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Role of river bank erosion in sediment budgets of catchments within the Loire river basin

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Quantifying volumes of sediments produced on hillslopes or in channels and transported or stored within river systems is necessary to establish sediment budgets. If research efforts on hillslope erosion processes have led to a relatively good understanding and quantification of local sources, in-channel processes remain poorly understood and quasi inexistent in global budgets. However, profound land use changes and agricultural practices have altered river functioning, caused river bank instability and stream incision. During the past decades in France, river channelization has been performed extensively to allow for new agricultural practices to take place.

Starting from a recent study on the quantification of sediment fluxes for catchments within the Loire river basin (Gay et al. 2013), our aim is to complete sediment budgets by taking into account various sources and sinks both on hillslope and within channel. The emphasis of this study is on river bank erosion and how bank erosion contributes to global budgets. A model of bank retreat is developed for the entire Loire river basin.

In general, our results show that bank retreat is on average quite low with approximately 1 cm.yr⁻¹. However, a strong variability exists within the study area with channels displaying values of bank retreat up to ~10 cm.yr⁻¹. Our results corroborate those found by Landemaine et al. 2013 on a small agricultural catchment. From this first step, quantification of volumes of sediment eroded from banks and available for transport should be calculated and integrated in sediment budgets to allow for a better understanding of basin functioning.

Gay A., Cerdan O., Delmas M., Desmet M., Variability of sediment yields in the Loire river basin (France): the role of small scale catchments (under review).

Landemaine V., Gay A., Cerdan O., Salvador-Blanes S., Rodriguez S. Recent morphological evolution of a headwater stream in agricultural context after channelization in the Ligoire river (France) (in prep)