

APPENDIX 1

The procedure of preparing and analyzing of zircons

The samples selected for SHRIMP analyses, each ~3–5 kg in weight, were crushed and the heavy mineral fraction (0.06–0.25 mm) separated using a standard procedure with heavy liquids and magnetic separation. Zircons were hand-picked under a microscope, mounted in epoxy and polished. Transmitted and reflected light photomicrographs were made, along with CL images, in order to select grains and choose sites for analysis. The Sensitive High Resolution Ion Microprobe (SHRIMP II) was used to analyze the zircons. Samples SA 1, WL 5 and 310C were analyzed at the Centre of Isotopic Research (CIR) of the All-Russian Geological Research Institute (VSEGEI) in St. Petersburg. Sample 300V1 was analyzed in the Beijing SHRIMP Center, Chinese Academy of Geological Sciences.

In both laboratories, the analytical procedures and conditions were very similar. U-Pb analyses were performed in peak-impinging mode by using a secondary electron multiplier in peak-jumping mode following the procedure described in Williams (1998) or Larionov et al. (2004). A primary beam of molecular oxygen was employed to bombard zircon in order to sputter secondary ions. The elliptical analytical spots had a size of ~25 x 30 μm , and the corresponding ion current was ~4 nA. The sputtered secondary ions were extracted at 10 kV. The 80 μm wide slit of the secondary ion source, in combination with a 100 μm multiplier slit, allowed mass-resolution of $M/\Delta M \geq 5000$ (1% valley) so that all the possible isobaric interferences were resolved. One-(VSEGEI) or two-minute (Beijing) rastering was employed before each analysis in order to remove the gold coating and any possible surface common Pb contamination.

The following ion species were measured in sequence: $^{196}(\text{Zr}_2\text{O})$ - ^{204}Pb -background (~204 AMU)- ^{206}Pb - ^{207}Pb - ^{208}Pb - ^{238}U - ^{248}ThO - ^{254}UO with integration time ranging from 2 to 20 seconds depending on secondary ion beam magnitude. Four cycles for each spot analyzed were acquired. Each fifth measurement was carried out on the zircon Pb/U standard TEMORA 1 (Black et al., 2003) with an accepted $^{206}\text{Pb}/^{238}\text{U}$ age of 416.75 ± 0.24 Ma. The 91500 zircon standard with a U concentration of 81.2 ppm and a $^{206}\text{Pb}/^{238}\text{U}$ age of 1062.4 ± 0.4 Ma (Wiedenbeck et al., 1995) was applied as a “U-concentration” standard.

The collected results were then processed with the *SQUID v1.12* (Ludwig, 2005a) and *ISOPLLOT/Ex 3.22* (Ludwig, 2005b) software, using the decay constants of Steiger and Jäger (1977). The common lead correction was done using measured ^{204}Pb according to the model of Stacey and Kramers (1975).