



## Investigating Precipitation Extreme and Ardebil Temperature Behavior by Statistical Tests

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### ABSTRACT

One of the natural disasters that threatens our country and every year billions of Rials damage to agricultural land and areas of natural resources and infrastructures, such as bridges, canals, dams, etc. makes, floods that usually associated with the occurrence of heavy rainfall. The aim of this study was to investigate the behavior of precipitation extreme precipitation and temperature with the help of statistical tests is Ardabil. Two measures atmospheric temperature and precipitation are the most important elements for identification and analysis of climate change identified by research centers and researchers used climate change. For this purpose, the daily data of precipitation, temperature minimum (night) and the maximum daily synoptic stations during the period 1965 to 2015 is Ardabil. The research team identified profiles are presented of climate change and climate change profiles (ETCCDI) was used to analyze the events and climate change. As impressive 12 profiles 20 profile 22 profiles of the precipitation extreme temperature and precipitation extreme of precipitation. For information about events, climate change, statistical analysis has been used by the World Meteorological Organization.

*Keyword:*  
*Precipitation*  
*Extreme*  
*Ardebil Temperature*  
*Statistical Tests*

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## INTRODUCTION

Human civilization is based on normal local conditions and based on the average influenced by natural elements or frequency of these elements is formed. Basically, natural disasters, extreme events are expected to take place no human artifacts and human capacity is therefore necessary powers to deal with such extreme events, and usually human in the face of damaged, frequency damage incurred. Each year, several natural disasters on our country come to the configuration. Therefore, today the time has come for environmental planners and policy makers accept that the nature of society has always extreme events are glaring in their plans and programs to predict the possibility of them at the time of the problems faced by smaller return (Montazeri, 2009).

Today's event is a minimum change in mind, we have all been attracted and concerns arising from the occurrence of these phenomena, many of the meetings of the scientific debate and research is the science of climate change in least we believe that the events in the form of precipitation extreme measures and in particular to the atmosphere in the temperature and B. The value of be looked down upon. The yen also proposed to be looked down upon that for the identification of these phenomena precipitation extreme behavior these two measures are considered important should be given. Ian load to the Yale effects of these phenomena occurring both within and outside the research of Iran on the microclimate change it done et al. precipitation extreme daily maximum and minimum temperatures observed in the analysis were Yale. In this study, data from the National Center for Atmospheric Administration of the US action Janos and the head of the unit. The results showed that the intended microclimate change throughout the seasons the same. To this means that during the winter and spring period microclimate change of the seasons is larger than the other Pierre (Keysser et al., 2006). Iran is the world's sixth most disaster-prone country in the top 10. Of the approximately 40 known in the world of natural disaster occurring in our country there are 30 cases (Farajzadeh, 2005). One of the natural disasters that threaten our country and every year billions of Rials damage to agricultural land and areas of natural resources and infrastructures, such as bridges, canals, dams, etc. makes, floods that usually associated with the occurrence of heavy rainfall. Therefore, in this study, based on a comparison of the absolute extreme daily rainfall and temperature as events that according to the data from meteorological stations capacity of its occurrence in nature, with average annual rainfall of as a measure that made it is compatible with your human has been built up in this way for this area of the city (Ardib Yale), the gap between those events are more extreme and mean mode, can be uncovered. These zones are arguably more sensitive and more vulnerable than. On the other hand, also be specified in terms of the time that this city, in the months of highest daily rainfall is received. Knowing it could be environmental planners to assist in the implementation of their successful programs and field management practices risk rather than crisis management on the issues of Heavy Rain and temperatures of the high (Montazeri, 2009).

## Methodology

Two measures atmospheric temperature and precipitation are the most important elements for identification and analysis of climate change identified by research centers and researchers used climate change. For this purpose, the daily data of precipitation, temperature minimum (night) and the maximum daily synoptic station Ardabil is used during the period 1965-2015. Gathering information on the definitions and concepts to describe the theory and research is a library. The temperature and precipitation data from the Bureau of Meteorology Ardabil will be provided. Cumulative deviations test (CDT) and likelihood ratio test Vercelli (WLRT) to identify homogeneous or heterogeneous data and identified a series of mutations and change the profile will be used when Whitney - to estimate the significance of the mutation is taken. The significance of each of the 33 profile remembers precipitation extreme was examined by nonparametric method to estimate and (Sen) per decade estimating the rate was steep.

## Finding

Results of fitness tests are shown on time series homogeneity and the overall index over the study period. (Table 1) It is remarkable that during the period of study time series of temperature and precipitation extreme indices often are heterogeneous in Ardabil synoptic stations. Among the 33 index homogeneity of the study only shows the time series of RX1day profile. Heterogeneous time series of at least two indices by homogeneous tests (anisotropy) at 99 percent confirmed. According to the results of the Mann-Kendall test the temperature in Ardabil station precipitation extreme indices, as can be seen in Table 1 of frost days, summer days, during the growing season, heat wave, the average maximum temperature average minimum temperature, night cold, warm nights, the largest minimum temperature, tropical nights, warm days and cold days, R5, R10, humid days and total annual precipitation has significant trends in the levels of 99 percent.

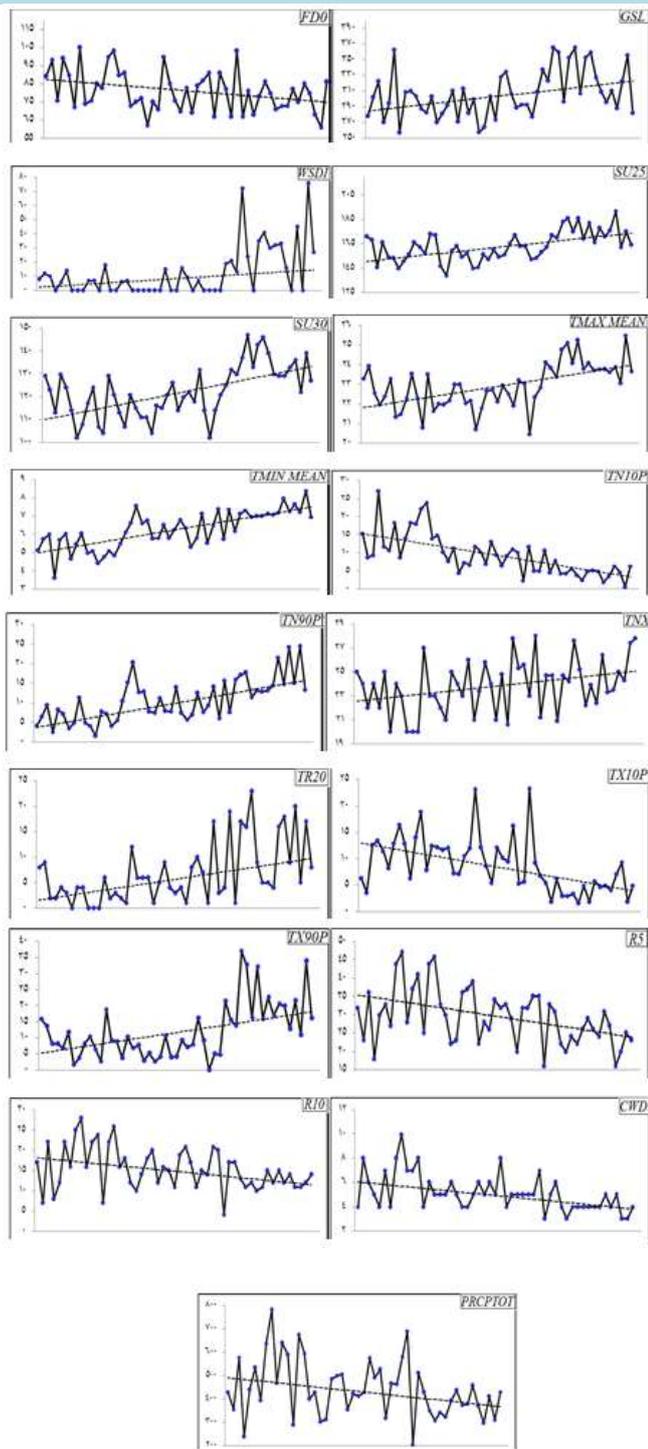
Table 1: Significant homogeneity and trends of temperature and precipitation extreme indices in the synoptic Wiki

Profile	Cumulative deviations	Homogeneity test	
		Likelihood Vercelli	Mann-Kendall
FD0	**1/78	**3/14	-1/19
FD5	0/97	**2/2	-1/6
SU25	***2/7	**5/25	**2/35
SU30	**2/58	***87/6	**4/57
ID0	**1/54	**1/46	-0/76
ID5	2/71	**3/59	-1/32
TR20	***2/46	**5/81	***2/99
TR25	**0/97	**2/69	
GSL	**2/54	1/32	2/12
TXx	**2/32	***4/12	0/91
TXn	***2/73	3/13	**2/12
TNx	3/41	**2/45	1/94
TNn	**2/54	1/32	2/12
TN10p	**2/32	***4/12	0/91
TX10p	***2/73	3/13	**2/12
TN90p	3/41	**2/45	1/94
TX90p	**2/54	1/32	2/12
WSDI	**2/32	***4/12	0/91
CSDI	***2/73	3/13	**2/12
DTR	3/41	**2/45	1/94
RX1day	**2/54	1/32	2/12
RX5day	**2/32	***4/12	0/91
SDII	**1/54	**1/46	-0/76
R5	2/71	**3/59	-1/32
R10	***2/73	3/13	**2/12
R20	3/41	**2/45	1/94
TMAX MEAN	**1/54	**1/46	-0/76
TMIN MEAN	2/71	**3/59	-1/32
CDD	***2/73	3/13	**2/12
CWD	3/41	**2/45	1/94
R95p	**2/54	1/32	2/12
R99p	***2/73	3/13	**2/12
PRCPTOT	3/41	**2/45	1/94

+ Significant at the 90 percent confidence level, \* significant at 95 per cent, and \*\*\* and \*\* significant at a confidence level of 99%.

Rand rate profile changes significantly every decade in Table 1. The greatest rate of change in the index between them during the growing season (GSL) is the rate of change of the index is 5.7 days per decade. In other words ten years Ardabil added 9 days during the growing season. The rate of change is increasing, and every ten years summer days also added 25 days to summer days. The mean minimum temperature (TMIN) 5.0 degrees Celsius every ten years has been added. The rate of change during heat waves (WSDI) 3 days per decade and heat waves have been longer. The frequency of occurrence of tropical nights (TR20) has increased. In contrast to 4 days per decade of frequency of occurrence of frost days (FD0) is reduced. The frequency of cold nights (TN10P) and cold days (TX10P) was 3.3 nights and 5.2 days per decade has been reduced. In general it can

be said that the occurrence frequency of precipitation extreme temperatures and decreased frequency of occurrence, Ardebil station precipitation extreme warm temperatures have risen. Figure 1 Sen slope estimator fit on annual time series profiles show significant precipitation extreme temperature and precipitation. Increasing and decreasing frequency of occurrence and amount of acclaimed a profile on the figure represents changes in these indices during the period under investigation.



**Figure 1: Sen Slope estimator fit on annual time series profiles show significant precipitation of Ardabil**

The aim of this study was to investigate the behavior of precipitation extreme precipitation and temperature Wiki to help test the synoptic stations. For this purpose, the daily precipitation data, the minimum temperature (overnight) and maximum temperature (daily) Ardabil synoptic stations were used during the period 1965-2015. To identify the profile of precipitation extreme precipitation and temperature profiles are presented of 27 research teams identify and profile of climate change and 6 other

precipitation extreme profile we used. Before doing any analysis of the data quality control and throws amounts of time series data were excluded. For information about events, climate change, statistical analysis suggested by the World Meteorological Organization we used to analyze climate change. Vercelli cumulative deviations test and likelihood ratio tests to identify homogeneous or heterogeneous time series data and identifying the mutation and change the profile was used. The findings show that in Ardabil profile of precipitation extreme cold frost days, the minimum temperature, cold nights, cold days are dwindling, while precipitation extreme hot summer days, nights, tropical, hot days, warm nights, number heat waves, the average minimum temperature average maximum temperature has increased. Increased precipitation extreme heat and reduce the intake of rainfall in Ardabil a sign of the occurrence of climate change and confirmed the findings of other researchers in the event of climate change in the region, which can lead to dehydration and water crises, problems of socio-economic and environmental abundance in the region.

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