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Two-dimensional appraisal of geomorphic control on braidplain and in-channel structural connectivity of a braided-wandering river from aerial photos (case study the Belá River, Slovakia)

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Throughout the Europe, reductions in the extent of braided river reaches have occurred since the end of the 19th century and throughout the 20th century. This is a particular study priority of present braided rivers, because they are unique natural entities and rich ecosystems. Understanding the temporal and spatial connectivity that has characterised braidplain and channel behaviour will give crucial information about the evolution and management decisions of this type of rivers. The aim of the contribution is to understand how the spatial connectivity has developed on the Belá River (23.6 km, average annual discharge 6.8 m3 s-1 at mouth, Strahler ord. 5, as a laterally unconfined, gravel-bed river with braided–wandering pattern situated in the North of Slovakia); evaluate how time-spatial linkages of channel and floodplain landforms have been affected by recent large flood events and local factors. Four geomorphological coupling levels of the structural connectivity for seven time periods, using aerial photography (1949–2009) have been investigated: i. valley slope/low terraces–braidplain; ii. channel–channel level; iii. channel–bank level; iiii. bar–channel bed level. Each time horizon has been selected to be representative for estimation linkages changes after large flood event. The development of geomorphological structural connectivity is examined by documenting sequential changes in braidplain width, channel planform (braided and wandering indices), bar and bank attached erosion/accretion areas as parameters reflecting four types of connectivity. The changes in the structural connectivity is expressed in the three-point ordinal scale (1. increasing; 2. unchanging; 3. decreasing) as well as in the map expression of river reaches zonation. Generally, the width of braidplain with decreasing trend refers to long term decoupling valley slope/terraces–braidplain linkages. This trend is prove also by decreasing of the braidplain area. The values of braided indices across years decrease contrary to the number of wandering ones exhibit rising tendency which indicates the increasing trend of channel-channel connectivity. The channel-bank type of connectivity exhibits temporal alternation. In some time periods increasing one dominates conditioned either by erosion or deposition processes but there are periods characterized also by decreasing or unchanging this type of connectivity. The interpretation of the bar-channel bed level connectivity by erosion/accretion areas allow us to make conclusions that during the period 1949–1973 both processes generate unchanging but intensive connectivity. On the contrary, the period 1986–2003 can be understand as decreasing and less intensive. The period 2003–2009 is considered as increasing one when the predominance of intensive deposition processes is clearly exhibited.

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