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Contradictory indications from terrestrial archives for the asynchronous LGM glaciation in the Central Spanish Pyrenees

Florian Hirsch and Thomas Raab

Chair of Geopedology and Landscape Development, Brandenburg University of Technology Cottbus - Senftenberg, Cottbus, Germany

Studies from several Mediterranean sites suggest a nonuniform glaciation during the last glacial cycle. For the Pyrenees an asynchronous maximum ice extent compared to the global last glacial maximum (LGM) is controversially discussed. Our study sites are located in the Central Spanish Pyrenees, namely the Aragon and Gallego Valley. Both valleys are type locations for the Pleistocene glaciations and the early maximum ice extent for the Pyrenees was dated amongst other sites in the Gallego Valley to about 36 ka. Due to the potential time span since the earlier deglaciation compared to LGM sites from Central Europe we used a pedological and sedimentological approach to reconstruct the Late Quaternary landscape development. Our results indicate a considerable reshaping of the LGM landscape prior to the onset of the Holocene. The LGM tills are covered by a deposit with high content of fine sand and coarse silt. On the slopes the clasts in these fine-grained sediments are aligned parallel to the slope direction, whereas in the underlaying tills the clasts are aligned rectangular to the slope direction and therefore representing the direction of the Pleistocene glacier movement. We attribute the alignment of the clasts in the sediment covering the tills to solifluction induced by periglacial conditions. The high contents of coarse silt and fine sand are also characteristic for the eolian component in periglacial slope deposits. OSL datings suggest an age of about 14 ka for these sediments. Soil micromorphology shows that the periglacial deposits were not subject to intensive pedogenic processes prior to the sedimentation but that profiles are strongly affected by lessivation after deposition. Soil erosion is only evident during the Holocene and we associate these phases of soil erosion with the human impact. We found no indications for geomorphologic and pedogenic processes between the reported deposition of the LGM till around 36 ka and the periglacial conditions dated in our study to about 14 ka.