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The Near Surface Equatorial Indian Ocean in 1979. Part I: Linear Dynamics

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ABSTRACT

Different wind field analyses are used to force a one layer adiabatic model of the near equatorial surface circulation in the Indian Ocean in 1979. The model simulates the major features of the observations: eastward jets were present in April-May and in October-November in the central Indian Ocean in phase with the local winds; the seasonal changes of thermocline depth in the western part of the basin are related to the near equatorial currents.

Significant discrepancies are also found. Some are due to the uncertainty in the wind fields. Correlation between different wind fields are only of the order of 0.75 for the low frequencies and magnitude can vary by a factor of 1.5. Others are attributed to model inadequacies especially the neglect of nonlinearity and the oversimplification of the vertical structure. There is an unrealistic energy focus in the central Indian Ocean though, in general, seasonal changes are underestimated by at least 30%.

Simpler dynamics failed to produce a reasonable agreement over the whole basin. A Yoshida jet did well for the currents in the central part of the basin, but did not reproduce the mass changes in the west. Sverdrup equilibrium reproduces the model zonal slope of the thermocline, but not the currents.

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