

Initial results of diurnal tide at Wuhan (114.4°E, 30.6°N) using Canonical Correlation Analysis

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In this paper, we use Canonical Correlation Analysis (CCA) method to investigate the mesosphere and low thermosphere (MLT) diurnal tidal winds during the year 2002 observed by a newly installed meteor radar at Wuhan (114.4°E, 30.6°N). Over a pair of typical heights analyzed by CCA, 6 effective tidal modes representing over 90% total variance of the input wind components are extracted. Initial result shows that the 1st mode and 2nd mode are related to the annual and semi-annual variations, and 3rd and 4th mode may be affected by the modulations of solar 27-day rotation and the 16-day planetary wave oscillation respectively. Among the all modes, 1st mode is the most notable which represents over 40% of total variance and the re-constructed diurnal tidal wind pattern using 1st mode tends to show maximum amplitudes in spring and autumn as well as a sudden phase transit near equinox month. According to the variations of tidal phases at a pair of analyzed heights, the vertical wavelengths are near 30km for all the 6 re-constructed diurnal tidal patterns, these suggested the classic tide mode $S(1, 1)$ may be dominant mode in diurnal tide.