



Analysis of Solar Influence on Tropospheric Weather Using a New Time Series of Weather Types

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A new daily weather types time series is used to analyse the influence of solar activity on European weather patterns. This new weather type classification is a reconstruction of an existing classification (CAP). MeteoSwiss have computed daily weather types for the Alpine Region from 1957 onward using ERA-40 and ERA-Interim reanalyses dataset with the CAP method (cluster analysis of principal components). Our new method uses early instrumental data from European weather stations to reconstruct the CAP9 classification. The new classification contains 7 types and covers the period 1763-2009.

This new time series is used to study the impact of the 11-year cycle on European tropospheric weather. For this, changes in the frequency of occurrence of the weather types are analysed. The sunspot number time series allows us to analyse changes in weather types over almost 250 years. We divide the solar activity in 3 classes (low, moderate, high) for January, February and March using subjective thresholds (33rd and 66th percentiles). The days in the 3 classes are then classified according to the new weather types. The first results show a tendency to have more days with an easterly or northerly flow over Europe under low solar activity. On the other hand, there is a higher occurrence of westerly types under high solar activity. These differences are more pronounced during the 1958-2009 period. The within types differences are also investigated with composites computed with ERA-40/Interim from 1958 to 2009. The mean sea level pressure tends to be lower over the North Atlantic under high solar activity. This study shows a change in the frequency of occurrence of weather types as well as change in the mean sea level pressure. The reasons of these changes will be further investigated.