Geophysical Research Abstracts
Vol. 15, EGU2013-8272, 2013
EGU General Assembly 2013

The uncertainty given by the input parameters in the radiometric modeling of soil redistribution rates

Andra-Rada Iurian, Robert-Csaba Begy, and Constantin Cosma

Babes-Bolyai University, Faculty of Environmental Science and Engineering, 30 Fantanele Street, 400294, Cluj Napoca, Romania (iurian.andra@ubbcluj.ro)

This communication discusses an alternative method to statistically derive the effective diffusion coefficient and the convective velocity of ^{137}Cs for undisturbed soil. Also, there is an emphasis on the importance of the particle size factor on the resulted soil redistribution rates, when using the diffusion and migration model for uncultivated fields.

The ^{137}Cs technique represents a worldwide instrument for assessing soil erosion and sedimentation rates in various agricultural and natural landscapes. Many radiometric models have been developed in the last 20 years, different for cultivated and uncultivated fields, which consider the radionuclide inventories across the field, the fallout pattern of ^{137}Cs and the processes related with the soil movement. This has given the opportunity to researchers to apply the same models in all studies related with the application of radiometric tools in deriving soil erosion rates, in order to have comparable results. However, there is still a lack of information in the procedure needed for an accurate determination of the parameters involved in these models, which could be a noticeable source of uncertainty in erosion radiometric modeling. The objectives of this work were:

(i) to apply the convection-diffusion model for the ^{137}Cs depth profile in the reference site using the least square fitting procedure to determine the effective diffusion coefficient and the convective velocity of ^{137}Cs;

(ii) to emphasise the importance of an accuracy determination of the input parameter values (particle size factors, diffusion coefficient and the convective velocity of ^{137}Cs) used in diffusion and migration model for uncultivated fields and;

(iii) to assess the soil erosion and deposition rates on Romanian pasture land using ^{137}Cs inventories.

The site under investigation is situated in the 'Some' watershed (N46^{o}52', E23^{o}45'), north-west extremity of the Transylvanian Plain, Romania. Twelve soil profiles were collected along two parallel transects according to the field micro-topography. An additional five incremental and bulk soil profiles were taken from an undisturbed terrace near the study field to establish the reference inventory of ^{137}Cs by means of gamma-ray spectrometry. The averaged reference inventory was determined as 3160 $\pm$ 247 Bq m^{-2}(n=5) and the variation coefficient was 27.44%.