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Modelling decadal flooding and sediment transport in pre-alpine France

K. E. Welsh (1), R. Chiverrell (1), T. J. Coulthard (2), J. A. Dearing (1), A. Lang (1)
(1) University of Liverpool, UK, (2) University of Hull, UK (Katharine.welsh@liv.ac.uk/+44 151 794 2866)

A cellular automata evolutionary landscape model (CAESAR) is used to capture complexity, non-linearity and feedbacks within the hydrological system of the Petit lac d'Annecy catchment, Haute Savoie, France (48'N; long.6˚8'E). The small lake catchment (251 km^2) has three main tributary rivers: Eau Morte, Ire and Bornette rivers, providing the context for applying and validating the model over decadal timescales since the 19^{th} century. The aim of the research is to unravel the role of key drivers, climate or vegetation cover, on water and sediment discharge. The model is driven using an hourly precipitation series from 1826 to the present, and the documented history of forest cover in different communes.

Results from recent model outputs will be shown to demonstrate capture of the long term decadal changes and the high frequency (hourly/daily) changes in the fluvial regime. Validation has been attempted by comparing the model outputs to instrument time series of water discharge and reconstructed lake sediment records of sediment discharge from the catchment. Initial comparisons indicate reasonable temporal robustness. Spatial robustness will be attempted through comparison of mapped model outputs with studies of channel stratigraphy and colluvial profiles. The results can now be used to decipher the impact of different combinations of precipitation regime and vegetation cover on the fluvial system. Once the model is fully validated against field data, it will be used to simulate future fluvial changes for scenarios over the next century based on future climate and land use projections for the pre-alpine zone.