EMS Annual Meeting Abstracts
Vol. 13, EMS2016-84-1, 2016
16th EMS / 11th ECAC

Heat waves characterization over France in present and future climate

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A new method for analysing the heat waves, based on the high quantiles of daily temperature distributions, has been defined to identify heat waves at different spatial and temporal scales. Heat waves are characterised as events combining information about duration, maximal temperature and global intensity. This method has been applied over France with the SAFRAN reanalysis data since 1959 to establish regional heat waves climatology and analyze trends. Specific application on summer 2015 shows a strong spatial variability of the heat wave intensity over France and the importance to take into account their spatial dimension. Their characteristics have also been calculated for historical and future climate based on the EURO-CORDEX regional multi-model ensemble, under two different Representative Concentration Pathway scenarios: RCP4.5 and RCP8.5.
The EURO-CORDEX ensemble simulates heat waves which characteristics are consistent with the events detected from the SAFRAN reanalysis between 1971 and 2005. Models are able to simulate waves as intense as the 2003 exceptional event. Under future climate conditions, whatever the considered scenario, the heat waves become more frequent and have higher mean duration and intensity. Moreover, heat waves could occur during a larger part of summer. The 2003 event corresponds to a typical event at the end of the century, and its characteristics are much lower than the strongest waves that could occur over the last 30 years of the 21st century. However, the intensity of the evolution during the end of the century will strongly depend on climate policies.