



## **Diurnal wind variability under heatwaves and extreme drought periods**

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Extreme weather situations produce strong impacts on society, infrastructures and ecosystems. The drought and heatwave that affected Europe in the summer of 2003 produced enormous socioeconomic implications. The anticyclonic conditions and a deficit of soil moisture availability led to the extremely high surface air temperatures registered. Several studies have shown that the characteristics of the 2003 European summer will be more frequent, more intense and longer lasting in the future. Therefore, determining atmospheric flow patterns during the heat wave and drought of 2003 is necessary in order to assess potential modifications in the circulations due to associated warmer and drier conditions. However, the effects that the extreme weather situation of the summer of 2003 produced on the surface wind have received little attention.

In this work, we examine changes in the wind field due to the heatwave and drought conditions that occurred in Europe during the summer of 2003. Our analysis, based on observations and high resolution mesoscale modelling, shows a 22 % decrease in the wind diurnal cycle for summer 2003 values compared to a climatological series based on the period from 1992-2004. We discuss the wind diurnal variability in terms of the synoptic scale atmospheric conditions, and of the mesoscale and boundary layer dynamic contribution influenced by the lower values in the soil moisture. The results suggest the synoptic conditions as the main reason of the wind field change and that these are modulated by the moisture conditions of the soil.