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Recent hydrogeomorphological change (AD 1855-2005), control factors and fluvial risk on an upper alpine valley floor (Guil river, Southern French Alps)

G. Arnaud-Fassetta (1) and M. Fort (1)

(1) CNRS UMR 8586 (Prodig), C.C. 7001 (Site Javelot), Université Paris 7, F-75205 Paris Cedex 13 (gilles.arnaud-fassetta@univ-paris-diderot.fr, fort@univ-paris-diderot.fr)

Much research carried out along rivers at intermediate altitudes has concluded that the general trend of decreasing bedload supply is primarily a result of human action, and only secondarily a response to changes in climate and vegetation. In contrast, we have recently shown that, in the upper reaches of alpine valleys, the shaping of active channels has been mostly dependent upon hydroclimatic variability, at least during the last fifty years. We propose to apply this hypothesis within a broader temporal framework so as to include the Little Ice Age period. The analysis rests on several types of data: longitudinal and cross profiles, old topographical maps, and aerial photographs. We took account of active channel width and area, sinuosity and incision index, and engineering structures. We used dendrochronology to improve constraints upon the age of terraces and to help to assess the impact of high magnitude floods on riparian forest development. We assert that, whereas the general trend is dominated by channel incision, the overall instability of the active channel is mainly controlled by the passage of high-magnitude low-frequency hydroclimatic events (1897, 1957, 2000). We go on to show that, provided that flood control structures are generally efficient, the last 50-years of land-use changes have reduced the channel capacity of the Guil, and so have increased the vulnerability of human installations to damage.