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European summer heatwaves and North Atlantic weather regimes in the last Millennium

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The European summer heatwaves have been increasing in frequency and magnitude in the past decades. A higher confidence in future changes in such extremes necessitates to have a better knowledge about extremes behavior in the past climate. The last millennium is well documented in terms of climate forcings. Modelling efforts have provided a wealth of climate simulations covering the last millennium. We want to exploit such data in order to assess how models simulate extreme summer heatwaves.

The surface temperature and precipitation are closely related to atmospheric patterns. It has been shown that rainy winter/spring seasons reduce the frequency of hot summer days whereas dry seasons can be followed by summers with high or low frequency of hot days. In this poster, we show the relation between winter/spring precipitation with the frequency of hot days in the 10 hottest summers in Europe and Southern Europe during the Medieval Warm Period (MWP 1150-1250), the Little Ice Age (LIA 1650-1750), and the historical-present period (1850-2005). We first focus on a millennium simulations with the IPSL model (IPSL-CM5). We use daily temperature, precipitation, and SLP data from CMIP5 (Coupled Model Intercomparison Project phase 5) and a couple of IPSL simulations with diferents forcings. Summer weather regimes has been computed as well for NCEP sea level pressure data in order to compare observations with the same period (1948-2005) in CMIP5 and IPSL simulations outputs.

We discuss and present the results comparing the effects of hydrological deficits in the preceding season, and the occurrence of specific weather regimes, during the hottest summers over Europe and SouthWestern Europe. This analysis compares differents climate forcings simulations.