

Quasi-Stationary Temperature Structure in the Upper Troposphere over the Tropical Indian Ocean Inferred from COSMIC RO

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Vertical fine structure of the tropical circulation in the upper troposphere was analyzed with using the dry temperature data obtained by COSMIC GPS-RO. Inversion layers in the upper troposphere were observed most frequently during the boreal summer over the Indian Ocean. The region has the characteristics of a shallow quasi-stationary stable layer that is inclined from a horizontal surface; it is higher in the east and to the north of the equator. We also conducted statistical analysis with objective reanalysis data made by the European Center for Medium-Range Weather Forecasts and confirmed the presence of a warm anomaly that has a structure consistent with the stable layer detected by COSMIC analysis. We analyzed the three-dimensional structure and relationship among the temperature, geopotential height, and wind field to discuss possible mechanisms for producing these quasi-stationary structures from the viewpoints of response to the stationary heating of the Asian summer monsoon and equatorial-trapped stationary Kelvin waves.