ATMOSPHERIC DUST IN SOUTHERN TURKEY

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INTRODUCTION

Transport of materials through the atmosphere is an important route by which materials (natural or antropogenic) are delivered to the sea.

The Mediterranean Sea is a classical example of a marine region with a number of contrasting catchment areas which supply material to the atmosphere. Therefore, the Mediterranean aerosols can be considered as a mixture of material of European origin and dust from the Sahara.

In a detailed study on atmospheric particles reaching and settling in Isreal, Yaalon and Ganor (1) found that on an annual basis approximately 25 million tons of dust settles on the Mediterranean Sea. Computed trajectories of the dust particles showed that the dust originates from the Libyan, Egyptian, Sinai and Negev deserts. The overall amount of dust reaching the Mediterranean basin is large compared to the other regions, and plays a significiant role in the geochemistry of the basin as well as the properties of soils of the areas such as the south of Turkey. Studies conducted by Ganor and Mamane (2), Ganor (3) and Dayan et al (4) and Ganor et al (5), following the pioneering works of Yaalon on the aeolian material of the eastern Mediterranean, considering analyses of clay and other minerals and chemical compositions along with meteorological data have partically set light on the event. However a future study which will enable coordinated teams located at the provenances, along with collection stations such as the ones in Mersin-S. Turkey and Isreal, should work on periodic samples collected from all sites throughout the active wind seasons, with remotely sensed data. The analyses should comprise detailed mineralogical studies aimed to solve weathering, paleoenviromental and dating phenomena on isolated crystals of all and/or dominant fractions, to be conducted by image analyses, electron microscopes and probe along with TL, stable isotopes, cathodoluminescence, XRD and DTA.

The aim of this preliminary study is to determine the chemical, mineralogical and morphological properties of 6 heavy dust storm materials collected from Adana and Mersin.

MATERIALS AND METHODS

The six samples collected are the windblown materials-pulses reaching Turkey between 1987-1992. Samples of the two heavy dust storms of 29 April 1987 (No.1) and May 1988 (No.2) confirmed to originate from northern Africa by Ganor (3) along with others (28 JAN. 1989 (No.3), 15-16 OCT. 1990 (No.4), 27-31 MAR 1992 (No.5), 8 MAY 1992 (No.6)) at dates corresponding to the regular pulse of dust transported particles. A dust sample was identified by remote sensing techniques to originate from the Arabian peninsula at OCT. 1990 corresponding to the 15-16 OCT. 1990 sample studied in this paper. The sample collected at 28 JAN 1989 may correspond to the sampling period of Dayan et al (4) at 9 FEB. 1989.

Samples were analysed for total elements, X-ray diffraction, TL and image analyses.

RESULTS AND DISCUSSION

The clay minerals of the dust materials of 1, 2, 4 and 5 (Group 1) are dominated by well crystalline kaolinite. Kaolinite is ~ 94% in 1, ~ 96% in 2, ~ 60% in 4 and ~ 90% in no 5. Materials of 1, 2 and 5 contain the highest amounts of kaolinite along side the highest of palygorskite in 4 and 5 and lesser amounts in 1 and 2. Smectite is the highest in 4 (25%) and at lesser amounts in other materials. Material 4 also has equal amounts of palygorskite as 5. Materials 3 and 6 (Group 2) have lesser kaolinite compared to materials of Group 1. Material 3 has the least amount of clay minerals due to it's high CO_3 content (5%). Material 6 is identical to the other materials except it's slightly less kaolinite. Highly crystalline and dominant kaolinite in the dust materials indicates an African - Saharan origin as stated by Mermut et al (5), Kapur et al (Unpublished data), Ganor et al (5) and Ganor (3). The chemical data - The high total Al and Fe - also verify an African origin reflecting the high amounts of kaolinite and high amounts of Fe due to past wet conditions of the Sahara. Colors of the samples according to the Munsell Scheme are identical for materials 1, 2 and 4 (10YR 7/3), whereas they slightly differ in materials 3 and 6. Material 5 is much redder than the others with the highest Fe (191.9 mg/g) and lowest $CaCO_3$ contents (2%).

The dominant particle size in all materials is between 10-50 µm, decreasing to 300-500 µm with a few 500-1000 µm particles. A similarity in particle sizes was determined along with a gradual decrease from 10-50 µm to 300-500 µm in materials 1 and 2, which are stated to originate from northern Africa by Ganor et al (5).

The roundness classes according to FitzPatrick (7) determined on sizes of the dominant fraction (10-50 µm) are well rounded - spherical and rounded - spherical indicating a long distance aerosolic

transportation. Materials 1, 2 and 6 alike their similarity in particle size distribution are shape wise well sorted within the size fractions of 10-20 μm and 20-50μm.

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