

Possible influences of solar magnetic activity in variation of atmosphere temperature

Zhi-Qiang Yin, Yan-Ben Han

National Astronomical Observatories, Chinese Academy of Sciences, Beijing, China

(yinzhq@bao.ac.cn;hyb@bao.ac.cn / Phone: 010-64860253/010-64888730)

Using the air temperature data from NCEP/NCAR to discuss the correlations between the solar magnetic activity, which is reflected in the sunspot frequency, and the temperature of troposphere and lower stratosphere. These data are monthly average air temperature from 1948 and have 17 pressure levels (hPa :1000, 925, 850, 700, 600, 500, 400, 300, 250, 200, 150, 100, 70, 50, 30, 20, 10), the spatial coverage is 2.5-degree latitude x 2.5-degree longitude global grid with 144x73 points. We separate these data to several parts including north hemisphere, south hemisphere, north pacific area, Europe-Asia continent area, Atlantic area, India Ocean and Africa, then reprocess these blocks of data to two columns time series through calculating these average values. We also select some special points of the 17 levels air temperature such as the points near equator or near coastline. Then we use the method of wavelet transform to analyze these reprocessing time series

Results from wavelet analysis indicate that the quasi 22-yr period of solar magnetic activity appear in air temperature as a whole, upper 70hpa the quasi 22-yr period are more evident and these periods are time variable. At some points, there are quasi 22-yr period in lower stratosphere. In troposphere, the component of periods become very complex including the top troposphere about 150 to 70hPa, but the leaves of 100hPa air temperature minus 150hPa parts show similar periods structure as the temperature of 70hPa at some points. This shows that the variation of air temperature is also affected by the solar magnetic activity at these levels. These phenomena need to be researched more deeply.