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Spectral Analysis of Solar Variability and their Possible Role on the Global Warming

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ABSTRACT

Our understanding of the indirect effect of changes in solar output and feedbacks in the climate system is minimal. There is much need to refine our understanding of key natural forcing mechanisms of the climate, including solar irradiance changes, in order to reduce uncertainty in our projections of future climate change. Through the recent years, the conflict between researchers about whether global warming is a human-generated phenomenon or a result of solar variability has raised many question marks. The aim of this work is to try to answer some of these questions by studying the possible role of some solar variability parameters such as the geomagnetic index (aa) and the sunspot number (Rz) in global temperature changes. Here, we present a correlative study of the possible contributions for the two components that may be closely associated with the climate, throughout the last 130 years (1880-2008). We compared the correlation analysis and the power spectral density (PSD) of the Rz and aa with that of the continuous records of the GT in order to get a closer look at a possible connection between them. Our results displayed that the correlations between both (aa & GST) and (Rz & GST) are +0.66 and +0.38, respectively when both parameters Rz and aa precedes by 2-3 yrs. The correlation of GST-aa is two times higher than that of GST-Rz. The GST spectrum reflected significant periods at 21.3-yr, 10.7-11.6 yr variations that observed in the considered geomagnetic and sunspot spectra.

KEYWORDS

Global Surface Temperature, Geomagnetic Indices, Solar Variability

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