Geophysical Research Abstracts
Vol. 18, EGU2016-11951, 2016
EGU General Assembly 2016

The regime of sediment transport in the Soloneţ Catchment (Romania): quantification of the controlling factors

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This paper focuses on the regime of sediment transportation to the river mouth of a catchment of 206 km2, located on the easternmost side of the Eastern Carpathians (NE Romania). The primary aim of the paper is to attempt a quantification of the catchment controlling factors of the sediment volume transited through the drainage network and their annual and multi-annual distribution. Among these factors we will focus on the role of sediment sources and human interventions in the mobilization of sediments towards rivers.
The data employed in this study were obtained from the Parhauti gauging station (1973 to 2014), located at a distance of about 1.7 km from the confluence of the Solonet River with the Suceava River. These are represented of measurements of water discharge, suspended sediment discharge (hourly or daily measurements during flash flood intervals) and monthly values. The data were correlated with records on rainfall, local slope and morphological characteristics of the river crosssection. For a more detailed analysis we introduced a further comparison with records obtained at other gauging stations, located within the same physical-geographical settings, in neighboring catchments.
Regarding our study catchment, investigations were performed on all variables that control flow formation and sediment load of water flows, i.e. geologic substrate, landforms, catchment morphometry, characteristics of the drainage network, land use, types of human interventions in the catchment area and on the river network. The average drainage network density equals ca. 2.5 km / km2, ranging from less than 1 km / km2 at the watershed, to the maximum of over 4 km / km2 recorded at the cuesta frontslopes.
The multi-annual average amount of suspended sediment transport is 3.06 kg / s. Suspended sediment transport occurs most intensely during summer (months VI-VIII), (59.8%) as a result of floods which enhance the power of the river. During winter months (XII-II), sediment transportation is very low (0.8%), with the exception of intervals with slight warming. Using different calculation models described in the literature, we estimated a transport of bedload ranging between 10 and 35% of the transport of suspended sediment, depending on the seasonal drainage conditions. The annual volume of sediment discharged from the Solonet River Catchment is approximately 135 000 t / year.
The obtained results were focused on the behavior of the sediment transport process during different timeframes (from the formation of flash floods, to the monthly transport regime and finally to the multi-annual trends for our entire study period) and on how certain types of controlling factors are involved in the process.