Oceanography/Vol.10/No.37/Spring 2019/1/6-6

Effective Synoptic Structures in the Supporting Dust Storms over the Persian Gulf

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Received Date: February 16, 2018 **Corresponding Author* *Accepted Date: September 17, 2018*

Abstract

In the paper, the atmospheric conditions in the Persian Gulf region and southwest of Iran were studied by analyzing several case studies in cold and warm seasons. For this purpose, three case studies were selected from the dust events occurred between September and March and have been studied using meteorological stations data, satellite imagery, ECMWF global data, and HYSPLIT and DREAM outputs models. The results showed that one of the main dust transport factors into the southwestern Iran was the northwesterly winds over western neighboring countries. This study showed that atmospheric mean layer patterns (500 hPa), did not play a fundamental role in the transport of dust, and, in all circumstances, duststorms occured in the northern flow of Earth's surface. However, a trough of low contours in 500 hPa was effective in enhancing convection and storm intensification. The ranging 0.2 to 0.6 Pa/s of downward vertical component of wind speed at a level of 925 hPa is suitable to control dust concentration near the surface of the Earth.The effect of the friction force on the Earth's surface, which causes the dust, doesn't move completely along the North-South direction and expand in the region horizontally. Northwest winds (Shamal wind) more than 25 kt at 925 hPa results in continued dust transportation to Iran. With the formation of a low level jet stream, the strengthening and development of duststorms is more likely. The output of the HYSPLIT model was as good as predicting the path of the particle in the direction of the northwest winds, and the output of the DREAM model showed a sharp decrease in horizontal visibility. By comparing horizontal visibility in Ahwaz and Abadan, as well as studying the output of the HYSPLIT model, it can be seen that local dwarfs are also formed in Ahwaz, which, in addition to the source of dust, can also be considered domestic sources.

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