Supplementary text, tables, and figures for Zuza et al.

# Footwall rotation in a regional detachment fault system: Evidence for horizontal-axis rotational flow in the Miocene Searchlight pluton, NV

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**Supplemental Table 1. EBSD analytical run conditions and processing variables**

| Sample | 14-4 (grains) | 15-1 | 14-3 | 13-2 | 14-4 (qtz ribbon) |
|---|---|---|---|---|---|
| Step Size: | 5µm | 10µm | 10µm | 5µm | 3µm |
| Field Width: | 3.35mm | 2.59mm | 6.71mm | 4.47mm | 3.71mm |
| Field Height: | 2.13mm | 5.49mm | 2.07mm | 2.58mm | 0.92mm |
| Number of Points: | 285420 | 142191 | 138897 | 462715 | 380996 |
| Hit Rate: | 95.70% | 83.00% | 70.80% | 77.10% | 97.70% |
| Accelerating Voltage: | 20.00 kV | 25.00 kV | 20.00 kV | 20.00 kV | 20.00 kV |
| Working Distance: | 24.7 mm | 24.8 mm | 25.1 mm | 25.2 mm | 25.3 mm |
| Specimen Tilt: | 70.0° | 70.0° | 70.0° | 70.0° | 70.0° |
| Binning Mode | 4x4 (160x120 px) | 4x4 (160x120 px) | 6x6 (106x80 px) | 6x6 (106x80 px) | 4x4 (160x120 px) |
| Exposure Time | 15.9 ms | 12.0 ms | 6.7 ms | 7.3 ms | 15.9 ms |
| Hough Resolution: | 200 | 200 | 70 | 200 | 200 |
| Band Detection Mode: | Edges | Edges | Edges | Edges | Edges |
| # of Bands Detected: | 12 | 12 | 12 | 12 | 12 |
| Indexing Mode: | OptimizedEBSD | OptimizedEBSD | OptimizedEBSD | OptimizedEBSD | OptimizedEBSD |

SEM: JEOL 7100FT

EBSD camera: Nordlys nano high resolution detector

Acquisition software: Aztec 3.0

**(U-Th)/He zircon thermochronology expanded methods and discussion**

Mineral separation:

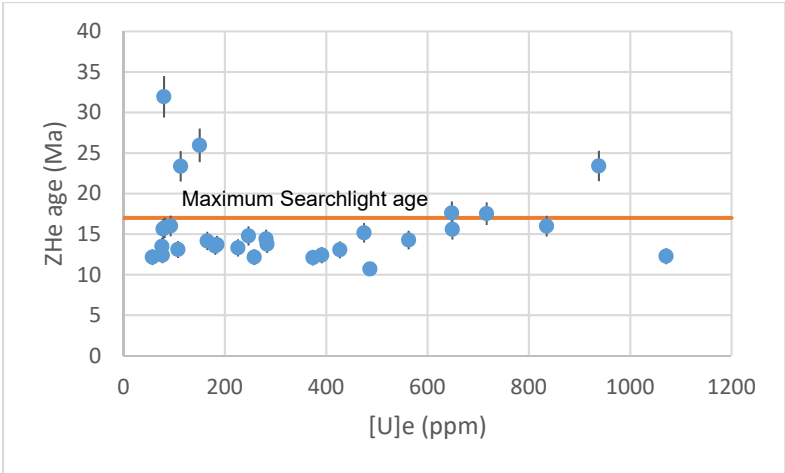
Zircons were separated using standard techniques at the University of Nevada, Reno. This involved crushing and sieving, Frantz magnetic separation, and heavy liquid separation.

(U-Th)/He methods:

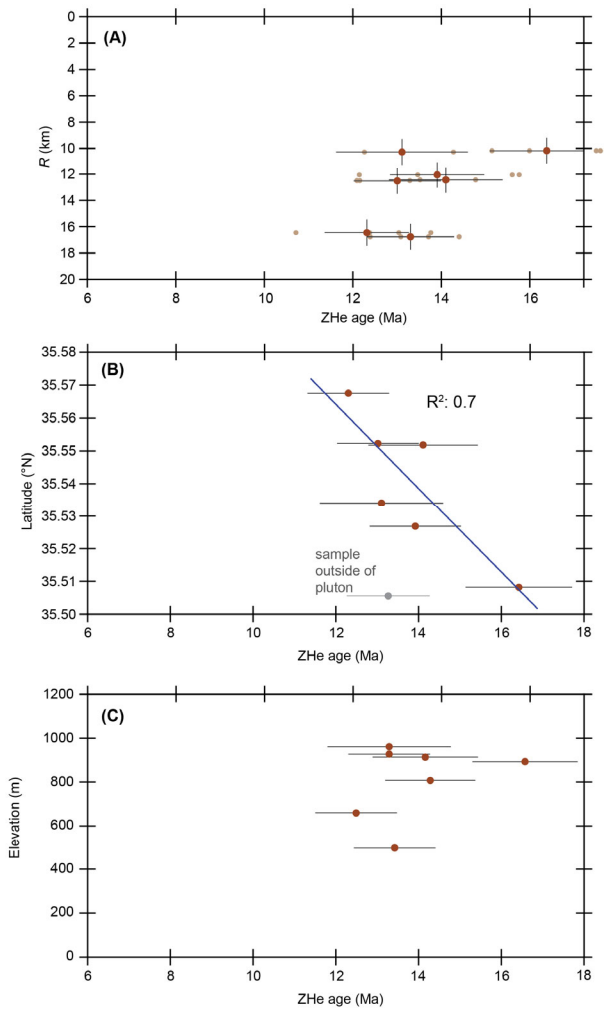
All (U-Th)/He analyses were done at the (U-Th)/He and U-Pb Geo- Thermochronometry Lab at the University of Texas at Austin. Zircon grains were hand selected using an optical microscope targeting euhedral, inclusion-free grains with a width ≥70 µm. Each grain's length and width were measured to calculate the alpha ejection correction factor (FT, Farley et al., 1996; Farley, 2000). Single zircon grains were packed into platinum tubes, heated with a diode laser for 10 minutes at 1250°C, and repeatedly reheated until the $^{4}$He yield dropped to <1% to ensure complete degassing of the sample. Extracted gas was spiked with a $^{3}$He tracer, cryogenically purified, and measured by isotope dilution on a quadrupole noble gas mass spectrometer. After degassing, zircons were removed from the platinum tubes and dissolved using standard double pressure vessel digestion procedures, including spiking with an enriched $^{230}$Th, $^{235}$U, and $^{149}$Sm tracer and two-stage dissolution using a hydrofluoric acid-nitric acid mix for 96 hours at 225°C , and hydrochloric acid for 12 hours at 180°C. U, Th, and Sm parent concentrations were measured by isotope dilution-inductively coupled plasma-mass spectrometry (ID-ICP-MS) analysis using a Thermo Scientific Element2 ICP-MS. Reported ages in Table 2 of the main text are alpha ejection corrected ($F_T$) using Helios software with standard errors of 8% ($2\sigma$) based on reproducibility of the Fish Canyon Tuff standard (Reiners et al., 2002).

(U-Th)/He zircon data:

A complete data table for our (U-Th)/He zircon (ZHe) analyses is provided below (**Supplemental Table 2**) and individual aliquot ages are plotted in **Supplemental Figure 2A**. We excluded some aliquots from mean age calculations that yielded ZHe ages older than the Searchlight pluton. The pluton has been well dated via U-Pb zircon by a variety of sources (Bachl et al., 2001; Miller et al., 2006; Faulds et al., 2010; Johnson, 2014) to be 15-16 Ma, with some more recent 15-16 Ma intrusions and dikes. Thus, ZHe older than 17 Ma, with uncertainty (**Supplemental Figure 2**), were excluded from our weighted mean calculations provided in Table 2 of the text. Note that there is a correlation between negative correlation between ZHe age and latitude, but no correlation between ZHe age and elevation (**Supplemental Figure 2**). Our sample traverse was generally confined to the northern half of the pluton, such that the oldest ZHe age from the lowest latitude sample was collected from near the middle of the pluton. The negative correlation in **Supplemental Figure 2B** demonstrates that the middle of the pluton cooled quicker than its margins, which is counter intuitive.




**Supplemental Figure 1**. Individual aliquot ZHe ages plotted against [U]e.




**Supplemental Figure 2**. Weighted mean ZHe ages plotted against (A) *R*, showing individual aliquot ages (light organge), (B) latitude, from approximately the northern pluton margin to its center, and (B) elevation. Note the negative correlation between ZHe and latitude suggests that the samples from the center of the Searchlight pluton cooled more rapidly than those near its margins. Greyed sample in B is outside of the pluton to the east.

**Supplemental Table 2. Zircon helium analyses**

| Aliquot | Raw Age (Ma) | Corr. Age (Ma) | err. (Ma) | U (ppm) | Th (ppm) | $^{147}$Sm (ppm) | [U]e | Th/U | He (nmol/g) | mass (ug) | Ft | ESR* (μm) | Notes[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample 13-4C** | | | | | | | | | | | | | |
| z3-13-4C-1 | 25.2 | 31.9 | 2.56 | 64.4 | 67.2 | 3.6 | 79.9 | 1.04 | 10.9 | 7.98 | 0.79 | 56.83 | o |
| z3-13-4C-2 | 12.6 | 15.6 | 1.25 | 63.5 | 64.5 | 3.6 | 78.3 | 1.02 | 5.3 | 10.66 | 0.80 | 61.79 | |
| z3-13-4C-3 | 12.8 | 15.8 | 1.26 | 68.6 | 55.4 | 2.7 | 81.4 | 0.81 | 5.6 | 10.50 | 0.81 | 62.91 | |
| z3-13-4C-4 | 11.0 | 13.5 | 1.08 | 59.8 | 69.9 | 3.0 | 75.9 | 1.17 | 4.5 | 12.49 | 0.82 | 66.61 | |
| z3-13-4C-5 | 10.0 | 12.2 | 0.97 | 48.9 | 35.4 | 1.4 | 57.1 | 0.72 | 3.1 | 13.44 | 0.82 | 67.62 | |
| **Sample 14-4** | | | | | | | | | | | | | |
| z3-14-4-2 | 17.7 | 23.4 | 1.87 | 93.1 | 85.4 | 1.6 | 112.8 | 0.92 | 10.9 | 5.84 | 0.76 | 49.52 | o |
| z3-14-4-3 | 10.2 | 13.5 | 1.08 | 157.3 | 102.5 | 3.4 | 180.9 | 0.65 | 10.0 | 5.63 | 0.76 | 48.19 | |
| z3-14-4-4 | 11.0 | 14.8 | 1.18 | 194.8 | 225.5 | 4.1 | 246.7 | 1.16 | 14.7 | 4.59 | 0.74 | 46.72 | |
| z3-14-4-5 | 10.4 | 14.2 | 1.13 | 142.3 | 100.5 | 0.0 | 165.4 | 0.71 | 9.3 | 3.66 | 0.73 | 43.61 | |
| **Sample 14-5** | | | | | | | | | | | | | |
| z3-14-5-1 | 9.3 | 12.2 | 0.97 | 250.1 | 34.2 | 1.9 | 258.0 | 0.14 | 13.0 | 4.93 | 0.76 | 48.73 | |
| z3-14-5-2 | 12.1 | 15.6 | 1.25 | 628.0 | 91.8 | 1.8 | 649.1 | 0.15 | 42.2 | 5.40 | 0.77 | 50.74 | |
| z3-14-5-4 | 9.2 | 12.1 | 0.97 | 368.2 | 25.6 | 5.7 | 374.1 | 0.07 | 18.6 | 4.99 | 0.76 | 47.67 | |
| z3-14-5-5 | 11.4 | 13.3 | 1.06 | 215.2 | 46.6 | 1.1 | 225.9 | 0.22 | 13.9 | 25.75 | 0.86 | 82.84 | |
| **Sample 14-9** | | | | | | | | | | | | | |
| z3-14-9-1 | 10.8 | 15.2 | 1.21 | 372.3 | 445.8 | 3.1 | 474.9 | 1.20 | 27.7 | 3.02 | 0.71 | 40.57 | |
| z3-14-9-2 | 12.6 | 17.5 | 1.40 | 530.3 | 809.4 | 0.0 | 716.7 | 1.53 | 49.0 | 3.36 | 0.72 | 42.34 | |
| z3-14-9-3 | 13.9 | 17.6 | 1.41 | 488.4 | 693.0 | 2.0 | 648.0 | 1.42 | 49.1 | 9.37 | 0.79 | 58.57 | |
| z3-14-9-4 | 17.2 | 23.4 | 1.87 | 695.2 | 1055.3 | 2.3 | 938.2 | 1.52 | 87.7 | 4.05 | 0.73 | 45.21 | o |
| z3-14-9-5 | 11.9 | 16.0 | 1.28 | 608.9 | 983.0 | 2.0 | 835.2 | 1.61 | 53.9 | 4.70 | 0.74 | 46.80 | |
| **Sample 15-2** | | | | | | | | | | | | | |
| z3-15-2-2 | 7.7 | 10.7 | 0.86 | 424.2 | 270.5 | 0.0 | 486.5 | 0.64 | 20.1 | 3.20 | 0.71 | 40.70 | |
| z3-15-2-3 | 9.3 | 13.1 | 1.05 | 364.8 | 270.3 | 0.0 | 427.0 | 0.74 | 21.4 | 2.78 | 0.71 | 39.85 | |
| z3-15-2-4 | 9.6 | 12.4 | 0.99 | 325.1 | 287.5 | 3.8 | 391.3 | 0.88 | 20.4 | 7.43 | 0.78 | 53.52 | |
| z3-15-2-5 | 10.7 | 13.8 | 1.10 | 238.1 | 197.1 | 1.2 | 283.5 | 0.83 | 16.5 | 7.87 | 0.78 | 54.62 | |
| **Sample SLP2** | | | | | | | | | | | | | |
| zSLP2-1 | 8.8 | 12.3 | 0.98 | 1061.2 | 42.9 | 0.0 | 1071.1 | 0.04 | 50.7 | 2.52 | 0.72 | 39.10 | |
| zSLP2-3 | 10.8 | 14.3 | 1.14 | 551.1 | 51.1 | 0.0 | 562.8 | 0.09 | 32.8 | 3.86 | 0.76 | 46.63 | |
| zSLP2-4 | 21.2 | 25.9 | 2.08 | 146.6 | 16.2 | 1.0 | 150.3 | 0.11 | 17.2 | 9.85 | 0.82 | 64.21 | o |
| **Sample SLP1** | | | | | | | | | | | | | |
| zSPL1-1 | 10.7 | 13.1 | 1.05 | 90.3 | 74.7 | 2.2 | 107.5 | 0.83 | 6.2 | 12.95 | 0.82 | 66.33 | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| zSPL1-2 | 12.3 | 16.0 | 1.28 | 79.1 | 60.8 | 0.0 | 93.1 | 0.77 | 6.2 | 6.64 | 0.77 | 51.13 | o |
| zSPL1-3 | 10.8 | 13.7 | 1.09 | 151.1 | 144.8 | 1.9 | 184.5 | 0.96 | 10.8 | 9.86 | 0.79 | 58.89 | |
| zSPL1-4 | 11.7 | 14.4 | 1.16 | 262.3 | 84.0 | 0.8 | 281.6 | 0.32 | 17.8 | 11.18 | 0.81 | 61.79 | |
| zSPL1-5 | 11.4 | 12.4 | 0.99 | 67.5 | 41.0 | 0.8 | 77.0 | 0.61 | 4.7 | 163.55 | 0.92 | 156.29 | |

*ESR = equivalent spherical radius

[!] Note explanation: o--Zhe age older than Searchlight pluton; aliquot excluded from mean

**Argon hornblende thermochronology**

Hornblende separation

Hornblende grains were separated using standard techniques at the Nevada Isotope Geochronology Lab at the University of Nevada, Las Vegas. This involved crushing and sieving, magnetic separation, and heavy liquid separation.

Argon thermochronology methods:

Samples were analyzed by the $^{40}Ar/^{39}Ar$ method at the Nevada Isotope Geochronology Lab at the University of Nevada Las Vegas. Hornblende grains were wrapped in aluminum foil and stacked in 6 mm inside diameter sealed fused silica tubes. Individual packets averaged 2 mm thick and neutron fluence monitors (FC-2, Fish Canyon Tuff sanidine) were placed every 5-10 mm along the tube. Synthetic K-glass and optical grade $CaF_2$ were included in the irradiation packages to monitor neutron induced argon interferences from K and Ca. Loaded tubes were packed in an aluminum container for irradiation. Samples irradiated at the U. S. Geological Survey TRIGA Reactor, Denver, CO were in-core for 4 hours in the 1 MW TRIGA type reactor. Correction factors for interfering neutron reactions on K and Ca were determined by repeated analysis of K-glass and $CaF_2$ fragments. Measured $(^{40}Ar/^{39}Ar)_K$ values were 2.32 (± 18.12%) x $10^{-2}$. Ca correction factors were $(^{36}Ar/^{37}Ar)_{Ca}$ = 2.63 (± 1.15%) x $10^{-4}$ and $(^{39}Ar/^{37}Ar)_{Ca}$ = 7.02 (± 0.49%) x $10^{-4}$. J factors were determined by fusion of 6-10 individual crystals of neutron fluence monitors which gave reproducibility's of 0.09% to 0.11% at each standard position. Variation in neutron fluence along the 100 mm length of the irradiation tubes was <4%. Matlab curve fit was used to determine J and uncertainty in J at each standard position. No significant neutron fluence gradients were present within individual packets of crystals as indicated by the excellent reproducibility of the single crystal fluence monitor fusions.

Irradiated FC-2 sanidine standards together with $CaF_2$ and K-glass fragments were placed in a Cu sample tray in a high vacuum extraction line and were fused using a 20 W $CO_2$ laser. Sample viewing during laser fusion was by a video camera system and positioning was via a motorized sample stage. Samples analyzed by the furnace step heating method utilized a double vacuum resistance furnace similar to the Staudacher et al. (1978) design. Reactive gases were removed by three GP-50 SAES getters prior to being admitted to a MAP 215-50 mass spectrometer by expansion. The relative volumes of the extraction line and mass spectrometer allow 80% of the gas to be admitted to the mass spectrometer for laser fusion analyses and 76% for furnace heating analyses. Peak intensities were measured using a Balzers electron multiplier by peak hopping through 7 cycles; initial peak heights were determined by linear regression to the time of gas admission. Mass spectrometer discrimination and sensitivity was monitored by repeated analysis of atmospheric argon aliquots from an on-line pipette system. Measured $^{40}Ar/^{36}Ar$ ratios were 329.35 ± 0.02% during this work, thus a discrimination correction of 0.8972 (4 AMU) was applied to measured isotope ratios. The sensitivity of the mass spectrometer was ~6 x $10^{-17}$ mol $mV^{-1}$ with the multiplier operated at a gain of 36 over the Faraday. Line blanks averaged 9.60 mV for mass 40 and 0.03 mV for mass 36 for laser fusion analyses and 8.78 mV for mass 40 and 0.03 mV for mass 36 for furnace heating analyses.

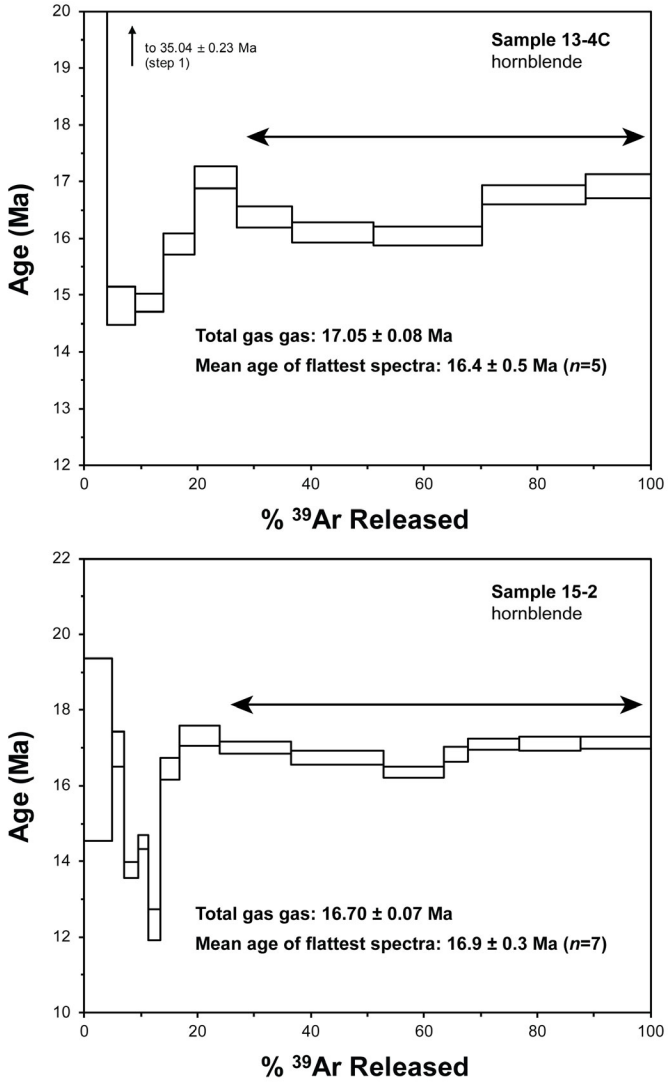
Discrimination, sensitivity, and blanks were relatively constant over the period of data collection. Computer automated operation of the sample stage, laser, extraction line and mass spectrometer as well as final data reduction and age calculations were done using LabSPEC software written by B. Idleman (Lehigh University). An age of 28.02 Ma (Renne et al., 1998) was used for the Fish Canyon Tuff sanidine fluence monitor in calculating ages for samples.

Argon thermochronology results:

We analyzed hornblende from two samples collected from the lower Searchlight pluton: for 13-4C [35.526913°N, 114.817447°W] and 15-2 [35.567649°N, 114.782625°W]. The Figure 3 map in the main text shows their locations. All analytical data are reported in **Supplemental Table 3** at the confidence level of 1σ (standard deviation). **Supplemental Figure 3** shows the age spectra for these two samples.

We attempted to obtain plateau ages from these $^{40}Ar/^{39}Ar$ analyses for the two samples—a plateau segment consists of 3 or more contiguous gas fractions having analytically indistinguishable ages (i.e. all plateau steps overlap in age at ± 2σ analytical error) and comprising a significant portion of the total gas released (typically >50%)—but our data did not satisfy these true plateau-age requirements. To qualitatively compare the samples, we calculated weighted mean apparent ages from the flattest part of the age spectra. Although not true plateau ages, we consider these ages reasonable geologic estimates. Total gas (integrated) ages are calculated by weighting by the amount of $^{39}Ar$ released, whereas plateau ages are weighted by the inverse of the variance.

The total gas age and visually determined plateau age for 13-4C are ~17.1 Ma and ~16.4 Ma respectively. The total gas age and visually determined plateau age for 15-2 are ~16.7 Ma and ~16.9 Ma respectively. We interpret that a meaningful and conservative age range for samples 13-4C and 15-2 are ~17.1-16.4 Ma and ~16.9-16.7 Ma, respectively.




**Supplemental Figure 3.** $^{40}Ar/^{39}Ar$ age spectra for analyzed hornblende for two samples from the Searchlight pluton. Neither sample yielded a plateau age, and we present the total gas age and a weighted mean age of the qualitatively determined flattest segment of the spectra.

**Supplemental Table 3. Ar/Ar data table for samples analyzed at Nevada Isotope Geochronology Lab**

**Sample 15-2** 9.26 mg, J = 0.00109 ± 0.38%

| step | T (C) | t (min.) | 36Ar | 37Ar | 38Ar | 39Ar | 40Ar | %40Ar* | % 39Ar rlsd | Ca/K | 40Ar*/39ArK | Age (Ma) | 1 s.d. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 750 | 12 | 2.114 | 0.990 | 0.742 | 10.213 | 786.299 | 11.6 | 4.9 | 0.984844 | 8.659212 | 16.95 | 1.21 |
| 2 | 850 | 12 | 0.189 | 0.279 | 0.150 | 4.771 | 103.978 | 43.0 | 2.3 | 0.594058 | 8.670505 | 16.97 | 0.23 |
| 3 | 950 | 12 | 0.165 | 1.462 | 0.163 | 4.940 | 90.563 | 42.2 | 2.4 | 3.008667 | 7.024155 | 13.76 | 0.11 |
| 4 | 990 | 12 | 0.162 | 2.718 | 0.168 | 3.855 | 82.733 | 38.2 | 1.8 | 7.176793 | 7.407529 | 14.51 | 0.10 |
| 5 | 1020 | 12 | 0.171 | 4.635 | 0.235 | 4.486 | 84.702 | 36.8 | 2.1 | 10.52783 | 6.288093 | 12.32 | 0.20 |
| 6 | 1040 | 12 | 0.125 | 9.354 | 0.393 | 6.979 | 99.045 | 64.8 | 3.3 | 13.66997 | 8.407200 | 16.46 | 0.14 |
| 7 | 1055 | 12 | 0.151 | 20.550 | 1.008 | 14.940 | 179.265 | 78.4 | 7.1 | 14.03067 | 8.853785 | 17.33 | 0.13 |
| 8 | 1070 | 12 | 0.227 | 36.874 | 1.891 | 26.430 | 298.586 | 80.5 | 12.6 | 14.23182 | 8.689499 | 17.01 | 0.08 |
| 9 | 1090 | 12 | 0.223 | 47.374 | 2.479 | 34.327 | 359.276 | 85.2 | 16.3 | 14.07736 | 8.552445 | 16.74 | 0.09 |
| 10 | 1115 | 12 | 0.126 | 30.232 | 1.582 | 22.334 | 223.428 | 88.1 | 10.6 | 13.80644 | 8.352804 | 16.35 | 0.08 |
| 11 | 1150 | 12 | 0.081 | 12.416 | 0.623 | 9.074 | 102.135 | 85.4 | 4.3 | 13.95674 | 8.600181 | 16.83 | 0.10 |
| 12 | 1190 | 12 | 0.161 | 28.717 | 1.441 | 19.135 | 214.322 | 83.2 | 9.1 | 15.31408 | 8.740835 | 17.11 | 0.07 |
| 13 | 1240 | 12 | 0.194 | 34.322 | 1.676 | 22.539 | 253.695 | 82.3 | 10.7 | 15.53989 | 8.738269 | 17.10 | 0.09 |
| 14 | 1400 | 12 | 0.238 | 38.956 | 1.941 | 26.107 | 299.856 | 82.6 | 12.4 | 15.22601 | 8.758804 | 17.14 | 0.08 |
| | | | | | | | | | 100.0 | | Total gas age = | 16.70 | 0.07 |

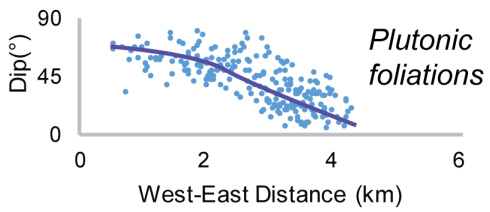
**Sample 13-4C** 60.62 mg, J = 0.00107 ± 0.47%

| step | T (C) | t (min.) | 36Ar | 37Ar | 38Ar | 39Ar | 40Ar | %40Ar* | % 39Ar rlsd | Ca/K | 40Ar*/39ArK | Age (Ma) | 1 s.d. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 750 | 12 | 1.484 | 0.801 | 0.606 | 8.215 | 642.256 | 24.2 | 4.1 | 0.985307 | 18.330514 | 35.04 | 0.23 |
| 2 | 950 | 12 | 0.387 | 2.825 | 0.346 | 9.828 | 205.263 | 38.9 | 4.9 | 2.906394 | 7.705278 | 14.81 | 0.17 |
| 3 | 1020 | 12 | 0.278 | 9.396 | 0.505 | 9.770 | 166.715 | 48.1 | 4.9 | 9.744382 | 7.732961 | 14.87 | 0.08 |
| 4 | 1040 | 12 | 0.140 | 13.641 | 0.678 | 10.981 | 135.355 | 72.0 | 5.5 | 12.59758 | 8.273721 | 15.90 | 0.10 |
| 5 | 1055 | 12 | 0.114 | 19.312 | 1.008 | 15.061 | 168.837 | 84.2 | 7.5 | 13.00499 | 8.889049 | 17.08 | 0.10 |
| 6 | 1070 | 12 | 0.171 | 26.761 | 1.324 | 19.329 | 216.597 | 80.1 | 9.7 | 14.04646 | 8.522522 | 16.38 | 0.09 |
| 7 | 1090 | 12 | 0.238 | 40.868 | 2.099 | 28.944 | 313.398 | 80.7 | 14.5 | 14.32636 | 8.378251 | 16.10 | 0.09 |
| 8 | 1120 | 12 | 0.212 | 52.489 | 2.772 | 38.088 | 376.850 | 88.2 | 19.1 | 13.98124 | 8.346891 | 16.04 | 0.08 |
| 9 | 1200 | 12 | 0.303 | 55.988 | 2.702 | 36.391 | 405.091 | 81.8 | 18.2 | 15.61644 | 8.728513 | 16.77 | 0.08 |
| 10 | 1400 | 12 | 0.200 | 30.878 | 1.625 | 23.052 | 263.412 | 84.0 | 11.5 | 13.58795 | 8.805902 | 16.92 | 0.11 |
| | | | | | | | | | 100.0 | | Total gas age = | 17.05 | 0.08 |

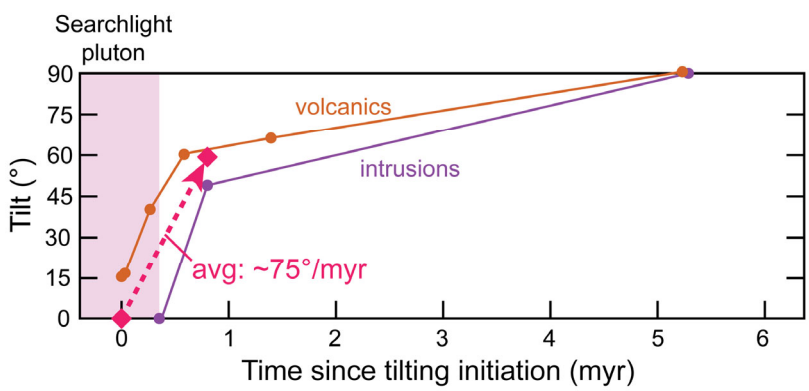
4 amu discrimination = 0.8972 ± 0.02%, 40/39K = 0.0232 ± 18.12%, 36/37Ca = 0.000263 ± 1.15%, 39/37Ca = 0.000702 ± 0.49%
notes: isotope beams in mV, rlsd = released, error in age includes J error, all errors 1 sigma
(36Ar through 40Ar are measured beam intensities, corrected for decay for the age calculations)

## Across-strike attitudes and tilting of Searchlight pluton

Here we show the across-strike (east-west) attitude variability that supplements information portrayed in **Figure 4** of the main text. Orientations from foliations within the Searchlight pluton, as well as crosscutting dikes, were extracted directly from the published 1:24,000 scale geologic maps of Faulds et al. (2010) and Hinz et al. (2012a, b). Almost all observations are north-striking; dikes generally dip east whereas plutonic foliations dip west. Dips from these observations were plotted across the east-west dimensions of the pluton (**Supplemental Figure 4**), which shows steeper dips in the west than the east. Tilting magnitude since the initiation of local extension is shown in **Supplemental Figure 5** (Faulds et al., 2002; Hinz and Faulds, 2009).




**Supplemental Figure 4.** Plot of foliation dip against west-east distance across the Searchlight pluton. Note the steeper dip to the west. Dip direction is not shown in this plot, but attitudes steeper than ~30° generally dip west. As attitudes become shallow-to-subhorizontal toward the east, they may dip west or east as part of a broad antifoam that is related to the Dupont Mountain fault.




**Supplemental Figure 5.** Tilt of volcanic rocks and intruding dikes, modified from Faulds et al. (2002) and Hinz and Faulds (2009) to show the magnitude of tilting after the intrusion of the Searchlight pluton and the initiation of rotation (i.e., assumed to be ~16.2 Ma here). Note the rapid tilting during the first million years of activity, followed by slower rotation. The steepest part of the curve corresponds to a rotation rate of ~75° $myr^{-1}$.

**Supplementary References**


Bachl, C.A., Miller, C.F., Miller, J.S., and Faulds, J.E., 2001, Construction of a pluton: Evidence from an exposed cross section of the Searchlight pluton, Eldorado Mountains, Nevada: Geological Society of America Bulletin, v. 113, no. 9, p. 1213-1228.

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