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Effect of climatological factors on airborne dust fallout rate in Khorasan Razavi Province, Northeast Iran

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Introduction: One of the most important characteristics of airborne dust is the amount of dust fallout rate deposited in the region. During the past decade, increasing awareness of the human health hazards posed by dust in Iran has spurred investigations documenting the deposition and source areas of the dust (Rashki, et al., 2012; Hojati et al., 2012), and identifying the regional atmospheric and land surface processes controlling dust transport. Also, in order to measure the dust fallout rate, similar studies have been carried out in Iran and other countries (Ta et al., 2004; O'hara et al., 2000). The objective of this study was to investigate the effect of climatological factors on airborne dust fallout rate in Khorasan Razavi Province, Northeast Iran.

Material and methods: Airborne dust samples were collected monthly from May 2014 to April 2015. A dry flat collection tray with an area of 1 m2, similar to that of Hojati et al. (2012) was used to sample airborne dust.

Results and Discussion: Totally, 600 samples collected from 50 areas in Khorasan Razavi province, showed significant spatial and temporal changes during 12 months. The lowest and highest monthly rates of atmospheric dust fallout occurred in December and June, with average amounts of 9.97 and 20.96 g m-2, respectively. The dust deposition rates considerably varied from 313.14 g m-2 y-1 in Gonabad city with desert climate regime in southern and 74.62 g m-2 y-1 in the city of Quchan with temperate-mountainous climate in northern part of the area. There was a positive and significant correlation between yearly dust fallout rate and maximum wind velocity, the minimum and maximum air temperature, average soil temperature at depth of 5 cm, and a negative correlation with relative humidity and precipitation. Spatial distribution analyses showed the highest amount of dust fallout in the southern and western parts of the province, with desert and sub-desert climate and in the spring with the highest frequencies of

dust storm. Also, in the months with higher rainfall, the amount of fallout rates decreased in most areas except of the eastern part of the province. Here, the high wind speed, dryness of the soil and frequency of dust storms recorded in June and July, have caused dust to be carried over longer distances than in other months. Determination of the origin of atmospheric suspended particles in Khorasan Razavi province requires further study and more comprehensive laboratory analyzes.

Keywords: Fallout rate, Climatological factors, Dust storm, Khorasan Razavi

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