



## **Long-term variability of heat waves in Argentina and recurrence probability of the severe 2008 heat wave in Buenos Aires**

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Heat waves are one of the main concerns related to the impacts of climate change because their frequency and severity are projected to increase in all projections of future climate. The objective of this work is to study the long-term variability in the occurrence of heat waves over Argentina. The number of days in heat waves per decade is analysed, considering spells of minimum temperature above the 90th percentile (MinTHW), maximum temperature above the 90th percentile (MaxTHW) and spells of days with both minimum and maximum temperature above the corresponding 90th percentile (EHW) for the October-March period. Decadal values in Buenos Aires experienced increases in all definitions of heat waves, but at other stations, the combination of different trends or decadal variability result in some cases in a decrease of extreme heat waves, as shown in Córdoba (central Argentina) and Las Lomitas (northern Argentina). In the northwestern part of the country, La Quiaca and Tinogasta show a strong change in the last decade, mainly due to the increment in the persistence of extreme MinTHW but also accompanied by increases in MaxTHW. In general, other stations show a clear positive trend in MinTHW and decadal variability in MaxTHW, with the largest EHW cases in the last decade. We also estimate recurrence probability of the longest and most severe heat wave in Buenos Aires (over 1909-2010, according to MaxTHW) that occurred from 3 to 14 November 2008. We use simulations with a stochastic autoregressive model that reproduces structure of the time series of daily maximum temperatures in Buenos Aires for (i) the recent climate and (ii) under several scenarios of possible future climate development based on climate models' projections. It is shown that the recurrence probability of such long and severe heat wave is likely to decline substantially in the near future even under a moderate warming trend.