

عنوان مقاله:

Investigation of the climatological effects of the stratospheric polar vortex in Southwest Asia

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خلاصه مقاله:

The relationship between the stratospheric conditions and evolution, and the surface weather, not only has revolutionized our understanding of the functions of different atmospheric layers and their dynamics, but has also brought about potential implications for weather and climate predictions in almost any region of the planet. Obtaining a better understanding of the field, particularly in Southwest Asia, is the motivation for this study. The, NCEP/NCAR reanalysis data including minimum and average daily temperature, geopotential height, the precipitation rate, pressure and relative humidity at the surface or various atmospheric levels are used. Due to the fact that between ۱۹۴۸ and ۱۹۵۷, observations of the upper atmosphere were less frequent and were made at synoptic hours different from today's main synoptic times, the reanalysis data are less reliable (Kistler et al., ۲۰۰۱); hence this period has been omitted in the present study; consequently only the data from ۱۹۵۸ to ۲۰۱۱ were used. The study region consists of an area between ۲۵-۴۵°N and longitudes ۳۵-۶۵°E, which includes Iran and extends westward to the Mediterranean Sea. The grid points are ۲.۵ degrees apart in both longitude and latitude. In a procedure similar to that of Thompson et al. (۲۰۰۲), the mean daily surface temperature and the frequency of cold events are compared in a ۶۰-day interval, following weak and strong vortex conditions. A cold event is defined as a day in which the minimum temperature falls more than one standard deviation beneath the January to March (JFM) climatological mean. The stratospheric polar vortex is called weak or strong when the absolute value of the daily geopotential height anomaly at ۱۰ hPa, averaged from ۶۰- ۹۰°N, is more than twice the JFM climatological standard deviation. Other variables such as relative humidity at ۸۵۰ hPa, surface pressure, the precipitation rate and temperature anomaly are also compared during these intervals. For each day, in evaluating the temperature anomaly and its standard deviation, use is made of the climatological mean value for the month that the day is in it. Values of a winter severity index (Thompson et al., ۲۰۰۲) are calculated and compared for every winter day using ۵۴ years of temperature data in the two cases of weak and strong polar vortex. The index is proportional to the standardized squared minimum daily temperature and is nonzero if and only if the latter temperature is below a specified threshold value. The winter severity index is averaged over all grid points within ... our domain of study. A randomization test is

کلمات کلیدی:

تاوه قطبی پوشن سپهر، شاخص شدت زمستان، رویداد سرد، شاخص NAM، وردایی اقلیم

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