Importance of characterising the dynamic circulation from altimetry to understand marine ecosystems of Kerguelen

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Ecosystems and multi-scale physical forcing

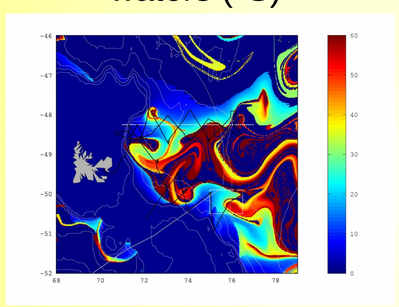
Biological responses of lower trophic levels to physical processes occurring at several scales are well documented[1]. The distribution of highest trophic levels from zooplankton to top predators is the result of behavioural choices based on the multitude of physical-biological and trophic interactions occurring through trophic webs[2].

➔ Is the physical dynamic structuring, previously identified at the lower trophic level, relevant for the whole ecosystem, i.e. across trophic webs?

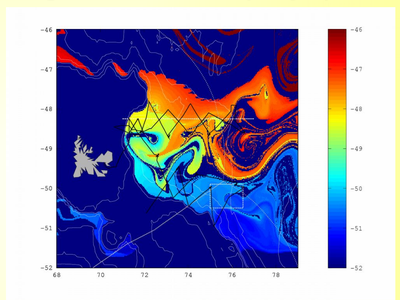
Pivotal role of altimetry: Interdisciplinary study of Kerguelen ecosystem

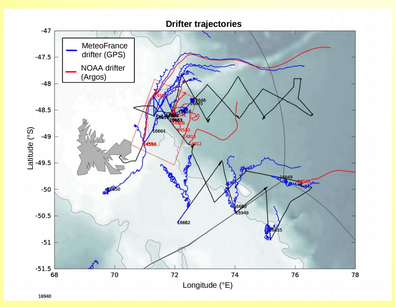
Physical diagnostics of circulation properties and (sub-)mesoscale activity

Latitudinal origin of waters (°S)



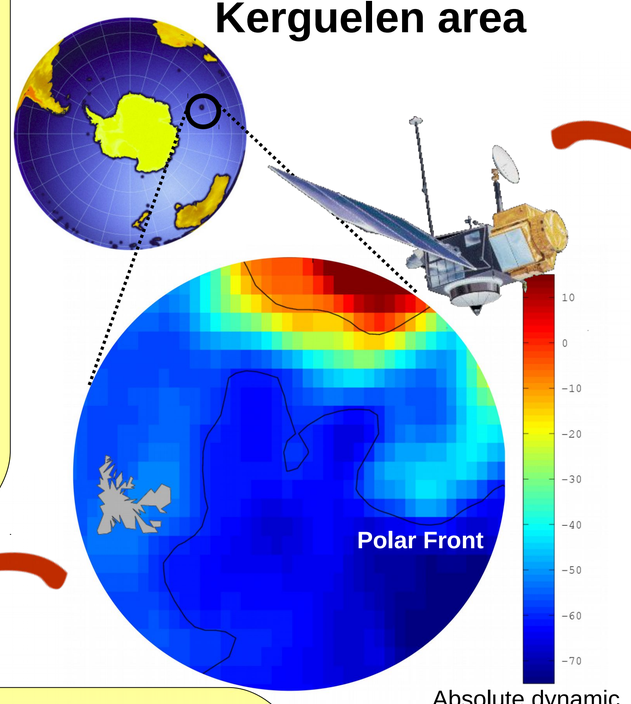
Age of waters (days)





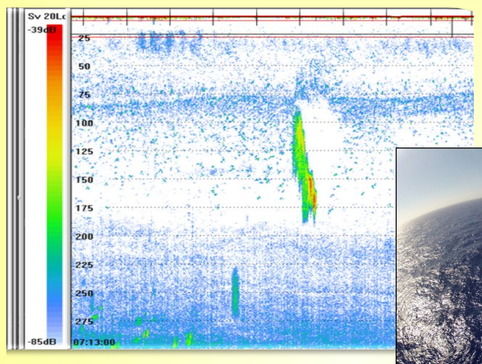
Trajectories of drifters released during *Mycto* cruise

Altimetry data in the Kerguelen area



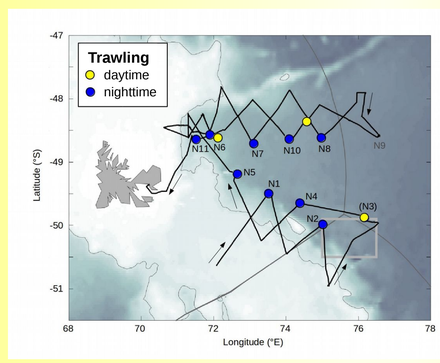
Absolute dynamic topography (cm)

3-D Hydroacoustic measurements of densities

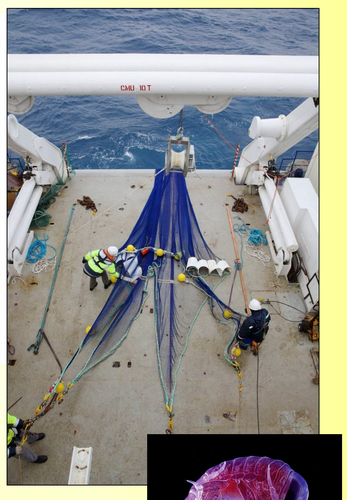


Echogram of fish school at 38kHz

Fish and zooplankton distribution and diversity



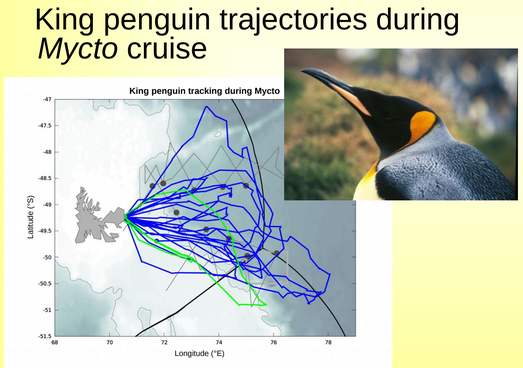
Trawling stations



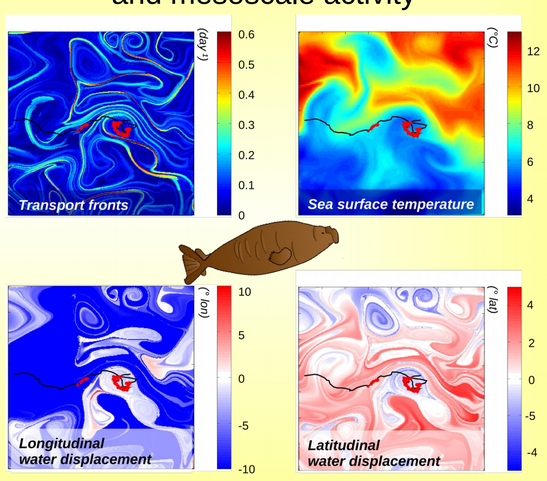
Biological sampling

Top predator ecology and foraging strategy

King penguin trajectories during *Mycto* cruise



Elephant seal trajectory and mesoscale activity[3]



✓ We aim to identify the influence of water mass and oceanographic mesoscale structures on biology (from zooplankton to top predators) and ecological processes within the dynamic circulation and the intense eddy field of the Antarctic circumpolar Current (ACC).

✓ During the *Mycto* cruise carried out in january 2014, simultaneous hydroacoustic-physical-biological data were collected to understand the pelagic ecosystem off Kerguelen plateau.

✓ To achieve a description of dynamic circulation in the Kerguelen area, we propose a characterization of the history of water parcels. We employed Lagrangian diagnostics based on the construction of fluid particle trajectories from satellite-derived velocity field. Altimetry-derived analyses are thus crucial to describe the dynamic physical habitat of marine biota.

References: [1]Lévy, M., et al. 2012. Bringing physics to life at the submesoscale. Geophysical Research Letter 39, L14602; [2]Prairie, J.C., et al., 2012. Biophysical interactions in the plankton: A cross-scale review. Limnology & Oceanography: Fluids & Environments. 2, 121–145; [3]Cotté, C., et al. Flexible preference of southern elephant seals for distinct mesoscale features within the Antarctic Circumpolar Current. In revision

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