Simulating the Longest Length of Dry Spells with Approach of Climate Change in Iran

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Extended Abstract

Introduction

According to the most recent climate classification that has done yet, about 90 percent of Iran is located in arid and semi-arid climate and more than 40 percent of Iran is facing a severe water crisis. Therefore, understanding the behavioral mechanisms of dry spells has a great significance in arid and semi-arid area, like country of Iran. Especially with the pose of the phenomenon of climate change that caused the worsening dryness and desertification in some of the region. Many research simulated dry spells with climate change approach and use of the output of AOGCM models. Researches in this category are less, but the most recent research has been done by the authors (Hashmy titles et al., 2015), entitled: investigation and modeling length dry spells in the southwest area of Iran. The results indicated length dry spells, have an increase of 20 percent, especially in the winter for decade 2050. In other researches that done by (Dastidar et al. 2010; Schoof and Pryor 2008; Racsko et al. 1991; Semenov and Brooks 1999), Simulating longest wet and dry spells by using randomly generated climate models (LARS-WGS) based on semi-empirical functions, which in this research has been emphasized properties of dry spells (like: frequency of occurrence, average length of wet and dry spells, and the maximum length of wet and dry spells). The aim of this research is to examine the longest length of dry spells with approach of climate change in Iran.

Materials and Methods

According to aim of this research is to study the longest and extraction length dry spells with climate change approach and climate modeling, used two database in this study: The first database involves collecting and analyzing information database (minimum temperature, maximum temperature, rainfall and sunshine) 45 synoptic stations that have favorable conditions (the maximum area coverage and continuous and reliable data) which were selected for the final processing of the data first base. The second database contains data provided by version 5 models (LARS-WGS) and on emissions scenarios (B1, A1B, A2) from AOGCM models for the decade 2050 to be downscaled. In fact, this data is the first database (minimum temperature, maximum, precipitation and sunshine) which was prepared on the format models for analysis and predict climate change, after downscale it. Because this study was based on the study and extraction length of dry spells in the range of long-term with the approach of climate change, so the methodology based on several stages: In the first verification (validation) of LARS-WG, to ensure efficiency in the process model simulation will be discussed. Then performance and capabilities of 15 AOGCM models with the new version Lars-wg were assessed. At the end, the precipitation threshold, with the aim of extraction the longest length dry spells was defined, and then compared with the maximum length of the simulated dry spells.

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Discussion and Results

Maximum dry spells in Iran is compliance with driest condition in central and eastern areas. So that the country could be divided on the threshold of .1 mm into 6 orbital region which the northern circuit during the period of 37 days (in the Rasht station) is the minimum and south eastern close circuit with 351-day period in Chabahar stations is maximum in dryness. The values show that there was no rain the threshold of .1 mm at more than 65 percent of the area’s dry spells over 7 months. With a threshold of 5 mm maximum length of dry spells lasted about a year with 364 days in Yazd station. That is roughly one year the size of 5 mm precipitation is not registered at this station. According to the threshold of 10 mm the condition of dry spells roughly worsened to previous thresholds. So that in 90 percent of the area’s dry spells has been dominated for more than 8 months. In Yazd and Zabul stations with the longest periods 365 days and Anzali station with the shortest period of 123 days is included.

Conclusion

Dry spells modeling indicated that with the base of both scenarios (A2 and B1) in the southeast and central areas in decade 2050 have the longest dry spells. So that in the most optimistic case (scenario B1) dry periods on average is 3 days longer than in the same of past situation. The maximum length of dry spells in the northern strip of the coast of the Caspian Sea has not so changed with the compare of the situation dry spells (only increased on average of 2 days). In the Northwest area during dry spells compared to the past situation is five days longer.

Key words: Dry spells, Simulation, Climate scenarios, Climate change, Iran.
References

3. Asakereh, H., Mazzini, F. (2010). To evaluate the probability of dry days in Golestan province using Markov chain model, geography and development, Volume 7, Number 8, pp 1-16.


