Geophysical Research Abstracts
Vol. 15, EGU2013-248, 2013
EGU General Assembly 2013

Short-term temporal and spatial variability of soil hydrophobicity in an abandoned agriculture field in Lithuania

Paulo Pereira (1), Maria Burguet (2), and Artemi Cerdà (3)

(1) Department of Environmental Policy, Mykolas Romeris University, Ateities g. 20, LT-08303 Vilnius, Lithuania (pereiraub@gmail.com), (2) Institute for Sustainable Agriculture (IAS-CSIC), Department of Agronomy, University of Cordoba, Av. Menendez Pidal s/n Campus Alameda del Obispo, Apartado 4084. 14080, Córdoba, (3) Department of Geography. University of Valencia. Blasco Ibañez, 28. 46010-Valencia

Soil water repellency (SWR) is a natural property of soils. Among other factors, SWR depends on soil moisture, mineralogy, texture, pH, organic matter, aggregate stability, fungal and microbiological activity and plant cover. It has implications on plant growth, superficial and subsurface hydrology and soil erosion. It is well known that SWR is temporarily, increasing when soils are dry and decreasing when moist. In agriculture, soil micro-topography is very heterogeneous with implications on surface water distribution and wettability. Normally, SWR studies are focused on large interval time (e.g, monthly or seasonally). The objective of this work is the study of SWR in a temporal scale and its variability in an abandoned agriculture field in Lithuania. An experimental plot with 21 m2 (07x03 m) was designed in a flat area. Inside this plot SWR was measured in the field, placing three droplets of water on the soil surface and counting the time that takes to infiltrate. A total of 105 sampling points were measured per sampling period.
Soil water repellency was measured after a period of 14 days without rainfall and in the seven consequent weeks (one measurement per week between 28th May and 07th of July 2012). The results showed that in this small plot, SWR was observed in the first (May 28), third and fourth measurements (08th of June and 16th). It was observed an increasing of the percentage of hydrophobic points (Water Drop Penetration Test $\geq$5 seconds) between the first and the fourth measurement, decreasing thereafter. Significant differences of SWR were observed among all periods ($F=78.32$, $p<0.0001$). The coefficient of variation (CV%) changed strikingly, 361.10 % (8th of May), 151.78 % (01st of June), 83.77% (08th of June), 125.87% (16th of June), 0.45 (22nd of June), 121%(31st of June) and 67.13% (7th of July). The correlation between the mean SWR and the CV% is 0.75, $p<0.05$.
The changes were attributed to different soil moisture conditions. The differences were also identified in the spatial pattern of SWR (assessed with the Global Moran's I Index). May 28, June 22 and July 7, SWR presented a random pattern, meanwhile in the remaining sampling periods, the spatial pattern was clustered. These results suggest that spatial variability increases with SWR, and that soil wettability changes at weekly scale, with unknown implications on plant water availability.. Overall, at small plot scale, SWR can change importantly in time and space leading to a complex dynamic of soil hydrological properties. More than soil moisture, other factors can rule these temporal and spatial changes in SWR. Further research is needed to accurate this situation.