

**Southern Ocean hydrography and circulation : CLIVAR GOODHOPE and IPY BONUS-GOODHOPE : Ocean dynamics, biogeochemistry and air-sea interactions in the Souther Ocean south of Africa**

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Prior to 1990, Southern Ocean (SO) observations were very few and sparse. Since then, an intense monitoring effort has been undertaken in two of the three SO chokepoints. The one south of Africa, which is the largest, has been undersampled despite its suspected importance in the Meridional Overturning Circulation (MOC). There, the SO plays a unique role in providing the export channel for North Atlantic Deep Water to the global ocean and by importing heat, salt and biogeochemical tracers from the Indian and Pacific oceans. This region is influenced by the largest turbulence ever observed and very efficient air-sea exchanges. Here the atmosphere and ocean are equally dynamic: the complex fronts, eddies and filaments in the ocean are matched by tight fronts, storm passages, and highly variable moisture contents in the atmosphere. Transfer of heat to the atmosphere from the ocean north of the polar front contributes to the dominance of cumuliform cloud types in this region. These local small-scale processes and the derived meridional fluxes constitute the major link between the Atlantic and the other ocean basins. Because of the lack of observations in this key region of the world ocean, in early 2003 we decided to initiate an observational project, named GoodHope by the Cape of Good Hope, within an International partnership. The project aims at studying the full-depth oceanic exchanges between the Indian, Atlantic and Southern oceans, in a latitude band that encompasses the subtropical domain between South Africa and the Subtropical Front (~35°S-40°S), and the ACC (~40°S-55°S). Specific objectives are a better knowledge of the temporal variability of the ACC transport, a study of property modifications experienced by the exchanged waters, an improved understanding of the mechanisms involved in these exchanges throughout the water column and, of course, a long term monitoring of water properties, dynamics and air-sea exchanges in time. However, to assess the role of SO in climate, regional phenomena need to be fully understood and to be integrated together with biological and biogeochemical estimates. Conceived in this framework the enhanced multidisciplinary IPY cruise, BONUS-GoodHope, was realized in early 2008. By coupling the ocean and atmosphere dynamics with biogeochemistry observations of the full-depth water column, the atmosphere and the sediments including trace metals and isotopes, BONUS-GoodHope preliminary results provide significant progresses in the complementary understanding of the physical, chemical and biological processes as well as on air-sea and interocean properties exchanges. In the present poster we will describe the major results on the regional air-sea dynamics and biogeochemistry as well as variability and observed changes in the subtropical and subpolar domains.