|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Supplementary Table 2a. U−Pb isotope data of Banavara detrital zircons measured at Muenster. | | | | | | | | | | |  |  |  |  |
| Analysis  name | U conc.  (ppm) | Measured ratios | | | | | | rho | Ages (Ma) | | | | | | Concor.  (%) |
| 206Pb/238U | ±2σ | 207Pb/235U | ±2σ | 207Pb/206Pb | ±2σ | 206Pb/238U | ±2σ | 207Pb/235U | ±2σ | 207Pb/206Pb | ±2σ |
| Degree of concordance >90% | | | | | | | | | | | | | | | |
| Ban-1 | 329 | 0.5850 | 0.0187 | 17.3468 | 0.6257 | 0.2151 | 0.0036 | 0.88 | 2969 | 76 | 2954 | 35 | 2944 | 27 | 101 |
| Ban-5 | 402 | 0.5729 | 0.0123 | 17.2966 | 0.4825 | 0.2190 | 0.0039 | 0.77 | 2920 | 50 | 2951 | 27 | 2973 | 29 | 98 |
| Ban-6 | 145 | 0.6206 | 0.0163 | 20.2683 | 0.6576 | 0.2369 | 0.0045 | 0.81 | 3112 | 65 | 3104 | 31 | 3099 | 31 | 100 |
| Ban-11 | 261 | 0.5911 | 0.0215 | 17.8168 | 0.7037 | 0.2186 | 0.0033 | 0.92 | 2994 | 87 | 2980 | 38 | 2970 | 25 | 101 |
| Ban-12 | 230 | 0.5801 | 0.0212 | 17.5600 | 0.7985 | 0.2195 | 0.0059 | 0.80 | 2949 | 87 | 2966 | 44 | 2977 | 44 | 99 |
| Ban-15-1 | 314 | 0.5933 | 0.0204 | 17.8411 | 0.6792 | 0.2181 | 0.0035 | 0.90 | 3003 | 83 | 2981 | 37 | 2967 | 26 | 101 |
| Ban-17 | 272 | 0.6134 | 0.0245 | 19.7630 | 0.8925 | 0.2337 | 0.0049 | 0.88 | 3083 | 98 | 3080 | 44 | 3078 | 34 | 100 |
| Ban-18 | 243 | 0.5870 | 0.0228 | 17.4125 | 0.7217 | 0.2151 | 0.0031 | 0.94 | 2977 | 93 | 2958 | 40 | 2945 | 23 | 101 |
| Ban-21 | 401 | 0.5660 | 0.0320 | 18.1634 | 1.0611 | 0.2327 | 0.0035 | 0.97 | 2891 | 132 | 2998 | 56 | 3071 | 24 | 94 |
| Ban-22 | 217 | 0.5329 | 0.0341 | 16.1322 | 1.0517 | 0.2196 | 0.0027 | 0.98 | 2754 | 143 | 2885 | 62 | 2978 | 20 | 92 |
| Ban-25 | 268 | 0.5951 | 0.0274 | 17.6967 | 0.8579 | 0.2157 | 0.0033 | 0.95 | 3010 | 111 | 2973 | 47 | 2949 | 24 | 102 |
| Ban-26 | 190 | 0.5950 | 0.0244 | 19.6859 | 0.8493 | 0.2400 | 0.0032 | 0.95 | 3010 | 99 | 3076 | 42 | 3120 | 21 | 96 |
| Ban-29 | 126 | 0.6221 | 0.0192 | 21.0291 | 0.6950 | 0.2452 | 0.0029 | 0.93 | 3118 | 76 | 3140 | 32 | 3154 | 19 | 99 |
| Ban-31 | 225 | 0.5802 | 0.0177 | 16.7889 | 0.6823 | 0.2099 | 0.0057 | 0.75 | 2949 | 72 | 2923 | 39 | 2905 | 44 | 102 |
| Ban-33 | 232 | 0.6060 | 0.0195 | 18.9146 | 0.6973 | 0.2264 | 0.0041 | 0.87 | 3054 | 78 | 3037 | 36 | 3027 | 29 | 101 |
| Ban-34 | 221 | 0.6098 | 0.0196 | 19.8168 | 0.6731 | 0.2357 | 0.0026 | 0.94 | 3069 | 78 | 3082 | 33 | 3091 | 18 | 99 |
| Ban-36 | 452 | 0.5797 | 0.0169 | 18.4830 | 0.6378 | 0.2312 | 0.0043 | 0.84 | 2947 | 69 | 3015 | 33 | 3061 | 30 | 96 |
| Ban-38 | 132 | 0.6099 | 0.0134 | 18.8082 | 0.5860 | 0.2237 | 0.0049 | 0.71 | 3069 | 54 | 3032 | 30 | 3007 | 35 | 102 |
| Ban-39 | 295 | 0.5861 | 0.0211 | 17.4216 | 0.7017 | 0.2156 | 0.0039 | 0.89 | 2974 | 86 | 2958 | 39 | 2948 | 29 | 101 |
| Ban-41 | 193 | 0.5724 | 0.0159 | 17.4231 | 0.5642 | 0.2208 | 0.0037 | 0.86 | 2918 | 65 | 2958 | 31 | 2986 | 27 | 98 |
| Ban-43 | 199 | 0.6152 | 0.0221 | 19.6328 | 0.8339 | 0.2314 | 0.0052 | 0.85 | 3091 | 88 | 3073 | 41 | 3062 | 36 | 101 |
| Degree of concordance <90% | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ban-2 | 425 | 0.3658 | 0.0079 | 10.8302 | 0.3169 | 0.2147 | 0.0042 | 0.74 | 2010 | 37 | 2509 | 27 | 2942 | 32 | 68 |
| Ban-3 | 274 | 0.5028 | 0.0197 | 16.5812 | 0.7157 | 0.2392 | 0.0043 | 0.91 | 2626 | 85 | 2911 | 41 | 3115 | 29 | 84 |
| Ban-4 | 365 | 0.1819 | 0.0115 | 5.2766 | 0.3612 | 0.2104 | 0.0055 | 0.93 | 1077 | 63 | 1865 | 59 | 2909 | 42 | 37 |
| Ban-7 | 174 | 0.3517 | 0.0242 | 10.5439 | 0.7495 | 0.2175 | 0.0040 | 0.97 | 1942 | 115 | 2484 | 66 | 2962 | 29 | 66 |
| Ban-8 | 250 | 0.3612 | 0.0099 | 10.8493 | 0.3595 | 0.2179 | 0.0041 | 0.83 | 1988 | 47 | 2510 | 31 | 2965 | 30 | 67 |
| Ban-9 | 239 | 0.3905 | 0.0176 | 12.1173 | 0.5902 | 0.2251 | 0.0042 | 0.92 | 2125 | 81 | 2614 | 46 | 3017 | 30 | 70 |
| Ban-10 | 855 | 0.0425 | 0.0037 | 1.3236 | 0.1228 | 0.2258 | 0.0068 | 0.95 | 268 | 23 | 856 | 54 | 3023 | 48 | 9 |
| Ban-13 | 369 | 0.2153 | 0.0153 | 6.4553 | 0.4737 | 0.2175 | 0.0041 | 0.97 | 1257 | 81 | 2040 | 65 | 2962 | 30 | 42 |
| Ban-14 | 428 | 0.2471 | 0.0236 | 7.0510 | 0.6881 | 0.2069 | 0.0041 | 0.98 | 1424 | 122 | 2118 | 87 | 2882 | 32 | 49 |
| Ban-15-2 | 496 | 0.3250 | 0.0138 | 10.4669 | 0.4793 | 0.2336 | 0.0041 | 0.92 | 1814 | 67 | 2477 | 42 | 3077 | 28 | 59 |
| Ban-19 | 757 | 0.2713 | 0.0143 | 8.0561 | 0.4369 | 0.2154 | 0.0029 | 0.97 | 1547 | 72 | 2237 | 49 | 2946 | 22 | 53 |
| Ban-20 | 311 | 0.5008 | 0.0186 | 17.1499 | 0.6805 | 0.2484 | 0.0034 | 0.94 | 2617 | 80 | 2943 | 38 | 3175 | 22 | 82 |
| Ban-23 | 594 | 0.3110 | 0.0215 | 9.6503 | 0.6830 | 0.2251 | 0.0036 | 0.97 | 1745 | 105 | 2402 | 65 | 3017 | 25 | 58 |
| Ban-24 | 412 | 0.4863 | 0.0223 | 16.4039 | 0.8082 | 0.2447 | 0.0043 | 0.93 | 2555 | 97 | 2901 | 47 | 3151 | 28 | 81 |
| Ban-27 | 381 | 0.3753 | 0.0150 | 11.2456 | 0.4780 | 0.2173 | 0.0031 | 0.94 | 2054 | 70 | 2544 | 40 | 2961 | 23 | 69 |
| Ban-28 | 266 | 0.4514 | 0.0140 | 13.3281 | 0.4366 | 0.2141 | 0.0023 | 0.94 | 2402 | 62 | 2703 | 31 | 2937 | 18 | 82 |
| Ban-30 | 235 | 0.3177 | 0.0588 | 9.1820 | 1.7062 | 0.2096 | 0.0036 | 1.00 | 1778 | 288 | 2356 | 172 | 2903 | 28 | 61 |
| Ban-32 | 699 | 0.2527 | 0.0095 | 7.3070 | 0.2854 | 0.2097 | 0.0023 | 0.96 | 1452 | 49 | 2150 | 35 | 2904 | 18 | 50 |
| Ban-35 | 317 | 0.4877 | 0.0139 | 15.5145 | 0.5344 | 0.2307 | 0.0045 | 0.83 | 2561 | 60 | 2847 | 33 | 3057 | 31 | 84 |
| Ban-37 | 126 | 0.4075 | 0.0103 | 12.2351 | 0.3364 | 0.2178 | 0.0023 | 0.92 | 2203 | 47 | 2623 | 26 | 2964 | 17 | 74 |
| Ban-42 | 172 | 0.4195 | 0.0105 | 12.8126 | 0.4219 | 0.2215 | 0.0047 | 0.76 | 2258 | 48 | 2666 | 31 | 2992 | 34 | 75 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Supplementary Table 2b. U−Pb isotopic data of Banavara zircon measured at Macquarie University. | | | | | | | | | | | | |  |  |  |  |
|  |  | U ppm | Th/U | Measured ratios | | | | | | Rho | Age (Ma) | | | | | | Concor % |
| Analysis | Th ppm | 206Pb/238U | 1s | 207Pb/235U | 1s | 207Pb/206Pb | 1s | 206Pb/238U | 1 s | 207Pb/235U | 1 s | 207Pb/206Pb | 1 s |
| Concordance >90% | | | | | | | | | | | | | | | | | |
| R9G2 | 7 | 582 | 0.0114 | 0.5907 | 0.0044 | 17.8642 | 0.2295 | 0.2194 | 0.0028 | 0.58 | 2992 | 18 | 2982 | 12 | 2977 | 20 | 101 |
| R2G5 | 0 | 25 | 0.0003 | 0.4857 | 0.0036 | 11.6575 | 0.1251 | 0.1741 | 0.0019 | 0.69 | 2552 | 16 | 2577 | 10 | 2597 | 18 | 98 |
| R3G2 | 0 | 11 | 0.0000 | 0.4837 | 0.0058 | 11.5443 | 0.2198 | 0.1731 | 0.0035 | 0.63 | 2543 | 25 | 2568 | 18 | 2588 | 33 | 98 |
| R3G3 | 0 | 11 | 0.0002 | 0.4932 | 0.0058 | 12.0425 | 0.2260 | 0.1771 | 0.0035 | 0.63 | 2585 | 25 | 2608 | 18 | 2626 | 33 | 98 |
| R3G4 | 0 | 26 | 0.0000 | 0.4803 | 0.0045 | 11.1893 | 0.1766 | 0.1690 | 0.0028 | 0.60 | 2529 | 20 | 2539 | 15 | 2548 | 27 | 99 |
| R5G6 | 0 | 12 | 0.0135 | 0.4864 | 0.0056 | 11.1513 | 0.2112 | 0.1663 | 0.0033 | 0.61 | 2555 | 24 | 2536 | 18 | 2521 | 33 | 101 |
| Concordance <90% | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| R7G6 | 266 | 236 | 1.1285 | 0.5251 | 0.0039 | 18.1719 | 0.2399 | 0.2511 | 0.0034 | 0.56 | 2721 | 16 | 2999 | 13 | 3192 | 21 | 85 |
| R7G7 | 438 | 1200 | 0.3652 | 0.1853 | 0.0014 | 5.4775 | 0.0681 | 0.2145 | 0.0026 | 0.59 | 1096 | 7 | 1897 | 11 | 2940 | 20 | 37 |
| R4G3 | 86 | 136 | 0.6302 | 0.5102 | 0.0034 | 17.8018 | 0.1761 | 0.2531 | 0.0025 | 0.67 | 2657 | 14 | 2979 | 10 | 3205 | 15 | 83 |
| R5G2 | 252 | 218 | 1.1527 | 0.4828 | 0.0038 | 15.9736 | 0.2170 | 0.2401 | 0.0033 | 0.57 | 2539 | 16 | 2875 | 13 | 3120 | 22 | 81 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Supplementary Table 3. LA-MC-ICPMS Lu-Hf isotope data of detrital zircon for the Banavara samples. | | | | | | | | | | |
| Analysis No. | 176Hf/177Hf | 1  | 176Lu/177Hf | 176Yb/177Hf | Age(Ma) | 176Lu/177Hf | Hf | 1 | TDM(Ga) | TDMc (Ga) |
| R2G2-T | 0.281001 | 0.000025 | 0.002932 | 0.101903 | 2973 | 0.281 | 4.6 | 0.9 | 3.3 | 3.1 |
| R2G4 | 0.281055 | 0.00002 | 0.002262 | 0.086278 | 2967 | 0.281054 | 6.4 | 0.7 | 3.16 | 2.99 |
| R2G9\* | 0.281078 | 0.000015 | 0.002509 | 0.106597 | 3007 | 0.281077 | 8.2 | 0.5 | 3.15 | 2.92 |
| R3G8 | 0.28099 | 0.000023 | 0.002694 | 0.099874 | 3027 | 0.280989 | 5.5 | 0.8 | 3.29 | 3.09 |
| R3G10 | 0.280913 | 0.000011 | 0.002346 | 0.110266 | 3062 | 0.280912 | 3.6 | 0.4 | 3.37 | 3.23 |
| R4G4 | 0.280969 | 0.000014 | 0.001942 | 0.099699 | 3078 | 0.280968 | 6 | 0.5 | 3.25 | 3.11 |
| R4G7\* | 0.280995 | 0.000016 | 0.002534 | 0.083451 | 3154 | 0.280994 | 8.7 | 0.6 | 3.27 | 3.01 |
| R4G9 | 0.28091 | 0.000012 | 0.000691 | 0.030076 | 2948 | 0.280909 | 0.8 | 0.4 | 3.23 | 3.31 |
| R4G10 | 0.281032 | 0.000012 | 0.002222 | 0.09901 | 2948 | 0.281031 | 5.2 | 0.4 | 3.19 | 3.05 |
| R6G4 | 0.281037 | 0.000012 | 0.001469 | 0.064505 | 2945 | 0.281036 | 5.3 | 0.4 | 3.12 | 3.04 |
| R8G1\* | 0.281084 | 9.50E-06 | 0.002041 | 0.089304 | 2973 | 0.281083 | 7.6 | 0.3 | 3.1 | 2.93 |
| R8G6\* | 0.280965 | 0.000012 | 0.00187 | 0.093347 | 3120 | 0.280964 | 6.9 | 0.4 | 3.25 | 3.09 |
| R8G9\* | 0.281092 | 0.000013 | 0.002295 | 0.106728 | 2986 | 0.281091 | 8.2 | 0.5 | 3.11 | 2.9 |
| R9G1 | 0.280966 | 0.000022 | 0.001271 | 0.042666 | 3099 | 0.280965 | 6.4 | 0.8 | 3.2 | 3.1 |
| R9G7 | 0.28099 | 0.000019 | 0.001686 | 0.06713 | 2905 | 0.280989 | 2.7 | 0.7 | 3.2 | 3.12 |
| R9G7-2 | 0.281022 | 0.000011 | 0.001914 | 0.074674 | 2905 | 0.281021 | 3.8 | 0.4 | 3.18 | 3.1 |
| R9G7-3 | 0.28105 | 0.000041 | 0.002985 | 0.094636 | 2905 | 0.281048 | 4.7 | 1.5 | 3.23 | 3.04 |
| R8G3\* | 0.281081 | 0.000016 | 0.003315 | 0.122955 | 2977 | 0.28108 | 7.6 | 0.6 | 3.22 | 2.93 |

\* Data not considered

Supplementary Table 4. Major oxide and trace element composition of the studied Banavara detrital Cr-spinel.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **29** | **31** | **32** | **34** | **35** | **37** | **38** | **40** | **42** | **44** | **46** | **48** | **52** | **54** | **56** |
| **Na2O** | 0.00 | 0.16 | 0.16 | 0.00 | 0.02 | 0.00 | 0.24 | 0.08 | 0.06 | 0.00 | 0.31 | 0.00 | 0.14 | 0.07 | 0.08 |
| **SiO2** | 0.02 | 0.08 | 0.00 | 0.03 | 0.03 | 0.00 | 0.01 | 0.02 | 0.00 | 0.00 | 0.11 | 0.00 | 0.02 | 0.00 | 0.00 |
| **K2O** | 0.03 | 0.01 | 0.01 | 0.03 | 0.00 | 0.02 | 0.00 | 0.01 | 0.03 | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.00 |
| **MnO** | 0.88 | 0.86 | 0.99 | 0.89 | 0.88 | 0.88 | 0.95 | 0.87 | 0.85 | 0.94 | 0.90 | 0.94 | 0.94 | 0.88 | 0.92 |
| **CoO** | 0.08 | 0.07 | 0.05 | 0.02 | 0.04 | 0.07 | 0.05 | 0.07 | 0.04 | 0.06 | 0.08 | 0.09 | 0.06 | 0.04 | 0.04 |
| **MgO** | 0.69 | 0.77 | 0.91 | 0.81 | 0.73 | 0.66 | 0.78 | 0.53 | 0.69 | 0.77 | 0.62 | 0.75 | 0.71 | 0.68 | 0.91 |
| **TiO2** | 0.08 | 0.65 | 0.48 | 0.51 | 0.07 | 0.11 | 0.09 | 3.37 | 0.46 | 0.09 | 0.12 | 0.06 | 0.11 | 0.11 | 0.04 |
| **CaO** | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.00 | 0.00 | 0.01 | 0.00 | 0.00 | 0.03 | 0.01 | 0.02 | 0.00 |
| **FeO** | 38.24 | 37.35 | 37.74 | 37.67 | 38.41 | 38.61 | 37.74 | 36.87 | 38.14 | 37.40 | 38.55 | 37.64 | 37.49 | 37.51 | 36.77 |
| **NiO** | 0.04 | 0.04 | 0.06 | 0.04 | 0.04 | 0.04 | 0.03 | 0.03 | 0.04 | 0.01 | 0.06 | 0.05 | 0.05 | 0.05 | 0.06 |
| **Al2O3** | 21.58 | 24.29 | 25.74 | 23.29 | 21.98 | 21.89 | 21.69 | 20.26 | 22.32 | 20.01 | 20.32 | 21.53 | 21.35 | 21.10 | 23.02 |
| **V2O3** | 0.16 | 0.16 | 0.14 | 0.21 | 0.19 | 0.20 | 0.21 | 0.19 | 0.22 | 0.12 | 0.10 | 0.17 | 0.23 | 0.19 | 0.25 |
| **Cr2O3** | 35.11 | 32.19 | 30.79 | 33.58 | 35.02 | 34.95 | 35.58 | 35.10 | 33.67 | 37.61 | 34.52 | 34.90 | 34.97 | 35.66 | 33.73 |
| **ZnO** | 3.36 | 3.79 | 3.99 | 3.61 | 3.44 | 3.36 | 3.39 | 3.14 | 3.48 | 3.22 | 3.07 | 3.26 | 3.31 | 3.33 | 3.50 |
| **Total** | **100.30** | **100.42** | **101.05** | **100.69** | **100.84** | **100.80** | **100.75** | **100.55** | **100.00** | **100.24** | **98.74** | **99.41** | **99.40** | **99.63** | **99.32** |
| Elements (in ppm) | | | | | | | | | | | | | | | |
| **Sc** | 0.19 | 0.34 | 0.39 | 0.40 | 0.42 | 0.32 | 0.28 | 0.23 | 0.21 | 0.25 | 0.28 | 0.52 | 0.24 | 0.26 | 0.40 |
| **Ti** | 1319 | 1097 | 2080 | 6123 | 1636 | 1581 | 1572 | 1397 | 1643 | 1523 | 1121 | 1852 | 1692 | 1565 | 2678 |
| **V** | 1132 | 1088 | 1259 | 1316 | 1150 | 1096 | 1079 | 1070 | 1190 | 1057 | 1057 | 1128 | 1074 | 1086 | 1099 |
| **Mn** | 6964 | 6583 | 7430 | 7649 | 7276 | 6931 | 6745 | 6640 | 6469 | 5891 | 6067 | 6393 | 6591 | 6406 | 6803 |
| **Co** | 384 | 351 | 403 | 422 | 387 | 370 | 362 | 362 | 349 | 313 | 313 | 342 | 352 | 344 | 354 |
| **Ni** | 235 | 211 | 256 | 265 | 233 | 227 | 221 | 219 | 213 | 194 | 203 | 220 | 213 | 204 | 230 |
| **Cu** | 0.30 | 0.33 | 0.13 | 0.70 | 0.00 | 0.12 | 0.12 | 0.12 | 0.17 | 0.00 | 0.00 | 0.90 | 0.00 | 0.00 | 0.27 |
| **Zn** | 36653 | 31570 | 36003 | 38164 | 33279 | 31296 | 31567 | 30988 | 32625 | 29153 | 28961 | 31920 | 31733 | 30615 | 31763 |
| **Ga** | 259 | 222 | 272 | 288 | 248 | 239 | 231 | 229 | 231 | 202 | 201 | 227 | 228 | 217 | 245 |