Geophysical Research Abstracts
Vol. 15, EGU2013-1284, 2013
EGU General Assembly 2013

Dynamics of heatwaves over Europe and the Mediterranean region identified with the aid of ERA-Interim data.

Evangelos Tyrlis (1), Panos Hadjinicolaou (1), George Zittis (1), Jos Lelieveld (1,2)

(1) The Cyprus Institute, Energy, Environment and Water Research Center (EEWRC), Nicosia, Cyprus (e.tyrlis@cyi.ac.cy), (2) Max-Planck Institute for Chemistry, Mainz, Germany

Heatwave episodes can be associated with life threatening meteorological conditions that can have significant societal impacts. The present study aims at the better understanding of the underlying heatwave dynamics occurring over Europe and the Mediterranean region. The analysis is based on daily maximum 2-metre temperatures derived from the ERA-Interim dataset spanning the period 1979-2012. Here heatwave conditions over a specific region are defined as temperature anomalies within the upper 5% percentile of the distribution that endure beyond 4 days. The division of the whole region in geographically coherent subregions allows the compilation of a comprehensive climatology of regional heatwave episodes. Aspects of this climatology are compared against the equivalent results produced with temperature data derived from the E-OBS gridded dataset. The events are classified with the aid of a severity index that accounts for the magnitude of the temperature anomaly averaged over the whole area affected by an episode and accumulated throughout its duration. The event of 2010 over western Russia stands out clearly followed by the weaker episode of 2003 that affected western Europe.
Detailed investigation of the synoptic conditions leading to the identified hot spells reveals the diverse circulation patterns associated with events occurring in different regions. The study of blocking occurrence throughout the ERA-Interim period, which is based on the PV-θ blocking index, highlights the importance of blocking anticyclones for driving high-latitude heatwave episodes. On the other hand, high index circulation over the North Atlantic and northern Europe can sometimes result in the building of ridges over the Mediterranean, which induce northward advection of warm air masses and thus result in warm spells that can affect either the western or the eastern parts of the basin. In particular, the frequency of hot spells over parts of the eastern Mediterranean is also strongly related to the intensity of the Etesians, which are persistent northerlies influenced by the South Asian Monsoon. It is found that in cases of weak Etesians, such as during July and August 2002, when both the Monsoon and the Etesians collapsed, heatwave conditions prevailed in large parts of the eastern Mediterranean and northeastern Africa.