

A. Petrenko

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----- REFERRED PAPERS -----

Campbell, R., Diaz F., Hu, Z.Y., Doglioli, A.M., **Petrenko, A.A.**, Dekeyser, I., *Nutrients and plankton spatial distributions induced by a coastal eddy in the Gulf of Lion. Insights from a numerical model.* Progr. Oceanogr. , submitted. [see preprint](#)

Nencioi, F., D'Ovidio, F., Doglioli, A.M., **Petrenko, A.A.** (2011), *Surface coastal circulation patterns by in-situ detection of Lagrangian Coherent Structures.* **Geophys. Res. Lett.**, Vol.38, L17604, doi:10.1029/2011GL048815. [see preprint](#)

The MerMex Group (2011), *Marine ecosystems' responses to climatic and anthropogenic forcings in the Mediterranean*, **PinO**, in press. [see preprint](#)

Hu, Z.H., **Petrenko, A.A.**, Doglioli, A.M., Dekeyser, I., *Numerical study of eddy generation in the western part of the Gulf of Lion.* **J. Geophys. Res.**, accepted. [see preprint](#)

Kersalé, M., Doglioli, A.M., **Petrenko, A.A.** (2011), *Sensitivity study of the generation of mesoscale eddies in a numerical model of Hawaii islands.* **Ocean Sci.**, 7, 277-291, doi : 10.5194/os-7-277-2011 . [see Open Access paper](#) or [see preprint](#)

Hu, Z.H., **Petrenko, A.A.**, Doglioli, A.M., Dekeyser, I. (2011), *Study of a mesoscale anticyclonic eddy in the western part of the Gulf of Lion.* **J. Mar. Syst.**, Vol.88/1, pp.3-11, doi: 10.1016/j.jmarsys.2011.02.008. [see preprint](#)

Hu, Z.H., Doglioli, A.M., **Petrenko, A.A.**, Marsalcix, P., Dekeyser, I. (2009), *Numerical simulations of eddies in the Gulf of Lion.* **Ocean Model.**, Vol. 28/4, pp. 203-208, doi: 10.1016/j.ocemod.2009.02.004 . [see preprint](#)

Ouillon, S., Douillet P., **Petrenko A.**, Neveux J., Dupouy C., Froidefond J.-M., Munoz-Caravaca A. (2008), *Optical Algorithms at satellite wavelengths for Total Suspended Matter in tropical coastal waters.* **Sensors**, 8, 4165-4185, doi:10.3390/s8074165 , [see paper](#)

Petrenko A., C. Dufau and C. Estournel (2008), *Barotropic eastward currents in the western Gulf of Lion, north-western Mediterranean Sea, during stratified conditions.* **J. Marine Syst.**, doi:10.1016/j.jmarsys.2008.03.004 , [see paper](#)

Gatti, J., **Petrenko, A.**, Leredde, Y., Devenon, J.-L. & Ulses, C.(2006), *The Rhone river dilution zone present in the northeastern shelf of the Gulf of Lion in December 2003.* **Continental Shelf Res.**, 26 (15), 1794-1805, doi:10.1016/j.csr.2006.05.012 , [see paper](#)

Petrenko A., Y. Leredde, and P. Marsalcix (2005), *Circulation in a stratified and wind-forced Gulf of Lions, NW Mediterranean Sea: in-situ and modeling data.* **Continental Shelf Res.**, 25, 5-27, doi:10.1016/j.csr.2004.09.004, [see paper](#)

Ouillon, S. and **Petrenko, A.** (2005), *Above-water measurements of reflectance and chlorophyll-a algorithms in the Gulf of Lions, NW Mediterranean Sea.* **Optics Express**, 13 (7), 2531-2548, doi:10.1364/OPEX.13.002531, [see paper](#)

Dufau-Julliand, C., Marsalcix, P., **Petrenko A.**, Dekeyser, I. (2004), *Three-dimensional modeling of the Gulf of Lion's hydrodynamics (northwest Mediterranean) during January 1999 (MOOGLI3 Experiment) and late winter 1999: Western Mediterranean Intermediate Water's (WIW's) formation and its cascading over the shelfbreak.* **J. Geophys. Res.**, 109 (C11), C11002, doi:10.1029/2003JC002019. [see paper](#)

Terminé

Parcours

ENSTA
Environnement Marin

> 35 campagnes en mer
(de nombreuses « cotières »)
RedTide, CMO, MOOGLI, SARHYGOL,
BISSECOTE, LATEX -07, -08, -09 et -10...

+ formation embarquée avec étudiants
Campagnes PHYBIO depuis 2001

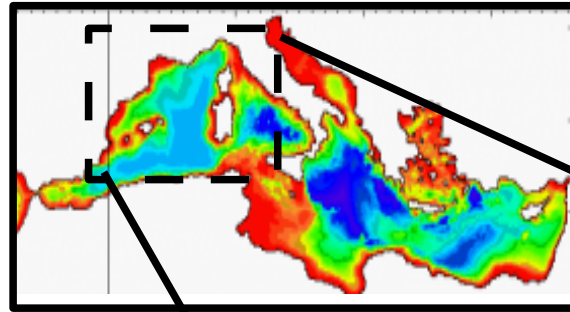
Etats-Unis
Scripps SIO, La Jolla (Master)
NOAA, Washington, DC (SeaGrant Fellow)
USC, Los Angeles (PhD)
OSU, Oregon (Post-doc)
DOE, Olympia – Seattle, Washington (PO)

+ Projets OUTPACE,
Coconet, OSCAHR,
GoLSWOT, PEACETIME,
BIOSWOT ...

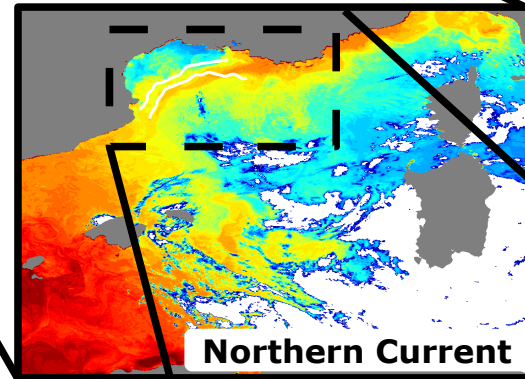
Marseille (Enseignant-Chercheur)
AMU – Aix Marseille Université
MIO - Mediterranean Institute of Oceanography

Co-Responsable
Océanographie Physique
et Biogéochimique (OPB)
Master d'Océanographie

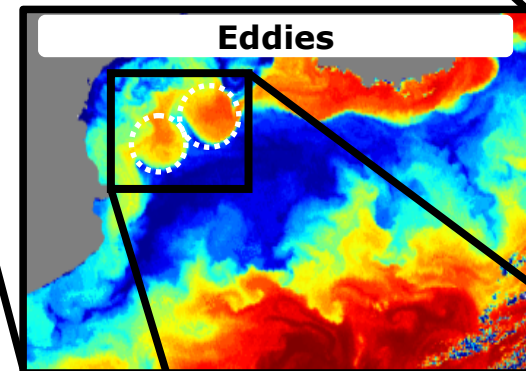
**≈1000-10000
km**



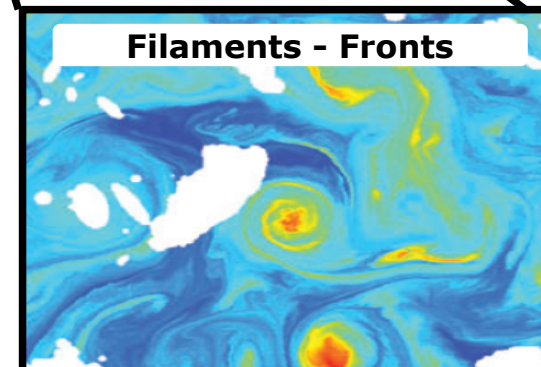
**≈100-1000
km**



**≈10-100
km**



**≈1-10
km**



**Processus physiques
et impacts sur la biogéochimie**

- Étude de courant de pente (ex « Courant Nord » Med. occidentale passant en Mer Ligure/Provence/Languedoc-Roussillon/Catalan)
- Circulation dans le Golfe du Lion (moyennes à fines échelles ; Finite Size Lyapunov Exponent FSLE)
- Mécanismes de formation des tourbillons
- Connectivité entre Aires Marines Protégées (théorie des graphes)
- Effets d'île et conséquences sur la biogéochimie
- Trajectoires de flotteurs lagrangiens et ondes d'instabilité tropicales

Thèses anciens étudiant(e)s OPB

- Louise Rousselet 2015- (déjà 1 JGR)
- Marion Kersalé 2011-14
- Ziyuan Hu 2008-2011
- Julie Gatti 2002-2006

+ Thésards (autres origines):

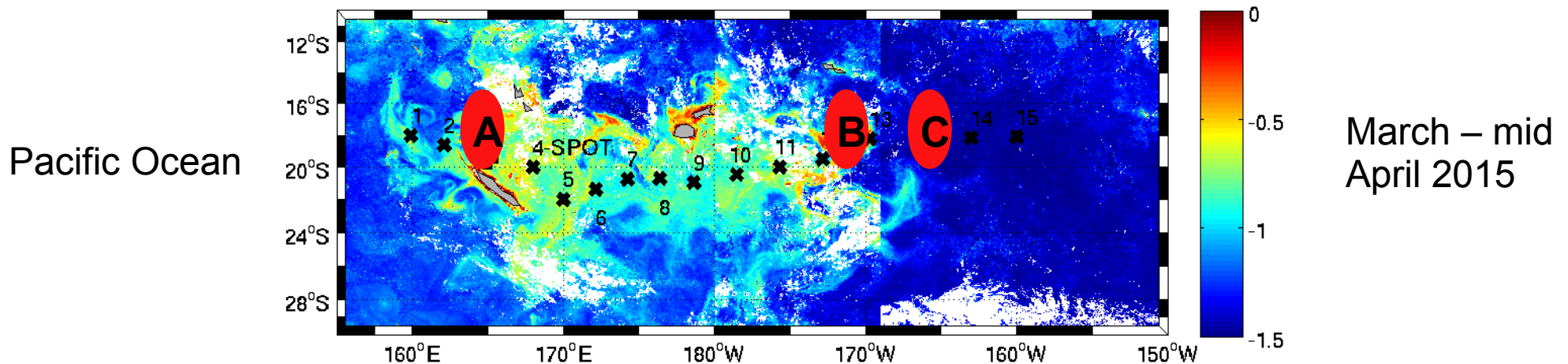
- Hirohiti Raapoto 2014-
- Andrea Costa 2013-17

+ M2 2017 : Simon Barbot

OUTPACE (Oligotrophy to ULTra-oligotrophy PACific Experiment)

PIs : T. Moutin, S. Bonnet

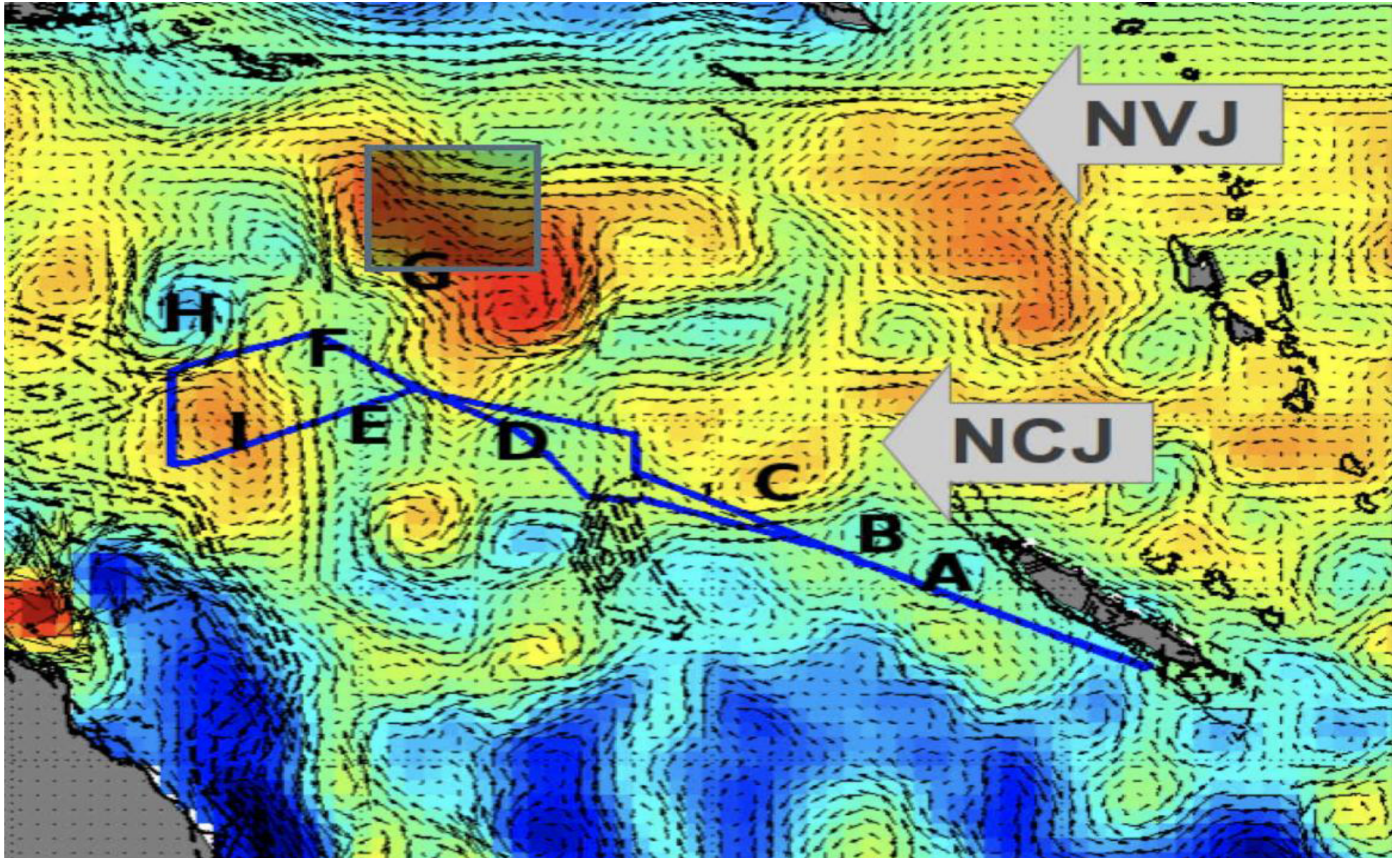
Main objective : to estimation production and fate of the organic matter (especially production sustained by di-nitrogen fixation) in 3 contrasting oligotrophic environments.



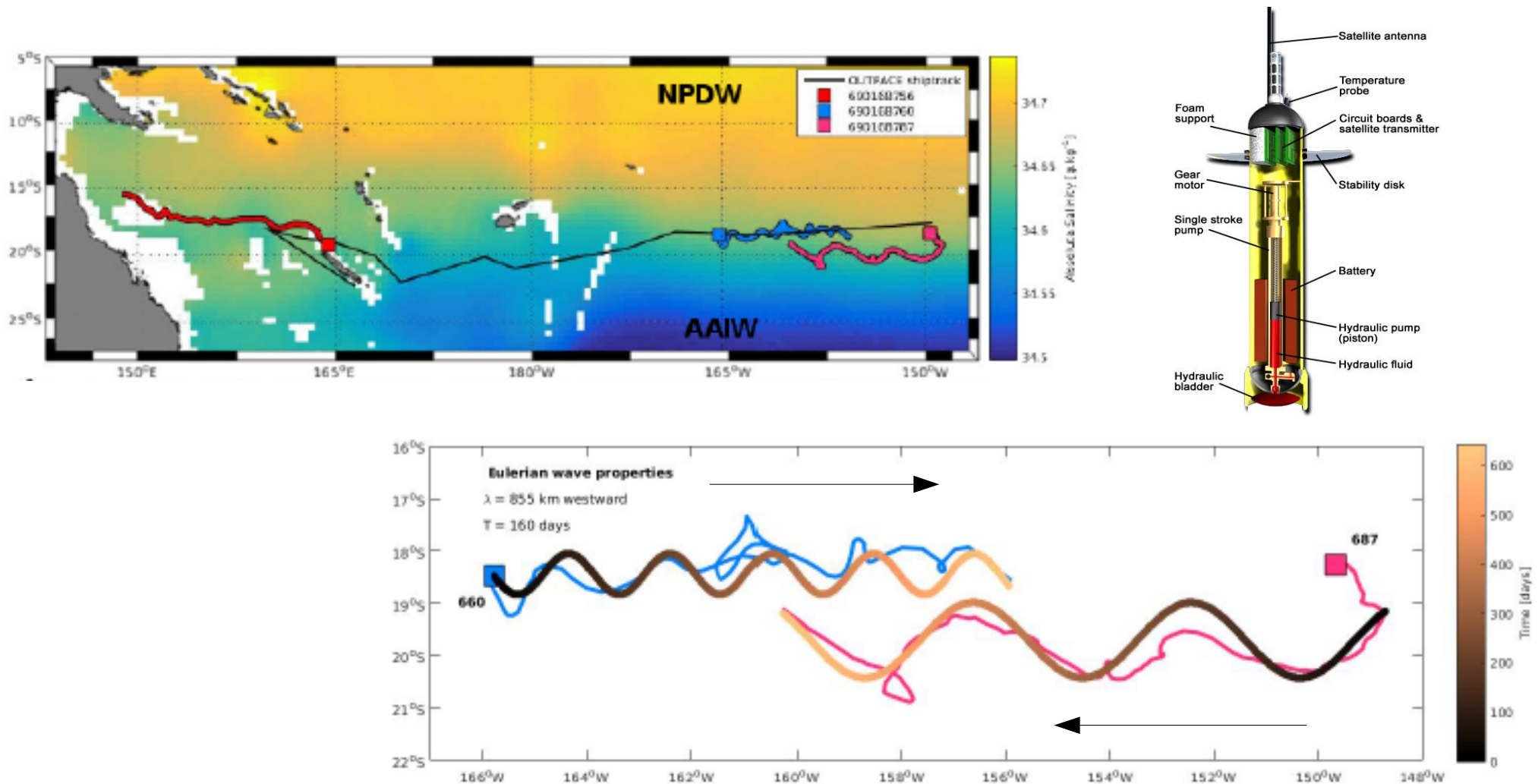
Lagrangian adaptative strategy, floats and MVP

L. Bellomo, A. Doglioli, F. d'Ovidio, C. Maes, F. Nencioli,
A. Petrenko, G. Rougier and the OUTPACE team

Mer de Corail – Lien entre Jet Nord Vanuatu et Jet Nord Calédonien via tourbillons



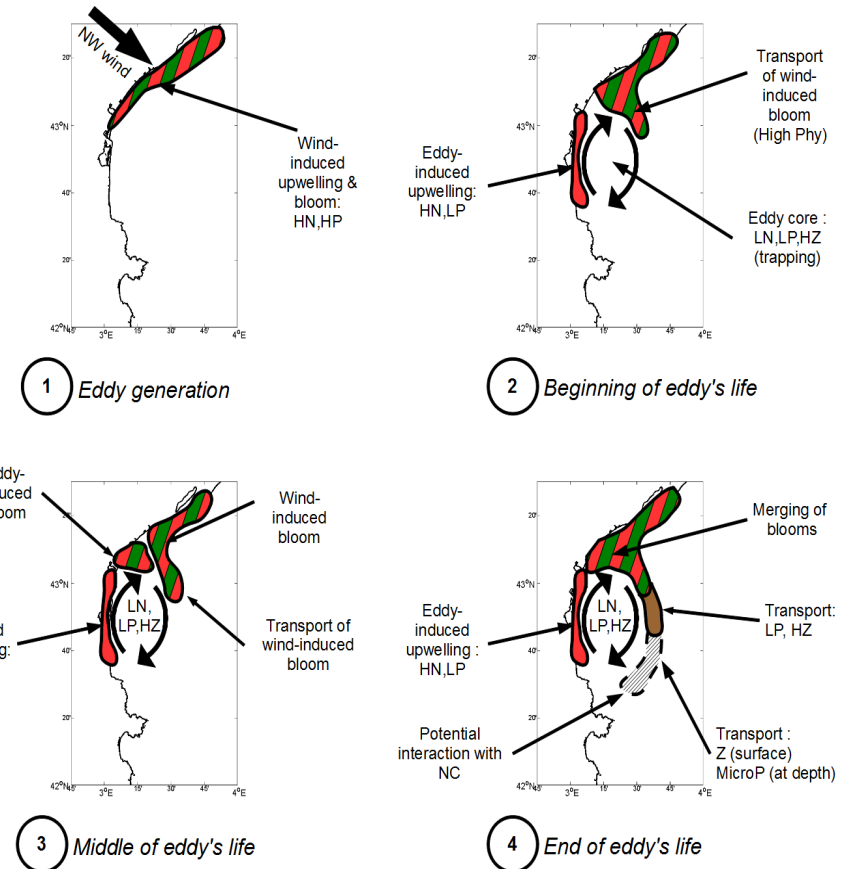
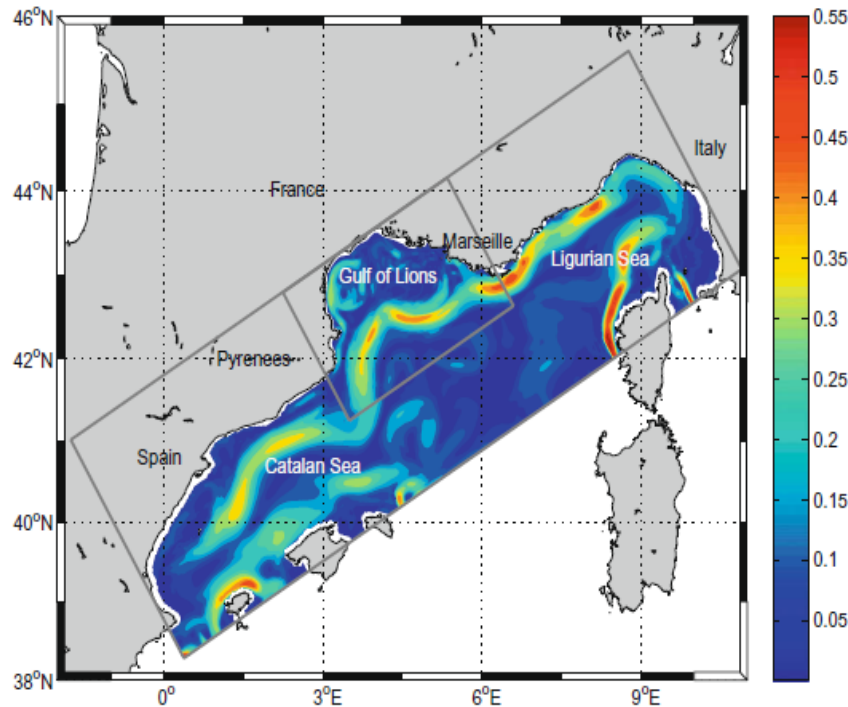
OUTPACE (T. Moutin et S. Bonnet) & THOT (E. Martinez) projects ; BGC-Argo floats (A. Petrenko) since 2015



A single Rossby wave, superimposed to the background current,
can explain both trajectories

[S. Barbot et al., 2017]

LATEX (PIs A. Petrenko et F. Diaz) LAgrangian Transport EXperiment



**Physical and Coupled physics-biogeochemistry modeling
+ 3 cruises 2008, 2009 and a big cruise (2RVs) in 2010**

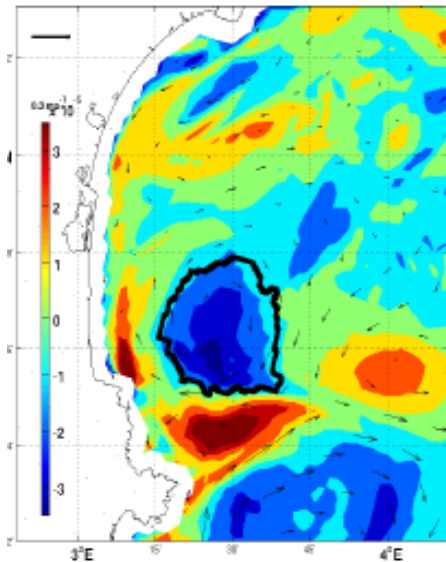
[A. Petrenko et al., 2017]

LATEX (PIs A. Petrenko et F. Diaz)

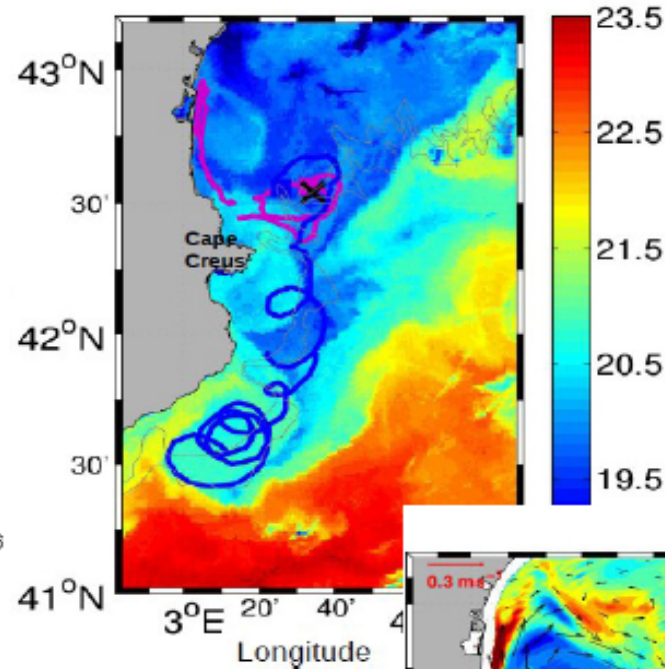
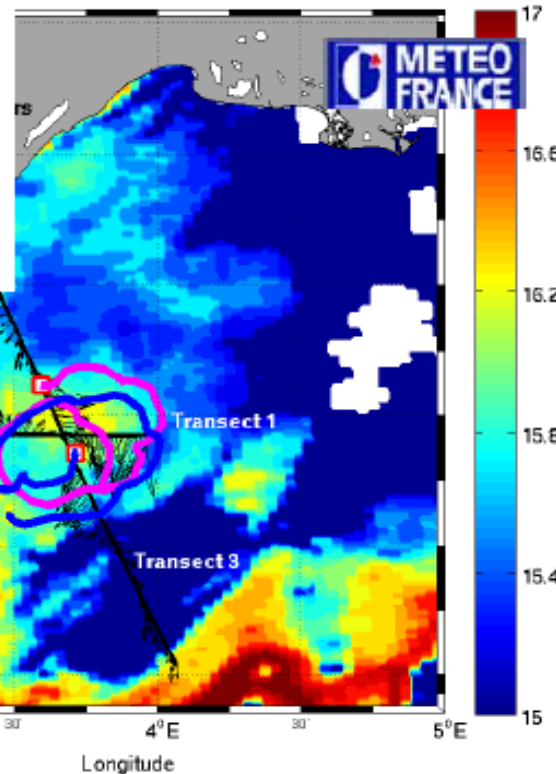
Lagrangian Transport EXperiment



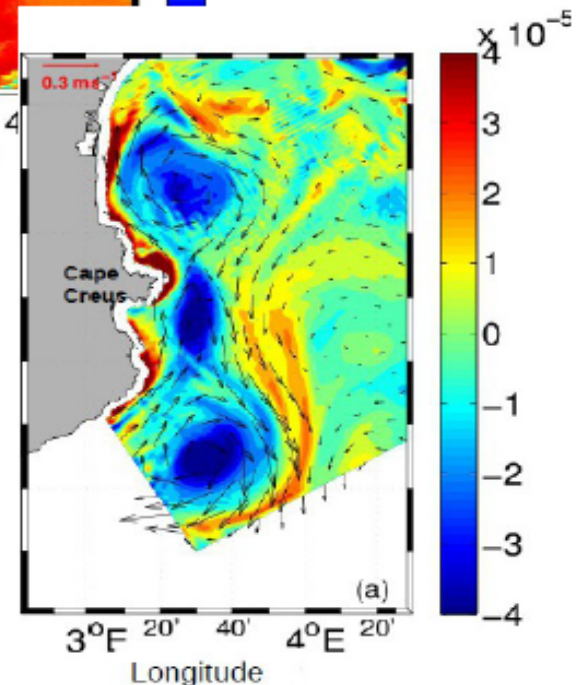
Latex08 & 09 cruises : anticyclonic eddies



**Latex08
eddy**



**Latex09
eddy
+transient
structure
+Catalan
eddy**



[Hu et al., JMS, 2011]

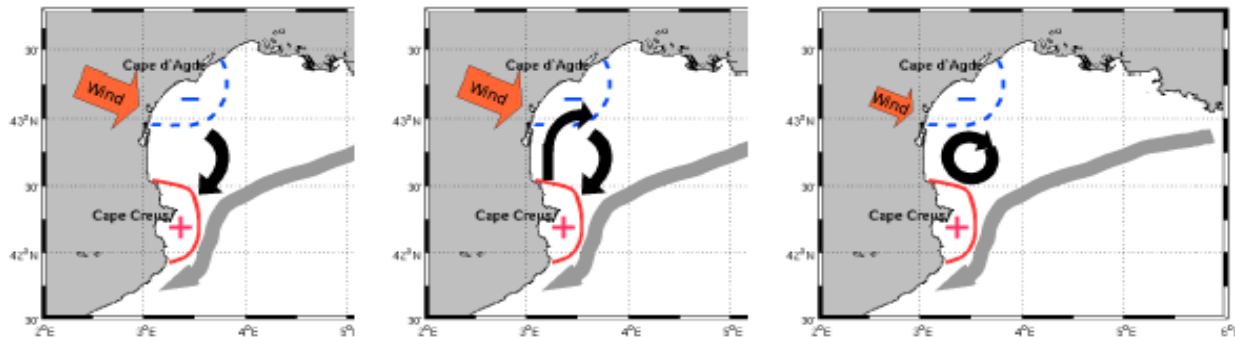
[Kersale et al., JGR, 2013]

LATEX (PIs A. Petrenko et F. Diaz) LAgrangian Transport EXperiment



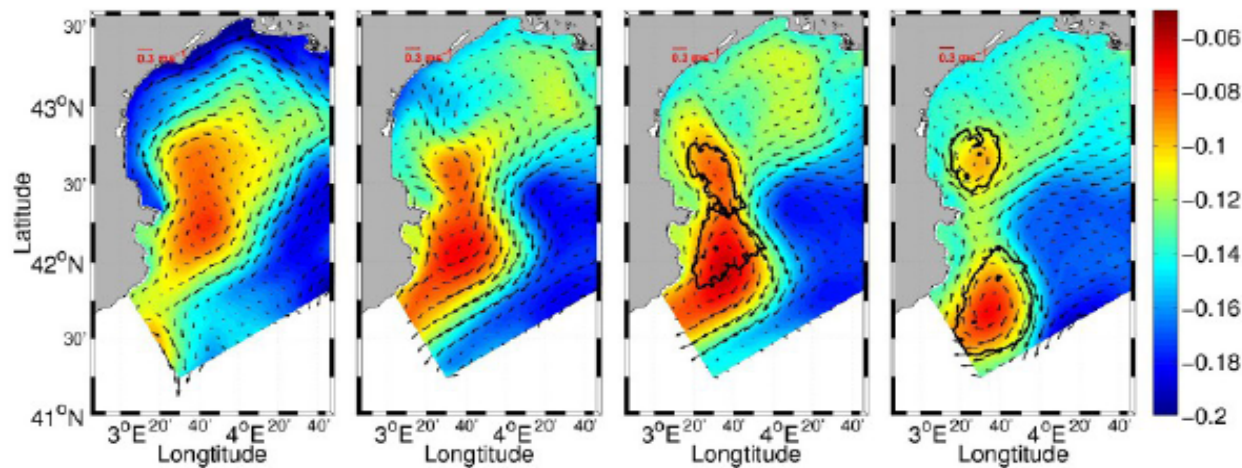
3D Circulation Model

Two eddy generation processes



Tramontane + stratification

[Hu et al., JGR, 2011]



anticyclonic circulation + NC meander

[Kersale et al., JGR, 2013]



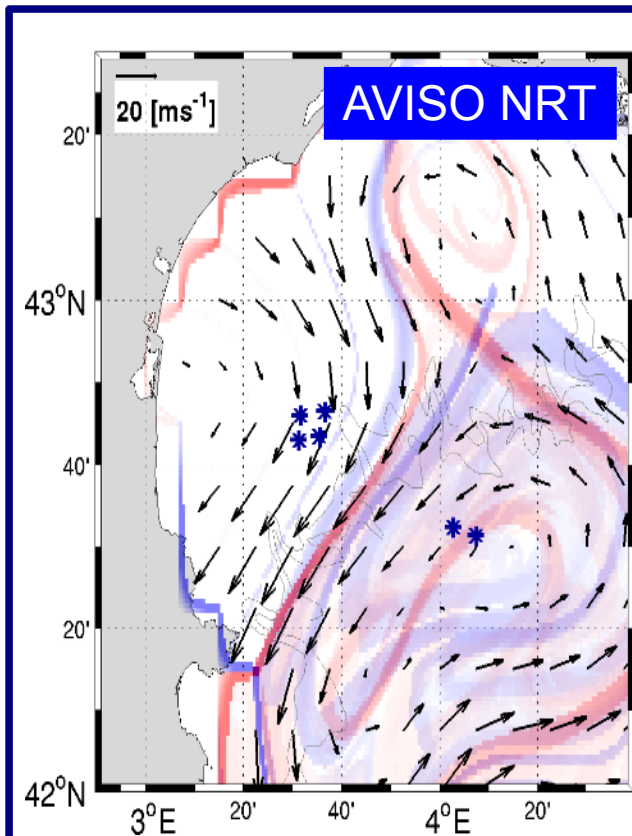
Latex10 cruise (1-24 septembre 2010)



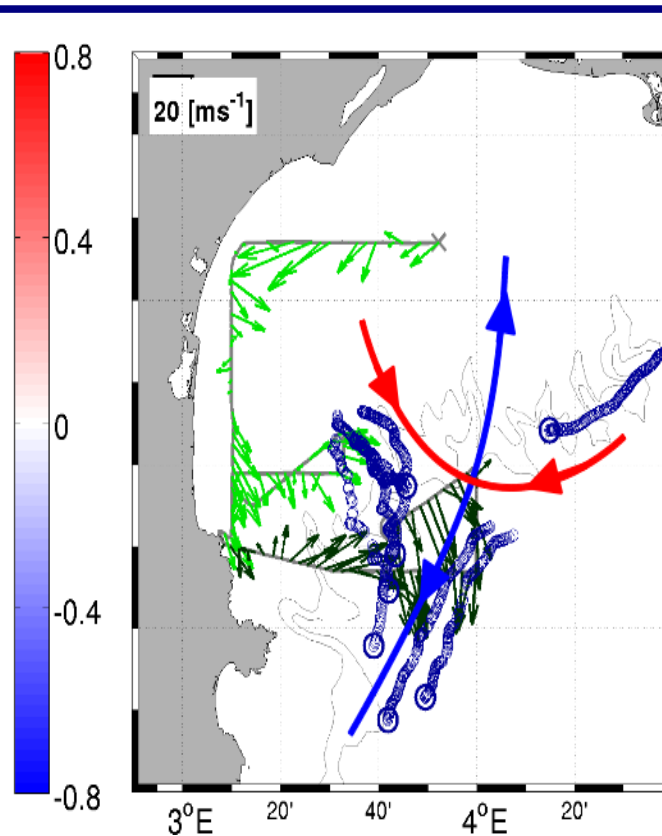
In-situ quasi real-time (with F. d'Ovidio) detection of Lagrangian Coherent Structures

LYAP(UNOV) 1

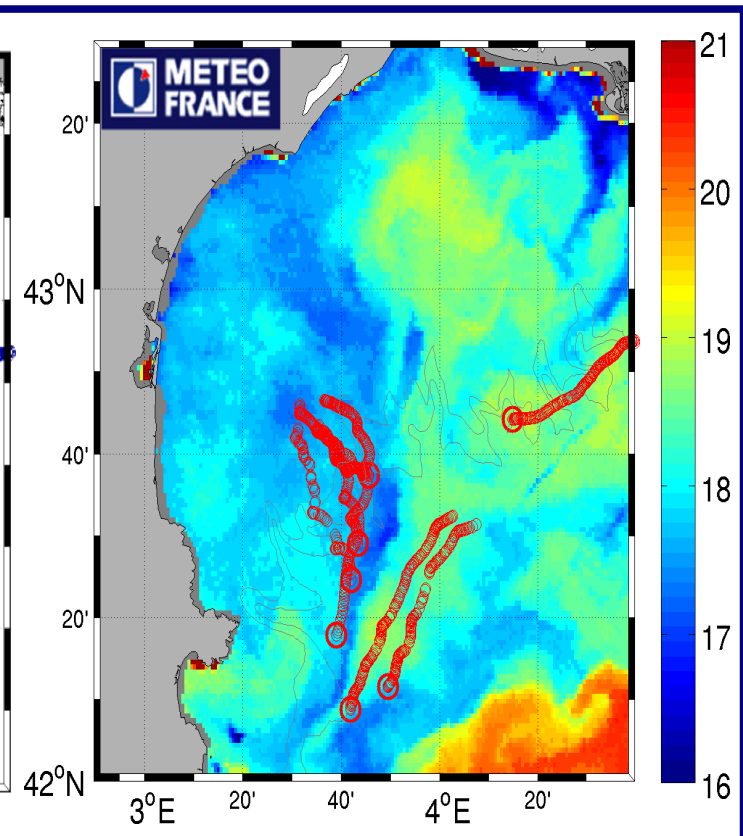
Altimetry LCS



In situ LCS



AVHRR SST

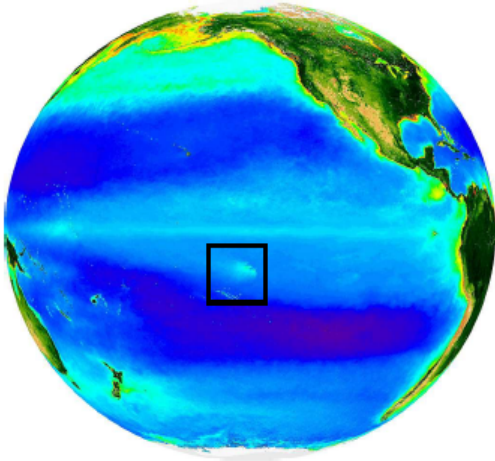


+ 2 other ones : LYAP 2 and LYAP 3

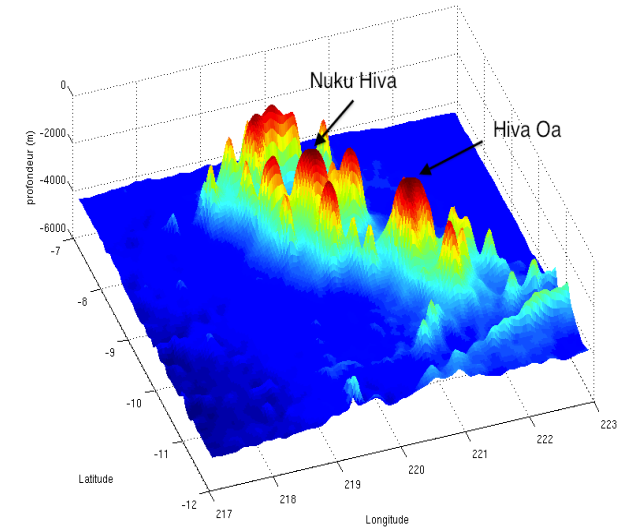
[Nencioli et al, GRL, 2011]



Island effect

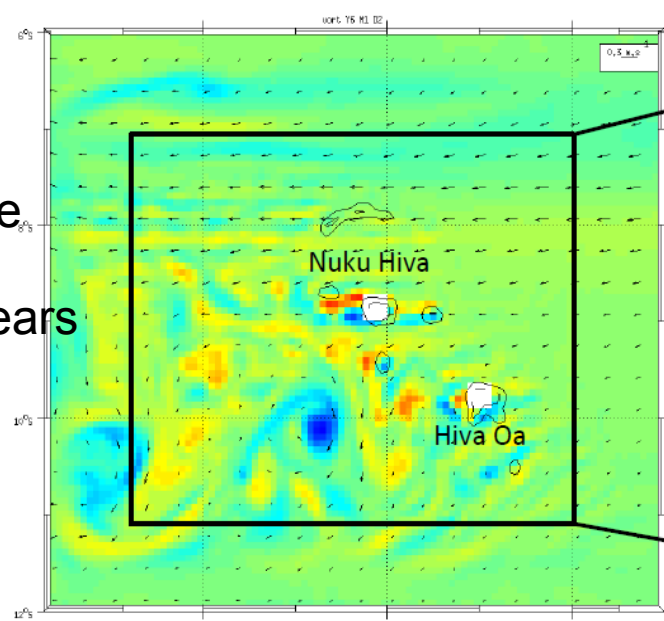


Objectives :
Dynamics of island wakes
Impacts on biogeochemistry
Wake eddies

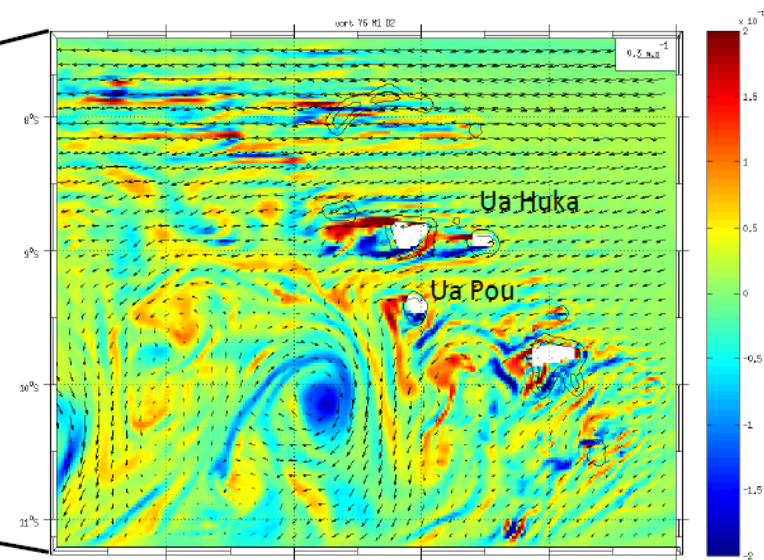


Scales :
Regional
to (sub) mesoscale
Climatological
with contrasting years

ROMS-AGRIF (users)



Champs de vorticité de la grille mère à 1/15°
(D02M01Y06)



Champs de vorticité de la grille fille à 1/45°
(D02M01Y06)

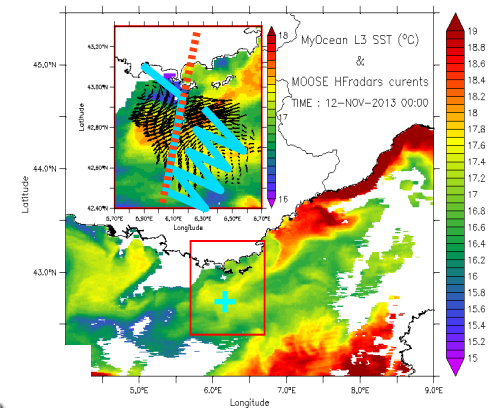
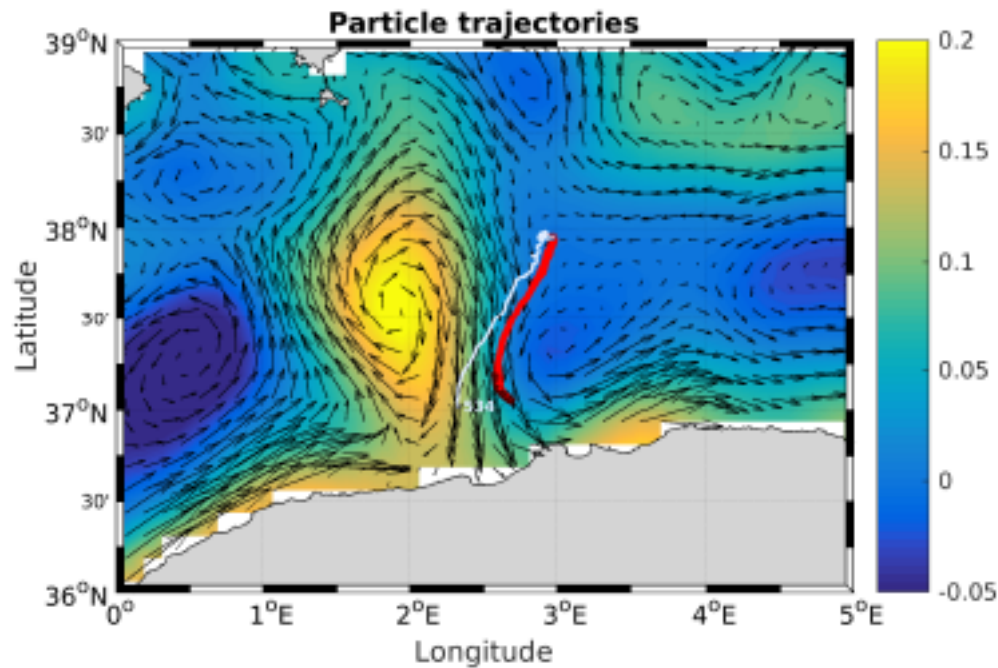
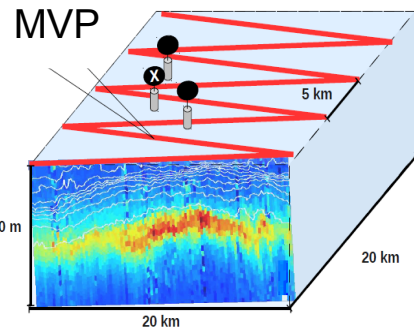
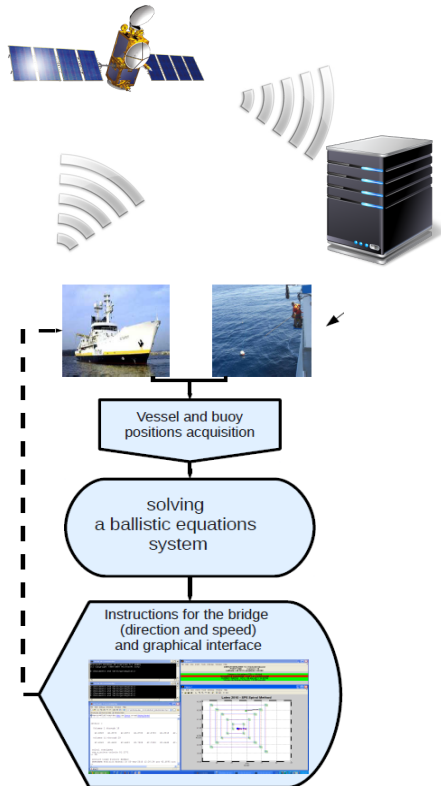
PhD thesis of Hirohiti Raapoto

+ [Raapoto et al., JGR in rev ; Raapoto et al., 2 to be submitted]

OSCAHR (Med Nord occidentale novembre 2015)

PEACETIME (Méditerranée Mai 2017)

BIOSWOT (2018 ; préparation altimétrie SWOT 2020)



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de Verneil A., Rousselet, L., Doglioli, A.M., **Petrenko, A.A.**, Moutin, T. (in review). *The Fate of a Southwest Pacific Bloom: Gauging the impact of submesoscale vs. mesoscale circulation on biological gradients in the subtropics*. Biogeosciences Discuss., doi:10.5194/bg-2017-84.

Costa, A., Doglioli, A.M., Marsaleix, P., **Petrenko A.A.** (submitted after revision). *Comparison of in situ microstructure measurements to different turbulence closure schemes in a 3-D numerical ocean circulation model*. Ocean Model. [see preprint](#)

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Cyr, F., Tedetti, M., Besson, F., Beguery, L., Doglioli, A.M., **Petrenko, A.**, Goutx, M. (2017). *A new glider-compatible optical sensor for dissolved organic matter measurements: test case from the NW Mediterranean Sea*. Front. Mar. Sci., 4:89, doi:10.3389/fmars.2017.00089.

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Costa, A., **Petrenko, A.A.**, Guizien, K., Doglioli, A.M. (minor revision). *On the Calculation of Betweenness Centrality in Marine Connectivity Studies Using Transfer Probabilities*. PLoS ONE. [see preprint](#)

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Kersalé, K., **Petrenko, A.A.**, Doglioli, A.M., Nencioli, F., Bouffard, J., Blain, S., Diaz, F., Labasque, T., Quéguiner, B., Dekeyser, I. (2016). *Diffusivity coefficients from the dynamics of a SF6 patch in a coastal environment*. J. Marine Syst., 2. 153, 42-54, doi:10.1016/j.jmarsys.2015.09.003 [see preprint, article educational material in French](#)