

Abstract

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Solar and Geomagnetic Activity Effects on Climate at Regional and Global Scales: Case Study- USA, Japan, and China

In this study we investigate the effects of solar and geomagnetic parameters on the mean surface air temperatures (MSAT) recorded at countries which covers a wide range of geographic latitudes from 20° N to 71° N. In this case, we Select three countries located in the northern hemisphere which are USA, Japan, and China for the period 1880-2004. From Correlation analyses we found that Total Solar Irradiance (TSI) has the greatest effect on the climate change and independent on the temperature group classification, a small change in energy flux that reached the Earth may play an important a leading role in climate changes in such countries. In addition the earlier changes of solar parameters may partially affect the present changes in temperatures. The excess of solar energy stored and accumulated for few future months (or even years) in the near-Earth system, lead to the temperature variability. Power spectral density (PSD) of the monthly values for solar and geomagnetic indices and the mean surface air temperature (MSAT) of USA, Japan, and China at different altitudes G1, G2, G3, G4, G5 have been performed. PSD show that the 22 yr solar magnetic cycle (Hale cycle) is more effect on MSAT than solar activity cycle. Generally, our results display that the solar variability parameters play an important role in climate changes and cannot be excluded from the responsibility of continuous global regional warming.