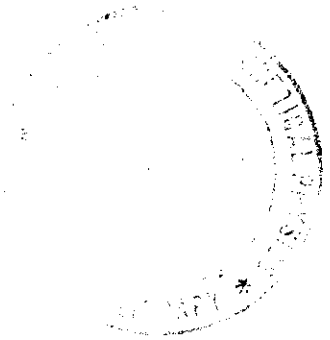

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PHYSICS OF WIND EROSION

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PHYSICS OF WIND EROSION 1/

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Abstract

Erosion process may be considered from three aspects: (1) the forces tending to dislodge and transport the particles (erosivity), (2) ease of particle detachment and transport (erodibility), and (3) nature of particle transport.

Logarithmic decrease in windspeed near the ground surface causes a vertical transfer of horizontal momentum. Researchers have observed that when this shear stress exerted at the surface exceeds that barely needed to cause erosion, the rate of movement of dry, erodible particles is directly proportional to shear stress raised to 3/2 power. When the particles are moist, cohesive forces between particles caused by the water must be overcome before erosion occurs. A model relating climatic erosivity and dust storm suspension load will be presented.

Erodibility of soil particles depends on density and size of particles (both primary and secondary) and stability of aggregates formed from primary particles. An increase in particle density decreases erodibility. Particles are most erodible in the 0.1 to 0.5 mm diameter size range. A soil erodibility index used in a wind erosion prediction model is based on percentage of particles greater than 0.84 mm diameter.

Particles may be selectively detached and transported in saltation, creep, or suspension.

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