**Appendix 1**

**Analytical methods**

The samples were crushed and sorted in two size fractions: 75-125 and 125-250 µm. Plagioclase crystals were separated using a Frantz magnetic separator and then were carefully hand-picked under a binocular microscope. We selected only unaltered and optically transparent plagioclase grains. The unaltered and optically transparent grains were then leached in dilute HF for one minute and then thoroughly rinsed with distilled water in an ultrasonic cleaner. Plagioclase separates were irradiated for 25 hours in the Hamilton McMaster University (Canada) nuclear reactor. The samples were loaded into two large wells of aluminium disc. The wells were bracketed by small wells that included FCs used as a neutron fluence monitor, for which an age of 28.294 (± 0.10%) Ma was adopted (Renne *et al*. 2010). The discs were Cd-shielded (to minimize undesirable nuclear interference reactions) and irradiated. The mean J-values computed from standard grains within the small pits range from 0.007054 (± 0.21%) to 0.006880 (± 0.34%) determined as the average and standard deviation of J-values of the small wells for each irradiation disc. Mass discrimination was monitored using an automated air pipette and provided mean values ranging from 1.001286 (± 0.36%) to 1.001553 (± 0.30%) per dalton (atomic mass unit). The correction factors for interfering isotopes were (39Ar/37Ar)Ca = 7.30x10-4 (± 11%), (36Ar/37Ar)Ca = 2.82x10-4 (± 1%) and (40Ar/39Ar)K = 6.76x10-4 (± 32%).

The 40Ar/39Ar analyses were performed at the Western Australian Argon Isotope Facility at Curtin University. The sample was loaded in 0-blank Cu-foil packages and was step-heated using a Pond Engineering® double vacuum resistance furnace. The gas was purified in a stainless-steel extraction line using a GP50 and two AP10 SAES getters and a liquid nitrogen condensation trap. Argon isotopes were measured in static mode using a MAP 215-50 mass spectrometer (resolution of ~450; sensitivity of 4x10-14 mol/V) with a Balzers SEV 217 electron multiplier, using 9 to 10 cycles of peak-hopping. Data acquisition was performed with the Argus program written by M.O. McWilliams; the program ran in a LabView environment. The raw data were processed using the ArArCALC software (Koppers, 2002). Plateau and isochron ages were calculated using the new decay constants determined by Renne et al. (2011). Argon isotopic data corrected for blank, mass discrimination and radioactive decay are given in supplementary Table 1. Individual errors in supplementary Table 1 are given at the 1σ level. Uncertainties on the plateau and isochron ages include all sources of errors, including error on the decay constant and uncertainty on age of the monitor. Blanks were monitored every three to four steps and typical 40Ar blanks ranged from 1 x 10-16 to 2x10-16 mol. Our criteria for the determination of a plateau are as follows: plateaus must include at least 70% of the 39Ar, and a plateau should be distributed over a minimum of three consecutive steps agreeing at the 95% confidence level and satisfying a probability of fit (P) of at least 0.05. Plateau age is given at the 2σ level and has been calculated using the mean of all the plateau steps, each weighted by the inverse variance of the individual analytical error. Integrated ages (2σ) are calculated using the total gas released for each Ar isotope. Inverse isochrons include the maximum number of steps with a probability of fit ≥ 0.05.