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Understanding the Fluvial Critical Zone

N. Bätz (1), S.N. Lane (1), A.J.A.M. Temme (2), and F. Lang (3)

(1) Institute of Geography, University of Lausanne, Switzerland (nico.baetz@unil.ch), (2) Land Dynamics Group, Wageningen University, Netherlands (arnaud.temme@wur.nl), (3) Department of Soil Science, Institute of Ecology, Technische Universität Berlin, Germany (fritzi.lang@tu-berlin.de)

Geomorphological modelling has evolved significantly the representation of the link between river morphology, flow processes and sediment transport; notably recently, with an emphasis upon the interactions between vegetation dynamics and morphodynamics. Nevertheless, vegetation dynamics have tended to be treated as a simplistic "black box" in which time replaces the more complex underlying processes. Thus, riparian vegetation dynamics not only result from interactions between surface-flow, topography and vegetation resistance to disturbance, but also soil development within the fluvial zone, which affects nutrient and water supply. More generally labeled the critical zone, there is a lack of considering the "critical fluvial zone" in geomorphological models. Understanding the key drivers of this system, thus the processes interrelating vegetation, topography, soil (formation), subsurface- and surface-flow, are crucial to understand how riverine landscapes respond to increasing human pressure and to climate change.

In this poster, we consider the likely nature of a braided river critical fluvial zone. Braided rivers in deglaciated forelands provide an opportunity to study the fluvial critical zone due to their dynamic properties, the restricted physical size, the simple ecosystems and the space-for-time relation caused by glacier retreatment after the "Little Ice Age".

The poster aims to commence a discussion on the fluvial critical zone, showing first results about: a) the system understanding of a braided river set in a recently deglaciated alpine foreland; b) methodological approaches to quantify the identified interrelating key processes; c) how quantitative understanding can be integrated into fluvial geomorphological modelling.