



## **Deep meridional overturning circulation in the Indian Ocean during Indian Ocean dipole Events**

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A deep meridional overturning circulation (MOC) is one of the characteristic features in the Indian Ocean, playing important role in conveying water mass between the Southern Ocean and the Indian Ocean. In addition to seasonal variations, the deep MOC also experiences significant interannual variations for which the deep MOC is investigated during IOD events. Based on several extreme IOD events, composite analysis reveals that an anomalous clockwise deep meridional overturning cell dominates from September to December accompanying with anomalous tropical easterlies anomaly and positive wind curl anomaly in the region north of 20°S to equator during IOD events. The induced Ekman dynamics give rise to water mass convergence centered on 10°S and pump water mass down to the deeper layer in Sep-Oct. The intensified clockwise deep cell extend to 34°S and therefore export deep and bottom water to the Southern Ocean in Nov-Dec. In this study, intimate relations are revealed between Ekman dynamics and deep MOC in the Southern Indian Ocean, which suggests a strong direct dynamical link connecting deep ocean and upper ocean-atmosphere coupled system over the Indo-Pacific region.