Geophysical Research Abstracts, Vol. 9, 09819, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09819

Soil Crusting and patch scale Connectivity on semi-natural and abandoned Lands

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Fine scale connectivity processes are strongly related to the properties of the soil surface, and the spatial configuration of bare and vegetated surfaces. After abandonment surface crusts develop upon wetting, raindrop impact and overland flow processes but also vegetation cover will develop. Under semi-arid conditions revegetation speed is very slow, and in combination with the very low organic matter contents in the soil, soils are prone to crusting processes over long periods, but also developing different types of crust with respect to slope position and vegetation pattern and type.

Crust formation is reflecting slaking and welding processes occurring in the topsoil, but also mechanical and physico-chemical processes acting on the soil surface. The crust properties can also be related to direct raindrop impact and by overland flow related erosion or deposition processes. The spatial organization of these different crust types is clearly affected by the presence and spatio-temporal development of vegetation.

The areas of study are located in semi-arid SE Spain in the province of Murcia on calcareous substrata such as marls and calcretes with low organic carbon contents. Crust properties have been studied macroscopically as well as by thin section analysis from soil samples taken from surfaces that were abandoned for short and longer periods, from semi-natural vegetation and from reforested areas. Vegetation patterns were mapped and as well as traces of overland flow processes that had occurred.

It was found that slaking crust developed very quickly, almost directly after wetting. Over time these crust were found to be stabilized by algae and lichen in non-eroding environments. In semi-natural vegetated areas clear spatial patterns in soil crust types develop with respect to vegetation clumps, showing deposition crusts upslope the veg-

etation and slaking and erosion crusts down slope and in between vegetation clumps. The spatial organization of the different crust types indicate what type of processes are acting on the surface, indicating the major flow paths of water, sediments and nutrients on the patch scale. The spatial distribution of runoff and sediment generating surfaces together with the buffering areas have important implications for runoff and sediment connectivity on hillslopes scale processes.

From the thin sections also a clear impression could be obtained on the soil properties, such as the sealing of topsoil, rooting, porosity and crack structures that affect infiltration properties which help in understanding spatial patterns relevant for hydrological connectivity.