**表1 白马山复式岩体锆石LA-ICP-MS U-Pb年龄测定结果**

Table 1 Results of LA-ICP-MS zircon U-Pb dting of the Baimashan complex pluton

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **测点编号** | **含量/10-6** | | **Th/U** | **同位素比值和误差** | | | | | |  | **年龄值和误差/Ma** | | | |
| **Th** | **U** |  | **207Pb/206Pb** | **1σ** | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** |  | **207Pb/235U** | **1σ** | **206Pb/238U** | **1σ** |
| **BM-30: 糜棱岩化花岗岩** | | | | | | | | | | | | | | |
| 01 | 32 | 214 | 0.15 | 0.05869 | 0.00073 | 0.52234 | 0.00713 | 0.06447 | 0.00052 |  | 427 | 5 | 403 | 3 |
| 02 | 29 | 150 | 0.19 | 0.06115 | 0.00115 | 0.57364 | 0.01150 | 0.06788 | 0.00067 |  | 460 | 7 | 423 | 4 |
| 03 | 19 | 143 | 0.13 | 0.05746 | 0.00121 | 0.51016 | 0.01129 | 0.06431 | 0.00070 |  | 419 | 8 | 402 | 4 |
| 04 | 11 | 102 | 0.11 | 0.05640 | 0.00100 | 0.52300 | 0.01035 | 0.06697 | 0.00066 |  | 427 | 7 | 418 | 4 |
| 05 | 14 | 31 | 0.47 | 0.05986 | 0.00145 | 0.54225 | 0.01356 | 0.06559 | 0.00056 |  | 440 | 9 | 410 | 3 |
| 06 | 12 | 106 | 0.11 | 0.05706 | 0.00091 | 0.51028 | 0.00854 | 0.06486 | 0.00059 |  | 419 | 6 | 405 | 4 |
| 07 | 8 | 85 | 0.09 | 0.05683 | 0.00081 | 0.49819 | 0.00787 | 0.06344 | 0.00046 |  | 410 | 5 | 397 | 3 |
| 08 | 14 | 115 | 0.12 | 0.06045 | 0.00144 | 0.54366 | 0.01573 | 0.06453 | 0.00057 |  | 441 | 10 | 403 | 3 |
| 09 | 14 | 96 | 0.15 | 0.05174 | 0.00174 | 0.48464 | 0.01645 | 0.06788 | 0.00058 |  | 401 | 11 | 423 | 4 |
| 10 | 70 | 101 | 0.69 | 0.05692 | 0.00121 | 0.53598 | 0.01291 | 0.06808 | 0.00065 |  | 436 | 9 | 425 | 4 |
| 11 | 12 | 133 | 0.09 | 0.05986 | 0.00129 | 0.54986 | 0.01647 | 0.06592 | 0.00090 |  | 445 | 11 | 412 | 5 |
| 12 | 23 | 285 | 0.08 | 0.05480 | 0.00128 | 0.48288 | 0.01317 | 0.06337 | 0.00066 |  | 400 | 9 | 396 | 4 |
| 13 | 12 | 71 | 0.17 | 0.05764 | 0.00105 | 0.53210 | 0.01244 | 0.06761 | 0.00129 |  | 433 | 8 | 422 | 8 |
| **BM-15: 似斑状黑云母花岗闪长岩** | | | | | | | | | | | | | | |
| 01 | 7 | 94 | 0.07 | 0.05302 | 0.00097 | 0.23600 | 0.00451 | 0.03235 | 0.00029 |  | 215 | 4 | 205 | 2 |
| 02 | 24 | 199 | 0.12 | 0.05225 | 0.00073 | 0.24264 | 0.00361 | 0.03373 | 0.00025 |  | 221 | 3 | 214 | 2 |
| 03 | 17 | 148 | 0.12 | 0.05271 | 0.00080 | 0.24184 | 0.00416 | 0.03332 | 0.00032 |  | 220 | 3 | 211 | 2 |
| 04 | 50 | 309 | 0.16 | 0.05320 | 0.00070 | 0.23318 | 0.00360 | 0.03178 | 0.00031 |  | 213 | 3 | 202 | 2 |
| 05 | 40 | 243 | 0.17 | 0.05279 | 0.00075 | 0.24352 | 0.00387 | 0.03345 | 0.00027 |  | 221 | 3 | 212 | 2 |
| 06 | 26 | 155 | 0.17 | 0.05502 | 0.00118 | 0.24769 | 0.00518 | 0.03276 | 0.00037 |  | 225 | 4 | 208 | 2 |
| 07 | 4 | 76 | 0.06 | 0.05028 | 0.00065 | 0.23266 | 0.00402 | 0.03345 | 0.00032 |  | 212 | 3 | 212 | 2 |
| 08 | 4 | 141 | 0.03 | 0.05028 | 0.00071 | 0.23782 | 0.00405 | 0.03435 | 0.00040 |  | 217 | 3 | 218 | 3 |
| 09 | 20 | 111 | 0.18 | 0.05162 | 0.00082 | 0.24536 | 0.00432 | 0.03455 | 0.00038 |  | 223 | 4 | 219 | 2 |
| 10 | 18 | 63 | 0.29 | 0.05074 | 0.00076 | 0.23590 | 0.00395 | 0.03372 | 0.00028 |  | 215 | 3 | 214 | 2 |
| 11 | 14 | 271 | 0.05 | 0.05318 | 0.00099 | 0.23549 | 0.00546 | 0.03209 | 0.00043 |  | 215 | 4 | 204 | 3 |
| 12 | 12 | 60 | 0.20 | 0.04909 | 0.00107 | 0.23959 | 0.00553 | 0.03549 | 0.00035 |  | 218 | 5 | 225 | 2 |
| 13 | 43 | 292 | 0.15 | 0.04997 | 0.00073 | 0.23190 | 0.00406 | 0.03370 | 0.00035 |  | 212 | 3 | 214 | 2 |
| 14 | 9 | 42 | 0.22 | 0.04942 | 0.00119 | 0.24108 | 0.00640 | 0.03553 | 0.00047 |  | 219 | 5 | 225 | 3 |
| 15 | 35 | 197 | 0.18 | 0.05109 | 0.00099 | 0.23899 | 0.00456 | 0.03413 | 0.00036 |  | 218 | 4 | 216 | 2 |
| 16 | 22 | 147 | 0.15 | 0.05567 | 0.00083 | 0.24966 | 0.00414 | 0.03259 | 0.00028 |  | 226 | 3 | 207 | 2 |
| 17 | 22 | 317 | 0.07 | 0.05245 | 0.00074 | 0.23164 | 0.00370 | 0.03207 | 0.00025 |  | 212 | 3 | 203 | 2 |

**表2 白马山复式岩体主量和微量元素分析结果**

Table 2 Major and trace element data of the Baimashan complex pluton

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **项目** | **糜棱岩化花岗岩** | |  | **似斑状黑云母花岗闪长岩** | | | |
| **BM-31** | **BM-50** |  | **BM-16** | **BM-17** | **BM-19** | **BM-21** |
| SiO2 | 74.93 | 75.99 |  | 68.46 | 68.32 | 69.25 | 69.41 |
| TiO2 | 0.04 | 0.04 |  | 0.45 | 0.45 | 0.26 | 0.25 |
| Al2O3 | 13.67 | 13.31 |  | 14.96 | 15.02 | 15.15 | 15.70 |
| TFe2O3 | 1.23 | 0.93 |  | 3.77 | 3.64 | 2.84 | 2.26 |
| MnO | 0.04 | 0.02 |  | 0.06 | 0.06 | 0.04 | 0.03 |
| MgO | 0.16 | 0.14 |  | 1.70 | 1.74 | 0.98 | 0.72 |
| CaO | 0.46 | 0.96 |  | 2.20 | 2.60 | 2.17 | 2.56 |
| Na2O | 3.93 | 3.16 |  | 2.67 | 2.78 | 2.91 | 3.21 |
| K2O | 4.65 | 4.94 |  | 3.45 | 3.63 | 5.23 | 4.43 |
| P2O5 | 0.01 | <0.01 |  | 0.10 | 0.10 | 0.08 | 0.08 |
| LOI | 0.52 | 0.27 |  | 1.64 | 1.33 | 0.36 | 0.36 |
| Total | 99.64 | 99.76 |  | 99.46 | 99.67 | 99.27 | 99.01 |
| A/CNK | 1.11 | 1.08 |  | 1.23 | 1.13 | 1.05 | 1.06 |
| Li | 7.3 | 40.3 |  | 85.8 | 73.2 | 43.8 | 40.3 |
| Be | 9.56 | 3.35 |  | 3.98 | 3.75 | 3.59 | 4.07 |
| Sc | 5.1 | 2.7 |  | 9.1 | 9.9 | 5.9 | 3.4 |
| V | <5 | <5 |  | 61 | 55 | 31 | 27 |
| Cr | 10 | 10 |  | 70 | 70 | 40 | 20 |
| Ni | 5.2 | 0.9 |  | 25.2 | 25.3 | 13.9 | 3.7 |
| Ga | 18.95 | 14.35 |  | 19.20 | 19.35 | 16.35 | 18.55 |
| Rb | 253 | 250 |  | 200 | 208 | 215 | 204 |
| Sr | 39.2 | 68.3 |  | 171.0 | 184.0 | 182.0 | 259 |
| Y | 21.1 | 41.2 |  | 14.5 | 15.3 | 10.5 | 11.3 |
| Zr | 53 | 45 |  | 219 | 179 | 158 | 382 |
| Nb | 28.8 | 10.0 |  | 12.2 | 10.4 | 8.4 | 8.1 |
| Mo | 0.34 | 0.53 |  | 0.70 | 1.08 | 0.85 | 0.52 |
| Sn | 32 | 11 |  | 10 | 8 | 4 | 9 |
| Cs | 13.85 | 32.4 |  | 12.50 | 13.10 | 14.25 | 13.85 |
| Ba | 158.5 | 377 |  | 499 | 432 | 1290 | 1665 |
| La | 10.4 | 13.0 |  | 27.0 | 37.9 | 17.9 | 139.5 |
| Ce | 20.5 | 26.1 |  | 68.5 | 72.6 | 44.4 | 227 |
| Pr | 2.49 | 3.33 |  | 6.07 | 8.07 | 3.82 | 23.2 |
| Nd | 8.5 | 12.3 |  | 21.2 | 25.9 | 12.0 | 65.0 |
| Sm | 2.54 | 3.34 |  | 4.34 | 4.65 | 2.35 | 7.89 |
| Eu | 0.21 | 0.49 |  | 0.85 | 0.88 | 0.95 | 1.53 |
| Gd | 2.78 | 4.22 |  | 3.32 | 3.90 | 2.30 | 4.10 |
| Tb | 0.55 | 0.79 |  | 0.54 | 0.56 | 0.36 | 0.53 |
| Dy | 3.35 | 5.51 |  | 2.83 | 2.92 | 2.02 | 2.37 |
| Ho | 0.70 | 1.31 |  | 0.55 | 0.58 | 0.41 | 0.44 |
| Er | 1.95 | 3.81 |  | 1.36 | 1.53 | 1.04 | 1.10 |
| Tm | 0.34 | 0.68 |  | 0.23 | 0.23 | 0.16 | 0.17 |
| Yb | 2.49 | 5.01 |  | 1.41 | 1.50 | 1.01 | 1.13 |
| Lu | 0.36 | 0.75 |  | 0.23 | 0.22 | 0.15 | 0.18 |
| Hf | 2.6 | 2.2 |  | 5.7 | 4.6 | 4.4 | 8.3 |
| Ta | 7.54 | 3.60 |  | 1.32 | 1.32 | 0.61 | 0.88 |
| W | 2 | <1 |  | 1 | 1 | 3 | 3 |
| Pb | 60.2 | 69.5 |  | 38.9 | 38.1 | 44.2 | 49.9 |
| Th | 13.15 | 21.5 |  | 25.1 | 28.5 | 13.85 | 53.1 |
| U | 3.57 | 7.56 |  | 4.88 | 3.67 | 2.20 | 3.30 |
| 注：主量元素氧化物质量分数为%，微量元素含量单位为10-6。 | | | | | | | |

**表3 白马山复式岩体锆石Lu-Hf同位素测试结果**

Table 3 Results of zircon Lu-Hf isotope analysis of the Baimashan complex pluton

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **测试点号** | **年龄/Ma** | **176Lu/177Hf** | **176Hf/177Hf** | **2 σ** | **(176Hf/177Hf)i** | **(176Hf/177Hf)CHUR** | **εHf(t)** | **TDM/Ma** | **TDM,2/Ma** |
| **BM-30: 糜棱岩化花岗岩** | | | | | | | | | |
| 23BM30-01 | 409 | 0.001748 | 0.282300 | 0.000039 | 0.282286 | 0.282518 | -8.2 | 1373 | 1912 |
| 23BM30-02 | 409 | 0.001220 | 0.282331 | 0.000052 | 0.282322 | 0.282518 | -6.9 | 1309 | 1833 |
| 23BM30-03 | 409 | 0.001631 | 0.282379 | 0.000042 | 0.282366 | 0.282518 | -5.4 | 1256 | 1734 |
| 23BM30-04 | 409 | 0.001440 | 0.282316 | 0.000035 | 0.282305 | 0.282518 | -7.5 | 1338 | 1870 |
| 23BM30-05 | 409 | 0.001017 | 0.282346 | 0.000033 | 0.282338 | 0.282518 | -6.4 | 1281 | 1797 |
| 23BM30-06 | 409 | 0.001100 | 0.282371 | 0.000035 | 0.282363 | 0.282518 | -5.5 | 1249 | 1742 |
| 23BM30-07 | 409 | 0.001748 | 0.282359 | 0.000038 | 0.282346 | 0.282518 | -6.1 | 1288 | 1780 |
| 23BM30-08 | 409 | 0.001154 | 0.282146 | 0.000330 | 0.282138 | 0.282518 | -13.4 | 1566 | 2242 |
| 23BM30-09 | 409 | 0.000823 | 0.282366 | 0.000043 | 0.282359 | 0.282518 | -5.6 | 1247 | 1749 |
| 23BM30-10 | 409 | 0.001508 | 0.282331 | 0.000045 | 0.282320 | 0.282518 | -7.0 | 1319 | 1838 |
| **BM-15: 似斑状黑云母花岗闪长岩** | | | | | | | | | |
| 23BM15-01 | 211 | 0.001015 | 0.282428 | 0.000032 | 0.282424 | 0.282641 | -7.7 | 1167 | 1731 |
| 23BM15-02 | 211 | 0.001010 | 0.282355 | 0.000037 | 0.282351 | 0.282641 | -10.3 | 1269 | 1894 |
| 23BM15-03 | 211 | 0.000752 | 0.282435 | 0.000039 | 0.282432 | 0.282641 | -7.4 | 1149 | 1713 |
| 23BM15-04 | 211 | 0.001010 | 0.282435 | 0.000031 | 0.282431 | 0.282641 | -7.4 | 1157 | 1716 |
| 23BM15-05 | 211 | 0.001142 | 0.282386 | 0.000045 | 0.282381 | 0.282641 | -9.2 | 1230 | 1826 |
| 23BM15-06 | 211 | 0.001131 | 0.282426 | 0.000037 | 0.282422 | 0.282641 | -7.7 | 1172 | 1735 |
| 23BM15-07 | 211 | 0.000736 | 0.282414 | 0.000043 | 0.282411 | 0.282641 | -8.1 | 1177 | 1759 |
| 23BM15-08 | 211 | 0.000938 | 0.282409 | 0.000035 | 0.282405 | 0.282641 | -8.3 | 1191 | 1772 |
| 23BM15-09 | 211 | 0.000804 | 0.282422 | 0.000037 | 0.282419 | 0.282641 | -7.9 | 1168 | 1742 |
| 23BM15-10 | 211 | 0.000816 | 0.282385 | 0.000032 | 0.282382 | 0.282641 | -9.2 | 1220 | 1824 |
| 23BM15-11 | 211 | 0.000985 | 0.282392 | 0.000033 | 0.282389 | 0.282641 | -8.9 | 1215 | 1810 |
| 23BM15-12 | 211 | 0.000789 | 0.282435 | 0.000030 | 0.282432 | 0.282641 | -7.4 | 1150 | 1713 |