# *Nature and structure of the atmospheric circulation in pervasive rains of spring, Iran*

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## Extended Abstract

### Introduction
Atmospheric circulation patterns play a major role in temporal distribution and geographical distribution of precipitation. According to most researchers, the changes in climatic circulation patterns are controller of swing shifts, and also the intensity of precipitation and changes in atmospheric moisture content. Thus, increases in atmospheric temperature will follow moisture content. On the other hand, the changes in precipitation patterns may be affected by carbon dioxide. How much the increase in greenhouse gases can affect climate processes is still a question by many researchers. But it is obvious that the density increases the concentration of greenhouse gases directly or indirectly in climate elements, and that both space and time is affected. However, many studies have indicated that rainfall patterns in tropical areas, especially over the oceans, are heavily influenced by changes in temperature (SST) patterns at sea level.

### Materials and methods
In order to perform an analysis of extensive spring rains in Iran, this study uses two groups of different environmental data.

1. Environmental Data: This group of data contains interpolation of daily spring rainfall quantities of station in April, May and June throughout the country from 1961 to 2010 (4650 days). Using daily precipitation data from 551 synoptic and climatology stations have been measured by the National Meteorological Organization of Iran. Finally, by combining these three matrices, matrix dimensions can be obtained for the studied period (4650×7187). After identifying rainy days, the percent coverage (pervasiveness of precipitation) has been considered. Given that most researchers in their studies have selected fifty percent coverage as the threshold for pervasive rains, this study also uses the 50% threshold. Thus, 265 days have been selected and subsequently analyzed.

2. Atmospheric data: these data consists of sea level pressure and geopotential height at 500

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hPa with zonal and meridional wind data. They have been received from the database of National Center for Environmental Prediction of National Center for Atmospheric Research (National Centers for Environmental Prediction / National Center for Atmospheric Research).

## Results and discussion

The results of this study have indicated that spring rainfall of pervasive rains is increasing towards June. The results of the study have also revealed that four patterns, the Saudi low pressure, Iran central low pressure, the Europe low pressure, Sudan low pressure, the Persian Gulf low pressure, Siberian high pressure and the multi-core patterns of the Middle East low pressure have the highest influence on the pervasive rainfall in spring. In all four patterns, the convergence centers of 1000 hPa are consistent with low pressure systems. In 1000 hPa level moisture flux maps, humidity injection has been done mainly through the anticyclone on the Arabian Sea into the Sudanese system. It was strengthened by injecting humidity from the Red Sea and the Persian Gulf. Therefore, the cold air advection of high pressure centers on the system has been occurred due to its dynamic and moisture transport in the North to the Persian Gulf and Iraq. According to the maps, Front Genesis at 850 hPa at all the patterns is frontogeneses mainly in accordance with the transmission path. It is hot and humid weather that extends north.

## Conclusion

Spring rains have also daily rise and fall with high spatial variation coefficients. Towards the June the changes become more significant. The results of the study have indicated that there are four patterns, the Saudi low pressure- Iran central low pressure, the Europe low pressure - Sudan low pressure, the Persian Gulf low pressure- Siberian high pressure pattern and the multi-core pattern of Middle East low pressure. These systems play the most important role in pervasive rainfall in spring on Iran.

***Keywords: spring pervasive precipitation, moisture flux, Frontogenesis, perceptible water, convergence and divergence***