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Active tectonics in the northern Tangra Yum Co Basin (central Tibet)

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Lake Tangra Yum Co in southern central Tibet is situated in a tectonic basin, bound by N-S trending normal faults forming a graben-like structure. The present-day lake level is at 4540 m asl, however wave-cut terraces and depositional terraces with beach berms (raised beaches) are found up to 200 m height above the sea level, testifying to higher lake levels of around 4740 m asl during the Holocene/Late Pleistocene. Several glacial landforms, like terminal and lateral moraines, remains of glacial outburst floods, and post-glacial landforms and sediments, like alluvial fans or carbonates serve as marker horizons for active tectonics. The fresh-water carbonates form three distinguishable sequences, which are exclusively found along the western shore. The lower sequence exposed closest to the lake level has been dated between 13 ka cal BP at the base, whereas the top of this sequence yields ages of around 6.5 ka cal BP (reservoir effect-uncorrected ages). We have found several seismites within these carbonates. However, from a morphotectonic point of view, the eastern shore seems to be more active in recent times. Here, active faults with pronounced soft- and hardrock scarps have been found, which displace clearly postglacial features.

Hydroacoustic surveys show that below the sea level further terraces have been developed, which points even to past lower lake levels than the present one at -3m, -9m, -25m, -40m characterized by drowned beach berms and incised valleys. Several faults also affect the lake floor and recent sediments, generally with a normal displacement. In conclusion, Lake Tangra Yum Co Basin is regarded as tectonically active, the carbonate horizons and geomorphological landforms are excellent markers for the calculation of post-glacial slip rates of the faults, and finally the lake level changes including the carbonate production in the today saline lake are clearly reflecting a climate signal. Cosmogenic and OSL datings in combination with radiocarbon dating are in progress to establish a robust timeframe for the genesis, erosion and deformation of the marker horizons and landforms.