



Sensitivity of the Agulhas recirculation to wind stress changes

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The sensitivity of the recirculation in the Agulhas region is investigated using a high-resolution, hybrid coordinate ocean model. This region, where the Indian and Atlantic Ocean meet, is of particular interest as it is a crucial part of the global scale Thermo-haline Circulation. The high degree of nonlinearity of the recirculation complicates its understanding and predictability.

The strength of the Agulhas current can change, through the Sverdrup transport, by changes in wind forcing. We investigate the sensitivity of the nonlinear recirculation area southeast off Africa to changes in wind stress.

The analysis of the model data shows that the timescale with which the strength of the recirculation decreases is much longer than what would be expected from the dissipation of energy by bottom friction. Apparently, the recirculation is not directly forced by the wind and associated Sverdrup transport. Our results support the hypothesis that part of this forcing is the divergence of relative vorticity eddy flux stresses. These stresses are generated by the internal variability of the ocean, especially near topography.

Sensitivity studies point out that the adjustment time of the recirculation is sensitive to the presence of the Agulhas plateau, the island of Madagascar and other bathymetric features. The relative importance of these features is presented and discussed.

The relatively long adjustment time scale of the Agulhas recirculation may limit the sensitivity of the shedding of Agulhas rings to wind stress. The implications this may have for interocean exchange is discussed.