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Mineralogical characteristic of airborne dust in Khorasan Razavi Province

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Introduction: The mineralogical composition of airborne dust changes depending on the mineralogy of the source area. The presence of specific minerals could be used as a tool to trace the sources of dust particles and this mineral may then be suggested as an origin-tracer. In other words, dust reflects the mineralogical composition of the source locations (Menendez et al., 2007; Lawrence and Neff 2009; Scheuvens et al., 2013). The objective of this study was to determine the mineralogy of airborne dust in Khorasan Razavi Province and find the relationship of spring and winter dust mineralogy with the loose Tertiary and Quaternary sediments occurring in the possible source areas.

Material and methods: Airborne dust was collected with passive samplers in 30 day-intervals over a one-year period at 50 different locations of the Province. A total of 24 samples were selected based on geochemical properties, particle size distribution and carbonate content. Samples were examined without any pre-treatment using X-ray diffractometer. The powdery samples were analyzed in the 2θ range of 2–60° with a scanning step of 0.02° and a 6 s/step counting time.

Results and Discussion: Based on X-ray results, the mineralogical composition of spring dust was Quartz>Feldspar>Calcite>Kaolinite>Muscovite. Probable source regions were also containing similar minerals with different portions in some area, i.e. Quartz>Calcite>Kaolinite>Feldspar>Muscovite. The mineralogy of winter dust was Quartz>Calcite>Feldspar>Muscovite>Dolomite. As far as the observations are concerned, quartz, feldspar and muscovite (reflecting the lithology of gneissic-granitic), as well as calcite and dolomite (reflecting the lithology of limestone) were more frequent than clay minerals. The results also suggest similar sources for dust deposited in different locations. Pye (1992) showed that dust particles rich in quartz, carbonate and feldspar likely originated from regions close or relatively close to the collection points while dust particles with considerable concentrations of clay minerals have been transported from distant area. Considering of mineralogical composition evidence and wind pattern, vast

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deserts which are located and surround province can be considered as the main source of dust in the study area.

Keywords: Mineralogy, Airborne dust, source region, Khorasan Razavi

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