

EGU22-6716

<https://doi.org/10.5194/egusphere-egu22-6716>

EGU General Assembly 2022

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A dammed palaeo-lake at the middle Yarlung Tsangpo River, Tibet

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The Yarlung Tsangpo River follows the Indus-Tsangpo suture through the southern Tibetan Plateau, and then becomes the Brahmaputra, following a bend into India through the Yarlung Tsangpo Gorge. In the middle reaches, narrow gorges alternate with broad valleys (Zhang, et al. 1998). In the section with steep and narrow gorges, the river is easily dammed by landslides, glaciers and/or moraines, rock avalanches and debris flows. Palaeo-lake sediments were discovered in the broad Xigazê valley and Dazhuka-Yueju gorge in the middle reach of the Yarlung Tsangpo River in Tibet. The river was likely dammed by a glacier and/or moraine at the eastern end of the Dazhuka-Yueju gorge. AMS ¹⁴C and OSL ages of lacustrine sediments indicate the palaeo-lake was formed during the period from ~30.2 to 32.3 cal. kyr BP, and failed at ~13.2 cal. kyr BP (Hu et al., 2018). The elevation of the dammed lake was 3811 m a.s.l., and its length, maximum water depth, and volume were 185 km, 211 m, and ~22.55 km³, respectively (Hu et al., 2022). The volume of the sediment was ~11.56 km³, which was calculated from the dam location, sediment surface elevation, and the ASTER GDEM2 data. Therefore, the backwater volume was 10.99 km³, and the peak flood possibly exceeded 3.4×10^5 m³/s during the dam failure. The dammed palaeo-lakes in the valleys downstream of the middle Yarlung Tsangpo River were also discharged during ~13 ka, and they were likely interconnected by hydrological processes. Hence, the failure of the dam and related flooding from the Dazhuka-Yueju gorge probably triggered a chain reaction of dam failures downstream, forming a megaflood. However, the dammed event in the Dazhuka-Yueju valley probably had a limited effect on the landforms at downstream because of the presence of another dammed palaeo-lake in the broad Zetang valley. So the ages of the dammed palaeo-lakes at the middle Yarlung Tsangpo River need to be constrained more precisely.

References

Hu, H.-P., Feng, J.-L., Chen, F., 2018. Sedimentary records of a palaeo-lake in the middle Yarlung Tsangpo: Implications for terrace genesis and outburst flooding. *Quaternary Science Reviews*, 192, 135-148.

Hu, H.-P., Liu, J.-H., Feng, J.-L., Ye, C.-S., Lv, F., Chen, F., Gong, Z.-J., Chen, L.-Q., Du, D.-D., 2022. Geomorphic processes of a dammed palaeo-lake in the middle Yarlung Tsangpo River, Tibet. *Science of the Total Environment*, 811C, 151949.

Zhang, D.D., 1998. Geomorphological problems of the middle reaches of the Tsangpo River, Tibet. *Earth Surface Processes and Landforms*, 23(10): 889-903.