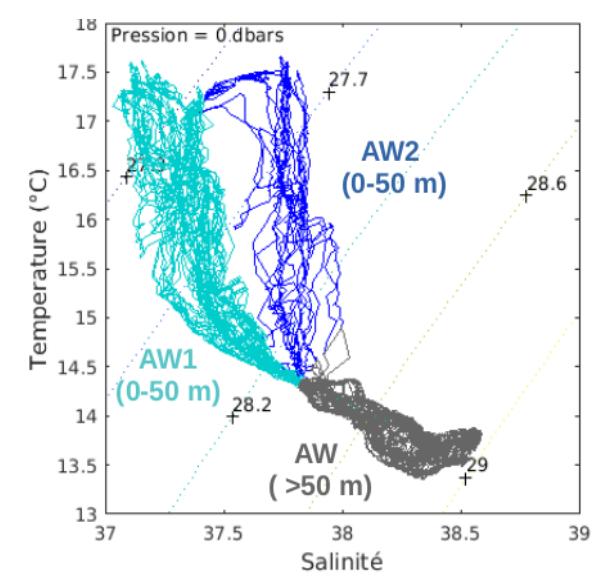
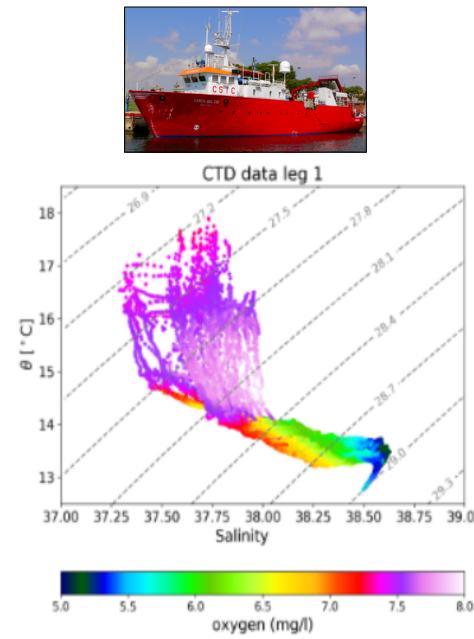
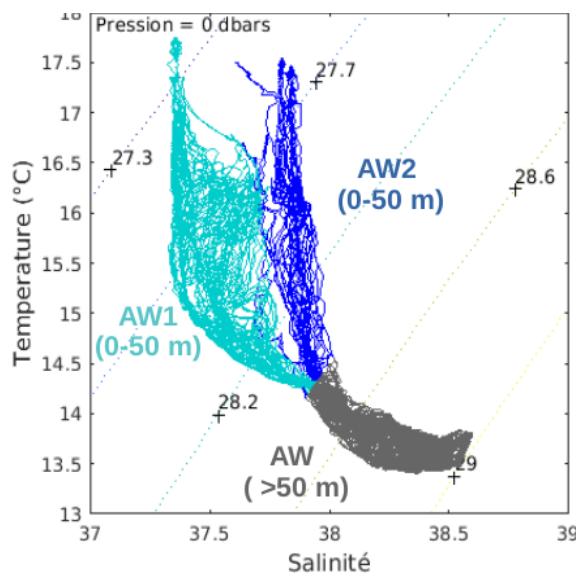
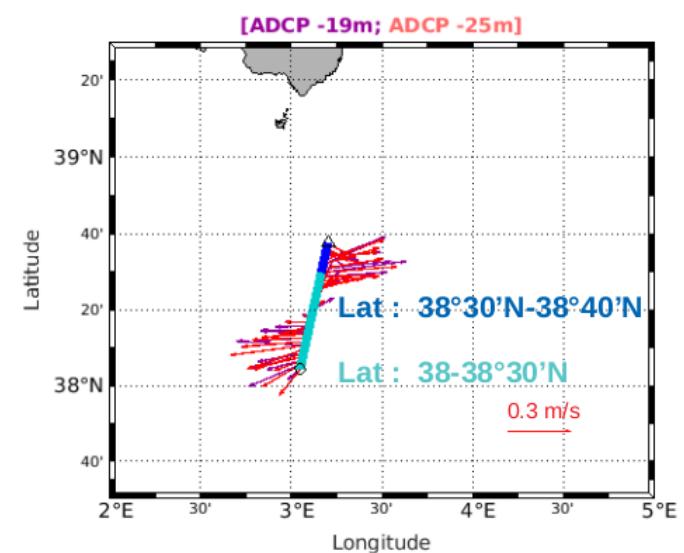
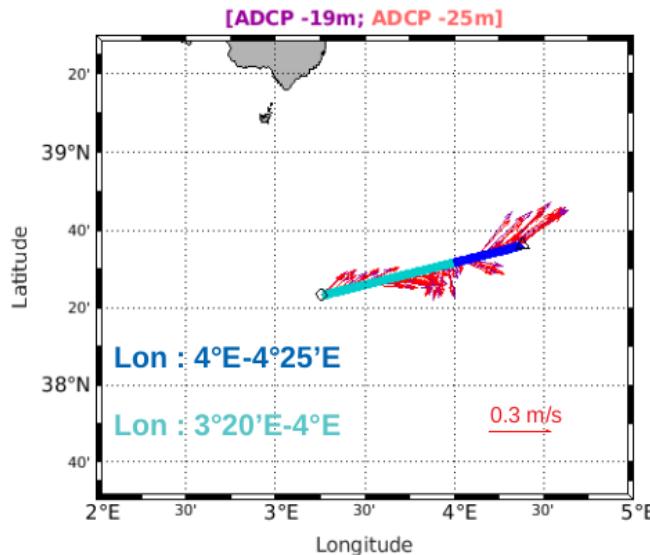
Preliminary results

High resolution hydrology



Preliminary results

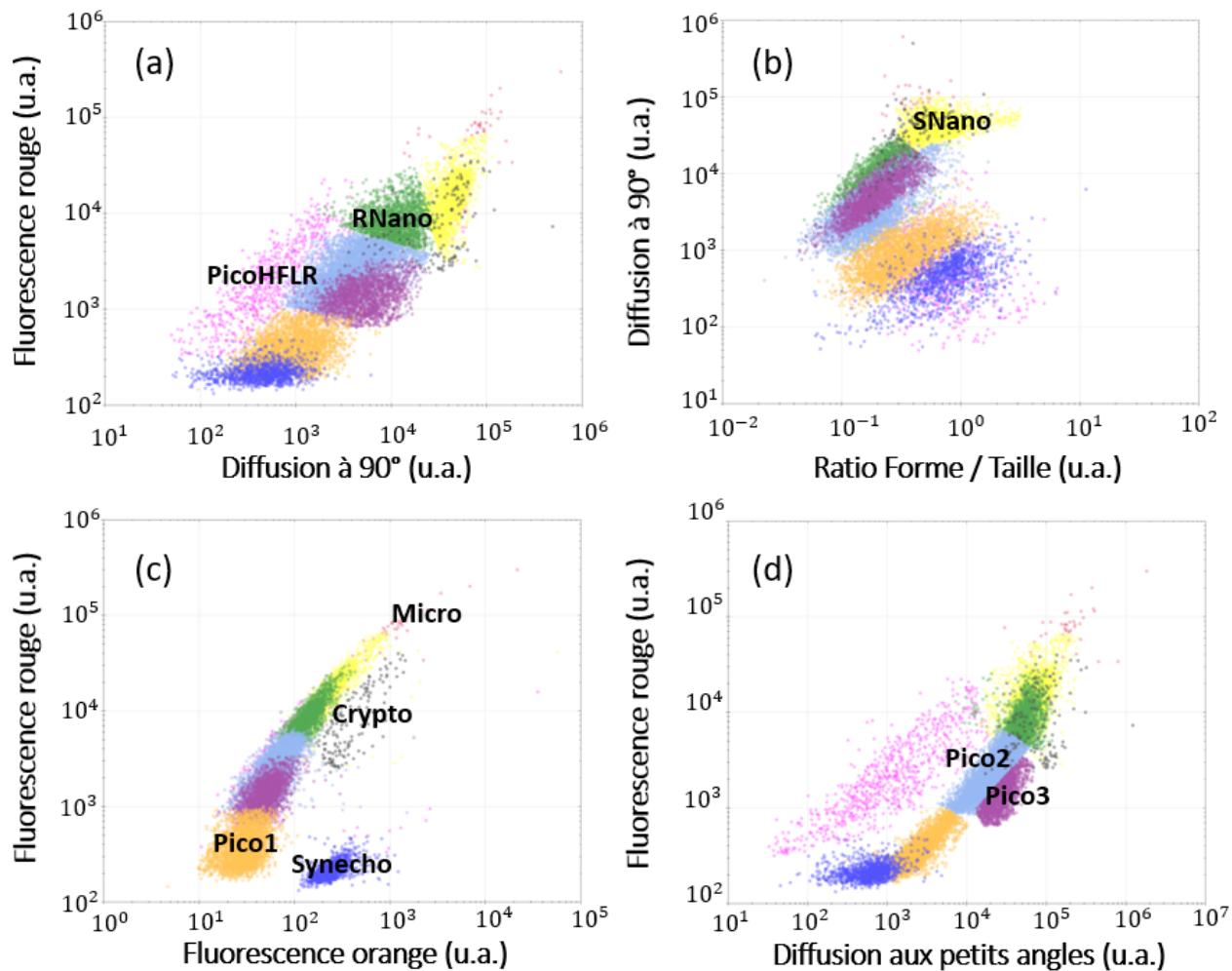
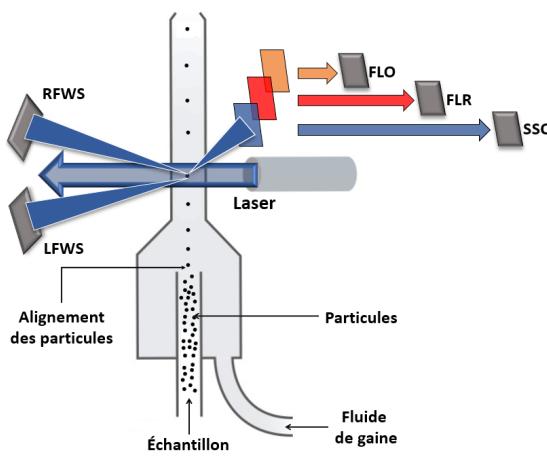
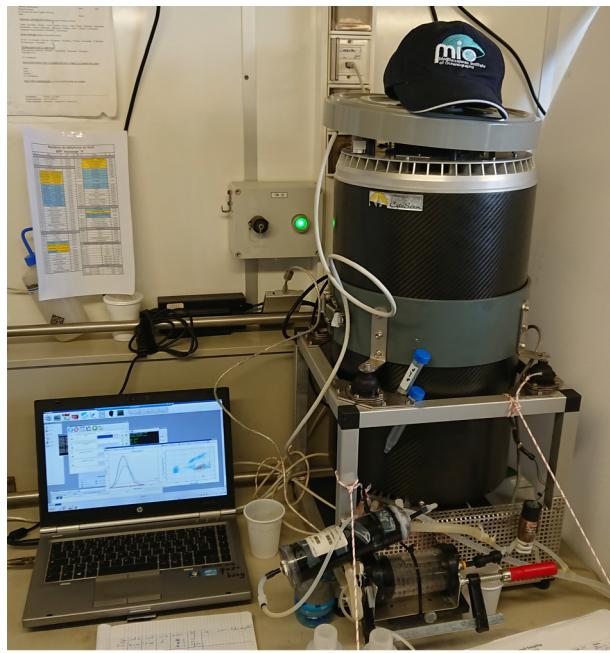
High resolution hydrology



Preliminary results

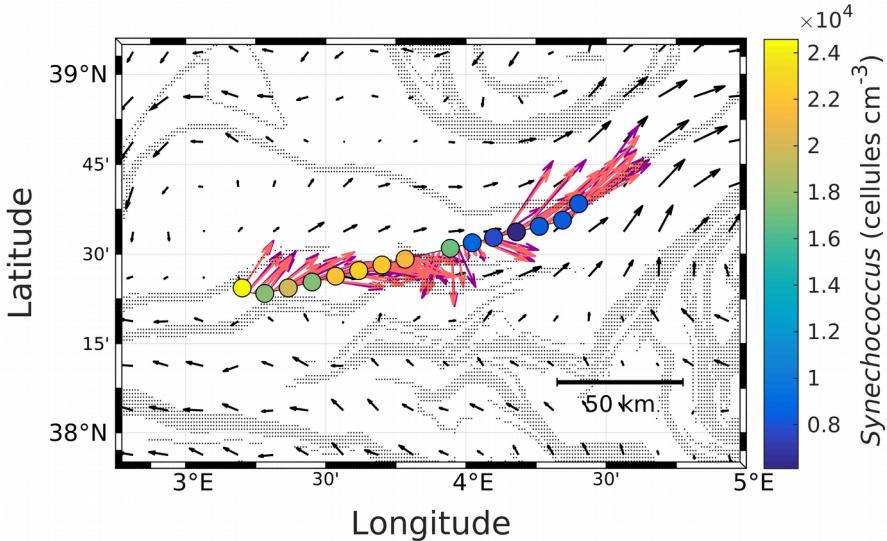
Cytometry

16 millions of particles
9 functional groups & 3 size classes
(pico-, nano- and micro- phytoplankton)



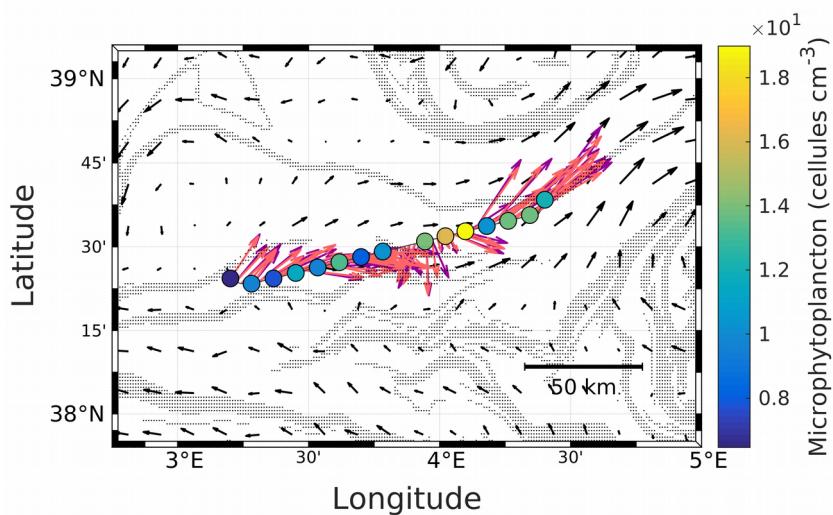
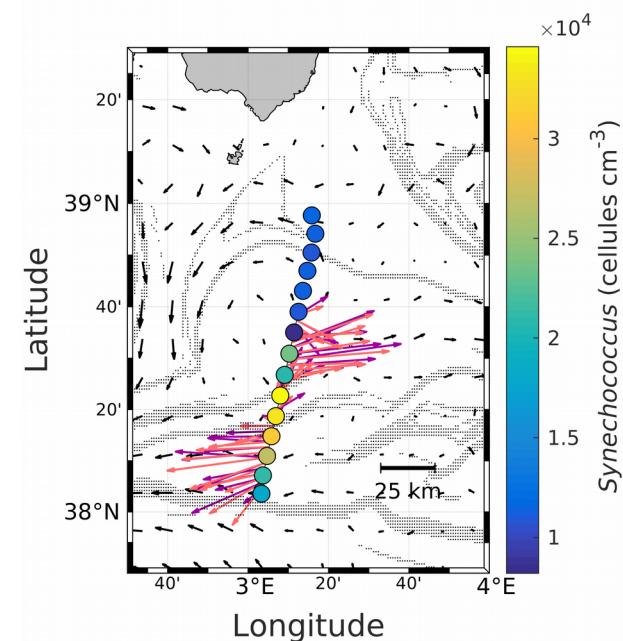
Preliminary results

Cytometry

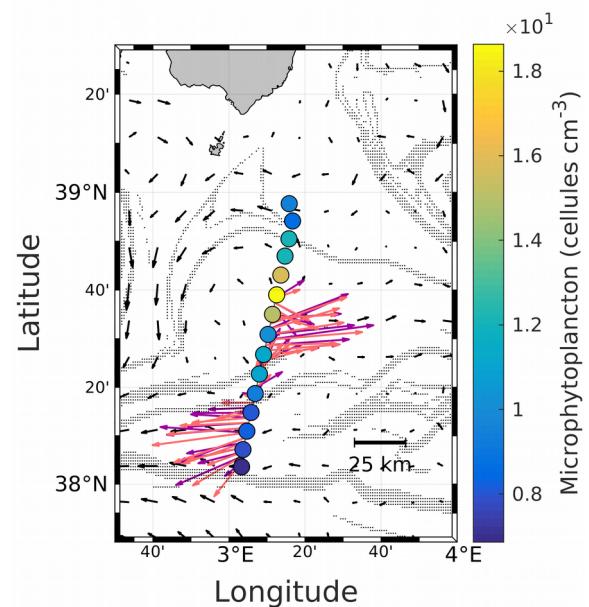


Synecococcus

**Contrasted
abundances
across
the front**

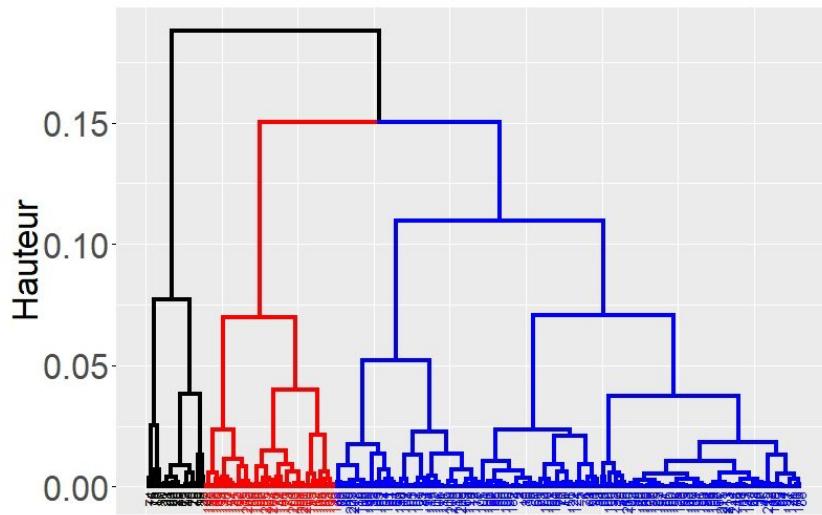
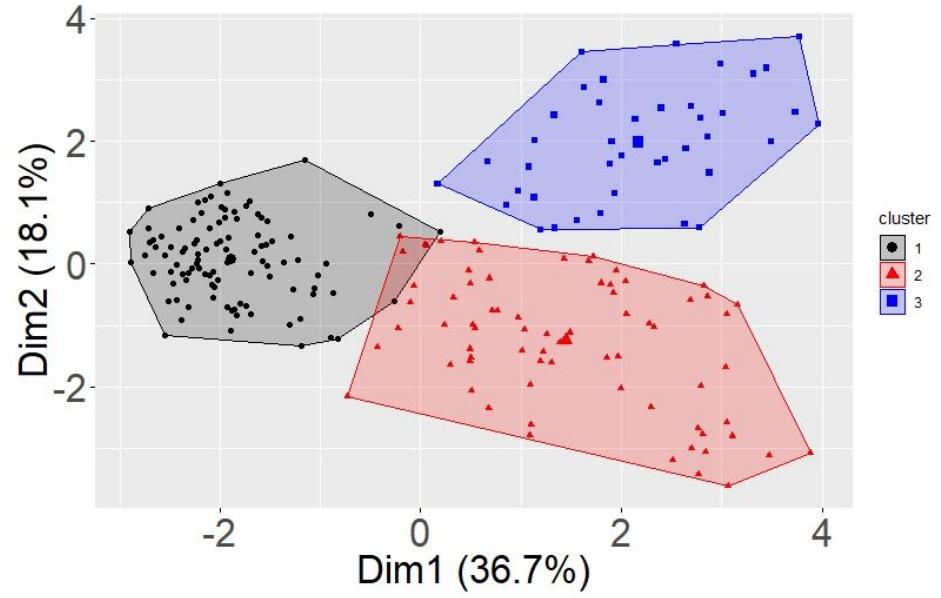


Microphytoplankton



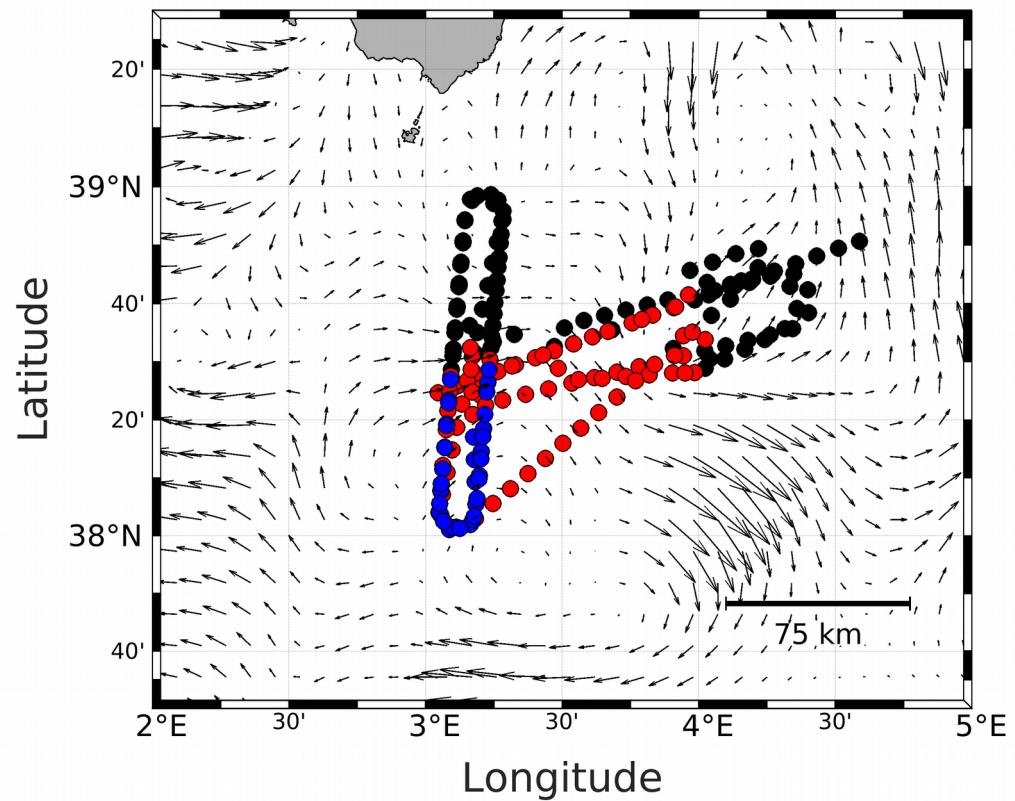
Preliminary results

Cytometry



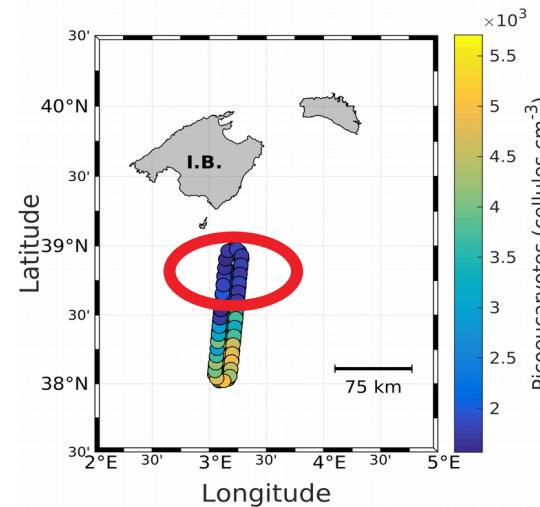
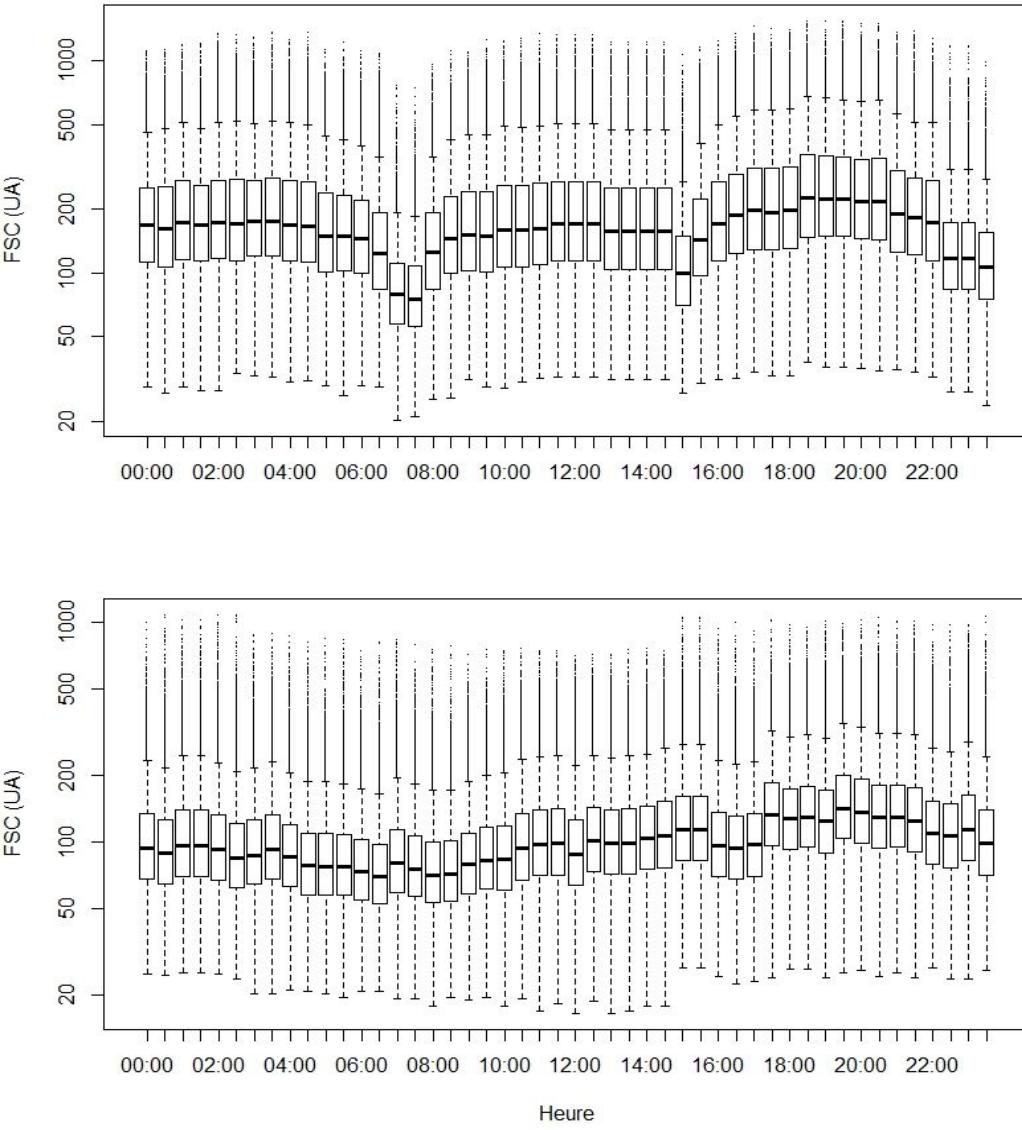
Statistical analysis on
11 variables (9 groups+T+S)

The spatial organization of the groups
is driven by currents

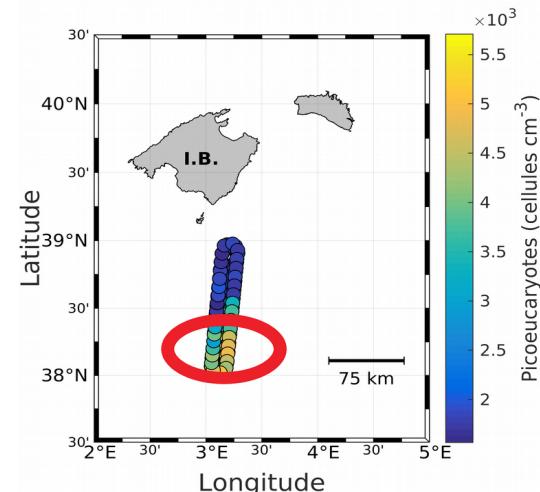
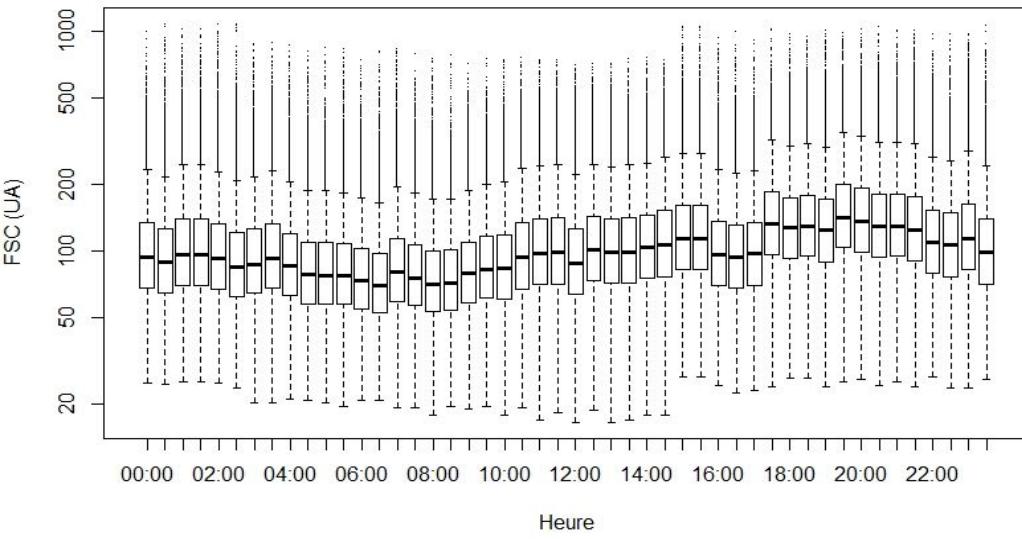


Preliminary results

Growing rate estimation

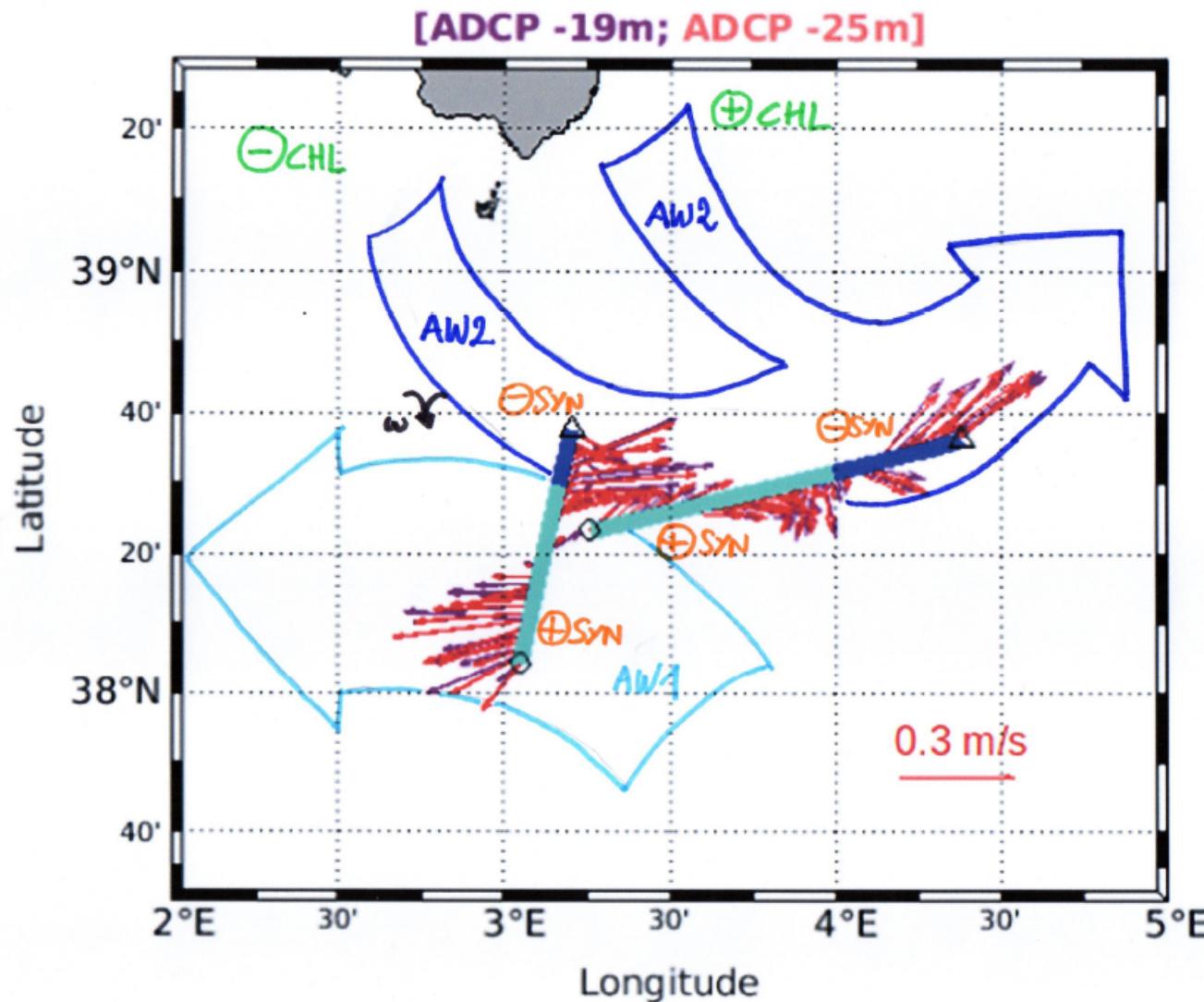


Contrasted
rates
associated
with the
different
communities



Preliminary results

Summarizing...



Conclusions & Perspectives

The SW Mediterranean SWOT crossover presents nice contrasts of water masses giving rise to an interesting fine-scale activity for both physics and biology.

Development of high resolution multidisciplinary measurements is successfully on-going.

Needs of

- direct measurements of vertical velocities and
- deeper biological sampling (e.g. @ DCM !)
- knowledge of higher levels of the trophic web (e.g. grazers)

*Thank you
for your attention !*

