



Constraining the glacial chronology of Bayan Har Shan, NE Tibetan Plateau – Cosmogenic exposure dating of boulders, surface pebbles/cobbles and sediment depth profiles

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The paleoglaciology of the Tibetan Plateau remains elusive, with important hiata regarding the style, extent, and timing of glaciations. Bayan Har Shan is a mountain region on the northeastern Tibetan Plateau, in a transition zone from the dry interior of the plateau in the west to the wetter eastern margin affected by the Asian monsoon. Bayan Har Shan hosts an ample record of glacial landforms and deposits indicating paleo-glaciers ranging from cirque and valley glaciers to ice-fields and ice caps. These glaciers, it has been suggested, also nourished a regional ice sheet. In an attempt to constrain the timing of glaciations in Bayan Har Shan, we have performed terrestrial cosmogenic nuclide (TCN) exposure dating on surface boulders and pebbles/cobbles from glacial deposits, and on pebbles in sediment depth profiles. The aim has been two-fold: to constrain the glacial chronology and to compare and evaluate the TCN ages of the three different TCN sample types.

We present the result of 67 Be-10 measurements from 15 sites in central Bayan Har Shan (40 boulder samples, 12 surface pebbles/cobbles samples and 15 depth profile samples from four depth profiles). The obtained TCN apparent exposure ages of boulders and surface pebbles/cobbles range from 3 ka to 145 ka with wide age spreads within groups of samples collected from one glacial deposit. Our TCN results of three different sample types (boulders, surface pebbles/cobbles and depth profile pebbles) from the northeastern Tibetan Plateau form an intriguing data set that may yield different age estimates with different interpretation strategies. However, they permit the following conclusions to be advanced:

- Pebbles/cobbles ages are broadly in agreement with boulder ages.
- Three depth profiles yield exponential curves for Be-10 concentrations with depth, in agreement with theoretical TCN depth profiles; ages are in broad agreement with boulder and surface pebbles/cobbles samples.
- Maximum ages (adopting an approach where the maximum ages constrain the minimum age of formation) of multiple sample sites are all c. 50 ka or older. This is underlined by the maximum ages around 50 ka from three moraines formed by glaciers just a few kilometres long, indicating that there has been no significant glaciation of central Bayan Har Shan over the last 50 ka.