

Abstract

Aly A Abdel-Halim

Possibility of a Physical Connection between Solar Variability and Global Temperature change throughout the period 1970-2008

The present work introduces a correlative study to investigate the possible effect of some geomagnetic and solar parameters on global surface temperature anomalies (GST). Monthly averages of GST anomalies through the period from 1970 till 2008 and four solar-geomagnetic activity indices have been used. The indices are the geomagnetic activity (aa), the sunspot number (Rz), and the dynamic pressure (nv^2) throughout a period of 39 years (1970-2008) and total solar irradiance (TSI) throughout a period of 24 years (1979-2003). Scatter plots are used to show the association between GST and each of the solar-geomagnetic activity indices at zero lag. Running cross correlation analyses were applied between GST and each of these indices at different lags. Finally a series of power spectral densities (PSD) have been obtained. Our results reveal increase in GST-solar variability correlations indicated that 40-50% of this increase in GST is due to solar forcing. It is also found from correlation analysis that the change of nv^2 over GST carries a phase shift of about 47 months (~4 yrs), with the change of Rz and TSI while it experiences a phase shift of 35 months (3 yrs) with the change of aa. Similarities between sets of significant peaks in the spectra of GST and solar geomagnetic activities have revealed from power spectra analyses.