Torrential rainfall events in Algarve (Portugal): geographic incidence and meteorological causes

M. Fragoso

Centro de Estudos Geográficos, Universidade de Lisboa, Portugal

One relevant feature of the rainfall rhythm in Southern Portugal is the occurrence of rainy events with a torrential character, especially during the fall season and often they represent a potential cause of important economic losses and damages. It is known that the higher frequency and magnitude of this kind of extreme climatic events over Southern Portugal is observed in the Algarve region, and in this paper it will be presented some results concerning the spatial and temporal incidence of this phenomenon, as also about the atmospheric environment that leads to its occurrence. The significant incidence of the rainfall events in Algarve region could be considered taking into account the main results of the statistical analysis of a daily rainfall dataset covering 98 stations located in Southern Portugal (southerly to Tagus river) and 15 years of records (1983-1998). After the selection of a sample with 199 cases (abundant rainfall days), an objective classification of daily abundant rainfall patterns was constructed and allowed to identify four distinctive clusters. Two of them are clearly associated with a higher amount of rainfall, aggregating rainfall days with a torrential character. Both patterns, mainly, affect the Algarve region, exhibiting a strong maximum of rainfall in the mountainous areas ("Serra do Caldeirão", or "Serra de Monchique"). Other relevant fact to retain from this analysis demonstrates the seasonal character of the intense precipitation events occurrence, considering that the torrential rainfall days grouped in those patterns were observed mainly during the fall season (66% and 63% of the cases, respectively).

Other sample of torrential events was considered selecting the rainy days with an amount of precipitation higher than 100mm during the period 1983-2002. These extreme events occurred mainly on fall season, and their spatial incidence was stronger at the mountainous areas of the inner parts of the Algarve region. A diagnostic study of the atmospheric context of some notable torrential events was carried out in order to identify the main factors that contribute to the convective character of the rainfall. The synoptic scale atmospheric pattern associated with these torrential events are clearly dominated by the influence of low pressure systems located over the Cadiz Gulf, responsible for the advection of fluxes of maritime air with a southerly component, providing a warm and moist air at the lower troposphere. This subtropical oceanic basin is an important area of cyclogenisis, and sometimes deep convection could be developed close to the costal areas of Algarve region or even over the inland areas. At the mesoscale scale of the atmospheric environment, different kinds of convective

structures could be produced generating heavy rainfall showers widely distributed or, in some cases, severe local storms and flash flooding. In this poster will be presented some figures and satellite derived images that document these distinctive features, observed in some of the torrential events that produced more damages, occurred in 1997 and 2001.