



The Agulhas-Benguela transition: A key region for large-scale ocean circulation and climate

S. Speich(1), P. Penven(2), B. Blanke(1), A. Doglioli(1), J. Lutjeharms(3)

(1) Laboratoire de Physique des Océans UMR CNRS/IFREMER/UBO, UFR Sciences, Brest, France Sabrina.Speich@univ-brest.fr (2) IRD UR IDYLE, Brest France and UCT, Cape Town, South Africa (3) Department of Oceanography, UCT, Rondebosch 77001, South Africa

Interocean exchange of heat and salt around southern Africa is thought to be a key link in the maintaining of the global ocean overturning circulation and therefore in the stability of our present climate. General circulation models suggest a predominant role for this so-called warm water route. While this connection has already been established for the upper layers of the thermocline, numerical results suggest that the Indo-Atlantic exchange is also essential to the injection of lower thermocline layers (i.e., in the range of Subantarctic Mode and Antarctic Intermediate Waters) into the South Atlantic. The confluence south of Africa of all these water masses makes it very important to understand locally the dynamics of water exchange. Most of the leakage of Indian water to the Atlantic Ocean occurs as large current rings that pinch off from the Agulhas Retroflection. These processes have been topics of theoretical and experimental research for more than twenty years. The Agulhas Current is the most intense western boundary current and the retroflection region shows one of the highest signal of kinetic energy. It has only recently been demonstrated, from intensive Eulerian and Lagrangian observations and satellite data, that the interocean exchange south of Africa is dynamically much richer and more complex than previously thought. We study the complex dynamics of the Agulhas Retroflection and regional mesoscale dynamics with a relatively high-resolution numerical model of the southern Africa Indo-Atlantic region. By means of a hierarchy of sensitivity experiments, we investigate the role of the shape and steepness of the bathymetry as well as the contribution of open ocean and atmosphere forcings. The results are discussed in terms of physical processes inducing or influencing the Agulhas Retroflection, ring shedding, local cyclone genesis and dynamics, and the influence and interaction of Agulhas waters with the

neighboring upwelling systems are also investigated.