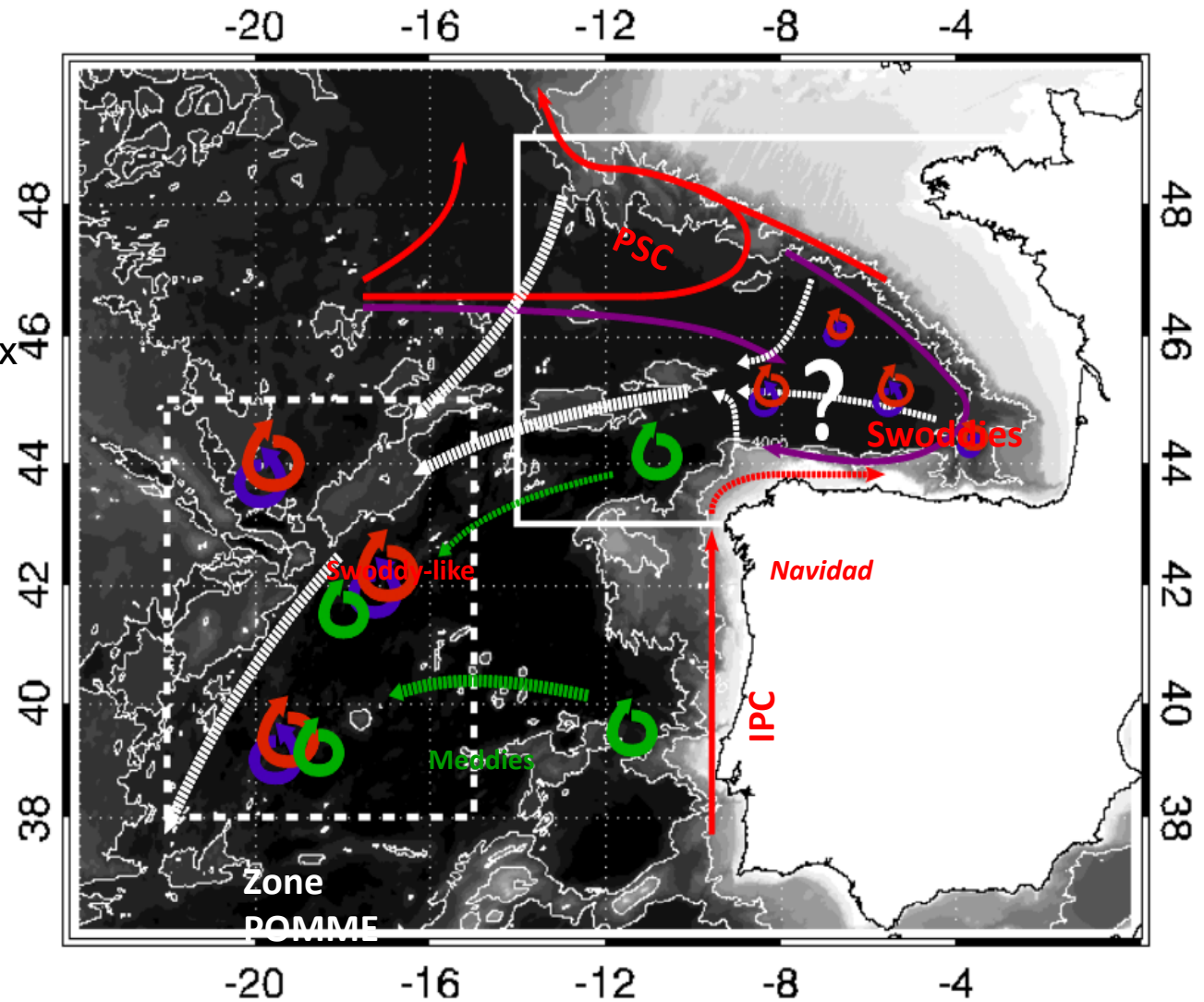


Dynamique tourbillonnaire du Golfe de Gascogne (GG)

Renaud DUSSURGET, Florence BIROL, Rosemary MORROW :

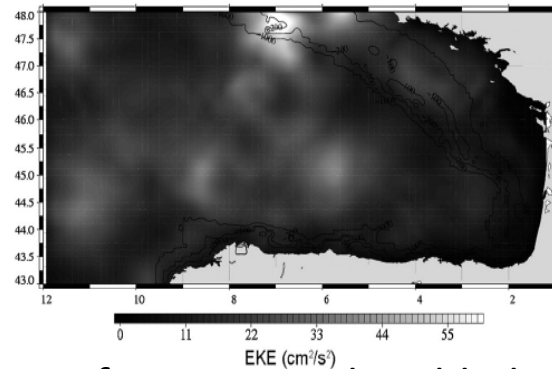
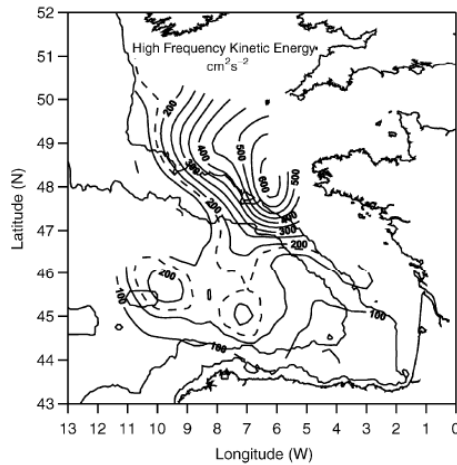
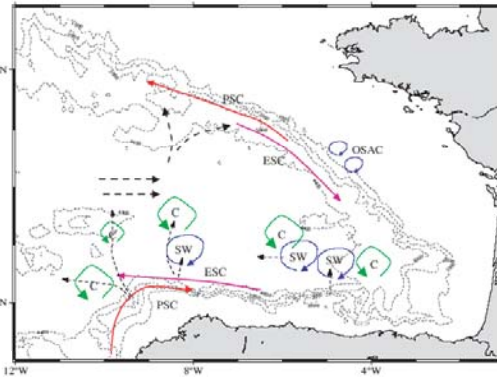
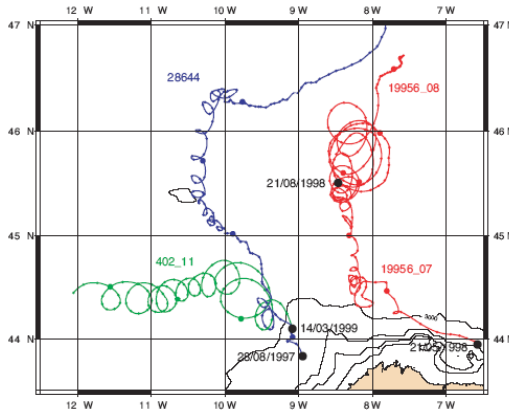
- Transport d'énergie et de traceurs vers l'ouest (large)
- Impact sur formation eaux modales (transport vertical, mélanges)
- Impact sur biogéochimie



From Colas, 2003; Van Aken, 2002; Serpette, 2006; Pingree & Le Cann, 1993; Le Cann, 2005.

Observabilité des tourbillons dans GG

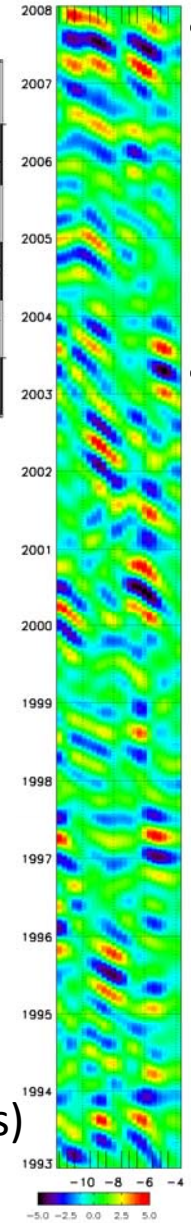
Subsurface drifters eddy motions
(Serpette et al., 2006)



EKE from regional gridded altimetry (Caballero et al., 2008)

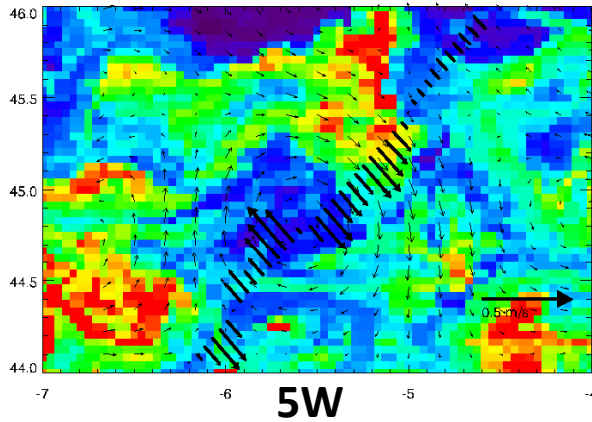
EKE from surface drifters
(Van Aken, 2002)

Aviso SLA (filt. 100-300 days)
Hovmöller along 45°N.

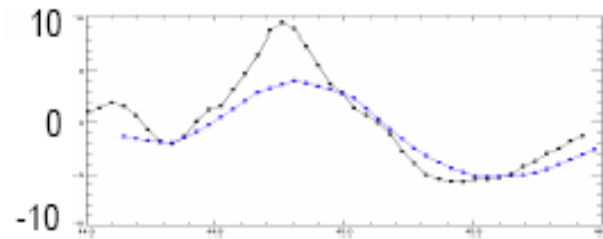


- Suivi tourbillons possible avec altimétrie standard? (propagation visible)
- Questions:
 - ▶ Processus de formation
 - ▶ Interaction avec bathymétrie, courant de pente, vent
 - ▶ Lien avec dynamique côtière (échange/intéactions)
 - ▶ variabilité ?

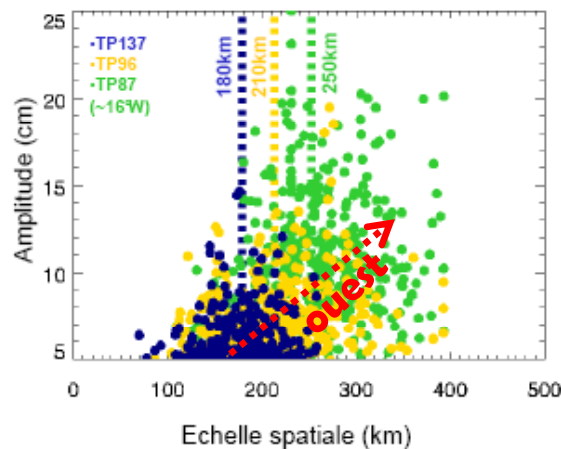
Observabilité des tourbillons (2)



45N
Chl-a MODIS 25/03/2003
+ Ugeo alti (coastal)
+ standard altimetry data

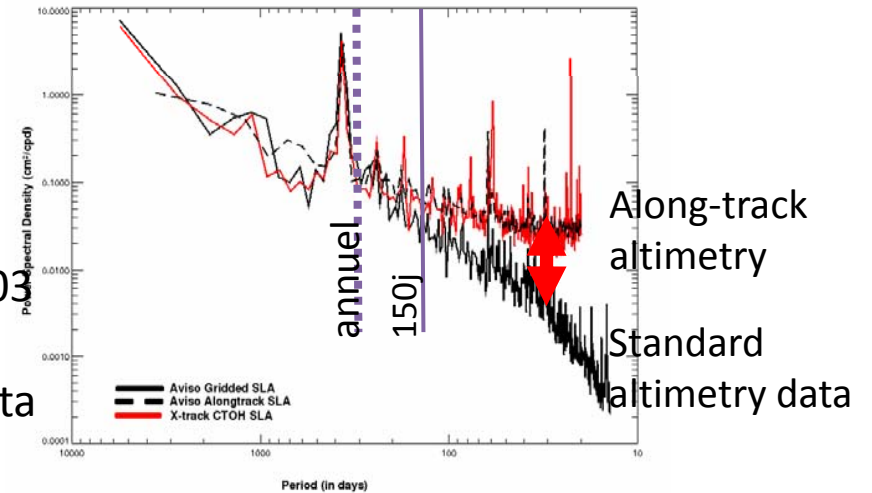


o 1Hz resolution (7km)
altimetry data (black)
o Standard gridded
product (blue)



Augmentation des
échelles et amplitudes
vers l'ouest
(bleu 5W – jaune 7W –
vert 16W)

Spectrum between Gridded and alongtrack Aviso SLA
and X-track CTOH SLA



- Données standard biaisées :
 - -2 (-5) cm amplitude
 - +50km échelle
 - -50 (-70)% vitesse geo.
 - Manque d'énergie en dessous de 150-200j.
- Méso-échelle générée dans le Golfe à de plus petites échelles, s'amplifiant vers l'ouest.
- Propagation vers l'ouest.
- Info. à fine échelle à partir d'alti. haute résolution.

Travaux en cours

- Observations :
 - Traitement des données d'altimétrie along track multimission (TP,J1,J2,EN,GFO)
 - ▶ 2001-2004 : forte activité tourbillonnaire
 - ▶ 2008 - ... : Jason-2
 - Récupération des échelles fines dans produits grillés (OI multi-échelle, multi-capteur, ...)
 - Analyses statistiques :
 - ▶ suivi Okubo-Weiss
 - ▶ FLSE (fronts, submésos., ...)
- Modèle (HyCOM – collaboration SHOM Toulouse)
 - Modèle « eddy-resolving » dans le Golfe de Gascogne ($1/32^\circ$)
 - validation du modèle (princ. représentation de l'activité tourbillonnaire)
 - Etude des processus de formation de ces tourbillons (pente, bathy, cisaillement,...)
 - Observabilité de processus

Signature des évènements Navidad
dans les données altimétriques
durant les hivers 2002-2003 et 2003-2004

G. Herbert, N. Ayoub, F. Lyard, P. Marsaleix
Pôle Océan et Couplages (POC), LEGOS, Toulouse

Merci au CTOH/LEGOS (F. Birol et M. Cancet)
et à Puertos del Estado pour les données de bouées

OBJECTIVE

**Identify the signature of the Iberian Poleward Current
along the Cantabrian coast in altimetric data
for the winters 2002/2003 and 2003/2004**

- ✦ **Can we detect its signature using along-track data ?
Is it coherent with the information provided by other datasets ?
What are the main characteristics of this signature ?**
- ✦ **What is the complementary information provided by altimetry ?**

 **Time scales of interest: daily to monthly**

Approach and data

- ❖ **Characterizing the thermal signature of the IPC extension in SST data**

 - ➡ AVHRR, MODIS, SAFOSI images + CMS interpolated fields

- ❖ **Analysis of altimetric along-track signal**

 - Comparison with buoys surface data (daily SST and velocity)

 - ➡ 4 buoys: Cabo de Penas, Estaca de Bares, Villano Sisargas, Cabo Silleiro

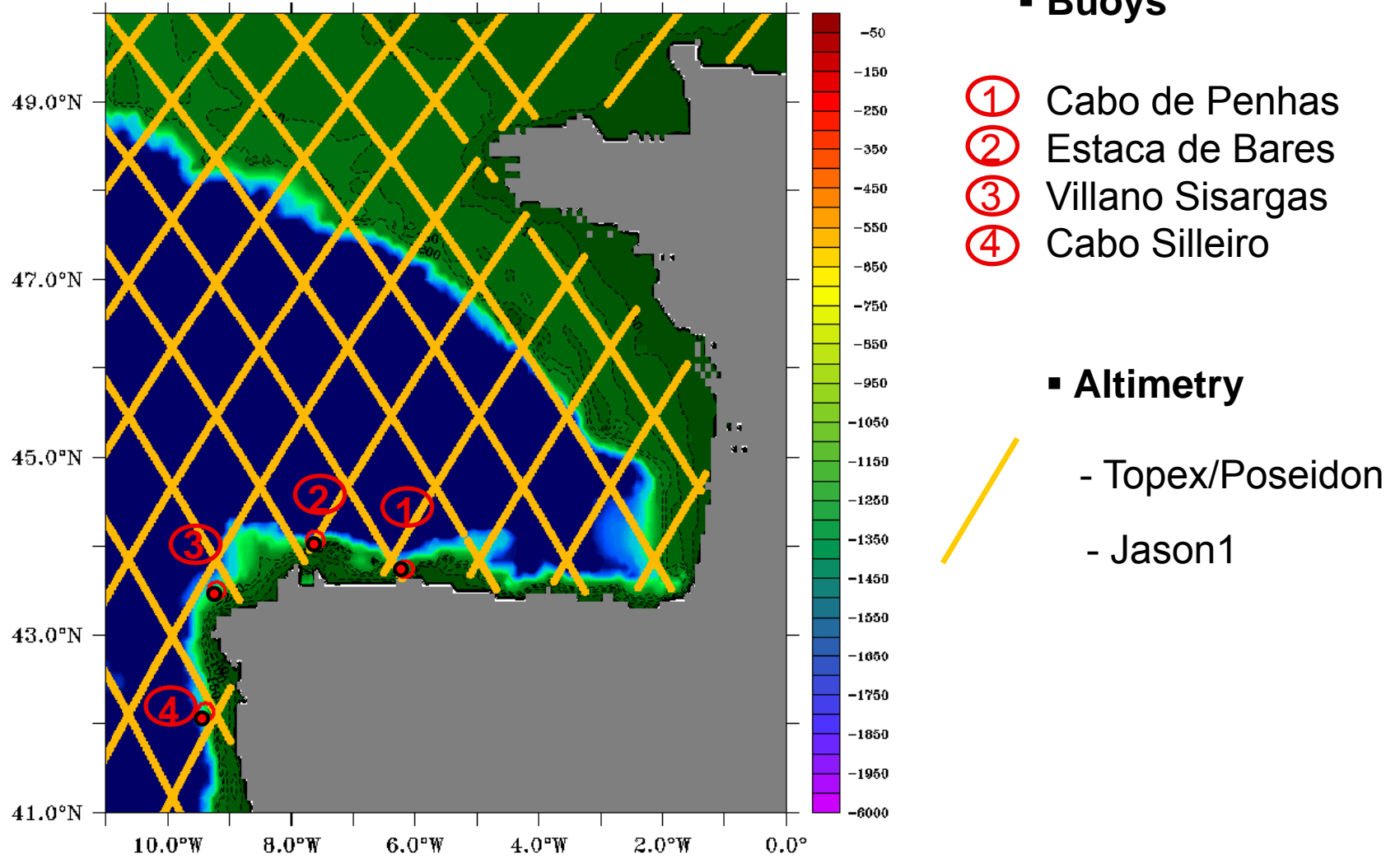
 - ➡ SLA computed with the XTrack processing tool (CTOH, LEGOS)

- ❖ **Model data comparison: SST, surface current**

 - Use of subsurface information in the model to better understand the SLA signal

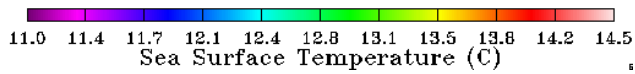
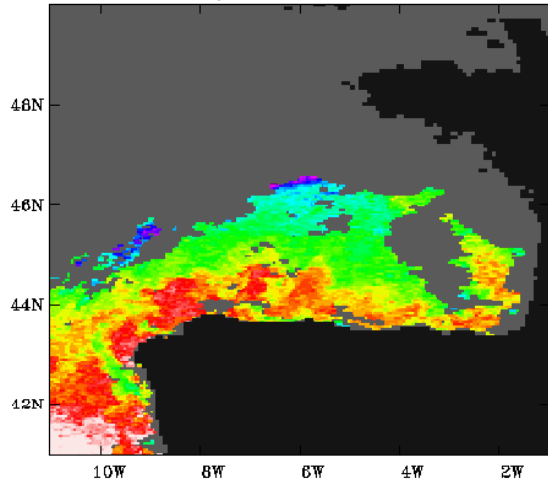
 - ➡ SYMPHONIE model, 3km x 3km, 43 vertical levels

Altimetric tracks and buoys location: area cover

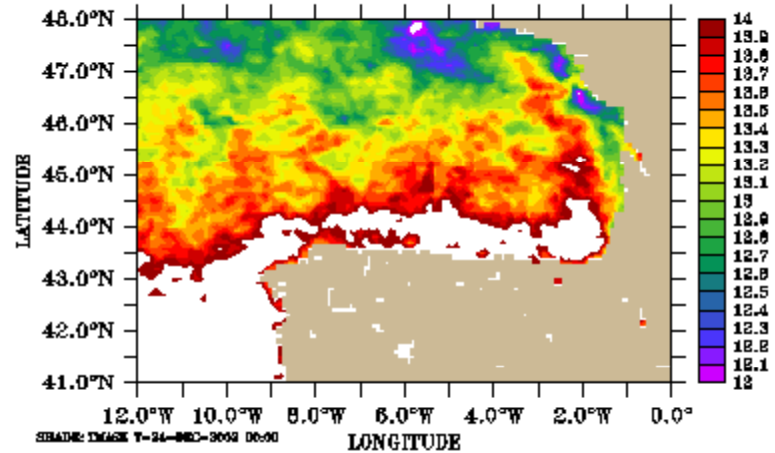


SST signature of warm (Navidad ?) events

AVHRR Jan 14th 2003



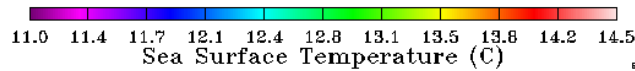
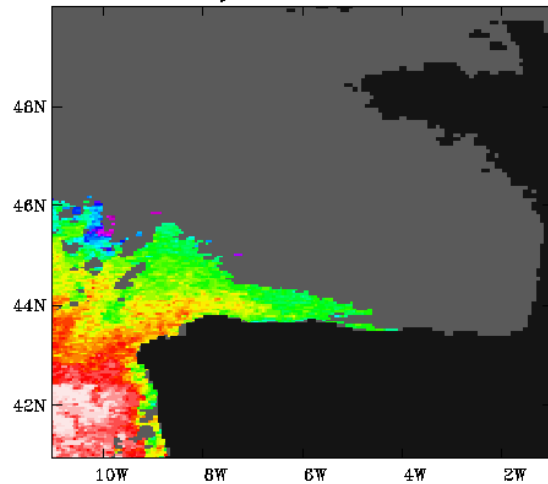
Dec 27 2002



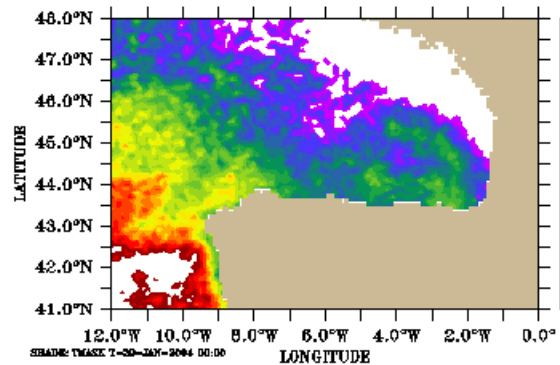
analyzed sea surface temperatures (degreeC)

CMS analyzed fields

AVHRR Jan 20th 2004

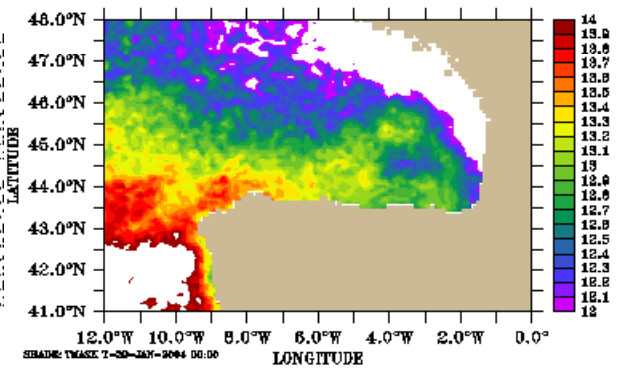


Jan 31 2004



analyzed sea surface temperatures (degreeC)

Feb 1 2004

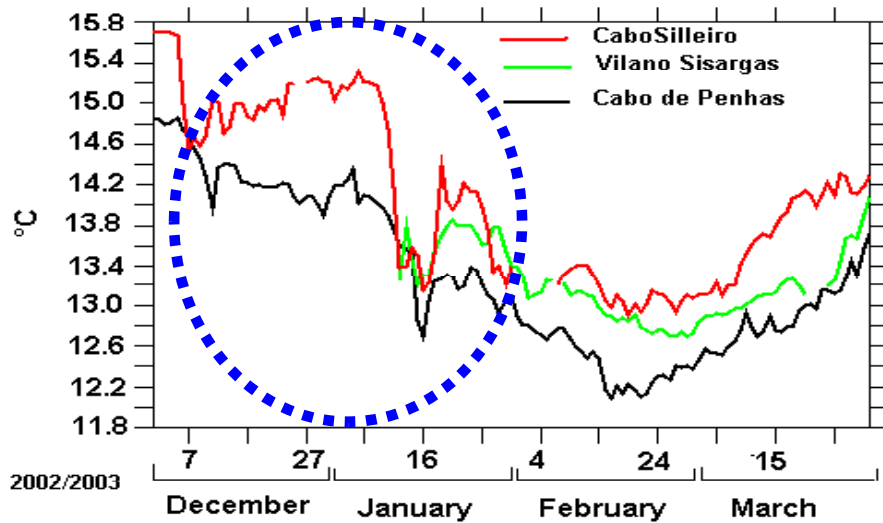


analyzed sea surface temperatures (degreeC)

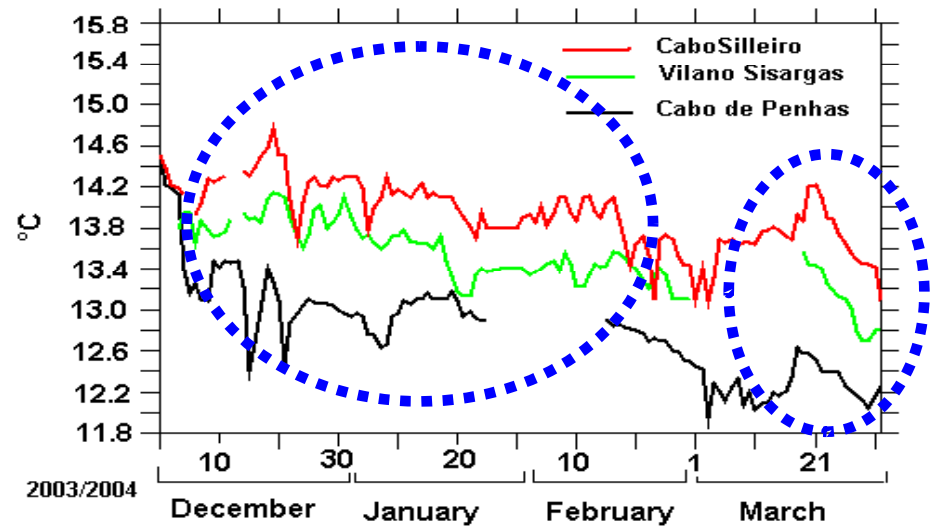
BUOYS: Sea Surface Temperature signature



2002/2003



2003/2004



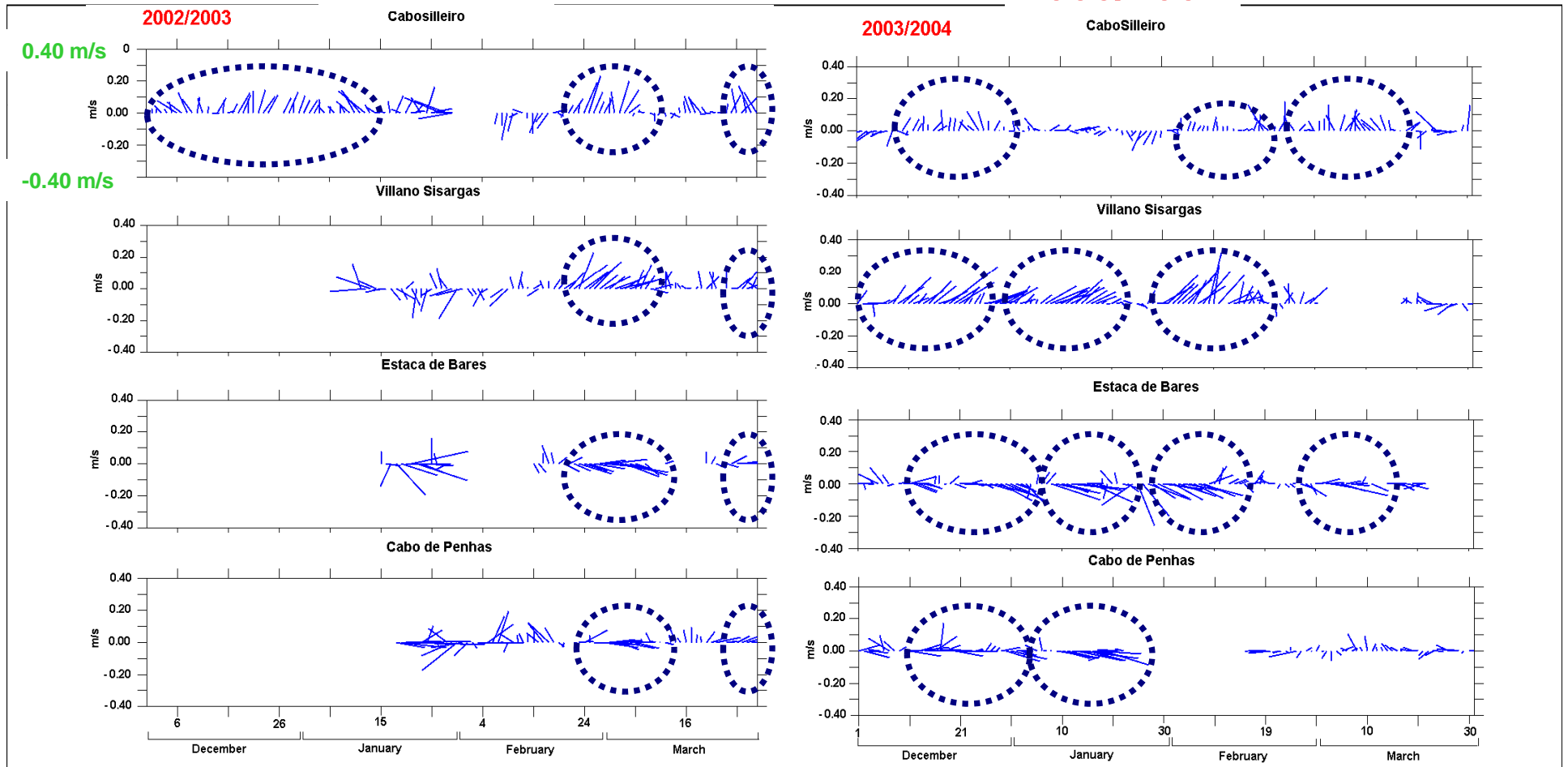
→ SST signal clear in 2002/2003, more ambiguous in 2003/2004

BUOYS : Surface current



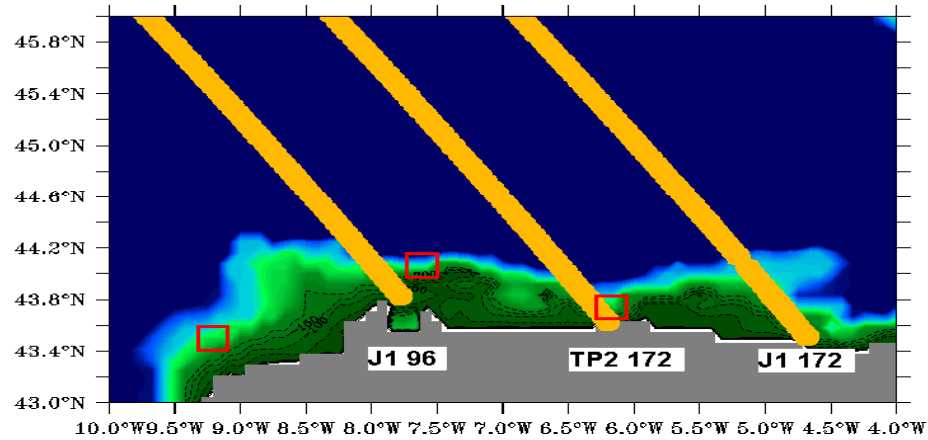
2002/2003

2003/2004

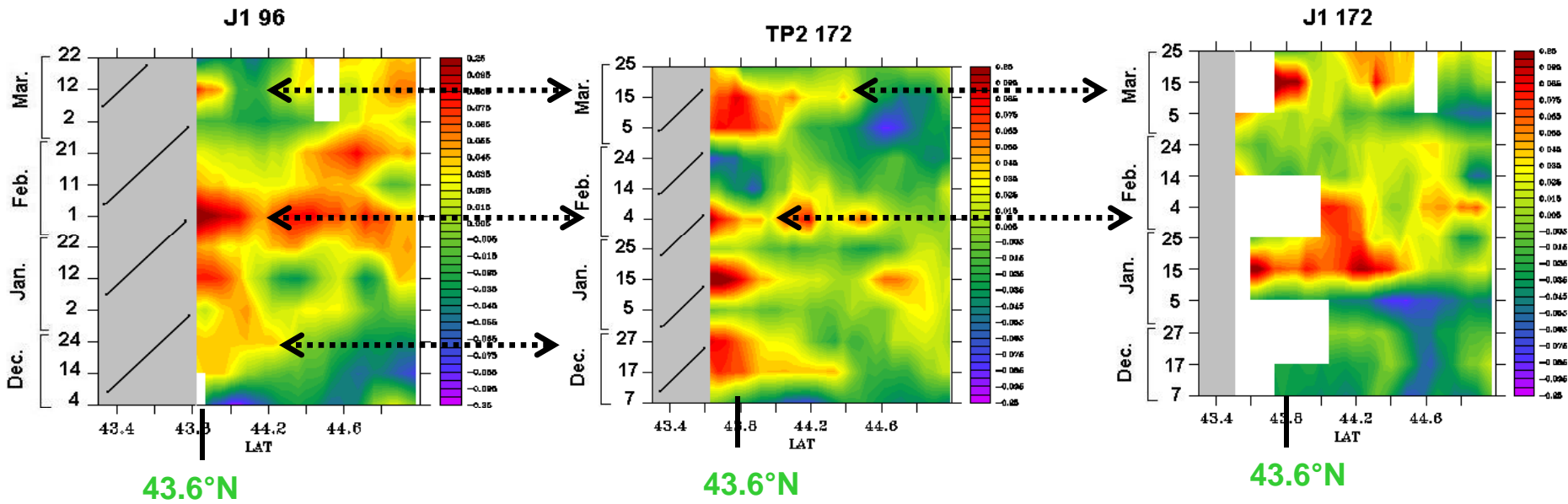


ALTIMETRY: SLA at the coast

Variations of along track SLA as a function of latitude and time

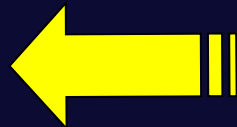
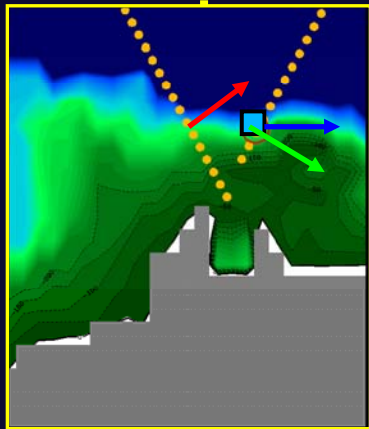
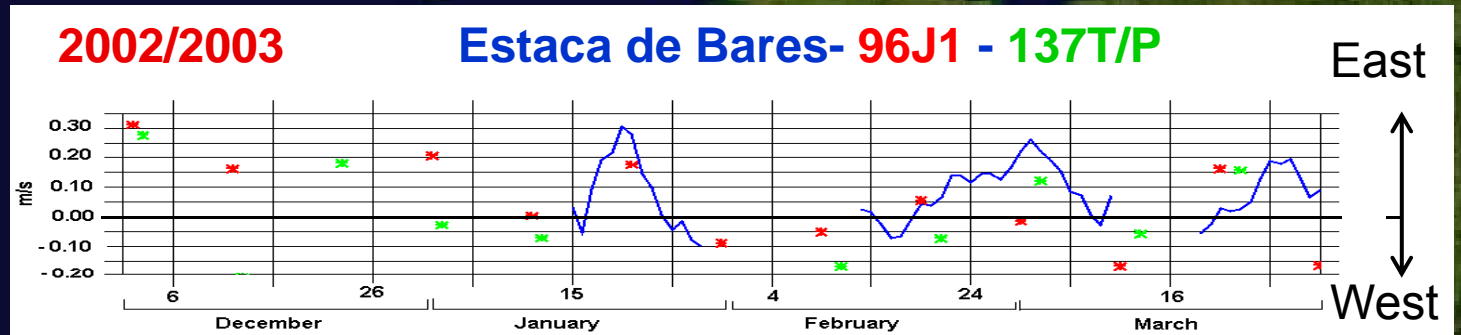


Dec. 2003/ March 2004



BUOYS-ALTIMETRY : Comparison of surface current

Underestimation
of the current by
altimetry



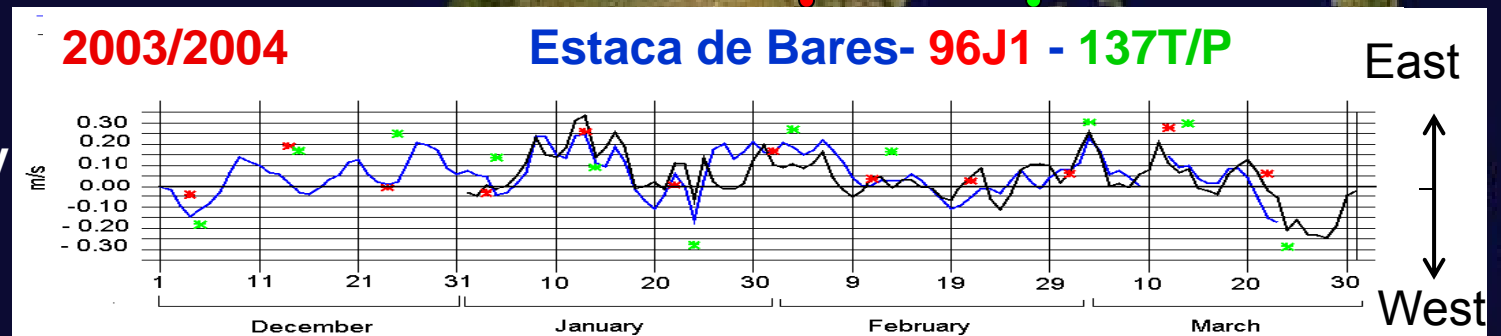
96-J1

137-T/P

Estaca de Bares

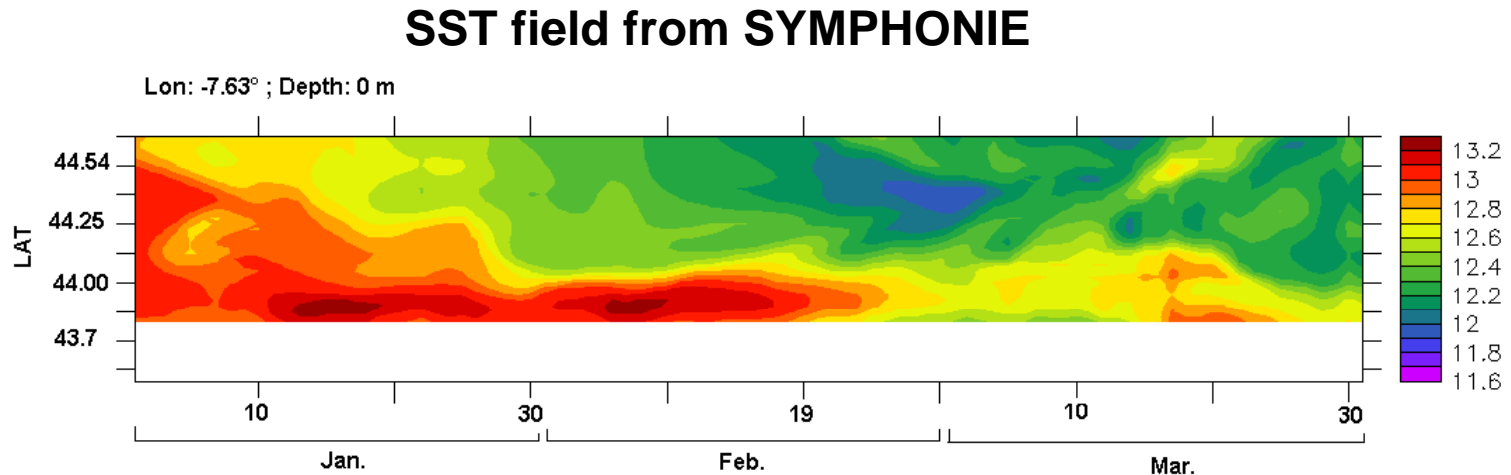
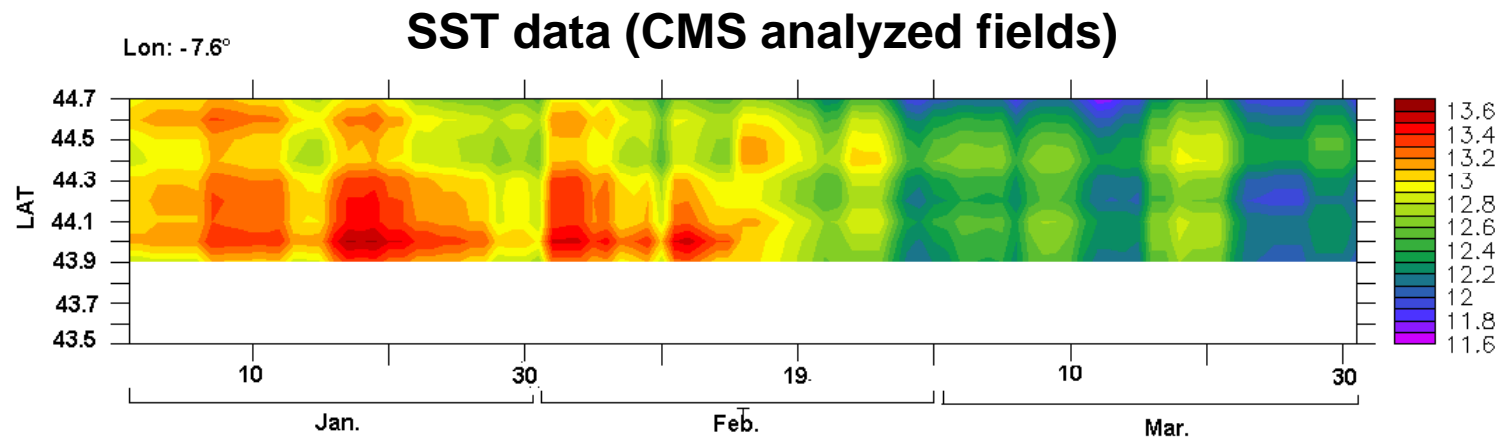


Good consistency
between buoy
and altimetry



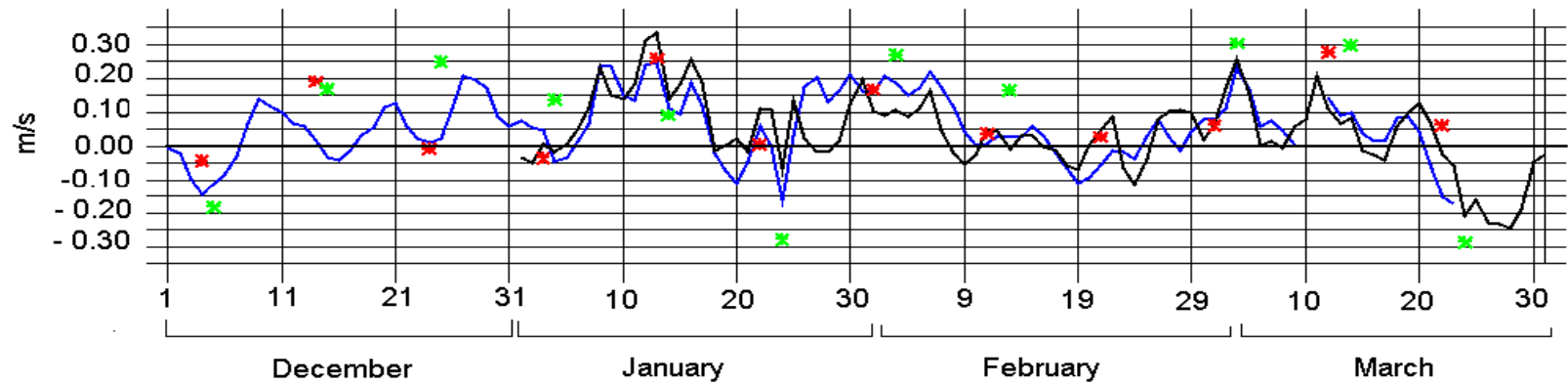
SYMPHONIE : Comparison with SST data (CMS)

SST variations as a function of time (Jan-Mar 2004) and latitude at $\sim -7.6^\circ\text{W}$ (close to Cabo de Penas)



SYMPHONIE : Comparison with buoy data

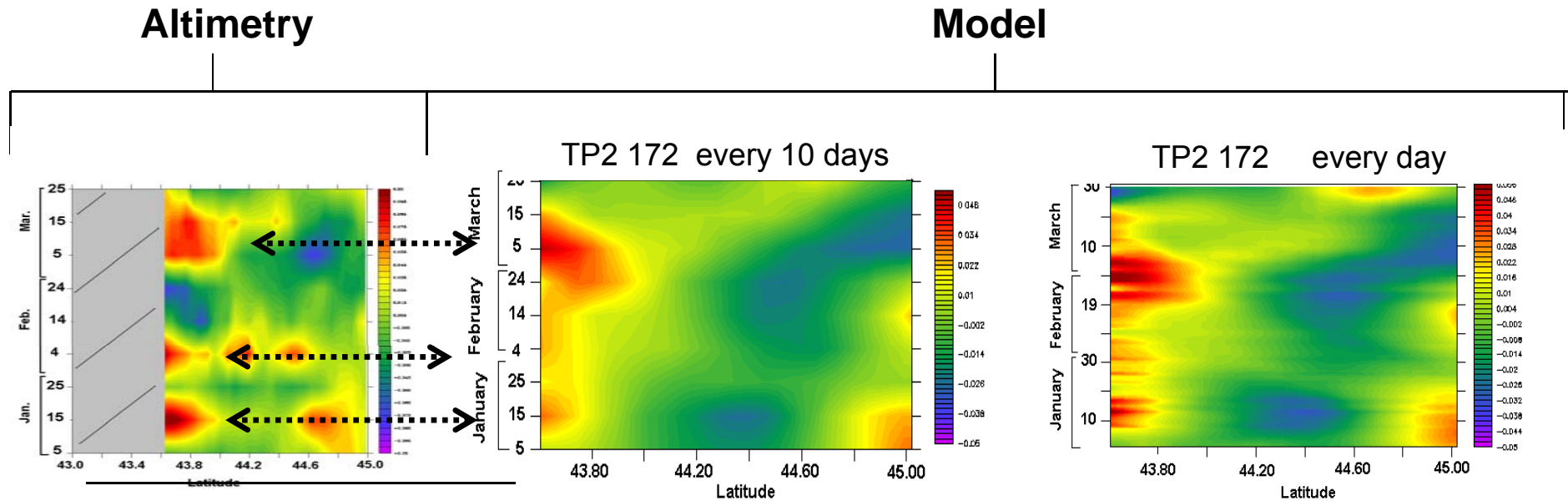
Zonal surface current anomalies for 2004
at Estaca de Bares (~8°W)



- Buoy data
- Symphonie at the closest point

- Consistency between model and buoy signal
- Large high frequency time variability

MODEL-ALTIMETRY : Comparison/evaluation of signals



Comparison:

→ good agreement with altimetry except March, earlier in the model.

Evaluation:

- Due to its 10-day sampling the altimetric signal may underestimate the maximum of an event.
- The relative characteristic of the events are well represented in the altimetric signal.

Preliminary conclusion

❑ Analysis of satellite SST and surface in situ data :

- Weak Navidad events in winter 2003/2004
- Signal with high frequency variability: pulses over a few days instead of a persistent current throughout several weeks.
- Significant spatial variability along the coast.

❑ Signature in the altimetric data:

- Depiction of eastward accelerations along the coast
- Good agreement with buoys data at the dates of occurrences. In 2003, lesser agreement than in 2004: due to the direction of the current with respect to the inclination of the tracks ?
- Coherent signal for consecutive parallel tracks.

❑ Complementary information provided by altimetry:

- when no satellite SST data available or weak SST signature
- on the meridional extent of the current

Présentation du travail de post-doc de Claire Maraldi (MERCATOR/LEGOS)

- postdoc de 14 mois (avril 2009 - novembre 2010)
- financement CNRS (MyOcean)
- lieu : Mercator-Océan (avril 2009 - décembre 2009), LEGOS (janvier 2010 - novembre 2010)
- travail en collaboration avec Pierre de Mey, Nadia Ayoub, Gaëlle Herbert, Florent Lyard et Jérôme Chanut, Guillaume Reffray, Bruno Levier



Grandes lignes du postdoc

Validation du système IBI sans assimilation :

- domaine : région Nord Est Atlantique
- résolution: grille ORCA 1/36°, 50 niveaux verticaux
- période de validation : 2008-2009

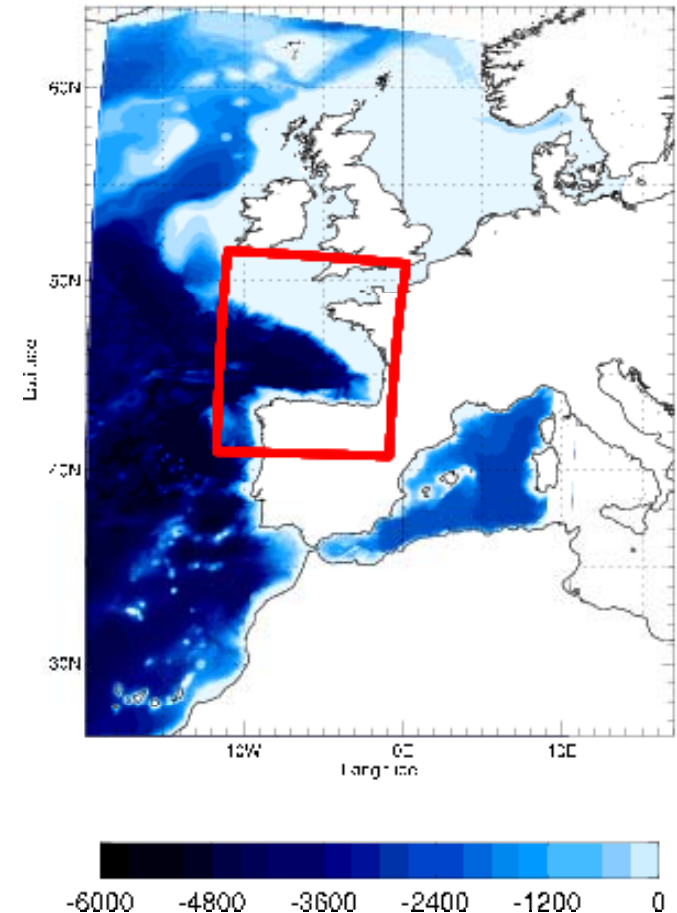
Stratégie :

- définition de nouvelles 'metrics' (HF, physique propre à la région d'étude)
- collecte des données
- rédaction d'un plan de validation pour IBI

Mise en place d'u maquette dans le Golf de Gascogne avec NEMO :

- validation scientifique sur un ou plusieurs processus physiques dans cette région

Bathymetrie (m)



Où en est-on ?

Validation :

- marée (validation « offline » sur les composantes) : données collectées, protocoles mis en place
- nouvelles 'metrics' définies
- plan de validation : plan établi, certains protocoles restent à définir

Maquette Golf de Gascogne :

- maquette mise en place, run lancé
- début de confrontation avec les données

