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GSA Data Repository Item 2017319

SUPPLEMENTARY MATERIAL

Standard Lab Procedures

Apatite and zircon were separated from rock samples by crushing, sieving, gravity separation using Wilfley table, magnetic separation and heavy liquid separation using sodium polytungstate and di-iodomethane at University of Graz. AFT analyses were carried out at Trinity College Dublin. Samples were etched in 5.5 M HNO₃ for 20 seconds at 21°C (after Donelick et al., 2005). Laser-ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) was used to determine uranium concentrations for fission-track dating (Donelick et al., 2005; Chew and Donelick, 2012). These analyses also provided apatite Cl concentrations (Chew et al., 2014a) and apatite U–Pb age data (Fig. S1; Chew et al., 2014b).

For apatite (AHe) and zircon (ZHe) (U–Th–Sm)/He analysis, single, euhedral, inclusion-free crystals were handpicked, measured and packed in Pt foil tubes. Helium was extracted by heating the Pt foils with a 808 nm diode laser at 600 – 700°C for 60 seconds (apatite) and at ~1200°C for 20 minutes (zircon) (Foeken et al., 2006). Helium was measured using a Hiden HAL3F quadrupole mass spectrometer. Apatite-bearing packets were then removed from the He extraction line, spiked with ²³⁵U and ²³⁰Th in 5% nitric acid and left at 80°C for 48 hours in sealed Teflon beakers. Zircon crystals were removed from the tubes before being dissolved in 49% HF at 235°C for 48 hours in a Parr bomb (Dobson et al., 2008). ²³⁸U, ²³⁵U and ²³²Th contents were determined via isotope dilution ICP-MS (Balestrieri et al., 2005). Durango apatite and Fish Canyon Tuff zircon were used as mineral age standards. The AHe and ZHe ages were calculated according to established procedures (Meesters and Dunai, 2005), and the ages corrected for alpha recoil (Farley et al., 1996; Ketcham et al., 2011).

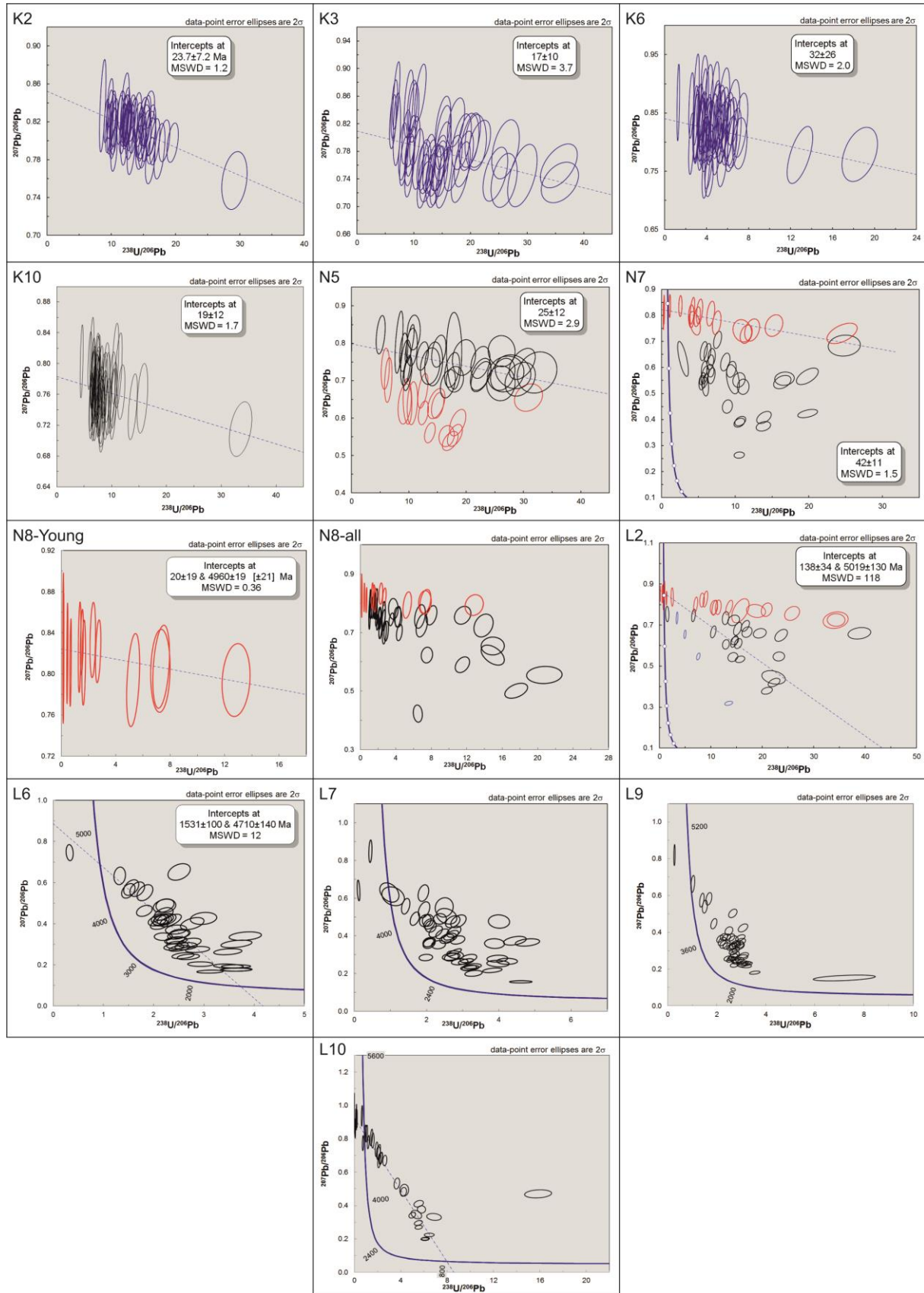


Figure S1. Tera-Wasserburg Concordia diagrams for all the samples dated using U-Pb method on apatite. Note that for partly reset samples (i.e. N5, N7, N8 and L2) ellipses with different colours indicate data from young and old apatite grains whereby data from only young grains is used for age calculation.

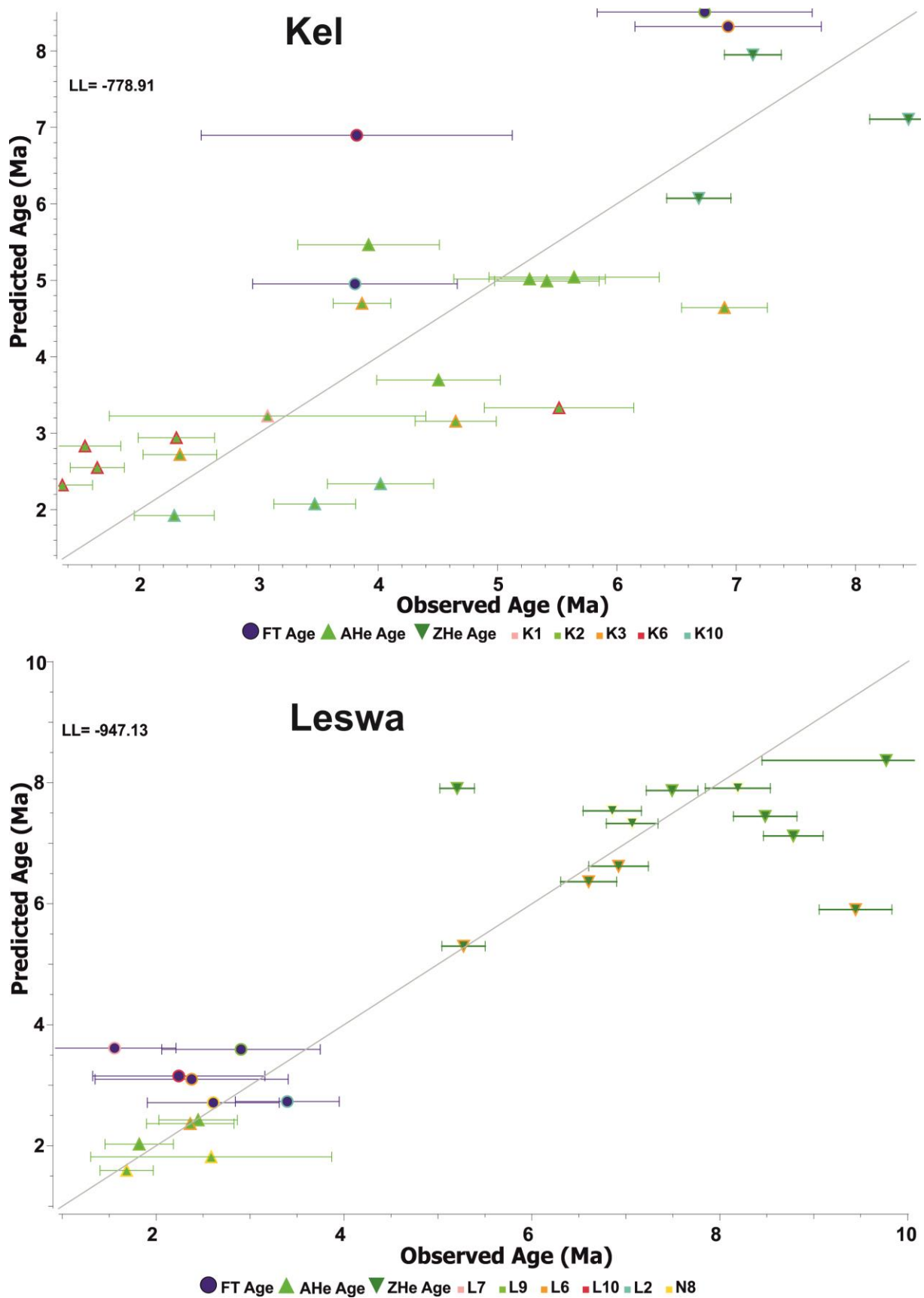


Figure S2. Thermal history modelling results for Kel and Leswa profiles showing observed versus predicted ages. LL: Log Likelihood.

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