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Investigation on bank instability distribution along the Cecina River (Central Italy)

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Many progresses have been recently made to quantify single processes of unstable banks, while it is more difficult to predict the spatial distribution of such processes in a fluvial system and to identify the reaches with highest bank instability. A research is carried out along the Cecina River (Central Italy) with the overall objective to test different methods and approaches for identification and analysis of bank instability in a fluvial system.

The following methods are used: (1) Characterization of the riverbanks in the present conditions, including field stream reconnaissance, longitudinal distribution of eroding banks, recent rates of bank retreat from aerial photos. (2) Analysis of past channel changes and present trends of channel adjustment. This includes a detailed study of planimetric changes from aerial photos in order to understand the channel evolution and eventually to relate present distribution of bank instability with trends of channel adjustments. (3) Application of the DOCPROBE (Downstream Changes in the PROcesses of Bank Erosion: Lawler, 1995) conceptual bank erosion model. (4) Application of lateral erosion or instability indexes proposed in literature (Bledsoe & Watson, 2001; Piegay et al., 2005). (5) Bend stability analysis. This analysis is based on bend stability theories (Zolezzi & Seminara, 2001) used to assess the stability properties of meander planform.

All methods are used in synergy and results are discussed, comparing them with the present distribution of bank instabilities observed by field reconnaissance and by the comparison of the last two aerial flights.