

WEATHER TYPES AND GEOGRAPHICAL DISTRIBUTION OF INTENSE RAINFALL

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EXTENDED ABSTRACT

The spatial rainfall distribution is affected by the prevailing weather situation as well as by geographical factors, such as latitude, orography, etc. The study of the areal distribution of rainfall is important especially when physiographic and climatological conditions vary over the same region causing different rainfall regimes.

In this research, the influence of the prevailing weather type to the geographical distribution of the intense daily rainfall is studied. The study area is the Sterea Hellas region (Central Greece) with an area of about 25 000 km². Five important and many smaller rivers belong to this region. One of them (the Acheloos river) is the biggest river (in discharge) in Greece providing water for irrigation and hydropower. Three others provide water supply to the area of Athens. The Pindos mountain chain in the west side of this region gives rise to heavy orographic rainfall and causes a wetter rainfall regime as compared with that of the east side. Thus, the annual rainfall varies from about 2000 mm in the northwestern part of the region to about 400 mm in the southeastern part (Athens).

Daily rainfall data of 71 rain gauges over the entire region are stored and analyzed using a Geographical Information System, for a twenty year period (1970-1990). From this period, 360 days with intense rainfall were extracted using a criterion based on a threshold of daily point rainfall. For each day with intense rainfall, a square grid is constructed and the rainfall depth is calculated for each cell. Furthermore, the intense rainfall days are classified according to the prevailing weather type using a daily calendar of synoptic weather types in Greece. A widespread classification of weather types in Greece is adopted, which is based on the trajectories of cyclones, the centers of anticyclones and some special synoptic situations at surface and 500 hPa level.

Several methods are used for the analysis and comparison of rainfall distributions. The rainfall fields are plotted using an appropriate color scale, thus visualizing the rainfall distribution. This assists localization of areas attracting intense rainfall. Frequency plots and spatial correlation plots are constructed for each rainfall field. The results of these methods are statistically analyzed to trace similarities in geographical distribution of rainfall produced by a specific weather type, and dissimilarities among the distributions of rainfall produced by different weather types. Overall, the analysis shows that different weather types affect the location and other characteristics of rainfall in the study area.