

On the trigger and interannual variability of the Natal Pulse

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Variability of the Agulhas Current in the southwestern Indian Ocean is characterized by its solitary meander event, known as the Natal Pulse, which may trigger the pinch off of the Agulhas Rings in the Agulhas retroflection region. These turbulent motions may influence inter-ocean water mass exchange between Indian and Atlantic Oceans and thus the global climate system.

In this study, the trigger of the Natal Pulse, and the interannual variability in the occurrence of Natal Pulse events are investigated using satellite altimeter data and outputs from the high-resolution OGCM (OFES) simulation.

It is found that most of the Natal Pulse events are triggered by anticyclonic eddies propagating from the upstream region, most of which originates from the Southeast Madagascar Current (SEMC), although eddies from Mozambique Channel also contribute to the Natal Pulse event.

Furthermore, interannual variations in the Natal Pulse occurrence correlate with eddy kinetic energy off the southern coast of Madagascar, which suggests that the Natal Pulse is controlled by anticyclonic eddies from the SEMC region. An automatic eddy tracking method supports this idea, and shows that possible eddy corridor is mainly from the SEMC region. The connection between the Natal Pulse and western boundary current along the Madagascar coast implies the potential contribution of the basin-scale wind field.

Keywords: Agulhas Current, Natal Pulse, Eddy-Mean Flow Interaction, Meander, Mesoscale Eddies