Geophysical Research Abstracts, Vol. 9, 11128, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-11128

Recent and future large scale circulation (LSC) changes around Mediterranean and Europe: a worsening factor affecting summer heatwaves through a regional intensification of global warming.

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With Global Warming, Extreme Heatwaves will certainly worsen; however several mechanisms may play a role and LSC changes may, a priori, as well reinforce the regional consequences of Global Warming, or reduce them.

During the hottest 2003 and 2006 (except august) summers, characteristic LSC patterns actually repeatedly occured, with a relative Low off Portugal, and High over Spain and (or) western Mediterranean and continental Europe, and contributed to advect hot tropospheric air masses from Maghreb and Sahara.

We first focus on the recent worsening of extreme heatwaves conditions. Using 60 year long series of daily observed TX, we quantify the recent increase of Summer Heatwave Indices (HWI) over France. By analogy with the so-called Weather Regimes, we call Heatwave Regime (HWR) the LSC pattern most responsible for intense heatwaves and show that the recent increase of HWI's originates both from Global Warming and from accompanying LSC changes.

A strong correlation exists, for each station, between its summer HWI, and the corresponding T850 HWI. We characterize the end of the 21st century intensification of extreme heatwaves comparing maps of simulated T850 HWI's for Control and Scenario periods: the future rise of HWIs also appears to receive a very substantial contribution from the increasing frequency of HWR-like LSC patterns occurence, the same mechanism already at work during last decades. A similar approach would point to a decreasing frequency of Cold Wave Regime patterns during winters.