Extended Abstract

Synoptic Analysis of Flood Generating Systems in the Southern Part of Iran

A. Parandeh Khozani1 and H. Lashkari2

Introduction

Flood is one of the most destructive natural disasters that have historically done considerable harm to humans. Unfortunately nowadays despite great technological improvements, there is still no acceptable prevention method for this natural phenomenon. This is mainly due to lack of knowledge or the limited facility in this field. Knowing the causes and predicting the time and intensity of the flood is a necessary step in such practices.

Iran is a dry and semi dry country with a small amount of rainfall that is unevenly distributed over time and space. Rainfalls are usually in the form of short and intensive showers as regards to the country's special climatic condition. According to the vegetation and topography, these showers would generally not get the chance to penetrate into the underlying layers and thus form disastrous floods. [Lashkari (1375)] Every year many people lose their lives because of floods. Records also show massive economical losses are a result of flood events. [Abstract of background flood In Iran (1374)].

In order to prevent flood damages and also for source water management one approache can be to study the flood in different regions using a synoptical method.

Objectives

The main aim of this article is to recognize the patterns of synoptic systems leading to torrential rainfalls in the south of Iran in order to make better use of the regional torrential rainfall and to help predicting the showers that lead to floods.

Methodology

Twenty major flood events were selected regarding the high discharge, daily rainfalls, and their related damages. Then their synoptic maps were investigated and finally were classified into four different groups regarding their arrangement, patterns, extensions and the movement directions.

Results and Discussion

The following factors give strength and applicability to the synoptic systems for flood prediction in southern Iran:

1- Before the precipitation starts, Sudans and Red Sea flame expands towards South of Iran and it covers the region at the beginning of precipitation.

2- The existence of a regional anticyclone on the Oman sea and the East of Arabestan plain provide enough moisture to feed this system in the day with the highest precipitation

3- The cover of Sibri anticyclone over Iran (and South of Iran) before the precipitation starts, causes the cold weather from high latitudes to increase the thermal gradient over the region. Sometimes the combination of Sibri anticyclone with Arabestan regional

1- Senior Expert of Climatology in Esfahan Meteorology Bureau E-mail: parandeh_153@yahoo.com
2- Associate Professor, Department of Geography, Faculty of Earth Sciences, Shahid Beheshti University, Iran, E-mail: Dr_lashkari61@yahoo.com
* - Corresponding Author
anticyclone transfer hot and humid weather of the Indian Ocean and the Oman Sea into this region.

4. The existence of high latitude Asour at the levels of 500 and 700 Hectopascal, strengthening thermal gradient over the region due to the cold weather from the East over the North of Africa and Mediterranean Sea also made Sudan heat low centers and Red Sea convergence zone active and to become dynamic and thermodynamic. (Figure 1 & 2).

5. The existence of high latitudes in the Arabestan plain at the levels of 700 and 500 Hectopascal is needed for transition of hot and humid weather into the system. (Figures 1 and 2).

6. The existence of low heat center before the beginning of precipitation on South and Center of Sudan, expands flame towards high latitude by its movement to the Red Sea. When it nears the South of Iran, precipitation begins.

![Figure 1](image1.png)

**Figure 1** - Situation of low altitude centers of 20 selected floods in the level of 700 Hectopascal in 24 & 48 hours before rainfall and the first & second day (heavy rain) after rainfall

![Figure 2](image2.png)

**Figure 2** - Situation of low altitude centers of 20 selected floods in the level of 500 Hectopascal in 24 & 48 hours before rainfall and the first & second day (heavy rain) after rainfall

**Conclusion**

With synoptic analysis of severe storms which lead to heavy rains and torrential rainfalls, it is shown that these storms are mainly caused (influenced) by strengthening the center of Sudan heat low and Red Sea convergence zone and sometimes these storms are caused by simultaneous merging of the Sudan heat low system and Mediterranean frontal system and changing into dynamic or thermodynamic systems.

**Keywords:** Synoptic analysis, Torrential systems, Flood forecasting, Iran, Inundation.

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