

Supplementary Material

1. Burial sampling field techniques

Sample CU02 was collected within quartz-rich sand lenses at a quarry pit just south of the Daotanghe Divide (Figs. 2a and S1a) at 45m below the top of the exposed basin fill surface. Sample CU04 was collected from coarse sand lenses within shallow lacustrine deposits at Longyangxia Divide at the base of modern road-cut (12 m below the basin top fill surface; Figs. 2a and S1b). Depth to the land surface prior to quarry and road construction was measured with a laser rangefinder and used in subsequent age calculations. Sample CU02 was from ~3100 m basin lacustrine fill, and sample CU04 was taken within the fluvial sands beneath the sand dune at the Daotanghe Divide (Table 1).

2. Burial sample preparation and measurement

Approximately 500 g medium to coarse sand of each sample were extracted from field samples. After rinsing with water more than three times, sieved samples (0.5 – 0.8 mm) were leached with a 6 N hydrochloric acid to dissolve carbonates. Samples were then subjected to leaching in a 5% HF/HNO₃ solution to remove meteoric ¹⁰Be as well as accessory minerals. Leached samples were then subject to heavy liquid separation to further purify the remaining quartz, and finally subjected to leaching with 1% HF/HNO₃ in the ultrasonic tank. From the purified quartz, approximately 0.4 g of each sample was weighed, dissolved with HF and HNO₃ solutions, and analyzed by ICP-OES (Inductively Coupled Plasma Optical Emissions Spectrometer) to measure Al concentrations in University of Colorado at Boulder. Typically, these concentrations are lower than 30 ppm, sufficiently low to merit analysis.

Following chemical procedure of mineral separation in Cosmlab in University of Colorado at Boulder, purified quartz from each sample (~33 – 61 g) was dissolved in HF and HNO₃. We added a ⁹Be spike of ~0.20 mg in a carrier solution. A single blank sample was also processed along with other quartz samples to control for variations in the preparation. After removal of fluorides with HNO₃ and HCl, and removal of Fe and Ti by anion exchange, pure Al and Be were separated on cation/anion exchange columns and precipitated as hydroxides. These precipitates were dried and oxidized at 900-950°C. The resultant Al₂O₃ and BeO powders were mixed with equal volumes of Ag and Nb respectively, and packed in target holders for AMS (Accelerator Mass Spectrometry) determination of ¹⁰Be/⁹Be and ²⁶Al/²⁷Al at the Lawrence Livermore National Laboratory CAMS facility (LLNL/CAMS)

Figure DR1. Field photos of the burial samples. a) Sample CU04 was taken within the fluvial sands beneath the sand dune at the Daotanghe Divide, and b) Sample CU04 was from ~3100 m basin lacustrine fill (Table 1).

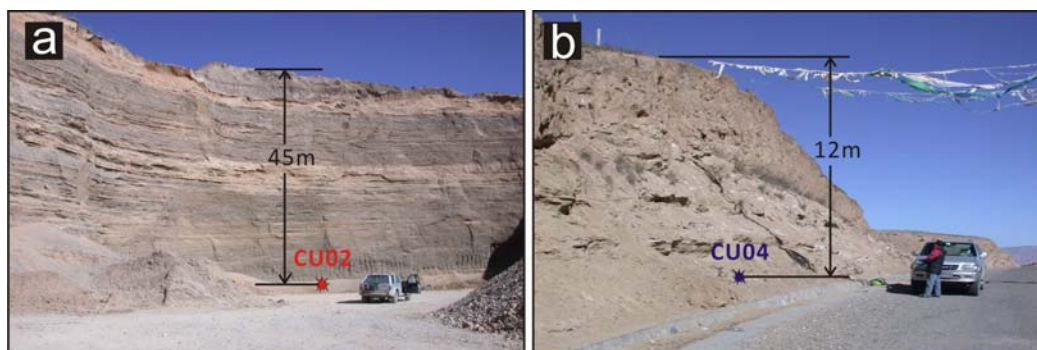


Fig. Dr1 Zhang et al.