Oceanography Seminar

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"Agulhas rings structure and interactions analyzed through remote data"

Abstract: Oceanic eddies have been the subject of many experimental and theoretical studies in the last 40 yr. In the South Atlantic, in particular, the mesoscale activity is believed to play central roles in the southward heat flux in high latitudes and the inter-ocean water properties exchanges with the Indian and the North Atlantic Oceans. Currently, it is believed that virtually all the upper layer overturning circulation in the Atlantic is originated from Indian Ocean leakage through Agulhas rings. Several studies used satellite altimetry to estimate the Agulhas rings general characteristics and pathways in the South Atlantic. But since the altimetry is restricted to the surface, the transport calculations are usually based on numerical model results or simple assumptions about the ring geometry. Although several studies have observed the Agulhas rings at sea, such observations are usually restricted to newly formed eddies and do not represent the vertical structure modifications along their lifetimes.

The combination the vertical profiles from the ARGO float program with Sea Surface Heigth (SSH) satellite data is used for the characterization of each particular mesoscale structure, allowing better estimates of the eddy meridional heat flux and volume transport.

Using 3 independent datasets (blended TMI/AMSR-E SST fields, Argo profiling floats and a blended winds product), a particular surface thermal signature for the anti-cyclonic Agulhas rings as they propagate across the South Atlantic Ocean is revealed: cold Sea Surface Temperature (SST) anomalies in the eddy cores, with warm anomalies at the boundaries.

Moreover, long-term observations of concurrent satellite measurements of SSH, SST, and scatterometer surface vector winds enable detailed studies of ocean-atmosphere and bio-optical couplings. A feedback mechanism explaining how the wind anomalies influence the upper ocean thermal expression emerges.

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