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 ^{16}O^- beam focused to a 25-30 μm diameter spot. The sample chamber was flooded with O_2 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 ^{94}Zr^{2}O^+ , ^{204}Pb^+ , ^{206}Pb^+ , ^{207}Pb^+ , ^{208}Pb^+ , ^{238}U^+ , ^{232}Th^{16}O^+ and ^{238}U^{16}O^+ 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^{2}O^+ 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 $^{230}\text{Th}$ 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 = $^{206}\text{Pb}^+$ was performed on the picked and mounted zircons in order to identify possible old zircons. Following this pre-screening, ca. ten grains per sample selected based on low $^{206}\text{Pb}^+$ count rates were then analyzed. Results including relative probability diagrams are shown in Figure 4. All age uncertainties are reported at $2\sigma$ level.

References

Paces, J.B. and Miller, J.D., Jr., 1993, Precise U-Pb ages of Duluth Complex and related mafic intrusions, northeastern Minnesota; geochronological insights to physical, petrogenetic, paleomagnetic, and tectonomagnetic processes associated with the 1.1 Ga Midcontinent Rift System: Journal of Geophysical Research, B, Solid Earth and Planets, 98, 13, 997-914, 013.