

# Paleoglaciology of the Bayan Har Mountain area, eastern Tibetan Plateau

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The glacial history of the Tibetan Plateau is a topic of considerable interest because of its significance for regional and global environmental reconstructions, and its interaction with variations in monsoon strength and plateau uplift. Published glacial reconstructions for the last glaciation range from a large ice sheet covering the entire Tibetan Plateau to extended valley glaciation forming discrete glaciated mountain blocks. Although current chronologies appear to underpin the restricted glaciation model, there appears to be enough regional variation to motivate further study, especially the glacial history predating the last glaciation. We therefore study the glacial history of a large upland section of the eastern Tibetan Plateau centered on the currently unglaciated Bayan Har Mountains (BHM), partly because chronological constraints are entirely absent, and partly because the area may once have been covered by an ice sheet of intermediate proportions. The BHM area, which houses the headwaters of the Huang He (Yellow River), contains a wide array of glacial deposits and morphologies. Moreover, it appears that superseding glaciations were ever limiting in extent and the area therefore presents optimal conditions to investigate glaciations over long time periods.

We report from an on-going investigation into the extent and chronology of Quaternary glaciers in this region, manifested in glacial deposits and landforms (e.g., erratics, end moraines, tills and trough valleys). Previous studies have indicated the occurrence of two phases of mountain glaciation during the last glaciation (OIS 2-4), with mountain glaciers distributed around the highest summits, and two prior glaciations of ice sheet glaciation character (the penultimate glaciation, OIS 6, and the Huang He ice sheet, OIS 12).

We mapped the glacial morphology of the area using satellite images and a DEM of 90 m resolution. Large-scale glacial landforms such as cirques, glacial troughs and U-shaped valleys indicate repeated glaciations, and so do series of moraine ridges and meltwater channels. The abundance of glacial traces detectable through remote sensing techniques diminish with decreasing elevation, and it appears that evidence for former ice sheets are based mainly on sedimentary evidence.

In an introductory field work in 2005, surface boulders (including erratics) and boulders in till profiles have been sampled for dating using terrestrial cosmogenic nuclide (TCN) concentrations in quartz. Sampling was carried out along a 300 km stretch of the Qingkang highway, crossing the 80,000 km<sup>2</sup> area of the Huang He ice sheet. We intend to present these first TCN results at the meeting.

Our study will present new data for the paleoglaciology of the eastern Tibetan Plateau, and will contribute to the resolution of questions such as:

- What glacial fluctuations occurred in the BHM area throughout the last glaciation?
- When did glaciation pre-dating the last glaciation occur?
- Was the area ever covered by an ice sheet?
- What is the relation Tibetan glaciation – uplift – climate variations?

These are questions of special significance also for former periglacial conditions, as reconstructed glaciers and ice sheets had a fundamental effect on regional paleoenvironmental conditions.

**Keywords:** paleoglaciology, glacial morphology, cosmogenic nuclides, Bayan Har