Comparison of Temperature Data above 20km between COSMIC and TIMED/SABER

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The long-term GPS radio occultation data above 40km levels may have potential use in the climate studies. However, their accuracy may be contaminated by the bending angle optimization process with CIRA climatology model in their temperature retrievals. In order to evaluate their data quality, COSMIC temperature data, TIMED/SABER data, and CIRA86 model data above 20km are compared to each other preliminarily. In January 2010, totally 37,448 profiles of temperature measurements for TIMED/SABER, and 54,846 dry-air profiles for COSMIC are available. There are globally distributed 196 pairs within one two hour and 1° latitude range and 2° longitude range for the comparison. Results show that the mean values of differences (T(SABER)-T(COSMIC)) are close to 0 K around 40km. They are negative above 40km with an extreme data of -5.4 K at 57km, and positive below 40km with maximum of 2.9 K at 23km. The variances of their differences increase with increasing height with 3 K at 20km and 11 K at 57km, which may be due to different locations and times of the pairs, as well as wave activities. Comparison between COSMIC and CIRA86 shows that their mean deviations are close to 0 K above 50km, close to about -6 K between 34km and 50km, and close to -2 K below 34km. Comparison between SABER and CIRA86 shows that their mean deviations are close to -4 K above 50km, close to about -6 K between 34km and 50km, and close to 0 K below 34km. Their variances have roughly similar features. The result that the mean deviations between COSMIC and CIRA86 are close to 0 K above 50km is due to the temperature retrieval method. Because the measured bending angle has a lot of noise above 40km or 50km, optimal estimation between the measured bending angle and the model bending angle derived from CIRA86 are taken to achieve a new bending angle profile. The optimization process makes the new bending angle profile more close to the model above 45km, from which the refractivity and temperature are derived. The comparison results above suggest that the model contamination occurs and increases versus height above 45-50km. New efforts on the optimization of the bending angle to improve the data quality will be valuable.