

The KEOPS2 campaign (PI: S. Blain, Observatoire Océanologique de Banyuls sur mer, UPMC) took place during October-November 2011 around Kerguelen Islands. The aim is to elucidate the response of ecosystem functioning and of the biogeochemical cycles to natural iron fertilization, a key factor controlling ecosystem dynamics (including CO₂ export) in the Southern ocean and other basins. It is a multidisciplinary campaign heavily relying on high quality satellite data.

A specific support from CNES enables KEOPS2 to benefit from such products, both in real time and delayed time production. CNES contributes via the Ssalto/DUACS project and in collaboration with LEGOS/CTOH, to specifically process altimeter products and derivatives for the Kerguelen area. The products were validated in collaboration with LOCEAN.

A **regional Mean Dynamic Topography** was specifically processed for the Kerguelen area (Fig 1). It benefits from improved processing, the latest geoid model including GOCE data, and additional in situ measurements with improved processing.

The regional MDT allows a better restitution of the mean circulation in the area, with for instance, an improved reconstruction of the Fawn Trough Current, and the Deep Western Boundary Current loop signature, observed around 80°E, 55°S.

In situ data from KEOPS2 campaign were later used to improve the regional MDT
→ main impact East of the Kerguelen Island.

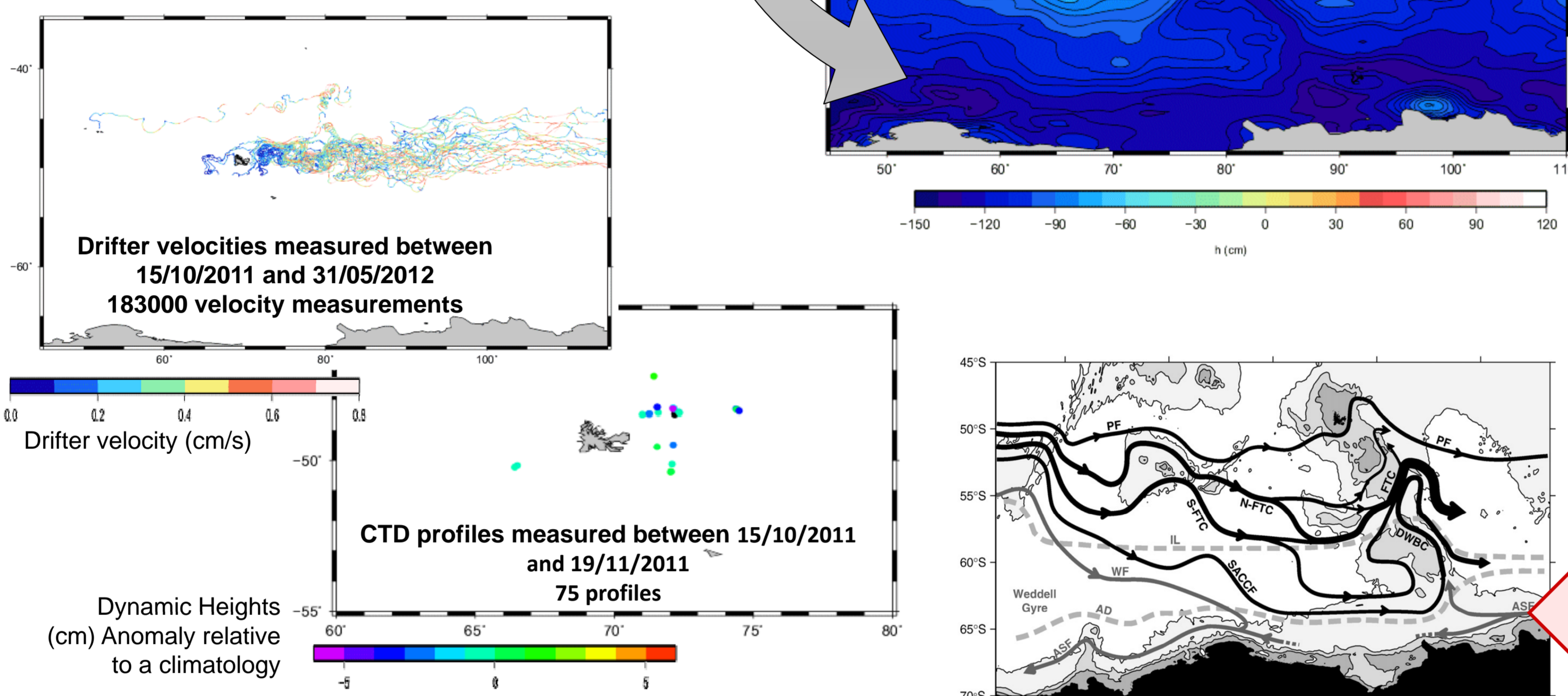
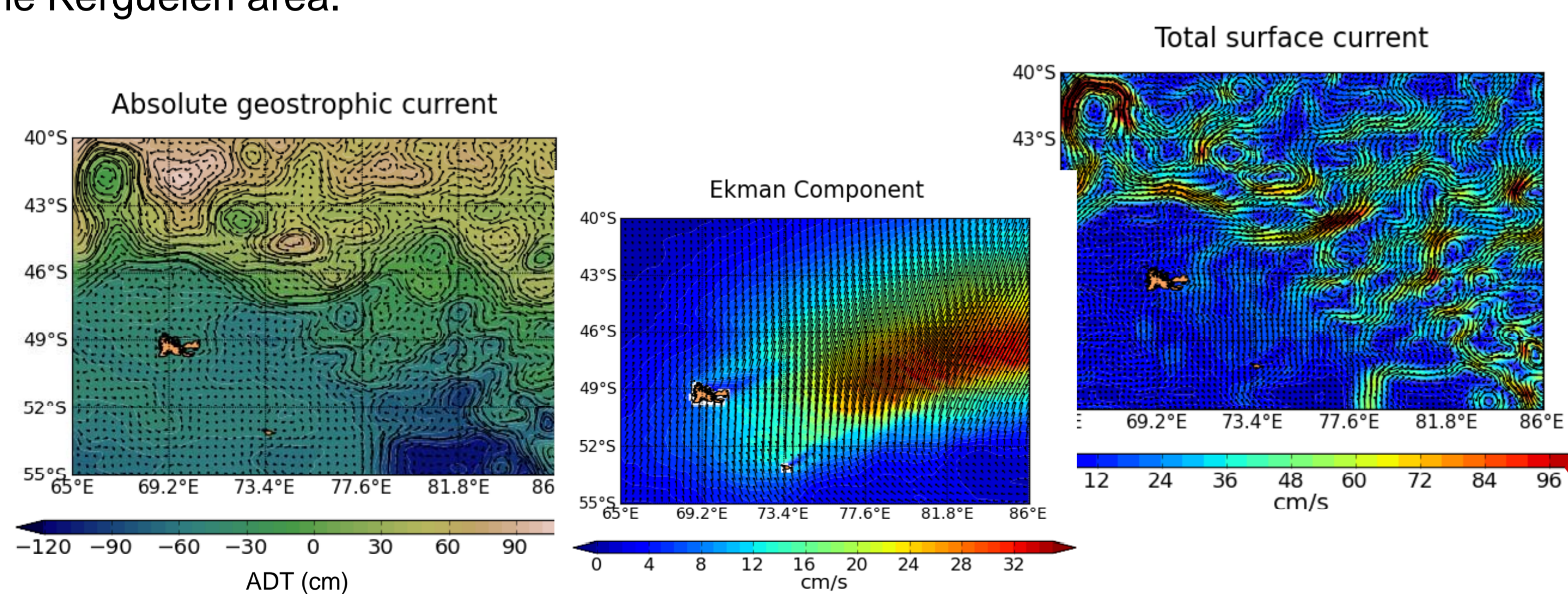


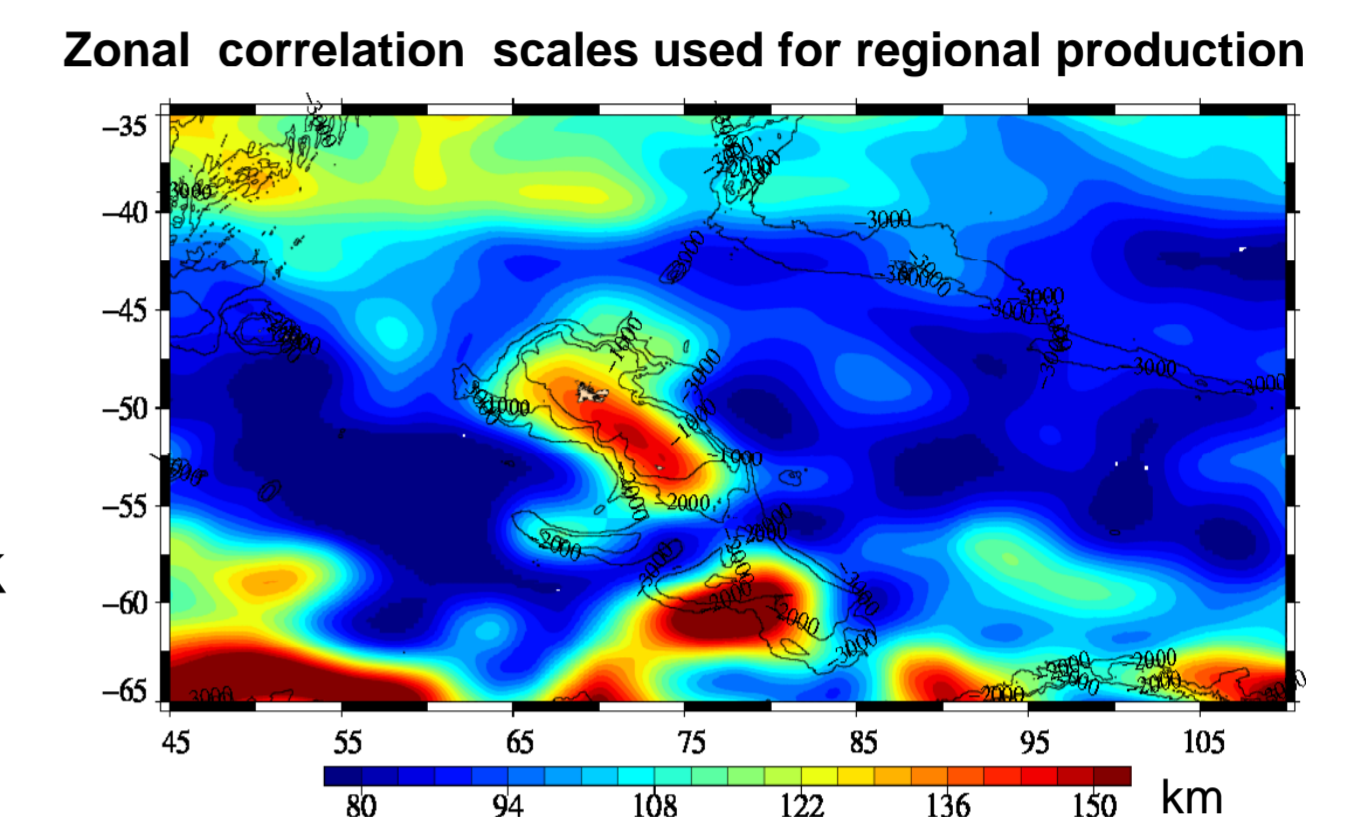
Fig. 1. Schematic of the large-scale circulation in the Enderby Basin as obtained from the present study. The Fawn Trough Current (FTC) results from the channeling of most of the Antarctic Circumpolar flow crossing the Enderby Basin. We tentatively called the two main branches of flow converging to form the FTC as the northern and southern affluents of the FTC (respectively the N-FTC and S-FTC). The N-FTC (S-FTC) is best characterized by the 22 °C (2 °C) Fmax deep isotherm. The Deep Western Boundary Current (DWBC) flowing along the eastern flank of the southern Kerguelen Plateau is also converging with the FTC at the outlet of the Fawn Trough sill. Circulation features deduced from the literature, namely the Weddell Frost (WF; Paik et al., 2008) and the Antarctic Slope Front (ASF) along the Antarctic coast which bifurcates in the area of the Princess Elizabeth Trough (McCartney and Donohue, 2007), are shown dark grey. The Antarctic Divergence (AD) and the Ice Limit (IL) are also shown (grey dashed lines).

The **total surface currents** are also delivered. The Ekman component is added to the absolute geostrophic currents (deduced from altimeter product). It is deduced from ECMWF wind stress analysis applying a regional Ekman model, specifically adjusted to the Kerguelen area.

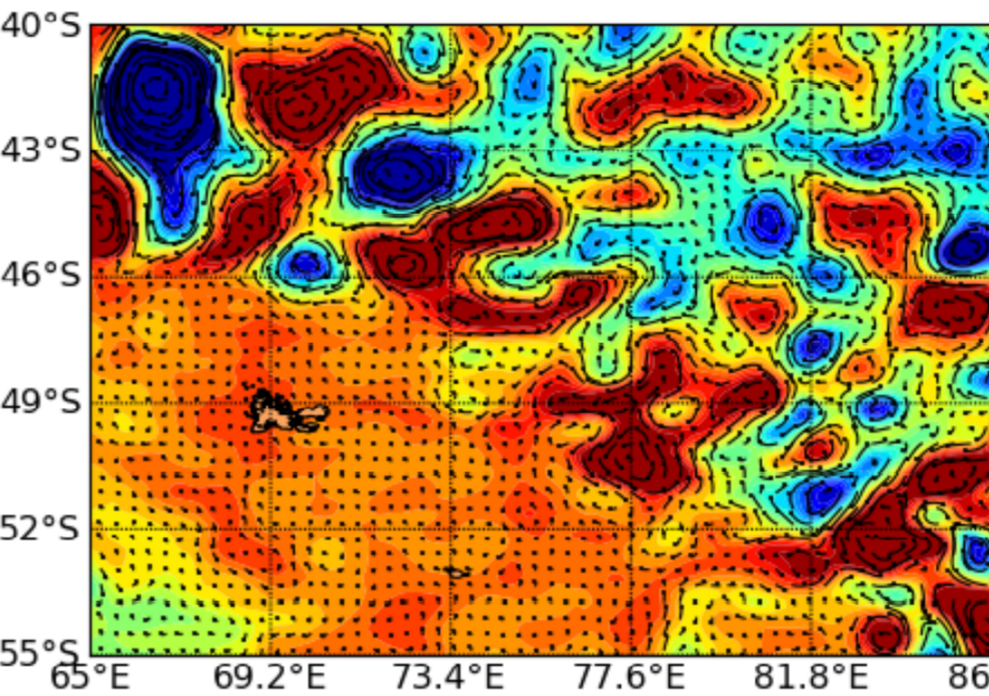


Altimeter data were specifically processed for the construction of Kerguelen regional products. Improvements mainly consist in :

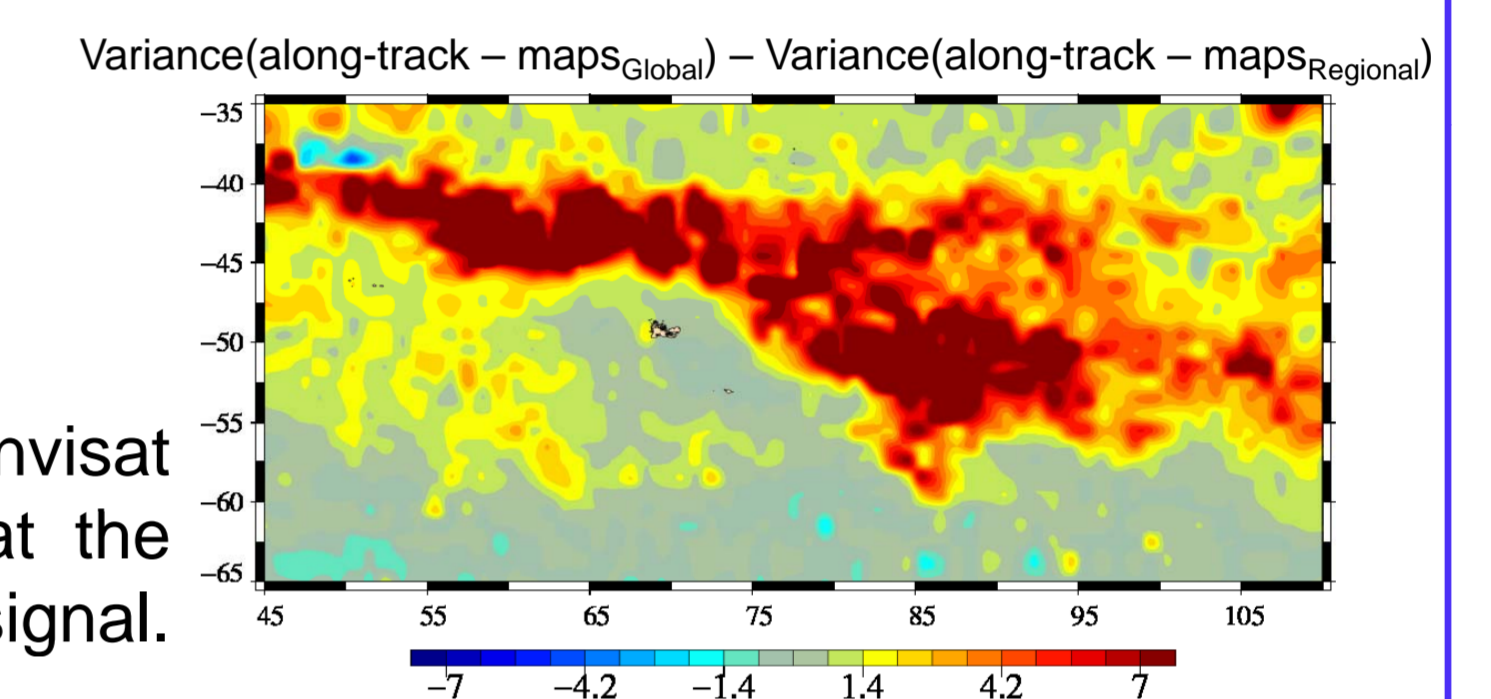
- Improved noise measurement reduction on along-track data (filtering)
- Improved correlation scales to take into account the geographical variability of the signal (Fig 2).
- High resolution (14 km for along-track and 1/8° for grids)



Anomalies of the geostrophic current



Map of Sea Level Anomalie and Absolute Dynamic Topographie, as well as geostrophic currents were delivered.



Comparison between SLA maps and Envisat along-track data : positive values mean that the regional product better fit along-track signal.

→ **Regional products better resolve the mesoscale signals than the existing global products.**

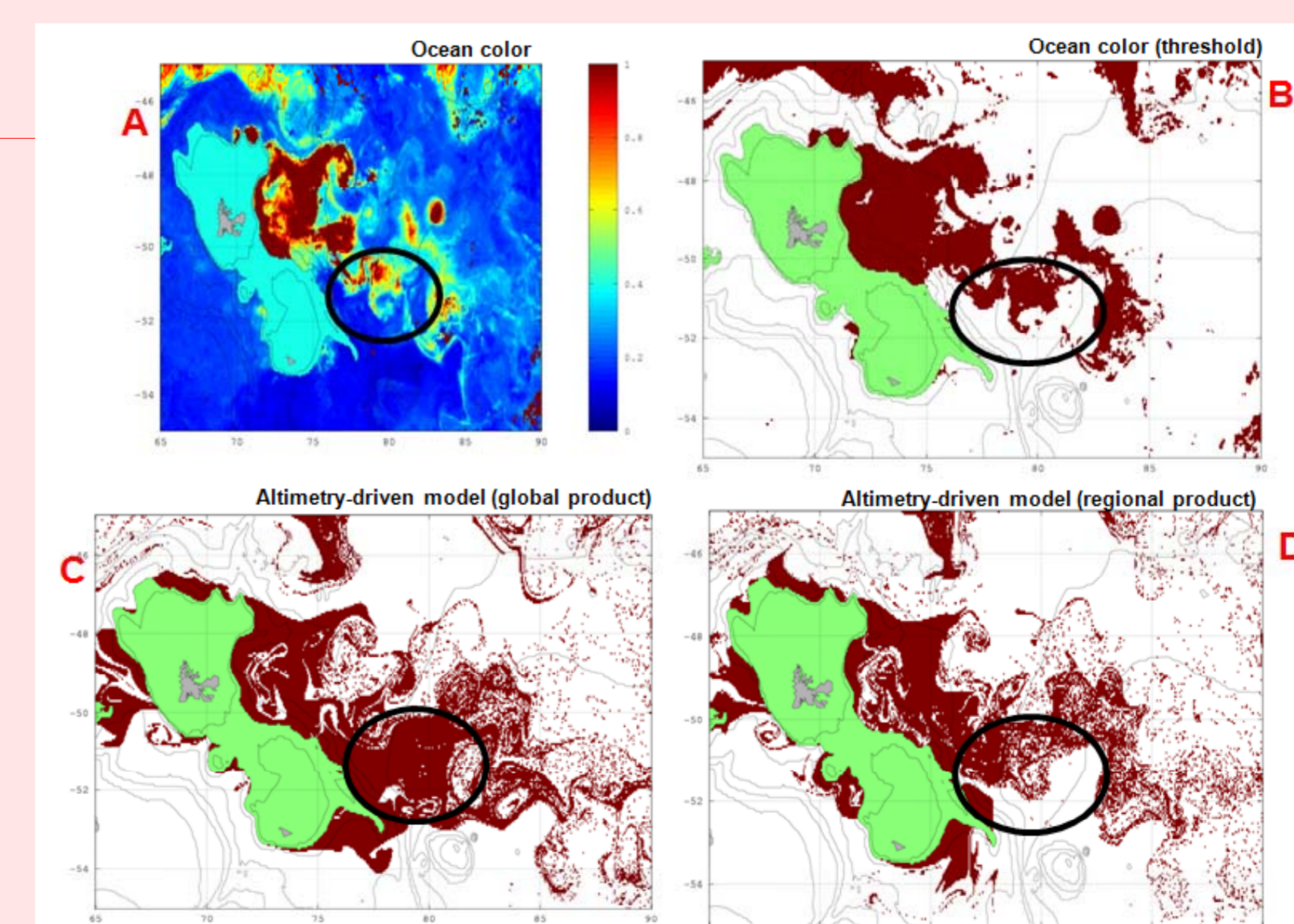
The regional products largely contribute to the KEOPS2 Campaign :

- before and during the campaign :
 - have synoptic monitoring of surface state
 - help predict the drifter trajectories
 - help choose the positions of in situ measurements
- After the campaign :
 - Validate and interpret the measurements acquired during the campaign.

KEOPS2 Campaign contributes to improve the altimeter products

- In situ measurements
- Validation with external data and new diagnostics
- User feedback on products quality

→ **The improved precision of the regional altimeter products and MDT is confirmed by comparison with Chlorophyll concentration:** altimeter regional products reproduce mesoscales structures and filaments underlined by surface chlorophyll concentration. They allow an accurate detection of fronts and filaments via a Lagrangian analysis.



Observation of the bloom extension

Prediction of the bloom extension using Global (C) or Regional (D) altimeter product

All the products are available via ftp AVISO in the directory /donnees/ftpseidr/DUACS/experimental/regional-keruelen (granted* access).



*Subscribe AVISO

Don't hesitate to use them and give your feedbacks to AVISO !

The regional product is clearly better in predicting the southern flank of the bloom extension. (Credits LOCEAN/ F. d'Ovidio) (More details on www.aviso.oceanobs.com)

→ **The regional altimeter products accuracy makes it possible to studying the key role of horizontal transport in structuring the phytoplankton abundance.**