
Data Repository

Supplementary Material File DR1. Analytical procedures for geochronology and thermochronology.

Fig. DR1. Concordia diagrams and weighted mean ages of zircon U-Pb samples. The ages that were not used for final age calculation were marked by dashed ellipses on concordia diagram.

Table DR1. (a) Sample location and description. (b) Sites for structural and sedimentary observations.

Table DR2. Zircon U-Pb geochronologic data analyzed by Laser-Ablation ICP Mass Spectrometry.

Table DR3. Zircon U-Pb geochronologic ages for Mesozoic magmatic rocks exposed within the LZTB, SE Tibet.

Table DR4. Geochronologic ages for Eocene volcanic clasts and plutonic rocks in and around the Jianchuan basin and LZTB, SE Tibet.

Table DR5. Zircon and apatite (U-Th)/He data.

Table DR6. Apatite fission-track data.
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Zircon U-Pb geochronology

Zircon U-Pb geochronological analyses were conducted at China University of Geosciences, Wuhan, China. U-Pb dating was performed using an Agilent 7500a ICP-MS, which is equipped with a GeoLas 2005 excimer laser ablation system at a spot diameter of 32 µm. Zircon 91500 was used as an external standard and analyzed twice every 5 unknowns. To keep age reproducibility and instrument stability, four GJ-1 zircon standards were inserted at the beginning and end of each run. Typical operating conditions and detailed analytical procedures are described in (Liu et al., 2008). Selection and integration of analytic signals, time-drift correction, and quantitative calibration for U-Pb dating were performed by ICP-MS DataCal. Ages were accepted with up to 10% and 20% discordance for plutonic and volcanic samples, respectively. The results reported here are $^{206}\text{Pb}/^{238}\text{U}$ ages for zircon ages $\leq 1.0$ Ga and $^{207}\text{Pb}/^{206}\text{Pb}$ ages for grains with ages $>1.0$ Ga. Age-distribution plots and age-concordia diagrams were generated using Isoplot/Ex. ver. 3.75 (Ludwig, 2012).

Low-temperature thermochronology

Apatite fission track analysis was performed at Apatite to Zircon, Inc., Viola, Idaho, USA. Apatite aliquots were mounted in epoxy and polished, and then etched in a 5.5 M HNO$_3$ solution at 21 °C for 20 s. Apatite fission track data were acquired using a New Wave Neodymium-YAG 213 nm laser ablation system coupled to a Finigan Element II Magnetic Sector ICP-MS at a 12 µm spot and a 5 Hz repetition rate with the laser set in constant energy mode. Analyses were corrected by $^{43}\text{Ca}$ as an internal standard for variations in ablation volume. For detailed procedures of sample analysis refer to Donelick et al. (2005)

Zircon and Apatite (U-Th)/He dating was accomplished at the University of Arizona, USA. Normally, 3–5 euhedral zircon and apatite crystals without visible inclusions, fracture and stainless surface were chosen using a stereo-zoom polarized microscope. The geometry of each grain was measured and photographed. The grains larger than 60 µm but smaller than 500 µm in both length and width were accepted to processed for (U-Th)/He analysis. The zircon and apatite grains were wrapped into Nb foil tubes and degassed by laser heating, and then analyzed for He using $^3$He isotope dilution, cryogenic purification and quadrupole mass spectrometry. The U, Th and Sm concentrations of each dissolved aliquots was measured on a sector inductively coupled plasma-mass spectrometer. Corrected (U-Th)/He ages were processed by applying the $\alpha$-ejection correction factor (Farley, 2002). Standard Fish Canyon Tuff zircon and Durango apatite fragments were identically analyzed together with unknowns to validate age determination, age
reproducibility and measurement accuracy. Mean ages of each sample were calculated based on all grain ages and relevant errors.

REFERENCES CITED


