Geophysical Research Abstracts
Vol. 20, EGU2018-56, 2018
EGU General Assembly 2018

Quantitative estimation of morphometric parameters of global public DEMs and their influence on the calculation of the values of soil losses from water erosion on the European territory of Russia

Kirill Maltsev and Artur Gafurov
Kazan Federal University, Institute of Ecology and Nature Management, Russian Federation (mlcvkirill@mail.ru)

The relief factor plays an important role in quantitative estimates of the intensity of erosion processes with using of the erosion models. The slope length, specific contributing area and slope as well as their combined indicators used in the calculations as the main parameters of the relief. All of the above morphometric indicators are currently calculated in GIS using digital elevation models(DEMs).
In this case, DEMs can be obtained by researchers using a wide variety of data and techniques. First, at the moment, such commercial DEMs are available as: "TanDEM-X WorldDEM"; "NextMap World 10 and World 30"; "ALOS AW3D" and some others. Second, researchers can independently create a DEMs, for example, based on data from topographic maps or using remote sensing data obtained from small unmanned aerial vehicles. These approaches require material and / or additional time costs, so researchers often use global DEMs that are distributed freely. Among them, four models can be distinguished, which can be considered as alternatives to each other: "SRTM C-SIR"; "SRTM X-SAR"; "ASTER GDEM v.2"; "AW3D30 DSM v.1.1"., since these models have the same horizontal detail. At the moment, the errors of both the DEM and the morphometric indices themselves, as well as their influence on the calculation of soil losses from water erosion of such models as "ASTER GDEM v.2", "SRTM C-SIR" well studied. At the same time, little attention has been paid to the analysis of the errors of these DEMs representing the territory of the European part of Russia in the world literature. Also, little attention is paid to the analysis of the errors of DEM "SRTM X-SAR" "AW3D30 DSM v.1.1" in the world literature, due to the fact that these models have become freely distributed only recently.
Therefore, in our study, we quantitatively analyzed the errors of such morphometric indices as slope, slope length, specific contributing area in global freely available DEMs listed above. The influence of the morphometric index error on the calculation of the potential loss of soil was estimated. As verification data, DEMs constructed using topographic maps of a scale of 1: 10000 and highly detailed remote sensing data were used. The study was conducted within few test sites of the European part of Russia located south of 60 degrees north latitude.
As an example of the results obtained, one can cite the fact that the slope values calculated on the basis of the global "SRTM C-SIR" DEM for the European territory of Russia are much more accurate than the slope values calculated using "ASTER GDEM v.2". The use of DEM "SRTM C-SIR" on small catchments in large-scale studies is only permissible for the calculation of averaged erosive loss of soil. At the same time, this model can not be used for spatial analysis and mapping in large-scale studies of soil erosion losses.