Quantification of the effect of cirrus cloud on the thermal structure of the Tropical Tropopause Layer

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Tropical tropopause is an intermediate layer between troposphere and stratosphere, the region where maximum convective outflow level and cold point tropopause altitude where tropical cirrus forms. Cirrus clouds are thin and wispy cold clouds which are wide spread over the globe in high altitudes (>7km at the tropics). The clouds have a major content of non-spherical ice crystals. It shows a large degree of spatial and temporal variability in their macro physical, microphysical and optical properties. It had studied the interaction of cirrus cloud to the thermal structure in the tropical tropopause layer. Most fundamental data needed for the study was simultaneous observation of temperature structure of the TTL and cloud information. The cirrus cloud information is obtained from Cloud – Aerosol Lidar and Infrared path finder Satellite Observation (CALIPSO) measurements within ±1^{o} latitude-longitude over Gadanki (13.45˚N, 79.3˚E). The data from Radiosonde has been analyzed and it has observed that TTL has a complex structure. It had categorized to sharp, multiple, broad and other peak according to their temperature structure in the TTL by direct observation. Those occasions when cirrus observations were found during both day and night are only analyzed in the present study. Cirrus top altitude distribution along with tropopause height has taken and the cirrus presence is categorized based on cirrus occurrence at the tropopause and below the tropopause. Relationship between tropopause thermal structure and sharpness with respect to the cirrus cloud thickness and presence were assimilated. It has found an observable radiative heating or cooling of tropopause when cirrus present over Gadanki both day and night. The relationship between Cirrus Top Height and CPT Height shows a positive correlation while that of CPT temperature shows a negative correlation so that it confirmed that cirrus radiative forcing more effective when which are near to the CPT. . Sharpness of the tropopause has negative relationship with the presence of cirrus.