The Antarctic Circumpolar Current in Argonautica

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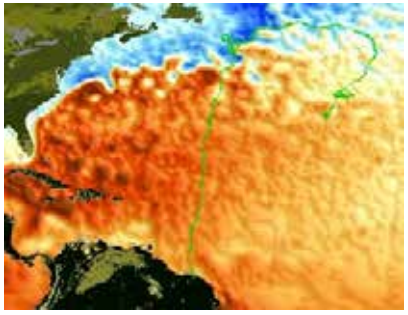
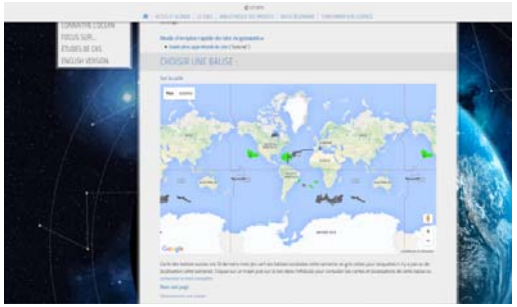
Argonautica

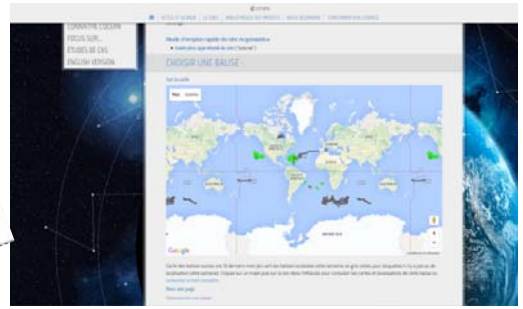
- Argonautica is an **educational project** to give teachers and students **resources** to:
  - learn about, understand, and protect the World oceans
  - Show how satellites are helping to broaden our knowledge of the oceans and protect the marine environment
- It offers the chance to:
  - track ocean currents through buoys, marine animals…
  - build experimental buoys…
  - and organize meetings and exchanges between students, scientists, engineers and skippers.





Argonautica

- “real” data provided to students from 5-6 to 21 years old, as geographical locations or maps
- background information on ocean phenomena, animals, data & satellites
- Fact sheets for teachers, to help them introduce the thematic, provide with activities
- scientists coming to classes, and the annual conference provide information



Maps & locations provided every Thursday (CET)

- **Argos locations**

ÉLÉPHANT DE MER PACOA

Éléphant de mer (*Mirounga leonina*)
Balise n°136211
Début de suivi : 29/12/2015
Dernière semaine de localisation : 99/99/9999
Lien permanent vers les données de cette balise
Plus d'informations :

- CEBC-CNRS : éléphant de mer
- dossier pédagogique : suivre des éléphants de mer

Sélectionner une date : 26/01/2016

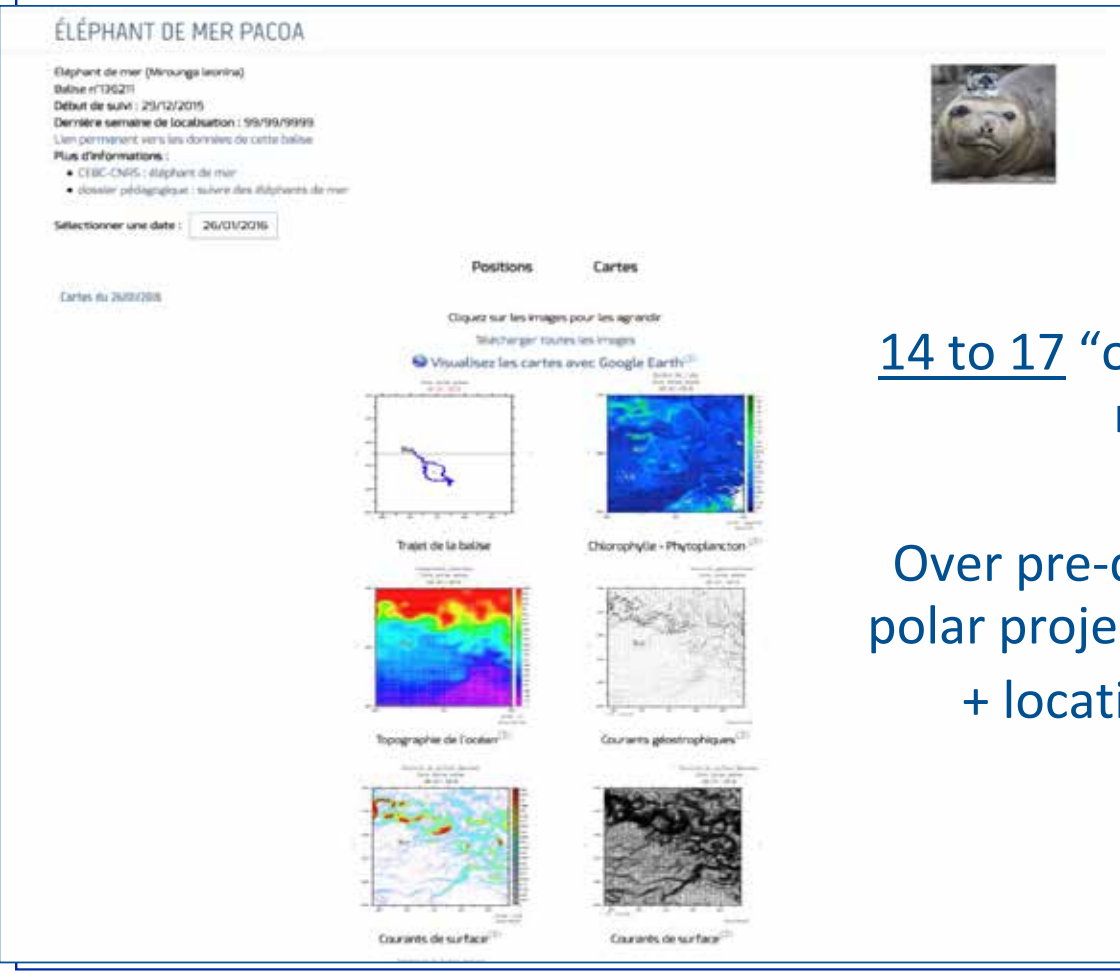
Positions | Cartes

Positions du 26/01/2016

Télécharger le fichier des positions ci-dessous
Télécharger le fichier de toutes les positions

num -	cl. -	date *yyyy/mm/dd*	h. *hh:mm*	lat. *deg.*	lon. *deg.*
0136211	B	2016/01/20	02:32	-49.516	70.226
0136211	A	2016/01/20	03:22	-49.555	70.309
0136211	A	2016/01/20	04:08	-49.533	70.239
0136211	B	2016/01/20	05:54	-49.516	70.207
0136211	B	2016/01/20	06:42	-49.515	70.258
0136211	0	2016/01/20	08:19	-49.439	70.420
0136211	2	2016/01/20	11:20	-49.442	70.388
0136211	0	2016/01/20	12:01	-49.441	70.411
0136211	1	2016/01/20	15:22	-49.440	70.401
0136211	3	2016/01/20	16:27	-49.447	70.409
0136211	3	2016/01/20	17:17	-49.447	70.397
0136211	3	2016/01/20	18:11	-49.445	70.405
0136211	1	2016/01/20	18:55	-49.451	70.405
0136211	A	2016/01/20	21:29	-49.447	70.409
0136211	3	2016/01/21	00:51	-49.446	70.403
0136211	B	2016/01/21	05:38	-49.436	70.386
0136211	2	2016/01/21	10:49	-49.445	70.404

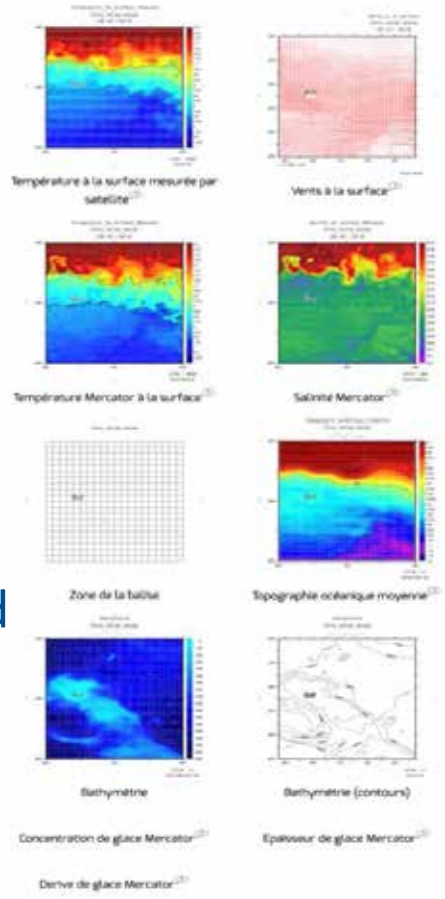
Maps & locations provided every Thursday (CET)



14 to 17 “oceanography” map

Over pre-defined areas; polar projection if needed

+ location plotted



Vendée Globe

- Every four years Argonautica teams up with skippers of the **Vendée Globe** around the world alone sail race.

→ Good media coverage, adventure appeal, human scale…

- **Five skippers** took part in the operation last year (2016-2017)

They released one or two drifting buoys each during the race, six total in the ACC (a seventh at the Equator)
Buoys were released in different areas

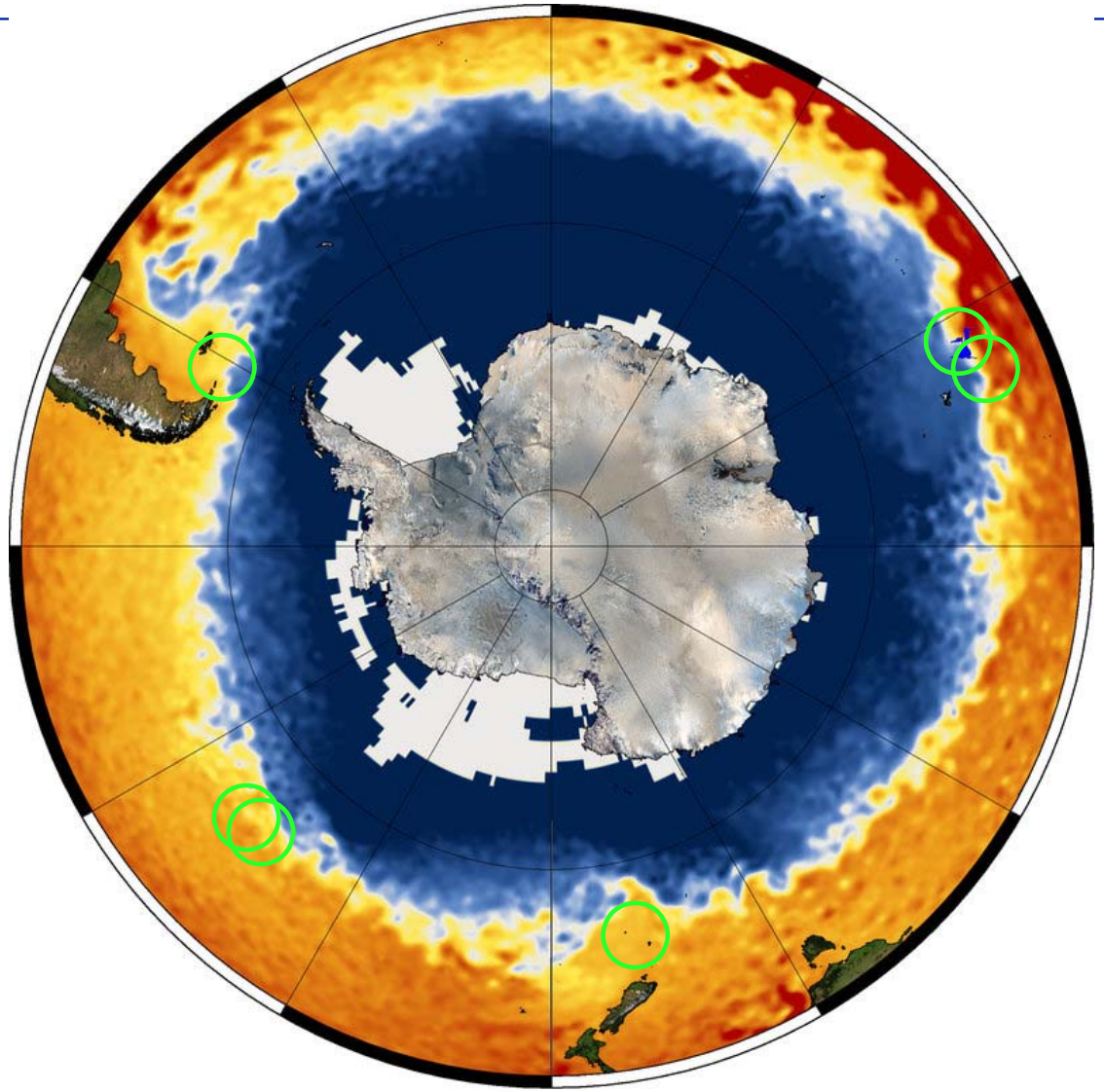

Alan Roura


Conrad Colman

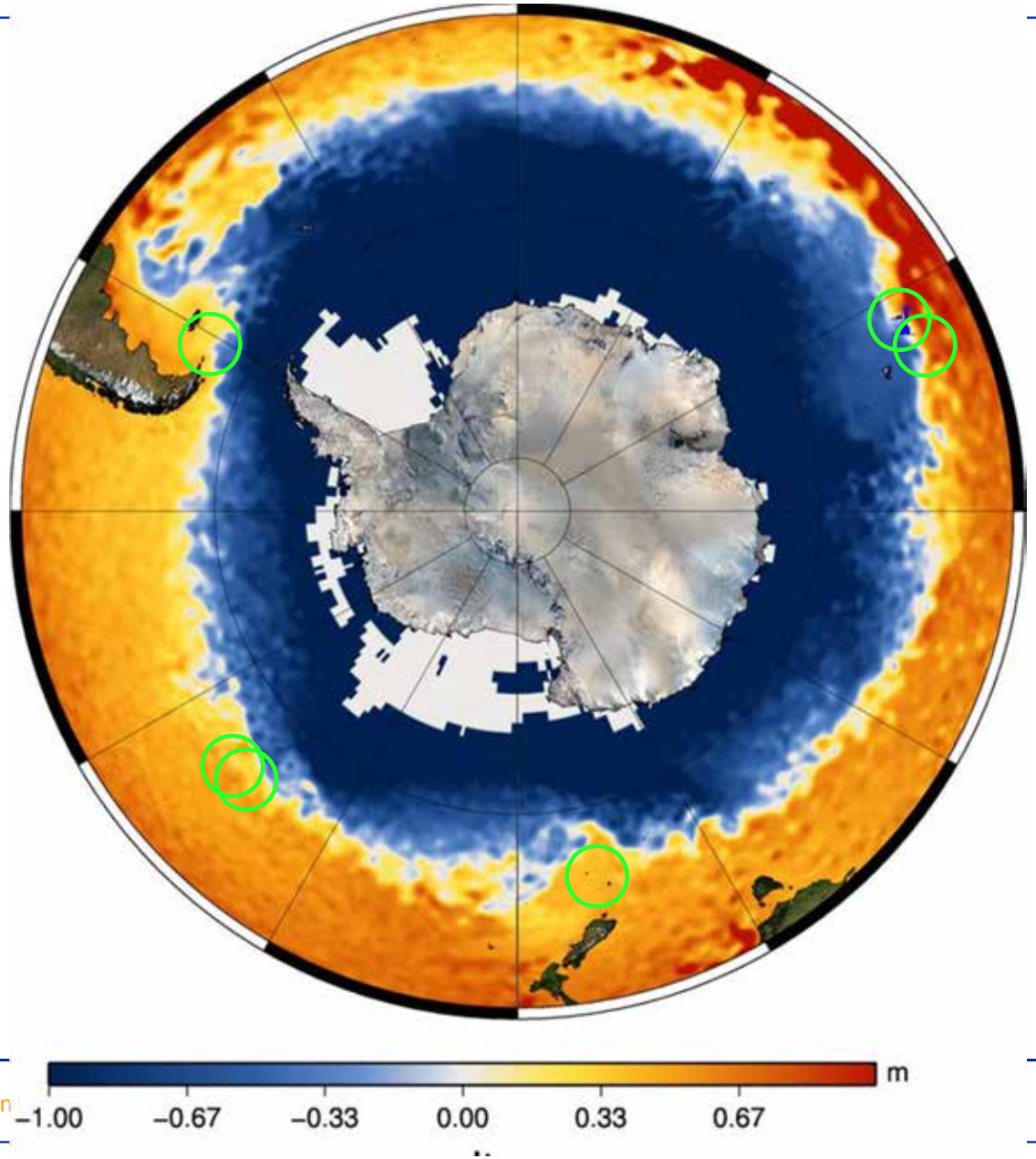

Didac Costa


Arnaud Boissières


Kito de Pavant



The Antarctic Circumpolar Current as seen in



The Antarctic Circumpolar Current as seen in

Launched buoys

- Two different kinds of buoys launched by skippers

  3-4 life expectancy (3-4 years for profesional ones)
- One is the “Echo” prototype, shown at last OSTST by Danielle for the students, with the aim of having a renewable energy buoy
- Both are lighter (which is important for sail race skippers), and easier to launch than oceanographic (professional) buoys

- Otherwise, professional buoys (DBCP) are “adopted” (Argo floats, too)

Census

Every year, Argonautica has followed something in the Antarctic Circumpolar Current since 2000

- available on line since 2004:
  - Vendée Globe buoys (2004, 2008, 2012, 2016)
    or buoys launched outside this event for Argonautica
  - Oceanographic professional buoys (DBCP in particular)

  - Experimental buoys (Lila, Jéliote, Curieuse, Magellan : 4), built by the students
  - Penguins (royal & emperor, macaroni) (79), elephant seals (85 beacons), albatrosses (21), Weddell seals (7) (➔ 192 !...)

- In 2016-2017, 6 buoys launched by Vendée Globe around the world alone sail race in this current (on a total of 7 buoys launched) (in addition to penguins and elephant seals)

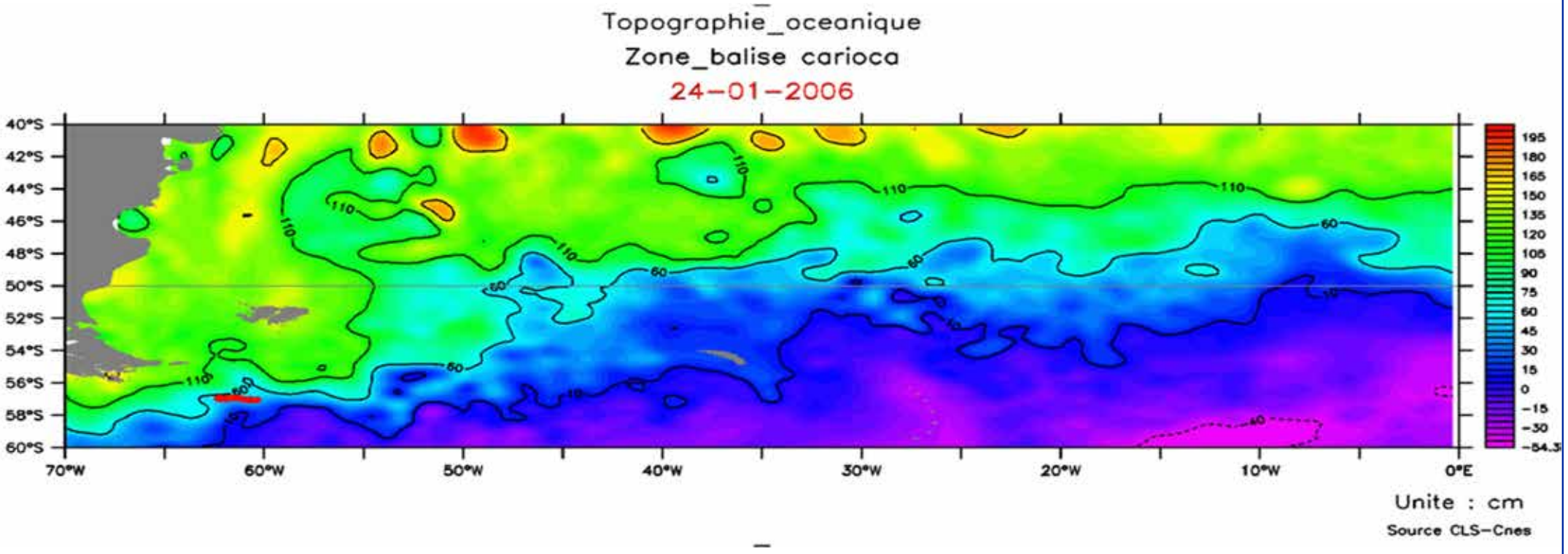
- 3 new ones these days, soon to be tracked on Argonautica (Zapiola, Drake passage)

Antarctic Circumpolar Current for Education

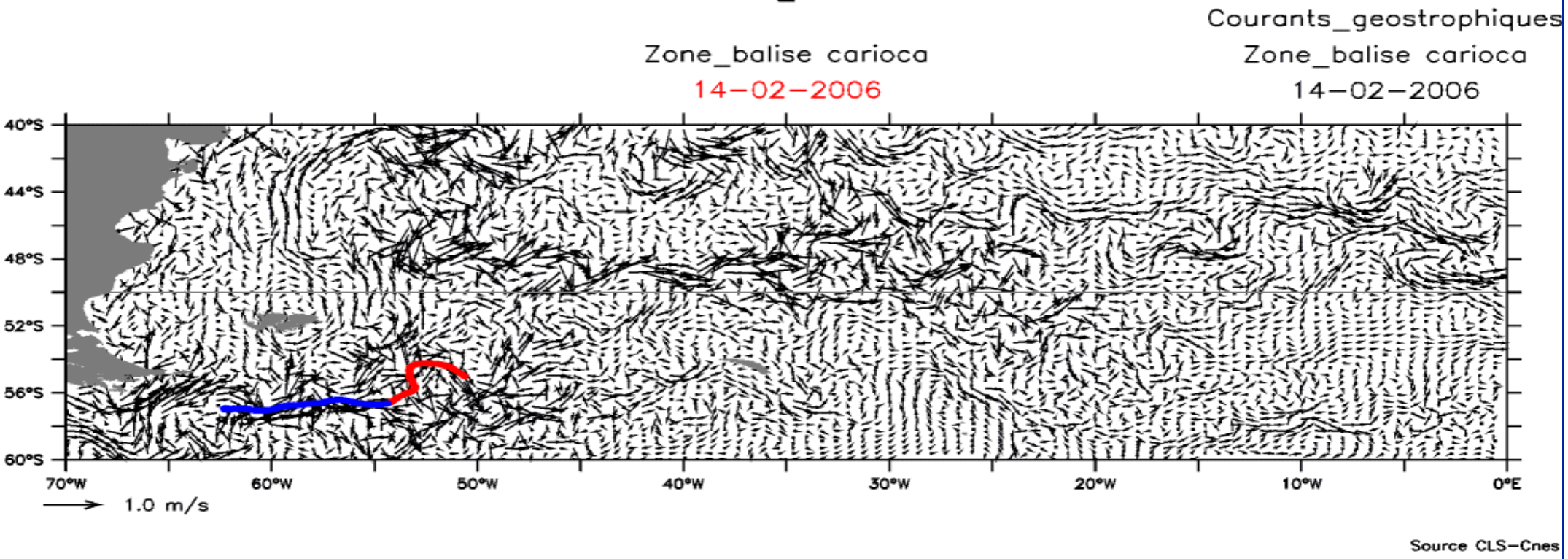
Rather far from France / Europe!... But

- Climate issues, with very sensitive environment
- Wildlife, (cute), strange and endangered
- Adventure appeal (“roaring forties”, sail race ice beauty….)

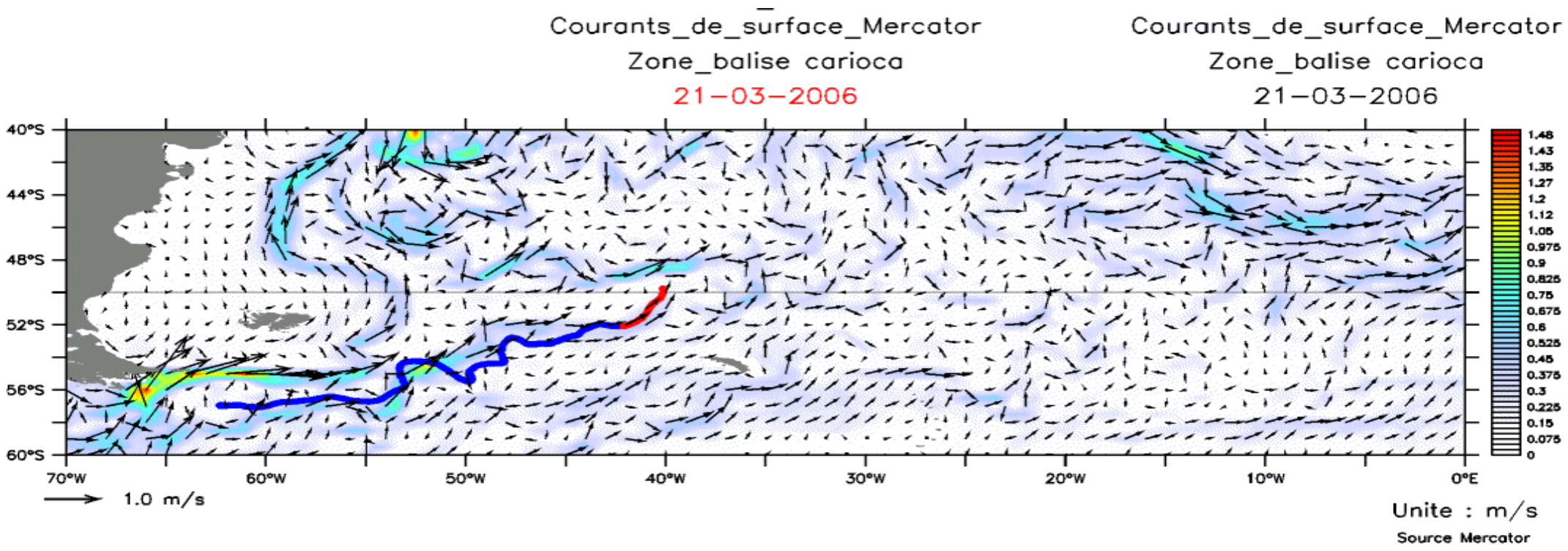
Carioca (DBCP buoy)



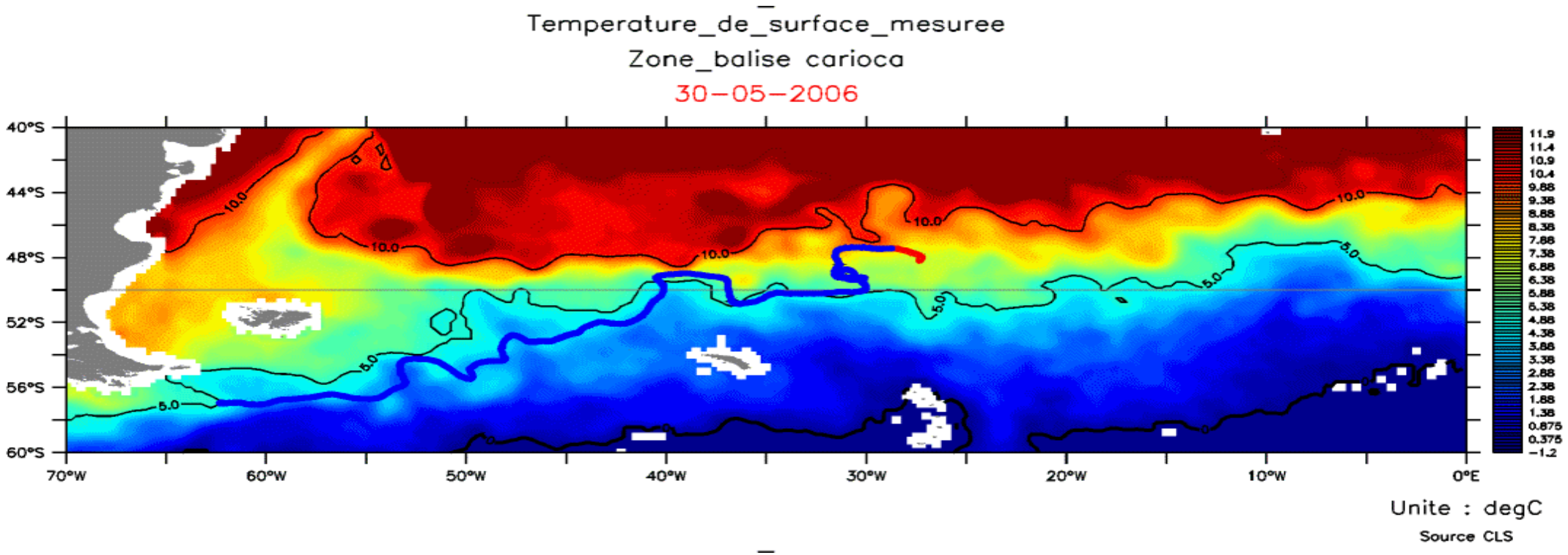
Carioca (DBCP buoy)



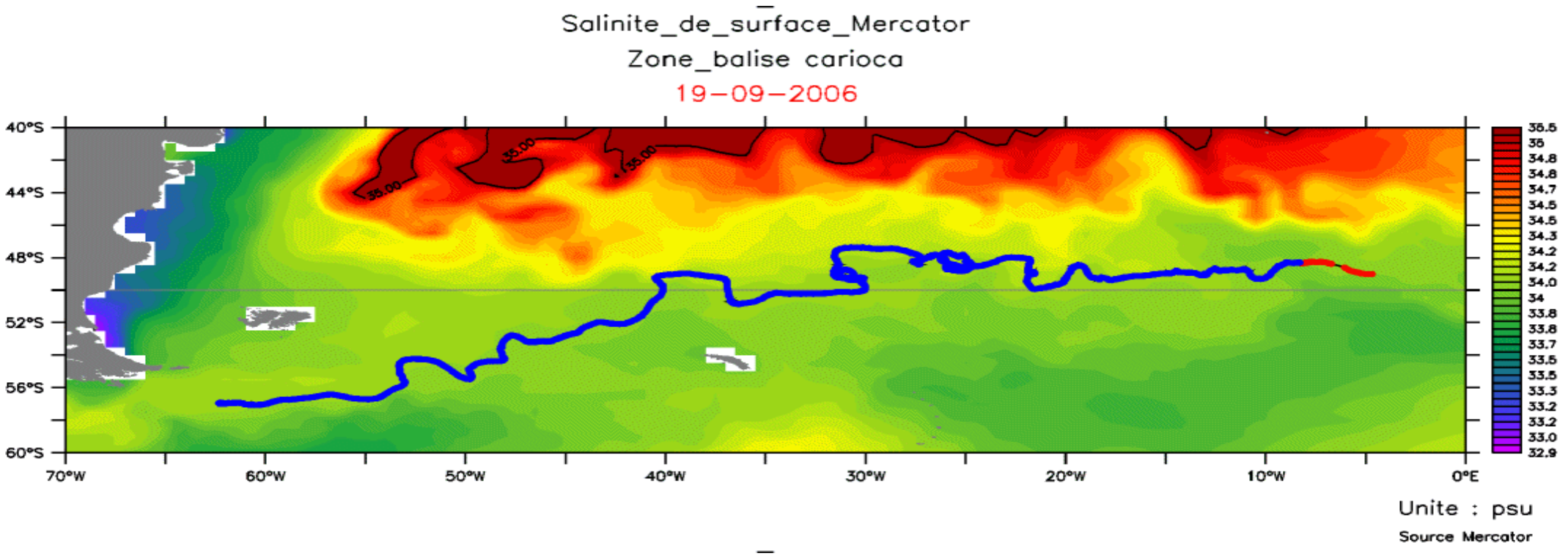
Carioca (DBCP buoy)



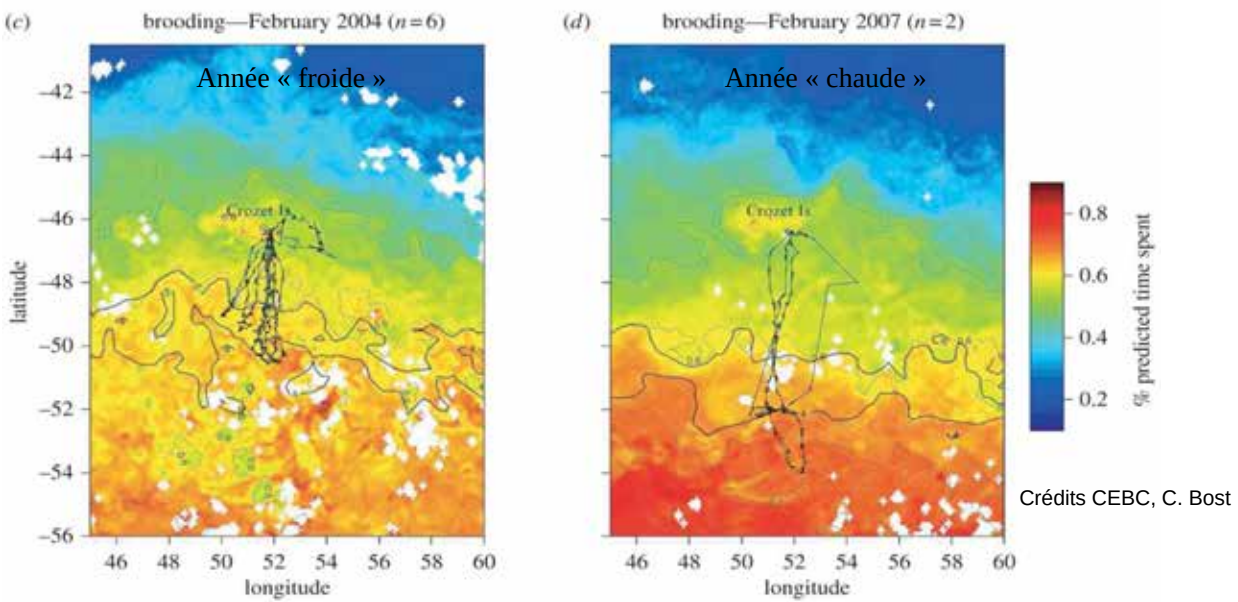
Carioca (DBCP buoy)



Carioca (DBCP buoy)



ACC and marine animals



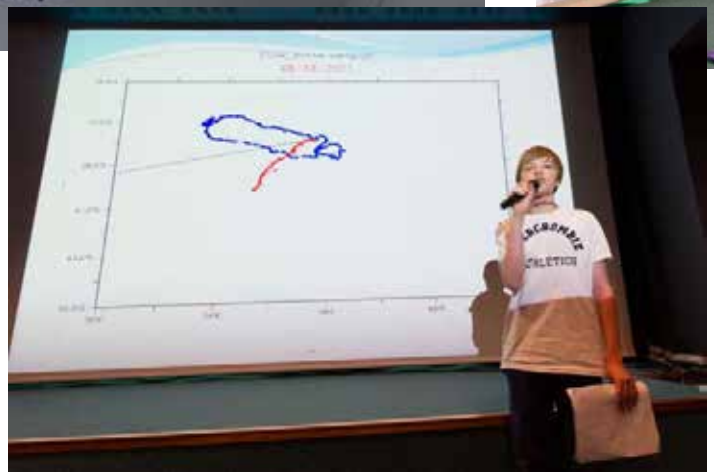
Crédits CEBC, C. Bost

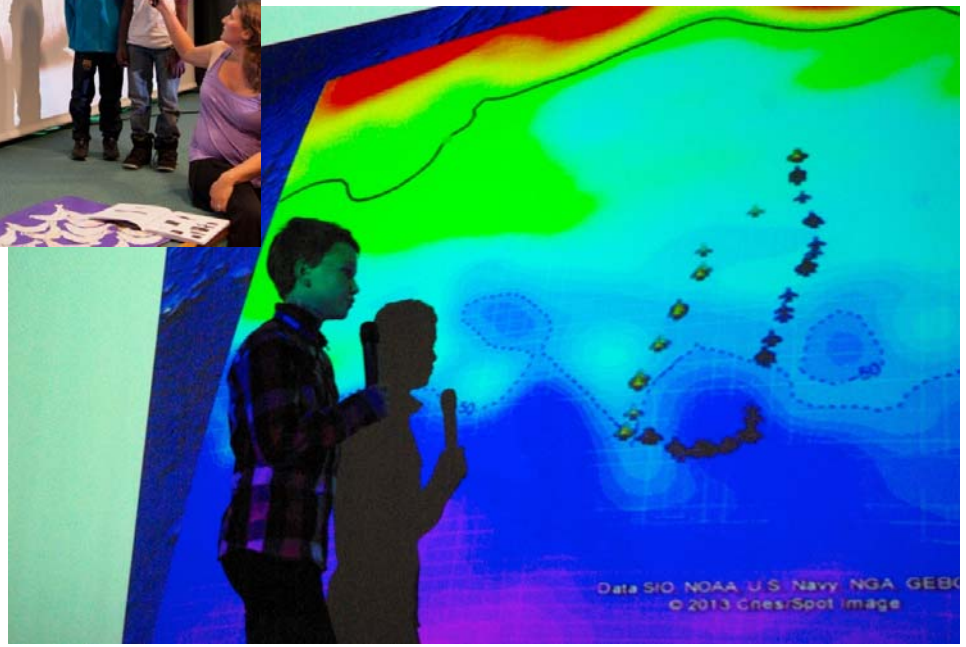
- King penguins go to feed in the Antarctic Circumpolar Current from Crozet Island
- “Warm” years, the current is more South than normal. The penguins have to go further to find fishes.
  If they take too long, their chick can die from hunger.

What the students/teachers are doing with those data?


Atelier Scientifique
Collège Paul Esquinance
LA RÉOLE (33)
cnes


FST: front subtropical
FSA: front subantarctique
FP: front polaire
DA: dérive antarctique
Fronts polaires




Data SIO NOAA U.S. Navy NGA GEBC
© 2013 Cnes/Spot Image

Etude de la bouée Bétance

Collége Bétance vu du ciel

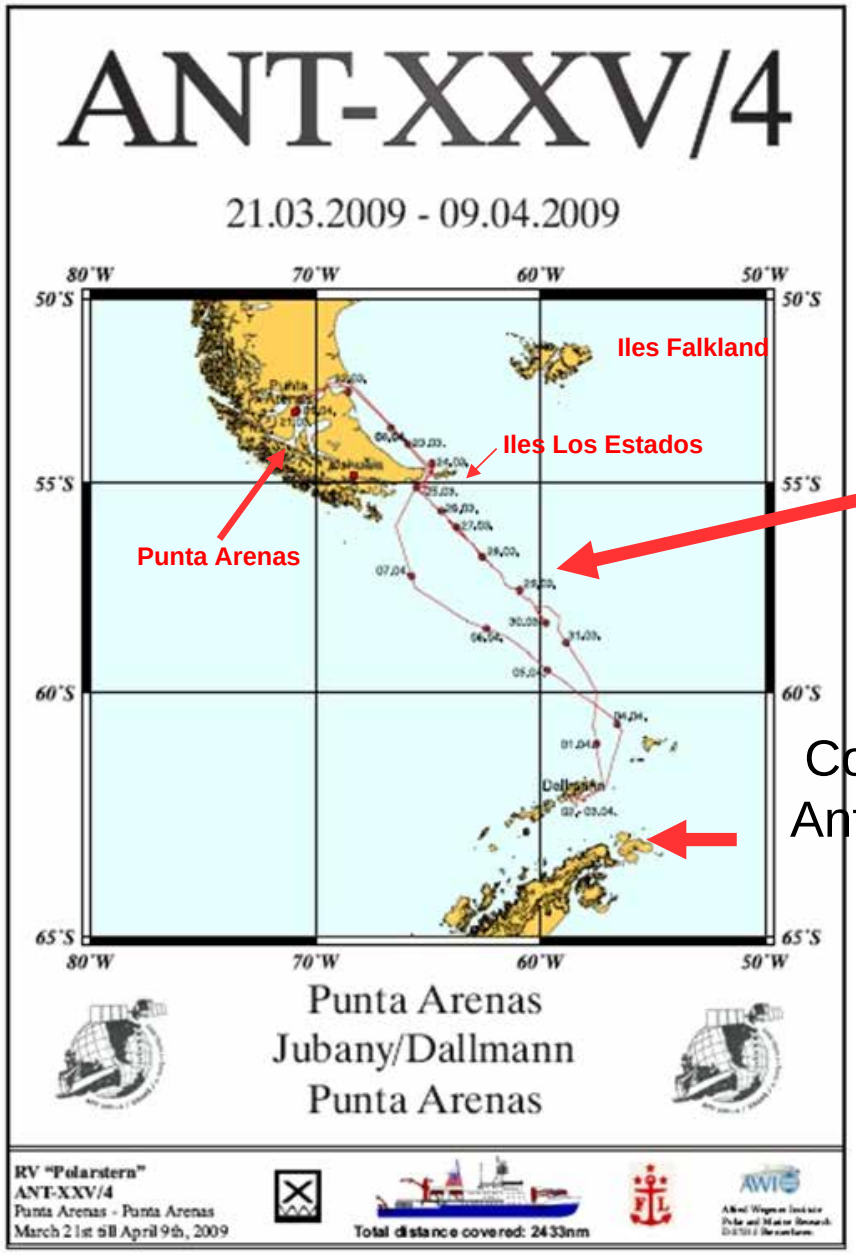
Classes de 5ème 1 et 3

Présentation par :

Emilien
Alexis
Léa
Justine

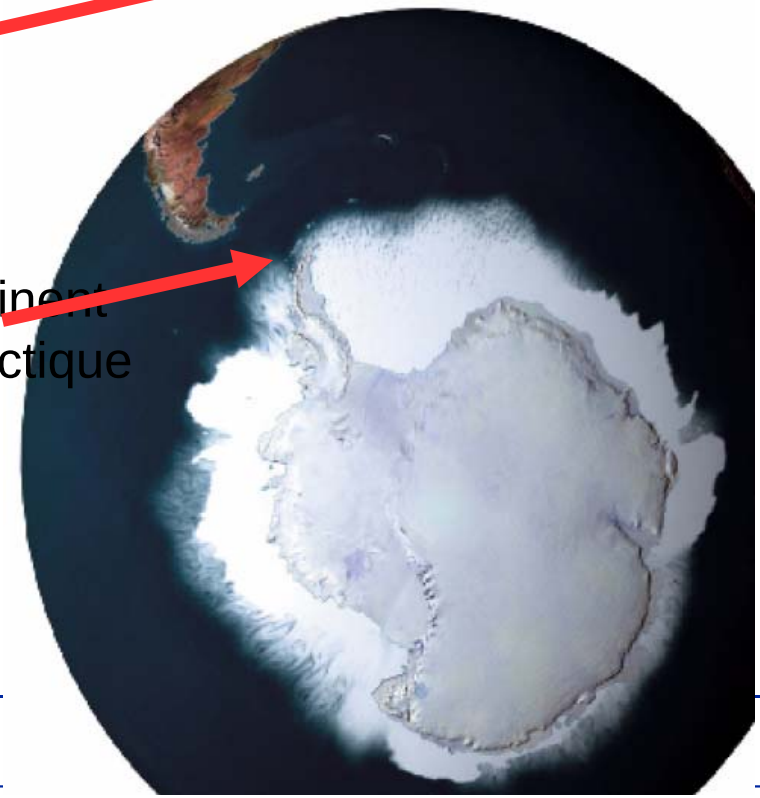
Etude des bouées dérivantes en Technologie

Campagne océanographique



Largage dans le passage de Drake

Continent Antarctique



Etude de la trajectoire

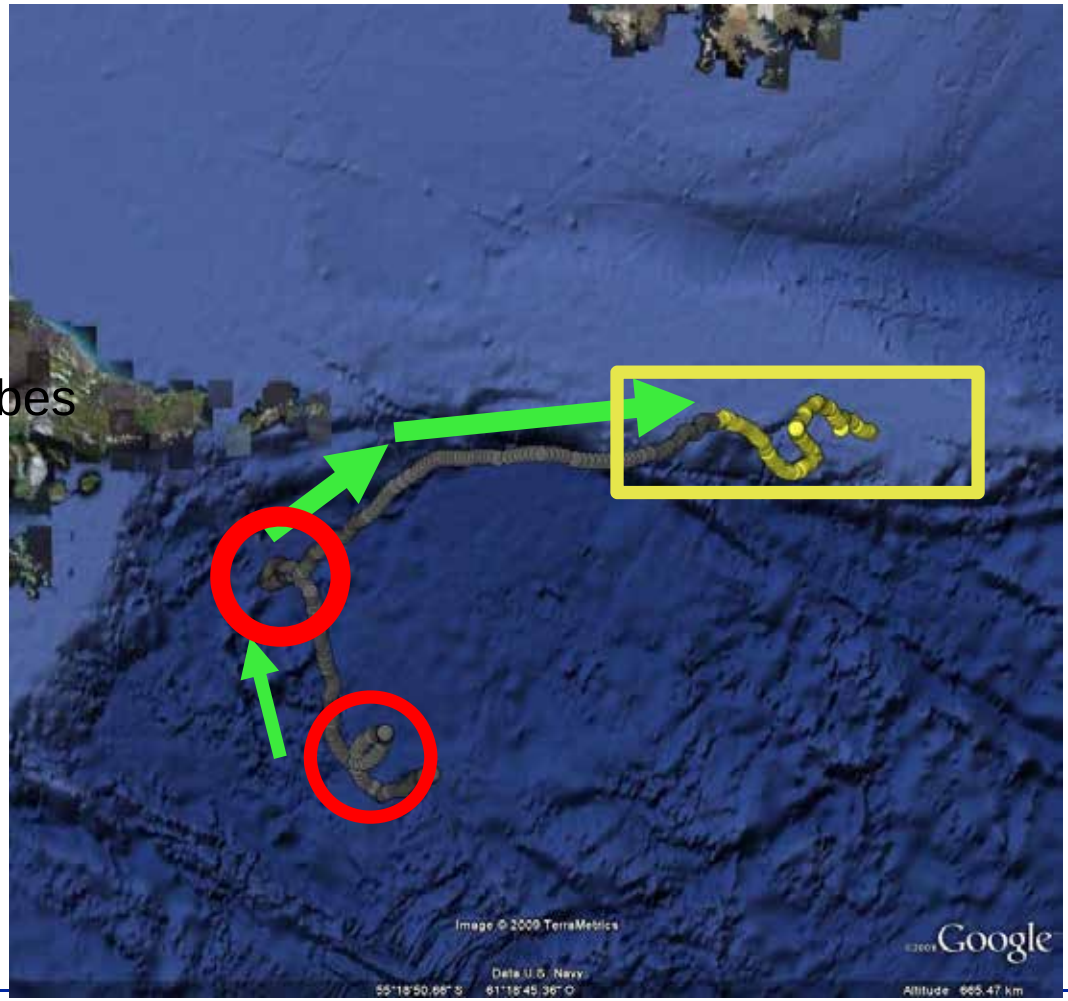
- Trajectoire de la bouée « Bétance »
- Avec la Bathymétrie (c'est la profondeur de l'océan)

Trajectoire de la balise Bétance

Méandres

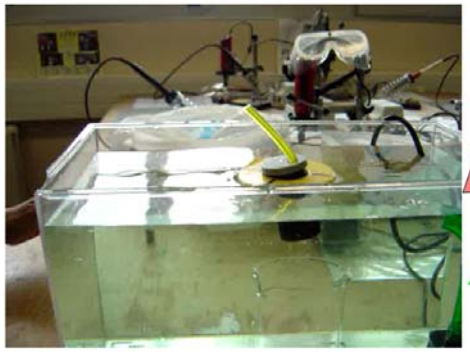
Grandes Courbes

Boucles



Nous avons réalisé des expériences pour comprendre ces 3 types de déplacements

Expérience N°1 Courant Marin



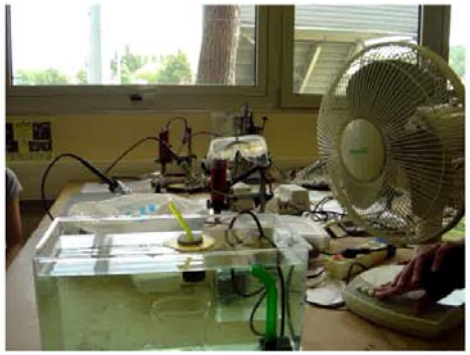
La bouée est entraînée par le courant.

Elle suit la trajectoire du courant.

Expérience N°2 Tourbillon

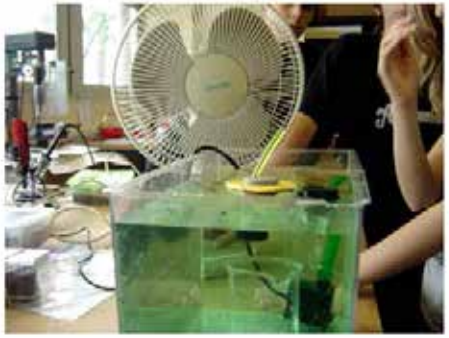
La bouée est est entraînée par le tourbillon dans un mouvement circulaire

Expérience N°3 Vent



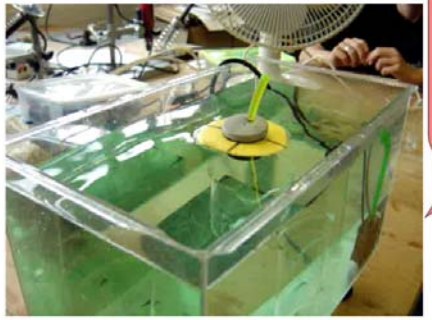
La bouée est entraînée par le vent.

Expérience N°4 Tourbillon + Vent

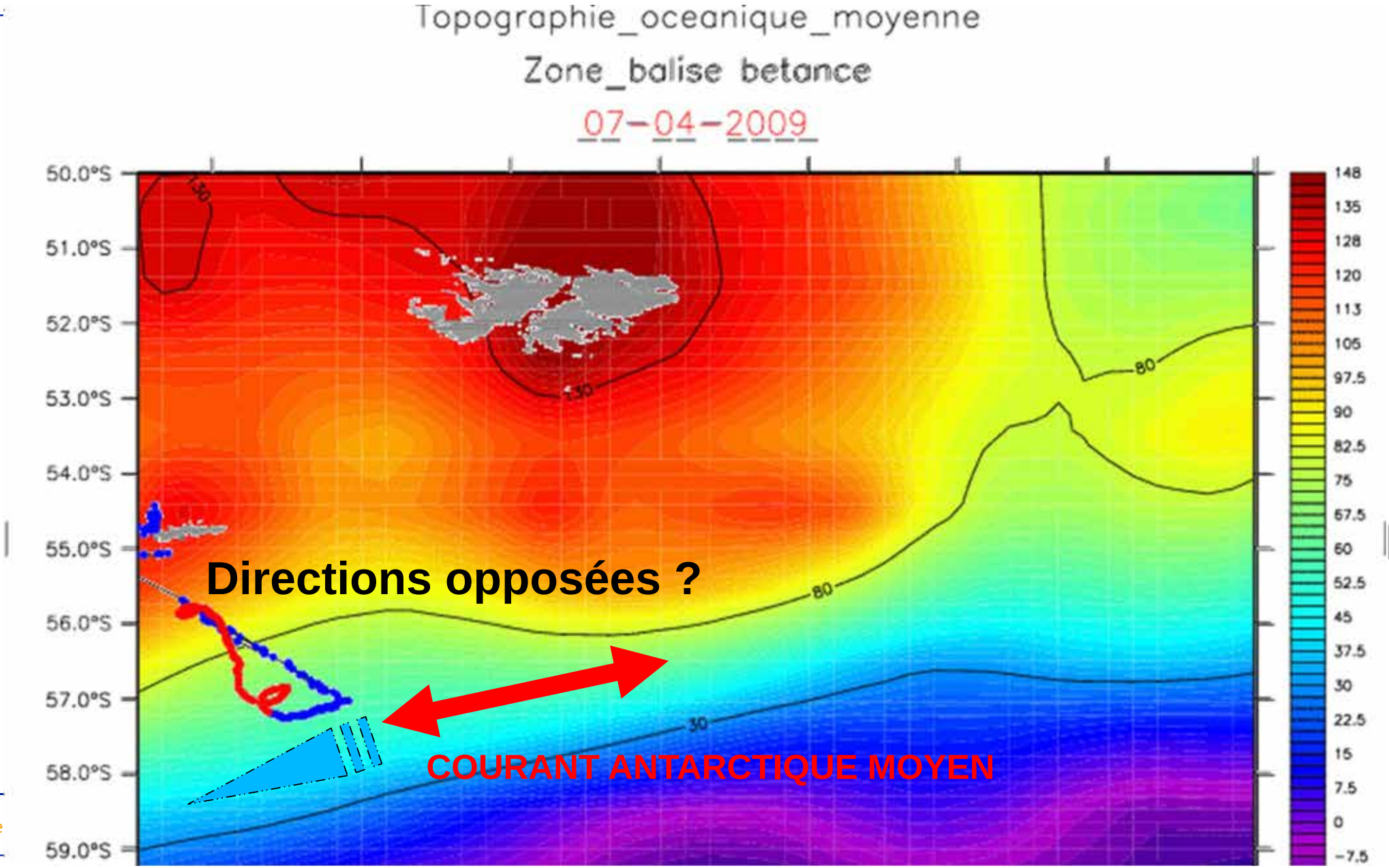


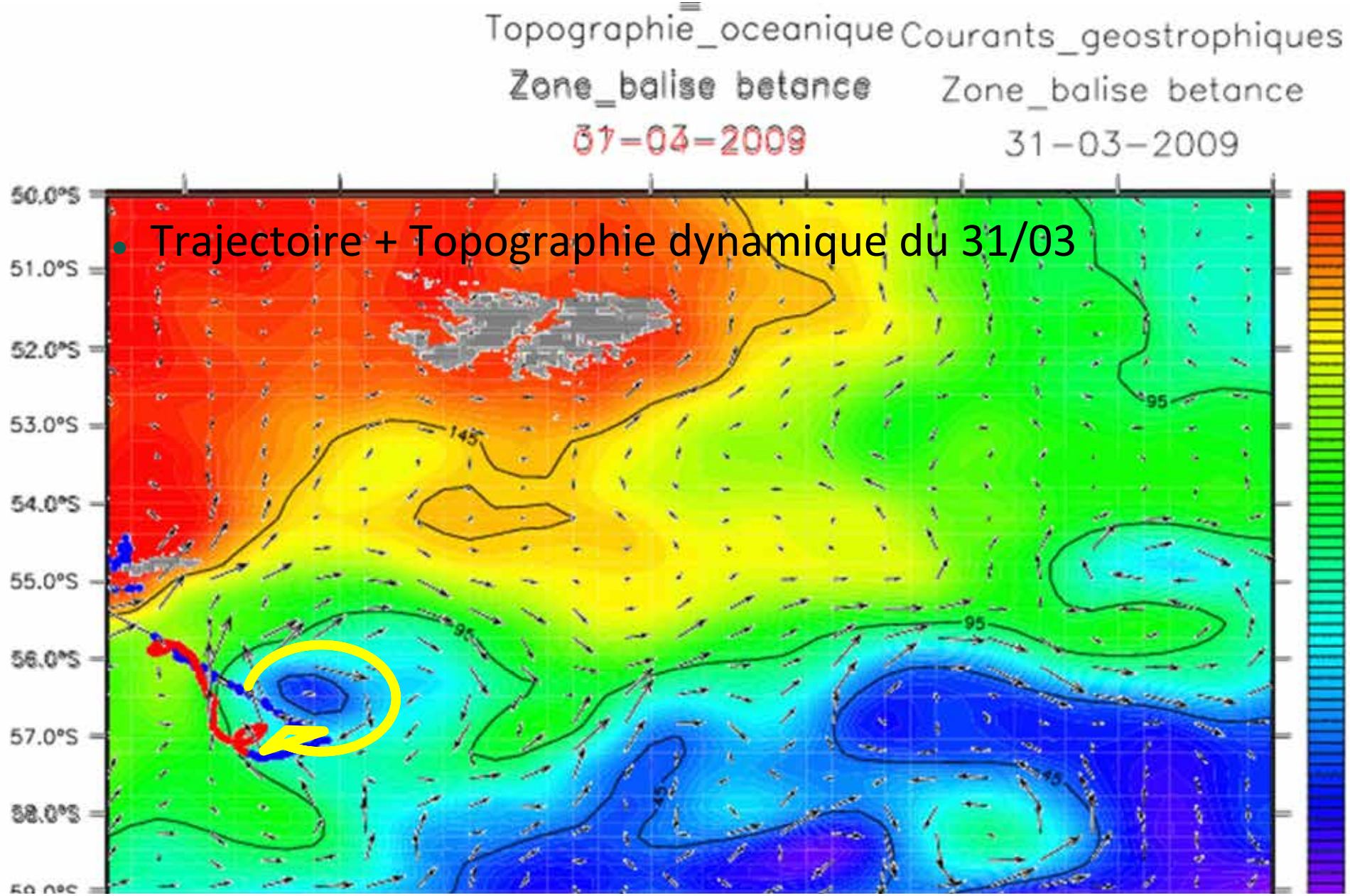
La bouée sort du tourbillon sous l'influence du vent.

Expérience N°5 Tourbillon + Courant



La bouée sort du tourbillon sous l'influence du courant


Topographie_oceanique_moyenne
Zone_balise betance
07-04-2009
50.0°S
51.0°S
52.0°S
53.0°S
54.0°S
55.0°S
56.0°S
57.0°S
58.0°S
59.0°S
130
130
80
80
30
148
135
128
120
113
105
97.5
90
82.5
75
67.5
60
52.5
45
37.5
30
22.5
15
7.5
0
-7.5
Directions opposées ?
COURANT ANTARCTIQUE MOYEN



- Trajectoire + Topographie dynamique du 31/03

Conclusions

- Questions:

- Utilisation des bouées dérivantes ?

- Utilisation des satellites altimétriques ?

- Etude des Océans et son rôle principal ?

- Etude du Climat ?

Réponses :

- Les bouées dérivantes mesurent localement et sur de courtes durées la température, la salinité, la pression et d'autres paramètres **- localisation, etc...**

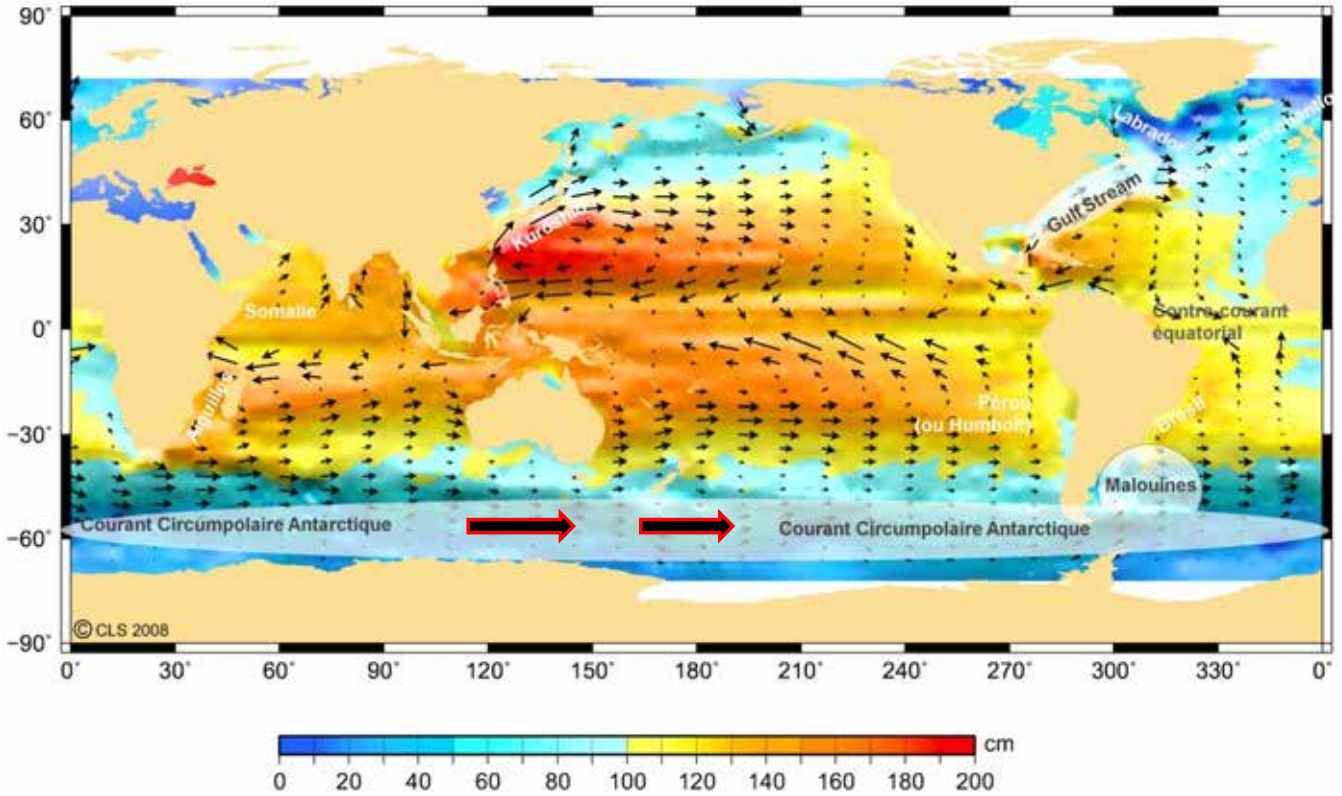
- Le satellite JASON fait des mesures de la hauteur des Océans : Topographie dynamique, des courants associés, etc... couverture spatio-temporelle G/10

- Les océans sont composés de différents courants chaud ou froid. Ils **transportent la chaleur** et **l'échange avec l'atmosphère** sur toute la planète.

- La température de la Terre est ainsi régulée à long terme par l'océan.

Le courant circumpolaire et les migrations animales.

Lycée Jacques Monod, Lescar 64.



Nord

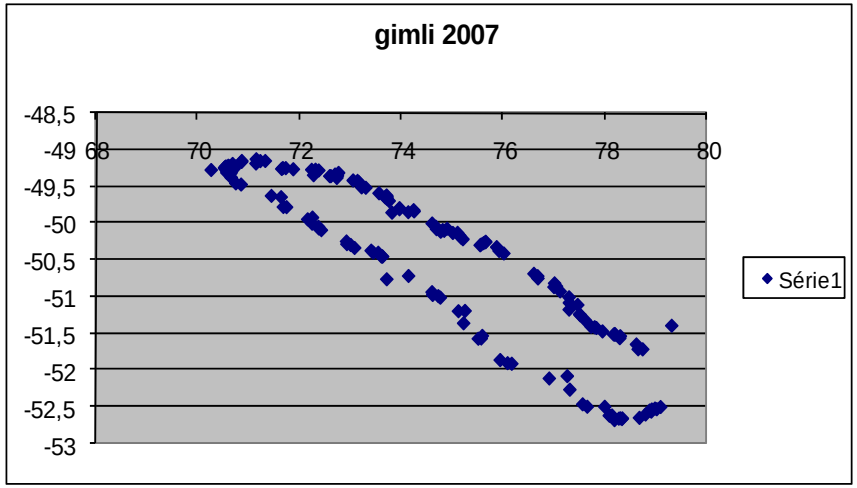
Ouest

Est

Sud

Nous nous sommes interrogées sur les migrations animales puis finalement nous avons décidé de nous concentrer sur celles des manchots royaux, grâce aux données du CNES.

We wondered about animal migrations. We finally decided to concentrate on King Penguins, thanks to CNES data


gimli 2007
-48,5
-49
-49,5
-50
-50,5
-51
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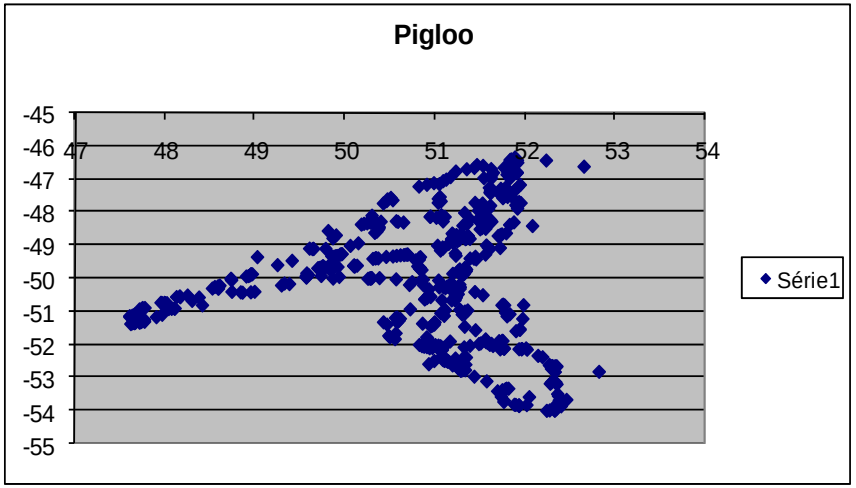
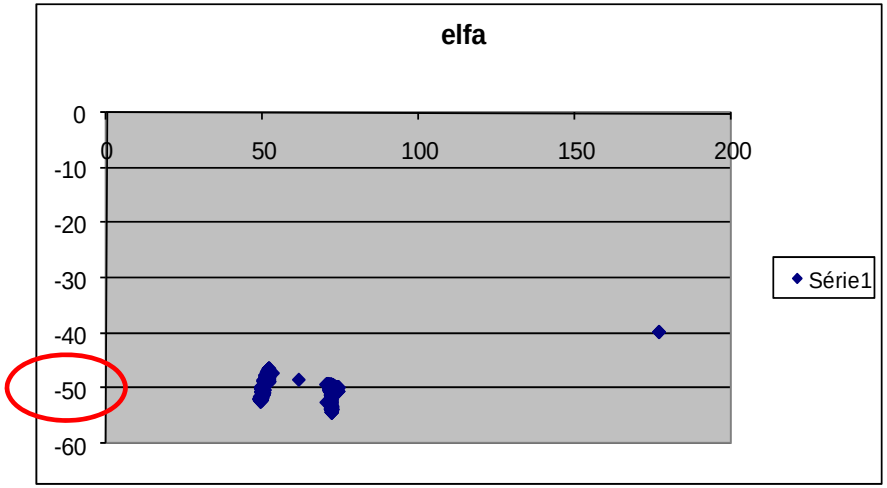
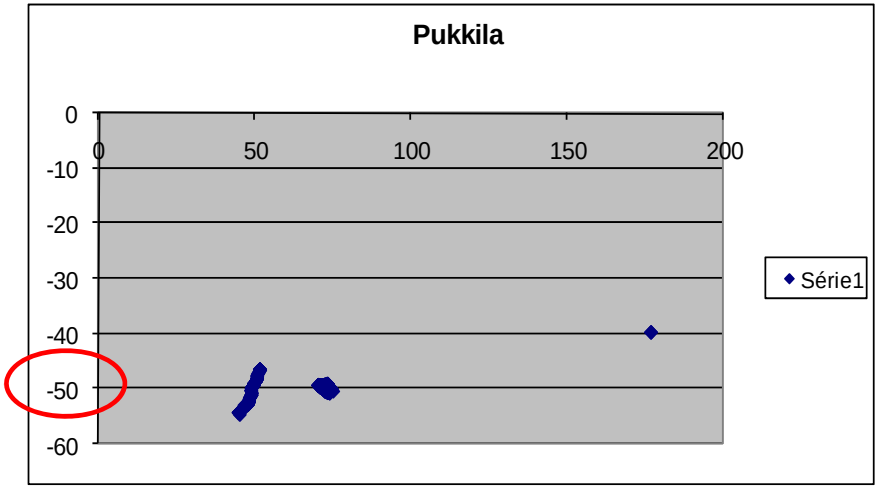
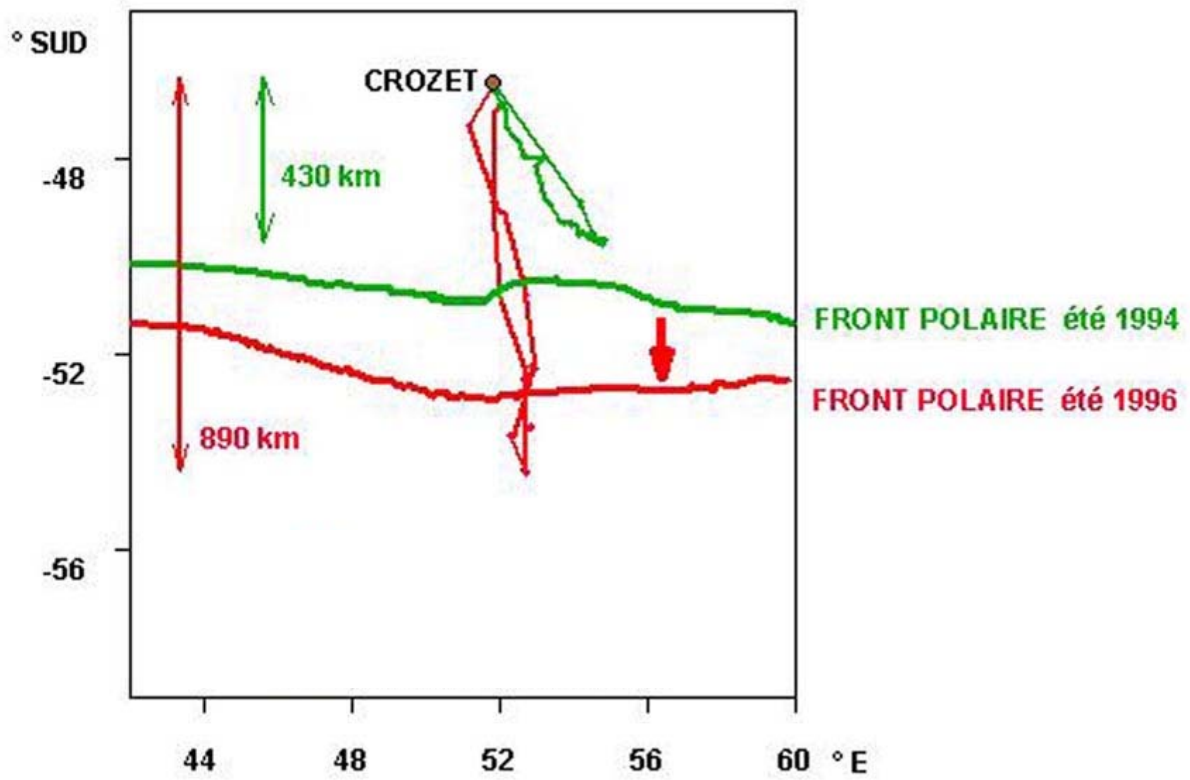
-52
-52,5
-53
68
70
72
74
76
78
80
Série1


Pigloo
-45
-46
-47
-48
-49
-50
-51
-52
-53
-54
-55
47
48
49
50
51
52
53
54
Série1



Année 2006-2007




° SUD
-48
-52
-56
CROZET
430 km
890 km
FRONT POLAIRE été 1994
FRONT POLAIRE été 1996
44
48
52
56
60 ° E

Take-home messages

- Antarctic Circumpolar Current a good area for cross cutting activities, multi-disciplinary
  - Biology
  - Earth sciences
  - Physics
  - Geography
  - Climate science
  - glaciology
- Students from kindergarten to high school find an interest in the area
- The fact that the area is far away is more an incentive than something that repel
- Sail races and skippers help, but also the animals
- Climate change an important issue for the young