

Evolution of observed daily temperature and precipitation extremes in the Balearic Islands

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The frequency distributions of daily temperature and precipitation change with time as an obvious expression of climate evolution. However, only mean values of the distributions are often monitored and the corresponding linear trends computed to assess climate change over the second half of the XX century and first years of the XXI. Indeed, these changes are well known and evident on the daily records available in the Balearic Islands from the 3 airports of the archipelago (Palma, Maó and Eivissa) for the period 1976-2006 and the 18 raingauges for the period 1951-2006. For the sake of completeness, this study is aimed at analyzing changes in the extremes of the distributions of daily temperature and precipitation in the Balearics. Before analyzing any changes, extreme values must first be characterized in terms of actual percentiles of the complete distribution. We define extreme events as those observed with a frequency lower than 1, 5 and 10% (nearly 1, 5 and 10 episodes per year or station). This relatively relaxed definition of "extreme" results in larger statistical significance of the derived trends in the frequency of this events in the relatively short available time series.

A basic statistical analysis of the extremes broke down in terms of stations and seasons reveals a general increase in the frequency of extremely warm daily maximum and minimum temperatures together with a decrease of extremely cold maximum and minimum temperature episodes. For example, the city of Palma shows a clear summer increase of extremely warm minimum temperatures (i.e., tropical nights become more frequent) together with a notable decrease in the frequency of cold minima. Regarding the daily precipitation registers, the statistical analysis reveals a moderate tendency towards the "extremization" of daily precipitation regimes, becoming during the second half of the XX century more frequent episodes with either torrential or very weak daily amounts.

Beyond the observed trends in mean values, this study highlights coherent shifts in the frequency distributions of observed temperatures consistent with a warmer climate and a significant widening of the precipitation frequency distribution, despite the measured decrease in annual mean accumulations.