University of British Columbia (UBC) Pacific Centre for Isotopic and Geochemical Research (PCIGR) U-Pb zircon ID-TIMS methods

Isotope-dilution thermal ionization mass spectrometry (ID-TIMS) procedures involved chemical abrasion of zircon fractions following procedures modified from Mundil et al. (2004), Mattinson (2005) and Scoates and Friedman (2008). Rock samples underwent standard mineral separation procedures, and zircon separates were handpicked in alcohol. The clearest, crack- and inclusion-free grains were selected, photographed, and then annealed at 900˚C for 60 hours. Annealed grains were chemically abraded, spiked with a 233-235U205Pb tracer solution (EARTHTIME ET535), and then dissolved. Resulting solutions were dried and loaded onto Re filaments (Gerstenberger and Haase, 1997).

Isotopic ratios were measured by a modified single collector VG-54R or 354S thermal ionization mass spectrometer equipped with analogue Daly photomultipliers. Analytical blanks were 0.2 pg for U and up to 1.0 pg for Pb. U fractionation was determined directly on individual runs using the ET535 mixed 233-235U205Pb isotopic tracer. Pb isotopic ratios were corrected for fractionation of 0.30%/amu, based on replicate analyses of NBS-982 reference material and the values recommended by Thirlwall (2000). Data reduction used the Excel™-based program of Schmitz and Schoene (2007). Standard concordia diagrams were constructed and regression intercepts and weighted averages calculated with Isoplot (Ludwig, 2003). All errors are quoted at the 2σ or 95% confidence level, unless otherwise noted. Isotopic ages were calculated with the decay constants λ238=1.55125E-10 and λ235=9.8485E-10 (Jaffey et al, 1971). EARTHTIME U-Pb synthetic solutions were analysed on an ongoing basis to monitor accuracy.

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