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Extending the paleoglaciological record of the southeastern Tibetan Plateau by combining geochronological and high-resolution remote sensing techniques

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Paleoglaciological data is a crucial source of information towards insightful paleoclimate reconstructions by providing vital boundary conditions for regional and global climate models. In this context, the Third Pole Environment is considered a key region because it is highly sensitive to global climate change and its many glaciers constitute a diminishing but critical supply of freshwater to downstream communities in SE Asia. Despite its importance, extents of past glaciation on the Tibetan Plateau remain poorly documented or controversial largely because of the lack of well define glacial chronostratigraphies and reconstructions of former glacier extent. This study contributes to a better documentation of the extent and improved resolution of the timing of past glaciations on the southeastern margin of the Tibetan Plateau. We deploy a high-resolution TanDEM-X Digital Elevation Model (12 m resolution) to produce maps of glacial and proglacial fluvial landforms in unprecedented detail. Geomorphological and sedimentological field observations complement the mapping while cosmogenic nuclide exposure dating of quartz samples from boulders on end moraines detail the timing of local glacier expansion. Additionally, samples for optically stimulated luminescence dating were taken from extensive and distinct terraces located in pull-apart basins downstream of the end moraines to determine their formation time. We compare this new dataset with new and published electron spin resonance

ages from terraces. Temporal coherence between the different chronometers strengthens the geochronological record while divergence highlights limitations in the applicability of the chronometers to glacial research or in our conceptual understanding of landscape changes in tectonic regions. Results highlight our current understanding of paleoglaciation, landscape development, and paleoclimate on the SE Tibetan Plateau.