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| Table S1. EPMA analyses of monazite from the basement granite with their apparent U-Th-Pbtotal ages. |
| **Anal. no.** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** | **12** | **13** | **14** | **15** | **16** |
| P2O5 | 25.71 | 27.50 | 22.18 | 27.93 | 27.78 | 29.39 | 32.65 | 32.56 | 26.55 | 27.51 | 26.64 | 29.18 | 29.08 | 24.97 | 29.69 | 29.73 |
| UO2 | 0.65 | 0.53 | 0.45 | 0.28 | 0.32 | 0.02 | 1.55 | 1.98 | 0.38 | 0.36 | 0.16 | 0.02 | 0.08 | 0.27 | 0.00 | 0.00 |
| ThO2 | 14.04 | 12.39 | 8.57 | 9.69 | 12.43 | 3.27 | 1.16 | 1.65 | 12.35 | 11.61 | 11.74 | 5.48 | 6.23 | 7.95 | 1.13 | 2.81 |
| SiO2 | 3.30 | 2.15 | 6.41 | 1.10 | 1.63 | 0.80 | 0.92 | 0.95 | 2.43 | 2.58 | 2.59 | 0.82 | 1.07 | 4.12 | 0.39 | 0.48 |
| TiO2 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.00 | 0.00 | 0.01 | 0.00 | 0.02 | 0.01 | 0.02 | 0.07 | 0.00 | 0.00 |
| Al2O3 | 0.03 | 0.03 | 0.09 | 0.11 | 0.05 | 0.01 | 0.00 | 0.00 | 0.05 | 0.02 | 0.08 | 0.01 | 0.02 | 0.22 | 0.01 | 0.00 |
| La2O3 | 13.40 | 12.22 | 10.45 | 11.75 | 11.42 | 13.22 | 0.00 | 0.00 | 14.40 | 13.33 | 14.57 | 15.86 | 15.44 | 14.20 | 17.74 | 17.27 |
| Ce2O3 | 24.72 | 23.98 | 20.89 | 25.70 | 24.64 | 29.60 | 0.03 | 0.05 | 25.81 | 25.30 | 27.82 | 30.03 | 29.49 | 27.58 | 30.40 | 31.53 |
| Pr2O3 | 2.30 | 2.40 | 1.82 | 2.70 | 2.64 | 3.26 | 0.00 | 0.00 | 2.36 | 2.43 | 2.74 | 2.94 | 2.86 | 2.69 | 3.28 | 3.23 |
| Nd2O3 | 7.72 | 8.13 | 6.09 | 9.77 | 9.71 | 12.17 | 0.35 | 0.37 | 8.01 | 8.50 | 9.55 | 10.24 | 9.98 | 9.83 | 12.53 | 11.53 |
| SmO | 1.10 | 1.46 | 1.06 | 2.08 | 1.72 | 3.38 | 0.47 | 0.46 | 1.14 | 1.40 | 1.45 | 1.57 | 1.58 | 1.81 | 1.79 | 1.64 |
| EuO | 0.00 | 0.00 | 0.00 | 0.09 | 0.07 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.02 | 0.02 | 0.02 | 0.14 | 0.07 |
| Gd2O3 | 0.65 | 1.05 | 0.43 | 1.09 | 1.07 | 1.89 | 3.15 | 3.16 | 0.74 | 0.93 | 0.76 | 0.83 | 0.86 | 1.11 | 0.98 | 0.85 |
| Dy2O3 | 0.25 | 0.46 | 0.22 | 0.24 | 0.29 | 0.28 | 4.49 | 4.45 | 0.28 | 0.43 | 0.16 | 0.14 | 0.20 | 0.16 | 0.05 | 0.08 |
| Ho2O3 | 0.21 | 0.22 | 0.12 | 0.16 | 0.17 | 0.16 | 1.17 | 1.18 | 0.18 | 0.18 | 0.15 | 0.16 | 0.17 | 0.15 | 0.00 | 0.00 |
| Er2O3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 3.85 | 3.80 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Yb2O3 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 4.07 | 4.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Y2O3 | 0.69 | 1.65 | 1.15 | 0.55 | 0.71 | 0.19 | 42.49 | 41.30 | 0.94 | 1.57 | 0.13 | 0.06 | 0.52 | 0.12 | 0.00 | 0.00 |
| FeO | 0.00 | 0.00 | 0.00 | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| CaO | 1.15 | 1.87 | 14.30 | 2.01 | 3.46 | 0.30 | 0.06 | 0.24 | 1.21 | 1.10 | 0.72 | 0.56 | 0.66 | 0.57 | 0.14 | 0.30 |
| PbO | 1.88 | 1.60 | 0.85 | 0.98 | 1.16 | 0.25 | 0.35 | 0.29 | 1.52 | 1.48 | 0.14 | 0.33 | 0.25 | 0.09 | 0.06 | 0.09 |
| SO2 | 0.01 | 0.00 | 0.03 | 0.11 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 | 0.02 | 0.02 | 0.05 | 0.00 | 0.00 |
| Total | 97.82 | 97.66 | 95.12 | 97.66 | 99.28 | 98.39 | 96.77 | 96.51 | 98.37 | 98.72 | 99.48 | 98.25 | 98.52 | 95.98 | 98.33 | 99.61 |
| Age (Ma) | 2522 | 2459 | 1884 | 2061 | 1926 | 1678 | 1243 | 804 | 2453 | 2534 | 265 | 1371 | 898 | 243 | 1203 | 779 |
| 2σ Error | 79 | 82 | 77 | 85 | 72 | 167 | 52 | 34 | 83 | 87 | 40 | 104 | 85 | 49 | 245 | 99 |
| % Error | 3 | 3 | 4 | 4 | 4 | 10 | 4 | 4 | 3 | 3 | 15 | 8 | 9 | 20 | 20 | 13 |
| **Anal. no.** | **17** | **18** | **19** | **20** | **21** | **22** | **23** | **24** | **25** | **26** | **27** | **28** | **29** | **30** | **31** |  |
| P2O5 | 28.82 | 29.65 | 26.22 | 26.69 | 29.29 | 27.57 | 29.33 | 29.85 | 29.81 | 27.59 | 27.86 | 28.04 | 28.38 | 25.91 | 29.01 |  |
| UO2 | 0.02 | 0.05 | 0.37 | 0.31 | 0.67 | 0.30 | 0.19 | 0.02 | 0.04 | 0.45 | 0.46 | 0.36 | 0.41 | 0.67 | 0.83 |  |
| ThO2 | 1.43 | 2.15 | 11.88 | 12.02 | 9.65 | 10.74 | 9.26 | 3.48 | 2.01 | 11.25 | 13.29 | 11.40 | 12.23 | 13.67 | 12.61 |  |
| SiO2 | 0.53 | 0.65 | 2.76 | 2.53 | 0.98 | 2.24 | 0.82 | 0.64 | 0.52 | 1.78 | 1.83 | 1.57 | 1.52 | 4.48 | 1.08 |  |
| TiO2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |  |
| Al2O3 | 0.01 | 0.00 | 0.03 | 0.02 | 0.02 | 0.16 | 0.02 | 0.01 | 0.02 | 0.03 | 0.03 | 0.04 | 0.02 | 0.03 | 0.02 |  |
| La2O3 | 17.68 | 16.75 | 12.79 | 13.40 | 15.17 | 12.48 | 12.57 | 14.26 | 16.91 | 13.17 | 11.54 | 13.62 | 12.79 | 10.86 | 9.91 |  |
| Ce2O3 | 30.79 | 31.59 | 25.55 | 25.56 | 26.59 | 24.57 | 26.97 | 29.80 | 31.66 | 25.97 | 23.63 | 25.51 | 24.59 | 23.71 | 21.12 |  |
| Pr2O3 | 3.14 | 3.18 | 2.87 | 2.64 | 2.49 | 2.58 | 2.95 | 3.32 | 3.13 | 2.66 | 2.55 | 2.53 | 2.56 | 2.42 | 2.44 |  |
| Nd2O3 | 11.83 | 11.33 | 10.62 | 9.02 | 8.54 | 9.32 | 10.80 | 12.31 | 11.09 | 9.16 | 9.01 | 8.63 | 8.47 | 8.76 | 8.74 |  |
| SmO | 1.63 | 1.70 | 1.87 | 1.35 | 0.90 | 1.59 | 1.55 | 2.95 | 1.51 | 1.37 | 1.69 | 1.32 | 1.30 | 1.58 | 2.10 |  |
| EuO | 0.08 | 0.08 | 0.12 | 0.04 | 0.00 | 0.07 | 0.07 | 0.21 | 0.05 | 0.00 | 0.09 | 0.01 | 0.02 | 0.06 | 0.14 |  |
| Gd2O3 | 0.83 | 0.95 | 1.35 | 0.96 | 0.52 | 1.22 | 0.96 | 1.74 | 0.84 | 0.92 | 1.46 | 0.92 | 1.10 | 1.18 | 1.78 |  |
| Dy2O3 | 0.06 | 0.14 | 0.27 | 0.35 | 0.18 | 0.40 | 0.15 | 0.20 | 0.09 | 0.26 | 0.54 | 0.37 | 0.48 | 0.45 | 0.98 |  |
| Ho2O3 | 0.00 | 0.00 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.02 | 0.00 | 0.03 |  |
| Er2O3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |  |
| Yb2O3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |  |
| Y2O3 | 0.00 | 0.16 | 0.89 | 1.53 | 1.05 | 1.52 | 0.25 | 0.03 | 0.00 | 1.22 | 2.28 | 1.67 | 2.30 | 1.64 | 4.12 |  |
| FeO | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |  |
| CaO | 0.15 | 0.16 | 0.64 | 0.91 | 1.81 | 2.02 | 1.77 | 0.41 | 0.23 | 1.43 | 1.78 | 1.59 | 1.80 | 1.49 | 2.68 |  |
| PbO | 0.07 | 0.31 | 1.49 | 1.50 | 1.42 | 1.31 | 1.11 | 0.18 | 0.08 | 1.48 | 1.70 | 1.45 | 1.58 | 1.81 | 1.77 |  |
| SO2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |  |
| Total | 97.07 | 98.84 | 99.74 | 98.84 | 99.28 | 98.09 | 98.75 | 99.41 | 98.00 | 98.76 | 99.71 | 99.01 | 99.55 | 98.72 | 99.35 |  |
| Age (Ma) | 1143 | 2958 | 2496 | 2528 | 2560 | 2463 | 2477 | 1203 | 857 | 2526 | 2512 | 2526 | 2539 | 2479 | 2481 |  |
| 2σ Error | 219 | 242 | 69 | 69 | 72 | 71 | 77 | 98 | 149 | 70 | 66 | 71 | 69 | 63 | 63 |  |
| % Error  | 19 | 8 | 3 | 3 | 3 | 3 | 3 | 8 | 17 | 3 | 3 | 3 | 3 | 3 | 3 |  |