Geophysical Research Abstracts
Vol. 18, EGU2016-14384, 2016
EGU General Assembly 2016

The effect of wind erosion on toxic element content of soils based on wind tunnel trials

Károly Tatárvári (1) and Gábor Négyesi (2)

(1) Institute of Environmental Sciences, Faculty of Agriculture and Food Sciences, Széchenyi István University, Mosonmagyaróvár, Hungary (tatarvarik@gmail.com), (2) Department of Physical Geography and Geoinformatics, University of Debrecen, Debrecen, Hungary

Wind erosion causes enormous problems in many parts of the world. It damages the fertile layer of soils, and eventually wind erosion can transport materials, pathogens and these may cause medical problems in the respiratory system. Numerous international and Hungarian surveys have proved, that wind erosion not only affects loose textured soils. During droughts wind erosion may cause great damage in bound soils of clay in case these are over-cultivated and dusty.
As an effect of climate change the duration and frequency of drought periods shall grow. In our investigation samples were taken from the upper 10 cms of soils of 5 various types of mechanical compounds (according to physical characteristics sand, clay, clay loam, loam, sandy loam) in Győr-Moson-Sopron County Hungary. According to the map of Hungary of the areas potentially affected by wind erosion the sand physical soil type is strongly endangered by wind erosion, other areas are moderatly endangered. According to most recent international classification areas belonging to the sand physical soil type are categorized as “endangered by wind erosion”, and others belong to the category “not endangered by wind erosion”, but these data were not based on local trials. When selecting the sampling areas it was taken to account that opencast sand and gravel mines are in operation in the area. Because of these recently significant wind erosion related phenomena were observed. The area is the most windy in the country. The mechanical composition, $CaCO_3$ content, pH value (H_2O,Kcl), humus content of the samples were defined. The wind erosion experiments were conducted in the wind tunnel of the University of Debrecen. The threshold velocities of the soils were measured, and the quantity of the soil transported by the wind was analyzed at four wind velocity value ranges. The transported material intercepted at different wind velocities at the height of 0-10 cm and 10-35 cm. The As, Ba, Cd, Co, Cr, Cu, Ni, Pb, and Zn contents of the original samples and the intercepted drift were analyzed by HNO_3+3 HCl and measured by ICP-OES device. All analysis were conducted at triple repetition, and in this study the results of the average values of the results are published. According to our measurements, at the soils of higher sludge and clay fraction the contained elements of the drift samples and the original (control) soil samples were nearly identical at wind velocities closest to the critical starting speed, whereas at higher velocities the values showed a slow decrease according to the mechanical composition. The reason of this according to our opinion is that at the wind velocities employed the fine dusty part of the drift containing higher concentration of elements exited above the altitude of 10-35 cms. The contents of elements in the drift of sand soil of lower sludge and loam content in proportion to the rise in wind velocity. The element content of the drift intercepted at the altitude range of 0-10 cms always exceeded that of the one intercepted at the altitude range of 10-35 cms.