

## Supplementary information

### Supplementary methods:

#### Influence of the dead time correction on MIC-measured Pb isotope ratios:

The default (factory-set) dead time value for all multi ion counters (MIC) of the Bristol Isotope Group's Neptune is 70 ns, and this value was used to correct the raw data intensities with the instrument's software. To test the influence of the dead time correction on the Pb isotope ratios obtained by laser ablation using the MIC, we ran a series of tests in which we corrected the raw data offline using a range of dead time values, from 20 ns to 100 ns. The offline calculations were made using the following formula:

$$N = N_m / (1 - (N_m \times \tau))$$

where  $N_m$  and  $N$  are the measured and corrected counts, and  $\tau$  is the deadtime. The corrected count rates were then pasted onto an in-house Excel spreadsheet to calculate gas bank- interference- and mass bias-corrected Pb isotope ratios.

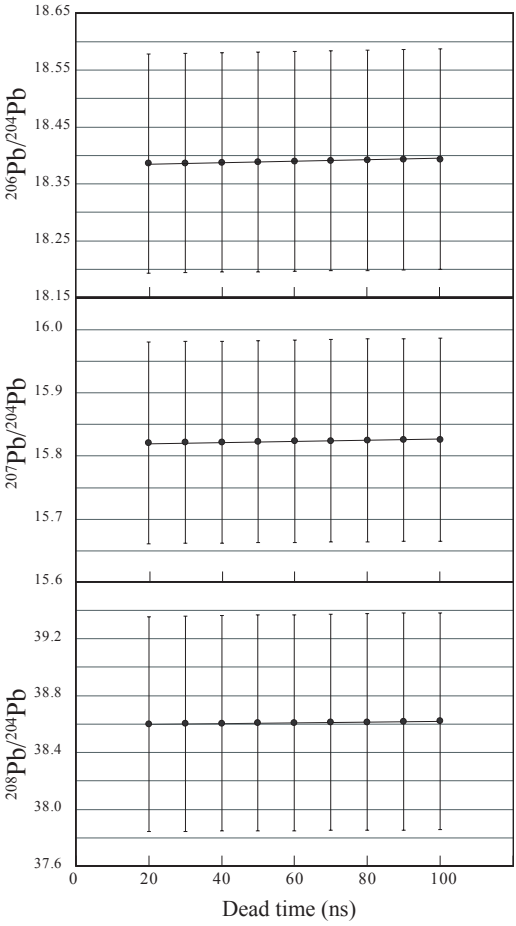
We made this test on one of the data sets measured on the Shap granite K-feldspar A6 on the 7<sup>th</sup> of February 2017. The Pb isotope ratios obtained on that sample after the online dead time correction by the Neptune software (using a default value of 70 ns) and our in-house offline correction (blank, mass bias and interferences) are  $18.391 \pm 0.193$ ,  $15.824 \pm 0.160$  and  $36.612 \pm 0.760$  (2s.e.) for the  $^{206}\text{Pb}/^{204}\text{Pb}$ ,  $^{207}\text{Pb}/^{204}\text{Pb}$  and  $^{208}\text{Pb}/^{204}\text{Pb}$ , respectively. We reprocessed the raw, dead time uncorrected data for this sample, with values ranging from 20 ns to 100 ns for the dead time correction, as summarized in the Table and the Figure below. We conclude that the influence of the

24 dead time may be considered as negligible (e.g., 0.04% maximal deviation on the  
25  $^{206}\text{Pb}/^{204}\text{Pb}$ ) when compared to the uncertainty over individual measurements at 10  $\mu\text{m}$   
26 spot size (e.g.,  $\sim 1\%$  2 s.e. on the  $^{206}\text{Pb}/^{204}\text{Pb}$ ).

Corrected data for different values of dead time.  
Data have been acquired at 10  $\mu\text{m}$  diameter laser spot and measured on MICs.

| dead time (ns) | $^{206}\text{Pb}/^{204}\text{Pb}$ | 2 s.e. (pr) | $^{207}\text{Pb}/^{204}\text{Pb}$ | 2 s.e. (pr) | $^{208}\text{Pb}/^{204}\text{Pb}$ | 2 s.e. (pr) |
|----------------|-----------------------------------|-------------|-----------------------------------|-------------|-----------------------------------|-------------|
| 20             | 18.386                            | 0.192       | 15.821                            | 0.159       | 38.600                            | 0.755       |
| 30             | 18.387                            | 0.193       | 15.822                            | 0.160       | 38.602                            | 0.756       |
| 40             | 18.388                            | 0.193       | 15.822                            | 0.160       | 38.605                            | 0.757       |
| 50             | 18.389                            | 0.193       | 15.823                            | 0.160       | 38.607                            | 0.758       |
| 60             | 18.390                            | 0.193       | 15.823                            | 0.160       | 38.610                            | 0.759       |
| 70             | 18.391                            | 0.193       | 15.824                            | 0.160       | 38.612                            | 0.760       |
| 80             | 18.392                            | 0.193       | 15.825                            | 0.160       | 38.615                            | 0.760       |
| 90             | 18.393                            | 0.194       | 15.825                            | 0.160       | 38.617                            | 0.761       |
| 100            | 18.394                            | 0.194       | 15.826                            | 0.160       | 38.620                            | 0.762       |

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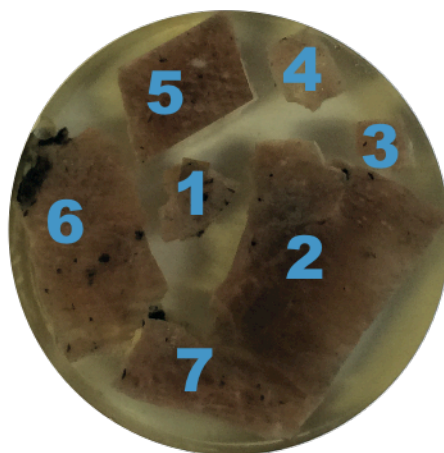
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31 **Supplementary figures**

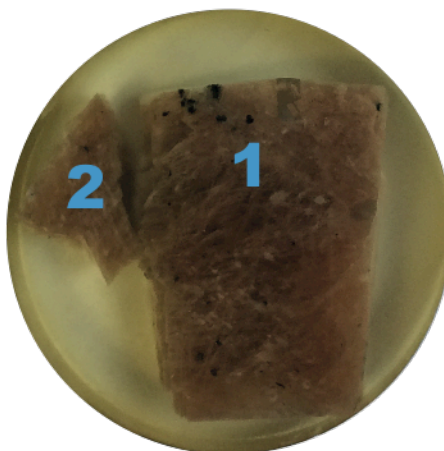
32 **Figure S1:** Photos of the mounts that include the different grains of K-feldspar Shap

33 granite analysed in this study.

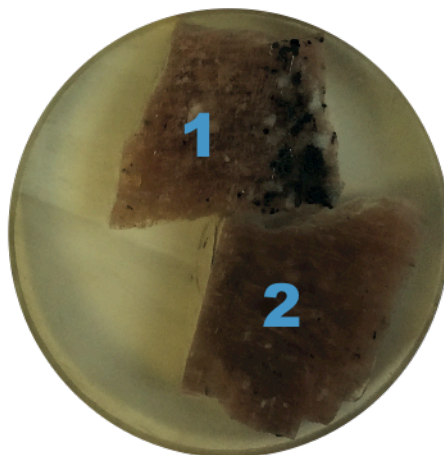
Shap-C A



Shap-C B

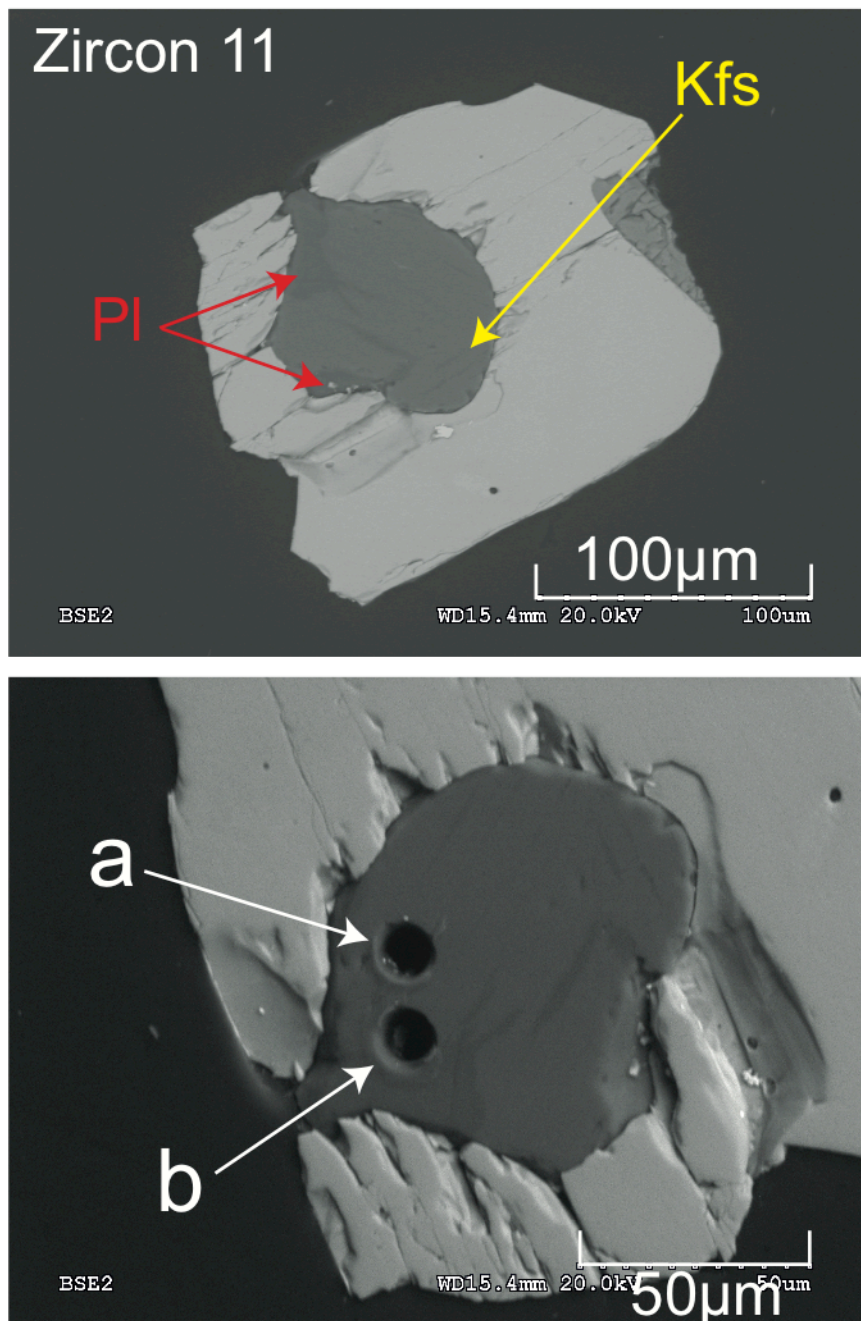


Shap-C C



35 **Figure S2:** SEM images of the studied inclusions before and after SIMS analyses.

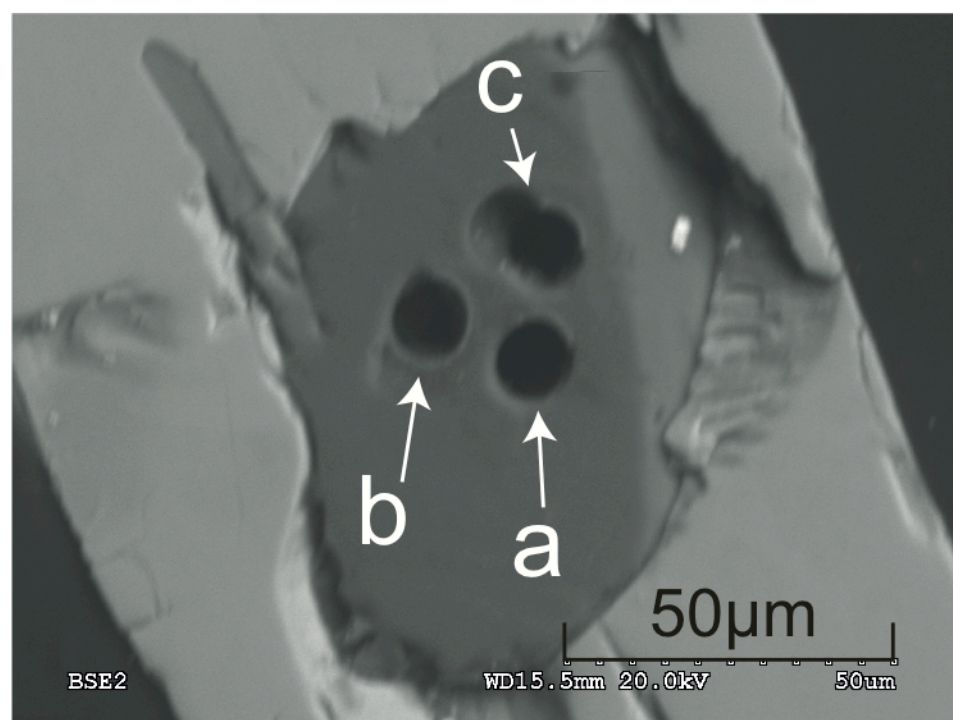
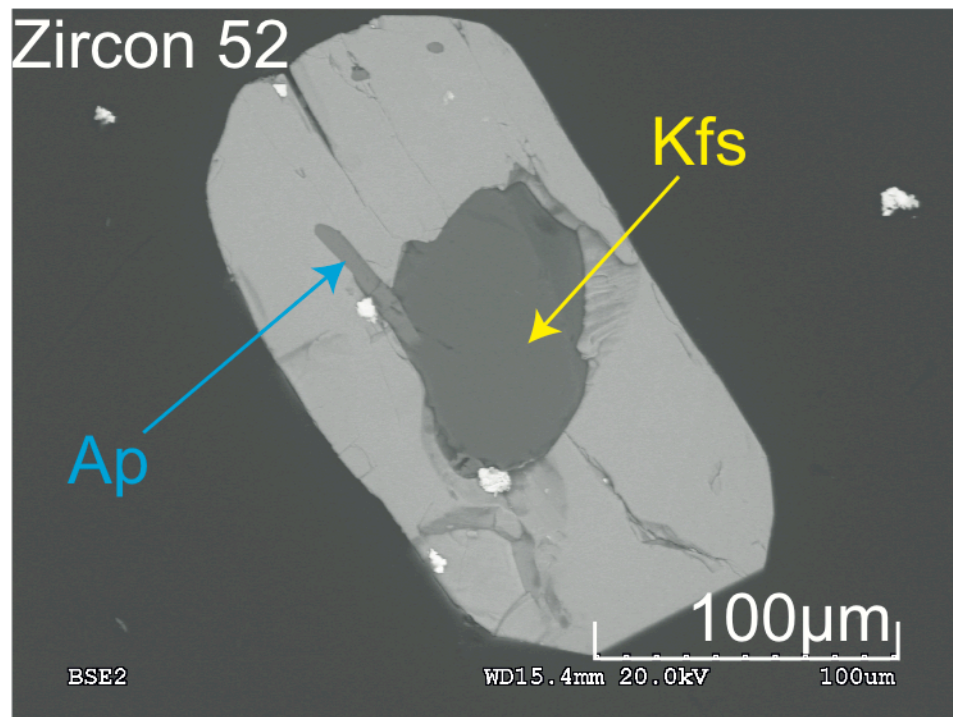
36 Kfs: K-feldspar; Pl: plagioclase; Ap: apatite; Px: pyroxene; Qtz: quartz.



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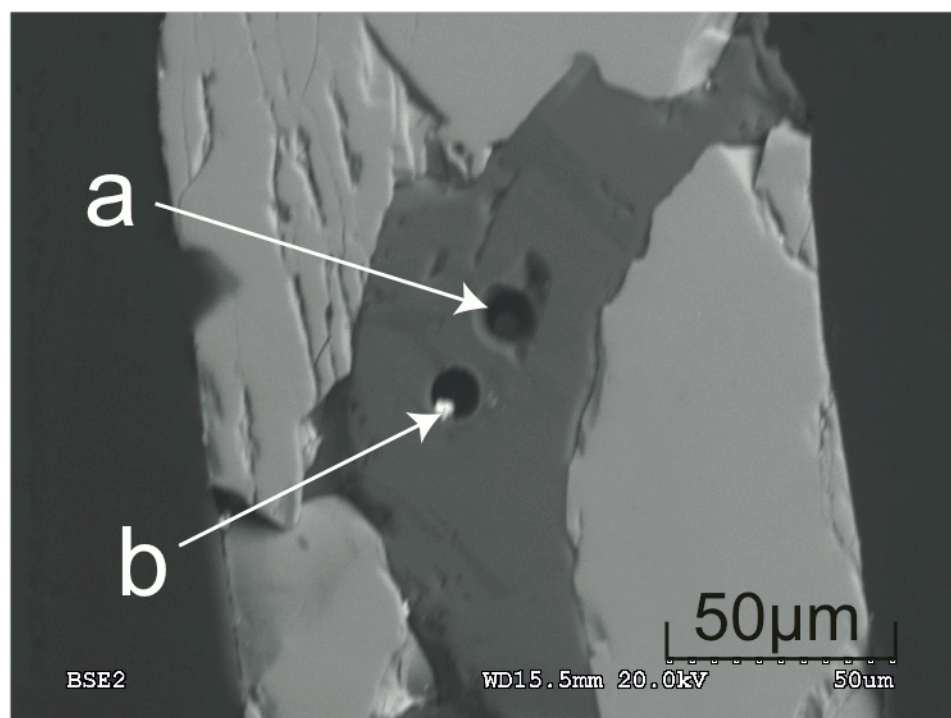
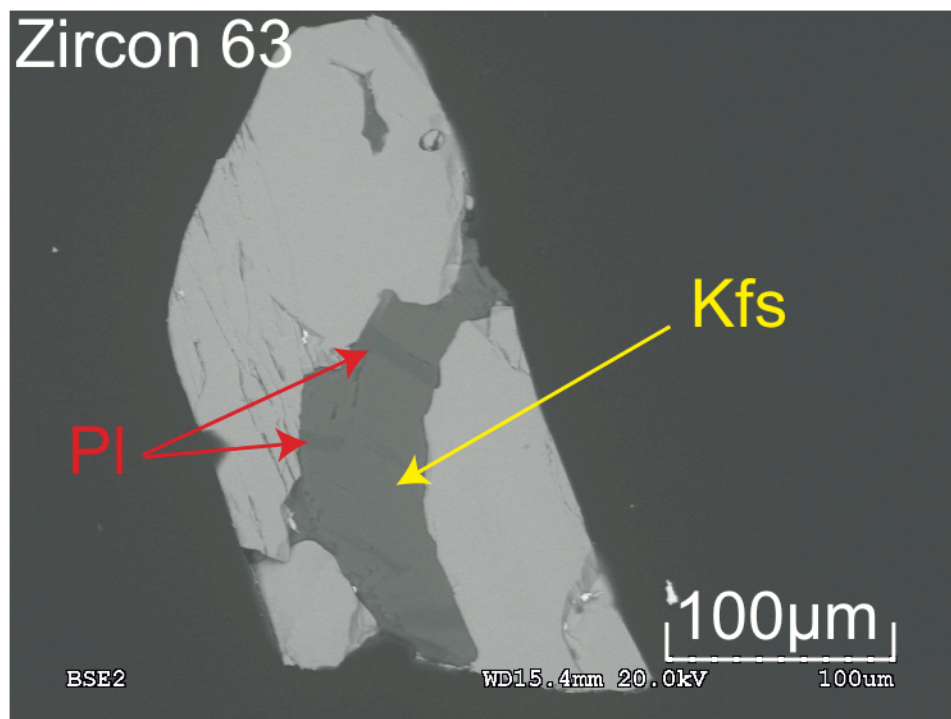


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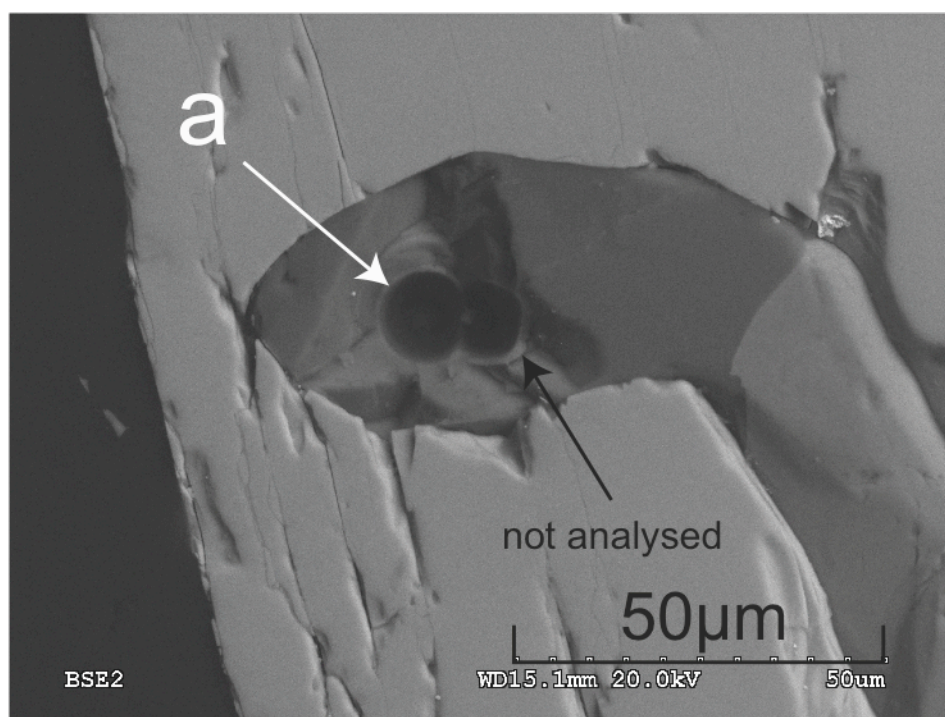
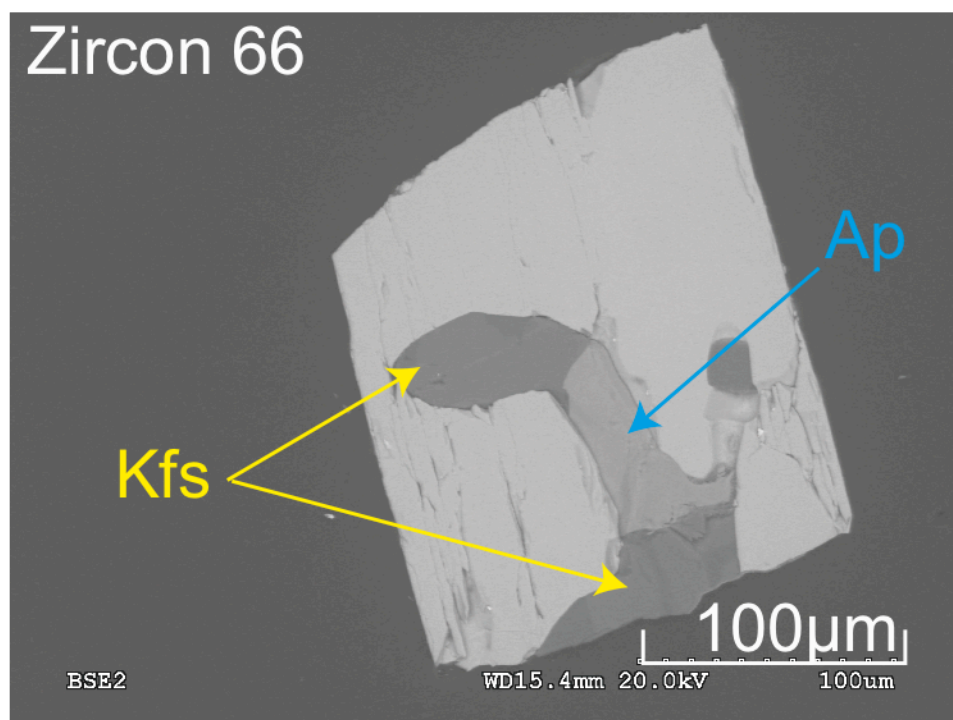


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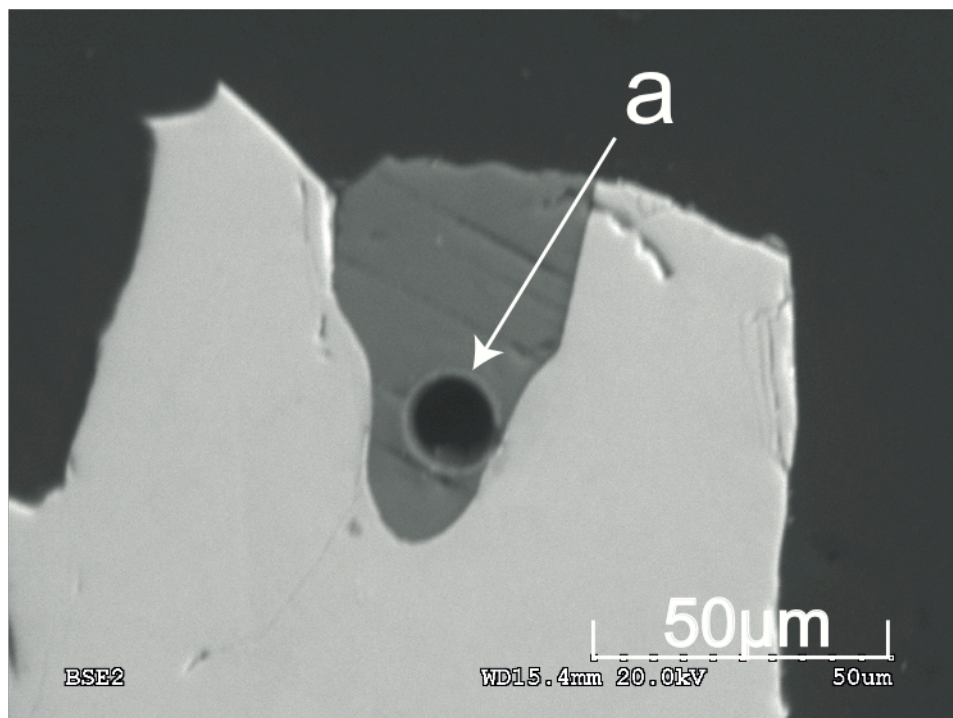
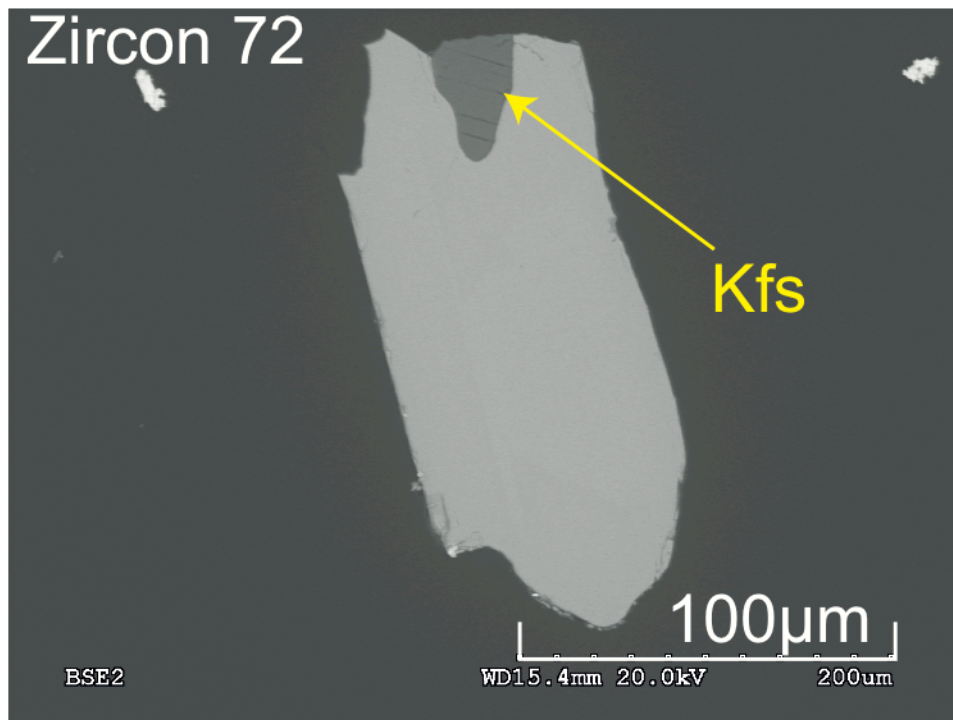
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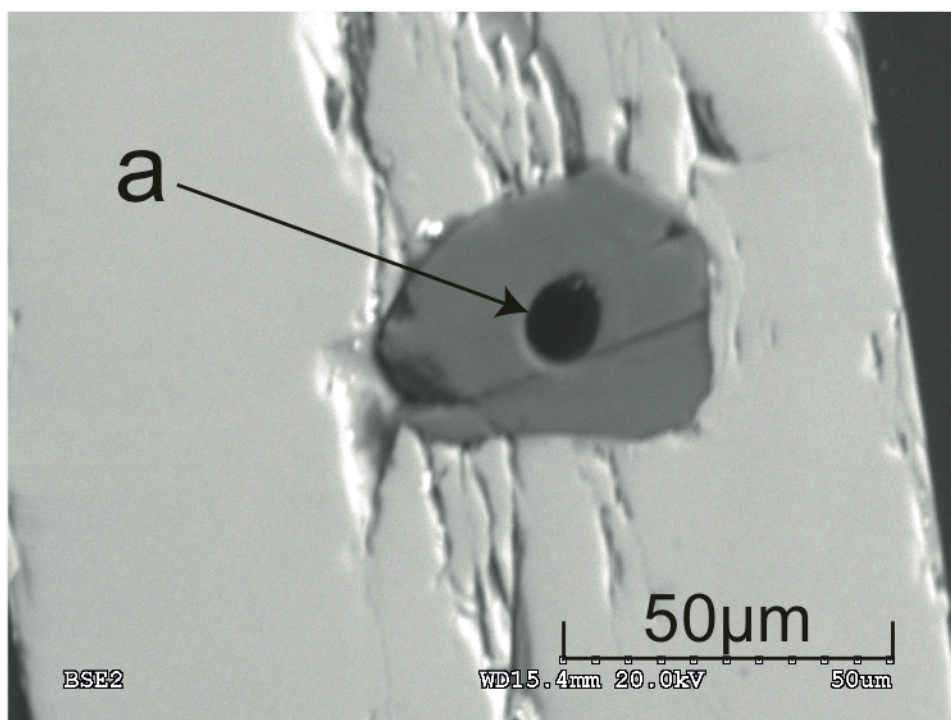
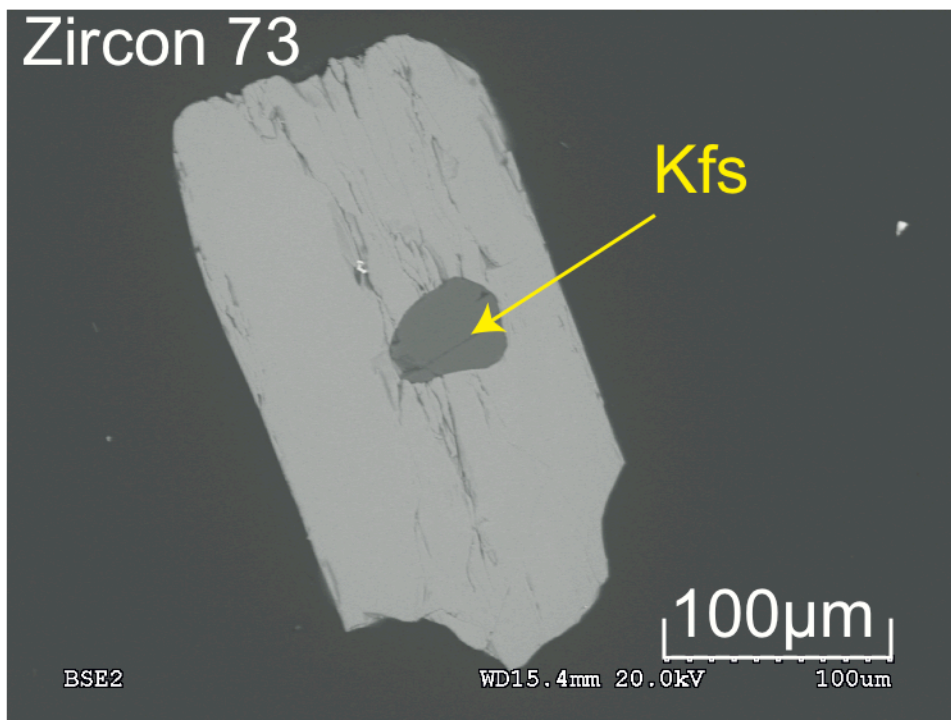


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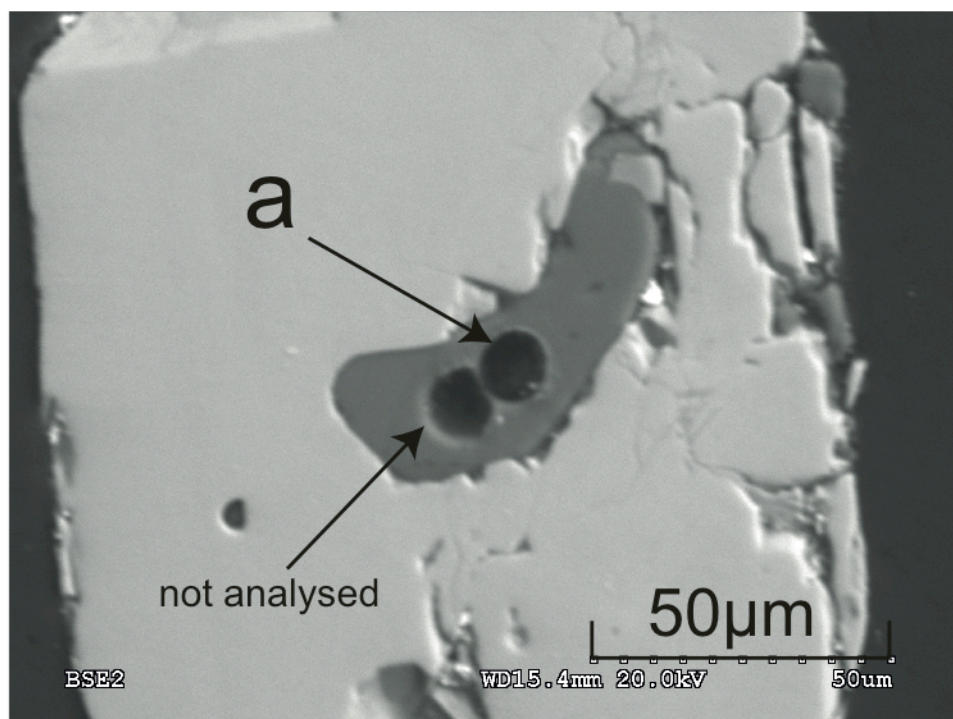
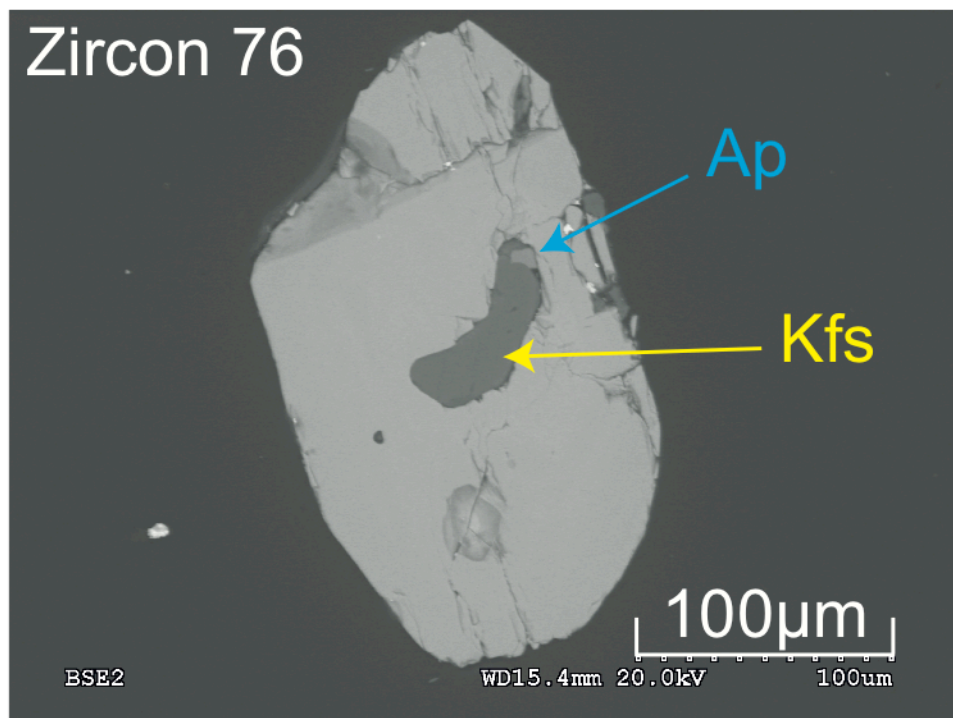


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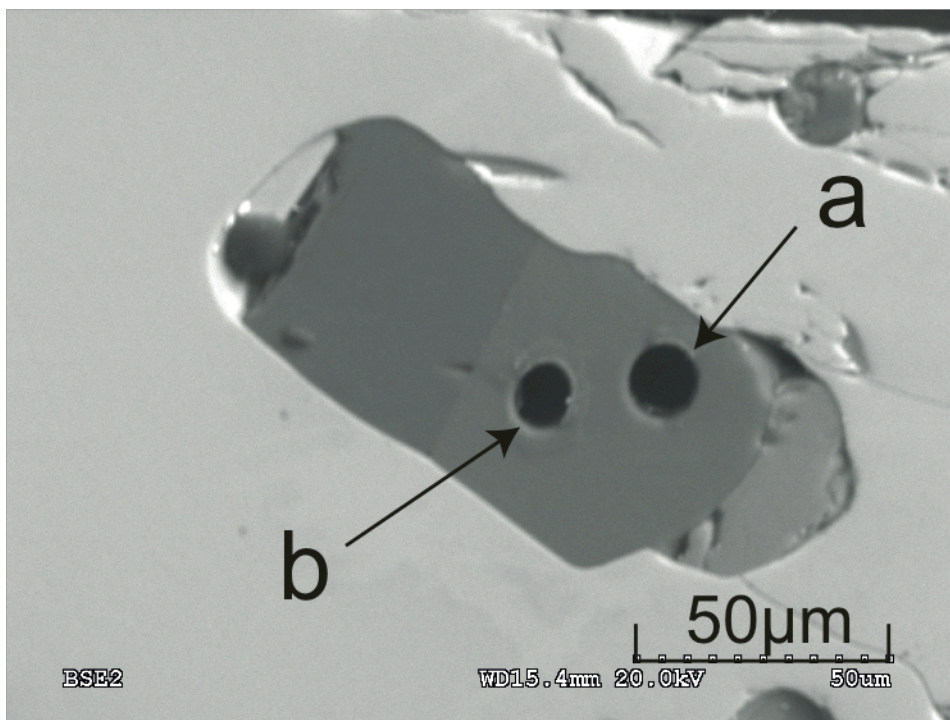
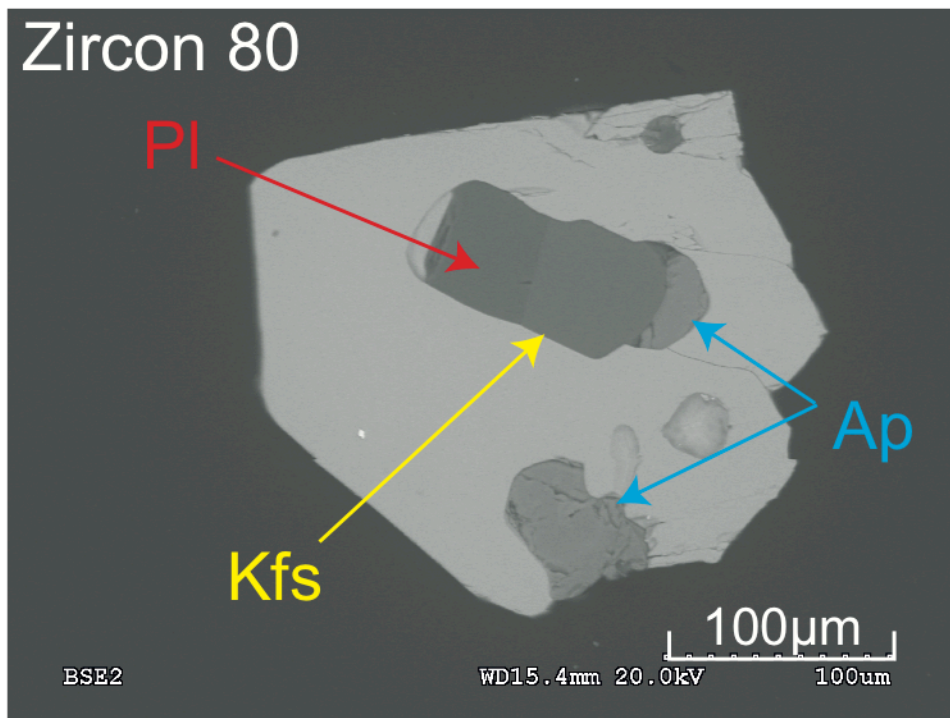
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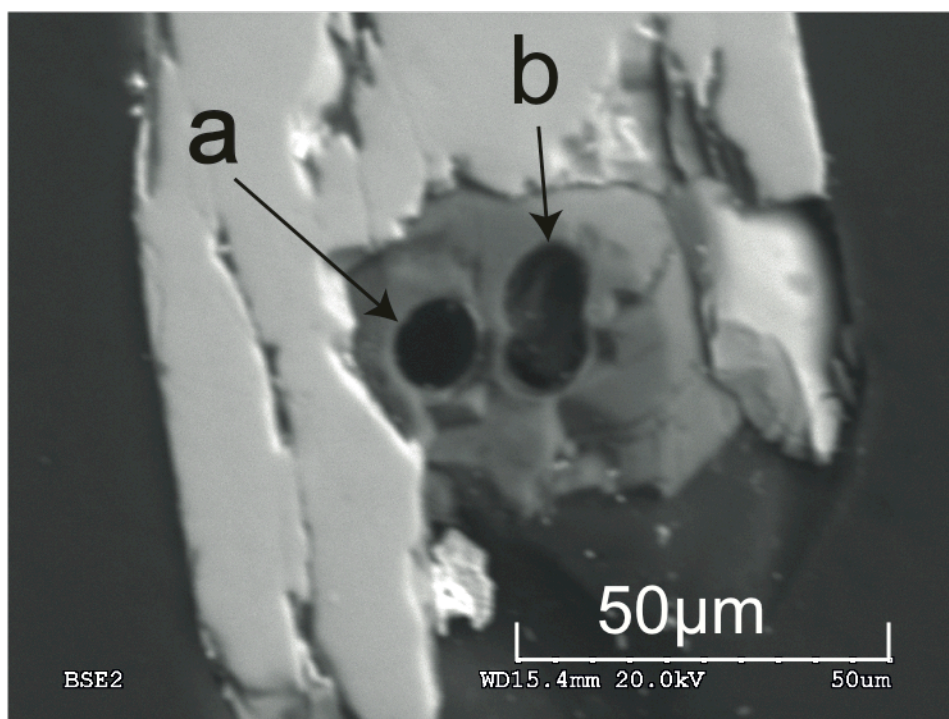
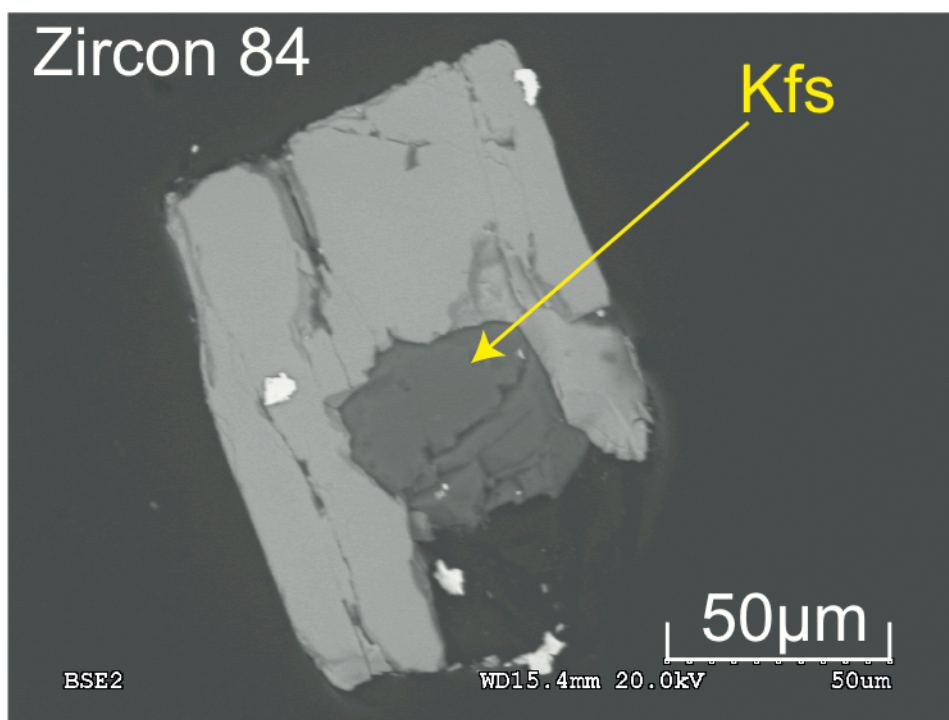
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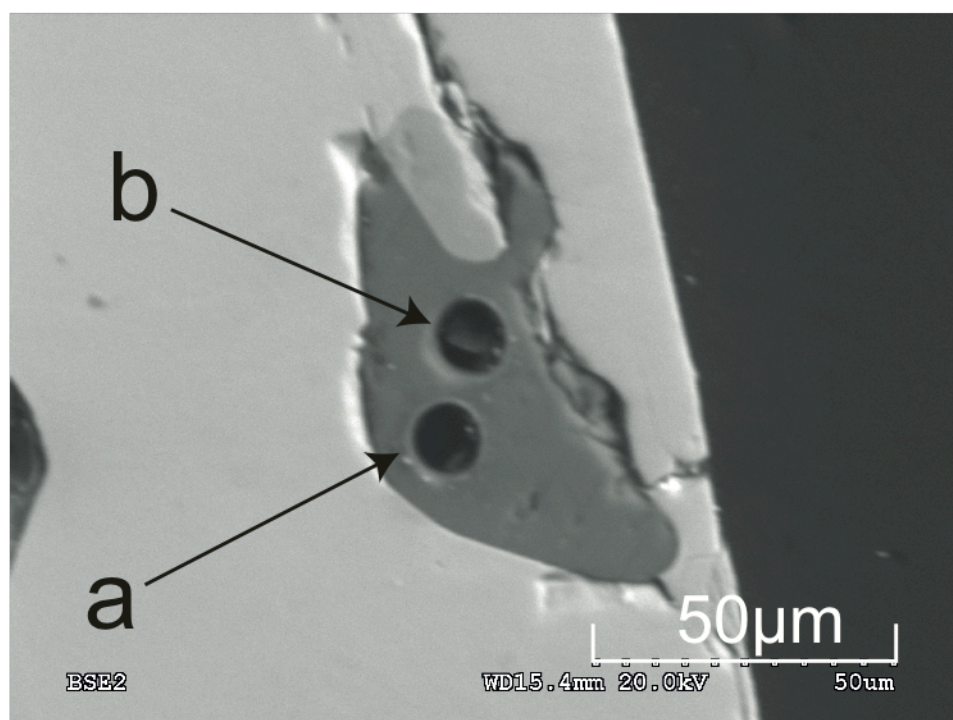
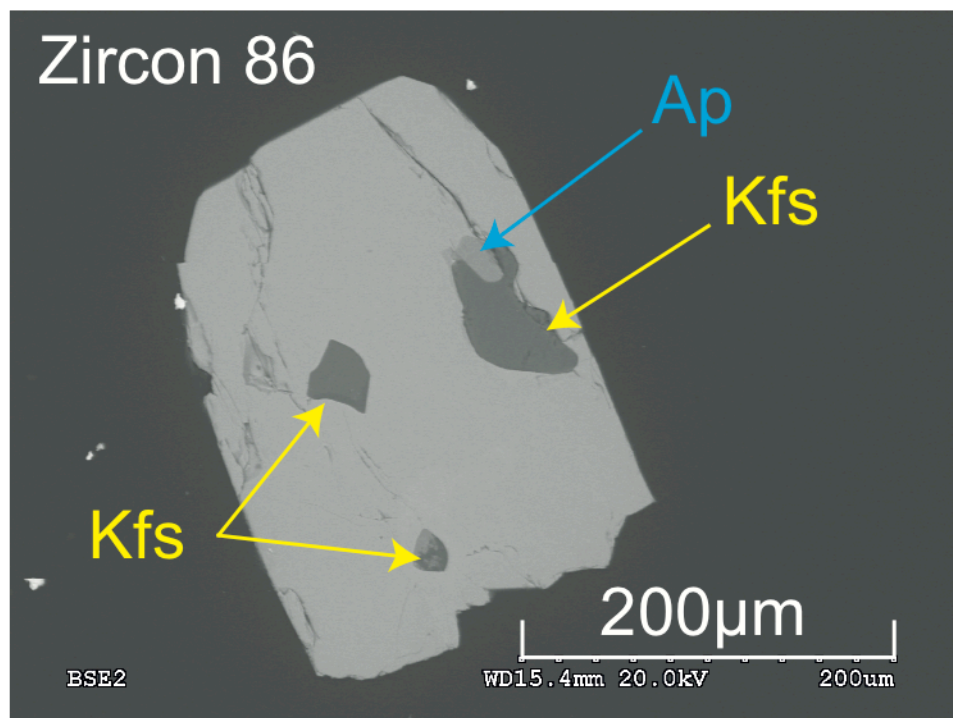


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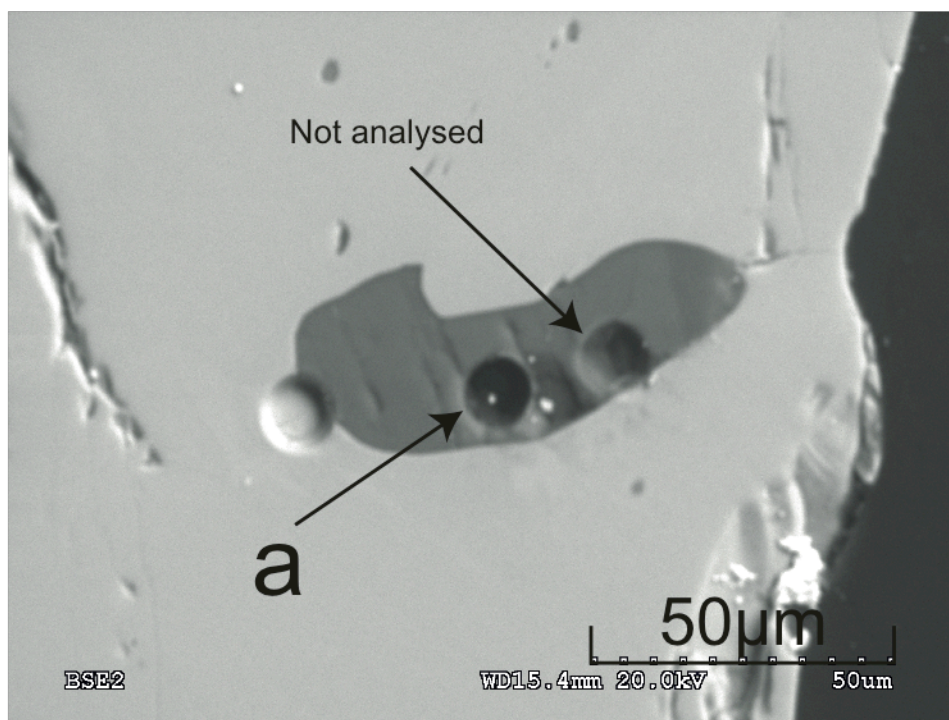
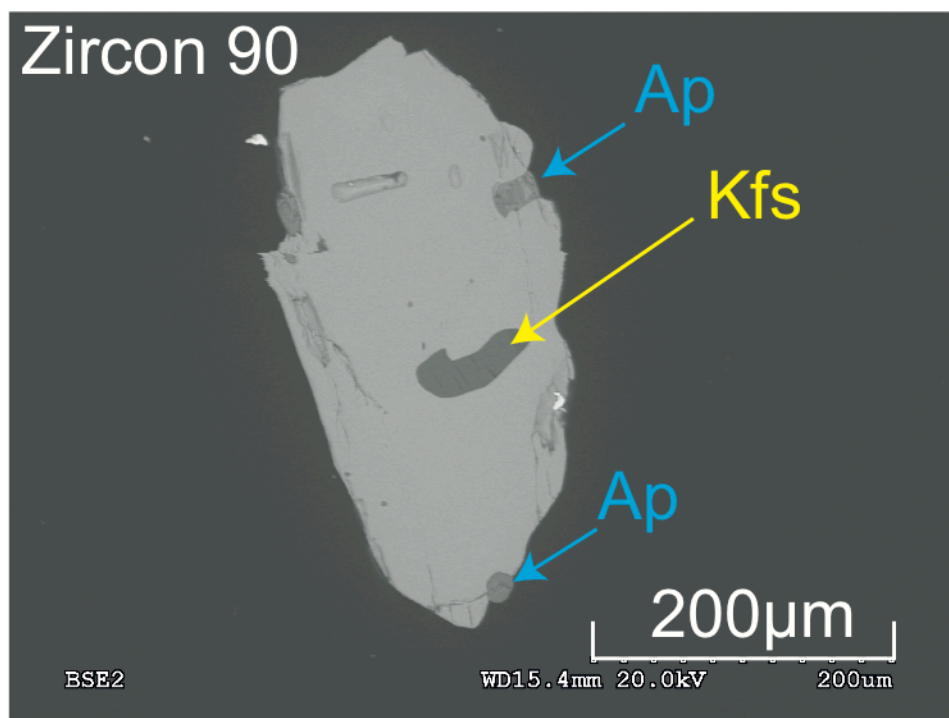


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79 **Supplementary Tables:****Table S1: Lead isotope data for K-feldspars from the Shap Granite (150 µm spot size)**

| Grain | Date of analysis | $^{206}\text{Pb}/^{204}\text{Pb}$ | 2 s.e. | $^{207}\text{Pb}/^{204}\text{Pb}$ | 2 s.e. | $^{208}\text{Pb}/^{204}\text{Pb}$ | 2 s.e. |
|-------|------------------|-----------------------------------|--------|-----------------------------------|--------|-----------------------------------|--------|
| A1    | 06/12/2016       | 18.241                            | 0.009  | 15.643                            | 0.008  | 38.219                            | 0.018  |
| A1    | 06/12/2016       | 18.230                            | 0.008  | 15.636                            | 0.007  | 38.199                            | 0.016  |
| A1    | 06/12/2016       | 18.249                            | 0.012  | 15.637                            | 0.006  | 38.203                            | 0.013  |
| A1    | 06/12/2016       | 18.236                            | 0.008  | 15.637                            | 0.006  | 38.202                            | 0.015  |
| A1    | 06/12/2016       | 18.234                            | 0.007  | 15.636                            | 0.006  | 38.200                            | 0.016  |
| A1    | 06/12/2016       | 18.238                            | 0.007  | 15.634                            | 0.006  | 38.196                            | 0.015  |
| A1    | 06/12/2016       | 18.247                            | 0.009  | 15.639                            | 0.006  | 38.210                            | 0.015  |
| A1    | 06/12/2016       | 18.232                            | 0.007  | 15.640                            | 0.006  | 38.211                            | 0.017  |
| A1    | 06/12/2016       | 18.237                            | 0.010  | 15.636                            | 0.009  | 38.204                            | 0.020  |
| A1    | 06/12/2016       | 18.225                            | 0.008  | 15.630                            | 0.006  | 38.187                            | 0.015  |
| A1    | 06/12/2016       | 18.236                            | 0.007  | 15.638                            | 0.006  | 38.208                            | 0.014  |
| A1    | 06/12/2016       | 18.233                            | 0.009  | 15.634                            | 0.008  | 38.199                            | 0.020  |
| A1    | 06/12/2016       | 18.234                            | 0.009  | 15.642                            | 0.007  | 38.217                            | 0.017  |
| A1    | 06/12/2016       | 18.224                            | 0.006  | 15.634                            | 0.005  | 38.197                            | 0.013  |
| A1    | 06/12/2016       | 18.231                            | 0.007  | 15.633                            | 0.005  | 38.199                            | 0.013  |
| A1    | 06/12/2016       | 18.235                            | 0.006  | 15.637                            | 0.005  | 38.203                            | 0.014  |
| A1    | 06/12/2016       | 18.228                            | 0.006  | 15.637                            | 0.005  | 38.203                            | 0.012  |
| A1    | 06/12/2016       | 18.232                            | 0.009  | 15.639                            | 0.007  | 38.206                            | 0.018  |
| A1    | 06/12/2016       | 18.232                            | 0.006  | 15.637                            | 0.006  | 38.200                            | 0.014  |
| A1    | 06/12/2016       | 18.238                            | 0.007  | 15.643                            | 0.006  | 38.221                            | 0.014  |
| A1    | 06/12/2016       | 18.235                            | 0.006  | 15.637                            | 0.005  | 38.206                            | 0.012  |
| A1    | 06/12/2016       | 18.227                            | 0.007  | 15.633                            | 0.006  | 38.191                            | 0.015  |
| A1    | 06/12/2016       | 18.230                            | 0.007  | 15.638                            | 0.006  | 38.204                            | 0.015  |
| B1    | 19/01/2017       | 18.293                            | 0.013  | 15.642                            | 0.011  | 38.231                            | 0.027  |
| B1    | 19/01/2017       | 18.301                            | 0.007  | 15.642                            | 0.006  | 38.236                            | 0.015  |
| B1    | 19/01/2017       | 18.292                            | 0.009  | 15.636                            | 0.007  | 38.224                            | 0.018  |
| B1    | 19/01/2017       | 18.289                            | 0.010  | 15.639                            | 0.007  | 38.234                            | 0.019  |
| B1    | 19/01/2017       | 18.303                            | 0.010  | 15.646                            | 0.008  | 38.243                            | 0.021  |
| B1    | 19/01/2017       | 18.296                            | 0.010  | 15.645                            | 0.009  | 38.241                            | 0.021  |
| B1    | 19/01/2017       | 18.299                            | 0.006  | 15.647                            | 0.005  | 38.248                            | 0.012  |
| B1    | 19/01/2017       | 18.288                            | 0.010  | 15.639                            | 0.008  | 38.223                            | 0.021  |
| B1    | 19/01/2017       | 18.297                            | 0.006  | 15.642                            | 0.005  | 38.236                            | 0.013  |
| B1    | 19/01/2017       | 18.291                            | 0.010  | 15.646                            | 0.009  | 38.242                            | 0.022  |
| B1    | 19/01/2017       | 18.290                            | 0.010  | 15.644                            | 0.008  | 38.236                            | 0.020  |
| B1    | 19/01/2017       | 18.288                            | 0.010  | 15.644                            | 0.009  | 38.235                            | 0.021  |
| B1    | 19/01/2017       | 18.282                            | 0.007  | 15.639                            | 0.006  | 38.226                            | 0.015  |
| B1    | 19/01/2017       | 18.291                            | 0.007  | 15.643                            | 0.006  | 38.243                            | 0.014  |

Table S1 (continued)

|    |            |        |       |        |       |        |       |
|----|------------|--------|-------|--------|-------|--------|-------|
| B1 | 19/01/2017 | 18.286 | 0.008 | 15.641 | 0.007 | 38.232 | 0.018 |
| B1 | 19/01/2017 | 18.288 | 0.010 | 15.648 | 0.009 | 38.247 | 0.024 |
| B1 | 19/01/2017 | 18.276 | 0.006 | 15.636 | 0.006 | 38.217 | 0.013 |
| B1 | 19/01/2017 | 18.299 | 0.009 | 15.645 | 0.007 | 38.257 | 0.019 |
| B1 | 19/01/2017 | 18.284 | 0.008 | 15.647 | 0.006 | 38.239 | 0.016 |
| B1 | 19/01/2017 | 18.275 | 0.008 | 15.636 | 0.007 | 38.215 | 0.017 |
| B1 | 19/01/2017 | 18.282 | 0.006 | 15.639 | 0.006 | 38.225 | 0.013 |
| B1 | 19/01/2017 | 18.281 | 0.006 | 15.641 | 0.006 | 38.226 | 0.014 |
| B1 | 19/01/2017 | 18.296 | 0.007 | 15.653 | 0.007 | 38.258 | 0.016 |
| B1 | 19/01/2017 | 18.286 | 0.012 | 15.646 | 0.011 | 38.240 | 0.026 |
| B1 | 19/01/2017 | 18.283 | 0.010 | 15.642 | 0.008 | 38.230 | 0.021 |
| B1 | 19/01/2017 | 18.292 | 0.007 | 15.654 | 0.006 | 38.259 | 0.013 |
| B1 | 19/01/2017 | 18.283 | 0.010 | 15.645 | 0.010 | 38.233 | 0.023 |
| B1 | 19/01/2017 | 18.273 | 0.011 | 15.644 | 0.009 | 38.232 | 0.023 |
| B1 | 19/01/2017 | 18.280 | 0.009 | 15.639 | 0.007 | 38.224 | 0.018 |
| B1 | 19/01/2017 | 18.286 | 0.008 | 15.644 | 0.007 | 38.237 | 0.017 |
| B1 | 19/01/2017 | 18.276 | 0.007 | 15.645 | 0.006 | 38.235 | 0.015 |
| B1 | 19/01/2017 | 18.292 | 0.009 | 15.647 | 0.008 | 38.253 | 0.020 |
| B1 | 19/01/2017 | 18.284 | 0.008 | 15.649 | 0.007 | 38.249 | 0.018 |
| A1 | 25/01/2017 | 18.237 | 0.010 | 15.638 | 0.007 | 38.209 | 0.017 |
| A1 | 25/01/2017 | 18.239 | 0.006 | 15.641 | 0.006 | 38.216 | 0.015 |
| A1 | 25/01/2017 | 18.241 | 0.006 | 15.646 | 0.005 | 38.228 | 0.013 |
| A1 | 25/01/2017 | 18.243 | 0.011 | 15.641 | 0.011 | 38.223 | 0.024 |
| C1 | 25/01/2017 | 18.241 | 0.010 | 15.642 | 0.009 | 38.218 | 0.022 |
| C1 | 25/01/2017 | 18.236 | 0.010 | 15.643 | 0.009 | 38.223 | 0.021 |
| C1 | 25/01/2017 | 18.232 | 0.008 | 15.642 | 0.007 | 38.220 | 0.016 |
| C1 | 25/01/2017 | 18.234 | 0.006 | 15.645 | 0.006 | 38.223 | 0.014 |
| C1 | 25/01/2017 | 18.230 | 0.009 | 15.642 | 0.008 | 38.217 | 0.019 |
| C1 | 25/01/2017 | 18.232 | 0.009 | 15.640 | 0.008 | 38.216 | 0.020 |
| C1 | 25/01/2017 | 18.230 | 0.007 | 15.636 | 0.006 | 38.211 | 0.014 |
| C1 | 25/01/2017 | 18.241 | 0.006 | 15.647 | 0.005 | 38.229 | 0.013 |
| C1 | 25/01/2017 | 18.235 | 0.007 | 15.641 | 0.007 | 38.216 | 0.015 |
| C1 | 25/01/2017 | 18.231 | 0.008 | 15.640 | 0.007 | 38.212 | 0.016 |
| A7 | 25/01/2017 | 18.242 | 0.010 | 15.642 | 0.009 | 38.218 | 0.022 |
| A7 | 25/01/2017 | 18.254 | 0.009 | 15.646 | 0.007 | 38.222 | 0.018 |
| A7 | 25/01/2017 | 18.252 | 0.008 | 15.648 | 0.005 | 38.231 | 0.012 |
| A7 | 25/01/2017 | 18.254 | 0.009 | 15.653 | 0.008 | 38.244 | 0.018 |
| A7 | 25/01/2017 | 18.244 | 0.006 | 15.644 | 0.005 | 38.223 | 0.013 |
| A7 | 25/01/2017 | 18.255 | 0.007 | 15.654 | 0.006 | 38.249 | 0.014 |
| A6 | 25/01/2017 | 18.227 | 0.010 | 15.637 | 0.009 | 38.202 | 0.021 |
| A6 | 25/01/2017 | 18.234 | 0.009 | 15.637 | 0.008 | 38.209 | 0.017 |
| A6 | 25/01/2017 | 18.233 | 0.011 | 15.640 | 0.009 | 38.212 | 0.021 |
| A6 | 25/01/2017 | 18.239 | 0.009 | 15.643 | 0.006 | 38.222 | 0.016 |
| A6 | 25/01/2017 | 18.245 | 0.008 | 15.647 | 0.007 | 38.232 | 0.017 |

Table S1 (continued)

|    |            |        |       |        |       |        |       |
|----|------------|--------|-------|--------|-------|--------|-------|
| A6 | 15/05/2017 | 18.245 | 0.008 | 15.647 | 0.007 | 38.229 | 0.018 |
| A6 | 15/05/2017 | 18.238 | 0.010 | 15.643 | 0.008 | 38.218 | 0.021 |
| A6 | 15/05/2017 | 18.257 | 0.007 | 15.644 | 0.006 | 38.225 | 0.014 |
| A6 | 15/05/2017 | 18.246 | 0.006 | 15.644 | 0.005 | 38.223 | 0.011 |
| A6 | 15/05/2017 | 18.244 | 0.004 | 15.645 | 0.004 | 38.226 | 0.011 |
| A6 | 15/05/2017 | 18.247 | 0.009 | 15.646 | 0.008 | 38.225 | 0.020 |
| A6 | 15/05/2017 | 18.253 | 0.009 | 15.641 | 0.008 | 38.217 | 0.019 |
| A6 | 15/05/2017 | 18.249 | 0.008 | 15.642 | 0.006 | 38.222 | 0.014 |
| A6 | 15/05/2017 | 18.253 | 0.006 | 15.642 | 0.005 | 38.218 | 0.012 |
| A6 | 15/05/2017 | 18.241 | 0.006 | 15.642 | 0.006 | 38.218 | 0.014 |
| A6 | 15/05/2017 | 18.242 | 0.007 | 15.642 | 0.005 | 38.217 | 0.013 |
| A6 | 15/05/2017 | 18.243 | 0.008 | 15.643 | 0.007 | 38.223 | 0.017 |
| A6 | 15/05/2017 | 18.240 | 0.006 | 15.642 | 0.005 | 38.221 | 0.012 |
| A6 | 15/05/2017 | 18.248 | 0.007 | 15.646 | 0.006 | 38.232 | 0.014 |
| A6 | 15/05/2017 | 18.252 | 0.006 | 15.644 | 0.005 | 38.228 | 0.013 |
| A6 | 15/05/2017 | 18.248 | 0.010 | 15.647 | 0.009 | 38.232 | 0.023 |
| A6 | 15/05/2017 | 18.250 | 0.006 | 15.644 | 0.005 | 38.225 | 0.013 |
| A6 | 15/05/2017 | 18.259 | 0.007 | 15.646 | 0.006 | 38.231 | 0.015 |
| A6 | 15/05/2017 | 18.240 | 0.007 | 15.644 | 0.007 | 38.223 | 0.015 |
| A6 | 15/05/2017 | 18.241 | 0.006 | 15.642 | 0.006 | 38.221 | 0.013 |
| A6 | 15/05/2017 | 18.243 | 0.007 | 15.646 | 0.006 | 38.225 | 0.014 |
| A6 | 15/05/2017 | 18.231 | 0.009 | 15.638 | 0.008 | 38.207 | 0.022 |
| A5 | 17/05/2017 | 18.250 | 0.010 | 15.644 | 0.008 | 38.238 | 0.020 |
| A5 | 17/05/2017 | 18.240 | 0.008 | 15.642 | 0.007 | 38.221 | 0.016 |
| A5 | 17/05/2017 | 18.239 | 0.007 | 15.642 | 0.006 | 38.219 | 0.016 |
| A5 | 17/05/2017 | 18.241 | 0.005 | 15.642 | 0.005 | 38.221 | 0.012 |
| A5 | 17/05/2017 | 18.254 | 0.012 | 15.640 | 0.010 | 38.222 | 0.024 |
| A4 | 17/05/2017 | 18.250 | 0.010 | 15.640 | 0.008 | 38.240 | 0.019 |
| A4 | 17/05/2017 | 18.242 | 0.007 | 15.641 | 0.006 | 38.228 | 0.016 |
| A4 | 17/05/2017 | 18.242 | 0.007 | 15.645 | 0.005 | 38.234 | 0.013 |
| A4 | 17/05/2017 | 18.227 | 0.008 | 15.636 | 0.006 | 38.209 | 0.015 |
| A4 | 17/05/2017 | 18.240 | 0.006 | 15.647 | 0.005 | 38.234 | 0.013 |
| A4 | 17/05/2017 | 18.249 | 0.005 | 15.643 | 0.004 | 38.234 | 0.011 |
| A3 | 17/05/2017 | 18.236 | 0.008 | 15.643 | 0.007 | 38.219 | 0.016 |
| A3 | 17/05/2017 | 18.233 | 0.007 | 15.640 | 0.007 | 38.213 | 0.017 |
| A3 | 17/05/2017 | 18.235 | 0.007 | 15.642 | 0.007 | 38.220 | 0.016 |
| A3 | 17/05/2017 | 18.234 | 0.006 | 15.642 | 0.006 | 38.216 | 0.014 |
| A3 | 17/05/2017 | 18.237 | 0.008 | 15.645 | 0.008 | 38.223 | 0.019 |
| A3 | 17/05/2017 | 18.237 | 0.007 | 15.642 | 0.006 | 38.214 | 0.013 |
| A2 | 17/05/2017 | 18.301 | 0.009 | 15.657 | 0.007 | 38.269 | 0.019 |
| A2 | 17/05/2017 | 18.302 | 0.006 | 15.651 | 0.005 | 38.254 | 0.013 |
| A2 | 17/05/2017 | 18.301 | 0.007 | 15.654 | 0.005 | 38.271 | 0.013 |
| A2 | 17/05/2017 | 18.308 | 0.009 | 15.655 | 0.008 | 38.267 | 0.020 |
| A2 | 17/05/2017 | 18.291 | 0.007 | 15.643 | 0.006 | 38.239 | 0.014 |



Table S1 (continued)

|                |            |              |              |              |
|----------------|------------|--------------|--------------|--------------|
| A2             | 17/05/2017 | 18.295 0.007 | 15.647 0.004 | 38.252 0.012 |
| <b>Average</b> |            | 18.255       | 15.642       | 38.224       |
| <b>2 s.d.</b>  |            | 0.049        | 0.010        | 0.033        |
| <b>ppm</b>     |            | 2694         | 615          | 853          |
| <b>%</b>       |            | 0.27         | 0.06         | 0.09         |

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**Table S2: Lead isotope data for K-feldspars from shap Granite measured at 40µm spot.**

| <b>Grain</b> | <b>Date of analysis</b> | <b><math>^{206}\text{Pb}/^{204}\text{Pb}</math></b> | <b>2 s.e.</b> | <b><math>^{207}\text{Pb}/^{204}\text{Pb}</math></b> | <b>2 s.e.</b> | <b><math>^{208}\text{Pb}/^{204}\text{Pb}</math></b> | <b>2 s.e.</b> |
|--------------|-------------------------|-----------------------------------------------------|---------------|-----------------------------------------------------|---------------|-----------------------------------------------------|---------------|
| <b>B1</b>    | 20/01/2017              | 18.08                                               | 0.25          | 15.47                                               | 0.21          | 37.79                                               | 0.52          |
| <b>B1</b>    | 20/01/2017              | 18.35                                               | 0.20          | 15.72                                               | 0.17          | 38.39                                               | 0.41          |
| <b>B1</b>    | 20/01/2017              | 18.37                                               | 0.22          | 15.72                                               | 0.19          | 38.43                                               | 0.47          |
| <b>B1</b>    | 20/01/2017              | 18.40                                               | 0.25          | 15.76                                               | 0.21          | 38.51                                               | 0.52          |
| <b>B1</b>    | 20/01/2017              | 18.23                                               | 0.21          | 15.62                                               | 0.19          | 38.16                                               | 0.46          |
| <b>B1</b>    | 20/01/2017              | 18.34                                               | 0.17          | 15.69                                               | 0.14          | 38.35                                               | 0.35          |
| <b>B1</b>    | 20/01/2017              | 18.30                                               | 0.22          | 15.66                                               | 0.19          | 38.27                                               | 0.46          |
| <b>B1</b>    | 20/01/2017              | 18.18                                               | 0.26          | 15.57                                               | 0.22          | 38.05                                               | 0.54          |
| <b>B1</b>    | 20/01/2017              | 18.21                                               | 0.37          | 15.59                                               | 0.31          | 38.10                                               | 0.78          |
| <b>B1</b>    | 20/01/2017              | 18.03                                               | 0.38          | 15.43                                               | 0.32          | 37.72                                               | 0.78          |
| <b>B1</b>    | 20/01/2017              | 18.18                                               | 0.34          | 15.55                                               | 0.29          | 38.03                                               | 0.70          |
| <b>B1</b>    | 20/01/2017              | 18.14                                               | 0.24          | 15.54                                               | 0.21          | 37.98                                               | 0.49          |
| <b>A1</b>    | 26/01/2017              | 18.25                                               | 0.34          | 15.65                                               | 0.29          | 38.23                                               | 0.74          |
| <b>A1</b>    | 26/01/2017              | 18.30                                               | 0.25          | 15.69                                               | 0.21          | 38.34                                               | 0.53          |
| <b>A1</b>    | 26/01/2017              | 18.03                                               | 0.27          | 15.47                                               | 0.22          | 37.78                                               | 0.56          |
| <b>A1</b>    | 26/01/2017              | 18.21                                               | 0.28          | 15.61                                               | 0.22          | 38.15                                               | 0.56          |
| <b>A1</b>    | 26/01/2017              | 18.17                                               | 0.21          | 15.60                                               | 0.18          | 38.11                                               | 0.42          |
| <b>A1</b>    | 26/01/2017              | 18.14                                               | 0.19          | 15.65                                               | 0.16          | 38.08                                               | 0.40          |
| <b>A1</b>    | 26/01/2017              | 18.02                                               | 0.24          | 15.40                                               | 0.15          | 37.60                                               | 0.37          |
| <b>A1</b>    | 26/01/2017              | 18.39                                               | 0.26          | 15.84                                               | 0.17          | 38.56                                               | 0.56          |
| <b>A1</b>    | 26/01/2017              | 18.28                                               | 0.20          | 15.68                                               | 0.18          | 38.33                                               | 0.45          |
| <b>A1</b>    | 26/01/2017              | 18.10                                               | 0.22          | 15.52                                               | 0.18          | 37.90                                               | 0.46          |
| <b>A1</b>    | 26/01/2017              | 18.39                                               | 0.20          | 15.70                                               | 0.21          | 38.56                                               | 0.42          |
| <b>A1</b>    | 26/01/2017              | 18.30                                               | 0.20          | 15.68                                               | 0.17          | 38.35                                               | 0.44          |
| <b>A1</b>    | 26/01/2017              | 18.09                                               | 0.17          | 15.52                                               | 0.14          | 37.89                                               | 0.35          |
| <b>A1</b>    | 26/01/2017              | 18.26                                               | 0.19          | 15.65                                               | 0.17          | 38.24                                               | 0.40          |
| <b>A1</b>    | 26/01/2017              | 18.11                                               | 0.30          | 15.51                                               | 0.27          | 37.93                                               | 0.64          |
| <b>A1</b>    | 26/01/2017              | 18.44                                               | 0.17          | 15.82                                               | 0.15          | 38.63                                               | 0.35          |
| <b>A6</b>    | 15/05/2017              | 18.12                                               | 0.29          | 15.53                                               | 0.24          | 37.98                                               | 0.55          |
| <b>A6</b>    | 15/05/2017              | 18.37                                               | 0.21          | 15.72                                               | 0.18          | 38.41                                               | 0.43          |
| <b>A6</b>    | 15/05/2017              | 18.36                                               | 0.27          | 15.71                                               | 0.23          | 38.39                                               | 0.56          |
| <b>A6</b>    | 15/05/2017              | 18.31                                               | 0.20          | 15.71                                               | 0.17          | 38.40                                               | 0.42          |
| <b>A6</b>    | 15/05/2017              | 18.34                                               | 0.20          | 15.74                                               | 0.17          | 38.45                                               | 0.43          |
| <b>A6</b>    | 15/05/2017              | 18.25                                               | 0.22          | 15.65                                               | 0.18          | 38.23                                               | 0.46          |
| <b>A6</b>    | 15/05/2017              | 18.25                                               | 0.31          | 15.65                                               | 0.25          | 38.24                                               | 0.59          |
| <b>A6</b>    | 15/05/2017              | 18.32                                               | 0.20          | 15.69                                               | 0.17          | 38.35                                               | 0.42          |
| <b>A6</b>    | 15/05/2017              | 18.38                                               | 0.19          | 15.78                                               | 0.16          | 38.54                                               | 0.39          |
| <b>A6</b>    | 15/05/2017              | 18.02                                               | 0.20          | 15.45                                               | 0.17          | 37.76                                               | 0.42          |
| <b>A6</b>    | 15/05/2017              | 18.25                                               | 0.20          | 15.66                                               | 0.17          | 38.22                                               | 0.41          |

Table S2 (continue)

|                |            |       |      |       |      |       |      |
|----------------|------------|-------|------|-------|------|-------|------|
| <b>A6</b>      | 15/05/2017 | 18.33 | 0.18 | 15.73 | 0.16 | 38.40 | 0.39 |
| <b>Average</b> |            | 18.24 |      | 15.63 |      | 38.20 |      |
| <b>2 s.d.</b>  |            | 0.24  |      | 0.21  |      | 0.52  |      |
| <b>ppm</b>     |            | 13094 |      | 13719 |      | 13618 |      |
| <b>%</b>       |            | 1.3   |      | 1.4   |      | 1.4   |      |

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**Table S3: Lead isotope data for K-feldspars from shap Granite measured at 10µm spot.**

| <b>Grain</b> | <b>Date of analysis</b> | <b><math>^{206}\text{Pb}/^{204}\text{Pb}</math></b> | <b>2 s.e.</b> | <b><math>^{207}\text{Pb}/^{204}\text{Pb}</math></b> | <b>2 s.e.</b> | <b><math>^{208}\text{Pb}/^{204}\text{Pb}</math></b> | <b>2 s.e.</b> |
|--------------|-------------------------|-----------------------------------------------------|---------------|-----------------------------------------------------|---------------|-----------------------------------------------------|---------------|
| A1           | 26/01/2017              | 18.195                                              | 0.192         | 15.627                                              | 0.198         | 38.128                                              | 0.362         |
| A1           | 26/01/2017              | 18.174                                              | 0.164         | 15.578                                              | 0.145         | 38.017                                              | 0.364         |
| A1           | 26/01/2017              | 18.221                                              | 0.278         | 15.624                                              | 0.226         | 38.251                                              | 0.497         |
| A1           | 26/01/2017              | 18.062                                              | 0.229         | 15.434                                              | 0.183         | 37.665                                              | 0.492         |
| A1           | 26/01/2017              | 18.398                                              | 0.284         | 15.768                                              | 0.239         | 38.514                                              | 0.661         |
| A1           | 26/01/2017              | 18.442                                              | 0.269         | 15.825                                              | 0.229         | 38.778                                              | 0.563         |
| A1           | 26/01/2017              | 18.450                                              | 0.228         | 15.794                                              | 0.197         | 38.563                                              | 0.480         |
| A1           | 26/01/2017              | 18.555                                              | 0.179         | 15.935                                              | 0.150         | 38.936                                              | 0.394         |
| A1           | 26/01/2017              | 18.351                                              | 0.231         | 15.730                                              | 0.187         | 38.426                                              | 0.479         |
| A1           | 26/01/2017              | 18.127                                              | 0.184         | 15.547                                              | 0.155         | 37.979                                              | 0.389         |
| A1           | 26/01/2017              | 18.332                                              | 0.140         | 15.687                                              | 0.126         | 38.281                                              | 0.289         |
| A1           | 26/01/2017              | 18.449                                              | 0.138         | 15.824                                              | 0.117         | 38.532                                              | 0.294         |
| A1           | 26/01/2017              | 18.297                                              | 0.141         | 15.705                                              | 0.123         | 38.326                                              | 0.286         |
| A1           | 26/01/2017              | 18.305                                              | 0.160         | 15.673                                              | 0.127         | 38.285                                              | 0.320         |
| A1           | 26/01/2017              | 18.335                                              | 0.164         | 15.705                                              | 0.156         | 38.350                                              | 0.381         |
| A1           | 26/01/2017              | 18.525                                              | 0.134         | 15.873                                              | 0.130         | 38.707                                              | 0.300         |
| A1           | 26/01/2017              | 18.294                                              | 0.139         | 15.653                                              | 0.115         | 38.248                                              | 0.281         |
| A6           | 06/02/2017              | 18.415                                              | 0.209         | 15.762                                              | 0.181         | 38.473                                              | 0.561         |
| A6           | 06/02/2017              | 18.284                                              | 0.161         | 15.633                                              | 0.148         | 38.179                                              | 0.304         |
| A6           | 06/02/2017              | 18.349                                              | 0.154         | 15.764                                              | 0.130         | 38.503                                              | 0.305         |
| A6           | 06/02/2017              | 18.153                                              | 0.165         | 15.616                                              | 0.142         | 38.065                                              | 0.374         |
| A6           | 06/02/2017              | 18.293                                              | 0.179         | 15.700                                              | 0.144         | 38.307                                              | 0.371         |
| A6           | 06/02/2017              | 18.116                                              | 0.144         | 15.545                                              | 0.115         | 37.886                                              | 0.300         |
| A6           | 06/02/2017              | 18.189                                              | 0.173         | 15.572                                              | 0.150         | 38.081                                              | 0.391         |
| A6           | 06/02/2017              | 18.299                                              | 0.227         | 15.697                                              | 0.198         | 38.254                                              | 0.462         |
| A6           | 06/02/2017              | 18.272                                              | 0.152         | 15.694                                              | 0.144         | 38.320                                              | 0.396         |
| A6           | 06/02/2017              | 18.232                                              | 0.174         | 15.658                                              | 0.142         | 38.244                                              | 0.347         |
| A6           | 06/02/2017              | 18.236                                              | 0.178         | 15.619                                              | 0.154         | 38.136                                              | 0.336         |
| A6           | 06/02/2017              | 18.102                                              | 0.217         | 15.534                                              | 0.183         | 37.906                                              | 0.417         |
| A6           | 06/02/2017              | 18.494                                              | 0.158         | 15.818                                              | 0.148         | 38.739                                              | 0.486         |
| A6           | 06/02/2017              | 18.227                                              | 0.193         | 15.577                                              | 0.166         | 38.197                                              | 0.386         |
| A6           | 06/02/2017              | 18.233                                              | 0.188         | 15.615                                              | 0.151         | 38.220                                              | 0.463         |
| A6           | 06/02/2017              | 18.365                                              | 0.150         | 15.778                                              | 0.116         | 38.480                                              | 0.309         |
| A6           | 06/02/2017              | 18.302                                              | 0.244         | 15.736                                              | 0.168         | 38.431                                              | 0.520         |
| A6           | 06/02/2017              | 18.314                                              | 0.284         | 15.733                                              | 0.215         | 38.422                                              | 0.549         |
| A6           | 06/02/2017              | 18.457                                              | 0.269         | 15.824                                              | 0.216         | 38.726                                              | 0.928         |
| A6           | 06/02/2017              | 18.577                                              | 0.227         | 15.912                                              | 0.186         | 38.885                                              | 0.364         |
| A6           | 06/02/2017              | 18.349                                              | 0.179         | 15.740                                              | 0.146         | 38.483                                              | 0.276         |
| A6           | 06/02/2017              | 18.110                                              | 0.190         | 15.548                                              | 0.156         | 37.954                                              | 0.382         |



Table S3 (continued)

|           |            |        |       |        |       |        |       |
|-----------|------------|--------|-------|--------|-------|--------|-------|
| <b>A6</b> | 07/02/2017 | 18.438 | 0.218 | 15.815 | 0.195 | 38.706 | 0.721 |
| <b>A6</b> | 07/02/2017 | 18.425 | 0.170 | 15.818 | 0.139 | 38.572 | 0.273 |
| <b>A6</b> | 07/02/2017 | 18.345 | 0.181 | 15.736 | 0.151 | 38.366 | 0.484 |
| <b>A6</b> | 07/02/2017 | 18.437 | 0.162 | 15.813 | 0.138 | 38.577 | 0.327 |
| <b>A6</b> | 07/02/2017 | 18.315 | 0.140 | 15.704 | 0.123 | 38.342 | 0.264 |
| <b>A6</b> | 07/02/2017 | 18.243 | 0.163 | 15.651 | 0.142 | 38.154 | 0.409 |
| <b>A6</b> | 07/02/2017 | 18.278 | 0.179 | 15.681 | 0.166 | 38.291 | 0.306 |
| <b>A6</b> | 07/02/2017 | 18.218 | 0.214 | 15.597 | 0.188 | 38.089 | 0.471 |
| <b>A6</b> | 07/02/2017 | 18.223 | 0.200 | 15.566 | 0.169 | 38.074 | 0.435 |
| <b>A6</b> | 07/02/2017 | 18.122 | 0.123 | 15.519 | 0.103 | 37.861 | 0.268 |
| <b>A6</b> | 07/02/2017 | 18.151 | 0.185 | 15.542 | 0.166 | 37.909 | 0.428 |
| <b>A6</b> | 07/02/2017 | 18.224 | 0.201 | 15.639 | 0.163 | 38.271 | 0.436 |
| <b>A6</b> | 07/02/2017 | 18.378 | 0.183 | 15.792 | 0.161 | 38.266 | 0.894 |
| <b>A6</b> | 07/02/2017 | 18.291 | 0.167 | 15.690 | 0.139 | 38.376 | 0.364 |
| <b>A6</b> | 07/02/2017 | 18.335 | 0.221 | 15.737 | 0.168 | 38.465 | 0.403 |
| <b>A6</b> | 07/02/2017 | 18.463 | 0.184 | 15.801 | 0.151 | 38.468 | 0.443 |
| <b>A6</b> | 07/02/2017 | 18.301 | 0.128 | 15.691 | 0.104 | 38.388 | 0.281 |
| <b>A6</b> | 07/02/2017 | 18.190 | 0.124 | 15.588 | 0.111 | 38.086 | 0.353 |
| <b>A6</b> | 07/02/2017 | 18.220 | 0.106 | 15.629 | 0.093 | 38.180 | 0.305 |
| <b>A6</b> | 07/02/2017 | 18.306 | 0.105 | 15.716 | 0.088 | 38.402 | 0.217 |
| <b>A6</b> | 07/02/2017 | 18.252 | 0.124 | 15.678 | 0.111 | 38.288 | 0.277 |
| <b>A6</b> | 07/02/2017 | 18.391 | 0.193 | 15.824 | 0.160 | 38.612 | 0.760 |
| <b>A6</b> | 07/02/2017 | 18.460 | 0.275 | 15.822 | 0.242 | 38.667 | 0.438 |
| <b>A6</b> | 07/02/2017 | 18.394 | 0.263 | 15.799 | 0.211 | 38.598 | 0.604 |
| <b>A6</b> | 07/02/2017 | 18.426 | 0.239 | 15.809 | 0.216 | 38.532 | 0.493 |
| <b>A6</b> | 07/02/2017 | 18.206 | 0.169 | 15.595 | 0.158 | 38.032 | 0.416 |
| <b>A6</b> | 07/02/2017 | 18.127 | 0.200 | 15.602 | 0.166 | 37.990 | 0.369 |
| <b>A6</b> | 07/02/2017 | 18.150 | 0.197 | 15.509 | 0.189 | 37.981 | 0.692 |
| <b>A6</b> | 07/02/2017 | 18.253 | 0.209 | 15.635 | 0.189 | 38.059 | 0.698 |
| <b>A6</b> | 07/02/2017 | 18.352 | 0.210 | 15.671 | 0.131 | 38.274 | 0.431 |
| <b>A6</b> | 07/02/2017 | 18.159 | 0.189 | 15.581 | 0.124 | 37.999 | 0.401 |
| <b>A6</b> | 07/02/2017 | 18.516 | 0.210 | 15.893 | 0.224 | 38.836 | 0.673 |
| <b>A6</b> | 07/02/2017 | 18.214 | 0.236 | 15.586 | 0.233 | 38.041 | 0.696 |
| <b>A6</b> | 07/02/2017 | 18.302 | 0.234 | 15.738 | 0.178 | 38.465 | 0.522 |
| <b>A6</b> | 07/02/2017 | 18.307 | 0.220 | 15.724 | 0.159 | 38.429 | 0.503 |
| <b>A6</b> | 07/02/2017 | 18.220 | 0.183 | 15.659 | 0.138 | 38.284 | 0.261 |
| <b>A6</b> | 07/02/2017 | 18.306 | 0.196 | 15.715 | 0.147 | 38.371 | 0.295 |
| <b>A6</b> | 07/02/2017 | 18.264 | 0.125 | 15.685 | 0.108 | 38.403 | 0.721 |
| <b>A6</b> | 07/02/2017 | 18.215 | 0.119 | 15.639 | 0.094 | 38.166 | 0.225 |
| <b>A6</b> | 07/02/2017 | 18.087 | 0.139 | 15.500 | 0.091 | 37.823 | 0.355 |
| <b>A6</b> | 07/02/2017 | 18.150 | 0.153 | 15.579 | 0.126 | 38.046 | 0.357 |
| <b>A6</b> | 07/02/2017 | 18.167 | 0.131 | 15.572 | 0.117 | 38.034 | 0.262 |
| <b>A6</b> | 07/02/2017 | 18.102 | 0.115 | 15.570 | 0.094 | 37.962 | 0.253 |
| <b>A6</b> | 07/02/2017 | 18.090 | 0.138 | 15.456 | 0.139 | 37.692 | 0.589 |

Table S3 (continued)

|           |            |        |       |        |       |        |       |
|-----------|------------|--------|-------|--------|-------|--------|-------|
| <b>A6</b> | 07/02/2017 | 18.291 | 0.114 | 15.721 | 0.117 | 38.332 | 0.160 |
| <b>A6</b> | 07/02/2017 | 18.205 | 0.132 | 15.573 | 0.116 | 38.027 | 0.339 |
| <b>A6</b> | 07/02/2017 | 18.303 | 0.142 | 15.686 | 0.127 | 38.239 | 0.371 |
| <b>A6</b> | 07/02/2017 | 18.332 | 0.145 | 15.699 | 0.092 | 38.241 | 0.216 |
| <b>A6</b> | 07/02/2017 | 18.303 | 0.150 | 15.681 | 0.129 | 38.295 | 0.371 |
| <b>A6</b> | 07/02/2017 | 18.416 | 0.240 | 15.770 | 0.199 | 38.618 | 0.735 |
| <b>A6</b> | 07/02/2017 | 18.215 | 0.219 | 15.634 | 0.179 | 38.080 | 0.711 |
| <b>A6</b> | 07/02/2017 | 18.526 | 0.143 | 15.885 | 0.121 | 38.827 | 0.432 |
| <b>A6</b> | 07/02/2017 | 18.367 | 0.208 | 15.774 | 0.180 | 38.363 | 0.537 |
| <b>A6</b> | 07/02/2017 | 18.292 | 0.183 | 15.660 | 0.159 | 38.164 | 0.391 |
| <b>A6</b> | 07/02/2017 | 18.248 | 0.180 | 15.622 | 0.166 | 38.184 | 0.371 |
| <b>A6</b> | 07/02/2017 | 18.154 | 0.216 | 15.563 | 0.212 | 38.112 | 0.659 |
| <b>A6</b> | 07/02/2017 | 18.380 | 0.214 | 15.743 | 0.197 | 38.522 | 0.397 |
| <b>A6</b> | 07/02/2017 | 18.212 | 0.168 | 15.622 | 0.151 | 38.189 | 0.450 |
| <b>A6</b> | 07/02/2017 | 18.154 | 0.309 | 15.589 | 0.245 | 38.055 | 0.576 |

|                |       |       |       |
|----------------|-------|-------|-------|
| <b>average</b> | 18.29 | 15.68 | 38.29 |
| <b>2 s.d.</b>  | 0.24  | 0.21  | 0.53  |
| <b>ppm</b>     | 12860 | 13377 | 13831 |
| <b>%</b>       | 1.3   | 1.3   | 1.4   |

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