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Soil mineralogy effects on runoff/rainfall ratio, soil erodibility and surface movement of pollutants

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Soil mineralogy has substantial effects on aggregate stability, and therefore, may also influence the seal formation, runoff and soil loss. Since the soil mineralogy has regional distribution it can be use as regional indicator to soil degradation, runoff and erosion problems. This paper will discuss the effects of soil mineralogy on seal formation and its micromorphology, infiltration rate (IR), runoff and soil loss amounts and surface movements of inorganic and organic pollutants under irrigation and rainfall conditions. Various soils with different mineralogy were collected from Israel, South Africa, Spain and Kenya. In these soils, the infiltration rate, and the interrill soil loss were determined in different slope gradients using rainfall simulator. The micromorphology of the crust, which was developed at the soil surface by the rainstorm, was determined by scanning electron microscope. Clay mineralogy was found to be a dominant factor in controlling, seal formation, infiltration rate, and interrill soil loss. The phyllosilicate soils, which were review in this paper, divided into two main groups: (i) stable soils with final IR > 8.0 mm h^{-1}; and (ii) unstable soils with final IR < 4.5 mm h^{-1}. These two soil groups differ in their mineralogy. Kaolinitic and illitic soils that do not contain smectite were stable soils, and less susceptible to seal formation. In contrast, kaolinitic and illitic soils that contain some smectite, and smectitic soils were unstable. Examination of the susceptibility of 21 phyllosilicate soils to interrill erosion indicated that these soils could be divided into three groups. The Kaolinitic and illitic soils that do not contain smectite had the lowest erodibilty factor, the kaolinitic and illitic soils that contain some smectite had moderate erodibilty factor, and the smectitic soils had the highest erodibility factor. Soil mineralogy had also effects on the slope factor, when the smectitic soils had the highest slope factor. Surface movement of macro nutrients, heavy metals, and atrazine was determined in a field with smectitic

soils under natural rainfall, and the results will be discussed in this presentation.