Holocene paleovegetation reconstructed from a fluvial sediment-paleosol sequence along the upper Alazani River (Caucasus region) using leaf-wax biomarkers – local vs. catchment information

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Due to its small-scale pattern of different climatic and ecologic regions and a long-lasting history of human land-use since ca. 8 ka, the Caucasus region is of particular interest with regard to Holocene climatic and paleoenvironmental changes. However, there only exists a limited number of paleoenvironmental reconstructions from that region yet. This study aims at reconstructing Holocene vegetational and paleoenvironmental changes using leaf-wax n-alkanes, n-carboxylic acids and compound specific $\delta 13C$ and δD isotopes from a fluvial sediment-paleosol sequence along the upper Alazani River in eastern Georgia. Phases of sedimentation and pedogenesis between >8 until ca. 1.7 cal. ka BP reflect alternating periods of geomorphic stability (pedogenesis) with reduced flooding activity due to more arid conditions, and periods of geomorphic activity (sedimentation) with increased flooding and erosion in the humid catchment area due to enhanced precipitation. Thus, biomarkers derived from non-pedogenetic sediments should be mostly derived from the catchment area located in the southern Greater Caucasus Mountains, whereas due to pedogenetic accumulation of organic matter biomarkers derived from the (paleo-)soils should mostly show the local signal of the sampling site located in the piedmont area.

Long-chain leaf wax-derived n-alkanes are present in all samples: Paleosols are mostly dominated by high contributions from grass vegetation (C31 and C33), indicating a local dominance of grass vegetation throughout the Holocene. This could be caused by relatively arid conditions and/or by agricultural use that is documented at this site by potsherds from ca. 8 cal. ka BP. Non-pedogenetic sediment layers show a higher abundance of grass-derived n-alkanes during the early Holocene and the Caucasian Holocene climate optimum around 5 cal. ka BP, whereas deciduous trees (C27 and C29) may have dominated after that period. However, it is not clear yet whether this vegetation change from grasses to deciduous trees in the catchment area of the Greater Caucasus Mountains is caused by climatic changes or by human activity.

The n-carboxylic acids generally corroborate and complement the alkane data. Compound-specific isotope analyzes are currently in progress.