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Forecasting the weather
- ensemble techniques
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Atmospheric circulation related with extreme rainfall events: A case studied in western Greece

M C Kotti (1,2), D Pisimanis (2), V Notaridou (2), and A Kazantzidis (1)

(1) Laboratory of Atmospheric Physics, University of Patras, Greece (akaza@upatras.gr), (2) Environmental Physics, University of Athens, Greece

Rainfall and temperature are the two most important factors that define the local climate. Rainfall is essential in Greece for the development of agricultural production, the preservation of the forests, the hydrologic cycle in general and dispersion of pollution. Furthermore, it concerns the country's economy by affecting the incomings from agricultural cultivation or even the costs of plumbing, irrigation and land reclamation. Despite the rainfall's utility, if the rainfall events are extreme in intensity or duration it can be catastrophic for rural and urban areas by causing floods, property damage, even human losses.
An attempt is made to find the dynamical and physical characteristics of the atmospheric circulation associated with the development of cases of heavy rainfall in western Greece especially the urban area of Patras. These cases were selected after statistical analysis of 21 years daily rainfall data for the cold period (October to March) during the period 1980-2000 and the episode of 14 November 1995 (198,4mm/day) was chosen to be presented in this work. The rainfall measurements were available every 3 h from the weather station of Araxos, while the radiosonde data were taken from the nearest weather station of Brindisi, Italy, in the west of the examined area. Within a few hours the mesoscale atmospheric systems pass over Brindisi and then western Greece. The study of the case was based on dynamic and thermodynamic factors (temperature advection, relative vorticity advection and dynamic instability), which determine the geopotential height change over time and therefore the development of updrafts in collaboration with Surface and isobaric maps, as derived from the European eteorological ulletin. Grid-point values of geopotential height and temperature on a 1x1 resolution were employed to estimate the temporal variation of vertical structure of the potential temperature and equivalent potential temperature, which allows study of dynamic instability in the atmosphere. It was found that case was related with the arrival of cool air from Russia. It was generated with the divergence in the upper levels and the approach of a well vertically organized cold front that reached almost the tropopause due to strong rising motions.