

Abstract

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Solar and Geomagnetic activity effects on Egypt's climate

We had investigated the effects of solar/geomagnetic activities on the surface air temperature of Egypt. We used the monthly sunspot numbers, solar flare and flux, total solar irradiance and geomagnetic disturbances as solar and geomagnetic activity indicators. We considered monthly Egypt surface air temperature (ESAT) throughout the period 1881-2009, which covers 12 solar activity cycles. We found a negative correlation between ESAT and solar geomagnetic indices, as well as a positive correlation with total solar irradiance for the entire data set. We found that the sign of the correlation between ESAT and R_z depends on North–South sunspot area, being positive when the Northern solar hemisphere is predominantly more active, and negative when more active is the southern hemisphere except for the cycle 13. The power spectra analyses have been applied to obtain the spectrum-cyclic behavior of ESAT, as well as for other parameters. The most pronounced power peaks were found around periods of 25.6, 8.0, 5.6, 4.1, 2.7, 2.3 years, indicating a remarkable role of solar/geomagnetic activities on Egypt's temperatures. We concluded that the signature of solar activity effect may exist on surface air temperature of Egypt.