

Investigation of the Low-Level Jet Role in Transportation of Shamal Dust Storms in Southwest Iran

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Abstract : Dust storm is one of the most important natural disasters in the world, where the Middle East suffers frequently due to the existence of the dust belt region. As a country in the Middle East, Iran mostly is affected by the dust storms from some internal and also external dust sources, mostly originating from deserts in Iraq, Syria, and Saudi Arabia. In this study, some severe Shamal dust storms were investigated in Southwest Iran. The measured PM_{10} reached up to $834 \mu\text{g m}^{-3}$ in some stations in west Iran and Iran-Iraq borders, while the measured PM_{10} reached up to $4947 \mu\text{g m}^{-3}$ SW stations in northern shores of the Persian Gulf. During these severe dust storms, a low-level jet was observed at 930hPa atmospheric level in north Iraq and south Iraq. the jet core and its width were about 16 ms^{-1} and 100 km, respectively, in the cases where it is located in the NW regions of Iraq and northeastern Syria (at 35°N and $40\text{-}41^\circ\text{E}$), So the jet was stronger at higher latitudes (34°N - 35°N) than at lower latitudes (32°N). Therefore, suitable conditions have been created for lifting of dust sources located in northwestern Iraq and northeastern Syria. The topography surrounding the Mesopotamia and north of the Persian Gulf play a major role in the development of the Low-Level Jet through the interaction of meteorological conditions and mountain forcing. Also, the output of CALIPSO satellite images show dust rising to higher than 5 km in these dust cases, that confirming the influence of Shamal wind on the dust storm occurrence.

Keywords : dust storm, shamal wind, the persian gulf, southwest Iran

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