



Channel-bed elevation changes for the Eastern Carpathian Rivers from streamflow gage records

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The rivers that drain the Eastern Carpathians were studied under the aspect of the contemporary modifications of the bed elevation using a data base on 37 cross sections. The determination method of the bed elevations dynamics is based on a long-term series of minimum annual water stages (1950 - 2010) at the gauging stations was used to determine the tendency to river-bed changes. This method was used in comparison with the hydrometric measurements in the pre-established sections, calculating the height of the lowest point of the bed in comparison with the reference level represented by "0" graphic of the hydrometric measuring staff. Hydrometric stations are distributed along the rivers, from a succession of 3 (in the case of the smallest river) to 10 for the largest river. The six rivers used in this study were impacted by human interventions differently. Two of them are modified by major disturbances (especially dams), while the others 4 evolves in almost natural conditions. The studied channels covers the whole tipological spectrum, from straight to braided, sinuous or meandering.

The objectives followed in the paper are the following: 1) Which is the average state of the above defined fluvial processes, at the level of the 37 analyzed hydrometric stations afferent to the rivers from the Eastern Carpathians? 2) Can the effects of some control factors in the behaviour of the river beds be identified according to the data base that we have? 3) Are there common tendencies in the evolution of the east-Carpathians river beds with the one reported in different areas from Europe?

Rivers response was differentiated, apparent without establishing a common pattern. The dominant fluvial process was channel incision in case of 3 rivers (of which only one impacted by the main human disturbances). Incision values varied between -50 cm and -300 cm. Other two rivers (of which one with substantial human impact) the degradation process is dominant (values between +40 and + 100 cm). Only in one case the river registered an alternation of incision (at 3 gauging stations) with aggradation (at other 3 gauging stations) along the river, overall, incision being the dominant process.

The channel sediment deficit is an important cause for river incision. Sediment supply to the channels was reduced after a replacement of crops on the slopes by meadows or forests. Gravel mining has also caused channel downcutting. The rapid channel changes began after 1970, as systematic training was introduced.