The Variability of 500 hpa Geopotential Height and its Role on January Oscillation of Iran

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Extended Abstract

Introduction

Iran country because of great spreading with a view to geographical longitude and latitude, existence the contortion of unevenness configuration and locating in exposed of air masses attacking has special circumstances in terms of temporal. The overall structure influenced by latitude, altitude and air masses. So that with changing each of these factors the temperature will change. In other words the general condition of temperature is a function of latitude and altitude and other factors such as aquatic area and land forms has a role in creating temperature structure that is referred as local factors. Although it seems that temperature changing follows a general pattern which depends on sun radiation angle and the quality of heating energy distribution in a term of hot months. But however the temperature is not steady but observed some subsidence and rising.

Data and methods

With due attention to 2.5 degree interval of NCEP data, 24 points is located in an internal frontier of Iran. So first the Geopotential height of 500 HPA and sea level temperature extracted for January in 1961-2010. Then in order to calculate the correlation of these variables on each other and these data standardized with Z index. The dispersion map of value correlation and sea level temperature indicates the strong relation in all regions of country. The most value correlation is in the center and north east. The most value of correlation in the south west of the country reach to 0.82 and the least of that reach to 0.59. The method which used in this research is circulation to environment and the aim was that the anomalies of Geopotential height of 500 HPA on sea surface studied. So the standardized Geopotential value of 500 was ordered in a 24 dimension (points number) in 50 (years number). Then in order to reduce the years of studied and also classification the years with same pattern, these data reduced to 4 factors with using factor analysis and the kind of VARIMAX rotation which totally explained 97.7 percent of data variance. Then the map related to each pattern draw and for recognizing the core maximum anomalies of geopotential height, the year which had the most correlation with each factor was chosen.

Discussion

The results which obtained from abnormal values in height of 500 HPA map, showed that the north west and south east had the most height abnormality and the synoptic result showed that in the first and the second patterns in an order, settlement the shallow trough, the orbital flows in east of Mediterranean and orbital lines of the height of 500 HPA and decreasing the Geopotential

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on Iran which was obstacle from transferring the hot weather of the lower latitudes, caused to occurrence a colder January in Iran. But in the patterns 3 and 4\textsuperscript{th} create a hotter January because of formation the ridge and increasing Geopotential height on Iran and prevent from transferring the unstable systems and falling the cold weather of higher latitudes.

**Conclusion**

The results show the following outstanding specifications about these patterns and their relation with temperature of January in Iran. In the first pattern existing the shallow trough in east of Mediterranean with strong orbital blowing on Iran, transfer the cold weather of high latitudes to Iran. In this occasion the north west of Iran had the most amount of negative abnormal and south east of Iran the most positive abnormal. In the second pattern the curvature of lines was too little and the flows were orbital and barotropic. In this pattern the maximum of negative abnormal in the level of 500 HPA is seen in south east of Iran. The occurred maximum core of negative abnormal in this pattern is located on Oman Sea. So existing the orbital flows create such a temperature of negative abnormal for south of Iran. In the 3\textsuperscript{rd} pattern a weak ridge create a weather subsidence from high latitude till North West of Iran. Also on the other hand a weak trough was seen at east of Aral lake. This occasion causes the positive geopotential height in the half west of Iran and negative abnormal in the east border of Iran and finally in the 4\textsuperscript{th} pattern with creating a weak ridge in the east of black sea cause to create a maximum positive abnormal core in this region. In this occasion all parts of the country specially the northwest had the more geopotential height.

It should be noted that which positive geopotential height in all the patterns cause to emerge the high temperature and reverse. Analyzing that which patterns cause positive and negative temperature in January month in Iran was the main output of this research. The performance of these patterns when appeared which we know orbital flows on level of 500 HPA cause to occur colder Januaries in the south east of Iran.

**Keywords:** Approach Circulation to the environment, 500 hpa height anomalies, anomalies temperature, principal components analysis, Iran.
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