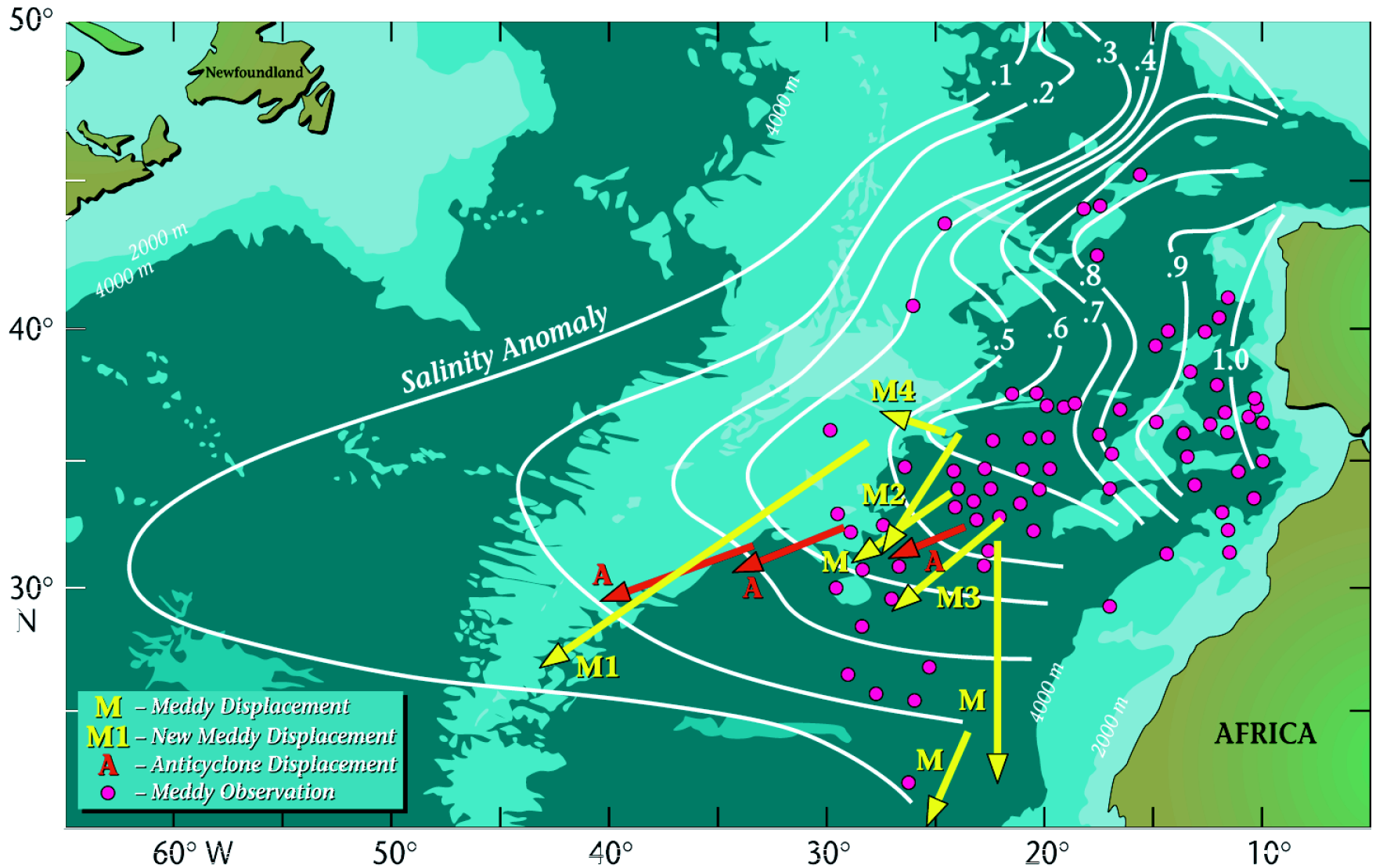
A satellite image of the Bay of Biscay, showing the coastline of France and the Iberian Peninsula. The ocean surface is covered with numerous eddies and sweddies, which are visible as swirling patterns of different colors (blue, green, yellow, and white) against the darker blue of the open ocean. The text is overlaid on the image.

Meddies and Sweddies in the Bay of Biscay : Observations and QG modelling

**X. Carton (LPO), B. Le Cann (LPO)
A. Serpette (SHOM), J. Dubert (UA)**

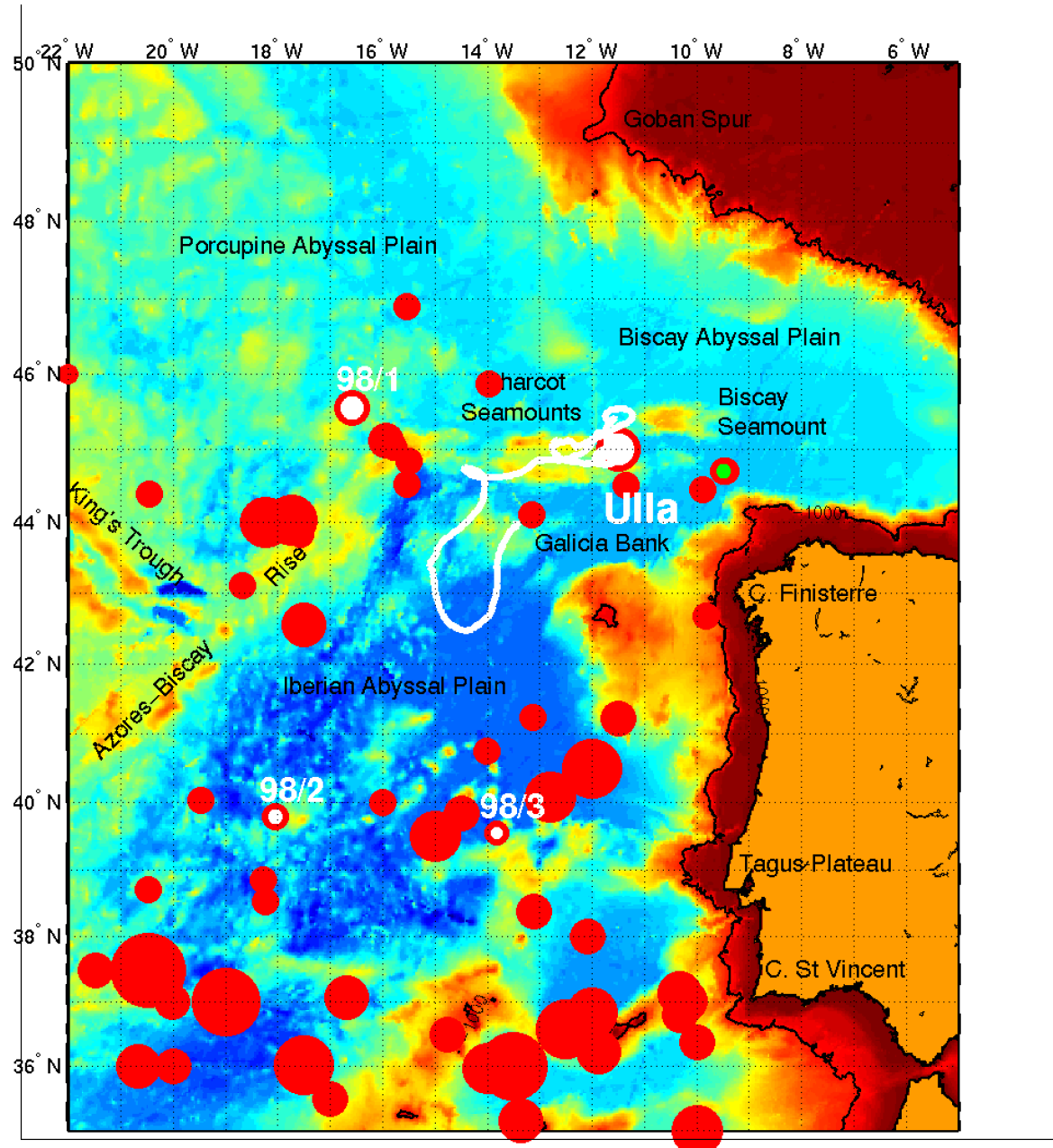
(JMS, in the press)

Meddies in the northeastern Atlantic



Richardson and Tychensky, 1998

The « Northern Meddies »



44 15.0 N
012 17.0 W

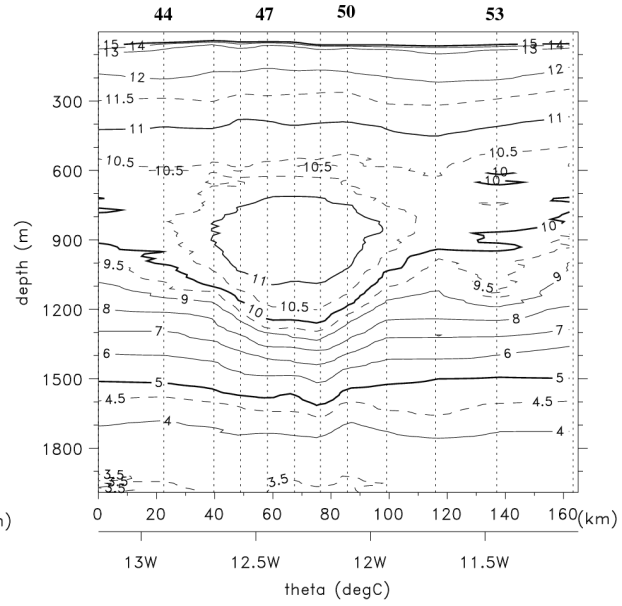
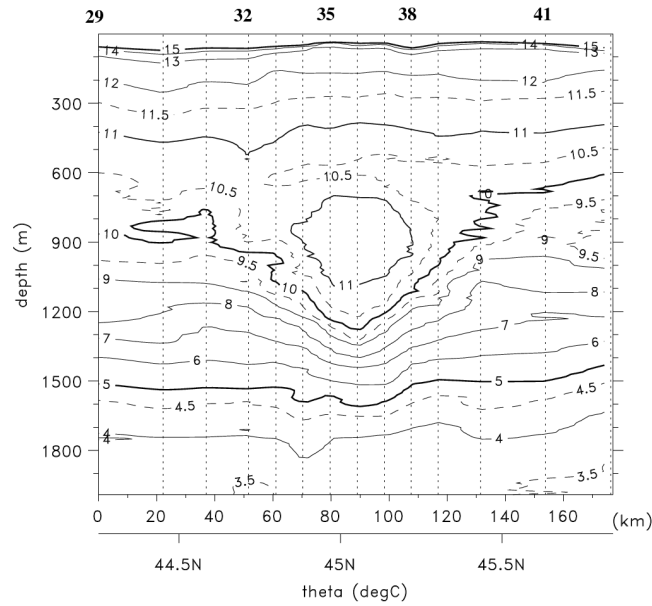
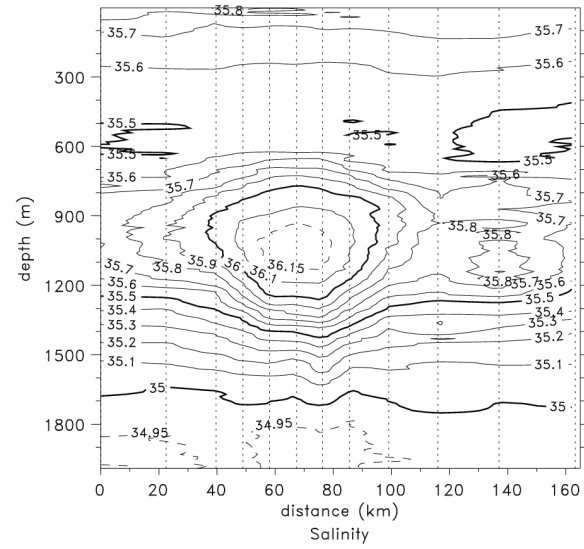
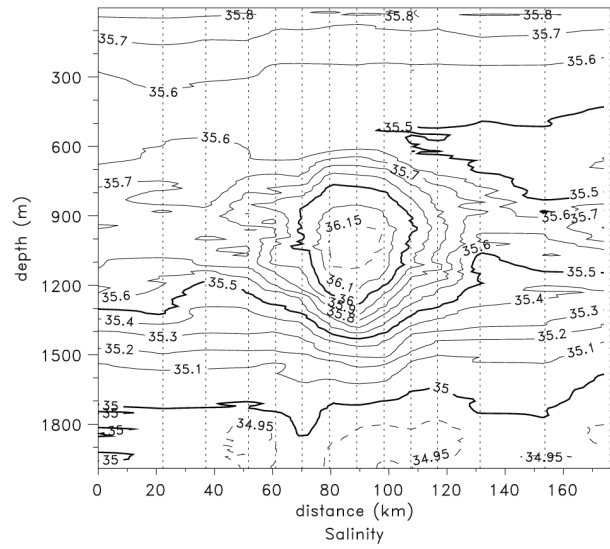
ARCANE/Thalassa 97 -Meridional line

45 50.2 N
012 16.9 W

44 59.9 N
013 11.2 W

ARCANE/Thalassa 97 -Zonal line

45 01.0 N
011 07.0 W



Ulla sections 1998, Paillet et al, 2002

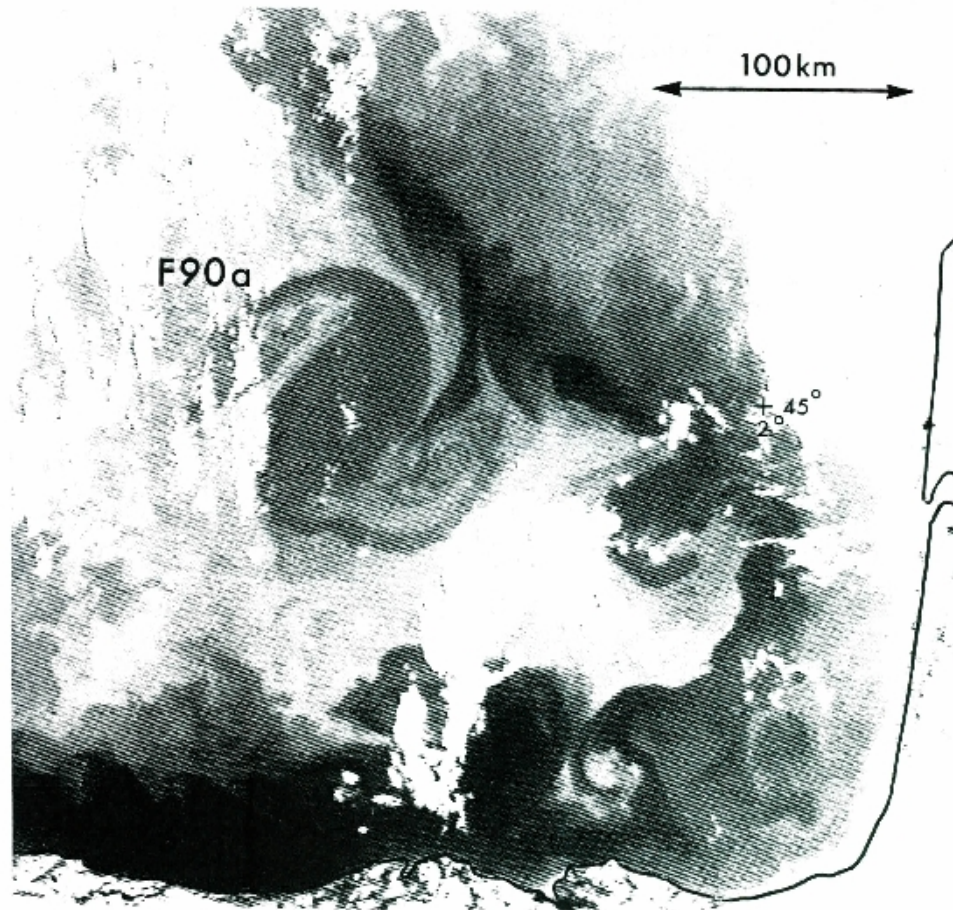
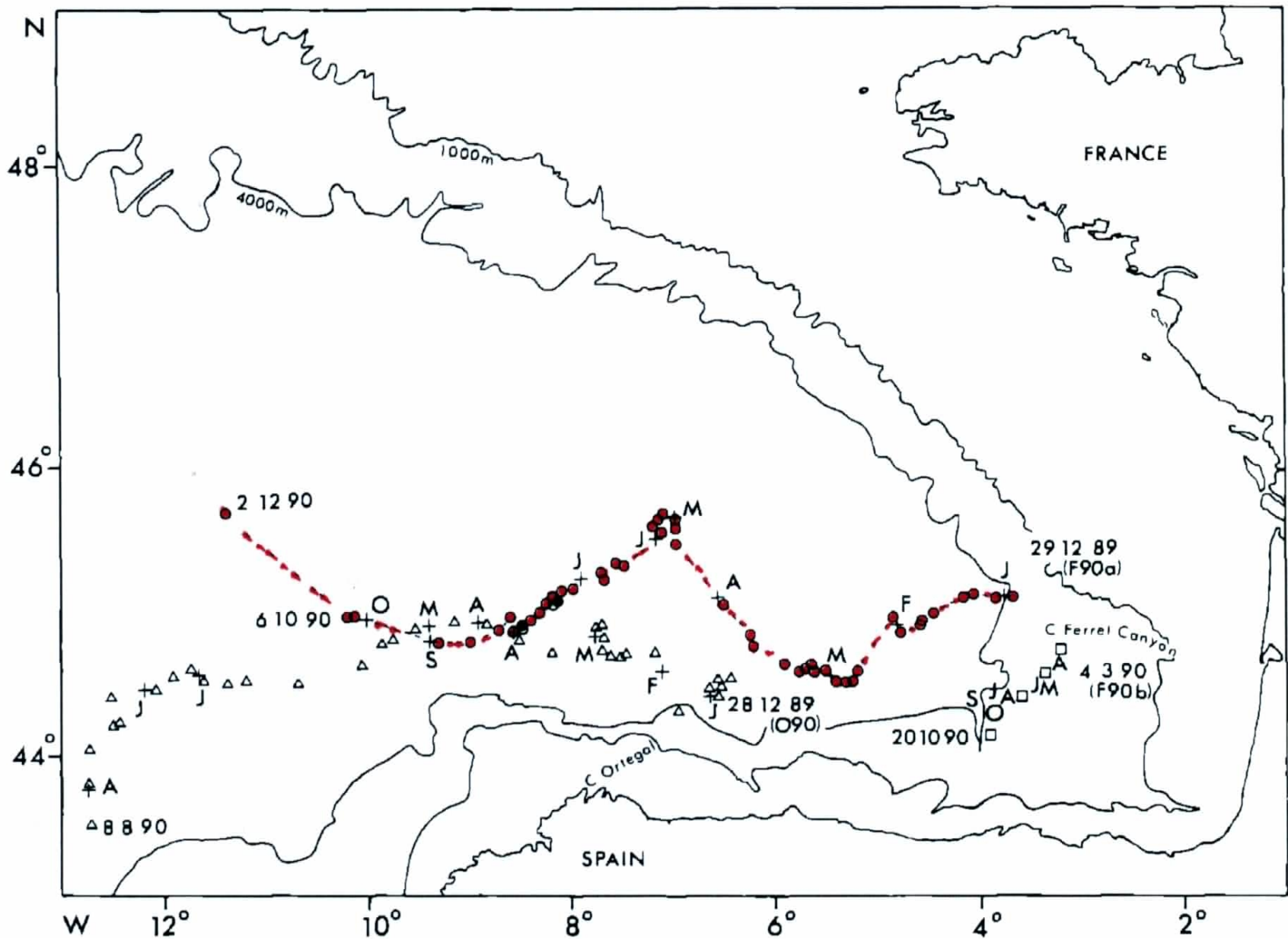
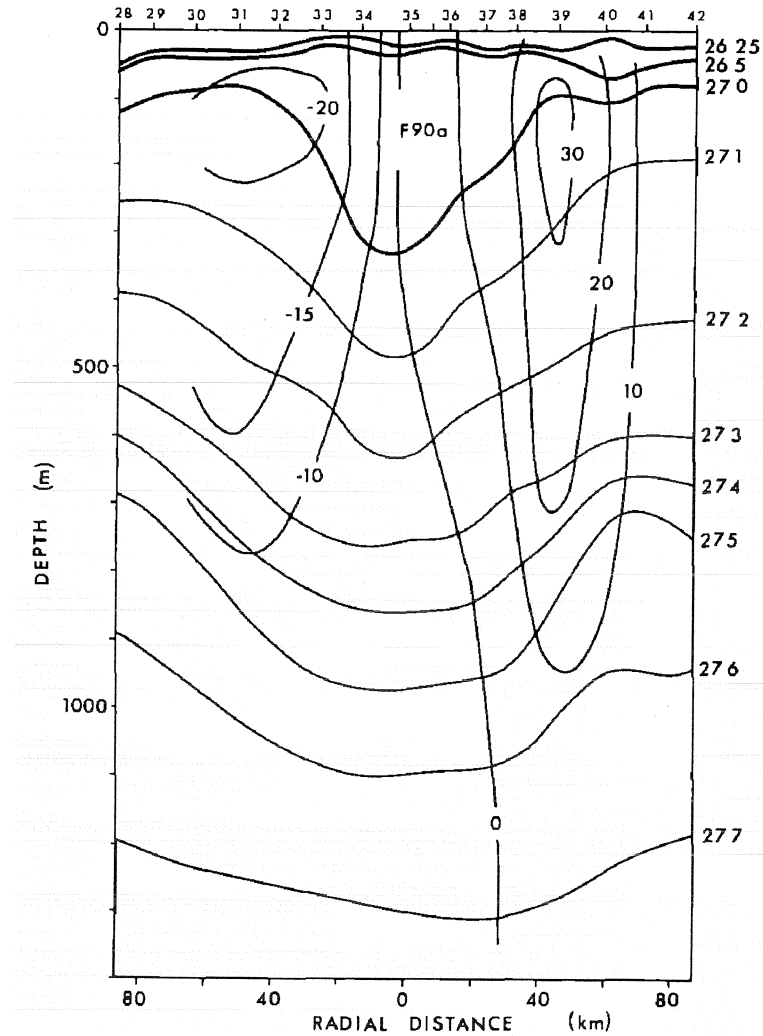


Image satellite infrarouge illustrant le développement d'instabilité du courant sur la pente continentale au voisinage du canyon du Cap Ferret (4 janvier 1990)

Tripole Swoddy F90a, Pingree and Le Cann, 1992

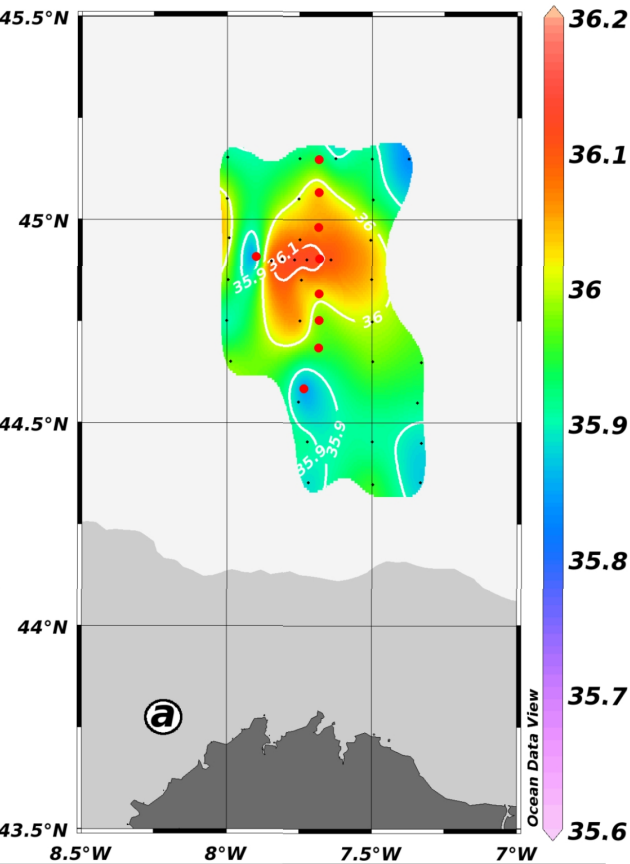


Trajectory Swoddy F90a in 1990, Pingree and Le Cann, 1992

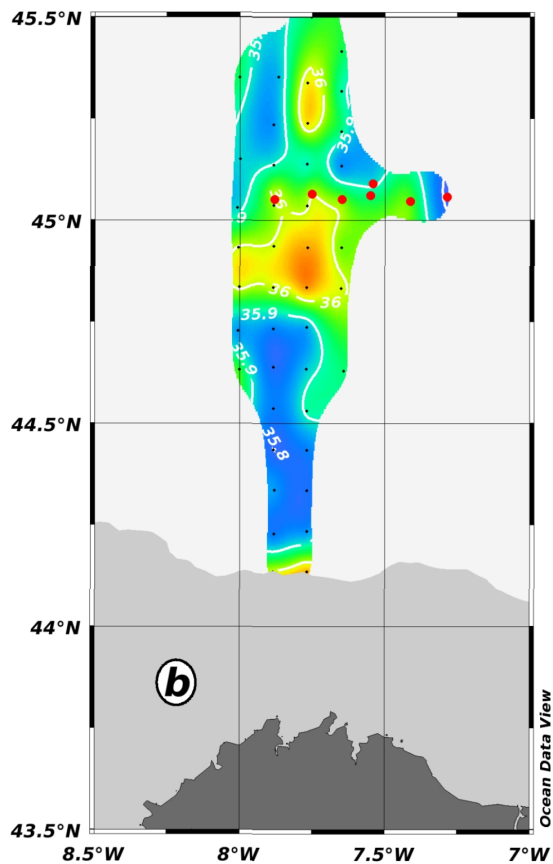


σ – geostrophic velocity section Swoddy F90a, Pingree and Le Cann, 1992

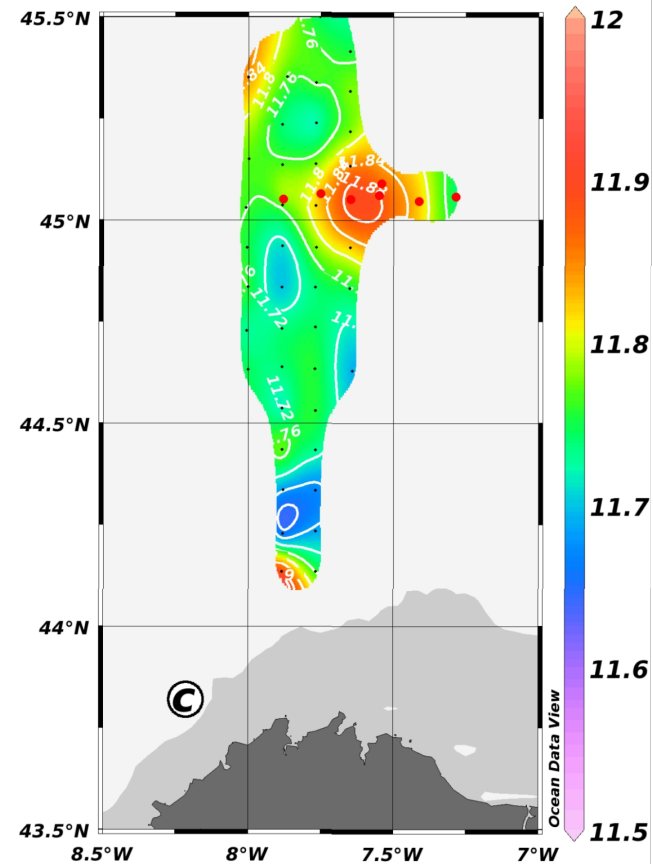
Salinity at 1000 m



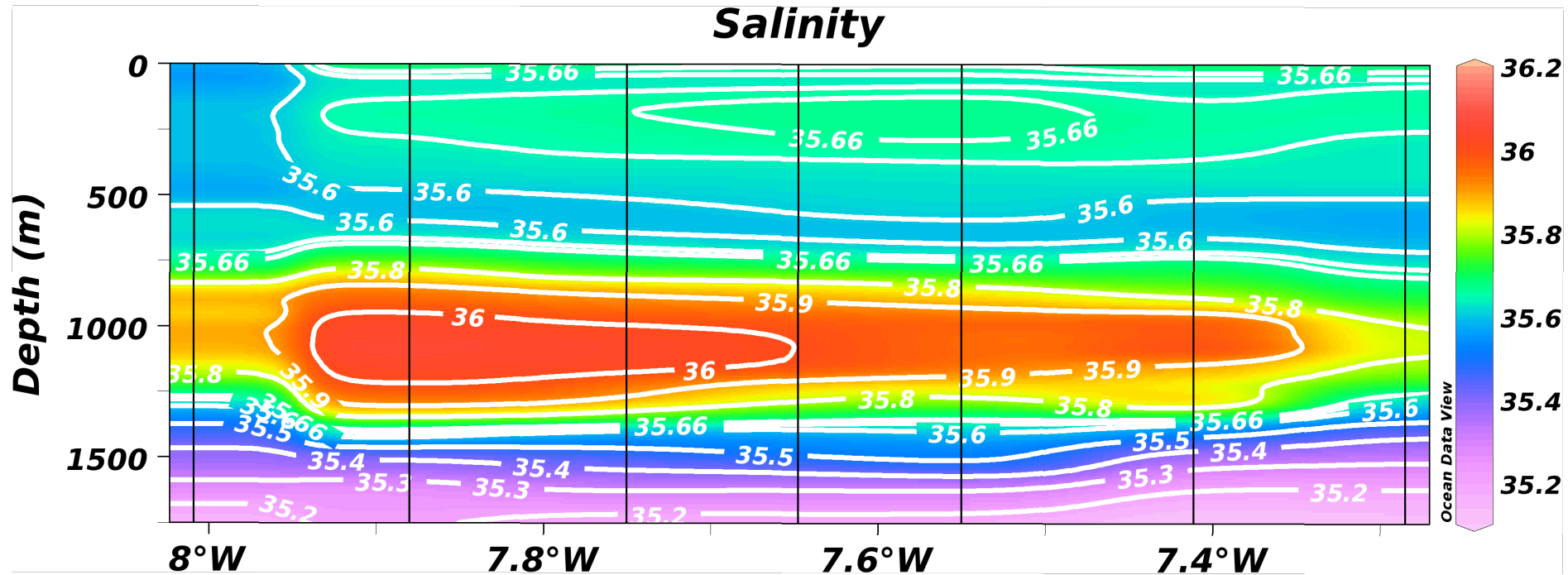
Salinity at 1000 m



Temperature (°C) at 200 m



- a) Salinity map at 1000m 2005/07/01-04
- b) Salinity map at 1000m 2005/07/16-19
- c) Temperature map at 200m 2005/07/16-19



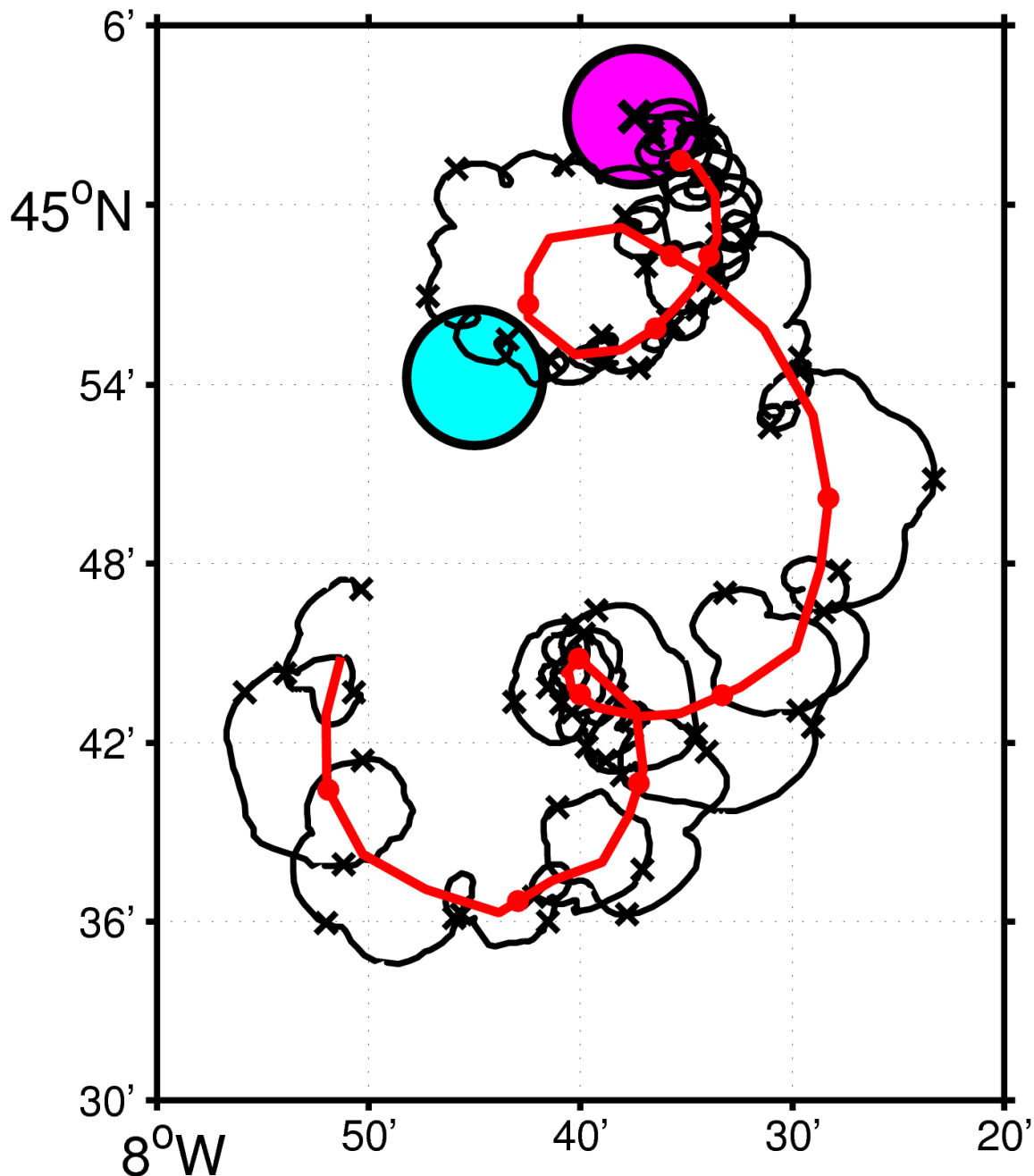
Vertical salinity section across CONGAS Meddy and Swoddy
2005/07/18-19 at 45°03'N

magenta circle: Swoddy
cyan circle: Meddy

Trajectory (black) of drifting buoy #30666 drogued at 200m, deployed on 2005/07/19 (Swoddy centre, 1 black cross / day)

In red, trajectory of Swoddy (1 red dot / 5 days)

Center exhibits ~ 20 days anticyclonic oscillations

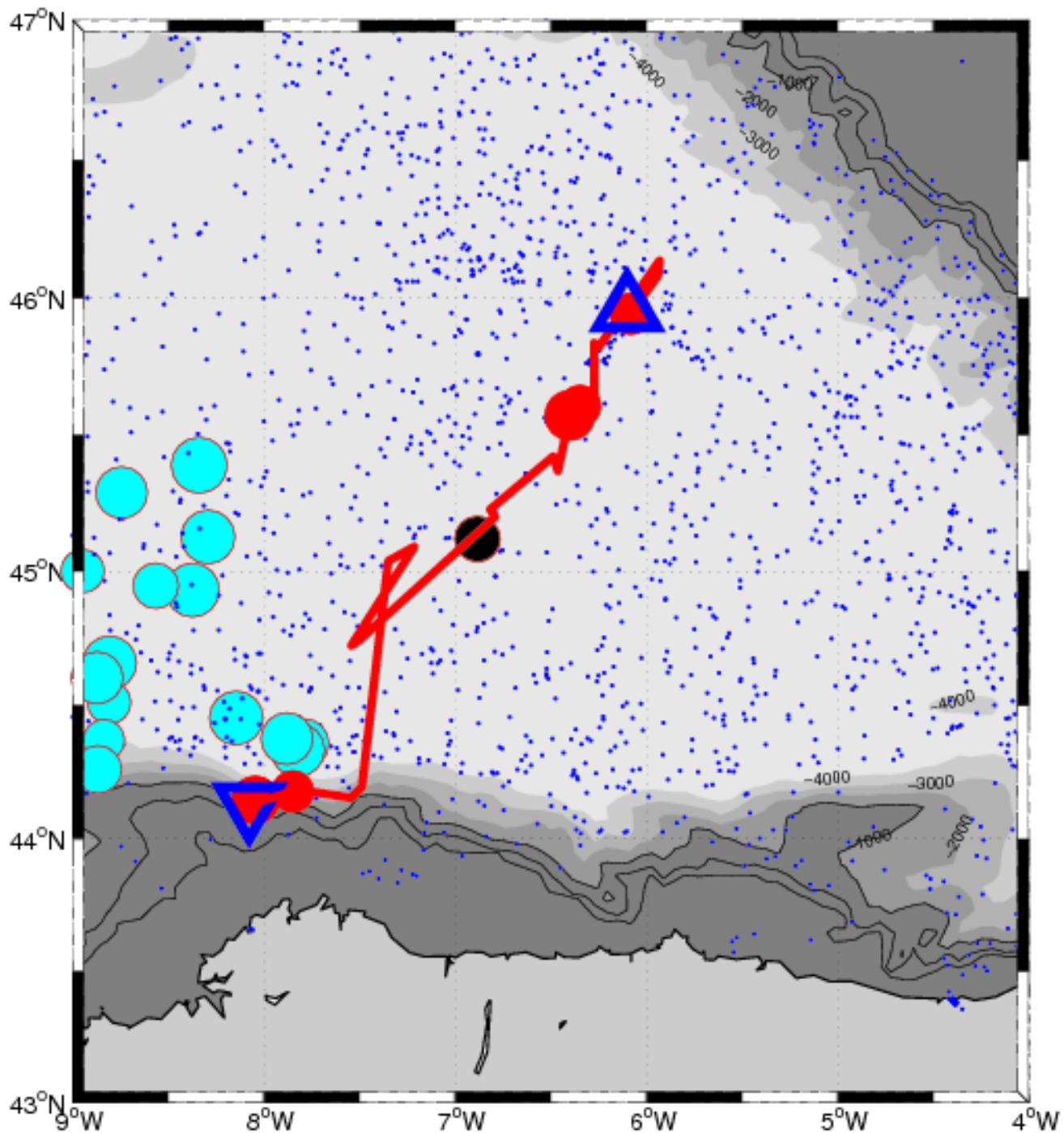


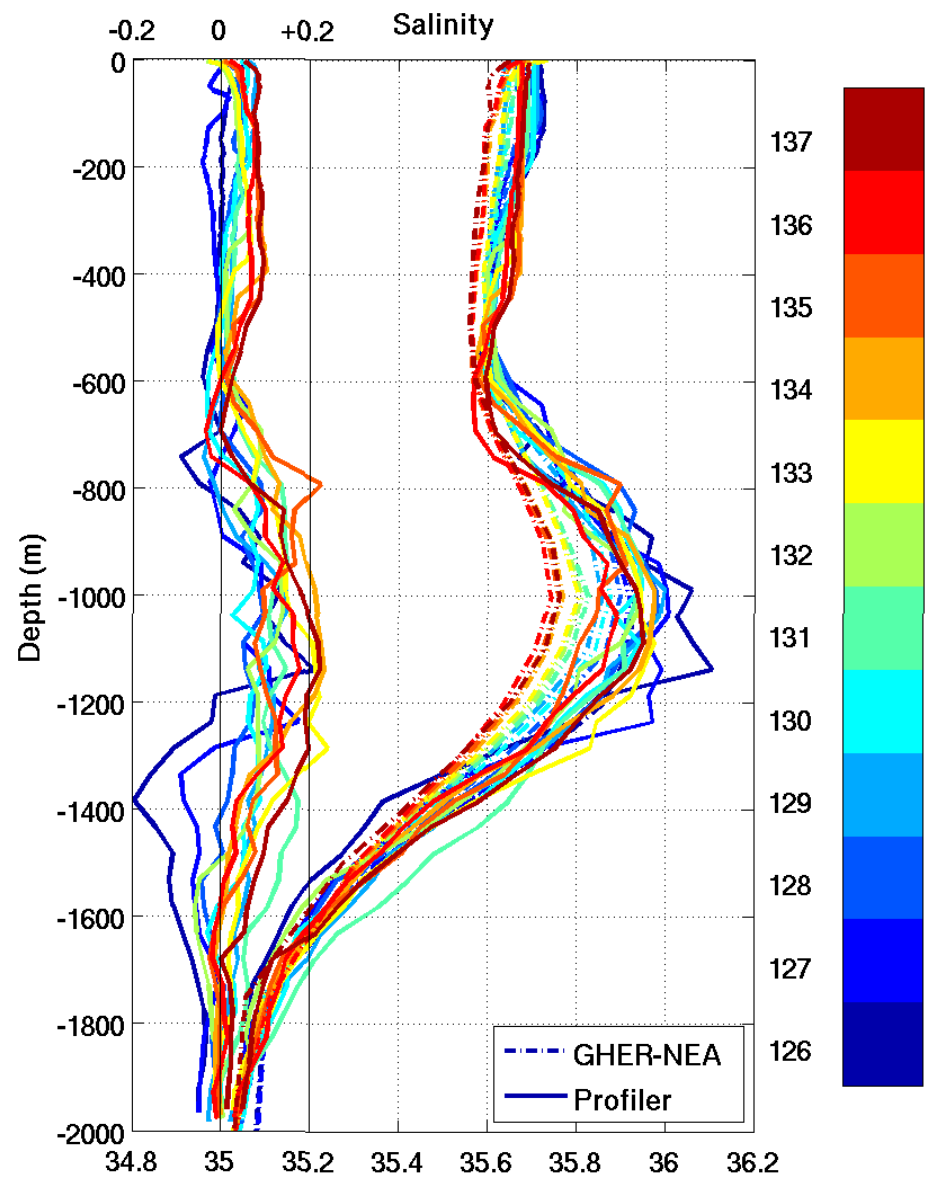
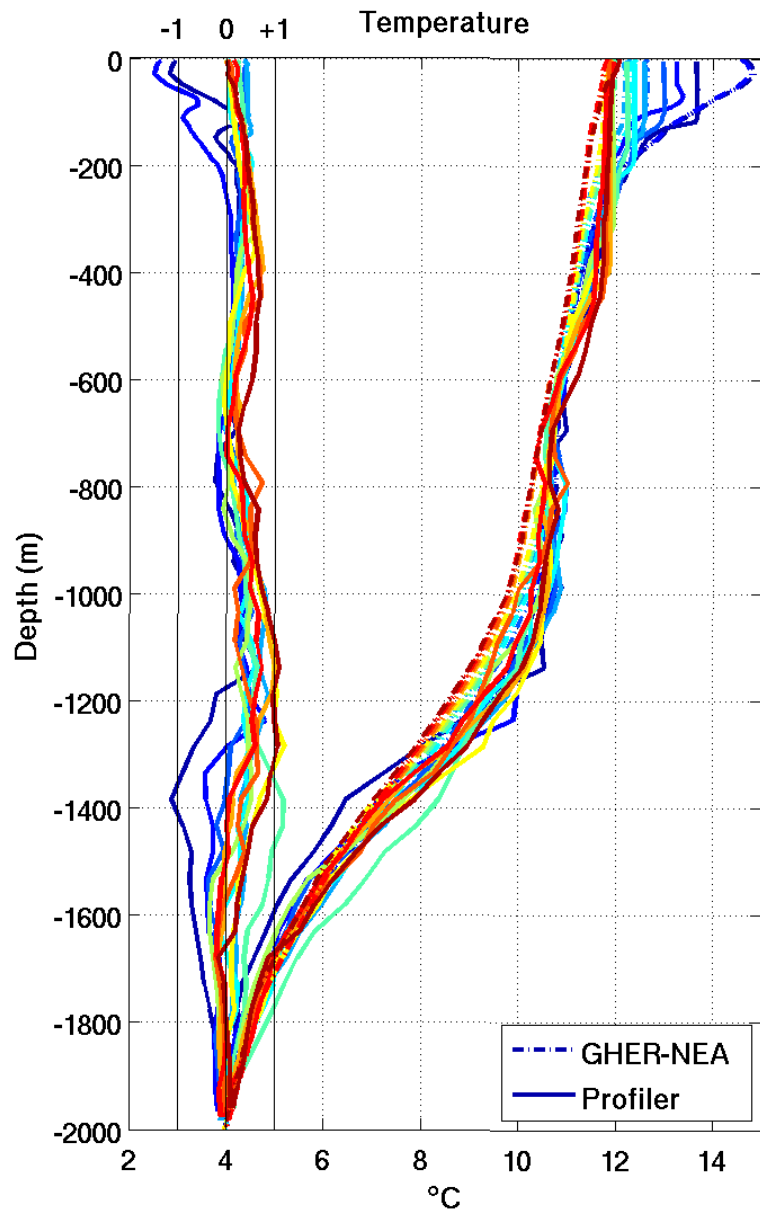
Salinity anomalies in the 700-1300 m range from ARGO floats (profiles up to may 2009 ; blue dots)

Cyan, red et black dots : anomalies > 0.2

#4900557 (2006/03/28) : black dot

#6900363 (2008/12/13 - 2009/04/02) : red dots

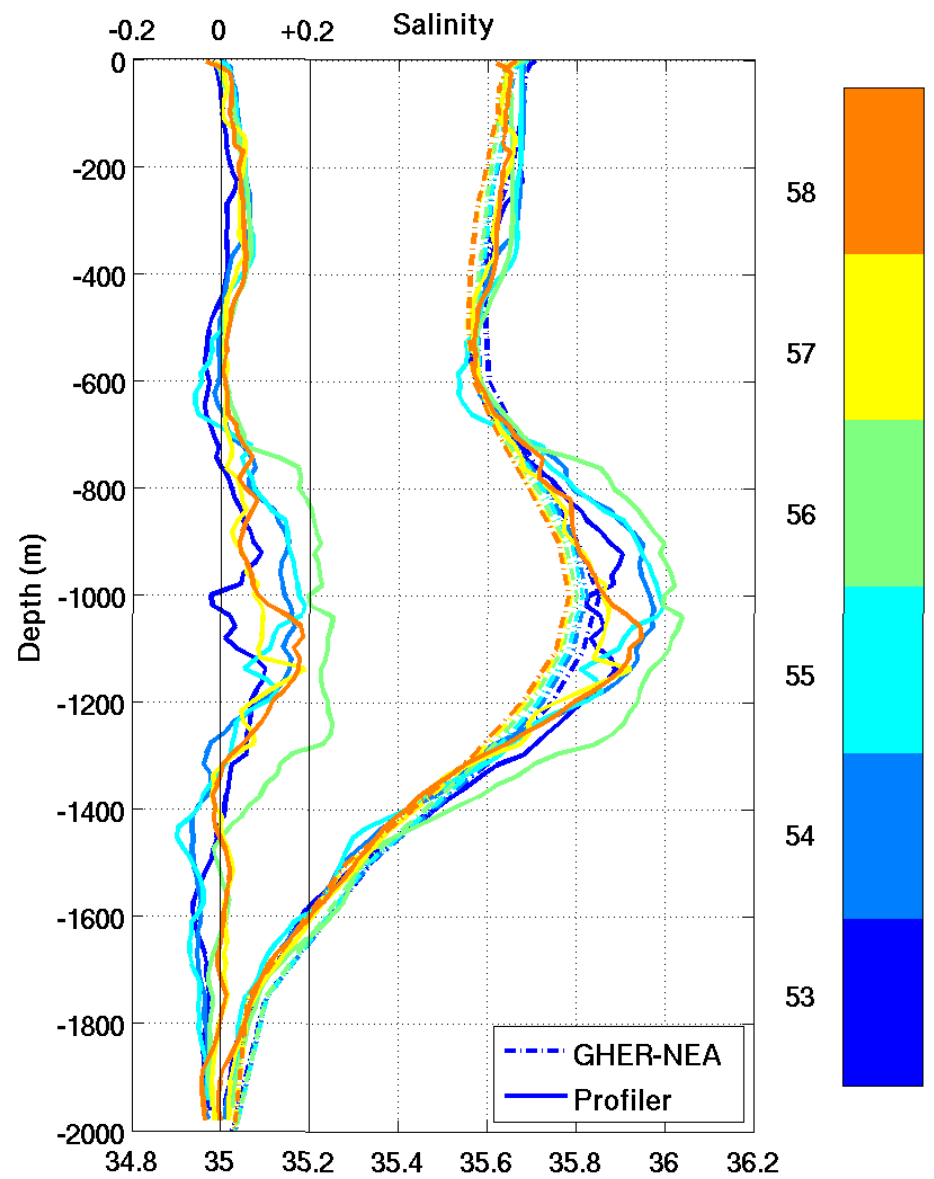
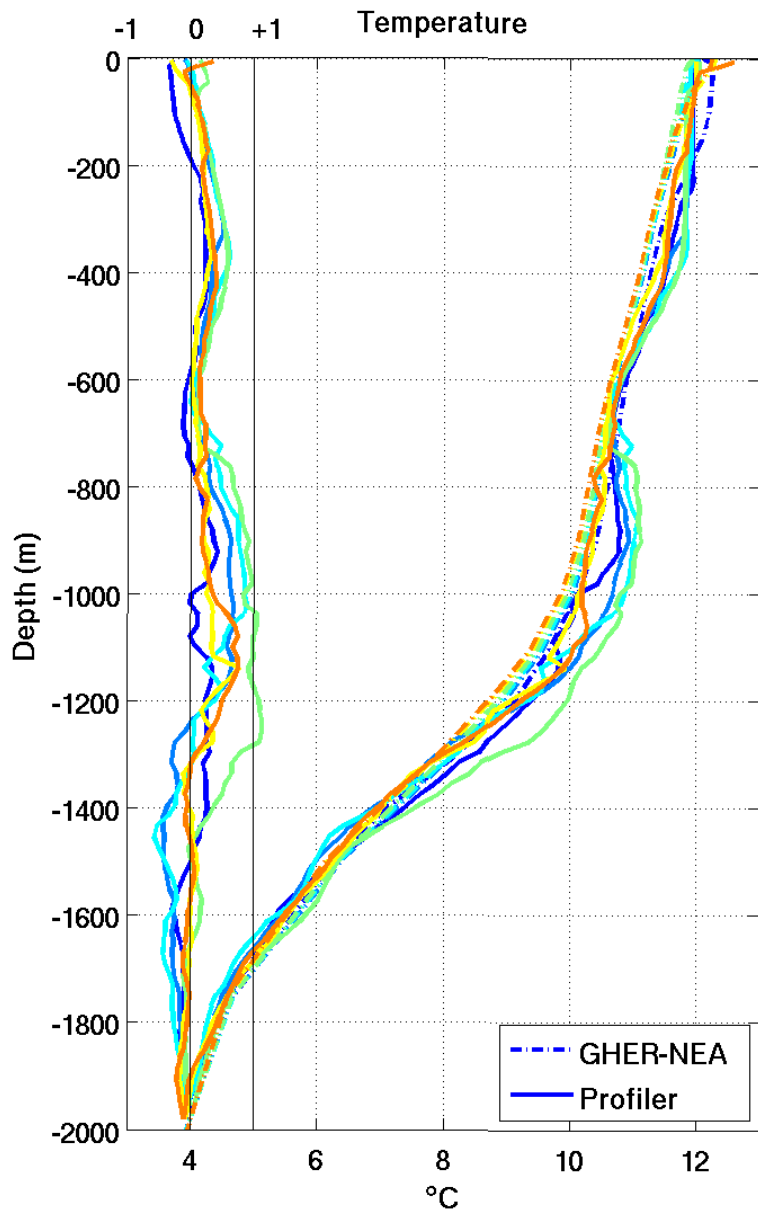




ARGO Temperature and salinity profiles

Float #6900363 2008/12/13 (c. 126) – 2009/04/02 (c. 137) (solid lines)

Anomalies referred to GHER-NEA climatology (dotted lines)



ARGO temperature and salinity profiles

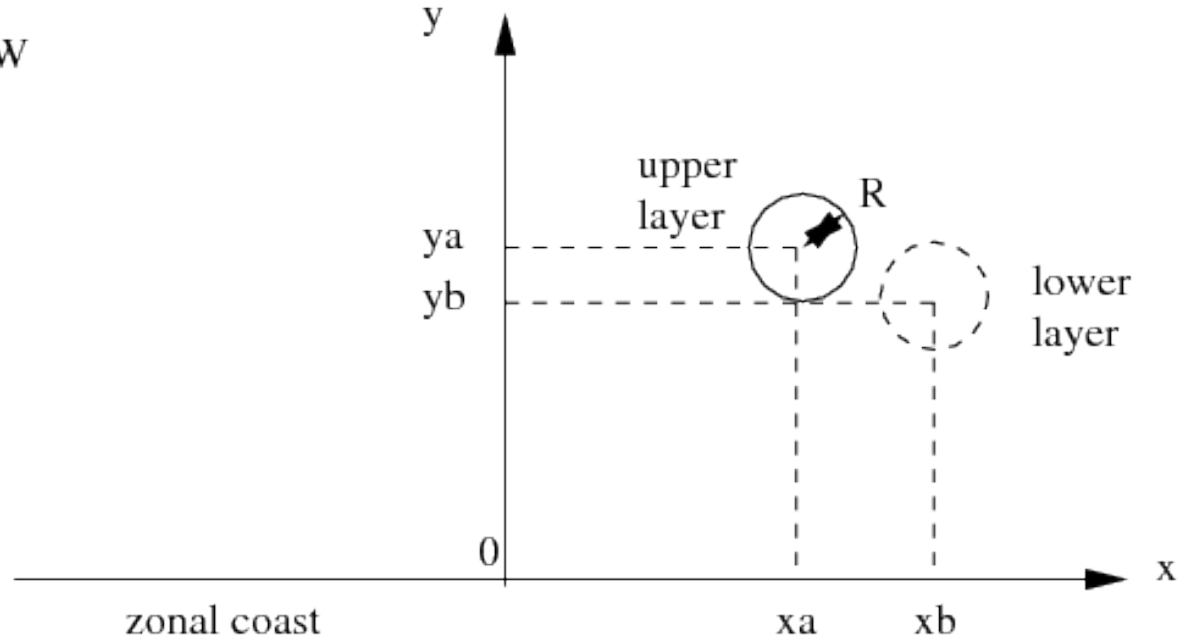
Float #4900557 2006/02/26 (c. 53) – 2006/04/17 (c. 58) (solid lines)

Anomalies referred to GHER-NEA climatology (dotted lines)

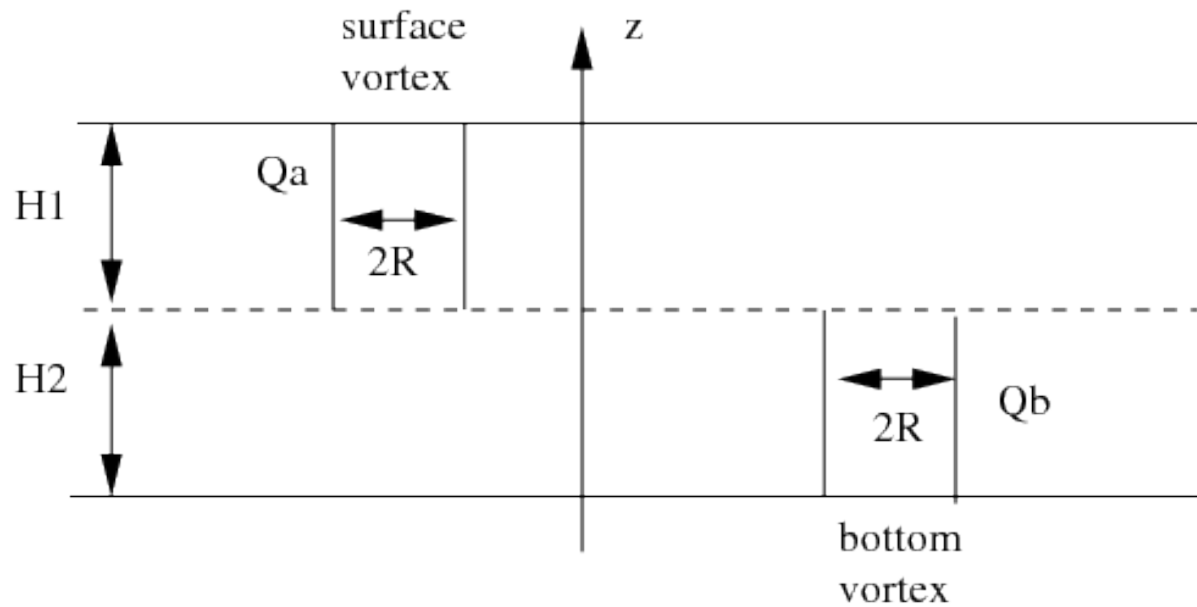
QG Model

- « Heton » type (points vortices Q) (Hogg and Stommel, 1985)
- 2 layers (Q_a surface , Q_b bottom)
- f plane, flat bottom
- Northern coast of Spain « Mirror »
- Shear and strain effects

TOP VIEW

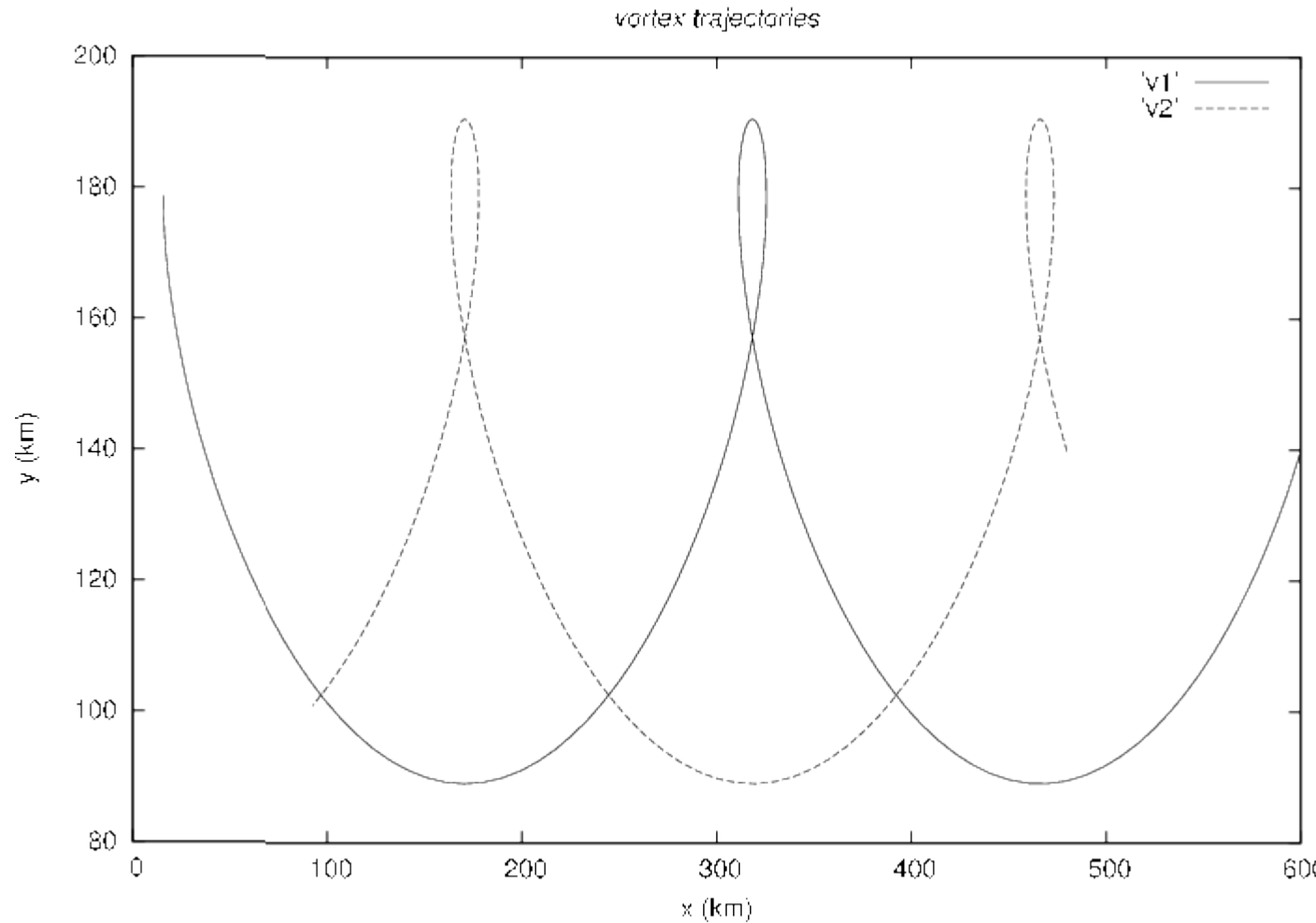


SIDE VIEW (Vertical section across the vortex centers)



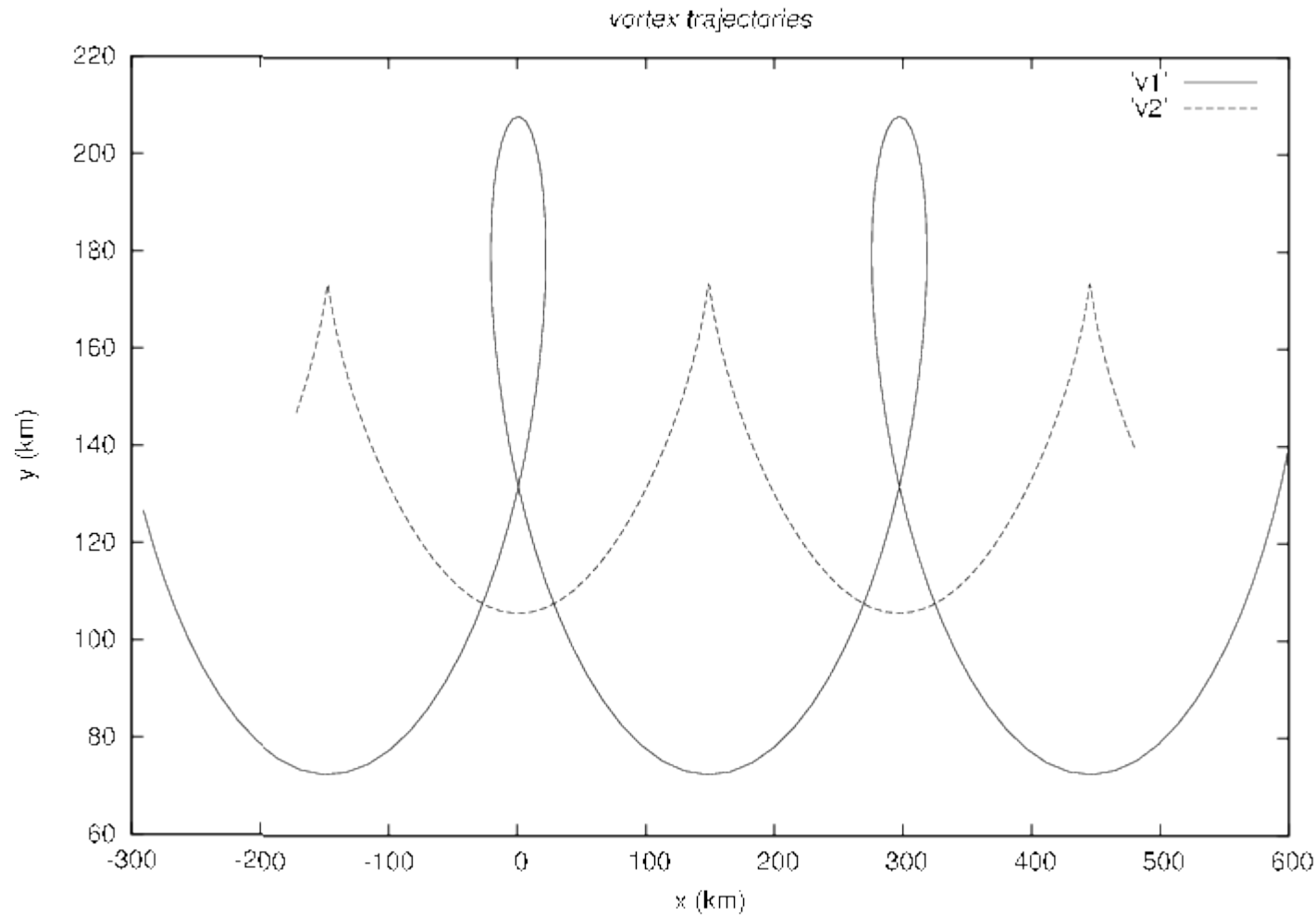
Point vortices
trajectories in the
surface layer (solid
line) and in the bottom
layer (dotted line)

$h1Qa/h2Qb=1$
 $d/Rd=4$
 $yc/Rd=4.7$

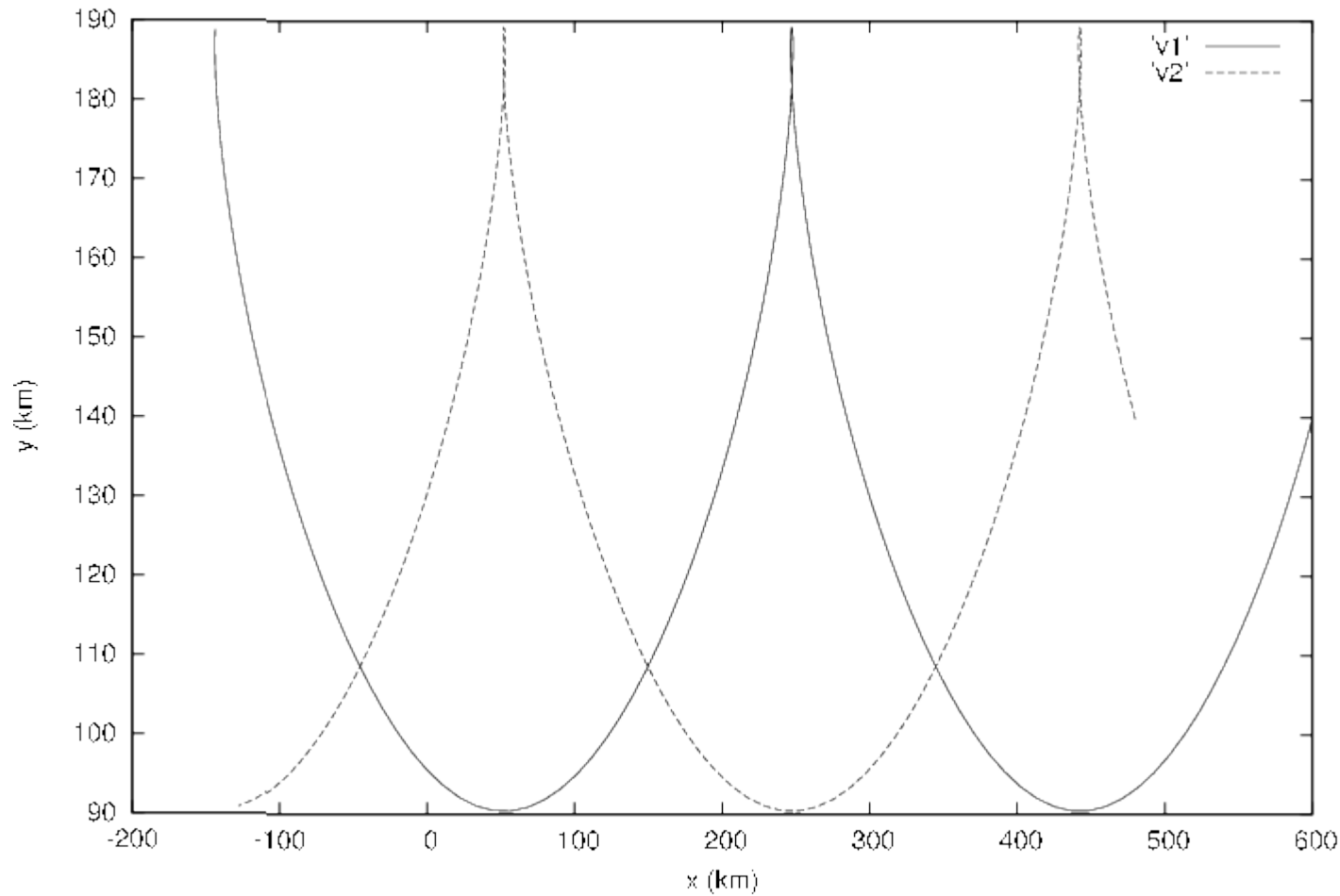


Point vortices trajectories

$h1Qa/h2Qb=0.5$
 $d/Rd=4$
 $yc/Rd=4.7$



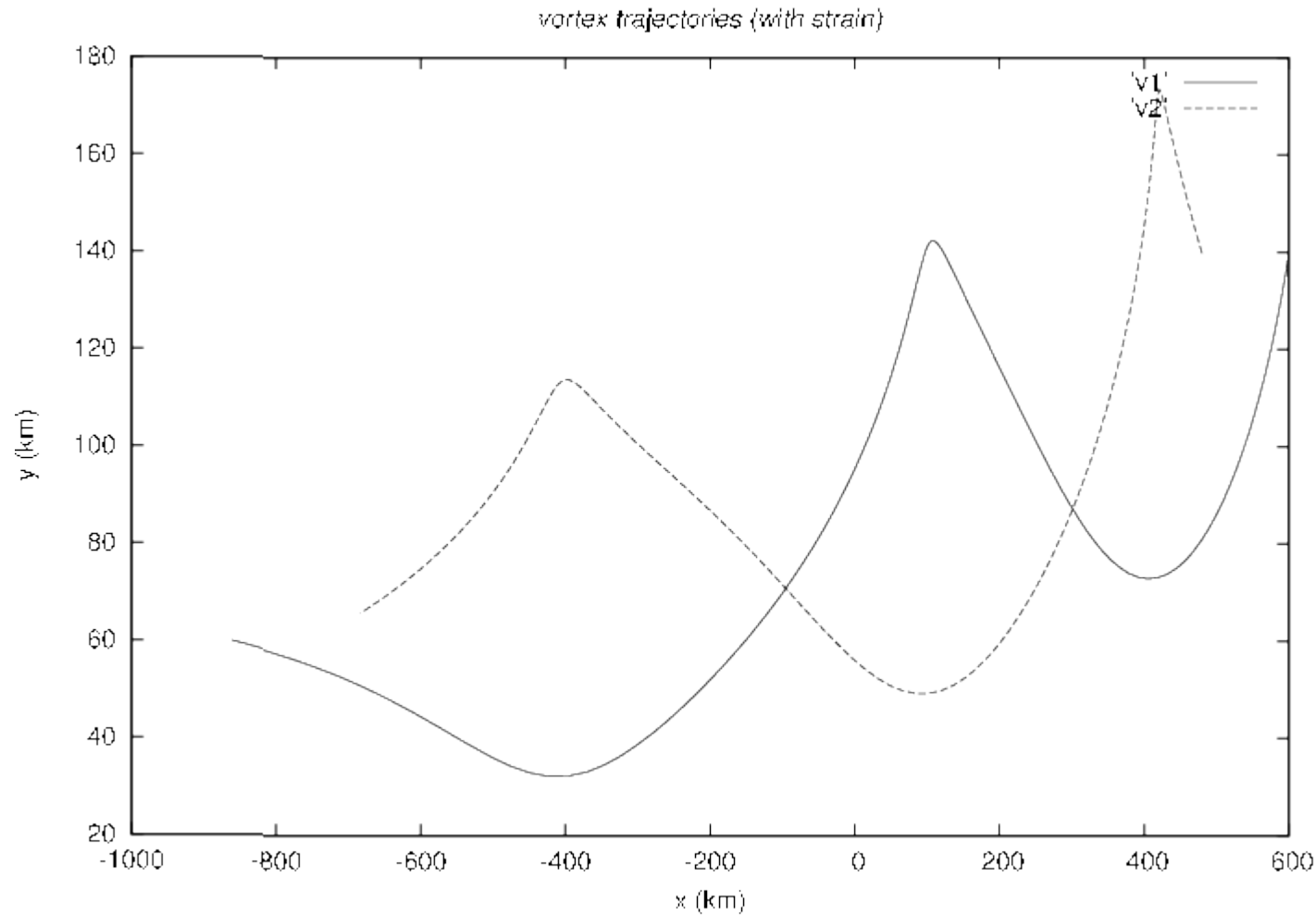
vortex trajectories (with shear)



Point vortices trajectories

$h1Qa/h2Qb=1$
 $d/Rd=4$
 $yc/Rd=4.7$

Strain= $0.5 \cdot 10^{-7} \text{ s}^{-1}$



Conclusions

- \exists Meddies in the Bay of Biscay
- From cruises and ARGO network
- Anomalies relatively weak
- Interactions with Swoddies
- « Simple » QG modelling
- Explanation of Swoddy trajectories?
- Statistics (frequency, extension ...)?
- Impact(s)?