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Multi-proxy record of land use change derived from colluvial soils of the western Pyrenees Mountains, France

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Archaeological evidence and paleoenvironmental proxies from wetland bogs (e.g. charcoal, pastoral pollen, fungal spores of sheep dung) clearly outline the regional chronology of Holocene pastoral activity in the Pyrenees. We increase the spatial and temporal resolution of this chronology through a place-based, millennial-scale investigation of land use activities within individual fields in the commune of Larrau, Pyrénées Atlantiques, France. We have identified several stratigraphic records of slopewash colluvium that span the entire Holocene that occur at the outlets of zero-order watersheds, each draining several hectares. To examine forest-to-pasture transformation, two to three meter long auger holes were sampled in contiguous five centimeter intervals. These samples were analyzed for charcoal content, radiocarbon age, magnetic susceptibility, particle size, organic matter, and n-alkane concentrations. Results indicate that intentional burning and clearing were initiated by the Late Neolithic (ca. 5000-6000 cal. BP), but more intense burning, clearing, and pronounced soil erosion occurred later during the Bronze Age and Iron Age. Charcoal concentrations and low frequency magnetic susceptibility provide evidence of initial burning and subsequent variation in the intensity of fire use. Radiocarbon chronologies exhibit order-of-magnitude spikes in sedimentation rates (1-10 mm/yr) during the Bronze Age and Iron Age that are asynchronous between sites. Asynchronous records suggest anthropic, rather than climatic, drivers and imply that land use varied in intensity across the landscape, unlike the uniform intensity of pasture use typical of the modern landscape. Sedimentation rates, and presumably erosion rates, returned to very near pre-pastoral background levels (<1mm/yr) during the last 1500 years. A pristine-degraded-recovery cycle is thus indicated for the span of the Holocene illustrating that not all pastures around the world persist with stereotypical degraded soils. N-alkane analyses are in progress, testing for changes in past vegetation communities (trees vs. grass), and we anticipate results and interpretation of those data by April 2016.