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COSMIC大气掩星与SABER/TIMED探测温度数据比较

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Comparison of temperature measurements between COSMIC atmospheric radio occultation and SABER/TIMED

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摘要

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摘要

本文利用2009年1月—2011年12月共3年的COSMIC大气掩星观测数据与SABER/TIMED探测数据开展15~60 km大气温度数据的比较分析研究,计算COSMIC与SABER/TIMED探测温度的绝对偏差($T_{\text{SABER}} - T_{\text{COSMIC}}$),并统计其平均温度偏差和标准偏差,分析温度偏差随高度、纬度和季节的分布特征,为COSMIC大气掩星与SABER/TIMED探测数据的应用提供更多的参考依据.结果表明: COSMIC与SABER/TIMED数据所反映的温度随高度的变化特征是一致的,数据的大体趋势吻合较好.全球范围的平均温度偏差在38 km左右接近于0 K,在38 km以上,平均温度偏差表现为负的系统性偏差,且随着高度逐渐增大,在38 km以下,平均温度偏差表现为正的系统性偏差,在23 km左右存在极大值,约为2.7 K. COSMIC与SABER/TIMED温度偏差的分布存在着随纬度和季节的变化特征,35 km以下,平均温度偏差在高纬地区和冬季较小,低纬地区和夏季较大,35 km以上,平均温度偏差在高纬地区和冬季较大,低纬地区和夏季较小.温度偏差的标准偏差在低纬地区和夏季较小,高纬地区和冬季较大.纬圈平均的温度偏差在南北半球的分布基本呈对称结构.

关键词 COSMIC, 大气掩星, SABER/TIMED, 温度, 比较

Abstract:

In this paper, stratospheric temperature measurements by COSMIC radio occultation were compared to SABER/TIMED observation from 15 to 60 kilometers during 3 years from January 2009 to December 2011. The absolute temperature difference of two different techniques was calculated, as well as the mean and the standard derivation of the temperature difference, and the characteristics of temperature difference versus height, latitude and season were analyzed also. The results are as follows: temperatures from COSMIC measurements are consistent with those of SABER/TIMED observations. The global mean temperature difference is close to 0 K at about 38 km. The mean temperature difference is negative above 38 km, and it increases with increasing height. Below 38 km, the mean temperature difference is positive with the maximum value of 2.7 K at about 23 km. In addition, the temperature difference between COSMIC and SABER/TIMED changes with latitude and season. The mean temperature difference is lower in high latitude region and winter below 35 km and is lower in low latitude region and summer above 35 km. The standard deviation of temperature difference is lower in low latitude region and summer and is larger in high latitude region and winter. The distribution of temperature difference in south and north hemisphere is symmetrical approximately.

Keywords COSMIC, Atmospheric occultation, SABER/TIMED, Temperature, Comparison

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