

Recent dynamical extremes in Europe

David Barriopedro

Instituto de Geociencias, IGEO (CSIC-UCM), Madrid, Spain (david.barriopedro@csic.es)

This talk provides an overview of several extreme events that affected Europe in the last years (2016-2018). The assessment focuses on the exceptionality of these events, considering the ongoing climate change and the associated synoptic circulation by using multiple approaches to diagnose extreme events and weather systems. July 2016 to June 2017 recorded the most severe European drought at continental scale since at least 1979, causing widespread impacts in water supply, agriculture and hydroelectric production. The event featured a highly unusual spatial pattern affecting northern and southern Europe, due to an alternating occurrence of high-latitude blocks and subtropical ridges that triggered precipitation deficits in the north and warming in the south, respectively. The drought peak in June 2017 coincided with the earliest European mega-heatwave of the last decades causing devastating forest fires and human casualties. It was associated with an unprecedented subtropical warm air intrusion, with signatures similar to those typical of July and August ridges. Dry conditions were partially alleviated in the second half of 2017 but exacerbated again in central and northern sectors during 2018. In the case of southwestern Europe, drying abruptly ended in March 2018, when this region experienced extraordinary rainy and windy conditions following the occurrence of an exceptional Sudden Stratospheric Warming (SSW). Recent warming trends are shown to exacerbate some of these events, which may represent current examples of future European extremes. Still, the results indicate a key role of the dynamics (high-latitude blocks and subtropical ridges), whose future projections are uncertain. Future studies should address the key drivers governing regional dynamical changes that are relevant to European extremes.