**Supplementary Information**

*Liu et al., Tusas-Abiquiu segment of the Rio Grande rift*

**1. Fault surface and mean slip**

At each fault surface where striae is found, we usually take several measurements (2-20, mostly 8-10). Below is a summary of the fault surface and the mean fault-slip data. Our original measurements are listed in the supplementary spreadsheet.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Site No.** | **GPS Location1** | | **HW Rock2** | **FW Rock2** | **Fault Surface** | | | **Slip Sense3** | **Fault-Slip** | | | | | **Conf. Level4** | **Notes** |
| **Easting** | **Northing** | **Strike** | **Dip** | **Dip Quad** | **Ave. Trend** | **Ave. Plunge** | **Ave. Rake** | **Rake’s St. Dev. (1σ)** | **No.** |
|  | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ***Tusas border faults*** | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| T1 | 384855 | 4067021 | pCoq | pCoq | 312 | 56 | E | N | 121 | 16 | 160.9 | 1.2 | 10 | 4 | E Gavilan Canyon Quad |
| T1 | 384857 | 4066907 | pCoq | Tlp | 199 | 25 | W | N | 288 | 25 | 88.8 | 1.7 | 16 | 3 |  |
| T1 | 384857 | 4066907 | pCoq | pCoq | 279 | 65 | N | N | 057 | 55 | 114.7 | 2.6 | 9 | 1 |  |
| T2 | 376456 | 4066335 | pC & Tlp | pC | 088 | 70 | S | D | 267 | 1 | 178.5 | 1.0 | 6 | 3 | Brazos Cliff fault |
| T2 | 376456 | 4066335 | pC & Tlp | pC | 105 | 85 | S | N | 283 | 18 | 161.6 | 1.2 | 10 | 5 |  |
| T2 | 376456 | 4066335 | pC & Tlp | pC | 278 | 80 | N | N | 282 | 22 | 22.7 | 1.8 | 10 | 5 |  |
| T2 | 376253 | 4066205 | pC & Tlp | pC | 109 | 84 | S | D | 288 | 12 | 167.5 | 1.9 | 6 | 4 |  |
| T3 | 383000 | 4065581 | pCoq | Tlp | 353 | 45 | E | N | 062 | 43 | 74.6 | 4.3 | 10 | 3 | East Gavilan fault, E Gavilan Canyon Quad. fault surface perpendicular to S1 schistosity |
| T3 | 385691 | 4061707 | pCoq | Tlp | 131 | 61 | S | N | 237 | 60 | 98.3 | 1.5 | 11 | 5 |  |
| T4 | 400308 | 4060473 | pCv | pCv & Tlpe/Tr | 313 | 65 | E | N | 089 | 56 | 114.3 | 2.6 | 6 | 5 | Mule Canyon fault, Mule Canyon Quad |
| T5 | 394133 | 4050112 | pCoq | Tlp | 145 | 68 | W | N | 270 | 64 | 105.0 | 0.0 | 4 | 4 | Vallecitos normal fault, Mule Canyon Quad |
| T6 | 399739 | 4044253 | pCv | pCv & Tlp | 125 | 70 | W | N | 279 | 50 | 125.4 | 0.8 | 10 | 4 | Vallecitos normal fault near Vallecitos |
| T7 | 404583 | 4031687 | pCoq & Tst | pCoq | 339 | 63 | E | N | 086 | 62 | 97.8 | 1.6 | 4 | 4 | antithetic fault to the Vallecitos normal fault near La Madera |
| T7 | 404583 | 4031687 | pCoq & Tst | pCoq | 338 | 50 | E | N | 079 | 49 | 96.7 | 0.9 | 3 | 4 |  |
| T8 | 392685 | 4028754 | pCoq & Tr | pCv & Ter | 178 | 46 | W | N | 275 | 46 | 94.9 | 2.2 | 7 | 5 | El Rito normal fault, north of El Rito |
| T8 | 392685 | 4028754 | pCoq & Tr | pCv & Ter | 195 | 46 | W | N | 275 | 46 | 83.0 | 2.4 | 7 | 5 |  |
| T8 | 392685 | 4028754 | pCoq & Tr | pCv & Ter | 195 | 69 | W | N | 293 | 69 | 92.6 | 1.9 | 7 | 5 |  |
| T8 | 392685 | 4028754 | pCoq & Tr | pCv & Ter | 179 | 42 | W | N | 276 | 42 | 95.4 | 2.6 | 8 | 5 |  |
| T9 | 398760 | 4028020 | pCoq & Ter & Tr | pCoq | 135 | 35 | W | N | 220 | 35 | 86.3 | 1.2 | 3 | 4 | south or Ortega Peak, west of La Madera |
| T10 | 407007 | 4026664 | pC (& Tt) | pC | 025 | 26 | E | N | 145 | 23 | 117.3 | 4.3 | 7 | 4 | Vallecitos normal fault, La Madera-Ojo Caliente area |
| T10 | 407007 | 4026664 | pC (& Tt) | pC | 210 | 32 | W | N | 276 | 30 | 69.7 | 2.5 | 6 | 5 |  |
| T10 | 406988 | 4026608 | pC (& Tt) | pC | 195 | 60 | W | N | 329 | 51 | 115.9 | 5.4 | 11 | 3 | Vallecitos normal fault, La Madera-Ojo Caliente area |
| T11 | 406469 | 4022880 | pC & Tst | pC | 195 | 70 | W | N | 260 | 68 | 81.1 | 1.5 | 8 | 5 | near the northern tip of the Ojo Caliente fault |
| T11 | 406469 | 4022880 | pC & Tst | pC | 226 | 43 | W | N | 315 | 43 | 89.0 | 2.0 | 2 | 3 |  |
| T11 | 406469 | 4022880 | pC & Tst | pC | 222 | 47 | W | N | 308 | 47 | 86.7 | 3.7 | 3 | 5 |  |
| T12 | 401706 | 4017540 | pC (& Tt) | pC | 103 | 73 | S | N | 273 | 30 | 148.6 | 2.5 | 11 | 5 | Cerro Colorado, SW of Ojo Caliente |
| T12 | 401706 | 4017540 | pC (& Tt) | pC | 106 | 73 | S | N | 281 | 17 | 162.5 | 2.1 | 6 | 5 |  |
| T12 | 401803 | 4017494 | pC (& Tt) | pC | 090 | 59 | S | N | 256 | 21 | 154.6 | 2.9 | 5 | 5 | Ojo Caliente area, border fault |
| T12 | 401843 | 4017494 | pC (& Tt) | pC | 090 | 69 | S | N | 253 | 37 | 140.3 | 3.6 | 4 | 5 |  |
| T13 | 408467 | 4029599 | Tt | Tt | 184 | 60 | W | N | 282 | 60 | 93.5 | 1.5 | 4 | 5 | Petaca area in La Madera Quad. |
| T13 | 408407 | 4028999 | Tt | Tt | 177 | 51 | W | N | 278 | 50 | 97.5 | 2.5 | 2 | 5 | Petaca area in La Madera Quad. |
| T14 | 396830 | 4034847 | Tlp & pCoq | pCoq | 146 | 36 | SW | N | 237 | 36 | 90.8 | 5.4 | 12 | 5 | Ortega West fault, clear brittle faulting evidence |
| T14 | 396830 | 4034847 | Tlp & pCoq | pCoq | 143 | 39 | SW | N | 232 | 39 | 89.4 | 0.9 | 8 | 5 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ***Abiquiu border faults*** | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| A1 | 379459 | 4016812 | Pcl | Pcl | 205 | 40 | W | N | 340 | 31 | 127.4 | 2.9 | 5 | 4 | one strand of the Cobre fault, in the Canon de Cobre |
| A1 | 379887 | 4016733 | TRcp & Pc | TRcp & Pc | 310 | 84 | N | S | 309 | 11 | 349.0 | 0.8 | 3 | 5 |  |
| A1 | 379887 | 4016733 | TRcp & Pc | TRcp & Pc | 305 | 75 | N | S | 307 | 8 | 8.0 | 2.4 | 3 | 3 |  |
| A1 | 379887 | 4016733 | TRcp & Pc | TRcp & Pc | 260 | 76 | N | S | 263 | 13 | 13.0 | 2.2 | 3 | 2 |  |
| A1 | 379887 | 4016733 | TRcp & Pc | TRcp & Pc | 325 | 74 | N | S | 138 | 23 | 335.3 | 0.5 | 3 | 5 |  |
| A1 | 379887 | 4016733 | TRcp & Pc | TRcp & Pc | 305 | 85 | N | S | 123 | 22 | 334.7 | 1.7 | 3 | 5 |  |
| A1 | 379887 | 4016733 | TRcp & Pc | TRcp & Pc | 287 | 70 | N | S | 296 | 23 | 26.0 | 2.2 | 3 | 4 |  |
| A1 | 379887 | 4016733 | TRcp & Pc | TRcp & Pc | 302 | 74 | N | S | 119 | 10 | 347.7 | 1.2 | 3 | 4 |  |
| A1 | 379518 | 4016711 | TRcp & Pc | TRcp & Pc | 281 | 70 | N | S | 284 | 8 | 8.5 | 3.5 | 2 | 5 |  |
| A1 | 379518 | 4016711 | TRcp & Pc | TRcp & Pc | 270 | 77 | N | S | 273 | 11 | 11.0 | 0.0 | 1 | 4 |  |
| A1 | 379210 | 4016694 | TRcp & Pc | TRcp & Pc | 286 | 77 | N | S | 291 | 19 | 19.5 | 6.5 | 2 | 5 |  |
| A1 | 379210 | 4016694 | TRcp & Pc | TRcp & Pc | 293 | 84 | N | S | 295 | 15 | 15.0 | 2.0 | 2 | 5 |  |
| A1 | 379210 | 4016694 | TRcp & Pc | TRcp & Pc | 276 | 81 | N | S | 280 | 21 | 21.5 | 2.5 | 2 | 5 |  |
| A1 | 379210 | 4016694 | TRcp & Pc | TRcp & Pc | 291 | 81 | N | S | 292 | 4 | 4.5 | 0.5 | 2 | 5 |  |
| A1 | 379210 | 4016694 | TRcp & Pc | TRcp & Pc | 291 | 79 | N | S | 296 | 26 | 26.0 | 0.0 | 1 | 5 |  |
| A2 | 379328 | 4013931 | TRcp | TRcp - Pc | 051 | 66 | E | N | 076 | 44 | 49.0 | 2.4 | 5 | 5 | northern end of Canones fault |
| A2 | 379579 | 4013822 | TRcp | TRcp | 345 | 40 | E | N | 093 | 39 | 104.0 | 2.0 | 2 | 3 | Arroyo del Cobre |
| A2 | 379579 | 4013822 | TRcp | TRcp | 354 | 35 | E | N | 092 | 35 | 97.0 | 0.0 | 1 | 5 |  |
| A2 | 379667 | 4013780 | TRcp & TRcu | TRcp - Pc | 050 | 65 | W | N | 252 | 39 | 43.8 | 3.7 | 5 | 4 | antithetic fault of Canones Fault |
| A2 | 379589 | 4013704 | TRcp | TRcp | 024 | 36 | E | N | 096 | 35 | 75.6 | 2.9 | 7 | 5 | Arroyo del Cobre |
| A3 | 378453 | 4013631 | TRc | TRc | 050 | 55 | E | N | 216 | 19 | 156.7 | 1.2 | 11 | 5 | synthetic fault of Canones Fault |
| A3 | 378453 | 4013631 | TRc | TRc | 120 | 29 | S | N | 262 | 19 | 138.0 | 4.4 | 6 | 5 |  |
| A3 | 378453 | 4013631 | TRc | TRc | 277 | 76 | N | N | 062 | 67 | 108.9 | 2.2 | 11 | 5 | antithetic fault of Canones Fault |
| A3 | 378401 | 4013586 | TRc | TRc | 198 | 35 | W | N | 327 | 28 | 123.8 | 2.2 | 4 | 5 | antithetic fault of Canones Fault |
| A3 | 378401 | 4013586 | TRc | TRc | 212 | 27 | W | N | 337 | 23 | 121.7 | 1.7 | 3 | 5 |  |
| A3 | 378401 | 4013586 | TRc | TRc | 218 | 30 | W | N | 345 | 25 | 123.0 | 0.0 | 1 | 4 |  |
| A3 | 378401 | 4013586 | TRc | TRc | 218 | 27 | W | N | 323 | 25 | 112.0 | 0.8 | 3 | 5 |  |
| A3 | 378401 | 4013586 | TRc | TRc | 219 | 41 | W | N | 337 | 38 | 111.7 | 3.4 | 3 | 5 |  |
| A3 | 378401 | 4013586 | TRc | TRc | 224 | 30 | W | N | 337 | 28 | 110.4 | 2.8 | 8 | 5 |  |
| A3 | 378401 | 4013586 | TRc | TRc | 225 | 18 | W | N | 334 | 17 | 107.7 | 1.2 | 3 | 5 |  |
| A3 | 378401 | 4013586 | TRc | TRc | 231 | 29 | W | N | 343 | 27 | 109.7 | 0.9 | 3 | 5 |  |
| A3 | 378401 | 4013586 | TRc | TRc | 232 | 38 | W | N | 341 | 36 | 105.0 | 2.0 | 2 | 5 |  |
| A4 | 377202 | 4012726 | TRcu | TRcu | 230 | 85 | W | N | 243 | 69 | 70.0 | 0.0 | 1 | 5 | antithetic fault of northern strand of Canones Fault |
| A4 | 377206 | 4012697 | TRcu | TRcu | 203 | 41 | W | N | 247 | 31 | 51.8 | 5.0 | 11 | 5 | antithetic fault of northern strand of Canones Fault |
| A4 | 377206 | 4012697 | TRcu | TRcu | 214 | 49 | W | N | 325 | 47 | 104.2 | 3.1 | 10 | 5 |  |
| A4 | 377184 | 4012681 | TRc | TRc | 000 | 52 | E | N | 075 | 51 | 81.0 | 0.0 | 1 | 4 | northern strand of Canones fault |
| A4 | 377184 | 4012681 | TRc | TRc | 023 | 57 | E | N | 120 | 57 | 94.0 | 0.0 | 1 | 5 |  |
| A4 | 377184 | 4012681 | TRc | TRc | 030 | 60 | E | N | 074 | 50 | 62.0 | 0.0 | 1 | 5 |  |
| A4 | 377184 | 4012681 | TRc | TRc | 335 | 55 | E | N | 067 | 55 | 91.0 | 2.0 | 2 | 5 |  |
| A4 | 377184 | 4012681 | TRc | TRc | 340 | 61 | E | N | 072 | 61 | 91.0 | 1.0 | 2 | 5 |  |
| A4 | 377184 | 4012681 | TRc | TRc | 340 | 58 | E | N | 083 | 57 | 97.0 | 0.0 | 1 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 024 | 68 | E | N | 041 | 36 | 39.0 | 0.0 | 1 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 025 | 79 | E | N | 030 | 22 | 22.5 | 1.5 | 2 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 035 | 75 | E | N | 073 | 66 | 71.5 | 8.5 | 2 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 038 | 74 | E | N | 047 | 30 | 31.0 | 5.0 | 2 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 042 | 54 | E | N | 107 | 51 | 75.0 | 0.0 | 1 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 052 | 80 | E | N | 090 | 74 | 77.0 | 0.0 | 1 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 062 | 85 | E | S | 063 | 9 | 9.0 | 0.0 | 1 | 5 |  |
| A5 | 377093 | 4012587 | TRcu | Trcu & TRcp | 066 | 85 | E | S | 067 | 9 | 9.0 | 0.0 | 1 | 4 |  |
| A6 | 376417 | 4012086 | Je | Je | 023 | 52 | W | N | 308 | 51 | 99.3 | 5.5 | 8 | 5 | antithetic fault of Canones Fault |
| A6 | 376417 | 4012076 | Je & Jt | Je & Jt | 010 | 48 | W | N | 295 | 47 | 100.5 | 1.8 | 4 | 5 | antithetic fault of Canones Fault |
| A6 | 376417 | 4012076 | Je & Jt | Je & Jt | 356 | 42 | W | N | 284 | 41 | 103.5 | 5.5 | 2 | 3 |  |
| A6 | 376417 | 4012076 | Je & Jt | Je & Jt | 357 | 44 | W | N | 295 | 40 | 111.0 | 4.0 | 2 | 3 |  |
| A6 | 376411 | 4011998 | Je & Jt | Je & Jt | 008 | 44 | W | N | 301 | 42 | 107.0 | 3.6 | 3 | 5 | antithetic fault of Canones Fault |
| A6 | 376411 | 4011998 | Je & Jt | Je & Jt | 022 | 38 | W | N | 301 | 38 | 97.0 | 1.3 | 6 | 5 |  |
| A6 | 376411 | 4011998 | Je & Jt | Je & Jt | 023 | 36 | W | N | 300 | 36 | 95.7 | 1.9 | 3 | 5 |  |
| A6 | 376411 | 4011998 | Je & Jt | Je & Jt | 028 | 33 | W | N | 302 | 33 | 93.3 | 0.4 | 4 | 5 |  |
| A6 | 376411 | 4011998 | Je & Jt | Je & Jt | 033 | 49 | W | N | 311 | 49 | 95.3 | 3.3 | 6 | 5 |  |
| A6 | 376411 | 4011998 | Je & Jt | Je & Jt | 036 | 47 | W | N | 313 | 47 | 94.7 | 1.2 | 3 | 5 |  |
| A6 | 376467 | 4011882 | TR & Pc | J & T | 040 | 65 | E | N | 105 | 66 | 80.0 | 0.0 | 1 | 5 | master fault of Canones fault |
| A6 | 376467 | 4011882 | TR & Pc | J & T | 045 | 68 | E | N | 137 | 64 | 91.0 | 0.0 | 1 | 5 |  |
| A6 | 376467 | 4011882 | Jt | Je | 047 | 65 | E | N | 104 | 61 | 74.7 | 2.8 | 10 | 5 | Canones fault in the Red Wash Canyon |
| A7 | 376742 | 4011802 | TRcu & J | TRcu | 198 | 58 | W | N | 290 | 58 | 91.3 | 2.3 | 8 | 5 | antithetic fault to Canones fault, Red Wash Canyon |
| A7 | 376742 | 4011802 | TRcu & J | TRcu | 350 | 45 | W | N | 282 | 43 | 106.3 | 2.6 | 9 | 5 |  |
| A7 | 376357 | 4011706 | Jm & Tr | Jm | 333 | 65 | W | N | 292 | 55 | 116.3 | 7.4 | 4 | 3 | antithetic fault of Canones Fault |
| A7 | 376357 | 4011706 | Jm & Tr | Jm | 344 | 55 | W | N | 291 | 49 | 113.3 | 4.5 | 3 | 3 |  |
| A7 | 376389 | 4011706 | Jm & Tr | Jm | 349 | 74 | W | N | 263 | 74 | 91.0 | 1.0 | 2 | 4 |  |
| A7 | 376389 | 4011706 | Jm & Tr | Jm | 350 | 72 | W | N | 263 | 72 | 91.0 | 1.6 | 6 | 4 |  |
| A7 | 376390 | 4011699 | Jm & Tr | Jm | 015 | 74 | W | N | 311 | 72 | 97.6 | 1.4 | 5 | 4 | antithetic fault of Canones Fault |
| A7 | 376390 | 4011699 | Jm & Tr | Jm | 026 | 88 | W | N | 309 | 88 | 90.2 | 0.4 | 5 | 4 | antithetic fault of Canones Fault, ca. 8m offset |
| A8 | 374731 | 4010780 | TR & Pc | TR & Pc | 219 | 51 | W | N | 274 | 45 | 66.2 | 1.9 | 5 | 5 | antithetic fault of Canones Fault |
| A8 | 374731 | 4010780 | TR & Pc | TR & Pc | 220 | 84 | W | N | 277 | 83 | 86.1 | 1.1 | 7 | 5 |  |
| A9 | 373786 | 4008953 | Jm | TRc & Pc | 043 | 65 | E | N | 144 | 65 | 94.6 | 6.9 | 20 | 5 | Canones fault south of Rio Chama, western strand |
| A9 | 373606 | 4008724 | Jm | TRcu | 040 | 58 | E | N | 111 | 57 | 79.8 | 4.4 | 6 | 5 | Canones fault south of Rio Chama, western strand |
| A9 | 373522 | 4008709 | Jm | TRcu | 074 | 64 | E | N | 109 | 50 | 58.0 | 1.8 | 8 | 5 | Canones fault south of Rio Chama, western strand |
| A9 | 373457 | 4008676 | Ta | Jm | 032 | 66 | E | N | 104 | 65 | 82.4 | 1.6 | 9 | 5 | Canones fault south of Rio Chama, eastern strand |
| A9 | 373251 | 4008543 | Je-Kd | TRc | 070 | 65 | E | N | 098 | 46 | 52.0 | 0.0 | 1 | 3 | Canones fault south of Rio Chama, western strand |
| A10 | 365367 | 4002917 | Ta | Ta | 181 | 72 | W | N | 303 | 69 | 101.0 | 0.8 | 3 | 5 | antithetic fault to the Gonzalez fault, south of Cerro Pedernal |
| A10 | 365367 | 4002917 | Ta | Ta | 353 | 30 | E | N | 091 | 30 | 97.2 | 4.4 | 5 | 4 | synthetic fault to the Gonzalez fault, south of Cerro Pedernal |
| A10 | 365367 | 4002917 | Ta | Ta | 168 | 75 | W | N | 266 | 75 | 93.5 | 3.8 | 4 | 4 | antithetic fault to the Gonzalez fault, south of Cerro Pedernal |
| A11 | 364066 | 3997345 | Tst | Ta | 184 | 48 | W | N | 319 | 38 | 123.7 | 2.6 | 3 | 4 | antithetic fault to the Gonzalez fault, south of Cerro Pedernal |
| A11 | 364066 | 3997345 | Tst | Ta | 186 | 54 | W | N | 339 | 32 | 139.0 | 2.7 | 7 | 5 |  |
| A11 | 364066 | 3997345 | Tst | Ta | 164 | 64 | W | N | 328 | 30 | 146.3 | 7.0 | 4 | 3 |  |
| A11 | 364066 | 3997345 | Tst | Ta | 194 | 53 | W | N | 312 | 49 | 107.8 | 1.1 | 6 | 5 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ***Abiquiu internal faults*** | | |  |  |  |  |  |  |  |  |  |  |  |  |  |
| N1 | 378546 | 4008898 | Ta & basaltic dike | Tr | 010 | 62 | E | N | 142 | 54 | 112.6 | 1.5 | 5 | 5 | Abiquiu Quad, internal fault, Garcia fault |
| N1 | 378546 | 4008898 | Ta & basaltic dike | Tr | 014 | 65 | E | N | 136 | 61 | 104.7 | 1.4 | 6 | 5 |  |
| N1 | 378546 | 4008898 | Ta & basaltic dike | Tr | 024 | 59 | E | N | 120 | 59 | 93.2 | 0.7 | 6 | 5 |  |
| N1 | 378546 | 4008898 | Ta & basaltic dike | Tr | 023 | 66 | E | N | 133 | 65 | 98.5 | 1.0 | 8 | 5 |  |
| N2 | 383514 | 4010656 | Ta | Ta | 076 | 84 | S | N | 111 | 80 | 81.4 | 1.9 | 10 | 5 | Abiquiu Quad, internal fault, Plaza Colorada fault |
| N2 | 382656 | 4010632 | Ta | Ta | 085 | 80 | S | N | 113 | 70 | 72.2 | 3.8 | 5 | 5 |  |
| N2 | 382504 | 4010714 | Ta | Ta | 081 | 64 | S | N | 158 | 63 | 84.0 | 2.2 | 3 | 5 |  |
| N2 | 382816 | 4010660 | Ta | Ta | 062 | 72 | S | N | 149 | 72 | 89.0 | 1.0 | 2 | 5 | Abiquiu Quad, internal fault, Plaza Colorada fault |
| N3 | 384459 | 4011682 | Ta | Ta | 000 | 65 | E | N | 090 | 65 | 90.1 | 2.4 | 9 | 5 | Abiquiu Quad, internal fault, Plaza Blanca fault, synthetic fault to the north splay, fracture filled by calcite veins |
| N3 | 384459 | 4011682 | Ta | Ta | 048 | 62 | E | N | 124 | 61 | 83.5 | 2.5 | 13 | 5 | Abiquiu Quad, internal fault, Plaza Blanca fault, synthetic fault to the north splay |
| N3 | 384231 | 4011191 | Ta | Ta | 015 | 79 | E | N | 163 | 70 | 107.0 | 1.3 | 6 | 5 |  |
| N3 | 384231 | 4011191 | Ta | Ta | 013 | 68 | E | N | 137 | 64 | 104.4 | 2.6 | 8 | 5 | Abiquiu Quad, internal fault, Plaza Blanca fault, north splay |
| N3 | 384240 | 4011104 | Ta | Ta | 017 | 62 | E | N | 127 | 61 | 98.7 | 1.6 | 7 | 5 | Abiquiu Quad, internal fault, Plaza Blanca fault, northernmost splay |
| N4 | 389478 | 4004579 | Tt | Tt | 007 | 70 | E | N | 082 | 69 | 84.9 | 1.2 | 7 | 4 | Medanales Quad, internal fault, El Rito fault |
| N4 | 389482 | 4004579 | Tt | Tt | 189 | 68 | W | N | 295 | 67 | 95.8 | 2.4 | 6 | 5 |  |
| N5 | 389472 | 4003161 | Tt | Tt | 005 | 62 | E | N | 087 | 62 | 86.0 | 1.3 | 7 | 5 | Medanales Quad, internal fault, El Rito fault |
| N5 | 389418 | 4002694 | Tt | Tt | 004 | 55 | E | N | 111 | 54 | 99.8 | 1.3 | 6 | 5 | Medanales Quad, internal fault, El Rito fault |
| N5 | 389418 | 4002694 | Tt | Tt | 020 | 74 | E | N | 134 | 73 | 96.4 | 4.3 | 8 | 4 |  |
| N5 | 389418 | 4002694 | Tt & basalt | Tt & basalt | 007 | 72 | E | N | 119 | 71 | 96.5 | 2.9 | 8 | 5 |  |
| N5 | 389374 | 4002198 | Tt | Tt | 336 | 87 | E | N | 147 | 72 | 108.0 | 2.5 | 8 | 5 | Medanales Quad, internal fault, El Rito fault |
| N5 | 389374 | 4002198 | Tt | Tt | 335 | 81 | E | N | 123 | 73 | 104.2 | 2.3 | 6 | 5 |  |
| N6 | 395973 | 4009065 | Tt | Tt | 026 | 56 | E | N | 096 | 54 | 78.7 | 2.0 | 6 | 3 | Medanales Quad, Fault 9 of May (1980), throw >= 10m |
| N7 | 395939 | 4003775 | Tt | Tt | 033 | 69 | E | N | 114 | 69 | 86.6 | 2.4 | 7 | 5 | Medanales Quad |
| N7 | 395902 | 4003724 | Tt | Tt | 023 | 69 | E | N | 132 | 68 | 97.0 | 3.3 | 4 | 1 | Medanales Quad, poorly-consolidated host rock |
| N7 | 395902 | 4003724 | Tt | Tt | 023 | 69 | E | N | 028 | 12 | 12.5 | 2.2 | 4 | 1 |  |
| N7 | 395902 | 4003724 | Tt | Tt | 359 | 70 | E | N | 133 | 63 | 107.4 | 3.1 | 7 | 5 |  |
| N7 | 395622 | 4003266 | Tt | Tt | 211 | 61 | W | N | 333 | 57 | 106.6 | 2.4 | 5 | 2 |  |
| N8 | 403636 | 4009390 | Tt | Tt | 023 | 84 | E | N | 104 | 84 | 89.0 | 0.0 | 1 | 5 | south of Ojo Caliente |
| N8 | 403636 | 4009390 | Tt | Tt | 208 | 63 | W | N | 291 | 63 | 87.0 | 2.0 | 2 | 5 |  |
| N8 | 404435 | 4008918 | Tt | Tt | 218 | 70 | NW | N | 291 | 69 | 84.0 | 1.4 | 5 | 5 |  |
| N8 | 404435 | 4008918 | Tt | Tt | 219 | 64 | W | N | 291 | 63 | 82.0 | 0.0 | 1 | 5 |  |
| N9 | 401560 | 4016752 | pC (& Tt) | pC (?) & Tt | 167 | 70 | W | N | 320 | 51 | 123.5 | 9.0 | 14 | 5 | Synthetic fault to the southern extension of the Ojo Caliente fault |
| N9 | 402352 | 4015897 | pC (& Tt) | pC (?) & Tt | 150 | 80 | W | N | 309 | 64 | 113.8 | 2.4 | 6 | 5 | Arroyo El Rita, SW of Ojo Caliente, extensive damage zone, highly fractured |
| N9 | 401064 | 4015291 | pC (& Tt) | pC (?) & Tt | 005 | 70 | E | N | 049 | 62 | 70.3 | 2.0 | 6 | 5 | Antithetic to the southern extension of Ojo Caliente fault |
| N9 | 401064 | 4015291 | pC (& Tt) | pC (?) & Tt | 178 | 71 | W | N | 274 | 71 | 92.0 | 1.9 | 5 | 5 |  |
| N9 | 401064 | 4015291 | pC (& Tt) | pC (?) & Tt | 153 | 83 | W | N | 329 | 32 | 147.6 | 2.7 | 8 | 5 |  |
| N10 | 403261 | 4016414 | Tt | Tt | 343 | 62 | E | N | 070 | 62 | 88.5 | 1.1 | 8 | 5 | El Rita fault, in Arroyo El Rita, SW of Ojo Caliente, fault core & damaga zone highly fractured & filled with calcite veins |
| N10 | 403237 | 4015986 | Tt | Tt | 034 | 77 | E | N | 076 | 71 | 76.1 | 6.3 | 7 | 5 | Antithetic to El Rita fault, in Arroyo El Rita, SW of Ojo Caliente |
| N10 | 403201 | 4015824 | Tt | Tt | 177 | 66 | W | N | 274 | 66 | 92.7 | 1.4 | 6 | 5 | El Rita fault, near Ojo Caliente volcanic ring, SW of Ojo Caliente |
| N10 | 403201 | 4015824 | Tt | Tt | 204 | 60 | W | N | 255 | 54 | 68.3 | 1.8 | 8 | 5 |  |
| N10 | 403102 | 4015584 | Tobc & Tt | Tt | 213 | 69 | W | N | 261 | 63 | 72.4 | 1.0 | 5 | 5 |  |
| N10 | 403102 | 4015584 | Tobc & Tt | Tt | 211 | 72 | W | N | 259 | 66 | 74.2 | 1.7 | 5 | 5 |  |
| N10 | 403102 | 4015584 | Tobc & Tt | Tt | 184 | 78 | W | N | 225 | 72 | 76.4 | 5.6 | 5 | 5 |  |

Note:

1. GPS coordinate system: NAD27, UTM13N.

2. Abbreviations of the hanging-wall (HW) and footwall (FW) rocks:

* Tst, Santa Fe Group, undivided
* Tt, Tesuque Fm.
* Tlp, Los Pinos Fm.
* Ta, Abiquiu Fm.
* Tr, Oligocene Ritito Conglomerate
* Ter, Eo-Oligocene El Rito Fm.
* Jm, Jurassic Morrison Fm.
* Jt, Jurassic Todilto Fm.
* Je, Jurassic Entrada Fm.
* Trcu, Triassic Chinle Group, upper (Rock Point Fm. and Petrified Forest Fm.)
* Trcp, Triassic Chinle Group, middle (Poleo Fm.)
* Trcl, Triassic Chinle Group, lower (Salitral Fm. and Shinarump Fm.)
* Pcu, Permian Cutler Group, upper (Arroyo del Agua Fm.)
* Pcl, Permian Cutler Group, lower (El Cobre Canyon Fm.)
* pC, Precambrian rocks, undivided
* pCoq, Proterozoic Ortega Quartzite
* pCy, Pretorozoic granitoid
* pCv, Proterozoic Vadito Group

3. Slip sense: N, normal; S, sinistral; D, dextral.

4. Confidence level is rated subjectively by the authors from 1 to 5, with 5 being the most confident and 1 the least confident.

**2. Sources for the geologic maps in this study**

Geologic maps of the Tusas-Abiquiu area (Figures 3, 5, 7, and 9) are compiled mainly from maps by the New Mexico Bureau of Geology & Mineral Resources and the U.S. Geological Survey, some of which were still in preliminary form. Each quadrangle’s name and reference are listed in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Brazos** (Bingler, 1968) | **Brazos Peak** (Bingler, 1968) | **Lagunitas Creek** (Bingler, 1968) | **Broke Off Mt** (Manley, 1982) | **San Antonio Mt** (Thompson & Lipman, 1994) | **La Segita Peaks** (Scholle, 2003) |
| **Tierra Amarilla** (Bingler, 1968) | **Peñasco Amarillo** (Bingler, 1968) | **East Gavilan Canyon** (Bingler, 1968; this study) | **Burned Mt** (Wobus & Manley, 1982) | **Mule Canyon** (Manley & Wobus, 1982) | **Tres Piedras** (Scholle, 2003) |
| **Las Nutrias** (Bingler, 1968) | **Cebolla** (Bingler, 1968) | **Canjilon Mt** (Bingler, 1968) | **Cañon Plaza** (Aby et al., 2012) | **Las Tablas** (Aby et al., 2010) | **Petaca Peak** (Scholle, 2003) |
| **Alire** (Smith et al., 1962; Bingler, 1968) | **Canjilon** (Smith et al., 1962; Bingler, 1968) | **Mogote Peak** (Smith et al., 1962; Bingler, 1968) | **Valle Grande Peak** (Kempter et al., 2008) | **La Madera** (Koning et al., 2007b) | **Servilleta Plaza** (Aby, 2008) |
| **Echo Amphitheater** (Smith et al., 1962; Bingler, 1968) | **Ghost Ranch** (Koning et al., 2006) | **Canjilon SE** (Kempter et al., 2007;  this study) | **El Rito** (Koning et al., 2008) | **Ojo Caliente** (Koning et al., 2005a) | **Taos Junction** (Koning et al., 2007c) |
| **Youngsville** (Kelley et al., 2005a) | **Cañones** (Kelley et al., 2005b) | **Abiquiu** (Maldonado, 2008;  this study) | **Medanales** (Koning et al., 2004b) | **Lyden** (Koning, 2004) | **Velarde** (Koning & Aby, 2003) |
| **Cerro del Grant** (Lawrence et al., 2004) | **Polvadera Peak** (Kempter et al., 2004) | **Vallecitos** (Kempter et al., 2005) | **Chili** (Koning et al., 2005b) | **San Juan Pueblo** (Koning & Manley, 2003) | **Chimayo** (Koning, 2003) |

For exact locations and sources of the maps, go to Open-File Geologic Map Series at the New Mexico Bureau of Geology & Mineral Resources, <https://geoinfo.nmt.edu/maps/>, and the National Geologic Map Database at the U.S. Geological Survey, <https://ngmdb.usgs.gov/ngm-bin/ngm_compsearch.pl> (last access date: June 4, 2018).

**References**

Aby, S., 2008, Geologic map of the Servilleta Plaza quadrangle, Cibola County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 182 scale 1:24,000.

Aby, S., Karlstrom, K., Koning, D., and Kempter, K., 2010, Geologic map of the Las Tablas quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 200, scale 1:24,000.

Aby, S.B., Kempter, K., and Karlstrom, K.E., 2012, Geologic map of the Cañon Plaza quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 221, scale 1:24,000.

Bingler, E.C., 1968, Geologic map of Rio Arriba County: New Mexico Institute of Mining and Technology, Bureau of Mines and Mineral Resources Division, Bulletin 91.

Kelley, S., Lawrence, J.R., and Osburn, G.R., 2005a, Geologic map of the Youngsville quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 106, scale 1:24,000.

Kelley, S.A., Osburn, G.R., Ferguson, C.F., Moore, J., and Kempter, K., 2005b, Geologic map of the Cañones quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 107, scale 1:22,732.

Kempter, K., Kelley, S., Goff, F., and Rampey, M., 2004, Preliminary geologic map of the Polvadera Peak quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 96, scale 1:24,000.

Kempter, K., Kelley, S., Koning, D., Ferguson, C., Osburn, B., and Fluk, L., 2005, Preliminary geologic map of the Vallecitos quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 108, scale 1:24,000.

Kempter, K., Zeigler, K., Koning, D., and Lucas, S., 2007, Preliminary geologic map of the Canjilon SE quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 150, scale 1:24,000.

Kempter, K., Koning, D.J., and Karlstrom, K. E., 2008, Geologic map of the Valle Grande Peak quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 180, scale 1:24,000.

Koning, D.J., 2003, Preliminary geologic map of the Chimayo quadrangle, Rio Arriba and Santa Fe Counties, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 71, scale 1:24,000.

Koning, D.J., and Aby, S., 2003, Preliminary geologic map of the Velarde quadrangle, Rio Arriba and Taos Counties, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 79, scale 1:24,000.

Koning, D.J., and Manley, K., 2003, Preliminary geologic map of the San Juan Pueblo quadrangle, Rio Arriba and Santa Fe Counties, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 70, scale 1:24,000.

Koning, D.J., May, J., Aby, S., and Horning, R., 2004b, Geologic map of the Medanales quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 089, scale 1:24,000.

Koning, D.J., Karlstrom, K., May, J., Skotnicki, S., Horning, R., Newell D., and Muehlberger, W.R., 2005a, Preliminary geologic map of the Ojo Caliente quadrangle, Rio Arriba and Taos Counties, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 101, scale 1:24,000.

Koning, D., Skotnicki, S., Kelley, S., and Moore, J., 2005b, Geologic Map of the Chili quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 103, scale 1:24,000.

Koning, D.J., Kelley, S., Zeigler, K.E., and Lucas, S.G., 2006, Geologic map of the Ghost Ranch quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 127, scale 1:23,386.

Koning, D.J., Karlstrom, K., Salem, A., and Lombardi, C., 2007b, Preliminary geologic map of the La Madera quadrangle, Rio Arriba County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 141, scale 1:24,000.

Koning, D.J., Aby, S., and Kelson, K., 2007c, Preliminary geologic map of the Taos Junction quadrangle, Taos County, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 144, scale 1:24,000.

Koning, D.J., Smith, G.A., and Aby, S., 2008, Geologic map of the El Rito quadrangle, Rio Arriba County, New Mexico: Mexico. New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 166, scale 1:24,000.

Lawrence, J.R., Kelley, S., and Rampey, M., 2004, Geologic map of the Cerro del Grant quadrangle, Rio Arriba and Sandoval Counties, New Mexico: New Mexico Bureau of Geology and Mineral Resources Open-File Geologic Map 87, scale 1:24,000.

Maldonado, F., 2008, Geologic map of the Abiquiu quadrangle, Rio Arriba County, New Mexico: U.S. Geological Survey Scientific Investigations Map 2998, scale 1:24,000.

Manley, K., 1982, Geologic map of the Broke Off Mountain quadrangle, Rio Arriba County, New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map 1450, scale 1:24,000.

Manley, K., and Wobus, R.A., 1982, Reconnaissance geologic map of the Mule Canyon quadrangle, Rio Arriba County, New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map 1407, scale 1:24,000.

Scholle, P.A., 2003, Geologic map of New Mexico: New Mexico Bureau of Geology and Mineral Resources, scale 1:500,000.

Smith, C.T., Budding, A.J., Pitrat, C.W., 1962, Geology of the southeastern part of the Chama basin: New Mexico Bureau Mines Mineral Resources, Bulletin, v. 75, p. 1-57.

Thompson, R.A. and Lipman, P.W., 1994, Geologic map of the San Antonio Mountain quadrangle, Rio Arriba County, New Mexico: U.S. Geological Survey, Geologic Quadrangle Map 1750, scale 1:24,000.

Wobus, R.A., and Manley, K., 1982, Reconnaissance geologic map of the Burned Mountain quadrangle, Rio Arriba County, New Mexico: U.S. Geological Survey Miscellaneous Field Studies Map 1409, scale 1:24,000.