

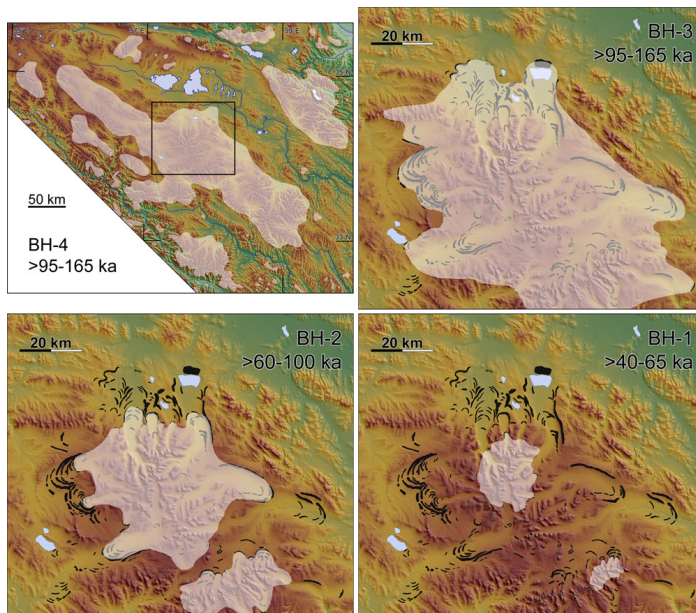
A paleoglaciological reconstruction for Bayan Har Shan, NE Tibetan Plateau

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The paleoglaciology of the Tibetan Plateau has remained elusive because extensive areas still lack detailed scrutiny. We here present a paleoglaciological reconstruction for the Bayan Har Shan region, NE Tibetan Plateau, which could serve as a working model to investigate other poorly investigated regions. The reconstruction is primarily based on three methods for revealing the glacial history; 1) remote sensing (geomorphology), 2) field studies (stratigraphy), and 3) numerical dating techniques. Remote sensing (SRTM elevation data, Landsat ETM+ satellite imagery and Google Earth) of a 136 500 km² area reveals an abundance of glacial landforms in the highest mountain areas and an absence of glacial landforms on intervening plateau surfaces. Stratigraphical data collected during three field seasons supplement the picture emerging from remote sensing. Glacial deposits (including erratic boulders and till) occur in the elevated mountain areas but are absent on the intervening plateau areas. Marginal moraines in central Bayan Har can be grouped to represent at least three separate glacial extents and scattered observations of glacial deposits indicate the presence of a fourth (and maximum) glacial extent. To tie the glacial geological record to a chronology we have employed terrestrial cosmogenic nuclide (TCN) exposure and optically stimulated luminescence (OSL) dating. Beryllium apparent exposure ages of 65 glacial boulders, surface cobbles/pebbles and depth profile samples yield minimum ages for the three youngest glacial extents of 40-65 ka, 60-100 ka, and 95-165 ka (with the wide age ranges due to TCN dating uncertainties). A preliminary OSL age of c. 160 ka from glacial sediments of the oldest of these glacial extents supports our interpretation based on TCN dating.

The glacial extent presented here is more restricted than most previous reconstructions, most notably with very restricted glaciers over at least the last 40-65 ka. These results indicate that while continental-scale ice sheets evolved and disappeared in North America and Eurasia over the last half of the last glacial cycle, the NE corner of the Tibetan Plateau experienced relatively minor glacial fluctuations.



Maximum glacial extent of the Bayan Har Shan area (BH-4, upper left corner) and three younger glacial stages for central Bayan Har Shan. The glacial extent is based on the glacial geological record of landforms and sediments and the chronological constraints are based on TCN dating.