表1 道伦达坝黑云母花岗岩LA-ICP-MS 锆石U-Pb测年结果

Table 1 LA-ICP-MS zircon U-Pb dating results of Daolundaba biotite granite

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 测点号 | | wB/10-6 | | | 比值 | 同位素比值 | | | | | | 年龄/Ma | | | | | |
| Pb\* | Th | U | Th/U | 207Pb/206Pb | 1 | 207Pb/235U | 1 | 206Pb/238U | 1 | 207Pb/206Pb | 1 | 207Pb/235U | 1 | 206Pb/238U | 1 |
| DLDB18-001 | 1 | 14.3 | 50.8 | 266.5 | 0.2 | 0.0567 | 0.0034 | 0.3675 | 0.0215 | 0.0471 | 0.0011 | 478 | 118 | 318 | 16 | 296 | 7 |
| 2 | 14.7 | 146.1 | 278.8 | 0.5 | 0.0534 | 0.0038 | 0.3205 | 0.0222 | 0.0435 | 0.0011 | 346 | 146 | 282 | 17 | 275 | 7 |
| 3 | 23.5 | 124.0 | 454.7 | 0.3 | 0.0543 | 0.0031 | 0.3404 | 0.0186 | 0.0455 | 0.0010 | 384 | 117 | 297 | 14 | 287 | 6 |
| 4 | 11.4 | 93.6 | 219.6 | 0.4 | 0.0541 | 0.0048 | 0.3302 | 0.0280 | 0.0442 | 0.0012 | 376 | 180 | 290 | 21 | 279 | 8 |
| 5 | 26.3 | 126.8 | 521.6 | 0.2 | 0.0522 | 0.0036 | 0.3240 | 0.0214 | 0.0450 | 0.0011 | 295 | 145 | 285 | 16 | 284 | 7 |
| 6 | 8.8 | 48.9 | 156.4 | 0.3 | 0.0559 | 0.0045 | 0.3667 | 0.0286 | 0.0476 | 0.0013 | 447 | 171 | 317 | 21 | 300 | 8 |
| 7 | 19.9 | 62.6 | 368.2 | 0.2 | 0.0548 | 0.0033 | 0.3642 | 0.0208 | 0.0482 | 0.0011 | 404 | 126 | 315 | 16 | 303 | 7 |
| 8 | 18.6 | 31.8 | 402.2 | 0.1 | 0.0534 | 0.0033 | 0.3067 | 0.0185 | 0.0416 | 0.0010 | 347 | 133 | 272 | 14 | 263 | 6 |
| 9 | 16.4 | 65.8 | 311.5 | 0.2 | 0.0517 | 0.0031 | 0.3309 | 0.0187 | 0.0464 | 0.0010 | 273 | 129 | 290 | 14 | 292 | 6 |
| 10 | 10.0 | 31.8 | 194.9 | 0.2 | 0.0592 | 0.0037 | 0.3735 | 0.0244 | 0.0458 | 0.0012 | 573 | 130 | 322 | 18 | 289 | 8 |
| 11 | 15.1 | 90.3 | 295.4 | 0.3 | 0.0581 | 0.0035 | 0.3537 | 0.0205 | 0.0442 | 0.0011 | 533 | 128 | 307 | 15 | 279 | 6 |
| 12 | 14.8 | 166.9 | 276.5 | 0.6 | 0.0554 | 0.0036 | 0.3241 | 0.0201 | 0.0424 | 0.0010 | 429 | 140 | 285 | 15 | 268 | 6 |
| 13 | 18.9 | 73.5 | 396.7 | 0.2 | 0.0502 | 0.0030 | 0.3067 | 0.0176 | 0.0443 | 0.0010 | 205 | 130 | 272 | 14 | 279 | 6 |
| 14 | 13.1 | 68.3 | 246.7 | 0.3 | 0.0547 | 0.0034 | 0.3475 | 0.0213 | 0.0460 | 0.0011 | 402 | 135 | 303 | 16 | 290 | 7 |
| 15 | 17.3 | 91.0 | 335.3 | 0.3 | 0.0577 | 0.0035 | 0.3597 | 0.0209 | 0.0452 | 0.0010 | 519 | 129 | 312 | 16 | 285 | 6 |
| 16 | 13.2 | 77.9 | 270.2 | 0.3 | 0.0524 | 0.0043 | 0.3069 | 0.0248 | 0.0425 | 0.0011 | 304 | 177 | 272 | 19 | 268 | 7 |
| 17 | 16.3 | 72.8 | 320.6 | 0.2 | 0.0526 | 0.0035 | 0.3409 | 0.0217 | 0.0470 | 0.0012 | 311 | 143 | 298 | 16 | 296 | 7 |
| 18 | 10.3 | 78.4 | 208.3 | 0.4 | 0.0490 | 0.0035 | 0.2901 | 0.0198 | 0.0429 | 0.0011 | 150 | 150 | 259 | 16 | 271 | 7 |
| 19 | 15.2 | 65.0 | 322.7 | 0.2 | 0.0572 | 0.0042 | 0.3203 | 0.0236 | 0.0406 | 0.0010 | 499 | 154 | 282 | 18 | 257 | 6 |
| 20 | 26.3 | 45.8 | 570.1 | 0.1 | 0.0537 | 0.0032 | 0.3138 | 0.0181 | 0.0424 | 0.0010 | 356 | 131 | 277 | 14 | 268 | 6 |
| 21 | 15.7 | 26.6 | 316.7 | 0.1 | 0.0529 | 0.0035 | 0.3345 | 0.0209 | 0.0459 | 0.0011 | 324 | 146 | 293 | 16 | 289 | 7 |
| 22 | 14.6 | 42.6 | 300.2 | 0.1 | 0.0527 | 0.0031 | 0.3228 | 0.0182 | 0.0444 | 0.0010 | 315 | 128 | 284 | 14 | 280 | 6 |
| 23 | 10.1 | 117.5 | 186.0 | 0.6 | 0.0519 | 0.0036 | 0.3227 | 0.0213 | 0.0451 | 0.0011 | 281 | 152 | 284 | 16 | 284 | 7 |
| 24 | 9.9 | 61.6 | 185.4 | 0.3 | 0.0546 | 0.0037 | 0.3460 | 0.0221 | 0.0460 | 0.0011 | 394 | 148 | 302 | 17 | 290 | 7 |
| 25 | 13.5 | 31.8 | 282.0 | 0.1 | 0.0496 | 0.0031 | 0.3016 | 0.0185 | 0.0441 | 0.0010 | 178 | 140 | 268 | 14 | 278 | 6 |
| DLDB18-010 | 1 | 37.8 | 54.9 | 788.0 | 0.1 | 0.0517 | 0.0032 | 0.3236 | 0.0187 | 0.0454 | 0.0015 | 274 | 130 | 285 | 14 | 286 | 9 |
| 2 | 9.4 | 126.1 | 160.3 | 0.8 | 0.0607 | 0.0049 | 0.3776 | 0.0277 | 0.0452 | 0.0016 | 628 | 162 | 325 | 20 | 285 | 10 |
| 3 | 12.2 | 69.5 | 245.7 | 0.3 | 0.0521 | 0.0045 | 0.3210 | 0.0265 | 0.0448 | 0.0016 | 290 | 179 | 283 | 20 | 282 | 10 |
| 4 | 10.3 | 80.8 | 190.6 | 0.4 | 0.0480 | 0.0040 | 0.3021 | 0.0237 | 0.0458 | 0.0016 | 97 | 170 | 268 | 18 | 288 | 10 |
| 5 | 23.6 | 71.1 | 325.9 | 0.2 | 0.0567 | 0.0102 | 0.3528 | 0.0666 | 0.0451 | 0.0018 | 479 | 342 | 307 | 50 | 285 | 11 |
| 6 | 8.9 | 55.3 | 168.1 | 0.3 | 0.0458 | 0.0040 | 0.2928 | 0.0242 | 0.0465 | 0.0016 | -13 | 156 | 261 | 19 | 293 | 10 |
| 7 | 8.3 | 61.6 | 149.2 | 0.4 | 0.0506 | 0.0042 | 0.3299 | 0.0275 | 0.0474 | 0.0017 | 221 | 166 | 290 | 21 | 299 | 10 |
| 8 | 20.9 | 53.5 | 437.3 | 0.1 | 0.0506 | 0.0037 | 0.3116 | 0.0213 | 0.0447 | 0.0015 | 224 | 170 | 275 | 17 | 282 | 9 |
| 9 | 20.0 | 47.0 | 412.3 | 0.1 | 0.0528 | 0.0036 | 0.3238 | 0.0208 | 0.0445 | 0.0015 | 320 | 162 | 285 | 16 | 281 | 9 |
| 10 | 15.7 | 86.7 | 294.0 | 0.3 | 0.0585 | 0.0045 | 0.3703 | 0.0266 | 0.0460 | 0.0016 | 548 | 180 | 320 | 20 | 290 | 10 |
| 11 | 9.3 | 53.9 | 165.4 | 0.3 | 0.0468 | 0.0044 | 0.3142 | 0.0281 | 0.0488 | 0.0017 | 40 | 203 | 277 | 22 | 307 | 10 |
| 12 | 21.6 | 49.6 | 427.1 | 0.1 | 0.0516 | 0.0036 | 0.3266 | 0.0216 | 0.0460 | 0.0015 | 268 | 153 | 287 | 17 | 290 | 9 |
| 13 | 18.5 | 35.2 | 384.0 | 0.1 | 0.0551 | 0.0036 | 0.3354 | 0.0213 | 0.0442 | 0.0015 | 416 | 140 | 294 | 16 | 279 | 9 |
| 14 | 12.2 | 71.6 | 230.7 | 0.3 | 0.0606 | 0.0052 | 0.3721 | 0.0306 | 0.0446 | 0.0016 | 624 | 181 | 321 | 23 | 281 | 10 |
| 15 | 26.8 | 41.3 | 583.4 | 0.1 | 0.0518 | 0.0035 | 0.3048 | 0.0195 | 0.0427 | 0.0014 | 277 | 155 | 270 | 15 | 270 | 9 |
| 16 | 8.0 | 138.8 | 121.8 | 1.1 | 0.0681 | 0.0095 | 0.4175 | 0.0708 | 0.0445 | 0.0021 | 872 | 314 | 354 | 51 | 280 | 13 |
| 17 | 13.8 | 138.7 | 240.4 | 0.6 | 0.0542 | 0.0042 | 0.3459 | 0.0250 | 0.0463 | 0.0016 | 380 | 177 | 302 | 19 | 292 | 10 |
| 18 | 26.4 | 73.3 | 499.6 | 0.1 | 0.0504 | 0.0034 | 0.3338 | 0.0208 | 0.0481 | 0.0016 | 212 | 152 | 292 | 16 | 303 | 10 |
| 19 | 13.5 | 80.1 | 252.9 | 0.3 | 0.0542 | 0.0045 | 0.3406 | 0.0271 | 0.0457 | 0.0016 | 379 | 187 | 298 | 21 | 288 | 10 |
| 20 | 18.7 | 67.1 | 374.4 | 0.2 | 0.0519 | 0.0039 | 0.3211 | 0.0223 | 0.0449 | 0.0015 | 282 | 171 | 283 | 17 | 283 | 9 |
| 21 | 14.4 | 130.8 | 267.1 | 0.5 | 0.0534 | 0.0040 | 0.3306 | 0.0235 | 0.0450 | 0.0015 | 345 | 168 | 290 | 18 | 284 | 10 |
| 22 | 6.3 | 42.9 | 112.2 | 0.4 | 0.0506 | 0.0050 | 0.3289 | 0.0305 | 0.0472 | 0.0017 | 224 | 194 | 289 | 23 | 297 | 10 |
| 23 | 20.7 | 44.9 | 428.8 | 0.1 | 0.0515 | 0.0039 | 0.3140 | 0.0225 | 0.0443 | 0.0015 | 264 | 155 | 277 | 17 | 279 | 9 |
| 24 | 7.5 | 48.5 | 137.0 | 0.4 | 0.0514 | 0.0044 | 0.3421 | 0.0286 | 0.0484 | 0.0017 | 257 | 179 | 299 | 22 | 305 | 11 |
| 25 | 10.5 | 129.6 | 184.9 | 0.7 | 0.0528 | 0.0046 | 0.3250 | 0.0267 | 0.0448 | 0.0016 | 318 | 195 | 286 | 20 | 282 | 10 |

表2 道伦达坝黑云母花岗岩锆石Lu-Hf同位素组成

Table 2 Zircon Hf isotopic compositions for the Daolundaba biotite granite

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 测点号 | | 年龄 | 176Yb/177Hf | 176Lu/177Hf | 176Hf/177Hf | 2 | (176Hf/177Hf)i | Hf(0) | Hf(*t*) | |  | | --- | | *t*DM(Ma) | | | *t*DMC(Ma) | *f*Lu/Hf |
| （Ma） |
| DLDB18-001 | 001-01 | 282 | 0.108285 | 0.003887 | 0.282821 | 0.000030 | 0.282800059 | 1.26 | 6.81 | 662 | 844 | -0.88 |
| 001-02 | 282 | 0.072960 | 0.002506 | 0.282809 | 0.000018 | 0.282795788 | 0.85 | 6.66 | 654 | 853 | -0.92 |
| 001-03 | 282 | 0.084030 | 0.002738 | 0.282742 | 0.000016 | 0.282727816 | -1.51 | 4.25 | 757 | 1007 | -0.92 |
| 001-04 | 282 | 0.078861 | 0.002689 | 0.282792 | 0.000021 | 0.282777752 | 0.25 | 6.02 | 683 | 894 | -0.92 |
| 001-05 | 282 | 0.044719 | 0.001393 | 0.282706 | 0.000017 | 0.282699059 | -2.78 | 3.24 | 781 | 1072 | -0.96 |
| 001-06 | 282 | 0.043569 | 0.001424 | 0.282785 | 0.000015 | 0.282777846 | 0.01 | 6.02 | 669 | 894 | -0.96 |
| 001-07 | 282 | 0.080898 | 0.002763 | 0.282772 | 0.000017 | 0.282757378 | -0.46 | 5.30 | 714 | 940 | -0.92 |
| 001-08 | 282 | 0.059013 | 0.002103 | 0.282737 | 0.000022 | 0.282725556 | -1.71 | 4.17 | 752 | 1012 | -0.94 |
| 001-09 | 282 | 0.069186 | 0.002359 | 0.282783 | 0.000021 | 0.282770561 | -0.07 | 5.77 | 690 | 910 | -0.93 |
| 001-10 | 282 | 0.092440 | 0.003298 | 0.282805 | 0.000031 | 0.282787836 | 0.72 | 6.38 | 674 | 871 | -0.90 |
| 001-11 | 282 | 0.078330 | 0.002699 | 0.282864 | 0.000019 | 0.282850079 | 2.81 | 8.58 | 576 | 730 | -0.92 |
| 001-12 | 282 | 0.054257 | 0.001614 | 0.282726 | 0.000016 | 0.282717816 | -2.07 | 3.90 | 757 | 1029 | -0.95 |
| 001-13 | 282 | 0.051034 | 0.001727 | 0.282780 | 0.000017 | 0.282770838 | -0.18 | 5.78 | 682 | 909 | -0.95 |
| 001-14 | 282 | 0.027470 | 0.000859 | 0.282698 | 0.000017 | 0.282693758 | -3.07 | 3.05 | |  | | --- | | 781 | | 1083 | -0.97 |
| 001-15 | 282 | 0.058781 | 0.001793 | 0.282729 | 0.000017 | 0.282720036 | -1.96 | 3.98 | 756 | 1024 | -0.95 |
| 001-16 | 282 | 0.058138 | 0.001636 | 0.282801 | 0.000018 | 0.28279264 | 0.58 | 6.55 | 650 | 860 | -0.95 |
| 001-17 | 282 | 0.063273 | 0.002319 | 0.282732 | 0.000024 | 0.282719368 | -1.89 | 3.95 | 764 | 1026 | -0.93 |
| DLDB18-010 | 010-01 | 287 | 0.058252 | 0.001559 | 0.282731 | 0.000021 | 0.282722607 | -1.91 | 4.18 | 749 | 1015 | -0.95 |
| 010-02 | 287 | 0.095138 | 0.002368 | 0.282759 | 0.000019 | 0.282745884 | -0.93 | 5.00 | 726 | 963 | -0.93 |
| 010-03 | 287 | 0.085179 | 0.002145 | 0.282794 | 0.000018 | 0.282782101 | 0.31 | 6.29 | 670 | 881 | -0.94 |
| 010-04 | 287 | 0.079498 | 0.002483 | 0.282781 | 0.000017 | 0.282767607 | -0.14 | 5.77 | 695 | 914 | -0.93 |
| 010-05 | 287 | 0.104979 | 0.002259 | 0.282819 | 0.000022 | 0.282806551 | 1.19 | 7.15 | 635 | 826 | -0.93 |
| 010-06 | 287 | 0.062971 | 0.001713 | 0.282809 | 0.000017 | 0.282799946 | 0.85 | 6.92 | 640 | 840 | -0.95 |
| 010-07 | 287 | 0.067832 | 0.001496 | 0.282740 | 0.000023 | 0.282731556 | -1.61 | 4.50 | 736 | 995 | -0.95 |
| 010-08 | 287 | 0.065048 | 0.002189 | 0.282773 | 0.000021 | 0.282761597 | -0.41 | 5.56 | 700 | 927 | -0.93 |
| 010-09 | 287 | 0.077609 | 0.001949 | 0.282772 | 0.000020 | 0.282761777 | -0.45 | 5.57 | 697 | 927 | -0.94 |
| 010-10 | 287 | 0.019799 | 0.000437 | 0.282672 | 0.000017 | 0.28266965 | -4.00 | 2.31 | 809 | 1135 | -0.99 |
| 010-11 | 287 | 0.049430 | 0.001577 | 0.282716 | 0.000022 | 0.282707813 | -2.43 | 3.66 | 771 | 1049 | -0.95 |
| 010-12 | 287 | 0.076713 | 0.002832 | 0.282800 | 0.000034 | 0.282784978 | 0.54 | 6.39 | 673 | 874 | -0.91 |
| 010-13 | 287 | 0.065416 | 0.001761 | 0.282754 | 0.000026 | 0.282744634 | -1.09 | 4.96 | 720 | 966 | -0.95 |
| 010-14 | 287 | 0.095223 | 0.002196 | 0.282784 | 0.000026 | 0.282772292 | -0.03 | 5.94 | 685 | 903 | -0.93 |
| 010-15 | 287 | 0.100179 | 0.003133 | 0.282829 | 0.000028 | 0.282812407 | 1.56 | 7.36 | 635 | 812 | -0.91 |
| 010-16 | 287 | 0.051481 | 0.001215 | 0.282786 | 0.000024 | 0.282779795 | 0.05 | 6.20 | 664 | 886 | -0.96 |
| 010-17 | 287 | 0.037231 | 0.000900 | 0.282736 | 0.000022 | 0.282730747 | -1.75 | 4.47 | 730 | 997 | -0.97 |
| 010-18 | 287 | 0.066204 | 0.002258 | 0.282760 | 0.000025 | 0.282747441 | -0.90 | 5.06 | 722 | 959 | -0.93 |
| 010-19 | 287 | 0.093769 | 0.003265 | 0.282771 | 0.000022 | 0.282753730 | -0.49 | 5.28 | 725 | 945 | -0.90 |
| 010-20 | 287 | 0.076179 | 0.001944 | 0.282791 | 0.000023 | 0.282780575 | 0.21 | 6.23 | 670 | 884 | -0.94 |

表3 道伦达坝黑云母花岗岩锆石微量元素数据（×10-6）

Table 3 Zircon trace element data for the Potoumian granodiorite in Guangdong Province（×10-6）

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 测点号 | DLDB18-001 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Ti | 3.63 | 9.47 | 3.90 | 19.48 | 13.91 | 14.05 | 2.74 | 6.05 | 3.34 | 7.03 | 4.01 | 10.41 | 6.75 | 5.87 | 5.81 | 13.88 | 6.73 | 10.72 | 8.02 | 15.08 | 2.30 | 6.52 | 10.70 | 7.65 | 23.48 |
| Y | 2746 | 2503 | 2986 | 2585 | 5030 | 1691 | 1986 | 1543 | 1997 | 1003 | 2311 | 2778 | 1860 | 2530 | 2278 | 2792 | 2352 | 2904 | 1650 | 3311 | 1882 | 1111 | 2694 | 1158 | 1844 |
| Nb | 1.23 | 0.98 | 2.39 | 0.88 | 1.14 | 1.02 | 1.26 | 1.35 | 1.41 | 0.71 | 0.76 | 1.15 | 1.52 | 0.86 | 1.31 | 0.70 | 1.13 | 0.86 | 0.98 | 1.56 | 0.96 | 1.00 | 0.84 | 0.94 | 0.55 |
| La | 0.01 | 0.00 | 0.00 | 0.03 | 0.04 | 0.03 | / | 0.00 | / | 0.01 | 0.00 | 0.04 | 0.01 | / | 0.03 | 0.13 | / | 0.02 | 0.01 | 0.00 | 0.01 | / | / | / | 0.01 |
| Ce | 0.99 | 2.72 | 2.61 | 2.22 | 3.20 | 1.36 | 1.14 | 0.55 | 1.28 | 1.13 | 1.47 | 3.27 | 1.55 | 1.21 | 1.92 | 2.22 | 0.99 | 1.32 | 0.93 | 0.79 | 0.38 | 0.91 | 2.28 | 1.53 | 1.01 |
| Pr | 0.05 | 0.29 | 0.10 | 0.38 | 0.50 | 0.11 | 0.03 | 0.04 | 0.03 | 0.06 | 0.06 | 0.26 | 0.10 | 0.06 | 0.13 | 0.39 | 0.05 | 0.14 | 0.10 | 0.10 | 0.04 | 0.08 | 0.24 | 0.07 | 0.14 |
| Nd | 1.50 | 4.16 | 2.16 | 5.87 | 8.90 | 2.35 | 0.69 | 1.21 | 0.77 | 1.51 | 1.58 | 6.04 | 2.17 | 2.71 | 1.88 | 5.90 | 1.19 | 3.64 | 2.05 | 1.18 | 0.79 | 1.43 | 5.25 | 1.22 | 3.42 |
| Sm | 5.02 | 10.90 | 6.47 | 11.01 | 17.59 | 5.58 | 3.25 | 5.25 | 3.10 | 3.68 | 5.68 | 11.05 | 8.19 | 5.50 | 5.23 | 11.20 | 4.10 | 8.72 | 6.04 | 4.99 | 2.11 | 4.84 | 11.17 | 4.22 | 7.86 |
| Eu | 0.16 | 1.09 | 0.33 | 0.48 | 0.62 | 0.22 | 0.10 | 0.12 | 0.07 | 0.14 | 0.12 | 0.32 | 0.15 | 0.30 | 0.07 | 0.47 | 0.08 | 0.50 | 0.11 | 0.12 | 0.10 | 0.11 | 0.21 | 0.10 | 0.19 |
| Gd | 43.83 | 63.19 | 44.39 | 64.83 | 114.41 | 31.80 | 27.24 | 42.83 | 28.39 | 27.53 | 39.81 | 65.96 | 52.39 | 44.23 | 38.12 | 67.84 | 35.14 | 55.56 | 42.20 | 44.85 | 22.97 | 34.49 | 63.84 | 22.95 | 46.38 |
| Tb | 17.31 | 20.26 | 18.41 | 20.66 | 40.55 | 11.83 | 12.51 | 17.29 | 11.82 | 9.07 | 16.10 | 22.15 | 18.90 | 16.61 | 14.88 | 22.95 | 15.14 | 20.72 | 14.13 | 20.66 | 10.16 | 12.17 | 20.61 | 8.65 | 14.15 |
| Dy | 233.5 | 233.8 | 244.2 | 242.1 | 478.3 | 146.9 | 166.3 | 173.2 | 161.0 | 97.4 | 210.2 | 261.9 | 198.0 | 217.4 | 191.8 | 264.1 | 201.1 | 247.2 | 156.6 | 280.1 | 150.5 | 119.3 | 246.4 | 104.0 | 173.1 |
| Ho | 90.8 | 86.7 | 100.7 | 91.2 | 172.6 | 56.2 | 64.4 | 46.5 | 67.4 | 32.6 | 81.6 | 96.2 | 59.6 | 85.9 | 78.6 | 98.3 | 76.5 | 97.6 | 53.6 | 103.4 | 61.0 | 35.1 | 95.5 | 39.9 | 64.2 |
| Er | 411.2 | 369.2 | 472.3 | 383.7 | 720.5 | 256.9 | 303.6 | 152.3 | 324.9 | 130.3 | 364.8 | 408.1 | 212.3 | 393.2 | 357.8 | 417.6 | 347.8 | 438.7 | 226.9 | 426.2 | 278.0 | 129.0 | 429.0 | 176.8 | 272.9 |
| Tm | 86.7 | 74.2 | 100.9 | 73.9 | 135.4 | 53.2 | 64.9 | 25.0 | 69.9 | 24.9 | 74.8 | 79.3 | 38.8 | 81.6 | 75.6 | 83.1 | 71.5 | 89.0 | 46.0 | 82.7 | 59.8 | 23.3 | 86.8 | 36.4 | 55.6 |
| Lu | 156.1 | 130.4 | 187.9 | 126.1 | 210.1 | 102.1 | 120.0 | 33.5 | 139.0 | 42.5 | 136.4 | 134.4 | 61.8 | 146.6 | 141.9 | 140.2 | 125.8 | 157.1 | 84.4 | 119.7 | 105.2 | 37.1 | 151.2 | 68.6 | 98.3 |
| Yb | 789.9 | 650.3 | 917.1 | 647.6 | 1111.9 | 491.9 | 602.7 | 191.0 | 665.8 | 216.2 | 680.8 | 685.8 | 320.3 | 735.9 | 701.4 | 723.0 | 645.9 | 796.1 | 418.5 | 689.2 | 541.4 | 196.7 | 764.5 | 335.9 | 486.4 |
| ΣREE | 1837 | 1647 | 2097 | 1670 | 3015 | 1161 | 1367 | 689 | 1473 | 587 | 1614 | 1775 | 974 | 1731 | 1609 | 1837 | 1525 | 1916 | 1052 | 1774 | 1232 | 595 | 1877 | 800 | 1224 |
| Th | 43.71 | 146.69 | 124.26 | 107.23 | 186.81 | 44.96 | 57.19 | 31.05 | 63.93 | 50.15 | 87.44 | 170.28 | 78.68 | 62.00 | 82.97 | 97.88 | 52.04 | 70.03 | 47.33 | 43.30 | 26.32 | 38.20 | 109.73 | 55.72 | 52.28 |
| U | 260.79 | 262.93 | 382.85 | 161.51 | 350.58 | 144.26 | 345.74 | 357.06 | 308.26 | 170.58 | 336.65 | 258.71 | 376.85 | 218.73 | 291.52 | 168.50 | 300.30 | 180.15 | 261.29 | 505.67 | 314.93 | 263.01 | 174.64 | 166.17 | 94.37 |
| Th/U | 0.17 | 0.56 | 0.32 | 0.66 | 0.53 | 0.31 | 0.17 | 0.09 | 0.21 | 0.29 | 0.26 | 0.66 | 0.21 | 0.28 | 0.28 | 0.58 | 0.17 | 0.39 | 0.18 | 0.09 | 0.08 | 0.15 | 0.63 | 0.34 | 0.55 |
| Ta | 0.52 | 0.40 | 0.92 | 0.35 | 0.56 | 0.45 | 0.73 | 0.59 | 0.65 | 0.31 | 0.53 | 0.57 | 0.59 | 0.40 | 0.64 | 0.37 | 0.55 | 0.42 | 0.45 | 0.91 | 0.52 | 0.47 | 0.42 | 0.37 | 0.27 |
| Hf | 10781 | 9262 | 10338 | 9478 | 11009 | 8822 | 11530 | 11079 | 11264 | 11057 | 10902 | 9051 | 10202 | 10605 | 11354 | 9755 | 12086 | 9988 | 11192 | 13150 | 12353 | 11012 | 10303 | 9631 | 10419 |
| Pb\* | 14.66 | 13.95 | 21.09 | 9.19 | 19.06 | 8.68 | 19.74 | 17.34 | 16.99 | 9.22 | 18.16 | 14.88 | 19.04 | 12.52 | 15.95 | 9.22 | 15.41 | 9.56 | 13.46 | 24.37 | 16.79 | 13.68 | 10.07 | 9.32 | 5.49 |
| δEu | 0.02 | 0.10 | 0.04 | 0.04 | 0.03 | 0.04 | 0.02 | 0.02 | 0.01 | 0.03 | 0.02 | 0.03 | 0.02 | 0.04 | 0.01 | 0.04 | 0.01 | 0.05 | 0.02 | 0.02 | 0.03 | 0.02 | 0.02 | 0.02 | 0.02 |
| Eu/Eu\* | 0.03 | 0.13 | 0.06 | 0.06 | 0.04 | 0.05 | 0.03 | 0.02 | 0.02 | 0.04 | 0.03 | 0.04 | 0.02 | 0.06 | 0.01 | 0.05 | 0.02 | 0.07 | 0.02 | 0.03 | 0.04 | 0.03 | 0.02 | 0.03 | 0.03 |
| δCe | 5.73 | 2.78 | 7.54 | 1.71 | 1.86 | 3.37 | 10.36 | 4.48 | 14.39 | 5.22 | 7.41 | 3.61 | 4.55 | 6.24 | 4.19 | 1.53 | 5.87 | 2.64 | 2.67 | 2.43 | 2.75 | 3.45 | 2.93 | 6.93 | 2.18 |
| Ce/Ce\* | 15.01 | 24.74 | 34.10 | 4.74 | 5.16 | 5.60 | / | 10.55 | / | 13.94 | 22.32 | 7.66 | 15.49 | / | 8.03 | 2.39 | / | 6.61 | 6.76 | 13.83 | 5.23 | / | / | / | 8.11 |
| Tzr(℃) | 700.71 | 790.46 | 706.78 | 869.80 | 831.39 | 832.46 | 677.14 | 746.48 | 693.45 | 760.90 | 709.19 | 800.24 | 756.93 | 743.73 | 742.78 | 831.10 | 756.58 | 803.37 | 773.80 | 840.35 | 662.84 | 753.60 | 803.18 | 769.10 | 892.35 |
| 测点号 | DLDB18-010 | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| Ti | 3.96 | 7.53 | 10.81 | 37.13 | 6.28 | 8.68 | 9.27 | 21.26 | 9.44 | 10.96 | 10.94 | 9.32 | 4.34 | 15.59 | 3.93 | 17.42 | 7.03 | 3.63 | 6.43 | 4.48 | 7.34 | 16.78 | 3.38 | 13.77 | 11.03 |
| Y | 4099 | 2650 | 2099 | 1746 | 3329 | 2355 | 1711 | 2120 | 2791 | 2642 | 1285 | 1933 | 1612 | 2285 | 3363 | 2428 | 3375 | 2649 | 3079 | 1641 | 1479 | 1509 | 4254 | 2193 | 2677 |
| Nb | 1.87 | 0.91 | 1.10 | 1.27 | 1.44 | 1.01 | 1.83 | 1.09 | 1.24 | 0.88 | 1.23 | 1.32 | 0.94 | 0.74 | 1.30 | 0.91 | 1.02 | 1.62 | 0.91 | 1.15 | 0.77 | 0.92 | 1.34 | 0.81 | 1.03 |
| La | 0.00 | 0.00 | / | 0.01 | 0.00 | / | 0.03 | 0.04 | 0.41 | 0.03 | 0.10 | 0.03 | / | 0.01 | / | 0.01 | 0.00 | 0.01 | 0.03 | / | / | / | / | / | 0.01 |
| Ce | 0.87 | 1.82 | 1.97 | 1.86 | 0.60 | 1.21 | 2.39 | 2.67 | 4.07 | 2.25 | 2.34 | 0.96 | 0.46 | 1.46 | 0.73 | 3.38 | 2.18 | 1.09 | 1.84 | 1.44 | 0.94 | 1.38 | 0.58 | 1.37 | 2.66 |
| Pr | 0.14 | 0.10 | 0.14 | 0.15 | 0.02 | 0.10 | 0.16 | 0.47 | 0.30 | 0.29 | 0.08 | 0.11 | 0.04 | 0.17 | 0.03 | 0.47 | 0.25 | 0.04 | 0.14 | 0.08 | 0.06 | 0.11 | 0.04 | 0.12 | 0.22 |
| Nd | 1.93 | 2.49 | 2.79 | 2.80 | 0.77 | 2.23 | 2.21 | 9.91 | 5.42 | 4.85 | 1.70 | 1.79 | 0.77 | 3.61 | 0.56 | 7.51 | 4.44 | 0.81 | 3.04 | 1.34 | 0.92 | 1.95 | 1.30 | 2.39 | 5.35 |
| Sm | 9.67 | 7.24 | 8.12 | 5.44 | 3.27 | 6.77 | 6.14 | 15.19 | 11.87 | 11.52 | 3.06 | 8.43 | 4.05 | 8.84 | 3.35 | 15.92 | 10.40 | 3.93 | 7.91 | 4.27 | 2.46 | 5.04 | 5.38 | 6.95 | 10.78 |
| Eu | 0.18 | 0.29 | 0.19 | 0.26 | 0.07 | 0.12 | 0.24 | 1.09 | 0.63 | 0.34 | 0.21 | 0.20 | 0.13 | 0.20 | 0.04 | 0.54 | 0.38 | 0.10 | 0.31 | 0.16 | 0.10 | 0.23 | 0.13 | 0.21 | 0.58 |
| Gd | 84.14 | 46.83 | 43.05 | 38.30 | 43.75 | 43.93 | 37.37 | 77.19 | 61.23 | 58.44 | 21.69 | 63.19 | 31.64 | 50.78 | 36.13 | 80.50 | 60.09 | 34.61 | 52.90 | 33.22 | 23.45 | 28.31 | 52.61 | 42.67 | 62.97 |
| Tb | 36.07 | 17.70 | 14.81 | 13.34 | 19.32 | 16.22 | 12.35 | 20.93 | 21.49 | 19.79 | 8.44 | 22.58 | 13.32 | 17.30 | 18.87 | 22.43 | 23.26 | 14.27 | 20.09 | 12.67 | 9.41 | 9.86 | 24.90 | 16.18 | 20.37 |
| Dy | 427.4 | 227.4 | 182.8 | 159.0 | 274.0 | 205.1 | 150.8 | 215.9 | 255.9 | 234.0 | 106.4 | 227.5 | 150.3 | 213.8 | 275.7 | 243.6 | 297.5 | 211.7 | 261.2 | 153.4 | 123.9 | 125.0 | 346.6 | 192.3 | 245.8 |
| Ho | 125.8 | 92.8 | 72.8 | 61.2 | 114.2 | 81.0 | 58.8 | 76.5 | 97.1 | 93.4 | 43.7 | 59.8 | 51.7 | 79.5 | 106.2 | 87.3 | 119.5 | 88.7 | 108.3 | 55.5 | 47.8 | 52.2 | 140.8 | 74.9 | 96.6 |
| Er | 436.9 | 445.6 | 337.7 | 270.2 | 531.9 | 371.0 | 266.0 | 316.1 | 423.5 | 407.6 | 203.6 | 182.2 | 208.2 | 349.0 | 473.8 | 367.8 | 529.9 | 424.6 | 508.8 | 244.8 | 208.6 | 246.7 | 646.6 | 330.2 | 425.6 |
| Tm | 74.0 | 91.6 | 72.9 | 54.6 | 110.0 | 76.9 | 55.0 | 62.7 | 85.0 | 84.8 | 42.8 | 27.9 | 42.7 | 70.1 | 100.5 | 71.2 | 108.3 | 93.5 | 108.0 | 51.1 | 43.1 | 53.3 | 137.0 | 67.0 | 87.0 |
| Lu | 89.9 | 169.1 | 136.3 | 99.0 | 200.9 | 148.4 | 104.4 | 109.8 | 152.1 | 147.3 | 83.0 | 32.8 | 74.5 | 124.2 | 167.8 | 126.4 | 187.9 | 179.0 | 202.2 | 97.9 | 75.8 | 104.8 | 248.2 | 118.0 | 153.0 |
| Yb | 551.9 | 836.8 | 656.0 | 493.7 | 1026.0 | 721.5 | 496.3 | 545.3 | 773.1 | 741.4 | 398.3 | 203.1 | 378.5 | 612.6 | 905.1 | 621.9 | 953.0 | 877.0 | 995.9 | 468.2 | 388.7 | 503.1 | 1249.9 | 593.4 | 771.9 |
| ΣREE | 1839 | 1940 | 1530 | 1200 | 2325 | 1674 | 1192 | 1454 | 1892 | 1806 | 915 | 831 | 956 | 1532 | 2089 | 1649 | 2297 | 1929 | 2271 | 1124 | 925 | 1132 | 2854 | 1446 | 1883 |
| Th | 57.75 | 83.94 | 70.22 | 76.67 | 43.08 | 51.94 | 75.22 | 146.76 | 130.18 | 106.58 | 55.76 | 43.61 | 27.08 | 81.61 | 36.10 | 148.61 | 110.34 | 72.43 | 93.56 | 62.62 | 35.29 | 44.75 | 40.51 | 60.67 | 112.08 |
| U | 754.03 | 181.46 | 131.36 | 176.79 | 331.06 | 148.74 | 169.39 | 109.14 | 296.12 | 214.57 | 152.51 | 360.61 | 299.34 | 159.84 | 544.75 | 133.00 | 246.62 | 410.53 | 211.99 | 293.98 | 234.47 | 93.27 | 415.21 | 168.35 | 164.39 |
| Th/U | 0.08 | 0.46 | 0.53 | 0.43 | 0.13 | 0.35 | 0.44 | 1.34 | 0.44 | 0.50 | 0.37 | 0.12 | 0.09 | 0.51 | 0.07 | 1.12 | 0.45 | 0.18 | 0.44 | 0.21 | 0.15 | 0.48 | 0.10 | 0.36 | 0.68 |
| Ta | 0.98 | 0.40 | 0.40 | 0.42 | 0.72 | 0.45 | 0.58 | 0.37 | 0.60 | 0.45 | 0.53 | 0.52 | 0.55 | 0.32 | 0.69 | 0.34 | 0.48 | 0.82 | 0.50 | 0.56 | 0.50 | 0.43 | 0.88 | 0.28 | 0.46 |
| Hf | 11429 | 10858 | 9570 | 9276 | 14198 | 10116 | 9297 | 8695 | 13066 | 10196 | 8488 | 10530 | 11660 | 10066 | 11876 | 10365 | 10724 | 11946 | 11508 | 11287 | 12502 | 9066 | 12211 | 9873 | 10209 |
| Pb\* | 181.07 | 60.54 | 46.16 | 57.77 | 83.93 | 45.62 | 55.87 | 59.68 | 97.13 | 73.34 | 47.42 | 90.48 | 72.97 | 55.16 | 129.45 | 65.39 | 81.35 | 108.61 | 69.66 | 80.35 | 60.58 | 31.62 | 101.98 | 51.97 | 63.58 |
| δEu | 0.01 | 0.04 | 0.02 | 0.04 | 0.01 | 0.02 | 0.04 | 0.08 | 0.06 | 0.03 | 0.06 | 0.02 | 0.02 | 0.02 | 0.01 | 0.04 | 0.04 | 0.02 | 0.03 | 0.03 | 0.03 | 0.05 | 0.01 | 0.03 | 0.05 |
| Eu/Eu\* | 0.02 | 0.05 | 0.03 | 0.06 | 0.02 | 0.02 | 0.05 | 0.10 | 0.07 | 0.04 | 0.08 | 0.03 | 0.03 | 0.03 | 0.01 | 0.05 | 0.05 | 0.03 | 0.05 | 0.04 | 0.04 | 0.06 | 0.02 | 0.04 | 0.07 |
| δCe | 1.91 | 5.72 | 4.28 | 3.67 | 8.84 | 3.79 | 4.29 | 1.68 | 2.68 | 2.25 | 5.99 | 2.45 | 3.28 | 2.56 | 7.16 | 2.14 | 2.60 | 7.61 | 3.65 | 5.45 | 4.86 | 3.72 | 4.50 | 3.50 | 3.51 |
| Ce/Ce\* | 9.34 | 28.53 | / | 10.40 | 16.38 | / | 8.38 | 4.67 | 2.80 | 5.43 | 6.37 | 4.31 | / | 8.56 | / | 10.42 | 22.62 | 18.03 | 6.78 | / | / | / | / | / | 13.22 |
| Tzr(℃) | 708.21 | 767.51 | 804.21 | 951.50 | 750.02 | 781.69 | 788.32 | 880.28 | 790.19 | 805.67 | 805.49 | 788.90 | 716.24 | 844.11 | 707.49 | 856.77 | 760.80 | 700.68 | 752.21 | 718.95 | 765.00 | 852.46 | 694.63 | 830.26 | 806.35 |