**Table S3.** Study-level paleomagnetic data from SQB, and paleomagnetic data of its surrounding blocks during the early Permian to Late Triassic.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Age (Ma) | *Plat* (°N) | *Plong* (°E) | *A*95 | *Paleolat* (°N) | Age (Ma) | *Plat* (°N) | *Plong* (°E) | *Paleolat* (°N) |
| India (Torsvik et al., 2012) | |  |  |  | South China Block (Huang et al., 2018) | |  |  |
| 200 | -24.4 | 130.0 | 2.8 | -20.1 | 200 | 71.3 | 220.4 | 19.6 |
| 210 | -23.0 | 124.8 | 2.2 | -24.0 | 210 | 62.1 | 215.2 | 14.2 |
| 220 | -21.0 | 117.7 | 2.3 | -29.1 | 220 | 53.1 | 213.7 | 8.2 |
| 230 | -17.6 | 113.2 | 2.5 | -34.0 | 230 | 46.1 | 214.1 | 2.9 |
| 240 | -11.6 | 112.5 | 3.6 | -39.7 | 240 | 43.3 | 215.5 | 0.2 |
| 250 | -6.8 | 112.5 | 3.6 | -43.9 | 250 | 46.2 | 223.5 | -1.2 |
| 260 | -6.0 | 112.7 | 2.6 | -44.5 | 260 | 53.6 | 244.3 | -1.0 |
| 270 | -3.4 | 108.9 | 2.9 | -48.6 | 270 | 55.0 | 257.6 | -1.5 |
| 280 | -0.9 | 103.5 | 2.8 | -53.1 | 280 | 55.0 | 271.5 | -2.0 |
| 290 | -0.8 | 101.4 | 2.4 | -53.9 | 290 | 54.8 | 274.8 | -2.0 |
| 300 | -0.7 | 99.2 | 2.8 | -54.7 | 300 | 55.4 | 266.2 | -1.6 |
| 310 | -1.5 | 93.8 | 3.9 | -55.1 | 310 | 55.4 | 257.4 | -1.1 |
| North China Block (Huang et al., 2018) | | |  | | Tarim (Huang et al., 2018) | |  |  |
| 200 | 72.2 | 356.2 | 30.7 | | 200 | 53.1 | 161.8 | 35.2 |
| 210 | 64.8 | 6.3 | 32.9 | | 210 | 53.4 | 163.1 | 34.5 |
| 220 | 62.4 | 6.3 | 32.6 | | 220 | 54.3 | 164.1 | 34.1 |
| 230 | 61.8 | 3.9 | 31.3 | | 230 | 54.6 | 165.9 | 33.1 |
| 240 | 60.7 | 1.2 | 29.8 | | 240 | 53.5 | 170.1 | 30.5 |
| 250 | 54.0 | 357.8 | 26.0 | | 250 | 53.9 | 175.4 | 27.6 |
| 260 | 47.2 | 358.0 | 23.5 | | 260 | 55.8 | 180.0 | 25.8 |
| 270 | 42.9 | 359.9 | 23.0 | | 270 | 58.6 | 182.5 | 25.6 |
| 280 | 40.3 | 2.8 | 23.9 | | 280 | 57.6 | 176.9 | 28.0 |
| 290 | 37.3 | 6.5 | 25.3 | | 290 | 57.3 | 172.4 | 30.2 |
| 300 | 32.1 | 10.4 | 26.2 | | 300 | 59.0 | 173.6 | 30.0 |
| 310 | 23.6 | 13.8 | 25.2 | | 310 | 59.4 | 174.7 | 29.6 |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Plate | Mean Age (Ma) | Age error (Ma) | Lithology | *Slat*  (°N) | *Slong*  (°E) | *N*/*n* | *Plat*  (°N) | *Plong*  (°E) | *A*95 | *Paleolat*  (°N) | Test | *Q* | Reference |
| NQB |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 208.5 | 4.5 | Volcanic rocks | 34.1 | 92.4 | 29/254 | 64.0 | 174.7 | 6.6 | 30.8 | F/R | 7 | Song et al., 2015 |
| 219 | 19 | Volcanic rocks | 34.2 | 93.3 | 5/34 | 59.0 | 184.0 | 17.1 | 25.0 | / | 5 | Lin & Watt, 1988 |
| 219 | 19 | Sandstone | 33.7 | 87.8 | 10/90 | 59.2 | 179.2 | 4.1 | 27.4 | R | 6 | Song et al., 2012 |
| 219 | 19 | Sediments | 34.1 | 92.4 | 8/62 | 80.4 | 185.2 | 7.5 | 31.3 | R | 6 | Zhou et al., 2019 |
| 224.5 | 2.5 | Volcanic rocks | 33.8 | 95.2 | 11/86 | 57.6 | 176.4 | 7.8 | 28.2 | F/R | 7 | Yu et al., 2022 |
| 241 | 1 | Volcanic rocks | 33.5 | 92.0 | 20/219 | 62.2 | 196.4 | 5.6 | 21.0 | F | 6 | Song et al., 2020 |
| 249 | 2 | Sediments | 33.7 | 86.9 | 8/74 | 24.9 | 216.5 | 8.2 | -14.1 | F | 6 | Zhou et al., 2019 |
| 251 | 3 | Volcanic rocks | 32.5 | 95.2 | 29/257 | 59.7 | 228.2 | 3.3 | 8.4 | F/R | 7 | Guan et al., 2021 |
| 259 | 1.4 | Volcanic rocks | 33.9 | 91.9 | 28/184 | -7.8 | 186.9 | 2.8 | -11.6 | F | 6 | Cheng et al., 2023+  Ma et al., 2019 |
| 265 | 6 | Limestone | 29.7 | 98.7 | 10/50 | 54.4 | 231.7 | 6.1 | 2.9 | F | 5 | Huang et al., 1992 |
| 265 | 6 | Limestone | 34.0 | 91.8 | 12/99 | -9.7 | 205.3 | 8.6 | -28.0 | F | 6 | Cheng et al., 2023+  Cheng et al., 2013 |
| 275 | 15 | Limestone | 33.7 | 86.7 | 5/46 | 31.7 | 226.8 | 12.5 | -14.5 | F/R | 6 | Cheng et al., 2012 |
| 296 | 1.2 | Volcanic rocks | 34.1 | 92.4 | 14/129 | 21.7 | 232.9 | 8.9 | -25.8 | F | 6 | Song et al., 2017 |
| 310 | 12 | Limestone | 34.1 | 92.4 | 16/127 | 25.7 | 241.5 | 2.2 | -26.1 | C | 6 | Yang et al., 2017 |
| IC |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 217 | 9 | Sediments | 16.9 | 101.6 | 13/124 | 48.7 | 165.9 | 7.2 | 31.7 | F | 6 | Yan et al., 2017 |
| 227 | 9 | Redbeds | 23.7 | 101.7 | 12/55 | -34.8 | 147.5 | 13.5 | 2.3 | F/R | 6 | Huang & Opdyke 2016 |
| 234.6 | 2.9 | Volcanic rocks | 23.0 | 100.4 | 21/122 | 46.1 | 176.2 | 4.8 | 24.3 | F/C/R | 7 | Yan et al., 2019 |
| 256 | 4 | Volcanic rocks | 21.5 | 103.7 | 4/36 | 45.6 | 226.8 | 6.4 | -3.0 | / | 4 | Chi et al., 2016 |
| 280 | 20 | Limestone | 15.3 | 101.1 | 15/126 | 34.1 | 331.7 | 5.7 | -0.2 | F/R | 6 | Yan et al., 2018 |
| 310 | 12 | Limestone | 21.8 | 101.3 | 14/93 | 76.1 | 181.3 | 4 | -31.2 | F/R | 6 | Yan et al., 2020 |
| SQB |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | K2**-**103.8 |  | Red beds | 32.5 | 84.3 | 22/174 | 49.2 | 1.9 | 3.2 |  | F | 6 | Chen et al., 2017 |
| 111-83 |  | Red beds | 33.2 | 88.7 | 9/73 | 32.7 | 163.9 | 3.1 |  | F | 6 | Meng et al., 2018 |
| 103.8 |  | Volcanic rocks | 32.5 | 84.3 | 14/91 | 79.3 | 339.8 | 5.7 |  | F | 6 | Chen et al., 2017 |
| 120-115 |  | Volcanic rocks | 32.9 | 83.5 | 16/127 | 37.9 | 162.2 | 5.1 |  | / | 5 | Cao et al., 2020 |
| J2 |  | Limestone | 32.7 | 89.4 | 13/98 | 1.0 | 41.1 | 4.6 |  | F/R | 7 | Cao et al., 2019 |
| 219 | 19 | Sandstone | 33.1 | 87.6 | 11/89 | 65.1 | 184.4 | 2.9/4.6 | 27.1 | R | 5 | Song et al., 2012 |
| 222 | 6 | Volcanic rocks | 33.0 | 88.1 | 25/199 | -24.4 | 104.5 | 4.3 | 30.5 | F/R | 6 | This study |
| 265 | 6 | Volcanic rocks | 33.2 | 86.9 | 9/73 | -34.1 | 94.7 | 5.8 | -22.6 | C | 6 | Wei et al., 2022 |
| Si |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 219 | 18 | Basalt | 23.9 | 99.2 | 15/131 | -21.7 | 160.9 | 6.1 | 1.7 | F/R | 7 | Zhao et al., 2015 |
| 242 | 5 | Limestone | 21.0 | 96.7 | - | 65.8 | 187.3 | 3.6 | 26.2 |  | 5 | Zhao et al., 2019 |
| 265 | 6 | Limestone | 21.0 | 96.7 | 3/28 | 53.2 | 254.1 | 1.7 | -2.9 | R | 5 | Zhao et al., 2019 |
| 286 | 13 | Basalt | 25.2 | 99.3 | 13/65 | -17.2 | 77.5 | 9.3 | -38.8 | F | 6 | Huang & Opdyke 1991 |
| Ir |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 219 | 19 | Sediments | 31.0 | 52.9 | 5/35 | 57.9 | - | 3.7 |  | / | 3 | Besse et al., 1998 |
| 249 | 2 | Sediments | 33.6 | 53.8 | 1/14 | 76.5 | 279.5 | 6.5 | 19.7 | / | 3 | Muttoni et al., 2009 |
| 249 | 2 | Sediments | 33.5 | 53.8 | 1/11 | 53.2 | 158.4 | 7 | 37.3 | / | 3 | Muttoni et al., 2009 |
| 255.5 | 3.5 | Sediments | 30.9 | 53.2 | 1/101 | -41.7 | 124.4 | 2.1 | -8.2 | R | 5 | Gallet et al.2000 |
| 255.5 | 3.5 | Limestone | 32.0 | 52.0 | 1/31 | -43.4 | 109.9 | 3.1 | -11 | / | 4 | Besse et al., 1998 |
| 265 | 6 | Volcanic rocks | 36.3 | 52.2 | 2/13 | 19.3 | 289.9 | 1.9 | -33.7 | / | 4 | Besse et al., 1998 |
| LH |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 219 | 19 | Limestone | 30.9 | 84.7 | 6/37 | 19.6 | 211.8 | 10.7 | -14.8 | F | 5 | Zhou et al., 2016 |

Notes: *Slat* and *Slong*, the latitude/longitude of the sampling site; *N*/*n*, number of sites/total number of samples; *Plat*/*Plong*,the latitude/longitude of the paleomagnetic pole; *Paleolat* is the paleolatitude calculated at the reference point of 33.0°N, 88.1°E; *A*95 is the 95% cone of confidence about the paleomagnetic pole; F/R/C denote data associated with a positive fold/reversal/conglomerate tests. The quality factor (*Q*) is an integer in the range 0-7, reflecting the number of reliability criteria (Van der Voo, 1990) met by each result.