Figure A.1 – Backscattered Electron (BSE) maps of (a) 10044,645; (b) 12038,263; (c) 12039,44; (d) 12063,330; (e) 14072,61; and (f) 15386,46. Examples of the major phases in each sample have been

annotated. Note, the black circular holes in (f) 15386,46 are laser ablation pits from a previous petrology study, which were avoided during the SIMS analyses.
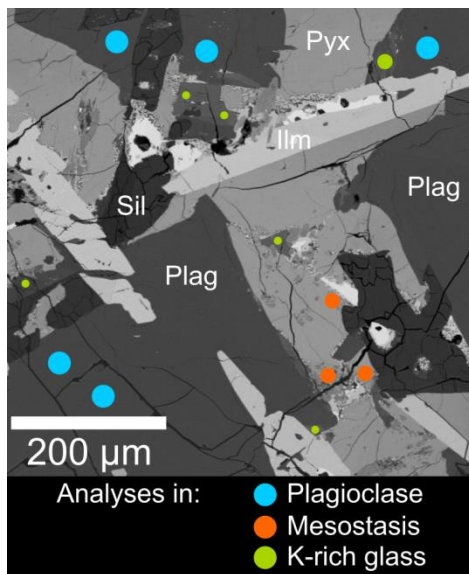

Figure A.2 – Backscattered Electron (BSE) image of a typical analysed region within one of the samples (12038,263) analysed. The locations of analysed phases have been indicated with color-coded circles. The sizes of the circles are approximately the same as the SIMS spot used in each location. Plag = plagioclase; Pyx = pyroxene; Sil = silica polymorph (likely cristobalite); Ilm = ilmenite.
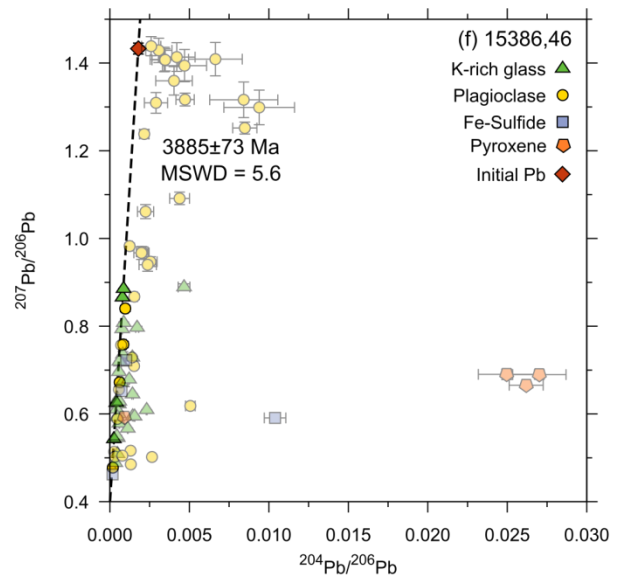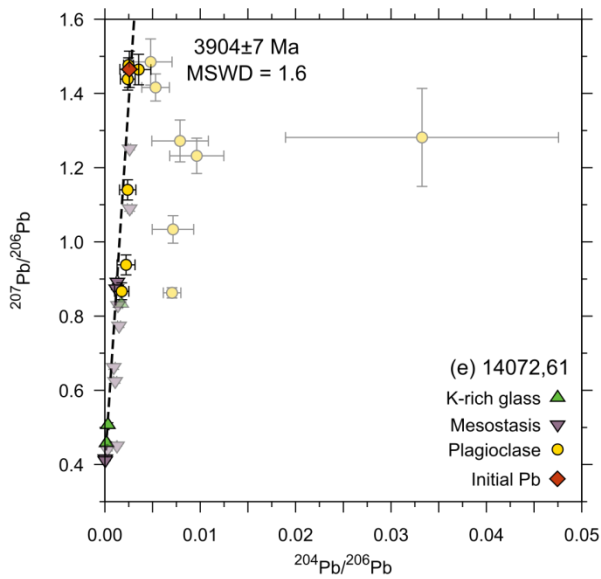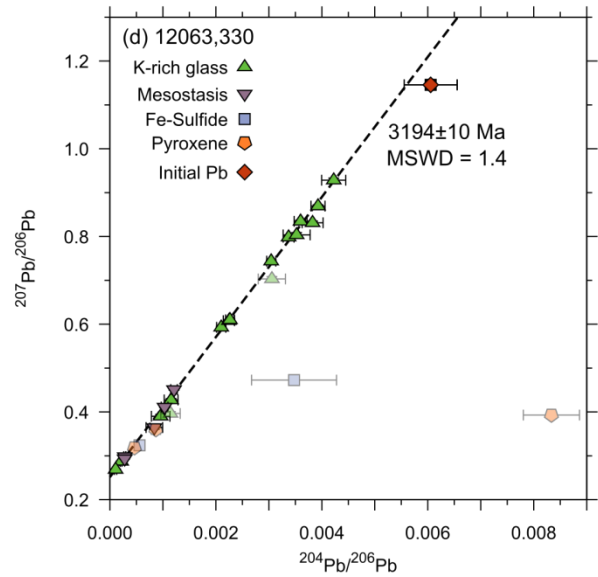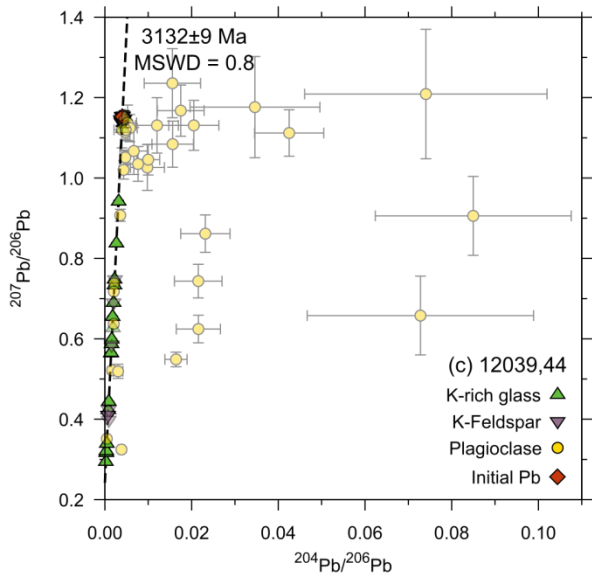
(a) 10044,645 — 3687±4 Ma, MSWD = 1.3; K-rich glass, Plagioclase, Fe-Sulfide, Initial Pb

(b) 12038,263 — 3242±12 Ma, MSWD = 1.4; K-rich glass, Mesostasis, Plagioclase, Fe-Sulfide, Pyroxene, Initial Pb

(c) 12039,44 — 3132±9 Ma, MSWD = 0.8; K-rich glass, K-Feldspar, Plagioclase, Initial Pb

(d) 12063,330 — 3194±10 Ma, MSWD = 1.4; K-rich glass, Mesostasis, Fe-Sulfide, Pyroxene, Initial Pb

(e) 14072,61 — 3904±7 Ma, MSWD = 1.6; K-rich glass, Mesostasis, Plagioclase, Initial Pb

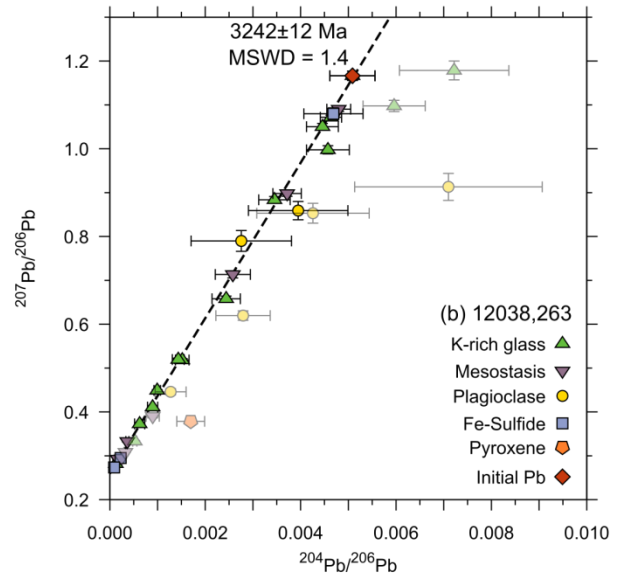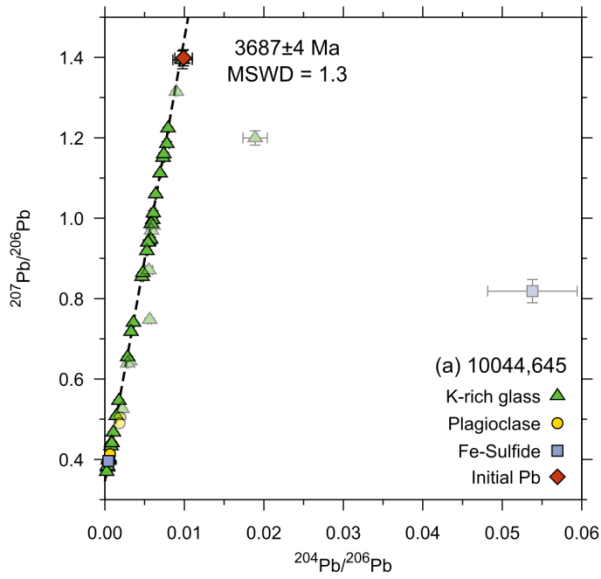(f) 15386,46 — 3885±73 Ma, MSWD = 5.6; K-rich glass, Plagioclase, Fe-Sulfide, Pyroxene, Initial Pb

Figure A.3 – ^{207}Pb/^{206}Pb vs. ^{204}Pb/^{206}Pb plots of the unfiltered and filtered datasets from: (a) 10044,645; (b) 12038,263; (c) 12039,44; (d) 12063,330; (e) 14072,61; and (f) 15386,46. The isochrons determined for each sample have been indicated with dashed lines. The filtered data used to define the isochrons are indicated with opaque symbols. The unfiltered data not used to define the isochrons are indicated with semi-transparent symbols. Error bars are at 2σ uncertainties.
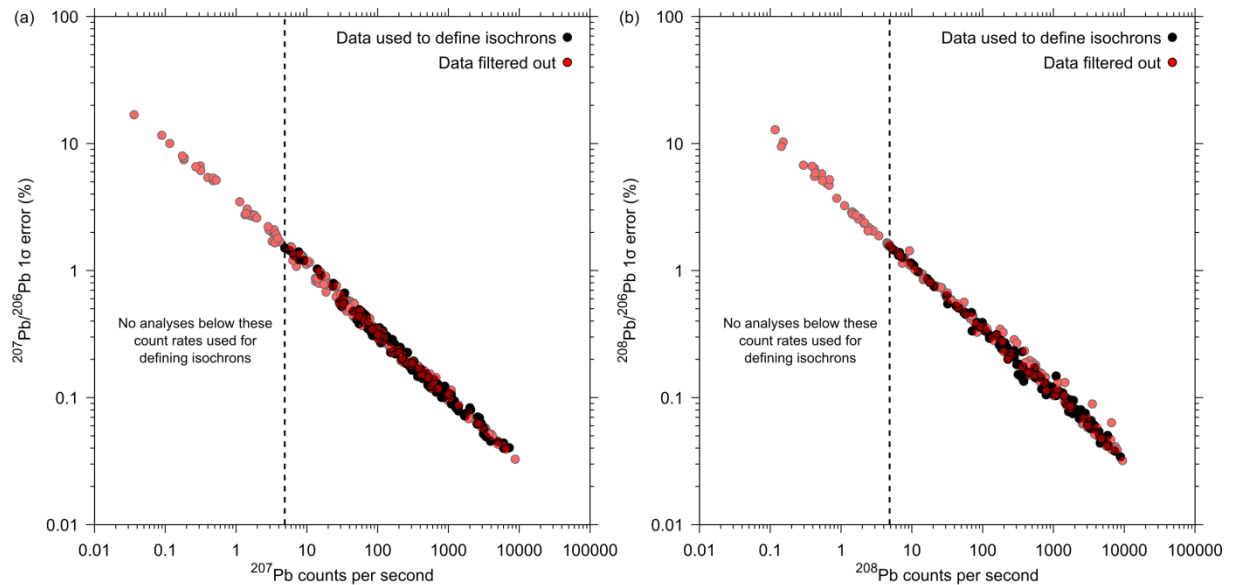

Figure A.4 – The precision of the entire SIMS dataset for all six samples in this study when compared with the (a) ^{207}Pb and (b) ^{208}Pb count rates. The dashed vertical lines indicate the limits below which no analyses were used in the final construction of the sample isochrons.
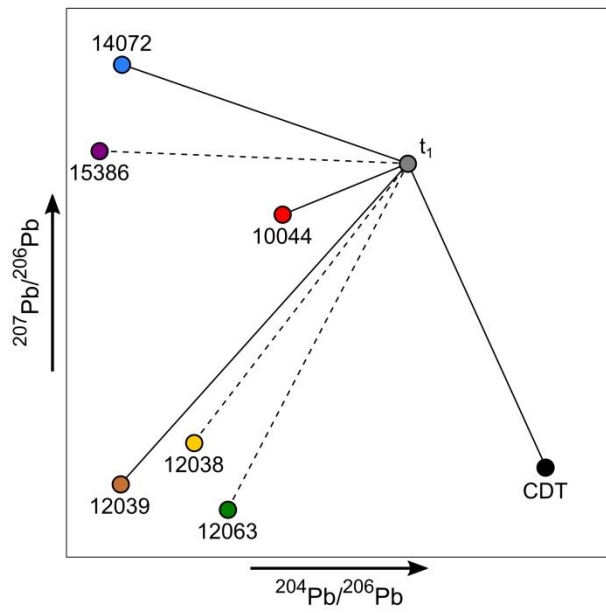
Figure A.5 – Schematic illustration of the two-stage model calculation. The solid isochrons were used to constrain the calculation of $\frac{^{207}Pb}{^{204}Pb}_{t_1}$, $\frac{^{206}Pb}{^{204}Pb}_{t_1}$ and t_1. See the discussion in the supplementary information for further details.