

Atmospheric Study by Simultaneous Observation of Equatorial Atmosphere Radar and Radiosonde

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Abstract

One of the important factors of stratosphere-troposphere atmosphere exchange is turbulence around tropopause. In the tropics, characteristics of the atmosphere change gradually from upper troposphere to lower troposphere (Tropical Tropopause Layer: TTL). Using a frequency domain interferometry (FDI) technique, high range resolution observation by Equatorial Atmosphere Radar (EAR) is possible. On December 2008, Simultaneous observations of EAR, lidar, and Radiosonde were conducted. During the period, a turbulence layer around TTL was detected and the detail structure of turbulence was observed. Radiosonde observation shows that potential temperature above this layer has low vertical gradient, which suggests that atmosphere between stratosphere and troposphere is mixing. Radiosonde wind observation shows strong vertical wind shear and low Richardson number in this turbulence layer. EAR observation shows that this layer expands about 1 km of vertical range and, spectral width of more than 3 m/s is seen. These results suggest that the turbulence is caused by Kelvin-Helmholtz instability.