SITE IDENTIFICATION

Paleochannel sites identified in Lindgren (1911) were located on georeferenced 1:125,000 geologic maps that were imported into Google Earth™ to obtain the geographic coordinates (WGS 84) of each mine. These maps are the 'Economic Geology' sheets for the following regions: Bidwell Bar (Turner, 1898), Downieville (Gannett, 1897), Smartsville (Lindgren and Turner, 1895), Colfax (Gannett, 1900), Truckee (Lindgren, 1897), Sacramento (Becker and Lindgren, 1893), Placerville (Lindgren and Turner, 1894), and Pyramid Peak (Hoover and Lindgren, 1896). The U.S.G.S. mineral resources database (https://mrdata.usgs.gov/mrds/) was also used to confirm the approximate location of some of the mine sites (i.e., within 500 m, according to the website).

ERROR ANALYSIS

The results presented in this study depend critically on the accuracy of the elevation measurements. Although most of the paleochannel sites are presently inaccessible, the elevations of three sites with particularly low-lying surficial deposits were confirmed during field visits: Indian Hill (Hietanen, 1976), Spring Creek (Saucedo and Wagner, 1992; Yeend, 1974), and Pacific House (N) (Lindgren and Turner, 1894) (Fig. S2). The elevation and geographical coordinates of these deposits, as well as both sites with volcanic rocks, were recorded with a handheld Garmin 400 GPS. The coordinates were used to retrieve the elevation from 1/3-arcsecond (~10-m) DEMs, which have a standard deviation for elevations of ±2.4 m (Haneberg, 2006; Survey, 2019). Although the GPS typically reported an uncertainty of 4-5 m, elevations measured by the GPS never differed from the DEM elevations by more than 2 m; therefore, we used the elevations from the DEMs and adopt 2.4 m as the uncertainty for these measurements.

The paleochannel elevations presented in Lindgren (1911) were measured with aneroid barometers, which are accurate to within 2 m when properly calibrated and with stable atmospheric pressures (Hamilton et al., 1957). However, these conditions appear to have been difficult to meet at times; for example, Lindgren's fieldbooks (1886) record fluctuations in barometer measurements of up to 15 m for the same location over the

course of a day. We conservatively take this value as the 1-σ error for the paleochannel elevations in Lindgren (1911). We do not account for any measurement errors that might have been caused by variations in temperature or pressure within the mines; given that the mines were generally not very long or deep, these errors are likely small. Note, also, that because the datum used for regional elevations has been updated since Lindgren (1911), the actual paleochannel elevations from the mines may be up to 8 m higher (C. Jones, pers. comm.), implying a potential systematic underestimate of the incision values by the same amount.

For the elevations of the modern river beds, there are two sources of uncertainty; the first is associated with the uncertainty in drawing the ray from paleochannel site to the correct location on the modern river. While the GIS software used, ARCGIS™, allows lines to be drawn at specified angles, meanders in the river planform introduce some uncertainty in determining the appropriate intersection point. Based on an average meander wavelength (~ 500 m) and an average river gradient (~1 %), we estimate this source of error in the modern bed elevation to be ±5 m. The second source of error is the inherent uncertainty associated with DEMs; as noted above, the standard deviation for elevations in a 1/3-arcsecond (~10-m) DEM is ±2.4 m (Haneberg, 2006; U.S.G.S., 2019). In a few locations (e.g., the North Fork Stanislaus River site), the bedrock river beds are presently under reservoirs; in these cases, the channel elevation was determined from pre-dam 1:24000 topographic maps. Additionally, in a few locations where the valley was deeply alluviated (i.e., Thistle Tunnel, Thistle Shaft, Sicard Flat), the slopes of the bedrock valley walls were extrapolated to estimate the elevation of the canyon bottoms.

Finally, the DEMs provide water surface elevations, rather than bed elevations. Because bedrock channels in the DEMs for the northern Sierra typically only have a width of one pixel (i.e., ~10 m), the data used to construct the DEMs appear to have been taken during low-flow conditions which, according to our field observations, would suggest average flow depths of ~1 m. Therefore, to account for the discrepancy between the channel elevations from the DEMs and the bed elevations, we subtracted 1 m from the former. Standard techniques (Robinson, 2016) were then used to propagate uncertainties in the elevations of the modern river bed, along with the uncertainty in the

elevations of the paleochannels, to yield a combined uncertainty of ±6 m for the incision depths for the sites that we visited and ±16 m for the inaccessible mining sites.

DATING OF ANDESITIC VOLCANIC DEPOSIT

The groundmass age (6.48 ± 0.01 Ma) of an andesitic volcanic deposit along the South Fork American River at the Twin Bridges site (Fig. 1D) was determined with $^{40}Ar/^{39}Ar$ using 28.201 Ma for the FCT-NM standard (Kuiper et al., 2008); the analysis was performed at the Argon Geochronology Laboratory at Oregon State University by incremental heating using a Synrad CO_2 laser. Specific details about the analysis and the release spectra can be found on the last page of this section.

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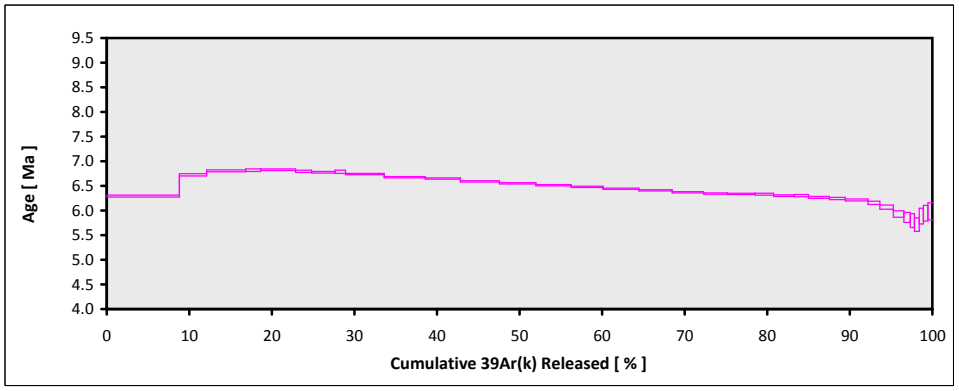
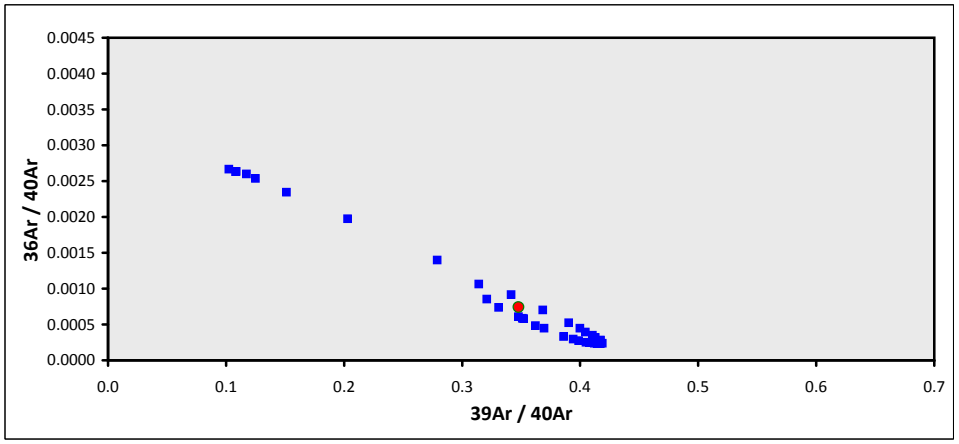
EXP#18E31404 > TB1 > Groundmass > GOBET (18-10)
S FORK AMERICAN RIVER > TWIN BRIDGES
18-OSU-06 (6E20-18) > Incremental Heating > Dan Miggins

Information on Analysis and Constants Used in Calculations

Project = **GOBET (18-10)**
Sample = **TB1**
Material = **Groundmass**
Location = **Twin Bridges**
Region = **S Fork American River**
Analyst = **Dan Miggins**
Irradiation = **18-OSU-06 (6E20-18)**
Position = **X: 999 | Y: 999 | Z/H: 25.29056 mm**
FCT-NM Age = **28.201 ± 0.023 Ma**
FCT-NM Reference = **Kuiper et al (2008)**
FCT-NM 40Ar/39Ar Ratio = **9.83636 ± 0.00846**
FCT-NM J-value = **0.00159789 ± 0.00000137**
Air Shot 40Ar/36Ar = **307.5990 ± 0.3138**
Air Shot MDF = **0.99015387 ± 0.00062047 (LIN)**
Experiment Type = **Incremental Heating**
Extraction Method = **Bulk Laser Heating**
Heating = **55 sec**
Isolation = **5.10 min**
Instrument = **ARGUS-VI-E**
Preferred Age = **Total Fusion**
Age Classification = **Crystallization Age**
IGSN = Undefined
Rock Class = Undefined
Lithology = Undefined
Lat-Lon = Undefined - Undefined
Age Equations = **Min et al. (2000)**
Negative Intensities = **Allowed**
Collector Calibrations = **36Ar**
Decay 40K = **5.530 ± 0.048 E-10 1/a**
Decay 39Ar = **2.940 ± 0.016 E-07 1/h**
Decay 37Ar = **8.230 ± 0.012 E-04 1/h**
Decay 36Cl = **2.257 ± 0.015 E-06 1/a**
Decay 40K(EC,β^+) = **0.580 ± 0.009 E-10 1/a**
Decay 40K(β^-) = **4.950 ± 0.043 E-10 1/a**
Atmospheric 40/36(a) = **295.50**
Atmospheric 38/36(a) = **0.1869**
Production 39/37(ca) = **0.0006425 ± 0.0000059**
Production 38/37(ca) = **0.0001800 ± 0.0000173**
Production 36/37(ca) = **0.0002703 ± 0.0000005**
Production 40/39(k) = **0.000607 ± 0.000059**
Production 38/39(k) = **0.012077 ± 0.000011**
Production 36/38(cl) = **262.80 ± 1.71**
Scaling Ratio K/Ca = **0.430**
Abundance Ratio 40K/K = **1.1700 ± 0.0100 E-04**
Atomic Weight K = **39.0983 ± 0.0001 g**

Results	40(a)/36(a) ± 2σ	40(r)/39(k) ± 2σ	Age ± 2σ (Ma)	MSWD	39Ar(k) (%,n)	K/Ca ± 2σ
Age Plateau Cannot Calculate						
Total Fusion Age		2.24652 ± 0.00137 ± 0.06%	**6.48 ± 0.01 ± 0.18%** Full External Error ± 0.15 Analytical Error ± 0.00		35	0.502 ± 0.000
Normal Isochron						
Inverse Isochron Cannot Calculate						





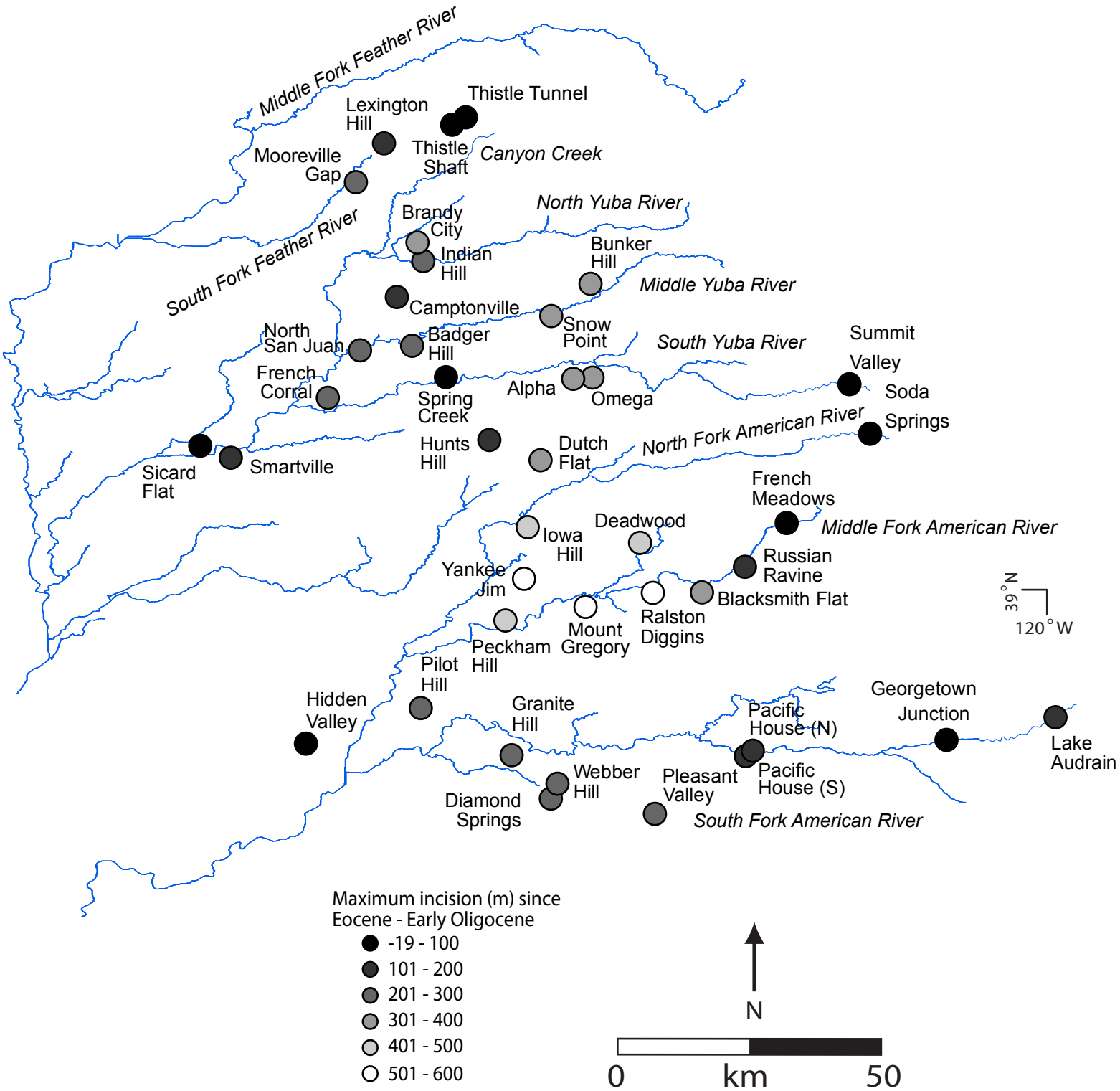


Fig. S1. Locations and names of mining sites with paleochannel data. Geographical coordinates and related information provided in Table S1.

TABLE S1. PALEOCHANNEL INFORMATION

Site Name	Lat. (dec. deg.)	Long. (dec. deg.)	Paleo-channel elev. (m)	Modern river	Lat. (dec. deg.)	Long. (dec. deg.)	Modern bed elev. (m)	Incision (m)	Paleochannel elev. source, page no. *
Alpha	39.335	-120.782	1174	S Yuba	39.360	-120.793	791	383	(Lindgren, 1911), 147
Badger Hill	39.380	-121.031	729	Mdl Yuba	39.389	-121.032	519	210	(Lindgren, 1911), Plate X
Blacksmith Flat	39.010	-120.585	1158	Mdl Fk Am	39.028	-120.592	783	375	(Lindgren, 1911), Plate X
Brandy City	39.544	-121.024	1067	N Yuba	39.519	-121.007	683	384	(Lindgren, 1911), 100
Bunker Hill	39.478	-120.758	1440	Mdl Yuba	39.459	-120.746	1056	384	(Lindgren, 1911), 142
Camptonville	39.467	-121.059	810	N Yuba	39.519	-121.076	615	195	(Lindgren, 1911), 100
Deadwood	39.085	-120.680	1130	Mdl Fk Am	39.070	-120.672	651	479	(Lindgren, 1911), 158
Diamond Springs	38.696	-120.816	542	S Fk Am	38.770	-120.850	269	273	(Lindgren, 1911), 170
Dutch Flat	39.211	-120.835	868	N Fk Am	39.167	-120.810	510	358	(Lindgren, 1911), Plate X
French Corral	39.306	-121.155	481	S Yuba	39.289	-121.144	258	223	(Lindgren, 1911), Plate X
French Meadows	39.116	-120.457	1539	Mdl Fk Am	39.114	-120.457	1519	20	(Lindgren, 1911), Plate X
Georgetown Jctn	38.785	-120.214	1646	S Fk Am	38.783	-120.213	1560	86	(Lindgren, 1911), Plate X
Granite Hill	38.765	-120.880	503	S Fk Am	38.814	-120.901	221	282	(Lindgren, 1911), 171
Hidden Valley	38.780	-121.188	112	N Fk Am	38.712	-121.152	82	30	(Becker and Lindgren, 1893)
Hunts Hill	39.241	-120.909	799	S Yuba	39.337	-120.953	618	181	(Lindgren, 1911), Plate X
Indian Hill	39.513	-121.010	914	N Yuba	39.516	-121.012	681	233	(Hietanen, 1976)
Iowa Hill	39.120	-120.841	802	N Fk Am	39.132	-120.861	401	401	(Lindgren, 1911), 148
Lake Audrain	38.821	-120.049	2286	S Fk Am	38.824	-120.051	2099	187	(Lindgren, 1911), Plate X
Lexington Hill	39.693	-121.069	1433	S Fk FR	39.686	-121.067	1242	191	(Turner, 1898)
Mooreville Gap	39.633	-121.112	1295	S Fk FR	39.644	-121.116	1055	240	(Saucedo and Wagner, 1992)
Mount Gregory	38.988	-120.763	869	Mdl Fk Am	39.006	-120.771	305	564	(Lindgren, 1911), 169
North San Juan	39.373	-121.112	620	Mdl Yuba	39.381	-121.107	407	213	(Lindgren, 1911), Plate X
Omega	39.336	-120.752	1228	S Yuba	39.359	-120.763	846	382	(Lindgren, 1911), 147
Pacific House N	38.769	-120.508	1052	S Fk Am	38.763	-120.505	891	161	(Lindgren and Turner, 1894)
Pacific House S	38.761	-120.519	1036	S Fk Am	38.767	-120.522	875	161	(Lindgren, 1911), Plate X
Peckham Hill	38.967	-120.885	665	Mdl Fk Am	38.957	-120.883	237	428	(Lindgren, 1911), 169
Pilot Hill	38.836	-121.017	381	S Fk Am	38.787	-120.981	170	211	(Lindgren, 1911), 163
Pleasant Valley	38.673	-120.657	753	S Fk Am	38.772	-120.703	497	256	(Becker and Lindgren, 1893)

Site Name	Lat. (dec. deg.)	Long. (dec. deg.)	Paleo-channel elev. (m)	Modern river	Lat. (dec. deg.)	Long. (dec. deg.)	Modern bed elev. (m)	Incision (m)	Paleochannel elev. source, page no. *
Ralston Diggings	39.008	-120.658	1059	Mdl Fk Am	39.019	-120.666	520	539	(Lindgren, 1911), 152
Russian Ravine	39.046	-120.507	1356	Mdl Fk Am	39.057	-120.524	1164	192	(Lindgren, 1911), Plate X
Sicard Flat	39.233	-121.349	91	S Yuba	39.219	-121.345	50	41	(Lindgren, 1911), Plate X
Smartville	39.214	-121.302	231	S Yuba	39.218	-121.304	72	155	(Lindgren, 1911), Plate X
Snow Point	39.430	-120.815	1284	Mdl Yuba	39.434	-120.818	879	405	(Lindgren, 1911), 141
Soda Springs	39.251	-120.330	1890	N Fk Am	39.247	-120.327	1816	74	(Lindgren, 1911), Plate X
Spring Creek	39.337	-120.975	701	S Yuba	39.333	-120.974	599	102	(Yeend and Peterson, 1974)
Summit Valley	39.327	-120.361	2073	S Yuba	39.309	-120.348	2072	1	(Lindgren, 1911), Plate X
Thistle Shaft	39.732	-120.945	1533	S Fk FR	39.741	-120.975	1474	59	(Lindgren, 1911), 108
Thistle Tunnel	39.721	-120.966	1457	S Fk FR	39.741	-120.974	1476	-19	(Lindgren, 1911), 108
Webber Hill	38.720	-120.802	579	S Fk Am	38.769	-120.829	282	297	(Lindgren, 1911), 170
Yankee Jim	39.031	-120.862	791	Mdl Fk Am	38.981	-120.830	262	529	(Lindgren, 1911), 150

* page number not provided for map sources