



Hillslope - river network relations in Plio-pleistocene badland environments of central Italy

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In Italy badlands occur in several different geomorphological and lithological settings. They are locally known as calanchi and biancane. Badlands generally occur on fine textured lithologies. However, calanchi can be found in different lithological units e.g. marls, shales and weakly cemented pyroclastic deposits, whereas biancane occur only on Pliocene marine clays. The occurrence of badlands is probably controlled by a variety of factors. Their distribution is associated with different morphostructural features and also strictly controlled by agricultural management. Furthermore transient landscape disequilibrium is a common response to climatic fluctuations between glacial and interglacial conditions. Such landscapes are best suited to investigate catchment-wide response to changes in incision. Badlands area of Central Italy was analyzed taking into account a temporary stream base level. Calanchi can be found in watersheds similarly where (i) cut-and-fill terraces are abundant and conversely (ii) where deep valleys have been incised. Generally in the first case the morphometrics throughout the basin are uniform so it appears to be a coupled hillslope-channel system, conversely in the second case the morphology of hillslopes upstream of knickzones is different from downstream of knickzones, suggesting that this reaches have been decoupled from the hillslopes. The rapid incision often causes a decoupling of the hillslope from the channel network. This is the case of the Elsa river basin where after tectonic uplift, has captured the Pesciola torrent and resulted in badland development in the upper part.

The aim of this study is to i) integrate fluvial network information, ii) state of the art, methodological concepts on confluence dynamics, iii) tributary impacts and iv) related hillslope processes in order to assess the actual fluvial dynamics of the stream channel network and the implications for the adjacent hillslope areas. The study area is characterized by calanchi and biancane processes. We present two examples from the Orcia River, showing active erosion processes, and the Ombrone River, that show erosion processes only for the confluence area with the Orcia River.