Table DR4: Zircon fission track Single grain ages listed for each sample.

===================ZetaAge Program v. 4.8 (Brandon 8/13/02)===================

**Zr\_OP1513-1** sedimentary bedrock, (counted by Lorenz Michel Sep. 2017)

EFFECTIVE TRACK DENSITY FOR FLUENCE MONITOR (tracks/cm^2): 5.410E+05

RELATIVE ERROR (%): 1.58

EFFECTIVE URANIUM CONTENT OF MONITOR (ppm): 50.00

ZETA FACTOR AND STANDARD ERROR (yr cm^2): 109.00 11.00

SIZE OF COUNTER SQUARE (cm^2): 1.000E-06

**Grain RhoS (Ns) RhoI (Ni) Squares U+/-2s Grain Age (Ma)**

**no. (cm^-2) (cm^-2) Age --95% CI--**

1 4.50E+06 ( 72) 5.44E+06 ( 87) 16 503 109 24.4 17.6 33.7

2 2.44E+06 ( 22) 1.89E+06 ( 17) 9 175 84 38.0 19.3 76.2

3 3.88E+06 ( 31) 6.75E+06 ( 54) 8 624 170 16.9 10.5 26.8

4 6.75E+06 ( 81) 5.92E+06 ( 71) 12 547 130 33.5 24.1 46.8

5 5.25E+06 ( 21) 6.50E+06 ( 26) 4 601 234 23.8 12.7 43.9

6 4.29E+06 ( 60) 3.86E+06 ( 54) 14 356 97 32.7 22.2 48.1

7 9.50E+06 ( 38) 5.50E+06 ( 22) 4 508 215 50.6 29.3 89.9

8 5.78E+06 ( 52) 3.78E+06 ( 34) 9 349 119 44.9 28.6 71.4

9 1.12E+07 ( 112) 5.40E+06 ( 54) 10 499 136 60.8 43.6 85.8

10 1.00E+07 ( 120) 8.33E+06 ( 100) 12 770 156 35.3 26.8 46.5

11 4.70E+06 ( 47) 2.70E+06 ( 27) 10 250 95 51.0 31.2 85.2

12 1.09E+07 ( 87) 6.38E+06 ( 51) 8 589 165 50.0 35.1 72.2

13 4.43E+06 ( 31) 3.43E+06 ( 24) 7 317 128 37.9 21.6 67.5

14 2.00E+07 ( 60) 7.00E+06 ( 21) 3 647 280 83.3 50.3 144.3

15 8.13E+06 ( 65) 8.75E+06 ( 70) 8 809 194 27.3 19.2 38.9

16 3.67E+06 ( 11) 3.00E+06 ( 9) 3 277 180 35.8 13.6 97.7

17 5.80E+06 ( 58) 6.10E+06 ( 61) 10 564 145 28.0 19.2 40.8

18 9.67E+06 ( 58) 1.00E+07 ( 60) 6 924 239 28.4 19.5 41.5

19 9.40E+06 ( 47) 8.40E+06 ( 42) 5 776 239 32.9 21.2 51.1

20 3.00E+06 ( 36) 2.17E+06 ( 26) 12 200 78 40.6 23.9 70.1

21 1.10E+07 ( 99) 7.67E+06 ( 69) 9 709 171 42.1 30.7 58.2

22 6.40E+06 ( 64) 5.80E+06 ( 58) 10 536 141 32.4 22.4 47.1

23 5.40E+06 ( 54) 5.40E+06 ( 54) 10 499 136 29.4 19.8 43.7

**Zr\_OP1517-2** sedimentary bedrock, (counted by Lorenz Michel Sep. 2017)

EFFECTIVE TRACK DENSITY FOR FLUENCE MONITOR (tracks/cm^2): 5.420E+05

RELATIVE ERROR (%): 1.58

EFFECTIVE URANIUM CONTENT OF MONITOR (ppm): 50.00

ZETA FACTOR AND STANDARD ERROR (yr cm^2): 109.00 11.00

SIZE OF COUNTER SQUARE (cm^2): 1.000E-06

**Grain RhoS (Ns) RhoI (Ni) Squares U+/-2s Grain Age (Ma)**

**no. (cm^-2) (cm^-2) Age --95% CI--**

1 7.33E+06 ( 88) 5.33E+06 ( 64) 12 492 124 40.5 29.0 56.8

2 1.55E+07 ( 155) 8.50E+06 ( 85) 10 784 171 53.6 40.9 70.8

3 7.86E+06 ( 165) 7.14E+06 ( 150) 21 659 109 32.4 25.8 40.8

4 4.88E+06 ( 39) 3.00E+06 ( 24) 8 277 112 47.7 28.1 83.0

5 1.08E+07 ( 130) 6.67E+06 ( 80) 12 615 138 47.8 35.9 64.0

6 9.00E+06 ( 144) 6.81E+06 ( 109) 16 628 122 38.9 30.1 50.4

7 8.07E+06 ( 121) 5.00E+06 ( 75) 15 461 107 47.4 35.3 64.2

8 7.25E+06 ( 87) 5.42E+06 ( 65) 12 500 124 39.4 28.2 55.2

9 5.81E+06 ( 93) 4.63E+06 ( 74) 16 427 100 37.0 27.0 51.0

10 8.00E+06 ( 72) 7.11E+06 ( 64) 9 656 165 33.1 23.3 47.2

11 1.47E+07 ( 176) 1.09E+07 ( 131) 12 1007 179 39.6 31.3 50.1

12 1.15E+07 ( 138) 9.00E+06 ( 108) 12 830 162 37.6 29.0 48.9

13 4.24E+06 ( 89) 2.90E+06 ( 61) 21 268 69 42.9 30.7 60.5

14 1.37E+07 ( 41) 1.10E+07 ( 33) 3 1015 352 36.6 22.6 59.7

15 7.75E+06 ( 93) 8.33E+06 ( 100) 12 769 155 27.4 20.4 36.8

16 4.44E+06 ( 40) 2.89E+06 ( 26) 9 267 104 45.2 27.0 77.2

17 1.13E+07 ( 45) 5.75E+06 ( 23) 4 530 219 57.3 34.1 99.4

18 1.26E+07 ( 189) 8.80E+06 ( 132) 15 812 143 42.1 33.5 53.1

19 8.00E+06 ( 64) 6.88E+06 ( 55) 8 634 171 34.3 23.5 50.1

20 2.03E+07 ( 61) 1.20E+07 ( 36) 3 1107 368 49.8 32.5 77.4

21 4.00E+06 ( 32) 3.25E+06 ( 26) 8 300 117 36.2 20.9 63.3

22 2.22E+06 ( 20) 1.78E+06 ( 16) 9 164 81 36.8 18.1 75.8

23 1.30E+07 ( 78) 8.83E+06 ( 53) 6 815 224 43.3 30.2 62.6

24 5.50E+06 ( 33) 4.33E+06 ( 26) 6 400 156 37.3 21.7 65.0

25 8.93E+06 ( 134) 6.47E+06 ( 97) 15 597 122 40.7 31.1 53.4

**Zr\_OP1533-2** sedimentary bedrock, (counted by Lorenz Michel Sep. 2017)

EFFECTIVE TRACK DENSITY FOR FLUENCE MONITOR (tracks/cm^2): 5.430E+05

RELATIVE ERROR (%): 1.58

EFFECTIVE URANIUM CONTENT OF MONITOR (ppm): 50.00

ZETA FACTOR AND STANDARD ERROR (yr cm^2): 109.00 11.00

SIZE OF COUNTER SQUARE (cm^2): 1.000E-06

**Grain RhoS (Ns) RhoI (Ni) Squares U+/-2s Grain Age (Ma)**

**no. (cm^-2) (cm^-2) Age --95% CI--**

1 5.27E+06 ( 79) 5.40E+06 ( 81) 15 497 111 28.8 20.8 39.8

2 2.17E+06 ( 65) 1.33E+06 ( 40) 30 123 39 47.8 31.8 72.9

3 4.92E+06 ( 118) 2.88E+06 ( 69) 24 265 64 50.4 37.1 68.9

4 1.93E+06 ( 77) 1.53E+06 ( 61) 40 140 36 37.2 26.3 53.0

5 1.94E+06 ( 31) 2.00E+06 ( 32) 16 184 65 28.6 16.9 48.4

6 4.04E+06 ( 109) 1.85E+06 ( 50) 27 171 48 64.1 45.5 91.6

7 3.96E+06 ( 95) 3.46E+06 ( 83) 24 318 70 33.8 24.9 46.0

8 5.58E+06 ( 134) 3.38E+06 ( 81) 24 311 70 48.7 36.7 65.1

9 6.89E+06 ( 186) 5.19E+06 ( 140) 27 477 82 39.2 31.3 49.2

10 7.67E+06 ( 46) 5.83E+06 ( 35) 6 537 181 38.7 24.4 62.0

11 1.36E+07 ( 272) 3.75E+06 ( 75) 20 345 80 106.3 82.1 139.3

12 1.03E+07 ( 164) 6.06E+06 ( 97) 16 558 114 49.8 38.5 64.8

13 4.08E+06 ( 98) 3.25E+06 ( 78) 24 299 68 37.1 27.2 50.6

14 7.97E+06 ( 255) 4.09E+06 ( 131) 32 377 67 57.2 42.9 76.4

15 8.25E+06 ( 99) 5.08E+06 ( 61) 12 468 120 47.8 34.4 67.0

16 3.20E+06 ( 64) 2.80E+06 ( 56) 20 258 69 33.7 23.2 49.2

17 4.21E+06 ( 101) 2.08E+06 ( 50) 24 192 54 59.4 42.0 85.2

18 1.06E+07 ( 212) 3.65E+06 ( 73) 20 336 79 85.3 65.1 113.0

19 4.95E+06 ( 99) 3.00E+06 ( 60) 20 276 72 48.6 34.9 68.2

20 1.66E+06 ( 73) 1.68E+06 ( 74) 44 155 36 29.1 20.8 40.8

21 9.59E+06 ( 307) 4.78E+06 ( 153) 32 440 72 59.0 44.7 77.9

22 8.50E+06 ( 153) 4.67E+06 ( 84) 18 430 94 53.6 40.8 71.0

23 5.73E+06 ( 86) 4.47E+06 ( 67) 15 411 101 37.9 27.2 53.0

**Zr\_OP1539-2** sedimentary bedrock, (counted by Lorenz Michel Sep. 2017)

EFFECTIVE TRACK DENSITY FOR FLUENCE MONITOR (tracks/cm^2): 5.440E+05

RELATIVE ERROR (%): 1.58

EFFECTIVE URANIUM CONTENT OF MONITOR (ppm): 50.00

ZETA FACTOR AND STANDARD ERROR (yr cm^2): 109.00 11.00

SIZE OF COUNTER SQUARE (cm^2): 1.000E-06

**Grain RhoS (Ns) RhoI (Ni) Squares U+/-2s Grain Age (Ma)**

**no. (cm^-2) (cm^-2) Age --95% CI--**

1 2.33E+06 ( 56) 4.46E+06 ( 107) 24 410 80 15.5 11.0 21.6

2 1.59E+06 ( 43) 4.37E+06 ( 118) 27 402 75 10.8 7.4 15.4

3 2.75E+06 ( 33) 7.33E+06 ( 88) 12 674 145 11.1 7.2 16.8

4 5.71E+05 ( 12) 1.48E+06 ( 31) 21 136 49 11.6 5.4 23.0

5 2.80E+06 ( 56) 5.95E+06 ( 119) 20 547 102 14.0 9.9 19.3

6 1.83E+06 ( 11) 3.00E+06 ( 18) 6 276 129 18.2 7.7 40.4

7 5.00E+05 ( 12) 1.50E+06 ( 36) 24 138 46 10.0 4.7 19.4

8 7.14E+05 ( 15) 2.24E+06 ( 47) 21 206 60 9.5 4.9 17.2

9 3.25E+06 ( 39) 7.33E+06 ( 88) 12 674 145 13.2 8.8 19.4

10 1.89E+06 ( 68) 4.00E+06 ( 144) 36 368 62 14.0 10.3 18.8

11 3.94E+06 ( 63) 6.69E+06 ( 107) 16 615 120 17.5 12.5 24.1

12 1.25E+06 ( 15) 4.33E+06 ( 52) 12 398 111 8.6 4.5 15.4

13 5.05E+06 ( 106) 1.16E+07 ( 243) 21 1064 140 12.9 10.2 16.3

14 2.50E+06 ( 15) 5.33E+06 ( 32) 6 490 173 14.0 7.0 26.4

15 5.71E+05 ( 12) 1.76E+06 ( 37) 21 162 53 9.7 4.6 18.8

16 1.31E+06 ( 21) 3.88E+06 ( 62) 16 356 91 10.1 5.8 16.7

17 4.76E+05 ( 10) 1.33E+06 ( 28) 21 123 46 10.7 4.6 22.4

18 1.13E+06 ( 27) 3.83E+06 ( 92) 24 352 74 8.7 5.4 13.5

19 5.00E+06 ( 60) 8.08E+06 ( 97) 12 743 152 18.3 13.0 25.6

20 3.50E+05 ( 7) 1.25E+06 ( 25) 20 115 46 8.4 3.0 19.7

21 1.69E+06 ( 27) 5.50E+06 ( 88) 16 506 109 9.1 5.7 14.1

**Zr\_OP1551-1** sedimentary bedrock, (counted by Lorenz Michel Sep. 2017)

EFFECTIVE TRACK DENSITY FOR FLUENCE MONITOR (tracks/cm^2): 5.470E+05

RELATIVE ERROR (%): 1.58

EFFECTIVE URANIUM CONTENT OF MONITOR (ppm): 50.00

ZETA FACTOR AND STANDARD ERROR (yr cm^2): 109.00 11.00

SIZE OF COUNTER SQUARE (cm^2): 1.000E-06

**Grain RhoS (Ns) RhoI (Ni) Squares U+/-2s Grain Age (Ma)**

**no. (cm^-2) (cm^-2) Age --95% CI--**

1 1.11E+06 ( 40) 1.78E+06 ( 64) 36 163 41 18.6 12.2 28.1

2 1.63E+06 ( 39) 2.54E+06 ( 61) 24 232 60 19.1 12.4 28.9

3 1.83E+06 ( 44) 3.33E+06 ( 80) 24 305 69 16.4 11.1 24.0

4 2.00E+06 ( 72) 2.67E+06 ( 96) 36 244 50 22.3 16.2 30.7

5 1.25E+06 ( 20) 8.13E+05 ( 13) 16 74 40 45.5 21.7 99.6

6 5.42E+05 ( 13) 1.50E+06 ( 36) 24 137 46 10.8 5.2 20.8

7 5.83E+05 ( 28) 1.00E+06 ( 48) 48 91 26 17.4 10.5 28.3

8 1.08E+06 ( 27) 2.48E+06 ( 62) 25 227 58 13.0 7.9 20.7

9 6.25E+05 ( 15) 1.67E+06 ( 40) 24 152 48 11.2 5.7 20.7

10 5.56E+05 ( 10) 2.00E+06 ( 36) 18 183 61 8.4 3.7 17.0

11 2.75E+06 ( 44) 4.56E+06 ( 73) 16 417 98 18.0 12.0 26.5

12 1.17E+07 ( 117) 1.21E+07 ( 121) 10 1106 204 28.8 22.1 37.5

13 6.10E+06 ( 61) 6.40E+06 ( 64) 10 585 147 28.4 19.6 40.9

14 3.33E+05 ( 10) 9.00E+05 ( 27) 30 82 31 11.1 4.8 23.5

15 9.71E+05 ( 34) 1.20E+06 ( 42) 35 110 34 24.1 14.9 38.8

16 2.14E+06 ( 77) 1.42E+06 ( 51) 36 129 36 44.8 31.1 65.2

17 2.58E+06 ( 62) 1.33E+06 ( 32) 24 122 43 57.4 37.0 90.9

18 5.83E+05 ( 21) 8.06E+05 ( 29) 36 74 27 21.6 11.7 39.1

19 1.08E+06 ( 39) 2.89E+06 ( 104) 36 264 52 11.2 7.5 16.3

20 2.50E+06 ( 40) 4.25E+06 ( 68) 16 388 95 17.5 11.5 26.3

21 1.15E+06 ( 23) 2.40E+06 ( 48) 20 219 63 14.3 8.3 23.9

22 6.54E+06 ( 157) 3.83E+06 ( 92) 24 350 74 50.6 38.9 66.3

23 1.72E+06 ( 62) 3.47E+06 ( 125) 36 317 58 14.8 10.7 20.2

**Zr\_OP1552-1** sedimentary bedrock, (counted by Lorenz Michel Sep. 2017)

EFFECTIVE TRACK DENSITY FOR FLUENCE MONITOR (tracks/cm^2): 5.480E+05

RELATIVE ERROR (%): 1.58

EFFECTIVE URANIUM CONTENT OF MONITOR (ppm): 50.00

ZETA FACTOR AND STANDARD ERROR (yr cm^2): 109.00 11.00

SIZE OF COUNTER SQUARE (cm^2): 1.000E-06

**Grain RhoS (Ns) RhoI (Ni) Squares U+/-2s Grain Age (Ma)**

**no. (cm^-2) (cm^-2) Age --95% CI--**

1 1.00E+06 ( 45) 1.82E+06 ( 82) 45 166 37 16.4 11.1 23.9

2 1.00E+06 ( 40) 1.83E+06 ( 73) 40 167 39 16.4 10.8 24.4

3 9.05E+05 ( 38) 1.83E+06 ( 77) 42 167 38 14.8 9.7 22.0

4 2.18E+06 ( 122) 2.52E+06 ( 141) 56 230 39 25.8 20.0 33.2

5 4.88E+06 ( 78) 4.25E+06 ( 68) 16 388 95 34.2 24.3 48.0

6 5.25E+05 ( 21) 1.08E+06 ( 43) 40 98 30 14.6 8.2 25.1

7 8.10E+05 ( 34) 1.36E+06 ( 57) 42 124 33 17.8 11.3 27.7

8 1.69E+06 ( 27) 1.81E+06 ( 29) 16 165 61 27.8 15.8 48.5

9 7.38E+05 ( 31) 1.48E+06 ( 62) 42 135 34 15.0 9.4 23.3

10 7.19E+06 ( 115) 5.63E+06 ( 90) 16 513 109 38.0 28.6 50.8

11 5.83E+05 ( 21) 1.42E+06 ( 51) 36 129 36 12.3 7.0 20.8

12 1.20E+06 ( 67) 2.34E+06 ( 131) 56 213 38 15.3 11.2 20.7

13 7.50E+05 ( 24) 1.78E+06 ( 57) 32 163 43 12.6 7.5 20.6

14 1.02E+06 ( 49) 2.48E+06 ( 119) 48 226 42 12.3 8.6 17.3

15 6.90E+05 ( 29) 1.29E+06 ( 54) 42 117 32 16.1 9.8 25.6

16 5.71E+05 ( 12) 1.29E+06 ( 27) 21 117 45 13.4 6.1 27.1

17 1.43E+06 ( 43) 3.87E+06 ( 116) 30 353 66 11.1 7.6 15.8

18 5.52E+06 ( 138) 4.60E+06 ( 115) 25 420 79 35.7 27.7 46.2

19 4.22E+05 ( 27) 1.27E+06 ( 81) 64 115 26 10.0 6.2 15.6

20 6.90E+05 ( 69) 1.37E+06 ( 137) 100 125 22 15.0 11.1 20.2

21 6.61E+05 ( 37) 1.43E+06 ( 80) 56 130 29 13.8 9.1 20.6

22 1.07E+06 ( 30) 2.00E+06 ( 56) 28 182 49 16.0 9.9 25.3

23 1.07E+06 ( 48) 2.87E+06 ( 129) 45 262 47 11.1 7.8 15.6

24 1.29E+06 ( 31) 2.21E+06 ( 53) 24 201 55 17.5 10.8 27.7

**Zr\_OP1582-1** sedimentary bedrock, (counted by Lorenz Michel Sep. 2017)

EFFECTIVE TRACK DENSITY FOR FLUENCE MONITOR (tracks/cm^2): 5.450E+05

RELATIVE ERROR (%): 1.58

EFFECTIVE URANIUM CONTENT OF MONITOR (ppm): 50.00

ZETA FACTOR AND STANDARD ERROR (yr cm^2): 109.00 11.00

SIZE OF COUNTER SQUARE (cm^2): 1.000E-06

**Grain RhoS (Ns) RhoI (Ni) Squares U+/-2s Grain Age (Ma)**

**no. (cm^-2) (cm^-2) Age --95% CI--**

1 4.77E+06 ( 143) 2.33E+06 ( 70) 30 214 51 60.3 45.0 81.6

2 5.50E+06 ( 165) 3.50E+06 ( 105) 30 321 63 46.5 36.2 60.0

3 7.72E+06 ( 139) 8.11E+06 ( 146) 18 744 125 28.2 22.2 35.9

4 6.09E+06 ( 67) 2.64E+06 ( 29) 11 242 89 68.1 43.6 109.3

5 3.17E+06 ( 95) 2.13E+06 ( 64) 30 196 49 43.9 31.7 61.3

6 5.31E+06 ( 85) 2.31E+06 ( 37) 16 212 70 67.7 45.7 102.6

7 5.62E+06 ( 118) 5.81E+06 ( 122) 21 533 98 28.7 22.0 37.3

8 8.56E+06 ( 231) 4.74E+06 ( 128) 27 435 78 53.4 42.8 66.9

9 4.12E+06 ( 198) 3.77E+06 ( 181) 48 346 53 32.4 24.4 43.0

10 4.50E+06 ( 54) 2.17E+06 ( 26) 12 199 77 61.2 37.8 101.9

11 2.57E+06 ( 54) 1.43E+06 ( 30) 21 131 48 53.1 33.5 86.1

12 3.36E+06 ( 121) 1.67E+06 ( 60) 36 153 40 59.5 43.4 82.7

13 9.05E+05 ( 19) 7.62E+05 ( 16) 21 70 34 35.1 17.1 73.0

14 2.75E+06 ( 33) 2.92E+06 ( 35) 12 268 90 28.0 16.8 46.3

15 4.12E+06 ( 99) 2.08E+06 ( 50) 24 191 54 58.5 41.3 84.0

16 2.42E+06 ( 29) 1.58E+06 ( 19) 12 145 66 45.1 24.5 85.1

17 1.74E+06 ( 61) 1.77E+06 ( 62) 35 163 41 29.2 20.1 42.2

18 6.40E+06 ( 96) 3.07E+06 ( 46) 15 281 83 61.6 43.0 89.6

19 8.92E+06 ( 107) 6.08E+06 ( 73) 12 558 131 43.4 31.9 59.3

20 6.67E+05 ( 20) 6.33E+05 ( 19) 30 58 26 31.2 15.8 61.7

21 2.50E+06 ( 50) 2.20E+06 ( 44) 20 202 61 33.7 22.0 51.7

22 2.56E+06 ( 92) 2.03E+06 ( 73) 36 186 44 37.3 27.1 51.5

23 7.38E+06 ( 155) 4.90E+06 ( 103) 21 450 90 44.5 34.5 57.8