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Regional assessment of braided riverscape multi-decadal changes following large floods (Example of 12 reaches in South East of France)

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Despite its continuous disappearance during the last centuries in the European Alps, braided river pattern still exists on a few reaches sparsely distributed in the Alpine area of the Rhône hydrographical district, especially in the Durance catchment area, where they cover a wide range of hydroclimatic and orographic settings. The aim of this talk is to understand how large floods control braided river planform temporal evolution at a regional scale. The research is based on a detailed analysis of series of aerial photos over several decades to finalize actions of preservation and restoration to satisfy the WFD objectives.

Amongst the 650 km of braided reaches still present in the Rhône basin, we chose 12 braided river reaches, reaching about 32.6 km of river length. Reaches have been selected to represent a large range of climatic conditions. A multi-decadal comparison of riverscape pattern and river channel morphology has been made from aerial black and white and panchromatic orthophotographs, provided by the National Geographical Institute (IGN) archive at five different dates (from 1950s to 2000s). The selection of photos is conditioned by the temporal position of the aerial photos series and of the floods to compare periods with and without critical floods (>Q10 at least).

Changes in river channel pattern is based on the analysis of the active channel width (e.g., the area occupied by water channels and unvegetated bars), mainly its narrowing or widening, but also on the island formation, growth and destruction. Both factors have been related to the historical analysis of high magnitude and low frequency flood occurrence.

We show that river reaches respond differently to flood events independently of their frequency or magnitude. A 1 in 10 year flood may have no planform effect in some cases, but significant effect in other cases, even observed on the same river, which underlines that flood impact is related to local conditions when flood occurs, partly depending on regional conditions (amount of sediment available, channel sinuosity, spatial and temporal pattern of vegetation encroachment). Our results improve the understanding of the fine-scale dynamic of braided rivers within the larger-temporal scale trend we previous explored at the 50 years time scale and open new research perspectives to explain factors explaining difference in vegetation establishment following floods observed between western and eastern braided reaches.