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Characteristics and composition of the falling dust sediments on Riyadh city, Saudi Arabia

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Riyadh city, the capital of Saudi Arabia, receives annually a considerable amount of dust. Dust samples were collected on a monthly or bi-monthly basis, from eight different locations in Riyadh during the period from March 1991 to February 1992. They were analysed for particle size distribution as well as physio-chemical and mineralogical compositions.

The dust fractions lie between loam and silt loam, having an average composition of 37% sand, 47% silt and 16% clay. $CaCO_3$ content, EC and pH were rather high and averaged 31·8%, 4·8 dSm^{-1} and 8·9, respectively. Results showed that dust samples contained considerable levels of some trace elements. Mean values of the detected elements (in $\mu g\ g^{-1}$ were Pb, 66·8; Ni, 26·0; Co, 20·6; Cd, 3·8; Zn, 141·8. Mn, 318·9; and Cu, 36·4. In addition to natural sources, these higher values may be related to other traditional sources such as motor vehicle emissions. Mineralogical analysis indicated that the dominant minerals in the dust samples were quartz and calcite.

Keywords: dust; pollution; Saudi Arabia; heavy metals

Introduction

Dust storms are a common phenomena in many parts of the world, especially in arid and semi-arid regions. The Arabian peninsula is one of the five major regions where dust originates (Idso, 1976). Riyadh city, the capital of Saudi Arabia, situated at an altitude of 600 m, is surrounded by desert areas and is therefore exposed to dust storms most of the year. Khalaf & Al-Hashash (1983) reported that dust storms are usually caused by the action of strong persistent winds on dry, fine-grained, and loose soil. During the occurrence of dust storms, a complete aeolian sedimentary cycle takes place, namely erosion, transportation and deposition.

The frequency of dust storms in the Arabian peninsula has been reported by many researchers (Goudie, 1978; El-Desouky & Al-Shalal, 1979; Safar, 1980). The rates of the falling dust in the Arabian Gulf region were evaluated by Khalaf & Al-Hashash (1983) who found that the average quantity of dust falling on Kuwait was 191 tons km^{-2} $month^{-1}$ and in Riyadh, Saudi Arabia, 392 tons km^{-2} $year^{-1}$ (Al-Tayeb & Jarrar, 1993). However, Basahy (1987) estimated the dust deposition rate to be 196–220 tons

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