DR2008143

Appendix.1 U-Pb geochronology

Epoxy grain mounts of hand-selected zircons were ground and polished to expose grain interiors. After ultrasonic cleaning with soapy water, diluted HCl and distilled water, the Au-coated mounts were transferred into a high vacuum chamber (>10⁻⁸ Torr) and kept overnight. Zircon analysis was performed using the UCLA Cameca ims 1270 ion microprobe with a mass-filtered, ca.15 nÅ ¹⁶O⁻ beam focused to a 25-30 μ m diameter spot. The sample chamber was flooded with O₂ at a pressure of ca. 4 x 10⁻³ Pa to enhance Pb⁺ yields by roughly a factor of 1.5. Secondary ions were extracted at 10 kV with an energy band pass of 50 eV. Following a ~ 4min pre-sputter period during which secondary beam alignment, mass centering, and charge compensation routines are automatically applied, intensities for ⁹⁴Zr₂O⁺, ²⁰⁴Pb⁺, ²⁰⁶Pb⁺, ²⁰⁷Pb⁺, ²⁰⁸Pb⁺, ²³⁸U⁺, ²³²Th¹⁶O⁺ and ²³⁸U¹⁶O⁺ were sequentially measured in 10 cycles at a mass resolution of ca. 4800, which is sufficient to resolve most molecular interferences.

The relative sensitivities for Pb and U were determined on reference zircon AS-3 (Paces & Miller, 1993) using a calibration technique similar to Compston et al. (1984). U and Th contents (Table 1) were calculated from ${}^{238}U^{16}O^+/{}^{94}Zr^2O^+$ and Th $^+/U^+$ with relative sensitivities (February 06 2006: 25.5 and 1.09; July 03 2006: 19.5 and 0.91) calibrated on reference zircon 91500 (Wiedenbeck et al., 2004). The ratio of standard analyses to unknowns was ~0.3 was for both sessions, with an external reproducibility of ${}^{206}Pb/{}^{238}U$ ages on AS-3 between 1.6 % (July 03 2006) and 1.8 % (February 06 2006). Unknown ${}^{206}Pb/{}^{238}U$ ages were calculated from common-Pb and disequilibrium corrected U/Pb isotopic ratios. Corrections for common-Pb are based on anthropogenic

compositions (Sañudo-Wilhelmy and Flegal, 1994) and initial disequilibrium ²³⁰Th was calculated from measured Th/U_{zircon} and a model Th/U_{melt}, using the average Th/U value for Southern Central Andes ignimbrites (~3; Siebel et al., 2001). Because of the likely possibility of reworked material in the collected ashes, a first quick screening with the ion beam on and the mass spectrometer tuned to mass/charge = 206 Pb⁺ was performed on the picked and mounted zircons in order to identify possible old zircons. Following this prescreening, ca. ten grains per sample selected based on low 206 Pb⁺ count rates were then analyzed. Results including relative probability diagrams are shown in Figure 4. All age uncertainties are reported at 2 σ level.

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