Comparison between three types of COSMIC GPSRO atmPrf and radiosonde data in the equatorial UTLS

Noersomadi Noersomadi[1]; Toshitaka Tsuda[1]; Atsuki Shinbori[1]
[1] RISH, Kyoto Univ.

We investigate the performance of three types of COSMIC GPS-RO atmPrf profiles. The first is the data retrieved by Full Spectrum Inversion (FSI) up to 30 km. The second and third are the data released by COSMIC Data Analysis and Archive Center (CDAAC) with different version which the newer is 2013.3520 version (GO13) and the older is 2010.2640 version (GO10). This study aims to analysis the different between those COSMIC GPS-RO dataset and their comparison with radiosonde data focusing on the tropopause properties in the equatorial region. The radiosonde data used in this research are provided by JAMSTEC during CINDY 2011 campaign project from October 1, 2011 to March 31, 2012. The mean difference of cold point tropopause (CPT) and lapse rate tropopause (LRT) between FSI and GO13 profiles are -0.72 K and 0.55 K, while FSI and GO10 profiles are -0.54 K and 0.19 K, and between GO13 and GO10 are 0.17 K and -0.36 K, respectively. The results indicate that FSI profiles close to GO10 in identifying LRT, and GO10 profiles close to GO13 in pointing CPT. The mean difference of CPT and LRT from 131 collocated radiosonde and those FSI, GO10, and GO13 profiles, within 200 km and 3 hours, are 0.34 K and 0.7 K, -0.32 K and 0.87 K, -0.20 K and 0.68 K, respectively. The results show that FSI has positive bias and both GO13 and GO10 have negative bias in detecting the CPT, but all of them have positive bias in identifying LRT. The standard deviation of temperature profiles difference between radiosonde and those three GPS-RO dataset are similar in the 15-19 km altitude range. However, the average power ratio of cross spectrum of lapse rate temperature between these collocated data show that FSI able to perform large normalized frequency of temperature gradient as observed by radiosonde instead the smooth profiles of GO13. The GO10 are similar with FSI below the mean tropopause at 18 km and as smooth as GO13 in the lower stratosphere. This study suggest that FSI profiles can be considered for investigating the detail structure of atmospheric stability in the upper troposphere and lower stratosphere.