**Supplementary Material E**

**Table 1: Data of 18 in-situ zircon Lu-Hf isotope analyses from quartz syenite.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **spot** | **176Yb/177Hf** | **±2s a** | **176Lu/177Hf** | **±2s b** | **178Hf/177Hf** | **180Hf/177Hf** | **SigHf** | **176Hf/177Hf** | **±2s c** | **176Hf/177Hf(t)** | **eHf(t)** | **±2s d** | **Avg MORB** | **TDM2 f** | **TDM2 g** | **age** | **±2s e** |
| 54 | 0,0568 | 46 | 0,00119 | 7 | 1,46633 | 1,88692 | 9 | 0,282475 | 26 | 0,282473736 | -9,721 | 0,94177 | 1,3 | 1,6 | 1,3 | 58 | 2 |
| 55 | 0,0419 | 34 | 0,00092 | 6 | 1,46632 | 1,88696 | 11 | 0,282489 | 25 | 0,282487538 | -9,23288 | 0,89168 | 1,3 | 1,5 | 1,3 | 58 | 2 |
| 56 | 0,0296 | 24 | 0,00066 | 4 | 1,46635 | 1,88689 | 8 | 0,282512 | 29 | 0,282511482 | -8,38606 | 0,85818 | 1,3 | 1,5 | 1,2 | 58 | 2 |
| 57 | 0,0282 | 23 | 0,00063 | 4 | 1,46626 | 1,88688 | 9 | 0,282508 | 29 | 0,282506907 | -8,54785 | 0,85537 | 1,3 | 1,5 | 1,2 | 58 | 2 |
| 58 | 0,0396 | 35 | 0,00088 | 6 | 1,46628 | 1,887 | 10 | 0,282482 | 37 | 0,282481361 | -9,45133 | 0,89674 | 1,3 | 1,6 | 1,3 | 58 | 2 |
| 59 | 0,0275 | 24 | 0,00061 | 4 | 1,46637 | 1,88686 | 10 | 0,282546 | 29 | 0,282545573 | -7,18033 | 0,85837 | 1,2 | 1,4 | 1,2 | 58 | 2 |
| 60 | 0,0292 | 24 | 0,00063 | 4 | 1,46632 | 1,88692 | 12 | 0,282546 | 23 | 0,282545441 | -7,18502 | 0,85848 | 1,2 | 1,4 | 1,2 | 58 | 2 |
| 61 | 0,0446 | 36 | 0,00096 | 6 | 1,46631 | 1,88677 | 9 | 0,282491 | 17 | 0,282489528 | -9,16249 | 0,89958 | 1,3 | 1,5 | 1,3 | 58 | 2 |
| 62 | 0,0427 | 34 | 0,00091 | 5 | 1,46642 | 1,88692 | 10 | 0,282506 | 17 | 0,282505199 | -8,60825 | 0,89298 | 1,3 | 1,5 | 1,3 | 58 | 2 |
| 63 | 0,0272 | 22 | 0,00057 | 3 | 1,46624 | 1,88696 | 10 | 0,282505 | 15 | 0,282504512 | -8,63254 | 0,85291 | 1,3 | 1,5 | 1,3 | 58 | 2 |
| 64 | 0,0267 | 22 | 0,00058 | 3 | 1,4662 | 1,88685 | 11 | 0,282535 | 17 | 0,282534826 | -7,56044 | 0,85275 | 1,2 | 1,5 | 1,2 | 58 | 2 |
| 65 | 0,0289 | 23 | 0,00061 | 4 | 1,46619 | 1,88689 | 11 | 0,282528 | 15 | 0,282526999 | -7,83726 | 0,85665 | 1,2 | 1,5 | 1,2 | 58 | 2 |
| 66 | 0,0554 | 47 | 0,00116 | 7 | 1,46622 | 1,88691 | 11 | 0,282458 | 16 | 0,28245676 | -10,32141 | 0,94797 | 1,4 | 1,6 | 1,3 | 58 | 2 |
| 67 | 0,0266 | 21 | 0,00059 | 4 | 1,46623 | 1,88688 | 10 | 0,282545 | 18 | 0,282543944 | -7,23797 | 0,85199 | 1,2 | 1,4 | 1,2 | 58 | 2 |
| 68 | 0,0386 | 31 | 0,00079 | 5 | 1,46639 | 1,88687 | 11 | 0,282515 | 21 | 0,282513938 | -8,29919 | 0,8812 | 1,2 | 1,5 | 1,2 | 58 | 2 |
| 69 | 0,0316 | 25 | 0,00067 | 4 | 1,4663 | 1,88698 | 10 | 0,282508 | 19 | 0,282506948 | -8,54638 | 0,86289 | 1,3 | 1,5 | 1,2 | 58 | 2 |
| 70 | 0,0428 | 35 | 0,00097 | 6 | 1,46636 | 1,887 | 8 | 0,282499 | 26 | 0,2824983 | -8,85227 | 0,89494 | 1,3 | 1,5 | 1,3 | 58 | 2 |
| 71 | 0,0209 | 17 | 0,00047 | 3 | 1,46642 | 1,88685 | 11 | 0,282551 | 25 | 0,282550346 | -7,01155 | 0,8426 | 1,2 | 1,4 | 1,2 | 58 | 2 |

**Table 2: U-Pb analytical data of the monzonite (SOA-02A). The (\*) indicates spots used in the Concordia.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **spot** | **176Yb/177Hf** | **±2s a** | **176Lu/177Hf** | **±2s b** | **178Hf/177Hf** | **180Hf/177Hf** | **SigHf** | **176Hf/177Hf** | **±2s c** | **176Hf/177Hf(t)** | **eHf(t)** | **±2s d** | **Avg MORB** | **TDM2 f** | **TDM2 g** | **age** | **±2s e** |
| 81 | 0,0627 | 52 | 0,00135 | 9 | 1,46622 | 1,88695 | 13 | 0,28251 | 27 | 0,282508903 | -8,43287 | 0,97371 | 1,3 | 1,5 | 1,2 | 60 | 2 |
| 82 | 0,0553 | 67 | 0,00117 | 12 | 1,46623 | 1,88702 | 14 | 0,282484 | 25 | 0,282482575 | -9,36404 | 1,06035 | 1,3 | 1,6 | 1,3 | 60 | 2 |
| 83 | 0,0372 | 31 | 0,00081 | 5 | 1,46617 | 1,887 | 11 | 0,282542 | 25 | 0,282540965 | -7,29894 | 0,88119 | 1,2 | 1,4 | 1,2 | 60 | 2 |
| 84 | 0,0445 | 36 | 0,00096 | 6 | 1,4659 | 1,88698 | 14 | 0,282515 | 24 | 0,282513922 | -8,25537 | 0,89859 | 1,2 | 1,5 | 1,2 | 60 | 2 |
| 85 | 0,0518 | 42 | 0,0011 | 7 | 1,46616 | 1,88684 | 11 | 0,282475 | 25 | 0,282474056 | -9,66531 | 0,92465 | 1,3 | 1,6 | 1,3 | 60 | 2 |
| 86 | 0,0266 | 21 | 0,00058 | 4 | 1,46614 | 1,88696 | 13 | 0,282547 | 22 | 0,282546827 | -7,0916 | 0,85162 | 1,2 | 1,4 | 1,2 | 60 | 2 |
| 87 | 0,0617 | 50 | 0,00132 | 8 | 1,46607 | 1,8868 | 10 | 0,282497 | 27 | 0,282495141 | -8,91958 | 0,96451 | 1,3 | 1,5 | 1,3 | 60 | 2 |
| 88 | 0,0235 | 19 | 0,00053 | 3 | 1,46615 | 1,88687 | 10 | 0,282569 | 23 | 0,28256878 | -6,31518 | 0,84647 | 1,1 | 1,4 | 1,1 | 60 | 2 |
| 89 | 0,0711 | 58 | 0,00152 | 9 | 1,46624 | 1,88687 | 9 | 0,282476 | 28 | 0,282474578 | -9,64684 | 1,00623 | 1,3 | 1,6 | 1,3 | 60 | 2 |
| 91 | 0,0421 | 34 | 0,00104 | 6 | 1,46624 | 1,88697 | 11 | 0,282532 | 23 | 0,282530392 | -7,67285 | 0,89112 | 1,2 | 1,5 | 1,2 | 60 | 2 |
| 92 | 0,0682 | 60 | 0,00153 | 11 | 1,4662 | 1,88696 | 15 | 0,28246 | 16 | 0,282458739 | -10,20704 | 1,01765 | 1,4 | 1,6 | 1,3 | 60 | 2 |
| 93 | 0,038 | 31 | 0,00086 | 5 | 1,4662 | 1,88689 | 14 | 0,282509 | 23 | 0,282508393 | -8,4509 | 0,87917 | 1,3 | 1,5 | 1,2 | 60 | 2 |
| 94 | 0,0435 | 35 | 0,00098 | 6 | 1,46632 | 1,88687 | 11 | 0,282509 | 19 | 0,282508336 | -8,45291 | 0,89559 | 1,3 | 1,5 | 1,2 | 60 | 2 |
| 95 | 0,0608 | 49 | 0,00134 | 8 | 1,46622 | 1,88687 | 12 | 0,282479 | 24 | 0,282477237 | -9,5528 | 0,95803 | 1,3 | 1,6 | 1,3 | 60 | 2 |
| 96 | 0,0268 | 22 | 0,00061 | 4 | 1,4663 | 1,88695 | 12 | 0,28256 | 19 | 0,282558933 | -6,66346 | 0,85248 | 1,2 | 1,4 | 1,1 | 60 | 2 |
| 97 | 0,054 | 43 | 0,0012 | 7 | 1,46641 | 1,88668 | 11 | 0,282513 | 23 | 0,282512081 | -8,32048 | 0,93169 | 1,3 | 1,5 | 1,2 | 60 | 2 |
| 98 | 0,0354 | 29 | 0,00075 | 5 | 1,46638 | 1,88692 | 14 | 0,282545 | 18 | 0,282543708 | -7,2019 | 0,87312 | 1,2 | 1,4 | 1,2 | 60 | 2 |
| 99 | 0,0423 | 34 | 0,00093 | 6 | 1,46628 | 1,88682 | 13 | 0,282513 | 19 | 0,282511937 | -8,32558 | 0,89141 | 1,3 | 1,5 | 1,2 | 60 | 2 |

**Table 3: U-Pb analytical data of the alkali feldspar syenite (SOA-05). The (\*) indicates spots used in the Concordia.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **spot** | **176Yb/177Hf** | **±2s a** | **176Lu/177Hf** | **±2s b** | **178Hf/177Hf** | **180Hf/177Hf** | **SigHf** | **176Hf/177Hf** | **±2s c** | **176Hf/177Hf(t)** | **eHf(t)** | **±2s d** | **Avg MORB** | **TDM2 f** | **TDM2 g** | **age** | **±2s e** |
| 100 | 0,0728 | 59 | 0,00155 | 9 | 1,46638 | 1,88683 | 9 | 0,282564 | 20 | 0,282562716 | -6,57403 | 1,01504 | 1,2 | 1,4 | 1,1 | 58 | 2 |
| 101 | 0,1421 | 114 | 0,00283 | 17 | 1,46621 | 1,88677 | 9 | 0,282403 | 23 | 0,282399913 | -12,3319 | 1,40371 | 1,5 | 1,7 | 1,5 | 58 | 2 |
| 102 | 0,0664 | 53 | 0,00137 | 8 | 1,46625 | 1,88695 | 10 | 0,282555 | 19 | 0,282553287 | -6,9075 | 0,98241 | 1,2 | 1,4 | 1,2 | 58 | 2 |
| 103 | 0,0911 | 73 | 0,0018 | 11 | 1,46634 | 1,88682 | 9 | 0,282526 | 26 | 0,282523574 | -7,95839 | 1,10385 | 1,2 | 1,5 | 1,2 | 58 | 2 |
| 104 | 0,1227 | 99 | 0,0025 | 15 | 1,46636 | 1,88689 | 8 | 0,282421 | 27 | 0,282418674 | -11,66838 | 1,2854 | 1,4 | 1,7 | 1,4 | 58 | 2 |
| 105 | 0,0518 | 42 | 0,0011 | 7 | 1,46643 | 1,88684 | 9 | 0,282586 | 27 | 0,282585266 | -5,77652 | 0,92459 | 1,1 | 1,4 | 1,1 | 58 | 2 |
| 106 | 0,0575 | 47 | 0,00122 | 7 | 1,46656 | 1,88684 | 9 | 0,282566 | 22 | 0,28256495 | -6,49504 | 0,94668 | 1,1 | 1,4 | 1,1 | 58 | 2 |
| 107 | 0,0908 | 74 | 0,00189 | 11 | 1,46651 | 1,88682 | 8 | 0,282476 | 24 | 0,2824738 | -9,71876 | 1,10462 | 1,3 | 1,6 | 1,3 | 58 | 2 |
| 108 | 0,0671 | 57 | 0,00138 | 9 | 1,46652 | 1,88683 | 9 | 0,282559 | 25 | 0,282557713 | -6,751 | 0,99986 | 1,2 | 1,4 | 1,1 | 58 | 2 |
| 109 | 0,188 | 151 | 0,00377 | 23 | 1,46652 | 1,88681 | 8 | 0,282247 | 22 | 0,28224306 | -17,87937 | 1,7214 | 1,8 | 2 | 1,8 | 58 | 2 |
| 110 | 0,0619 | 51 | 0,0013 | 8 | 1,4666 | 1,88694 | 9 | 0,282585 | 14 | 0,28258365 | -5,83366 | 0,96883 | 1,1 | 1,4 | 1,1 | 58 | 2 |
| 111 | 0,0904 | 79 | 0,00183 | 12 | 1,46653 | 1,88682 | 8 | 0,282486 | 1120 | 0,28248392 | -9,36083 | 1,1424 | 1,3 | 1,6 | 1,3 | 58 | 2 |
| 112 | 0,0854 | 69 | 0,0017 | 10 | 1,46664 | 1,88669 | 9 | 0,28252 | 21 | 0,282518586 | -8,13478 | 1,07327 | 1,2 | 1,5 | 1,2 | 58 | 2 |
| 113 | 0,0544 | 44 | 0,00116 | 7 | 1,46665 | 1,8869 | 8 | 0,2826 | 16 | 0,282598905 | -5,29414 | 0,93386 | 1,1 | 1,3 | 1,1 | 58 | 2 |
| 114 | 0,0763 | 61 | 0,00158 | 10 | 1,46665 | 1,88677 | 9 | 0,282575 | 14 | 0,282573626 | -6,18819 | 1,02757 | 1,1 | 1,4 | 1,1 | 58 | 2 |
| 115 | 0,0712 | 57 | 0,00143 | 9 | 1,46664 | 1,88677 | 10 | 0,282586 | 18 | 0,282583984 | -5,82185 | 1,00353 | 1,1 | 1,4 | 1,1 | 58 | 2 |
| 116 | 0,06 | 48 | 0,00121 | 7 | 1,46654 | 1,88692 | 9 | 0,282583 | 20 | 0,282581411 | -5,91285 | 0,95525 | 1,1 | 1,4 | 1,1 | 58 | 2 |

**Table 4: U-Pb analytical data of the nepheline syenite. The (\*) indicates spots used in the Concordia.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **spot** | **176Yb/177Hf** | **±2s a** | **176Lu/177Hf** | **±2s b** | **178Hf/177Hf** | **180Hf/177Hf** | **SigHf** | **176Hf/177Hf** | **±2s c** | **176Hf/177Hf(t)** | **eHf(t)** | **±2s d** | **Avg MORB** | **TDM2 f** | **TDM2 g** | **age** | **±2s e** |
| 146 | 0,1384 | 119 | 0,00339 | 22 | 1,46662 | 1,88683 | 7 | 0,282365 | 18 | 0,282360449 | -13,5502 | 1,44319 | 1,5 | 1,8 | 1,5 | 65 | 0 |
| 147 | 0,1854 | 149 | 0,00443 | 27 | 1,46666 | 1,88686 | 8 | 0,282272 | 18 | 0,282266193 | -16,90598 | 1,70235 | 1,7 | 2 | 1,7 | 65 | 0 |
| 148 | 0,0513 | 41 | 0,00126 | 8 | 1,46667 | 1,88693 | 7 | 0,28256 | 19 | 0,282558141 | -6,55827 | 0,92171 | 1,2 | 1,4 | 1,1 | 65 | 0 |
| 149 | 0,0538 | 51 | 0,00134 | 10 | 1,46665 | 1,88668 | 7 | 0,282578 | 22 | 0,282575894 | -5,9526 | 0,97174 | 1,1 | 1,4 | 1,1 | 65 | 0 |
| 150 | 0,1753 | 141 | 0,00422 | 25 | 1,46664 | 1,88663 | 8 | 0,282294 | 16 | 0,282289077 | -16,03009 | 1,62916 | 1,7 | 1,9 | 1,7 | 65 | 0 |
| 151 | 0,1356 | 113 | 0,00323 | 20 | 1,4666 | 1,88679 | 8 | 0,282367 | 17 | 0,282362827 | -13,46609 | 1,40026 | 1,5 | 1,8 | 1,5 | 65 | 0 |
| 152 | 0,1419 | 115 | 0,00356 | 22 | 1,46657 | 1,88662 | 7 | 0,282337 | 17 | 0,282332192 | -14,54958 | 1,40989 | 1,6 | 1,8 | 1,6 | 65 | 0 |
| 153 | 0,3176 | 255 | 0,00716 | 43 | 1,46666 | 1,88666 | 8 | 0,281848 | 12 | 0,28183932 | -31,98133 | 2,6697 | 2,5 | 2,8 | 2,5 | 65 | 0 |
| 154 | 0,0732 | 59 | 0,00188 | 12 | 1,46673 | 1,8867 | 8 | 0,282515 | 18 | 0,282513083 | -8,15186 | 1,01585 | 1,2 | 1,5 | 1,2 | 65 | 0 |
| 155 | 0,1181 | 99 | 0,00294 | 19 | 1,46667 | 1,88675 | 7 | 0,282423 | 18 | 0,282419214 | -11,47181 | 1,28749 | 1,4 | 1,7 | 1,4 | 65 | 0 |
| 156 | 0,1048 | 89 | 0,00259 | 17 | 1,46674 | 1,88677 | 8 | 0,282452 | 11 | 0,282448419 | -10,41669 | 1,21291 | 1,4 | 1,6 | 1,4 | 65 | 0 |
| 157 | 0,057 | 47 | 0,00142 | 9 | 1,4667 | 1,88664 | 9 | 0,282565 | 13 | 0,282563368 | -6,39562 | 0,94861 | 1,1 | 1,4 | 1,1 | 65 | 0 |
| 158 | 0,0625 | 52 | 0,00173 | 11 | 1,46666 | 1,88676 | 7 | 0,282567 | 13 | 0,282564432 | -6,35798 | 0,97586 | 1,1 | 1,4 | 1,1 | 65 | 0 |
| 159 | 0,1093 | 89 | 0,00264 | 16 | 1,4667 | 1,8868 | 7 | 0,282463 | 26 | 0,282460057 | -10,00508 | 1,21242 | 1,3 | 1,6 | 1,3 | 65 | 0 |
| 160 | 0,0883 | 99 | 0,00208 | 20 | 1,46672 | 1,88677 | 7 | 0,282496 | 14 | 0,28249395 | -8,85074 | 1,2862 | 1,3 | 1,5 | 1,3 | 65 | 0 |
| 161 | 0,0803 | 76 | 0,0021 | 14 | 1,46665 | 1,88667 | 6 | 0,282553 | 15 | 0,282550548 | -6,87123 | 1,1185 | 1,2 | 1,4 | 1,2 | 65 | 0 |
| 162 | 0,0623 | 50 | 0,00159 | 10 | 1,4667 | 1,88683 | 6 | 0,282539 | 18 | 0,282537331 | -7,31647 | 0,96484 | 1,2 | 1,4 | 1,2 | 65 | 0 |
| 163 | 0,102 | 87 | 0,00243 | 16 | 1,46667 | 1,8867 | 7 | 0,282442 | 16 | 0,282438908 | -10,77526 | 1,19688 | 1,4 | 1,6 | 1,4 | 65 | 0 |
| 164 | 0,0346 | 31 | 0,00085 | 6 | 1,46662 | 1,88663 | 7 | 0,282602 | 21 | 0,282601095 | -5,06129 | 0,87999 | 1,1 | 1,3 | 1,1 | 65 | 0 |
| 165 | 0,0634 | 51 | 0,00156 | 9 | 1,46675 | 1,88674 | 7 | 0,282515 | 17 | 0,282513438 | -8,1615 | 0,96917 | 1,2 | 1,5 | 1,2 | 65 | 0 |