LA-ICPMS Methodology: PCIGR University of British Columbia

Zircon grains were separated using conventional crushing, grinding and wet shaking table methods, followed by heavy liquid and magnetic separation at the Pacific Centre for Isotopic and Geochemical Research (PCIGR). Zircon grains were dated using laser ablation (LA) ICP-MS methods, employing a New Wave UP-213 laser ablation system and a Thermo Finnigan Element 2 single collector, double-focusing, magnetic sector ICP-MS. Zircons were handpicked from the heavy mineral concentrate and mounted in an epoxy puck along with several grains of the Plešovice zircon standard (Sláma et al. 2008), together with a separate in-house, 197 Ma standard zircon, and brought to a very high polish. High quality portions of each grain free of alteration, inclusions, or possible inherited cores were selected for analysis. The surface of the mount was washed for 10 minutes with dilute nitric acid and rinsed in ultraclean water prior to analysis. Line scans were employed in order to minimize elemental fractionation during the analyses. Backgrounds were measured with the laser shutter closed for ten seconds, followed by data collection with the laser firing for approximately 29 seconds. The time-integrated signals were analysed using GLITTER software (Van Achterbergh et al. 2001; Griffin et al. 2008), which automatically subtracts background measurements, propagates all analytical errors, and calculates isotopic ratios and ages. Time resolved data were carefully examined to identify and avoid portions of the signal that reflected Pb loss and/or the presence of older inherited cores or altered zones in the zircon being analyzed. Corrections for mass and elemental fractionation were made by bracketing analyses of unknown grains with replicate analyses of the Plešovice zircon standard. A typical analytical session for dating zircons at the PCIGR consists of four analyses of the standard zircon, followed by four analyses of unknown zircons, two standard analyses, four unknown analyses, etc., and finally four standard analyses. The 197 Ma in-house zircon standard was analysed as an unknown in order to monitor the reproducibility of the age determinations on a run-to-run basis. Final interpretation and plotting of the analytical results employed the ISOPLOT software (Ludwig 2003). The final interpreted age for intrusive samples is based on a weighted average of the individual calculated $^{206}Pb/^{238}U$ ages. Analytical results for detrital zircon samples are filtered, with analyses that exhibit >5% reverse discordance or >10% normal discordance being rejected. Errors are quoted at the 2σ level. For samples yielding isotopic ages >1Ga, the $^{207}Pb/^{206}Pb$ ages are reported, whereas for samples <1 Ga the $^{206}Pb/^{238}U$ ages are reported. Detrital zircon ages are presented as cumulative density plots.

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