

## Clouds analysis in heavy and super heavy precipitations in the southern coasts of Caspian Sea

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Received: November 9, 2010 / Accepted: August 13, 2011, 1-4 P

### Extended abstract

#### 1- Introduction

The cloudiness effects on the climate in the southern coasts of Caspian Sea through increasing of humidity, precipitation and cloudiness cooling. Spreading of Caspian Sea in the north of area and Elborze Mountains in the south of area cause suitable conditions to generate heavier precipitation in the southern coasts of the Sea when low pressure systems pass from area or high pressure systems are located in around of Caspian Sea. The previous researches showed that convective clouds are the most important cause to generate heavier precipitation but non

convective clouds can produce this group of precipitation if they accompany with convective clouds. In this research, kinds of low clouds which produce heavy and super heavy precipitation events were studied.

#### 2- Methodology

Precipitation events are computed on the basis of daily precipitations (1982 to 2003). Precipitation events were divided into 2 groups heavy and super heavy precipitations after sorting with regard to 25 and 50 percent probability. Then, the classes were grouped into two classes convective and non convective clouds based on clouds synoptic indices. Clouds synoptic indices 2, 3, 8 and 9 show convective clouds as well clouds synoptic indices 4, 5, 6 and 7 show non convective clouds. Convective and non convective clouds which generate heavy and super heavy precipitation events analysis and compare were used METEOSAT 5 images were used to

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survey and determinate clouds location in different geographic places.

### 3- Discussion

Precipitations in the southern coasts of Caspian Sea are different from of the rest of places in Iran both amount and duration. Synoptic and dynamic conditions particularly sea surface temperature over the Sea and cold advection from north to south can be the most important factors to produce the clouds. The previous studies have indicated that the main cause to generate heavier events is convective clouds. The results show that the area is divided into 3 regions on the basis of formation conditions of clouds and its daily and monthly regimes in general. The first region is the west and middle coasts of Caspian Sea. Cumulonimbus clouds (type 3 and then 9) produce heavier precipitation and the frequency of convective clouds in heavy group is less than super heavy group. Frequency maximum is at 03 and 15 o'clock GMT in different months for heavy precipitations group. The second region is the east coasts of Caspian Sea. The convective clouds are the main cause to generate heavier precipitation events and its frequency is more than non convective clouds. The most frequency of convective and non convective clouds is between 03 and 15 o'clock GMT. The third region includes mountainous parts in the middle of area. Cumulonimbus clouds (type 3) which are locally and not spread produce heavier precipitations.

### 4- Conclusion

convective precipitations particularly cumulonimbus clouds are the main cause to generate heavy and super heavy precipitation events originally in the southern coasts of Caspian Sea even though non convective have been spread throughout of sky. Non convective clouds have the main role in heavy precipitation than super heavy precipitation. Cloudiness percent and monthly regime aren't similar in different regions as cloudiness in the west region is more than the east and mountainous places. The frequency maximum is 03 and 12 GMT for convective and non convective clouds respectively.

**Keywords:** convective and nonconvective clouds, heavy and super heavy precipitations, southern coasts of Caspian Sea.

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