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New data on the Late Pleistocene evolution of the Klagenfurt Basin, Austria

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The Klagenfurt Basin in the southern Austrian region of Carinthia was glaciated during the Last Glacial Maximum (LGM). Next to numerous lakes, the present-day landscape predominantly exhibits landforms such as moraines and large river terraces systems. These landforms can be seen as markers for post-LGM tectonics: If they are deformed, the basin has taken up a share of the ~N-S shortening prevailing due to the ongoing collision of Adria and Europe. If the landforms are undeformed, this deformation is accommodated elsewhere, most likely further south along the Periadriatic and Sava Fault system or by a NW-SE-trending strike-slip fault system at the junction between Southern Alps and Dinarides in Slovenia. Our study is motivated by the recent discovery of earthquake-triggered mass movements in Carinthian lakes and new data on Late Pleistocene-Holocene speleothem damage in the Karawanken mountains, illustrating that the area is seismically active. We used newly available high-resolution digital elevation models to scan the area for postglacial deformation but found no conclusive evidence for tectonic activity since the Würm glaciation. We then analysed several outcrops of Late Pleistocene sediments throughout the Klagenfurt Basin to check for soft-sediment deformation features that could be linked to strong seismic shaking. These outcrops were documented as 3D virtual models. Deformed silty-sandy layers were encountered in several places, and one outcrop showed spectacularly folded fluvial gravels. However, we do not need to invoke tectonics as the causative mechanism. Instead, we interpret these structures as evidence for a late glacial advance. Luminescence dating is underway to put constraints on the timing of this event. Our study implies that although there are records for recent strong earthquakes around the Klagenfurt Basin, the rates of deformation are so low that they can not be detected in the post-LGM landscape.