Analysis of meteorological drought using Triple Diagram Model in the Kurdistan Province, Iran

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Abstract

Drought which means scarcity of water can affect adversely various sectors of human society, agriculture, water supply, industry and environment. Drought is best characterized by multiple climatological parameters as a natural hazard. An understanding of the spatio-temporal dependence relationships between effective variables on drought is necessary to its description and analysis. The main purpose of this study is to investigate the climatological drought in synoptic station of Kurdistan Province, Iran, using Triple Diagram Model (TDM). The data consist of monthly average temperature, precipitation, and also relative humidity from seven synoptic stations. The standardized precipitation index (SPI) was calculated for each station. The variogram of different used models have been analyzed and were been chosen using the cross validation method. According to coefficient of determination and residual sum of square indices appropriate method was selected for drawing triple diagram models. The triple diagram models have been prepared based on geostatistic principles by SPI, temperature, and relative humidity variables. The results indicate that SPI classification characterized by the scattering in two input variables can provide the analysis framework of the characteristics and variations of climatological factors. According to the calculated SPI and Triple Diagram Models, the drought periods usually occur in the less than 60% relative humidity amount and almost all of temperature ranges. The spatial relationship between stations/regions can be carried out by comparison of the humidity conditions. Application of the triple diagram models can be recommended for drought analysis in other climatological stations. The triple diagram plots help to make interpretations in spite of extreme scatter points and facilitate the explanations of the influencing trend among variables.

Keywords: Drought Severity; Geostatistics; Meteorological Drought Pattern; Standardized Precipitation Index (SPI); Wet and Dry Spells

Introduction

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Methodology

The main purpose of this study is to investigate the climatological drought in synoptic station of the Kurdistan Province, Iran, by using Triple Diagram Model (TDM). The data consists of monthly average temperature, precipitation, and also relative humidity from seven synoptic stations. The standardized precipitation index (SPI) was calculated for each station. The variogram of different used models have been analyzed and were been chosen using the cross

validation method. According to coefficient of determination and residual sum of squares indices appropriate method was selected for drawing triple diagram models. The triple diagram models have been prepared based on geostatistic principles by SPI, Temperature, and relative humidity variables.

Discussion

The results indicate that SPI classification is characterized by the scattering in two input variables can provide the analysis framework of the characteristics and variations of climatological factors. According to the calculated SPI and Triple Diagram Models, the drought periods usually occur in the less than 60% relative humidity amount and almost all of temperature ranges.

Conclusion

The spatial relationship between stations/regions can be carried out by comparison of the humidity conditions. Application of the triple diagram models can be recommended for drought analysis in other climatological stations. The triple diagram plots help to make interpretations in spite of extreme scatter points facilitate the explanations of the influencing trend among variables.