The Etesian wind system - Classification and Climatology

Stella Dafka (1), Elena Xoplaki (1), Andrea Toreti (1,2), Prodromos Zanis (3), Fidel González Rouco (4), and Juerg Luterbacher (1)

(1) Climatology, Climate Dynamics and Climate Change, Department of Geography, Justus-Liebig-Universität Giessen, Giessen, Germany (sdafka@yahoo.com), (2) Institute for Environment and Sustainability, Joint Research Centre, European Commission, Ispra, Italy, (3) Department of Meteorology and Climatology, School of Geology, Aristotle University of Thessaloniki, Greece, (4) Department of Physics of the Earth, Astronomy and Astrophysics I, Complutense University of Madrid, Spain

The Etesian winds are among the most persistent regional scale wind systems around the globe blowing basically from the north in the lower atmosphere over the Aegean Sea during summer and early autumn.

Here, we present an analysis of the Etesian winds in the past and present time, for the extended summer season (May-September) covering the period 1971–2000 and the historical period 1780-1970. The analysis is based on instrumental station time series, ERA-40 and the Twentieth Century Reanalysis datasets. One aim of this study is to objectively classify Etesian days and to identify the Etesian episodes where an episode is defined as a series of consecutive Etesian days that are exceeding the duration threshold of 1 day. The proposed classification is based exclusively on atmospheric circulation parameters and more specifically on the sea level pressure difference among Athens and Rhodes island (3-hourly stations) during the period 1971-2000. Then, a climatological analysis of the classified Etesian days over the Aegean is provided. The relationship between the Etesians and the large-scale atmospheric circulation is also investigated by applying a classification procedure to the associated 500 hPa geopotential height field (Z500). A comparative study between results based on instrumental station time series and on Reanalyses data was held considering the vertical structure of the atmosphere.

First results show that the proposed classification method capture satisfactorily the Etesian pattern. Further, a good agreement have been found for the wind field between Reanalyses and station time series. During the recent period 1971–2000, two clusters have been selected for the Z500 field associated with the Etesian days indicating the controlling role of the large scale circulation on the Etesian wind pattern.

Finally, since the Etesian wind system shows great stability over time it would be of great importance to provide a comprehensive assessment of the wind field, its variability and evolution from past to the future, an evaluation of wind power resources over the Aegean with the goal to identify suitable areas for wind energy generation in the frame of the future climate change in the area.