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Structure of the Antarctic Circumpolar Current in Drake Passage observed from satellite altimetry

Nicolas Barré, Christine Provost, Nathalie Sennéchael, and Alice Renault
LOCEAN, UPMC, Paris, France (nbalod@locean-ipsl.upmc.fr)

The flow of the Antarctic Circumpolar Current (ACC) has long been known to be concentrated into three deep-reaching oceanic fronts. High resolution hydrographic sections and maps of sea-surface height (SSH) revealed that the ACC consists of multiple jets or frontal filaments. Sokolov and Rintoul (2009) found that the ACC fronts consisted of multiple branches associated with local maxima in the gradient of absolute SSH along the entire circumpolar path. They inferred the location of the frontal branches fitting SSH contours to SSH gradients.

The Drake Passage (DP) is a region with a rough topography, where the strong flow of the ACC is constricted. We carefully examine the structure and distribution of the ACC frontal branches in DP using maps of absolute SSH gradients. Positions of the branches deduced from altimetry are compared to the in situ data from six hydrographic transects performed in 2005, 2006, 2008 and 2009. Sea-surface temperature and chlorophyll concentration from the satellite radiometers MODIS and AMSR-E provide complementary information on the structure of the ACC. The robustness of the SSH value associated with each frontal branch is examined both in space (throughout DP) and time.