Geophysical Research Abstracts
Vol. 14, EGU2012-10730, 2012
EGU General Assembly 2012

Slope erosion estimation in the river basin of the boreal zone of the East Russian Plain

O. Yermolaev
Kazan Federal University, Department of Landscape Ecology, Kazan, Russian Federation (Oleg.Yermolaev@ksu.ru)

INTRODUCTION Multi-factor controls of erosion processes determine the complexity of erosion-affected hillslope geosystem functioning. Relationships between erosion and its major controls change in geographical space, so that slope erosion regimes vary regionally, being determined by landscape conditions. Problems with the quantitative assessment of all types of soil erosion from raindrop to gullies still require a satisfactory solution. In this paper we propose to consider the entire complexity of hillslope erosion processes as a unit termed "basin erosion". The focus of this paper is on the methodological aspects of revealing the roles different landscape conditions play in causing basin erosion.
The East Russian Plain was chosen as the investigation region due to the wide distribution of a spectrum of erosion processes in the region. It is also where the so-called "Erosion Pole" of European Russia is situated. During the last 200 years arable land cover has increased by 40–60% and now comprises about 80–85% of basins area. The period of most intensive agriculture in the region began about 200 years ago.
Different combinations of natural and anthropogenic conditions create geocomplexes of different taxonomic levels known as "landscapes". Depending on the degree to which erosion processes are generalized in an investigation, it is necessary to use different geosystem taxon as the basic unit. To evaluate the role different landscape factors play in the development of human-accelerated basin erosion, a landscape map of the East Russian Plain was created.
DATA The study territory is located within the forest, forest-steppe and northern part of steppe landscape zone of the Russian Plain and comprises more than 130 000 km2. The total number of parameters used for landscape regionalization comprised more than 50 (including: hydro-climatic, geomorphological, anthropogenic, lithological and landscape-geophysical); 3331 river basins were examined with an average catchment area of 40 km2.
METHODS The method of "self-organizing maps of Kohonen" was used as the main approach for automatic regionalization.
RESULTS Spatial analyses of soil erosion and gullying intensity in the study region based on available information allows us to conclude that: maximum basin erosion is characteristic for upland landscapes of broad-leaved forest zones (Sub-boreal) and the southern part of mixed forest zone; its intensity decreases in both western and eastern directions; to the north and to the south from upland landscapes of broad-leaved forest zones we can also observe lowering of basin erosion intensity; in the north it happens because of lower agricultural activity, and to the south it is due to development of chernozem soils more stable to erosion; and zonality is typical for soil erosion processes.