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Obervation of mesopause temperature by Kunming meteor radar

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A method to calibrate the initial temperatures derived from the meteor radar at Kunming in low latitudes area using SABER temperatures is presented in this paper. Most of the meteors are observed in the local morning by Kunming meteor radar, therefore, the daily mean temperatures measured by the meteor radar were biased by local morning values. The daily temperatures estimated using temperature gradient model technique are consistent well with the daily SABER temperatures which averaged from 1600 to 0600 UT, but fluctuate greater than SABER temperatures. The correlation coefficient between the meteor and SABER temperatures is 0.58. The Lomb Periodograms of meteor and SABER temperatures both exhibit clear seasonal and interannual periodicities, with annual, semiannual, quasi 90 day and terannual oscillations. The results of harmonic fit analysis show that the mean values are very close and these periodic oscillations have similar phases, however, the oscillation amplitudes of meteor temperatures are larger than SABER temperatures. The larger fluctuations of meteor temperatures were identified as larger amplitude of the temperature oscillation components. Thus, the amplitude calibration was used to adjust the larger fluctuations of meteor temperatures. After temperature calibration was performed, the fluctuations of meteor and SABER temperatures agree well, and the accuracy of the calibrated temperatures has been significantly improved. In addition, the temperatures determined by the temperature gradient model technique could effectively be used to study the waves and oscillations in the mesopause region.

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