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Fronts and seasonal evolution of the upper layer of the Antarctic Circumpolar Current south of South Africa

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In the framework of the GOODHOPE project, a multi-year monitoring of the oceanic region south of South Africa and to about 55˚S was undertaken at the beginning of 2004. The experiment, which rests on ARGO profiling floats, regular expendable bathythermograph (XBT) and Conductivity-Temperature-Depth (CTD) measurements, in conjunction with analyses of altimetric data, aims at a better understanding and quantification of the Indo-Atlantic oceanic exchanges by both the highly turbulent flow of the subtropical region and the Antarctic Circumpolar Current (ACC) farther south. For the first time the profiling floats (33 PROVORs active in January 2006) provide a year-round hydrographic sampling of this seasonally inaccessible region.

In this study we first analyse the frontal structure of the ACC as observed from the float data, and as reconstructed through empirical relationships from XBTs and altimetric data calibrated on available CTD transects. We focus on the temporal variations of the frontal patterns and their relation to the underlying bathymetry. The seasonal variations of the surface and upper ocean properties are then studied with particular emphasis on the heat and salt content of the surface mixed layer in the various ACC frontal zones.