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Influence of the solar activity on the stratosphere-troposphere exchange in the southern Africa: Wavelet Approach

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Stratosphere–troposphere exchange (STE) plays an important role in atmospheric chemistry as it changes the oxidative capacity of the troposphere and potentially also affects the climate system because ozone and water vapour are potent greenhouse gases. Moreover, the exchange of particles between the stratosphere and the troposphere could lead to an increase of "bad" ozone (tropospheric ozone) and changes in concentrations of "good" ozone (stratospheric ozone). In this study, we investigate the variability of the STE using ERA-Interim reanalysis data set from the European Centre for Medium-Range Weather Forecasts (ECMWF) and a refined version of a previously developed Lagrangian methodology in the context of solar cycle variation. For the purpose of assessing the solar activity, both solar index F10.7 and the sunspot number index R were used. The study employs the methods of assessing statistical significance and confidence intervals of cross-wavelets phase and wavelet coherence to investigate the influence of solar activity in the formation of the STE process.

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No

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