

Zonnation of temporal changes and uniformity of rainfall in Iran

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Extended Abstract

Introduction

Changes in rainfall regime can represent the effects of climate change. Reduction and increase in rainfall affect many environmental phenomena such as runoff, air temperature, humidity, and also many human activities including agriculture and housing. On the other hand, the growing need for understanding climatic characteristics is essential for human life. Increasing climate information has helped understand the climatic characteristics in different regions. Therefore, use of new classification methods seems inevitable. One of the most widely used methods is cluster analysis classification recently used extensively in climate zoning.

Materials and methods

For identifying the Iranian rainy areas, the first hourly data of precipitation of 53 synoptic stations, in a common statistical period, was received from the Meteorological Organization from 1984 to 2013. The hourly data were initially converted to daily to determine the number of days of rain (rainfall of 0.1 mm or more). In order to implement the classification from rainfall continuity period, rainy days were extracted in seven classes of precipitation such as one-day range, two-day range, and three days to seven days range. The precipitation more than seven days put in class with seven days sequence. The cluster analysis was used to identify climatic regions and their features. As a result, Iran was divided into seven regions with the highest intra-group similarity and the most difference among the groups in terms of the number of rainy days. For study of rainfall periodic characteristics, we used two coefficients of variation index and rainfall uniformity index. Using Spatial Analysis in ArcGIS, we prepared annual, decade,

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and seasonal maps for the study areas to find the areas exposed to the risk of intense precipitation and flood events. In other words, vulnerable areas can be identified.

Results and discussion

Based on hierarchical cluster analysis, rainfall day in Iran was separated into seven zones. Coefficient percentage of variation of the annual rainfall in Iran ranges from 73% to 245%. In other words, the spatial variation of rainfall is high in the regions. The third zone, with change coefficient 73, has the lowest coefficient of variation due to the relatively good dispersion of rainfall during the year. After that, the fourth zone has the lowest coefficient of variation. The seventh zone, in western areas of the country and Yasuj station, is in the third rank. The variation coefficient has increasing pattern to the east ward, south ward, and south-east ward of the country. The variability of rainfall on first zone has the highest percentage. The third and fourth zone, with a rainfall uniformity index more than 70%, has periodic form. The uniformity of precipitation has decreased from the north to the central regions, so that the lowest level of the uniformity is related to the first zone with a sporadic and heavy rainfall.

Conclusion

In the present study, using the characteristics of rainy day and applying cluster analysis, it was found that there are seven precipitation zones in the country. Rainfall, Precipitation amount, and rainfall distribution is different in each of the zones. The first zone has the highest spatial variability and the highest percentage of annual variation coefficient. The lowest annual average uniformity index is related to rainfall distribution and precipitation uniformity. Comparison of the rainfall zones in terms of temporal and spatial variability determined that periodic rainfall distribution in the country is mainly concentrated in the third decade of the period of study.

Keywords: *Iran, concentration, Sequence of rainfall day, zoning*