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| **Table S3:** Dated Fish Canyon Tuff zircons |
| **Sample** | **Mass****(μg)** | **U****(femto mol)** | **Th****(femto mol)** | **He****(femto mol)** | **eU****(ppm)** | **Rs****(μm)** | **Raw Age****(Ma)** | **FTK** | **FTZK** | **Corrected Age****(Ma)** | **Error ± 1σ,****(Ma)** | **Mean age (Ma)** | **Error****1σ,****(Ma)** |
| FCTz1 | 3.92 | 8122.53 | 5002.26 | 220.47 | 566.13 | 47.17 | 18.39 | 0.75 |  | 24.51 | 0.09 |  |  |
| FCTz2 | 3.48 | 8700.03 | 4231.28 | 262.74 | 664.85 | 46.28 | 21.00 | 0.75 |  | 28.08 | 0.10 |  |  |
| FCTz6 | 4.07 | 10066.28 | 4904.02 | 297.68 | 658.10 | 50.29 | 20.56 | 0.77 |  | 26.81 | 0.07 |  |  |
| FCTz7 | 2.47 | 4328.45 | 1970.73 | 99.62 | 463.43 | 40.24 | 16.11 | 0.71 |  | 22.59 | 0.04 |  |  |
| FCTz8 | 2.79 | 6617.66 | 3192.79 | 184.10 | 630.11 | 44.85 | 19.36 | 0.74 |  | 26.15 | 0.14 |  |  |
| FCTz9 | 1.86 | 4942.44 | 2334.42 | 154.38 | 705.43 | 38.53 | 21.78 | 0.70 |  | 31.06 | 0.10 |  |  |
| FCTz11 | 2.92 | 7626.85 | 4210.77 | 229.15 | 705.88 | 46.22 | 20.61 | 0.75 |  | 27.61 | 0.14 |  |  |
| FCTz13 | 4.78 | 10585.95 | 5250.70 | 320.18 | 590.73 | 52.79 | 20.99 | 0.78 |  | 27.01 | 0.09 |  |  |
| FCTz14 | 1.77 | 4350.36 | 2286.13 | 126.79 | 659.27 | 37.85 | 20.11 | 0.70 |  | 28.92 | 0.12 |  |  |
| FCTz15 | 3.71 | 7748.76 | 5372.95 | 239.62 | 579.59 | 46.15 | 20.62 | 0.74 | 0.74 | 27.72 | 0.09 |  |  |
| FCTz18 | 3.90 | 5486.19 | 2627.70 | 209.43 | 374.39 | 48.29 | 26.57 | 0.76 |  | 35.05 | 0.07 |  |  |
| FCTz19 | 4.52 | 6564.60 | 3791.79 | 202.46 | 394.24 | 47.05 | 21.05 | 0.75 |  | 28.06 | 0.05 |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  | **27.80** | **0.90** |

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| **Table S4:** Dated Durango apatites |
| **Sample** | **Raw Age, Ma** | **Error ±1σ,****Ma** | **Mean age, Ma** | **Error** |
| DUR A1 | 30.49 | 0.07 |  |  |
| DUR A2 | 31.00 | 0.08 |  |  |
| DUR A3 | 30.87 | 0.09 |  |  |
| DUR A4 | 30.79 | 0.08 |  |  |
|  |  |  | **30.79** | **0.0036** |