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The influence of Seychelles Dome on the large scale Tropical Variability

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The Seychelles Dome (SD) is the thermocline ridge just South of the equator in the Western Indian Ocean basin. It is characterized by strong atmospheric convection and a shallow thermocline and is associated with large intraseasonal convection and SST variability (Harrison and Vecchi 2001).
The SD is influenced by surface and subsurface processes, such as air-sea fluxes, Ekman upwelling from wind stress curl, ocean dynamics (vertical mixing) and oceanic Rossby waves from southeastern Indian Ocean. The favoring season for a strong SD is the boreal winter, where the thermocline is most shallow. Then the southeasterly trade winds converge with the northwesterly monsoonal winds over the intertropical convergence zone and cause cyclonic wind stress curl that drives Ekman divergence and a ridging of the thermocline.
It is found that the subseasonal and interranual variability of the SD is influenced by large scale events, such as the Indian Ocean Dipole (IOD), the ENSO and the Madden-Julian Oscillation (MJO) (Tozuka et al., 2010, Lloyd and Vecchi, 2010). The SD is enhanced by cooling events in the Western Indian Ocean and easterly winds that raise the thermocline and increase the upwelling. This can be associated with a strong Walker circulation, like negative IOD conditions or La Nina-like conditions.
So far the studies focus on the origins of the SD variability, but the influence of the SD itself on regional or large scale climate is largely unknown. In this study we focus on the influence of the SD variations on the large scale tropical circulation. We analyze the covariance of the SD variations and the tropical circulation in a 200 year control imulation of the climate model EC-EARTH and perform idealized SST forced simulations to study the character of the atmospheric response and its relation to ENSO, IOD and MJO.

References

-Harrison, D. E. and G. A. Vecchi, 2001: January 1999 Indian Ocean cooling event. Geophys. Res. Lett., 28, 3717–3720.
-Lloyd, I. D., and G. A. Vecchi, 2010: Submonthly Indian Ocean cooling events and their interaction with large-scale conditions. J. Climate, 23, 700–716.
-Tozuka, T., T. Yokoi, and T. Yamagata, 2010: A modeling study of interannual variations of the Seychelles Dome. J. Geophys. Res., 115, C04005, doi:10.1029/2009JC005547.