Geomorphological and climatic controls on the settling of river valleys in NW Transylvania (Romania) in the Holocene

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The wide river valleys and their lower terraces in NW Transylvania were the main avenue along which people and cultures crossed the Carpathian Mountains (East Central Europe) in the early Holocene and later established communities up to the present. This colonization process was marked by constant shifts between the locations of the main settlements, in response to changes in climate and associated geomorphological processes. In this paper, we have combined paleoclimatic, paleovegetation and geomorphological data from the Someșul Mic catchment to provide a narrative of interactions between human settlers and their natural and built environment between ca. 8000 cal BP and 1850 AD.

The climate of the region had a high degree of continentality (warm summers and cold winters) in the early Holocene that started to decrease after ca. 7000 cal BP, to reach a minimum in the mid-Holocene. After ca. 4000 cal BP, summer temperatures slightly increased while winter ones decreased, leading to renewed continentality. Contrary, the precipitation regime was dominated by low values in the first half of the Holocene, followed by an abrupt increase after 5500 cal BP, when Mediterranean climate expanded northwards. Pollen records indicate large-scale increases in temperate forests from the early Holocene onwards; with a general decrease in openness after 8500 cal BP. Following the spread of Neolithic societies, arable land expanded after ca. 7500 cal BP, while forested areas started to decrease subsequently. The absolute ages of alluvial sediments along the the median reach of Someșul Mic river suggest the river flows at the floodplain level since the Last Glacial Maximum. In the Late Glacial the channel has transformed from a coarse gravel braided channel type in an incised, meandering or anabranching one, except in the area of the former alluvial fan of the river, developed at the entrance in the hilly area. In this case, the Bolling – Allerod Interstadial is marked by a slight diminish of flow regime, with the maintenance of the braided pattern. Generalized channel change in a narrow, incised meandering one occurred with few hundred years delay after the edge of the Holocene, and most probably was predated by a transitory channel type (wandering or subadapted braided pattern).

Mesolithic, Neolithic, Bronze, Iron, Roman and Mediaeval findings are preferentially (82 \%) positioned on alluvial fans, glacises or positive floodplain forms imposed by tectonic uplifts. Only 18 \% of them are located in areas affected by local subsidence or with evidences of fluvial activity (active channel, meander belt, palaeochannels).
The human communities have fully used the local opportunities in placing their constructions: alluvial fans, glacis, positive morphologies imposed by local tectonics, stable channel reaches at millennial or even Holocene scale. The centennial and millennial climatic variations (precipitation) most probably influenced the spatial dynamics of human settlements and constructions, with advancements during warm and dry periods in more vulnerable areas to floods, torrential activity or ground level variations, and retreats during cold and humid ones. The role of abrupt climate oscillation changes is not well understood.