Supplementary table 4a In situ zircon oxygen isotope compositions analyzed at the CMCA from the granitoids from Qiyugou gold deposit

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Analysis name | RAW DATA from CIPS | | Drift corrected | | SIMS corrected ratios | | δ18Ozircon | 2s abs | δ18OWR | 2s abs |
| 18O/16O | s int in rel.% | 18O/16O | s abs | 18/16O | s abs |
| QYG-B02\_1 | 0.00202 | 0.01103 | 0.00202 | 2.22594E-07 | 0.002016 | 3.67068E-07 | 5.44 | 0.37 | 7.21 | 2.13 |
| QYG-B02\_2 | 0.00202 | 0.00724 | 0.00202 | 1.46201E-07 | 0.002017 | 3.26668E-07 | 6.02 | 0.33 | 7.79 | 2.09 |
| QYG-B02\_3 | 0.00202 | 0.01343 | 0.00202 | 2.70999E-07 | 0.002016 | 3.98264E-07 | 5.58 | 0.40 | 7.34 | 2.16 |
| QYG-BR01\_1 | 0.00202 | 0.01137 | 0.00202 | 2.29493E-07 | 0.002017 | 3.74754E-07 | 5.84 | 0.37 | 7.34 | 1.88 |
| QYG-BR01\_2 | 0.00202 | 0.00972 | 0.00202 | 1.9629E-07 | 0.002017 | 3.55467E-07 | 6.00 | 0.35 | 7.50 | 1.86 |
| QYG-BR01\_3 | 0.00202 | 0.01276 | 0.00202 | 2.5761E-07 | 0.002017 | 3.92529E-07 | 5.66 | 0.39 | 7.16 | 1.89 |
| QYG-BR01\_4 | 0.00202 | 0.01060 | 0.00202 | 2.13889E-07 | 0.002017 | 3.65376E-07 | 5.64 | 0.36 | 7.14 | 1.87 |
| QYG-BR01\_5 | 0.00202 | 0.01186 | 0.00202 | 2.39446E-07 | 0.002017 | 3.80969E-07 | 6.06 | 0.38 | 7.56 | 1.88 |
| QYG-B06\_01 | 0.00202 | 0.00781 | 0.00202 | 1.5765E-07 | 0.002016 | 3.35595E-07 | 5.53 | 0.33 | 7.27 | 2.08 |
| QYG-B06\_02 | 0.00202 | 0.01245 | 0.00202 | 2.51103E-07 | 0.002016 | 3.88211E-07 | 5.27 | 0.39 | 7.01 | 2.13 |
| QYG-B06\_03 | 0.00202 | 0.01351 | 0.00202 | 2.72562E-07 | 0.002016 | 4.0238E-07 | 5.19 | 0.40 | 6.93 | 2.14 |
| QYG-B06\_04 | 0.00202 | 0.01286 | 0.00202 | 2.59514E-07 | 0.002016 | 3.93765E-07 | 5.59 | 0.39 | 7.33 | 2.13 |
| QYG-B06\_05 | 0.00202 | 0.00836 | 0.00202 | 1.68774E-07 | 0.002018 | 3.41112E-07 | 6.15 | 0.34 | 7.54 | 2.11 |
| QYG-B06\_06 | 0.00202 | 0.01059 | 0.00202 | 2.13749E-07 | 0.002017 | 3.65332E-07 | 5.80 | 0.36 | 7.24 | 2.07 |
| QYG-B06\_07 | 0.00202 | 0.00683 | 0.00202 | 1.37792E-07 | 0.002016 | 3.26746E-07 | 5.50 | 0.33 | 7.20 | 2.14 |
| QYG-B06\_08 | 0.00202 | 0.01348 | 0.00202 | 2.72041E-07 | 0.002016 | 4.02086E-07 | 5.46 | 0.40 | 7.62 | 2.18 |
| QYG-B06\_09 | 0.00202 | 0.01586 | 0.00202 | 3.20212E-07 | 0.002017 | 4.36147E-07 | 5.88 | 0.44 | 7.28 | 2.12 |
| QYG-B06\_10 | 0.00202 | 0.01169 | 0.00202 | 2.35893E-07 | 0.002016 | 3.78629E-07 | 5.53 | 0.38 | 7.89 | 2.08 |
| QYG-B06\_11 | 0.00202 | 0.01188 | 0.00202 | 2.39876E-07 | 0.002017 | 3.81174E-07 | 5.78 | 0.38 | 7.52 | 2.12 |
| QYG-B06\_12 | 0.00202 | 0.00961 | 0.00202 | 1.93999E-07 | 0.002018 | 3.54245E-07 | 6.14 | 0.35 | 7.88 | 2.09 |
| QYG-B06\_13 | 0.00202 | 0.00991 | 0.00202 | 2.00115E-07 | 0.002018 | 3.57677E-07 | 6.36 | 0.36 | 8.10 | 2.10 |
| QYG-B06\_14 | 0.00202 | 0.01123 | 0.00202 | 2.26933E-07 | 0.002018 | 3.73356E-07 | 6.53 | 0.37 | 8.27 | 2.11 |
| QYG-B06\_15 | 0.00202 | 0.01319 | 0.00202 | 2.6604E-07 | 0.002016 | 3.98013E-07 | 5.25 | 0.40 | 6.99 | 2.14 |
| **Reference materials** | | | | | | | | | | |
| **Penglai** |  |  |  |  |  |  |  |  |  |  |
| PL-1 | 0.00202 | 0.008453 | 0.00202 | 1.71E-07 | 0.002016 | 3.38E-07 | 5.23 | 0.34 |  |  |
| PL-2 | 0.00202 | 0.006874 | 0.00202 | 1.39E-07 | 0.002015 | 3.23E-07 | 5.10 | 0.32 |  |  |
| PL-3 | 0.00202 | 0.013161 | 0.00202 | 2.66E-07 | 0.002016 | 3.94E-07 | 5.27 | 0.39 |  |  |
| PL-4 | 0.00202 | 0.010339 | 0.00202 | 2.09E-07 | 0.002016 | 3.59E-07 | 5.18 | 0.36 |  |  |
| PL-5 | 0.00202 | 0.009027 | 0.00202 | 1.82E-07 | 0.002016 | 3.44E-07 | 5.26 | 0.34 |  |  |
| PL-6 | 0.00202 | 0.010638 | 0.00202 | 2.15E-07 | 0.002016 | 3.62E-07 | 5.42 | 0.36 |  |  |
| PL-7 | 0.00202 | 0.009935 | 0.00202 | 2E-07 | 0.002016 | 3.54E-07 | 5.32 | 0.35 |  |  |
| PL-8 | 0.00202 | 0.012364 | 0.00202 | 2.49E-07 | 0.002016 | 3.84E-07 | 5.42 | 0.38 |  |  |
| PL-9 | 0.00202 | 0.010559 | 0.00202 | 2.13E-07 | 0.002016 | 3.61E-07 | 5.45 | 0.36 |  |  |
| PL-10 | 0.00202 | 0.01481 | 0.00202 | 2.99E-07 | 0.002016 | 4.18E-07 | 5.39 | 0.42 |  |  |
| PL-11 | 0.00202 | 0.013192 | 0.00202 | 2.66E-07 | 0.002015 | 3.95E-07 | 5.07 | 0.39 |  |  |
| PL-12 | 0.00202 | 0.009626 | 0.00202 | 1.94E-07 | 0.002016 | 3.51E-07 | 5.60 | 0.35 |  |  |
| PL-13 | 0.00202 | 0.009117 | 0.00202 | 1.84E-07 | 0.002015 | 3.45E-07 | 5.07 | 0.34 |  |  |
| PL-14 | 0.00202 | 0.013504 | 0.00202 | 2.72E-07 | 0.002016 | 3.99E-07 | 5.30 | 0.40 |  |  |
| PL-15 | 0.00202 | 0.013316 | 0.00202 | 2.69E-07 | 0.002016 | 3.97E-07 | 5.38 | 0.40 |  |  |
| PL-16 | 0.00202 | 0.014078 | 0.00202 | 2.84E-07 | 0.002016 | 4.07E-07 | 5.54 | 0.41 |  |  |
| PL-17 | 0.00202 | 0.010415 | 0.00202 | 2.1E-07 | 0.002016 | 3.6E-07 | 5.15 | 0.36 |  |  |
| PL-18 | 0.00202 | 0.007765 | 0.00202 | 1.57E-07 | 0.002016 | 3.31E-07 | 5.32 | 0.33 |  |  |
| PL-19 | 0.00202 | 0.011628 | 0.00202 | 2.35E-07 | 0.002016 | 3.74E-07 | 5.27 | 0.37 |  |  |
| PL-20 | 0.00202 | 0.013518 | 0.00202 | 2.73E-07 | 0.002016 | 3.99E-07 | 5.33 | 0.40 |  |  |
| PL-21 | 0.00202 | 0.010529 | 0.00202 | 2.12E-07 | 0.002016 | 3.61E-07 | 5.44 | 0.36 |  |  |
| PL-22 | 0.00202 | 0.008453 | 0.00202 | 1.71E-07 | 0.002016 | 3.38E-07 | 5.23 | 0.34 |  |  |
| PL-23 | 0.00202 | 0.006874 | 0.00202 | 1.39E-07 | 0.002015 | 3.23E-07 | 5.10 | 0.32 |  |  |
| PL-24 | 0.00202 | 0.013161 | 0.00202 | 2.66E-07 | 0.002016 | 3.94E-07 | 5.27 | 0.39 |  |  |
| **Temora** | | | | | | | | | | |
| TEM-1 | 0.00202 | 0.010339 | 0.00202 | 2.09E-07 | 0.002016 | 3.59E-07 | 5.18 | 0.36 |  |  |
| TEM-2 | 0.00202 | 0.009027 | 0.00202 | 1.82E-07 | 0.002016 | 3.44E-07 | 5.26 | 0.34 |  |  |
| TEM-3 | 0.00202 | 0.010638 | 0.00202 | 2.15E-07 | 0.002016 | 3.62E-07 | 5.42 | 0.36 |  |  |
| TEM-4 | 0.00202 | 0.009935 | 0.00202 | 2E-07 | 0.002016 | 3.54E-07 | 5.32 | 0.35 |  |  |
| TEM-5 | 0.00202 | 0.012364 | 0.00202 | 2.49E-07 | 0.002016 | 3.84E-07 | 5.42 | 0.38 |  |  |
| TEM-6 | 0.00202 | 0.010559 | 0.00202 | 2.13E-07 | 0.002016 | 3.61E-07 | 5.45 | 0.36 |  |  |
| TEM-7 | 0.00202 | 0.01481 | 0.00202 | 2.99E-07 | 0.002016 | 4.18E-07 | 5.39 | 0.42 |  |  |

Supplementary table 4b In situ zircon oxygen isotope compositions analyzed at the BRIUG from the granitoids from Qiyugou gold deposit

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Analysis name |  | 16O | s abs | |  | 18O/16O | s abs | δ18Ozircon | s abs | δ18OWR | s abs |
| QYG-B02\_4 |  | 2.36E+09 | | 0.01003 |  | 0.00202 | 0.00790 | 6.12 | 0.08 | 7.88 | 1.84 |
| QYG-B02\_5 |  | 2.36E+09 | | 0.01944 |  | 0.00202 | 0.00779 | 5.70 | 0.08 | 7.46 | 1.84 |
| QYG-B02\_6 |  | 2.36E+09 | | 0.02098 |  | 0.00202 | 0.00714 | 5.70 | 0.07 | 7.46 | 1.84 |
| QYG-B02\_7 |  | 2.35E+09 | | 0.01851 |  | 0.00202 | 0.00771 | 5.76 | 0.08 | 7.52 | 1.84 |
| QYG-B02\_8 |  | 2.35E+09 | | 0.01877 |  | 0.00202 | 0.00719 | 6.14 | 0.07 | 7.91 | 1.84 |
| QYG-B02\_9 |  | 2.33E+09 | | 0.02192 |  | 0.00202 | 0.00786 | 5.54 | 0.08 | 7.31 | 1.84 |
| QYG-B02\_10 |  | 2.34E+09 | | 0.02391 |  | 0.00202 | 0.00660 | 5.62 | 0.07 | 7.39 | 1.83 |
| QYG-B02\_11 |  | 2.33E+09 | | 0.01703 |  | 0.00202 | 0.00648 | 6.13 | 0.06 | 7.90 | 1.83 |
| QYG-B02\_12 |  | 2.31E+09 | | 0.01967 |  | 0.00202 | 0.01036 | 5.75 | 0.10 | 7.51 | 1.87 |
| QYG-B02\_13 |  | 2.32E+09 | | 0.02592 |  | 0.00202 | 0.00586 | 5.34 | 0.06 | 7.11 | 1.82 |
| QYG-B02\_14 |  | 2.32E+09 | | 0.01733 |  | 0.00202 | 0.00563 | 5.82 | 0.06 | 7.59 | 1.82 |
| QYG-B02\_15 |  | 2.33E+09 | | 0.01663 |  | 0.00202 | 0.00631 | 5.80 | 0.06 | 7.57 | 1.83 |
| QYG-B02\_16 |  | 2.32E+09 | | 0.01343 |  | 0.00202 | 0.00754 | 5.58 | 0.08 | 7.34 | 1.84 |
| QYG-B02\_17 |  | 2.31E+09 | | 0.01579 |  | 0.00202 | 0.00850 | 5.74 | 0.09 | 7.51 | 1.85 |
| QYG-B02\_18 |  | 2.31E+09 | | 0.01854 |  | 0.00202 | 0.00853 | 5.53 | 0.09 | 7.30 | 1.85 |
| QYG-B02\_19 |  | 2.32E+09 | | 0.01400 |  | 0.00202 | 0.00869 | 5.35 | 0.09 | 7.12 | 1.85 |
| QYG-B02\_20 |  | 2.31E+09 | | 0.02176 |  | 0.00202 | 0.00845 | 5.96 | 0.08 | 7.72 | 1.85 |
| QYG-B02\_21 |  | 2.3E+09 | | 0.01950 |  | 0.00202 | 0.01035 | 5.58 | 0.10 | 7.35 | 1.87 |
| QYG-B02\_22 |  | 2.3E+09 | | 0.02028 |  | 0.00202 | 0.00840 | 5.56 | 0.08 | 7.33 | 1.85 |
| QYG-B02\_23 |  | 2.3E+09 | | 0.02037 |  | 0.00202 | 0.00574 | 5.44 | 0.06 | 7.21 | 1.82 |
| QYG-BQ01\_1 |  | 2.52E+09 | | 0.00903 |  | 0.00202 | 0.00622 | 5.43 | 0.06 | 7.54 | 2.17 |
| QYG-BQ01\_2 |  | 2.52E+09 | | 0.01025 |  | 0.00202 | 0.00730 | 5.58 | 0.07 | 7.69 | 2.18 |
| QYG-BQ01\_3 |  | 2.52E+09 | | 0.01852 |  | 0.00202 | 0.00838 | 5.33 | 0.08 | 7.44 | 2.19 |
| QYG-BQ01\_4 |  | 2.52E+09 | | 0.00877 |  | 0.00202 | 0.00642 | 5.62 | 0.06 | 7.73 | 2.17 |
| QYG-BQ01\_5 |  | 2.51E+09 | | 0.01472 |  | 0.00202 | 0.00765 | 5.77 | 0.08 | 7.88 | 2.18 |
| QYG-BQ01\_6 |  | 2.49E+09 | | 0.01098 |  | 0.00202 | 0.00622 | 5.44 | 0.06 | 7.55 | 2.17 |
| QYG-BQ01\_7 |  | 2.51E+09 | | 0.01311 |  | 0.00202 | 0.00662 | 5.55 | 0.07 | 7.66 | 2.17 |
| QYG-BQ01\_8 |  | 2.52E+09 | | 0.01479 |  | 0.00202 | 0.00748 | 5.51 | 0.07 | 7.62 | 2.18 |
| QYG-BQ01\_9 |  | 2.52E+09 | | 0.01175 |  | 0.00202 | 0.00668 | 5.67 | 0.07 | 7.78 | 2.18 |
| QYG-BQ01\_10 |  | 2.52E+09 | | 0.01642 |  | 0.00202 | 0.00646 | 5.52 | 0.06 | 7.63 | 2.17 |
| QYG-BQ01\_11 |  | 2.52E+09 | | 0.01524 |  | 0.00202 | 0.00861 | 5.98 | 0.09 | 8.08 | 2.19 |
| QYG-BQ01\_12 |  | 2.52E+09 | | 0.01545 |  | 0.00202 | 0.00767 | 5.78 | 0.08 | 7.89 | 2.19 |
| QYG-BQ01\_13 |  | 2.51E+09 | | 0.02272 |  | 0.00202 | 0.00854 | 5.57 | 0.09 | 7.68 | 2.19 |
| QYG-BQ01\_14 |  | 2.51E+09 | | 0.01535 |  | 0.00202 | 0.00516 | 5.82 | 0.05 | 7.93 | 2.16 |
| QYG-BQ01\_15 |  | 2.51E+09 | | 0.01058 |  | 0.00202 | 0.00638 | 5.90 | 0.06 | 8.01 | 2.17 |
| QYG-BQ01\_16 |  | 2.52E+09 | | 0.00968 |  | 0.00202 | 0.00595 | 5.91 | 0.06 | 8.02 | 2.17 |
| QYG-BQ01\_17 |  | 2.5E+09 | | 0.01532 |  | 0.00202 | 0.00644 | 6.35 | 0.06 | 8.45 | 2.17 |
| QYG-BQ01\_18 |  | 2.51E+09 | | 0.01660 |  | 0.00202 | 0.00726 | 6.12 | 0.07 | 8.23 | 2.18 |
| QYG-BQ01\_19 |  | 2.5E+09 | | 0.01641 |  | 0.00202 | 0.00746 | 5.80 | 0.07 | 7.91 | 2.18 |
| QYG-BQ01\_20 |  | 2.52E+09 | | 0.01672 |  | 0.00202 | 0.00656 | 5.54 | 0.07 | 7.65 | 2.17 |
| QYG-BR01\_6 |  | 2.64E+09 | | 0.01063 |  | 0.00202 | 0.00843 | 5.85 | 0.08 | 7.36 | 1.59 |
| QYG-BR01\_7 |  | 2.65E+09 | | 0.01986 |  | 0.00202 | 0.00486 | 5.71 | 0.05 | 7.21 | 1.55 |
| QYG-BR01\_8 |  | 2.65E+09 | | 0.01222 |  | 0.00202 | 0.00712 | 5.57 | 0.07 | 7.07 | 1.57 |
| QYG-BR01\_9 |  | 2.65E+09 | | 0.00768 |  | 0.00202 | 0.00784 | 5.64 | 0.08 | 7.14 | 1.58 |
| QYG-BR01\_10 |  | 2.66E+09 | | 0.01790 |  | 0.00202 | 0.00557 | 5.79 | 0.06 | 7.29 | 1.56 |
| QYG-BR01\_11 |  | 2.65E+09 | | 0.01363 |  | 0.00202 | 0.00534 | 5.79 | 0.05 | 7.29 | 1.56 |
| QYG-BR01\_12 |  | 2.62E+09 | | 0.00893 |  | 0.00202 | 0.00572 | 6.01 | 0.06 | 7.51 | 1.56 |
| QYG-BR01\_13 |  | 2.61E+09 | | 0.01341 |  | 0.00202 | 0.00530 | 5.44 | 0.05 | 6.94 | 1.56 |
| QYG-BR01\_14 |  | 2.62E+09 | | 0.01903 |  | 0.00202 | 0.00531 | 5.78 | 0.05 | 7.28 | 1.56 |
| QYG-BR01\_15 |  | 2.62E+09 | | 0.01456 |  | 0.00202 | 0.00878 | 5.87 | 0.09 | 7.37 | 1.59 |
| QYG-BR01\_16 |  | 2.63E+09 | | 0.00857 |  | 0.00202 | 0.00631 | 5.92 | 0.06 | 7.43 | 1.57 |
| QYG-BR01\_17 |  | 2.63E+09 | | 0.02056 |  | 0.00202 | 0.00607 | 5.65 | 0.06 | 7.15 | 1.56 |
| QYG-BR01\_18 |  | 2.61E+09 | | 0.06220 |  | 0.00202 | 0.01061 | 6.29 | 0.11 | 7.79 | 1.61 |
| QYG-BR01\_19 |  | 2.62E+09 | | 0.01255 |  | 0.00202 | 0.00704 | 6.00 | 0.07 | 7.50 | 1.57 |
| QYG-BR01\_20 |  | 2.62E+09 | | 0.01019 |  | 0.00202 | 0.00489 | 6.12 | 0.05 | 7.62 | 1.55 |
| QYG-BR01\_21 |  | 2.63E+09 | | 0.01002 |  | 0.00202 | 0.00707 | 6.00 | 0.07 | 7.50 | 1.57 |
| QYG-BR01\_22 |  | 2.63E+09 | | 0.01380 |  | 0.00202 | 0.00622 | 6.01 | 0.06 | 7.51 | 1.56 |
| QYG-BR01\_23 |  | 2.63E+09 | | 0.01239 |  | 0.00202 | 0.00748 | 5.90 | 0.07 | 7.40 | 1.58 |
| QYG-BR01\_24 |  | 2.63E+09 | | 0.01026 |  | 0.00202 | 0.00540 | 6.04 | 0.05 | 7.54 | 1.56 |
| QYG-BR01\_25 |  | 2.63E+09 | | 0.01196 |  | 0.00202 | 0.00843 | 5.80 | 0.08 | 7.30 | 1.59 |
| **Reference materials** | | | | | | | | | | | |
| **Penglai** | | | | | | | | | | | |
| Penglai\_01 |  | 2.36E+09 | | 0.017 |  | 0.00202 | 0.006 | 5.50 | 0.06 |  |  |
| Penglai\_02 |  | 2.36E+09 | | 0.015 |  | 0.00202 | 0.008 | 5.36 | 0.08 |  |  |
| Penglai\_03 |  | 2.36E+09 | | 0.015 |  | 0.00202 | 0.007 | 5.52 | 0.07 |  |  |
| Penglai\_04 |  | 2.34E+09 | | 0.019 |  | 0.00202 | 0.008 | 5.35 | 0.08 |  |  |
| Penglai\_05 |  | 2.33E+09 | | 0.011 |  | 0.00202 | 0.005 | 5.40 | 0.05 |  |  |
| Penglai\_06 |  | 2.32E+09 | | 0.020 |  | 0.00202 | 0.008 | 5.57 | 0.08 |  |  |
| Penglai\_07 |  | 2.31E+09 | | 0.012 |  | 0.00202 | 0.009 | 5.37 | 0.09 |  |  |
| Penglai\_08 |  | 2.31E+09 | | 0.014 |  | 0.00202 | 0.007 | 5.35 | 0.07 |  |  |
| Penglai\_09 |  | 2.31E+09 | | 0.020 |  | 0.00202 | 0.006 | 5.23 | 0.06 |  |  |
| Penglai\_10 |  | 2.31E+09 | | 0.026 |  | 0.00202 | 0.009 | 5.21 | 0.09 |  |  |
| Penglai\_11 |  | 2.29E+09 | | 0.022 |  | 0.00202 | 0.009 | 5.00 | 0.09 |  |  |
| Penglai\_12 |  | 2.29E+09 | | 0.022 |  | 0.00202 | 0.006 | 5.03 | 0.06 |  |  |
| Penglai\_13 |  | 2.28E+09 | | 0.016 |  | 0.00202 | 0.006 | 5.13 | 0.06 |  |  |
| Penglai\_14 |  | 2.65E+09 | | 0.015 |  | 0.00202 | 0.008 | 5.13 | 0.08 |  |  |
| Penglai\_15 |  | 2.66E+09 | | 0.016 |  | 0.00202 | 0.009 | 5.22 | 0.09 |  |  |
| Penglai\_16 |  | 2.65E+09 | | 0.022 |  | 0.00202 | 0.009 | 5.35 | 0.09 |  |  |
| Penglai\_17 |  | 2.67E+09 | | 0.016 |  | 0.00202 | 0.006 | 5.15 | 0.06 |  |  |
| Penglai\_18 |  | 2.62E+09 | | 0.005 |  | 0.00202 | 0.009 | 5.54 | 0.09 |  |  |
| Penglai\_19 |  | 2.63E+09 | | 0.010 |  | 0.00202 | 0.006 | 5.37 | 0.06 |  |  |
| Penglai\_20 |  | 2.64E+09 | | 0.009 |  | 0.00202 | 0.007 | 5.47 | 0.07 |  |  |
| Penglai\_21 |  | 2.63E+09 | | 0.010 |  | 0.00202 | 0.006 | 5.46 | 0.06 |  |  |
| Penglai\_22 |  | 2.63E+09 | | 0.015 |  | 0.00202 | 0.006 | 5.28 | 0.06 |  |  |
| Penglai\_23 |  | 2.63E+09 | | 0.021 |  | 0.00202 | 0.008 | 5.06 | 0.08 |  |  |
| Penglai\_24 |  | 2.63E+09 | | 0.019 |  | 0.00202 | 0.005 | 5.37 | 0.05 |  |  |
| **Qinghu** |  |  | |  |  |  |  |  |  |  |  |
| Qinghu\_01 |  | 2.34E+09 | | 0.009 |  | 0.00202 | 0.007 | 5.60 | 0.07 |  |  |
| Qinghu\_02 |  | 2.33E+09 | | 0.029 |  | 0.00202 | 0.008 | 5.49 | 0.08 |  |  |
| Qinghu\_03 |  | 2.31E+09 | | 0.022 |  | 0.00202 | 0.008 | 5.68 | 0.08 |  |  |
| Qinghu\_04 |  | 2.30E+09 | | 0.021 |  | 0.00202 | 0.008 | 5.51 | 0.08 |  |  |
| Qinghu\_05 |  | 2.31E+09 | | 0.016 |  | 0.00202 | 0.007 | 5.51 | 0.07 |  |  |
| Qinghu\_06 |  | 2.30E+09 | | 0.033 |  | 0.00202 | 0.007 | 5.38 | 0.07 |  |  |
| Qinghu\_07 |  | 2.30E+09 | | 0.017 |  | 0.00202 | 0.007 | 5.35 | 0.07 |  |  |
| Qinghu\_08 |  | 2.29E+09 | | 0.025 |  | 0.00202 | 0.005 | 5.44 | 0.05 |  |  |
| Qinghu\_09 |  | 2.66E+09 | | 0.009 |  | 0.00202 | 0.005 | 5.43 | 0.05 |  |  |
| Qinghu\_10 |  | 2.68E+09 | | 0.015 |  | 0.00202 | 0.009 | 5.41 | 0.09 |  |  |
| Qinghu\_11 |  | 2.62E+09 | | 0.022 |  | 0.00202 | 0.008 | 5.60 | 0.08 |  |  |
| Qinghu\_12 |  | 2.62E+09 | | 0.012 |  | 0.00202 | 0.007 | 5.69 | 0.07 |  |  |
| Qinghu\_13 |  | 2.63E+09 | | 0.015 |  | 0.00202 | 0.005 | 5.49 | 0.05 |  |  |
| Qinghu\_14 |  | 2.63E+09 | | 0.019 |  | 0.00202 | 0.007 | 5.49 | 0.07 |  |  |

Notes: δ18O(Zircon–WR) = δ18OZircon − δ18OWR = −0.0612 × SiO2 (in wt.%) + 2.5