



MJO modulation of Tropical Depression Initiations above the Southern Indian Ocean

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The cyclogenesis above the South Indian Ocean (SOI) is analyzed by considering separately initiations of tropical depressions (TD) and the probability for a given TD to reach the Tropical Storm (TS) strength. An original TD tracking approach is developed based on the ERA-Interim dataset. Only TD with duration longer than 2 days are considered and cyclogenetic TDs are identified using the IBTrACS dataset. ERA-I provides 2.5 times more TD initiations compared to IBTrACS (that focuses on developed systems) and thus gives a more comprehensive basis to study the physics of TD initiations and the probability to reach the TS strength. The MJO modulation of the number of TS is mostly due to the modulation of the number of TD initiations over the eastern SOI.

These TD initiations are clearly concentrated at 55°E, 75°E and 95°E and may be primarily attributed to the development of an unstable (inversion of the PV meridional gradient) cyclonic meridional shear of the zonal wind at low-levels. The reinforcement of the shear results first from a heat low, related to a precipitation anomaly, which triggers westerly winds equatorward of the initiation region. The shear is also reinforced by a large-scale geostrophic easterly wind anomaly south of the initiation regions due either to a reinforcement of the subtropical high (for the western IO) or to a large-scale depression over the western Maritime Continent (for the eastern IO). The origin of the modulation of TD initiations by the MJO and by ENSO is discussed for each of the 3 longitudes.