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Climate Changes Associated with High Amplitude Sq Geomagnetic Variations

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ABSTRACT

The Earth's climate has always been changing since the ancient geologic Epochs. When the solar irradiance propagates between the outer magnetospheric regions and the ionosphere, mediate dynamic processes of the magnetosphere-ionosphere-thermosphere system are affected at the lower end of their paths by the interaction of the radiations with the neutral atmosphere. The ionosphere-thermosphere interactions play an important role for explaining the relationship between the magnetic field and the changes in the atmospheric temperature.
The main target of this work is to investigate the relationship between the diurnal magnetic field variations resulted from solar activities and the variation in the Earth's temperature. The meteorological and geomagnetic data acquired from different observatories around the globe were analyzed. Three different locations in Egypt, Portugal and Slovakia for long and daily terms were presented.
The results show that for long periods, there is a close relationship between the diurnal variations, Sq magnetic field and the atmospheric temperature. The increasing rate of the temperature at mid-latitude areas is higher than at high-latitude areas. During the period of investigation, it is found that the temperature increases at Helwan, Egypt by about 0.033 °C/year, 0.03 °C/year at Coimbra, Portugal and 0.028 °C/year in Hurbanovo/Stará Lesn, Slovakia. The Sq geomagnetic variations depend on the intensity of the electric currents generated by the effect of solar radiations in the Ionosphere.