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Missing evidence for the LGM-asynchronity in the Central Spanish Pyrenees in geomorphological, sedimentological and pedological archives

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According to the state of knowledge, the glacial advances in the Eastern Pyrenees were synchronous with the global LGM during the Late Pleistocene (MIS 2), but the glacial advances in the Central Spanish Pyrenees at MIS 3 were asynchron with the global LGM. Whereas in the Eastern Pyrenees the glacial advances are dated in several well agreeing studies by surface exposure dating of boulders from lateral or terminal moraines, the asynchronity of the Central Spanish Pyrenees was postulated mainly by OSL dating on glacial and fluvial sediments and on radiocarbon dating of pollen from lacustrine deposits. The time difference of about 15 ka raises the question if this is a result of (local) climate factors or owed to failures caused by using several dating techniques on different archives. Anyway, if this time lag is correct, post-LGM formation of soils and sediments from the Late Pleistocene should be different between the Eastern Pyrenees and the Central Spanish Pyrenees. We therefore applied a combined approach of geomorphological, sedimentological and pedological investigations to reconstruct the Late Quaternary landscape development in the Aragon- and Gallego Valley of the Central Spanish Pyrenees.
Our study reveals that in both valleys the Pre-Holocene geomorphodynamics on the lateglacial deposits show clear analogies with findings from Pleistocene periglacial landscapes in Central Europe. For MIS 4 and early MIS 3 periglacial processes are proven by loess deposition and formation of solifluction sediments.
The glacial sediments, which were dated in earlier studies into mid MIS 3 and counted so far as prove for the asynchronous LGM of the Central Spanish Pyrenees, are covered by periglacial deposits of lateglacial age (14 ka to 11 ka). Surprisingly neither the glacial sediments have pedogenic features that indicate lateglacial soil development, nor do the periglacial deposits show indications for lateglacial soil erosion. Therefore we conclude that soil formation began after the sedimentation of the periglacial deposits, either implying a striking timeframe of more than 15 ka with a stable landscape without any pedogenesis, or the untenability of the MIS 3 age of the glacial sediments. Because we can clearly differentiate further phases of geomorphodynamics during the Holocene with truncated soil profiles and the correlate sediments of soil erosion next to undisturbed soils in periglacial sediments with a lateglacial age, we challenge the thesis of an asynchronous LGM in the Central Spanish Pyrenees and advocate a synchronous LGM in the Gallego- and Aragon valley analog to the Eastern Pyrenees.