

Influence of the tropics on the Southern Annular Mode

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A new physical understanding of the Southern Annular Mod (SAM) is gained by investigating the impact of tropical sea surface temperatures on the SAM, which complements the well-accepted notion that the SAM is primarily maintained by the internal atmospheric dynamics of the extratropics. The SAM is highly correlated with SST anomalies in the tropical central Pacific during JJA, and SST anomalies in the tropical eastern Pacific during DJF. The SAM in the Pacific basin show a large similarity to a tropical forced Rossby wave train, known as the Pacific South America (PSA) pattern, while in the Indian Ocean basin, a zonally symmetric meridional dipole mode dominates. Thus, the SAM has a tendency to behave differently on the Eastern Hemisphere and Western Hemisphere, and the observed interannual structure of the SAM represents a combination of the internal atmospheric dynamics of the extratropics that is more prevailing in the south India Ocean and the influence of the tropics in the south Pacific. In addition to the well-recognized positive trend in summer, the SAM also exhibits a noticable negative winter trend since 1979, characterized by prominent increasing height anomalies in the high latitude. It both seasons, SAM trends are directly linked to long term changes in the tropical Pacific SST.