

EOS

TRANSACTIONS, AMERICAN GEOPHYSICAL UNION
VOLUME 60 NUMBER 46 NOVEMBER 13, 1979



P61

MINERALOGY AND MORPHOLOGY OF THE COATINGS ON SAND GRAINS FROM THE GILF KEBIR, SOUTHWEST EGYPT

Donna J. Prestel and John E. Mainwright (Lockheed, 1830 NASA Rd., Houston, TX 77058)
Farouk El-Baz (Smithsonian Inst., Wash., DC)

Field investigations indicate that the red color of desert sand is due to the presence of coatings on individual grains. Sand grains become redder as the distance from their source increases, in fact, the color of desert surfaces as seen in earth orbital photographs is indicative of soil composition. Relative-age zones can be mapped from these photos which do not correspond to mapped boundaries of geological formations. We suggest that color variations are due to the growth of a coating during aeolian transport of the sand grains.

Sand grains collected from the Gilf Kebir plateau in the southwestern desert of Egypt were studied to characterize the coatings. The mineralogy of the coating scraped off sand grains was determined by X-ray diffraction (Gandolfi camera). The morphology and chemistry of the sand grains and their coatings were studied using a high resolution (25 Å) SEM with an attached energy dispersive x-ray analyzer (EDXA).

The sand grains have a ubiquitous, 2-5 μm thick, rough and porous coating of complex morphology. Its particles range in size from a few hundred angstroms to about 2 micrometers. Many of the particles are hexagonal platelets, or layered platelets. The hexagonal platelet morphology and Fe and Al-rich chemistry observed agrees well with the presence of kaolinite and hematite identified by x-ray diffraction. Abrasion features and secondary crystals are common.

The nature of the coatings on individual grains is believed to have a significant effect on the spectral characteristics of the uppermost layer of the desert surface, and therefore must be evaluated in the interpretation of satellite photographs.

872