



Extreme precipitation trend in Catalonia since 1950

Marco Turco and Maria del Carmen Llasat

Meteorological Hazards Analysis Team, Department of Astronomy & Meteorology, Faculty of Physics, University of Barcelona, Spain (mturco@am.ub.es)

The aim of this work is to evaluate the trend of extreme rainfall in Catalonia (NE Iberian Peninsula) from 1950 to 2003 using a high-resolution daily gridded dataset. There is a great uncertainty on rainfall in future projections for all the scenarios in this region (INM, 2007), and the present state of the art in the matter offer results that in some occasions do not agree between them (Llasat et al, 2008; Gonzalez-Hidalgo et al, 2009; Burgueño et al , 2005). The differences are mainly due to the different data-set, the definition of the rainfall metrics indexes and the methodology to estimate the trend. In order to do the present analysis, the Spain-02 daily rainfall data for a grid of 20 km (Herrera et al. 2009) has been used in the framework of the Spanish project Estcena. Previously the gridded data has been compared with the observed series for Barcelona, showing a global good correspondence with the total rain series. The trend analysis has been done following the method described in Kiktev et al (2003), in which the significance (and also the field significance) of the trends are estimated by the Monte-Carlo method. This analysis has been applied to the annual and seasonal rain as well as the six best STARDEX indexes related with extreme rainfall, for each point of the grid in the region and the average of them as representative of the entire Catalonia. In order to analyse the influence of the length series as well as the departure point, 24 series have been built, the first series starting from 1950 and ending at 2003, the second starting from 1951 and ending at 2003, and so on; the last is the series starting from 1973 and ending at 2003, in order to consider the minimum climate interval of 30 years.

Results show no global trend in the annual rainfall and STARDEX indexes. A change of global trend has been found in spring for the periods starting on 1970 or afterwards, with a decreasing of seasonal rainfall and an increasing of maximum number of consecutive dry days. On the contrary, this index presents a decreasing trend since 1960 for the autumn. Considering only the annual spatial variability of the trends in the last 50 years with field significance, the majority of grid points show an increase in the heavy rainfall days, in the heavy rainfall proportion, in the 90th percentile and in the precipitation intensity. Considering instead the last 30- 40 years, these extreme precipitation indexes present a spatial dipolar pattern, with more or less 20-30% of the area with a positive trend and 20-30% with a negative trend.