Eocene magmatism in the Himalaya: A response to lithospheric flexure during early Indian collision?

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**Data Depository 3（Tables）**

**Table DR1 Summary of Eocene magmatic and metamorphic rocks in Tethyan Himalaya**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample No.** | **location** | **Latitude** | **Longitude** | **Age (Ma)** | **Dating method** | **Lithography** | **SiO2 (wt.%)** | **Origin** |
| 13JT04 | Langshan | 28°58' | 92°09' | 45.0±1.4 | SIMS titanite U-Pb | gabbro | 42.66 | Ji et al. (2016) |
| T0394-AM | Yardoi | 28°48' | 91°54' | 43.5±1.3 | SHRIMP zircon U-Pb | amphibolite | 48.35 | Zeng et al. (2011) |
| T0395-03 | Yardoi | 28°45' | 92°01' | 47.6±1.8 | SHRIMP zircon U-Pb | biotite gneiss |  | Gao et al. (2012) |
| T0388 | Yardoi | 28°46' | 92°03' | 45.0±1.0 | SHRIMP zircon U-Pb | garnet amphibolite |  | Gao et al. (2012) |
| T0319-06 | Yardoi | 28°48' | 92°00' | 42.6±1.1 | SHRIMP zircon U-Pb | granite | 71.80 | Zeng et al. (2011) |
| 310037 | Yalaxiangbo | 28°47' | 92°03' | 42±5 | Biotites 40Ar/39Ar | granite | 71.85 | Aikman et al. (2012) |
| T471-1 | Yardoi | 28°49' | 91°57' | 43.3±0.2 | LA-ICPMS zircon U-Pb | granite | 73.52 | Zeng et al. (2015) |
| 405011 | Dala | 28°36' | 92°18' | 44.1±1.2 | SIMS zircon U–Pb | granite |  | Aikman et al. (2008) |
| T391 | Dala | 28°40' | 92°10' | 43.6±0.2 | LA-ICPMS zircon U-Pb | granite | 70.98 | Zeng et al. (2015) |
| cb-172 | Dala | 28°37' | 92°15' | 44.6±0.4 | SHRIMP zircon U-Pb | granite | 69.17 | Hou et al. (2012) |
| 410007 | Dala | 28°37' | 92°20' | 44.1±1.2 | SIMS zircon U–Pb | granite | 62.12 | Aikman et al. (2012) |
| G16379 | Dala | 28°42' | 92°15' | 43.3±0.6 | LA-ICPMS zircon U-Pb | granite | 70.26 | Dai et al. (2019) |
| G16385 | Dala | 28°40' | 92°15' | 43.4±0.4 | LA-ICPMS zircon U-Pb | granite | 70.28 | Dai et al. (2019) |
| G16391 | Dala | 28°42' | 92°15' | 43.2±0.5 | LA-ICPMS zircon U-Pb | granite | 70.00 | Dai et al. (2019) |
| G16397 | Dala | 28°43' | 92°16' | 43.4±0.4 | LA-ICPMS zircon U-Pb | granite | 67.18 | Dai et al. (2019) |
| cb-77-1 | Quedang | 28°29' | 92°17' | 46.3±0.5 | SHRIMP zircon U-Pb | granite | 69.25 | Hou et al. (2012) |

**Continued Table DR1**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample No.** | **location** | **Latitude** | **Longitude** | **Age (Ma)** | **Dating method** | **Lithography** | **SiO2 (wt.%)** | **Origin** |
| cb-77-3 | Quedang | 28°29' | 92°17' | 45.4±0.4 | SHRIMP zircon U-Pb | granite (enclave) | 69.25 | Hou et al. (2012) |
| yx-9 | Yangxiong | 28°23' | 92°35' | 46.5±0.7 | SHRIMP zircon U-Pb | granite | 68.30 | Hou et al. (2012) |
| T0684 | Ridang | 28°40' | 92°12' | 41.4±0.2 | LA-ICPMS zircon U-Pb | granite | 74.92 | Zeng et al. (2015) |
| LM2 | Liemai | 28°27' | 92°40' | 48.5±1.1 | LA-ICPMS zircon U-Pb | granite | 71.34 | Tian et al. (2018) |
| 09FW115 | Rmba | 29°07' | 90°06' | 44.3±0.5 | SIMS zircon U–Pb | granite | 70.82 | Liu et al. (2014) |
| 12FW111 | Rmba | 29°08' | 90°09' | 44.1±0.8 | SIMS zircon U–Pb | granite | 67.62 | Liu et al. (2014) |
| 17JT13 | Haweng | 29°00' | 90°20' | 45.3±0.4 | SIMS zircon U–Pb | granodiorite | 71.37 | Ji et al. (2020) |
| 17JT16 | Haweng | 29°00' | 90°20' | 44.5±0.8 | SIMS zircon U–Pb | granodiorite | 71.48 | Ji et al. (2020) |
| 17JT15 | Haweng | 29°00' | 90°20' | 44.3±0.8 | LA-ICPMS zircon U-Pb | granodiorite | 73.53 | Ji et al. (2020) |
| 12FW75 | Haweng | 29°00' | 90°20' | 44.4±0.6 | LA-ICPMS zircon U-Pb | granodiorite | 69.98 | Ji et al. (2020) |
| 2000T16 | Niuku | 29°44' | 84°33' | 44.8±2.6 | SHRIMP zircon U-Pb | granite |  | Ding et al. (2005) |
| D8038Y | Buza | 28°48' | 86°22' | 45.5± | Biotites 40Ar/39Ar | granite | 72.06 | Pan et al. (2004) |
| D8201Y | Qubusang | 28°52' | 85°58' | 45.3± | Biotites 40Ar/39Ar | granite | 72.36 | Pan et al. (2004) |
| D3148Y | Louwu | 28°53' | 85°12' | 43.4± | Biotites 40Ar/39Ar | granite | 72.94 | Pan et al. (2004) |
| AY 06-29-06 10B | Zhegu Co | 28°59′ | 91°33′ | 56.9±4.4 | LA-ICPMS zircon U-Pb | detrital zircons |  | Webb et al. (2013) |
| JZ18-2-1 | Gyantse | 28°57′ | 89°34′ | 48.6±0.5 | SIMS zircon U–Pb | diabase | 50.77 | This study |

**Table DR2** **Bulk‐rock major, trace elemental compositions for the Gyantse mafic rocks in Tethyan Himalaya**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **13JZ08-1** | **13JZ09-1** | **13JZ11-1** | **16ML16-1** | **16ML16-2** | **16ML16-3** | **16ML17-2** | **16ML17-4** | **JZ18-1-2** | **JZ18-1-3** |
| Latutide | 28°57′24.8″ | 28°56′52.7″ | 28°59′11.7″ | 28°56′25.7″ | 28°56′25.7″ | 28°56′25.7″ | 28°57′17.5″ | 28°57′17.5″ | 28°57′25.5″ | 28°57′25.5″ |
| Longtitude | 89°34′05.5″ | 89°34′29.5″ | 89°36′17.7″ | 89°32′45.1″ | 89°32′45.1″ | 89°32′45.1″ | 89°32′42″ | 89°32′42″ | 89°34′09.3″ | 89°34′09.3″ |
| Rock type | gabbro | gabbro | gabbro | gabbro | gabbro | gabbro | gabbro | gabbro | diabase | diabase |
| SiO2 | 48.33 | 53.36 | 48.66 | 54.48 | 52.54 | 52.95 | 50.73 | 50.32 | 47.87 | 47.64 |
| TiO2 | 2.29 | 1.87 | 2.81 | 1.93 | 2.05 | 1.99 | 2.09 | 2.33 | 2.19 | 2.16 |
| Al2O3 | 13.24 | 14.50 | 14.09 | 11.35 | 12.25 | 10.90 | 14.93 | 13.52 | 11.73 | 11.87 |
| Fe2O3T | 11.46 | 9.51 | 12.77 | 10.08 | 10.95 | 11.05 | 10.00 | 10.33 | 11.99 | 12.10 |
| MnO | 0.16 | 0.13 | 0.21 | 0.15 | 0.15 | 0.15 | 0.16 | 0.13 | 0.16 | 0.16 |
| MgO | 8.77 | 4.98 | 5.96 | 8.90 | 8.45 | 9.90 | 6.28 | 5.84 | 11.69 | 11.73 |
| CaO | 8.94 | 7.04 | 8.78 | 6.38 | 7.45 | 6.89 | 9.48 | 9.72 | 7.72 | 7.85 |
| Na2O | 2.30 | 3.06 | 2.85 | 1.54 | 2.29 | 1.23 | 2.59 | 2.05 | 1.93 | 1.87 |
| K2O | 0.95 | 1.97 | 0.97 | 1.82 | 0.91 | 1.34 | 0.91 | 0.41 | 0.02 | 0.02 |
| P2O5 | 0.26 | 0.31 | 0.30 | 0.26 | 0.28 | 0.24 | 0.25 | 0.29 | 0.26 | 0.26 |
| LOI | 2.75 | 3.06 | 2.26 | 2.52 | 2.61 | 3.04 | 2.09 | 4.56 | 4.44 | 4.34 |
| Total | 99.45 | 99.78 | 99.65 | 99.42 | 99.92 | 99.68 | 99.5 | 99.5 | 100.00 | 100.00 |
| Sc | 24.0 | 24.2 | 24.4 | 22.3 | 22.7 | 25.2 | 27.7 | 27.6 | 22.4 | 23.1 |
| V | 222 | 194 | 280 | 183 | 187 | 196 | 227 | 246 | 217 | 223 |
| Cr | 524 | 163 | 53 | 722 | 622 | 815 | 255 | 133 | 894 | 919 |
| Co | 47.7 | 29.6 | 40.1 | 40.2 | 38.1 | 43.7 | 31.5 | 32.6 | 50.02 | 54.0 |
| Ni | 111 | 36.2 | 27.6 | 108 | 84.7 | 115 | 22.6 | 19.1 | 128 | 133 |
| Ga | 19.9 | 22.5 | 23.1 | 18.8 | 19.5 | 18.7 | 21.3 | 21.6 | 17.49 | 18.7 |
| Rb | 32.3 | 85.5 | 36.6 | 77.0 | 36.1 | 55.2 | 35.1 | 13.2 | 0.41 | 0.40 |
| Sr | 631 | 385 | 334 | 619 | 341 | 367 | 643 | 664 | 341 | 381 |
| Y | 22.9 | 32.2 | 28.9 | 30.5 | 30.5 | 30.3 | 25.9 | 29.4 | 24.7 | 25.3 |
| Zr | 195 | 279 | 244 | 270 | 247 | 252 | 192 | 216 | 178.4 | 185.6 |
| Nb | 11.8 | 14.4 | 18.2 | 16.5 | 15.3 | 15.1 | 12.6 | 14.1 | 11.9 | 11.7 |
| Cs | 1.41 | 4.08 | 1.73 | 2.58 | 1.48 | 2.04 | 1.60 | 1.20 | 0.34 | 0.37 |
| Ba | 292 | 441 | 390 | 373 | 164 | 261 | 331 | 139 | 16.4 | 17.2 |
| La | 18.8 | 31.7 | 26.0 | 29.3 | 27.8 | 27.3 | 18.2 | 22.6 | 18.4 | 18.3 |
| Ce | 44.3 | 70.8 | 57.7 | 66.6 | 63.5 | 61.8 | 43.7 | 52.7 | 42.5 | 43.1 |
| Pr | 6.02 | 9.16 | 7.50 | 8.41 | 8.18 | 7.88 | 5.94 | 7.15 | 5.73 | 5.82 |
| Nd | 27.2 | 39.4 | 32.1 | 35.4 | 34.2 | 33.5 | 26.3 | 31.3 | 25.7 | 26.2 |
| Sm | 6.31 | 8.78 | 7.34 | 7.56 | 7.44 | 7.22 | 6.11 | 7.16 | 5.72 | 5.92 |
| Eu | 2.01 | 2.47 | 2.40 | 1.97 | 2.18 | 1.94 | 1.98 | 2.20 | 1.86 | 1.90 |
| Gd | 6.24 | 8.68 | 7.46 | 6.61 | 6.56 | 6.48 | 5.55 | 6.38 | 5.87 | 5.62 |
| Tb | 0.92 | 1.23 | 1.11 | 1.04 | 1.03 | 1.00 | 0.88 | 1.01 | 0.91 | 0.87 |
| Dy | 5.16 | 6.85 | 6.19 | 6.06 | 6.00 | 5.96 | 5.15 | 5.92 | 4.94 | 4.82 |
| Ho | 0.95 | 1.32 | 1.18 | 1.19 | 1.18 | 1.17 | 1.01 | 1.16 | 0.94 | 0.94 |
| Er | 2.48 | 3.33 | 3.01 | 2.93 | 2.87 | 2.92 | 2.46 | 2.78 | 2.45 | 2.54 |
| Tm | 0.34 | 0.46 | 0.42 | 0.42 | 0.41 | 0.42 | 0.35 | 0.40 | 0.34 | 0.35 |
| Yb | 2.06 | 2.79 | 2.53 | 2.58 | 2.58 | 2.57 | 2.14 | 2.43 | 2.13 | 2.07 |
| Lu | 0.31 | 0.41 | 0.39 | 0.40 | 0.39 | 0.41 | 0.33 | 0.36 | 0.27 | 0.29 |
| Hf | 4.93 | 7.15 | 6.43 | 7.23 | 6.51 | 6.52 | 5.05 | 5.75 | 4.52 | 4.80 |
| Ta | 0.85 | 1.09 | 1.28 | 1.21 | 1.09 | 1.10 | 0.86 | 0.98 | 0.84 | 0.87 |
| Pb | 2.83 | 7.13 | 15.92 | 13.49 | 4.74 | 4.45 | 3.31 | 4.91 | 4.93 | 5.42 |
| Th | 4.24 | 9.70 | 5.46 | 9.84 | 8.59 | 8.92 | 4.11 | 4.85 | 3.79 | 4.04 |
| U | 0.78 | 1.71 | 1.09 | 1.76 | 1.50 | 1.58 | 0.78 | 0.89 | 0.71 | 0.78 |

**Continued Table DR2**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **JZ18-1-4** | **JZ18-2-1** | **JZ18-2-2** | **JZ18-2-5** | **16ML17-1** | **JZ18-1-1** | **JZ18-2-3** | **JZ18-2-4** | **13JZ11-3** |
| Latutide | 28°57′25.5″ | 28°57′25.3″ | 28°57′25.3″ | 28°57′25.3″ | 28°57′17.5″ | 28°57′25.5″ | 28°57′25.3″ | 28°57′25.3″ | 28°59′11.7″ |
| Longtitude | 89°34′09.3″ | 89°34′15.7″ | 89°34′15.7″ | 89°34′15.7″ | 89°32′42″ | 89°34′09.3″ | 89°34′15.7″ | 89°34′15.7″ | 89°36′17.7″ |
| Rock type | diabase | diabase | diabase | diabase | gabbro | diabase | diabase | diabase | gabbro |
| SiO2 | 47.70 | 50.77 | 50.19 | 48.02 | 46.99 | 46.02 | 49.79 | 47.67 | 41.15 |
| TiO2 | 2.27 | 2.59 | 2.62 | 2.35 | 2.18 | 2.09 | 2.87 | 2.75 | 2.21 |
| Al2O3 | 11.59 | 14.73 | 14.58 | 12.42 | 13.07 | 11.06 | 14.07 | 13.62 | 11.76 |
| Fe2O3T | 12.02 | 10.52 | 10.42 | 11.87 | 10.29 | 12.02 | 11.66 | 11.63 | 15.42 |
| MnO | 0.16 | 0.15 | 0.15 | 0.16 | 0.16 | 0.15 | 0.17 | 0.15 | 0.18 |
| MgO | 11.91 | 5.73 | 5.69 | 10.19 | 7.92 | 12.38 | 5.91 | 6.05 | 13.87 |
| CaO | 7.87 | 8.44 | 7.57 | 8.32 | 7.59 | 7.05 | 4.89 | 6.56 | 8.30 |
| Na2O | 1.76 | 3.06 | 2.90 | 2.13 | 2.08 | 1.24 | 3.20 | 1.71 | 1.09 |
| K2O | 0.02 | 1.40 | 2.09 | 0.02 | 0.15 | 0.02 | 0.02 | 0.29 | 0.65 |
| P2O5 | 0.26 | 0.31 | 0.31 | 0.28 | 0.23 | 0.26 | 0.35 | 0.33 | 0.23 |
| LOI | 4.33 | 2.29 | 3.11 | 3.99 | 9.05 | 7.48 | 7.39 | 9.08 | 4.62 |
| Total | 99.89 | 99.97 | 99.63 | 99.74 | 99.71 | 99.77 | 100.31 | 99.85 | 99.47 |
| Sc | 23.1 | 27.6 | 26.6 | 23.6 | 23.5 | 21.8 | 24.8 | 24.7 | 26.3 |
| V | 224 | 263 | 256 | 228 | 217 | 210 | 259 | 261 | 252 |
| Cr | 935 | 145 | 149 | 679 | 431 | 994 | 93 | 103 | 128 |
| Co | 52.1 | 32.4 | 27.2 | 55.3 | 39.5 | 60.4 | 35.3 | 37.0 | 89.7 |
| Ni | 133 | 19.8 | 19.5 | 186 | 54.9 | 149 | 45.5 | 51.2 | 128 |
| Ga | 18.0 | 23.0 | 22.3 | 19.3 | 19.1 | 17.5 | 22.8 | 21.8 | 19.7 |
| Rb | 0.390 | 52.4 | 71.9 | 0.340 | 6.70 | 0.700 | 0.950 | 17.6 | 25.0 |
| Sr | 349 | 608 | 584 | 527 | 496 | 255 | 184 | 182 | 71.0 |
| Y | 25.5 | 30.7 | 30.0 | 25.9 | 23.4 | 23.9 | 36.6 | 36.0 | 25.2 |
| Zr | 187 | 223 | 218 | 187 | 181 | 165 | 280 | 274 | 188 |
| Nb | 12.4 | 14.4 | 13.8 | 12.6 | 12.6 | 11.4 | 21. 5 | 20.6 | 15.7 |
| Cs | 0.330 | 2.06 | 2.94 | 0.260 | 0.850 | 0.420 | 0.090 | 0.760 | 1.85 |
| Ba | 15.7 | 281 | 608 | 16.7 | 48.0 | 26.5 | 11.6 | 40.0 | 129 |
| La | 19.1 | 22.9 | 22.6 | 19.6 | 17.7 | 18.1 | 30.2 | 29.5 | 22.3 |
| Ce | 44.4 | 53.2 | 51.7 | 44.9 | 41.3 | 41.1 | 66.2 | 65.3 | 49.6 |
| Pr | 5.82 | 7.06 | 6.87 | 5.91 | 5.48 | 5.59 | 8.57 | 8.20 | 6.4 |
| Nd | 26.1 | 31.1 | 30.6 | 26.5 | 24.1 | 24.7 | 36.1 | 35.5 | 27.6 |
| Sm | 5.91 | 7.12 | 7.06 | 6.16 | 5.57 | 5.75 | 8.08 | 7.57 | 6.31 |
| Eu | 1.97 | 2.34 | 2.37 | 1.99 | 1.88 | 1.87 | 2.49 | 2.52 | 2.03 |
| Gd | 5.87 | 7.35 | 7.16 | 6.39 | 4.93 | 5.48 | 8.08 | 8.20 | 6.35 |
| Tb | 0.92 | 1.12 | 1.07 | 0.96 | 0.80 | 0.84 | 1.24 | 1.25 | 0.94 |
| Dy | 4.93 | 6.06 | 6.00 | 5.04 | 4.73 | 4.66 | 6.93 | 6.84 | 5.30 |
| Ho | 0.97 | 1.20 | 1.11 | 0.99 | 0.92 | 0.92 | 1.38 | 1.34 | 1.02 |
| Er | 2.45 | 3.06 | 2.88 | 2.62 | 2.24 | 2.35 | 3.55 | 3.36 | 2.60 |
| Tm | 0.34 | 0.45 | 0.42 | 0.37 | 0.31 | 0.32 | 0.48 | 0.49 | 0.36 |
| Yb | 2.01 | 2.56 | 2.43 | 2.11 | 1.90 | 1.94 | 3.06 | 2.99 | 2.21 |
| Lu | 0.29 | 0.35 | 0.34 | 0.30 | 0.29 | 0.26 | 0.43 | 0.41 | 0.33 |
| Hf | 4.68 | 5.81 | 5.53 | 4.72 | 4.77 | 4.40 | 7.04 | 7.05 | 4.95 |
| Ta | 0.87 | 1.01 | 0.99 | 0.92 | 0.88 | 0.81 | 1.50 | 1.43 | 1.11 |
| Pb | 5.98 | 4.12 | 5.20 | 5.95 | 2.77 | 6.81 | 6.44 | 4.43 | 0.70 |
| Th | 4.05 | 4.93 | 4.72 | 4.00 | 3.57 | 3.49 | 7.40 | 7.34 | 5.14 |
| U | 0.77 | 0.87 | 0.89 | 0.77 | 0.65 | 0.69 | 1.34 | 1.45 | 1.01 |

**Table DR3 Bulk‐rock Sr‐Nd isotopic compositions for the Gyantse mafic rocks in Tethyan Himalaya**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sample** | **Rb** | **Sr** | **87Rb/86Sr** | **87Sr/86Sr** | **2σ** | **87Sr/86Sr(i)** | **(87Sr/86Sr)CHUR** | **εSr(t)** | **Sm** | **Nd** | **147Sm/144Nd** | **143Nd/144Nd** | **2σ** | **εNd(t)** |
| 13JZ08-1 | 32.3 | 631.3 | 0.148220 | 0.707737 | 0.000010 | 0.707632 | 0.704442 | 45.3 | 6.31 | 27.19 | 0.1403 | 0.512502 | 0.000005 | -2.29 |
| 13JZ11-1 | 36.6 | 334.1 | 0.317199 | 0.709792 | 0.000012 | 0.709566 | 0.704442 | 72.7 | 7.34 | 32.08 | 0.1383 | 0.512515 | 0.000005 | -2.03 |
| 13JZ11-3 | 25.0 | 71.0 | 1.019962 | 0.708671 | 0.000012 | 0.707946 | 0.704442 | 49.7 | 6.31 | 27.56 | 0.1384 | 0.512495 | 0.000006 | -2.41 |
| JZ18-1-1 | 0.7 | 255.0 | 0.007916 | 0.708366 | 0.000010 | 0.708360 | 0.704442 | 55.6 | 5.75 | 24.67 | 0.1409 | 0.512510 | 0.000011 | -2.14 |
| JZ18-1-3 | 0.40 | 380.6 | 0.003012 | 0.708204 | 0.000007 | 0.708202 | 0.704442 | 53.4 | 5.92 | 26.21 | 0.1365 | 0.512512 | 0.000013 | -2.07 |
| JZ18-2-1 | 52.42 | 608.4 | 0.249297 | 0.707755 | 0.000009 | 0.707578 | 0.704442 | 44.5 | 7.12 | 31.09 | 0.1385 | 0.512513 | 0.000009 | -2.07 |
| JZ18-2-2 | 71.9 | 583.9 | 0.356306 | 0.708021 | 0.000007 | 0.707768 | 0.704442 | 47.2 | 7.06 | 30.55 | 0.1396 | 0.512507 | 0.000004 | -2.19 |
| JZ18-2-4 | 17.6 | 181.7 | 0.280976 | 0.711653 | 0.000008 | 0.711453 | 0.704442 | 99.5 | 7.57 | 35.51 | 0.1289 | 0.512480 | 0.000011 | -2.65 |

**Table DR4** **SIMS zircon U‐Pb dating and O isotopes for the Gyantse mafic rocks in Tethyan Himalaya**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Analysis spot** | **U** | **Th** | **Pb** | **Th/U** | **238U/206Pba** | **±σ** | **207Pb/206Pba** | **±σ** | **206Pb/204Pb** | **207-corr ageb** | **±σ** | **δ18O** | **±σ** |
| **ppm** | **ppm** | **ppm** |  |  | **%** |  | **%** |  | **Ma** |  | **‰** |  |
| JZ18-2-1B@01 | 292 | 152 | 3.17 | 0.52 | 125.5 | 1.70 | 0.08246 | 1.47 | 236 | 48.9 | 0.8 | 5.76 | 0.28 |
| JZ18-2-1B@02 | 490 | 505 | 5.13 | 1.03 | 131.6 | 1.65 | 0.04908 | 1.53 | 5128 | 48.7 | 0.8 | 5.82 | 0.19 |
| JZ18-2-1B@03 | 154 | 71 | 1.49 | 0.46 | 129.9 | 2.17 | 0.06355 | 2.19 | 761 | 48.4 | 1.0 | 6.11 | 0.25 |
| JZ18-2-1B@04 | 293 | 140 | 2.69 | 0.48 | 131.2 | 1.95 | 0.06729 | 11.5 | 1813 | 47.7 | 1.0 | 6.42 | 0.25 |
| JZ18-2-1B@05 | 386 | 261 | 3.84 | 0.68 | 127.0 | 1.73 | 0.04822 | 1.50 | 5992 | 50.5 | 0.9 | 5.82 | 0.30 |
| JZ18-2-1B@06 | 405 | 310 | 4.65 | 0.77 | 125.3 | 2.37 | 0.08937 | 18.2 | 327 | 48.5 | 1.6 | 6.11 | 0.32 |
| JZ18-2-1B@07 | 122 | 48 | 1.09 | 0.40 | 131.3 | 1.91 | 0.04634 | 3.14 | 14221 | 48.9 | 0.9 | 5.96 | 0.15 |
| JZ18-2-1B@08 | 172 | 147 | 2.21 | 0.85 | 121.3 | 2.57 | 0.13485 | 12.8 | 163 | 47.1 | 1.7 | 5.76 | 0.37 |
| JZ18-2-1B@09 | 215 | 209 | 2.11 | 0.98 | 139.9 | 2.92 | 0.04872 | 1.98 | 4992 | 45.8 | 1.3 | 5.90 | 0.15 |
| JZ18-2-1B@10 | 502 | 609 | 5.53 | 1.21 | 129.3 | 1.82 | 0.04743 | 1.42 | 15018 | 49.7 | 0.9 | 5.08 | 0.23 |
| JZ18-2-1B@11 | 337 | 362 | 3.51 | 1.07 | 132.6 | 1.66 | 0.04897 | 1.60 | 6309 | 48.3 | 0.8 | 5.63 | 0.34 |
| JZ18-2-1B@12 | 130 | 103 | 1.25 | 0.79 | 135.7 | 2.25 | 0.05150 | 2.54 | 5044 | 47.0 | 1.1 | 5.97 | 0.26 |
| JZ18-2-1B@13 | 173 | 139 | 1.67 | 0.80 | 133.6 | 2.41 | 0.04925 | 2.24 | 2535 | 47.9 | 1.2 | 6.14 | 0.24 |
| JZ18-2-1B@14 | 307 | 120 | 2.73 | 0.39 | 131.7 | 1.70 | 0.04712 | 1.69 | 25862 | 48.8 | 0.8 | 6.26 | 0.24 |

a 238U/206Pb and 207Pb/206Pb ratios are not corrected for common lead.

b 207-corr age refers to 206Pb/238U age that is corrected for common lead based on 207Pb-based method with common lead isotope composition of 207Pb/206Pb ratio anchored at 0.8356.

**Table DR5 Representative pressure-temperature (P-T) and thermal gradients for Cenozoic metamorphism in Himalaya**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **No.** | **Location** | **Longitude** | **Latitude** | **Age （Ma）** | **T（°C）** | **P (GPa)** | **Ref.** |
| 1 | Sikkim | 88°11′48"E | 27°24′18"N | 23 | 750 | 1.2 | Harris et al., 2004 |
| 2 | Yadong | 88°50′E | 27°25′N | 30 | 845 | 1.2 | Zhang et al., 2017 |
| 3 | Barun | 87°12′21″E | 27°39′34″N | 22-11 | 800 | 1 | Groppo et al., 2012 |
| 4 | Sikkim | 88°32′33"E | 27°45′58"N | ~31-17 | 800 | 0.9 | Rubatto et al., 2013 |
| 5 | Jomolhari | 89°20′59″E | 27°47′49″N | 36 | 800 | 0.85 | Regis et al., 2014 |
| 6 | Rani Pauwa | 85°13′E | 27°49′N | 44-38 | 760 | 1.05 | Khanal et al., 2021 |
| 7 | Sikkim | 88°33'2"E | 27°50'15"N | 36 | 800 | 0.9 | Rubatto et al., 2013 |
| 8 | Nyalam transect | 85°40′E | 27°55′N | 19 | 690 | 1.03 | Wang et al., 2015 |
| 9 | Nyalam transect | 85°40′E | 27°55′N | 10-8 | 637 | 0.92 | Wang et al., 2015 |
| 10 | Everest | 87°0′45"E | 27°59'16"N | 39 | 770 | 0.5 | Cottle et al., 2009 |
| 11 | Ama Drime Massif | 87.391009°E | 28.182265°N | 38 | 750 | 1.5 | Kellett et al., 2014 |
| 12 | Annapurna | 83.50°E | 28.25°N | 37 | 775 | 1 | Kohn and Corrie, 2011 |
| 13 | Duplex | 85°30′E | 28°10′N | 3.5 | 550 | 0.8 | Kohn, 2008 |
| 14 | Langtang(Munsiari thrust) | 85°30′E | 28°10′N | 10.5 | 725 | 1.2 | Kohn, 2008 |
| 15 | Langtang(Main Central thrust) | 85°30′E | 28°10′N | 16 | 725 | 1.2 | Kohn, 2008 |
| 16 | Langtang(Langtang thrust) | 85°30′E | 28°10′N | 21 | 825 | 0.8 | Kohn, 2008 |
| 17 | Nyalam transect | 85°40′E | 28°10′N | 19-16 | 690 | 1 | Wang et al., 2016 |
| 18 | Nyalam transect | 85°40′E | 28°10′N | 25-16 | 790 | 0.9 | Wang et al., 2016 |
| 19 | Dinggye | 87°20′E | 28°10′N | 30-29 | 830 | 1 | Wang et al., 2017 |
| 20 | Nyalam transect | 86°01′E | 28°10′N | 39.7-34 | 667 | 1.26 | Wang et al., 2013 |
| 21 | Nyalam | 86°0′1″E | 28°13′3″N | 32 | 750 | 0.69 | Wang et al., 2015 |
| 22 | Gyirong-Syabrubensi-Langtang | 85°21′E | 28°14′N | 24 | 720 | 0.9 | Khanal et al., 2020 |
| 23 | Gyirong-Syabrubensi-Langtang | 85°21′E | 28°14′N | 33 | 710 | 1.2 | Khanal et al., 2020 |
| 24 | Nepal | 87°28′E | 28°14′N | 25-15 | 970 | 1.1 | Wang et al., 2021 |
| 25 | Everest | 87°20′E | 28°20′N | 30 | 770 | 2 | Wang et al., 2021 |
| 26 | Kali Gandaki | 84°50′E | 28°30′N | 36-28 | 720 | 1.1 | Iaccarino et al., 2015 |
| 27 | Mabja dome | 88°30′E | 28°50′N | 35 | 705 | 0.82 | Lee and Whitehouse, 2007 |
| 28 | Sikkim-Darjeeling | 88°40′E | 28°50′N | ~8 | 800 | 1 | Ganguly et al., 2000 |
| 29 | Bhutan |  |  | 8 | 800 | 1.2 | Kohn, 2014 |
| 30 | Yardoi dome | 92°03′E | 28°50′N | 18-17 | 650 | 0.9 | Wang et al., 2018 |
| 31 | Yardoi dome | 92°03′E | 28°50′N | 48-36 | 665 | 0.8 | Ding et al., 2016a |
| 32 | Yardoi dome | 92°03′E | 28°50′N | 48-45 | 660 | 0.8 | Ding et al., 2016b |
| 33 | Bhutan | 89°45′1.34″E | 28°6′8.31″N | 14 | 800 | 0.9 | Grujic et al., 2011 |
| 34 | Nepal | 87°24′E | 28°9′N | 30 | 770 | 2 | Wang et al., 2021 |
| 35 | Namche Barwa Syntaxis | 95°20′E | 29°20′N | 40 | 880 | 1.6 | Zhang et al., 2015 |

**Table DR6 data source of 143Nd/144Nd and Nb/Ta ratios for representative components**

|  |  |
| --- | --- |
| **Component** | **Data Source** |
| Tethyan MORB | Xu and Castillo (2004) |
| Panjal basalt | Shellnutt et al. (2014), |
| Tethyan Himalaya Eocene granite | Zeng et al. (2011) |
| Tethyan Himalaya Eocene granite | Hou et al. (2012) |
| Oligo-Miocene leucogranite | Guo and Wilson (2012) |
| Continental crust | Rudnick and Gao (2003) |
| MORB, DMM | Sun and McDonough (1989) |
| GLOSS | Plank and Langmuir, 1998 |

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