Synoptic Analysis of Sweeping Cold Waves of Iran
Case: Chahar Mahal & Bakhtiari, 21 Dec 2004-18 Feb 2005

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Introduction
Human life has been affected by the weather conditions. Since weather conditions may be favorable or adverse, human has tried to defend himself against climatic conditions through understanding the nature of the climate. These efforts led to the identification of the origin and how they were created. Such knowledge is also more accurate and more scientific.

In synoptic climatology, by relying on the accepted principle of explanation and analysis of environmental changes of the earth surface through the changes of pressure patterns, it is possible to more explain, analyze, and forecast the climatic phenomena of the earth surface.

One of the most important climatic disasters that threaten our country, are cold wave and severe freezing that in some years covers large areas of the country. Freezing usually occurs with the entry of the air masses of below zero degrees. These air masses accompanied with relatively stable and multi-day cold waves that may lead to adverse effects. For example, scarce and extreme cold of January and February 2005 in Iran, which has covered a wide and extensive part of the country.

For synoptic explanation and analyze of the sweeping cold wave of Iran, minimum temperature of the stations within the province of Chaharmahal & Bakhtiari was selected and then the data of sea level pressure (SLP) & geo-potential height of middle level of atmosphere was select for explaining this event.

Research Methodology
This study intends to present a synoptic analysis of the sweeping cold of January and February 2004 in Charmahal & Bakhtiari province by the “Environment to circulation analyze “model. Then specifies the cause and continuation of this cold.
Following the accomplishment of this goal, means the synoptic analysis of sweeping cold wave from 21 December 2004 up to 18 February 2005, the data of eight meteorology stations (synoptic and climatology) in this province was used. The statistics of minimum daily temperatures for this two-month period of 8 stations were obtained from the Statistical Center of Iran Meteorological Organization.

Also, the daily data of sea level pressure and geo-potential height for the months of January and February (December 21, 2004 to February 18, 2005) at the study area with location accuracy of 2.5 was obtained from NCEP / NCAR base.

**Discussion and Results**

In this period, high-pressure center of Siberia, through its relocation from the east to the west, sends its spit toward the lower geographical latitudes and consequently seven severe cold wave have been created in the region. In this study, the cold wave is called small-period. Each small-period 1, 3, 5 and 7 were continued for two consecutive days. Each small-period 2 and 6, five days and finally small-period 4, has been continued for six consecutive days.

In all Geo-potential height maps, simultaneously with the penetration and spread of Siberian high pressure on the study area, heights was created up to elevation 5,800 meters. This feature justifies the falling of severe cold weather along the east part of these heights.

Comparing the maps of sea level pressure of small-periods showed the Siberian high pressure center simultaneously with its developing over southern latitudes has moved up to about 50 degrees east longitude (exactly along the geographic north of Iran).

In peak condition, (25 to 29 January 2005), the sixth period of cold wave (up to mean temperature -16.7 °C) has been formed in the study area.

**Conclusion**

In the period 10.01.1383 to 30.11.1383 (December 21, 2004 to February 18, 2005), the Siberian high pressure with displacement of its center toward the west along geographical north of Iran, as well as strengthening and expanding its spit toward the southern latitudes, has imposed a severe cold wave to the study area. Its effects has been appeared as the severe fall of minimum temperatures in the area. During the small-periods that Siberian high pressure is consistent with the orientation of the west winds, the most severe cold waves has created in the region.

**Keywords:** Siberian high-pressure, Cold wave, Minimum temperature, Period-Small, Geo-potential height, Sea level pressure.
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