

The role of Low level jet and determining the trajectory in the Persian Gulf dust storm (case study: 17-19 February, 2017)

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Abstract

Dust is a natural process in the desert areas. Strong winds on the dry soil surface make the particulate matter suspended in the air near the ground. In recent years, the influence of several natural factors has led to the further spread of dust in the western and southwestern parts of Iran. A storm take placed in the Khuzestan province and the northwest of the Persian Gulf, in February 17-19, 2017. The purpose of this study was to determine the source of dust as well as to study the conditions of the wind speed and direction and role of Low Level Jet in dust formation and transfer to Khuzestan and Persian Gulf. For synoptic analysis meteorological data provided from the ECMWF website. The horizontal distribution of dust investigated by MODIS satellite image and DREAM model. The HYSPLIT model also determined the dust trajectory. A coincidence survey showed that the northwest winds in eastern Syria and northwest of Iraq (the northern wind) were formed at the height of the fissure between east to west of Iran and a stack of compression from Turkey to north of Arabia. The synoptic analysis showed that northwest winds (Shamal) in eastern Syria and northwest of Iraq (northern wind) were formed between the pressure trough which is extended from east to west ward of Iran and pressure ridge from Turkey to north of Saudi Arabia. The northwest winds at the 925 *hPa* reached 14 to 16 *m/s* (28 to 32 Knt). The increase in the wind speed in the low altitudes of the atmosphere led to an increase in wind speed of 10 meters by 9 *m/s* (18 Knt), which resulted in the release of dust particles into the atmosphere. During February 18 in southeastern Iraq and southwestern Iran, the LLJ developed. The result was an increase in turbulence and the vertical extension of the dust in the lower layers of the atmosphere. The synoptic north wind direction corresponded to the HYSPLIT model and Windrose. All of them represented the northwest wind direction and confirmed the transfer of dust from Iraq to the Persian Gulf. Satellite imagery and the DREAM model determined the deserts of Iraq and eastern Syria as the origin of the Persian Gulf dust. The MODIS imagery and the DREAM model showed the deserts of northwestern of Iraq and eastern Syria as the source of Persian Gulf dust storm.

Keywords: Dust storm, Persian Gulf, DREAM Model, HYSPLIT Model.