Extreme precipitation events in Macaronesia

Abstract

The thesis is dedicated to extreme precipitation events in Macaronesia, an area in the Eastern Atlantic that includes the Azores, Madeira, Canary and Cape Verde Islands. An extensive physical-geographic characteristic of the region is followed by the analysis of daily rainfall data from the period 1977–2016, based on 16 stations. Data quality fluctuates, whereas data from the Canary Islands proved to be the most reliable. To evaluate the extremity of precipitation, their one-day to three-day sums are expressed using return periods, each archipelago then obtains an overview of 20 events with the largest extremity via geometric means of the return periods. The temporal and spatial variability of the events is solved by direction vector method. In all the archipelagoes, the cases of extreme precipitation are concentrated in the humid part of the year, but at varying intensities. The highest concentration of the events is reported in Cape Verde (in September), whereas the smallest one belongs to Azores and Madeira, with one-day extremes even in the warmer part of the year. An increase in the number of events during the studied period has only been reported in Cape Verde. Extreme events usually hit only one of the Macaronesian archipelagoes. Finally, a basic analysis of the circulation causes of extreme events is carried out, using selected typification of synoptic situations.

Keywords: Macaronesia, extreme precipitation, oceanic climate, return period, seasonality of precipitation