Geophysical Research Abstracts, Vol. 9, 01941, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01941

On Madagascar, Mozambique and Agulhas Eddies

J. H. LaCasce, P. E. Isachsen
University of Oslo

The southwest Indian Ocean is a site of intense eddy variability. This is due in part to the retroflection of the Agulhas Current, which pinches off to produce Agulhas eddies. But there are numerous additional eddies here which do not stem from the retroflection. We suggest these may derive from discontinuities in the wind-driven Sverdrup circulation. The discontinuities connect the northern and southern tips of Madagascar with Africa, and the southern tip of Africa with South America. In an analytical barotropic model with a flat bottom, the discontinuities produce intense westward jets which are barotropically unstable. We studied the development of the instability using a primitive equation model, with a flat bottom and realistic coastlines. The model produced westward jets at the three sites, and these became unstable after several weeks, producing 200-300 km scale eddies. The model has only a weak Agulhas retroflection and so cannot account for Agulhas ring formation, but the eddies produced west of Madagascar and the cyclones generated west of South Africa are in line with observations. The models suggest that the north Madagascar jet is robust but that the south Madagascar jet depends on the position of the zero curl line in the Indian Ocean; under certain circumstances, the south jet can vanish or even retroflect.