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Assessment of the Suspended Sediment Yield in the Rivers' Basin of the Russian Plain

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Abstract: The forest-steppe landscapes on the east of the Russian Plain possess favourable agro-climatic resources. The evaluation of the suspended sediment yield was performed for the rivers' basin of the East Russian Plane. The following aspects of the subject were being studied: examination of the calculated values of suspended sediment yield in the small rivers' basins on the mathematical – statistical model of the sediment load; building the map of spreading the sediment yield; studying the suspended sediment yield spatial trends in the small rivers' basins. The study area is located within the forest, forest-steppe and northern part of the steppe landscape of the Russian Plain and comprises more than 130 000 km^2. The calculated values of sediment yield module for each of 3331 basins of the examined territory were calculated.

Key words: Suspended sediment yield · Erosion processes · Landscapes · Russian plain · Mathematical – statistical model · Correlation analysis

INTRODUCTION

Extensive cultivation is responsible for accelerated soil erosion and suspended sediment yield. For this reason, the study region is figuratively called the “erosion pole” of Russia.

The intensity and spatial variation in the operation of exogenic process is influenced by many factors and studies of the magnitude and spatial variability of suspended sediment yield (SSY) in river basins provide a useful means of assessing the impact of such processes. The sediment yield of a river basin provides an important indication of the rate of denudation in the upstream basin and the conveyance loss associated with the transfer of sediment to the basin outlet reflects the balance between erosional and depositional processes in landscape development. Since it is related to the intensity of mechanical and physical denudation processes, SSY provides a useful variable for comparing different areas or regions. Furthermore, contemporary SSY data provide valuable information for addressing key geomorphological issues related to the role of exogenic processes in landscape evolution. SSY data possess a number of important features which make them particularly valuable for assessing denudation and landscape evolution. These include the use of standard methods for documenting SSY, the existence of records covering extended periods and the ability to cover large areas and to provide information relating to a range of scales [1, 2].

The evaluation of the erosion processes in the watershed on the modern suspended sediment yield rivers' has some essential aspects which were studied in a greater detail by V.I. Mozzgerin [3]. In particular, the following outlooks of his work should be stressed: 1) the initial data about the suspended sediment yield (SSY) is always quantitative and allows to use these materials as the ideal mode in the studying of the exogenic processes; 2) data on a suspended sediment yield well correlated with the area denudation – the river's basin; 3) the suspended sediment yield for many reasons cannot be the exact measure of the intensity of the landscape forming processes in the river's basin. In this respect, SSY can be employed for the general evaluation of the intensity of the denudation processes in a watershed.

In the light of the information above, the aim of our research was to evaluate the intensity of the basins' erosion processes on the sediment load. Two main problems were analyzed: 1) the evaluation of the slope erosion processes on the suspended sediment yield in the basins with a data from the longitudinal hydrological observations; 2) the examination of the calculated values of SSY of a drifts in the small rivers' basins on the

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