Strong Interannual Anomalies in the South-western Tropical Indian Ocean Associated with the 2006 Indian Ocean Dipole (IOD)

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The southwestern tropical Indian Ocean is characterized by a pronounced shallow thermocline called the Seychelles-Chagos Thermocline Ridge (SCTR), which extends roughly from 50-80°E in the 5-12°S band. Existence of the shallow thermocline coupled with the presence of Sea Surface Temperature (SST) higher than 26.5°C throughout the year make it a potentially important region for air-sea interactions (Vialard et al, 2009). Variabilities at different timescales, from diurnal to interannual, are observed in this region, producing regional as well as global climatic modulation. In this study, we document the strong interannual-warming anomaly observed in this region following the 2006 Indian Ocean Dipole

Using newly developed high accuracy air-sea flux data (TropFlux) along with Argo data, we analyzed the various processes that contributed to the SST interannual anomaly in the SCTR region associated with the 2006 Indian Ocean Dipole (IOD). Our results indicate that lateral advection contributed significantly to the initial warming in the SCTR region from August to November 2006. The break-up of advective terms indicates that the advective warming is mostly contributed by zonal advection, consistent with the observed westward current anomalies. Part of the high correlation between thermocline depth and SST anomalies in this region could hence be explained by the zonal current anomalies in balance with the sea level anomaly, rather by than the direct modulation of the subsurface cooling. However, at a later stage, from April to December 2007, there is a decrease in subsurface cooling that maintains the positive SST anomaly throughout 2007. The influence of thermocline depth anomalies on the subsurface-surface connection hence seems to be seasonally dependent.

References

[1] Vialard et al, Bull. Am. Met. Soc., 90, 45-61 (2009).