METHODS

Geochemical Analyses

Whole-rock major and trace element concentrations were determined by X-ray fluorescence (XRF) at Washington State University's GeoAnalytical Lab. Samples were hand picked to exclude zeolite contaminants and then powdered in agate, tungsten carbide, or zirconia mills. Fused beads (2:1 Li-tetraborate to sample mixure) were analyzed for 27 elements (DR Table1).

Nd, Sr, and U isotopic analyses were conducted at the Radiogenic Isotope Laboratory at the University of New Mexico. Samples were dissolved in an HF/HNO_3 mixture at about 110-120 °C for 24- 48 hours. U-series samples were spiked with known quantities of ^{229}Th, ^{233}U, and ^{236}U and precipitated with iron hydroxides. Sr and Nd were separated on small columns using Ichrom Industries' Sr.Spec, Tru.Spec and LnSpec chromatographic resins, similar to a method described by Pin et al (1994).

Nd and Sr isotopes were measured on a Thermo Neptune multi-collector inductively coupled plasma mass spectrometer. Nd isotopes were normalized to $^{146}Nd/^{144}Nd=.7219$. Replicate analyses (n=20) of the La Jolla Nd standard during the course of this study gave a mean $^{143}Nd/^{144}Nd$ value of 0.511845 ± 13 (2δ). Sr isotopes were normalized to $^{86}Sr/^{88}Sr$ ratio of 0.1194. Replicate analyses (n=5) of NBS-987 gave a mean $^{87}Sr/^{86}Sr$ value of 0.710238 ± 19 (2δ). Epsilon Nd values $\{([^{143}Nd/^{144}Nd_{sample}/^{143}Nd/^{144}Nd_{CHUR}]-1)*10000\}$ were calculated using $^{143}Nd/^{144}Nd_{CHUR,\ 0\ Ma} = 0.512638$. (CHUR = Chondritic undifferentiated reservoir). U-Th chemistry and mass spectrometry were done following the method described by Asmerom, 1999, prior to our acquisition of the Neptune. NBL-112 U standard was measured during the course

of the study, obtaining $\delta^{234}U$ of -36 ± 1. $\delta^{234}U = \{ [(^{234}U/^{238}U_{sample} / ^{234}U/^{238}U_{secular\ equilibrium})-1]*1000\}$. $^{234}U/^{238}U_{secular\ equilibrium}$ is equal to the ratio of the decay constants (λ) of ^{238}U and ^{234}U, $\lambda_{238}/\lambda_{234}$.

Data compilation

A literature search was conducted to find all the reliable Nd analyses on Miocene and younger mafic volcanic rocks on and adjacent to the Colorado Plateau. Analyses were included if: 1) the analyzed sample had $SiO_2 \leq 52$ wt %, 2) reliable age information was available, and 3) sample locations were given. Lamprophic rock types were excluded from the analysis as they origin at much deeper levels than common basalt. For simplicity all the mafic samples included in this study will be referred to as basalt even though some would be chemically classified as basaltic trachy-andesites, trachy-basalts, tephrites or basanites. Similarly the term "alkali basalt" is used loosely to mean not tholeiitic basaltic rocks. Ages assigned to analyzed samples were based on $^{40}Ar/^{39}Ar$ dates or $^{40}K/^{40}Ar$ dates. Sample locations, when not cited explicitly, were often vague and had to be estimated given sample maps, descriptions of sampling localities, or were taken from the Western North American Volcanic and Intrusive Rock Database (NAVDAT - http://www.navdat.org/). Although NAVDAT was an important literature review tool, data were compiled from the original sources to better assess the sample locations, age estimates, and the procedures used in determining isotopic values.

DISCUSSION

Crustal Contamination

Most studies of magma source regions for alkali basalts from the southwestern United States have concluded that crustal contamination has only minor effect on Nd isotopes (Feuerbach et al., 1993; Fitton et al., 1991; Kempton et al., 1991; McMillan et al., 2000; Perry et

al., 1988), but some have suggested that non-mantle-xenolith bearing basalts can have subtle crustal contamination (Glazner and Farmer, 1992; Wenrich et al., 1995). To investigate this we compare the 1/Sr concentrations of southwestern basalts with their $^{87}Sr/^{86}Sr$ values (DR Fig. 3). A positive relationship is expected in the cases of crustal contamination due to assimilation of crustal material with low concentrations of dominantly radiogenic Sr. In western Grand Canyon, like most other subregions (see DR Fig. 3a), the oldest samples have among the highest $^{87}Sr/^{86}Sr$ values and the largest Sr concentrations. This is counter to the model proposed by Wenrich et al. (1995) that the older western Grand Canyon basalts were asthenospheric melts that were contaminated by crustal assimilation during assent, as lower Sr concentrations would be expected in the case of crustal contamination. Many of the $\leq$ 4.5 Ma basalts, like the Little Springs flow, are clearly asthenospheric as their ε_{Nd} and $^{87}Sr/^{86}Sr$ values are indistinguishable from MORB. Hence, we do not think crustal contamination has a first order effect on the Nd and Sr isotopic values, particularly in the case of the oldest and youngest basalts which have high Sr concentrations.

DR TABLE 1 - Nd and Sr isotopic results from western Grand Canyon basalts.

	Whitmore	Whitmore Cascade	Toroweap C	"Massive Diabase"†	Upper Gray Ledge	Lower Gray Ledge	"Massive Diabase"†	Black Ledge	Vulcans Anvil	Little Springs	Grassy Knoll
	W00-190-02	RC06-187.7-1	LP01-179-04	W00-195-1	LP01-189-01	LP01-184.01	RC05-188.1R-1	RC07-246-1C	RC06-178-1	RC08-LS-CHEM¥	K07-SHIV-1
	Tholeitte	Tholeitte	Alkali Basalt	Alkali Basalt	Alkali Basalt	Alkali Basalt	Alkali Basalt	Basanite	Basanaite	Basanite	
Lat	36.1239	36.1527	36.2004	36.0923	36.1295	36.1499	36.1448	35.8240	36.2076	36.3443	36.2904
Long	-133.1966	-113.2088	-113.0797	-113.2649	-113.2036	-113.1998	-113.2039	-113.6464	-113.0596	-113.1371	-113.4773
Age (Ma)‡	0.318 ± 0.081	0.209 ± 0.023#	0.487 ± 0.048	0.298 ± 0.057	0.127 ± 0.027	0.200 ± 0.072	0.611 ± 0.023#	0.567 ± 0.015#	0.593 ± 0.021#	0.001	5.41 ± 0.08#
SiO_2 (wt %)	50.88	51.34	49.22	48.46	46.20	45.57	46.30	43.16	44.08	45.88	
TiO_2 (wt %)	1.38	1.38	1.64	1.74	2.24	2.32	2.29	2.84	2.76	2.74	
Al_2O_3 (wt %)	14.82	14.95	16.62	14.29	13.37	12.80	13.54	13.51	13.35	15.35	
FeO* (wt %)	10.57	10.54	9.38	11.65	10.94	11.09	10.50	11.44	11.55	12.46	
MnO (wt %)	0.16	0.16	0.16	0.18	0.17	0.17	0.17	0.18	0.17	0.16	
MgO (wt %)	8.60	8.82	7.62	10.07	12.19	12.53	10.42	10.55	10.69	7.94	
CaO (wt %)	8.44	8.55	10.19	9.03	10.77	10.47	9.76	10.71	10.01	8.33	
Na_2O (wt %)	3.20	3.26	3.41	3.09	2.99	2.79	3.03	3.38	3.46	4.35	
K_2O (wt %)	0.73	0.72	1.04	0.89	1.18	1.13	1.44	1.69	1.35	2.04	
P_2O_5 (wt %)	0.19	0.19	0.45	0.36	0.58	0.55	0.60	0.83	0.66	0.59	
	98.97	99.91	99.73	99.76	100.63	99.42	98.05	98.29	98.08	99.84	
Ni (ppm)	187	187	79	235	283	314	222	177	204	135	
Cr (ppm)	341	361	225	386	473	467	343	290	377	141	
Sc (ppm)	24	24	30	26	29	26	23	24	23	13	
V (ppm)	178	181	230	192	248	242	207	244	244	205	
Ba (ppm)	234	261	748	411	894	838	682	672	447	341	
Rb (ppm)	12	12	13	12	16	15	20	19	23	20	
Sr (ppm)	282	294	583	466	691	671	716	913	843	681	
Zr (ppm)	96	96	141	130	168	169	214	281	235	217	
Y (ppm)	20	19	23	20	22	20	22	25	20	19	
Nb (ppm)	11	10	29	23	44	43	48	71	54	41	
Ga (ppm)	18	19	18	20	18	16	20	20	20	24	
Cu (ppm)	72	65	68	49	73	77	65	56	56	48	
Zn (ppm)	98	97	83	111	92	98	103	106	107	130	
Pb (ppm)	2	4	7	4	5	4	6	5	3	4	
La (ppm)	12	15	36	26	45	42	46	54	41	25	
Ce (ppm)	26	28	61	46	87	76	76	103	76	61	

Th (ppm)	2	2	7	4	6	5	6	7	4	4	
Nd (ppm)	15	17	28	22	38	36	35	49	39	28	
U (ppm)	1	1	3	2	2	2	3	2	3	1	
$^{87}Sr/^{86}Sr(m)^{\S}$	0.705217 ± 9	0.705409 ± 16	0.703978 ± 11	0.704583 ± 16	0.704174 ± 12	0.704086 ± 16	0.703856 ± 6	0.703581 ± 16	0.706378 ± 11	0.702890 ± 13	0.704591 ± 23
$^{143}Nd/^{144}Nd^{\S}$	0.512563 ± 19	0.512570 ± 25	0.512658 ± 9	0.512663 ± 10	0.512696 ± 14	0.512746 ± 12	0.51279 ± 15	0.512902 ± 7.	0.512931 ± 15	0.513035 ± 11	0.512696 ± 13
$\varepsilon_{Nd}(O)$	-1.46	-1.32	0.39	0.48	1.12	2.11	2.96	5.16	5.72	7.74	1.12
U (ppm)‡										1.177 ± 5	
Th (ppm)‡										3.224 ± 11	
$(^{230}Th/^{232}Th)^{‡}$										1.256 ± 10	
$(^{238}U/^{232}Th)^{‡}$										1.107 ± 6	
$(^{230}Th/^{238}U)^{‡}$										1.1345 ± 9	

† From separate flow remnants previously refered to as Massive Diabase by Hamblin, 1994 (see Crow et al., 2008)

‡ 2 sigma error reported

* All Fe is reported as FeO

Crow unpublished Ar/Ar age

§ 1 sigma error reported

¥ U-Th, major and minor element analyses performed on separate sample (LS503)

DR TABLE 2 - Nd and Sr isotopic values for Neogene basaltic rocks in the southwestern US.

Sample Number	Latitude	Longitude	Reference	Age (Ma)		Geochemical Classification	εNd(0)	$^{87}Sr/^{86}Sr(m)$
92-08	35.3700	-111.5000	Asmerom et al., 1995	0.0010		ALKALI BASALT	-0.3	
92-07	35.3700	-111.5000	Asmerom et al., 1995	0.0010		ALKALI BASALT	0.5	
92-09(b)	35.3700	-111.5000	Asmerom et al., 1995	0.0010		ALKALI BASALT	0.6	
A81-12	33.4700	-109.0000	Bikerman et al., 1992	5.0000		ALKALI BASALT	-2.5	0.706150
G-4	33.8200	-108.5800	Bikerman et al., 1992	0.9000		THOLEIITE	5.3	0.703630
MH-1	34.6807	-114.3117	Bradshaw et al., 1993	20.5000		ALKALI BASALT	*-7.6*	0.708360
MO-1	34.6833	-114.3107	Bradshaw et al., 1993	21.0000		TRACHYBASALT	*-6.0*	0.708270
MO-5	34.6821	-114.3117	Bradshaw et al., 1993	20.5000		TRACHYBASALT	*-5.6*	0.707810
BW-4	34.5105	-114.0755	Bradshaw et al., 1993	10.0000		THOLEIITE	*-4.3*	0.706600
K-5	35.7162	-114.1582	Bradshaw et al., 1993	10.0000		ALKALI BASALT	*-3.5*	0.705710
H-1	34.4248	-114.2504	Bradshaw et al., 1993	21.5000		ALKALI BASALT	*-2.3*	0.707330
M-1	35.8691	-114.6051	Bradshaw et al., 1993	5.8000		ALKALI BASALT	*1.8*	0.704870
BW-6	34.2844	-114.1113	Bradshaw et al., 1993	5.0000		TRACHYBASALT	*5.5*	0.704770
801C	34.4286	-109.5595	Condit et al., 2010 (website)	6.5900		THOLEIITE	*-1.9*	
714SLS	34.2436	-110.0188	Condit et al., 2010 (website)	1.6100		ALKALI BASALT	-1.3	0.705715
717MR	34.4080	-109.8203	Condit et al., 2010 (website)	1.5600	± 0.03	ALKALI BASALT	-0.4	0.705868
CH7	34.3190	-109.5420	Condit et al., 2010 (website)	1.1800		ALKALI BASALT	-0.1	0.705657
770SS	34.3149	-109.9856	Condit et al., 2010 (website)	1.4500		ALKALI BASALT	0.6	0.704873
SF2	34.0889	-109.4055	Condit et al., 2010 (website)	1.1500		ALKALI BASALT	2.4	0.704360
715SLS	34.2442	-110.0200	Condit et al., 2010 (website)	1.9100		ALKALI BASALT	2.8	0.704173
716SM	34.1674	-109.8226	Condit et al., 2010 (website)	1.0100	± 0.02	ALKALI BASALT	2.8	
SS8	34.3091	-109.7694	Condit et al., 2010 (website)	1.8000		UNKNOWN	2.8	0.703735
749OM	34.3091	-109.7694	Condit et al., 2010 (website)	1.8000		TEPHRITEBASANITE	2.9	0.704164
414MC	34.1119	-109.7510	Condit et al., 2010 (website)	0.6500		TEPHRITEBASANITE	*3.0*	0.703780
TP6	34.2115	-109.5575	Condit et al., 2010 (website)	0.9600		ALKALI BASALT	3.7	0.704000
JC11	34.2876	-109.5610	Condit et al., 2010 (website)	1.3500		TEPHRITEBASANITE	3.7	0.703446
CX	34.2353	-109.3666	Condit et al., 2010 (website)	0.9300		ALKALI BASALT	4.1	
732SN	34.0751	-109.4620	Condit et al., 2010 (website)	0.5000		ALKALI BASALT	*4.2*	0.703742
RT4	34.2731	-109.5740	Condit et al., 2010 (website)	1.2000		ALKALI BASALT	4.6	0.703629
JC734	34.1106	-109.3165	Condit et al., 2010 (website)	3.0600		TEPHRITEBASANITE	5.4	0.704010
JC732	34.0758	-109.4228	Condit et al., 2010 (website)	1.2600		ALKALI BASALT	5.6	0.703400
TMF-5	35.8026	-114.6383	Daley and DePaolo, 1992	5.8000		THOLEIITE	-8.4	0.707390
TMF-9	35.8026	-114.6383	Daley and DePaolo, 1992	5.8000		ALKALI BASALT	-7.9	0.707460
714-35	36.1585	-114.6999	Daley and DePaolo, 1992	12.5000		TEPHRITEBASANITE	-6.4	0.707000
TDM-5	35.7665	-114.8080	Daley and DePaolo, 1992	13.2000	± 1.4	BASALTICTRACHYANDESITE	-5.3	0.706940
TMF-2	35.9043	-114.6211	Daley and DePaolo, 1992	4.9000		ALKALI BASALT	-0.2	0.705190
TID-1	35.9043	-114.6211	Daley and DePaolo, 1992	4.6000		TEPHRITEBASANITE	6.4	0.702930
Lr87-1	33.0292	-108.1667	Davis and Hawkesworth, 1993	20.6000	± 0.5	BASALTICTRACHYANDESITE	*-4.6*	0.706640
B188-12	33.1833	-108.0292	Davis and Hawkesworth, 1993	21.0000		TRACHYBASALT	*-4.1*	0.706480

B188-11	33.1833	-108.0292	Davis and Hawkesworth, 1993	21.0000		TRACHYBASALT	*-4.1*	0.706490
K280S	33.0625	-108.1667	Davis and Hawkesworth, 1993	6.5000	± 0.6	TEPHRITEBASANITE	*6.9*	0.703140
APC88-1	33.8250	-108.6208	Davis and Hawkesworth, 1995	0.9000	± 0.2	THOLEIITE	*4.9*	0.703780
T 6-15G	35.7513	-106.2955	Duncker et al., 1991	3.0000	± 1	ALKALI BASALT	*-0.8*	0.704769
T 6-7B	35.8675	-106.2077	Duncker et al., 1991	3.0000	± 1	ALKALI BASALT	*-0.4*	0.704936
H SF-5	35.8168	-106.1714	Duncker et al., 1991	3.0000	± 1	BASALTIC TRACHYANDESITE	*0.5*	0.704252
H I-4	35.7850	-106.1911	Duncker et al., 1991	3.0000	± 1	TRACHYBASALT	*1.0*	0.705121
H I-6	35.7800	-106.1900	Duncker et al., 1991	3.0000	± 1	ALKALI BASALT	*1.2*	0.704245
H SF-10	35.8040	-106.1416	Duncker et al., 1991	3.0000	± 1	TRACHYBASALT	*1.3*	0.704259
CF12-6-10	36.7833	-116.5500	Farmer et al., 1989	3.7000		UNKNOWN	-10.4	0.707470
TS6-13-6	37.0833	-116.3333	Farmer et al., 1989	2.7000		UNKNOWN	-10.2	0.706900
CF11-7-1	36.6833	-116.5000	Farmer et al., 1989	0.3000		UNKNOWN	-9.1	0.707040
FB785	36.7833	-116.5833	Farmer et al., 1989	1.1000		UNKNOWN	-9.0	0.707010
DV3-30-23V	35.9333	-116.7333	Farmer et al., 1989	0.7000		UNKNOWN	-8.6	0.706950
SB9-21-3	37.1500	-116.7333	Farmer et al., 1989	0.3000		UNKNOWN	-8.4	0.706980
NE5-20-5	37.0833	-116.6167	Farmer et al., 1989	7.5000		ALKALI BASALT	-7.8	0.707090
CF1-8-3	36.7167	-116.5833	Farmer et al., 1989	10.1000		UNKNOWN	-7.5	0.707250
TS6-15-2	37.3667	-116.3667	Farmer et al., 1989	8.8000		UNKNOWN	-1.3	0.706710
TS6-14-7A	36.9333	-115.8500	Farmer et al., 1989	7.0000		ALKALI BASALT	2.2	0.703870
TS9-19-20FP	37.0833	-115.9500	Farmer et al., 1989	8.7000		UNKNOWN	3.7	0.703940
TS6-14-12DV	36.8833	-115.8833	Farmer et al., 1989	7.0000		ALKALI BASALT	3.7	0.704710
RE10-2-53V	38.0833	-116.1167	Farmer et al., 1989	5.0000		UNKNOWN	4.4	0.703560
PR7-12-31V	38.6333	-116.0667	Farmer et al., 1989	10.2000		UNKNOWN	4.6	0.703490
CIM-8143	35.2000	-115.8667	Farmer et al., 1989	0.0400		ALKALI BASALT	9.1	0.702980
CIM-8142	35.2333	-115.7167	Farmer et al., 1989	1.0000		ALKALI BASALT	10.1	0.702940
Ci-53	35.2209	-115.6850	Farmer et al., 1995	6.9200		PHONOTEPHRITE	5.0	0.705020
Ci-12	35.3385	-115.6320	Farmer et al., 1995	3.0000		TEPHRITEBASANITE	5.6	0.703490
Ci-9-102	35.3530	-115.6540	Farmer et al., 1995	5.5000		PHONOTEPHRITE	6.3	0.703390
Ci-49	35.2171	-115.7050	Farmer et al., 1995	7.5500		PHONOTEPHRITE	6.3	0.703300
CD-8	35.2171	-115.7050	Farmer et al., 1995	6.5000		PHONOTEPHRITE	6.4	0.703520
Ci-10-101	35.3570	-115.6420	Farmer et al., 1995	5.9000		PHONOTEPHRITE	6.8	0.703240
Ci-9-101	35.3603	-115.6540	Farmer et al., 1995	6.2000		PHONOTEPHRITE	7.1	0.703050
Ci-16	35.3142	-115.8190	Farmer et al., 1995	6.0800		PHONOTEPHRITE	7.5	0.703940
Ci-19	35.4208	-115.8360	Farmer et al., 1995	4.4800		BASALTIC TRACHYANDESITE	7.5	0.703530
Ci-6-1	35.2766	-115.7320	Farmer et al., 1995	0.2700		TRACHYBASALT	7.9	0.702920
Ci-15	35.2355	-115.7440	Farmer et al., 1995	0.8500		ALKALI BASALT	8.0	0.703130
Ci-43	35.1946	-115.8410	Farmer et al., 1995	0.1500		TRACHYBASALT	8.0	0.702930
CD-13	35.1943	-115.8410	Farmer et al., 1995	0.1000		TRACHYBASALT	8.1	0.702820
Ci-20	35.2541	-115.7290	Farmer et al., 1995	0.3300		TRACHYBASALT	8.2	0.702990
CD-1	35.1839	-115.7760	Farmer et al., 1995	0.5600		TRACHYBASALT	8.3	0.703010
CD-2	35.1966	-115.7820	Farmer et al., 1995	0.3500		TRACHYBASALT	8.3	0.703040
Ci-60	35.4780	-115.8300	Farmer et al., 1995	3.9300		BASALTIC TRACHYANDESITE	8.4	0.703340

CD-7	35.2092	-115.7160	Farmer et al., 1995	0.8500		TRACHYBASALT	8.4	0.702900
CD-6	35.2062	-115.7400	Farmer et al., 1995	0.5000		BASALTIC TRACHYANDESITE	8.5	0.703210
CD-9	35.1943	-115.8410	Farmer et al., 1995	0.1000		TRACHYBASALT	8.5	0.702850
MC-1	35.3064	-115.7780	Farmer et al., 1995	3.8800		BASALTIC TRACHYANDESITE	8.5	0.703470
CD-3	35.2196	-115.7550	Farmer et al., 1995	0.1350		TRACHYBASALT	8.6	0.702850
CD-5	35.1931	-115.7380	Farmer et al., 1995	0.9900		TRACHYBASALT	8.9	0.703310
Ci-75	35.3284	-115.8440	Farmer et al., 1995	3.6400		UNKNOWN	9.0	0.703620
MC-1A	35.3064	-115.7780	Farmer et al., 1995	3.8500		TRACHYBASALT	9.2	0.703060
EMD-209	36.1167	-114.7500	Feuerbach et al. 1993	12.0000		BASALTICTRACHYANDESITE	-9.9	
78-218	36.0833	-114.8333	Feuerbach et al. 1993	12.7500		ALKALI BASALT	-8.3	
TH 60-04	35.7500	-114.6667	Feuerbach et al. 1993	10.1500	± 0.5	ALKALI BASALT	-8.3	
LV-104	36.5053	-115.0417	Feuerbach et al. 1993	16.4000	± 0.6	TEPHRITEBASANITE	-7.2	
4-13	36.2500	-113.8333	Feuerbach et al. 1993	5.4500		ALKALI BASALT	-6.7	
OAB 10-121	36.4119	-114.3839	Feuerbach et al. 1993	6.0100		TEPHRITEBASANITE	-3.6	
OAB 10-120	36.4119	-114.3839	Feuerbach et al. 1993	6.0100		ALKALI BASALT	-2.3	
3-6	36.2500	-114.2500	Feuerbach et al. 1993	9.3100		ALKALI BASALT	-0.9	
OAB 38-143	36.0625	-114.6822	Feuerbach et al. 1993	5.6600		ALKALI BASALT	-0.9	
OAB-hy 38-13	36.0625	-114.6822	Feuerbach et al. 1993	5.6600		ALKALI BASALT	-0.8	
OAB 42-82	36.0769	-114.5956	Feuerbach et al. 1993	5.0200		TRACHYBASALT	-0.7	
OAB 57-107	35.8772	-114.5875	Feuerbach et al. 1993	4.9500		ALKALI BASALT	1.4	
OAB 57-113	35.8772	-114.5875	Feuerbach et al. 1993	4.9500		TEPHRITEBASANITE	1.4	
5-14	36.2500	-113.8333	Feuerbach et al. 1993	5.4500		ALKALI BASALT	1.5	
YAB 25-2	36.0769	-114.5956	Feuerbach et al. 1993	4.3000		TEPHRITEBASANITE	3.2	
YAB 42-76	36.0769	-114.5956	Feuerbach et al. 1993	4.3000		TEPHRITEBASANITE	3.6	
CM-87	35.6676	-114.1453	Feuerbach et al. 1998	17.9000		UNKNOWN	*-8.3*	
92-224	35.5700	-114.5086	Feuerbach et al. 1998	16.0000		UNKNOWN	*-6.2*	0.708531
MD-34	35.6530	-114.6318	Feuerbach et al. 1998	14.7900		UNKNOWN	*-4.7*	0.707646
MD-43	35.6530	-114.6318	Feuerbach et al. 1998	15.3000		UNKNOWN	*-3.1*	0.706521
5LT358	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	ALKALI BASALT	*-7.4*	0.705094
US83	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	BASALTIC TRACHYANDESITE	*-6.9*	0.705681
5LT351	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	TRACHYBASALT	*-6.7*	0.705887
5LT352	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	TRACHYBASALT	*-6.5*	0.705703
US78	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	THOLEIITE	*-5.0*	0.704812
5LT338	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	TRACHYBASALT	*-4.6*	0.704636
5LT360	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	BASALTIC TRACHYANDESITE	*-4.6*	0.704580
US79	39.9714	-107.2460	Gibson et al., 1991	22.0000	± 2	THOLEIITE	*-4.5*	0.704827
J-107	36.7500	-105.5000	Johnson et al., 1990	13.0000	± 2	TEPHRITEBASANITE	-3.8	0.706050
J-115	36.7500	-105.5000	Johnson et al., 1990	13.0000	± 2	UNKNOWN	-1.4	0.704340
J-108	36.7500	-105.5000	Johnson et al., 1990	13.0000	± 2	ALKALI BASALT	-1.2	0.704790
5LT128	39.9130	-106.6417	Leat et al., 1990	22.7500	± 1.25	TRACHY BASALT	*-8.3*	0.706668
5LT125	39.9130	-106.6417	Leat et al., 1990	22.7500	± 1.25	TRACHY BASALT	*-7.4*	0.706851
5LT124	39.8937	-106.6478	Leat et al., 1990	22.7500	± 1.25	TRACHY BASALT	*-7.1*	0.705716

5LT121	39.8937	-106.6478	Leat et al., 1990	22.7500	± 1.25	ALKALI BASALT	*-6.2*	0.706250
5LT119	39.8937	-106.6478	Leat et al., 1990	22.7500	± 1.25	ALKALI BASALT	*-5.7*	0.706043
5LT51	40.1856	-106.9712	Leat et al., 1991	8.7500	± 1.25	ALKALI BASALT	*-7.7*	0.704894
5LT84	40.1419	-106.8708	Leat et al., 1991	8.7500	± 1.25	ALKALI BASALT	*-7.4*	0.704355
5LT94	40.1100	-106.8677	Leat et al., 1991	8.7500	± 1.25	BASALTIC TRACHYANDESITE	*-5.3*	0.704197
5LT54	40.1832	-106.9117	Leat et al., 1991	8.7500	± 1.25	TEPHRITEBASANITE	*-4.3*	0.704166
US89	40.2161	-106.9328	Leat et al., 1991	8.7500	± 1.25	TEPHRITEBASANITE	*-3.6*	0.704596
5LT87	40.1370	-106.8699	Leat et al., 1991	8.7500	± 1.25	ALKALI BASALT	*-2.1*	0.704724
5LT96	40.1128	-106.8569	Leat et al., 1991	8.7500	± 1.25	TEPHRITEBASANITE	*-2.1*	0.706295
5LT86	40.1359	-106.8615	Leat et al., 1991	8.7500	± 1.25	TEPHRITEBASANITE	*-2.0*	0.704252
5LT70	40.2519	-106.8184	Leat et al., 1991	8.7500	± 1.25	TEPHRITEBASANITE	*-2.0*	0.705049
5LT107	40.1061	-106.8457	Leat et al., 1991	8.7500	± 1.25	TRACHYBASALT	*-0.8*	0.704782
5LT90	40.1335	-106.7923	Leat et al., 1991	8.7500	± 1.25	ALKALI BASALT	*-0.2*	0.703948
5LT89	40.1335	-106.7923	Leat et al., 1991	8.7500	± 1.25	TEPHRITEBASANITE	*0.6*	0.704099
5LT154	40.5706	-106.9679	Leat et al., 1988A	9.3500	± 1.75	TRACHYBASALT	*-7.6*	0.704057
5LT157	40.5706	-106.9679	Leat et al., 1988A	9.3500	± 1.75	BASALTIC TRACHYANDESITE	*-7.5*	0.704133
5LT152	40.5706	-106.9679	Leat et al., 1988A	9.3500	± 1.75	TRACHYBASALT	*-7.5*	0.704067
5LT155	40.5706	-106.9679	Leat et al., 1988A	9.3500	± 1.75	BASALTIC TRACHYANDESITE	*-7.3*	0.704002
5LT156	40.5706	-106.9679	Leat et al., 1988A	9.3500	± 1.75	BASALTIC TRACHYANDESITE	*-7.3*	0.704131
5LT104	40.1339	-106.8550	Leat et al., 1988B	8.7500	± 1.25	TRACHYBASALT	*-9.1*	0.704154
5LT190	41.0266	-107.2731	Leat et al., 1988B	8.7500	± 1.25	TRACHYBASALT	*-7.0*	0.704332
US73	39.5306	-107.0582	Leat et al., 1988B			TRACHYBASALT	*-6.0*	0.705529
US111	39.9667	-106.7000	Leat et al., 1989	0.6400	± 0.2	TEPHRITEBASANITE	*-5.7*	0.704719
5LT21	39.3167	-106.9167	Leat et al., 1989	1.9250	± 0.055	BASALTIC TRACHYANDESITE	*-5.1*	0.705748
5LT14	39.3167	-106.9167	Leat et al., 1989	1.9250	± 0.055	TRACHYBASALT	*-4.9*	0.705505
5LT11	39.3167	-106.9167	Leat et al., 1989	1.9250	± 0.055	TRACHYBASALT	*-4.9*	0.706251
5LT16	39.3167	-106.9167	Leat et al., 1989	1.9250	± 0.055	TRACHYBASALT	*-4.7*	0.706141
5LT18	39.3167	-106.9167	Leat et al., 1989	1.9250	± 0.055	BASALTIC TRACHYANDESITE	*-4.6*	0.706158
US68	39.6666	-107.1500	Leat et al., 1989	0.1000	± 0.1	TRACHYBASALT	*-4.4*	0.705688
US67	39.6500	-107.0333	Leat et al., 1989	0.0040	± 0.0003	TRACHYBASALT	*-4.3*	0.710244
9-94-16	33.7500	-111.8750	Leighty, 1997	21.3400		ALKALI BASALT	-7.8	
9-94-41	33.5789	-112.8720	Leighty, 1997	15.0100		THOLEIITE	-7.1	
11-94-1	33.5936	-112.0860	Leighty, 1997	14.5000	± 1.5	THOLEIITE	-6.5	
8-94-10	34.5767	-112.2100	Leighty, 1997	13.4000		ALKALI BASALT	-6.0	
3-93-59	33.9658	-112.0690	Leighty, 1997	20.0000		ALKALI BASALT	-5.2	
4-93-5	33.8750	-111.8750	Leighty, 1997	20.0000		ALKALI BASALT	-3.2	
5-93-3	34.3628	-112.2170	Leighty, 1997	13.4700		ALKALI BASALT	-2.4	
4-95-29	34.0797	-111.7130	Leighty, 1997	9.5000	± 1.5	ALKALI BASALT	-2.2	
12-94-2	34.4914	-111.6900	Leighty, 1997	9.5000	± 1.5	ALKALI BASALT	-1.8	
4-93-51A	33.8903	-112.2100	Leighty, 1997	16.2000		THOLEIITE	0.3	
9-94-47	33.3281	-112.7590	Leighty, 1997	3.2800		THOLEIITE	3.1	
12-94-14A	33.0197	-113.9990	Leighty, 1997	3.1900		ALKALI BASALT	3.6	

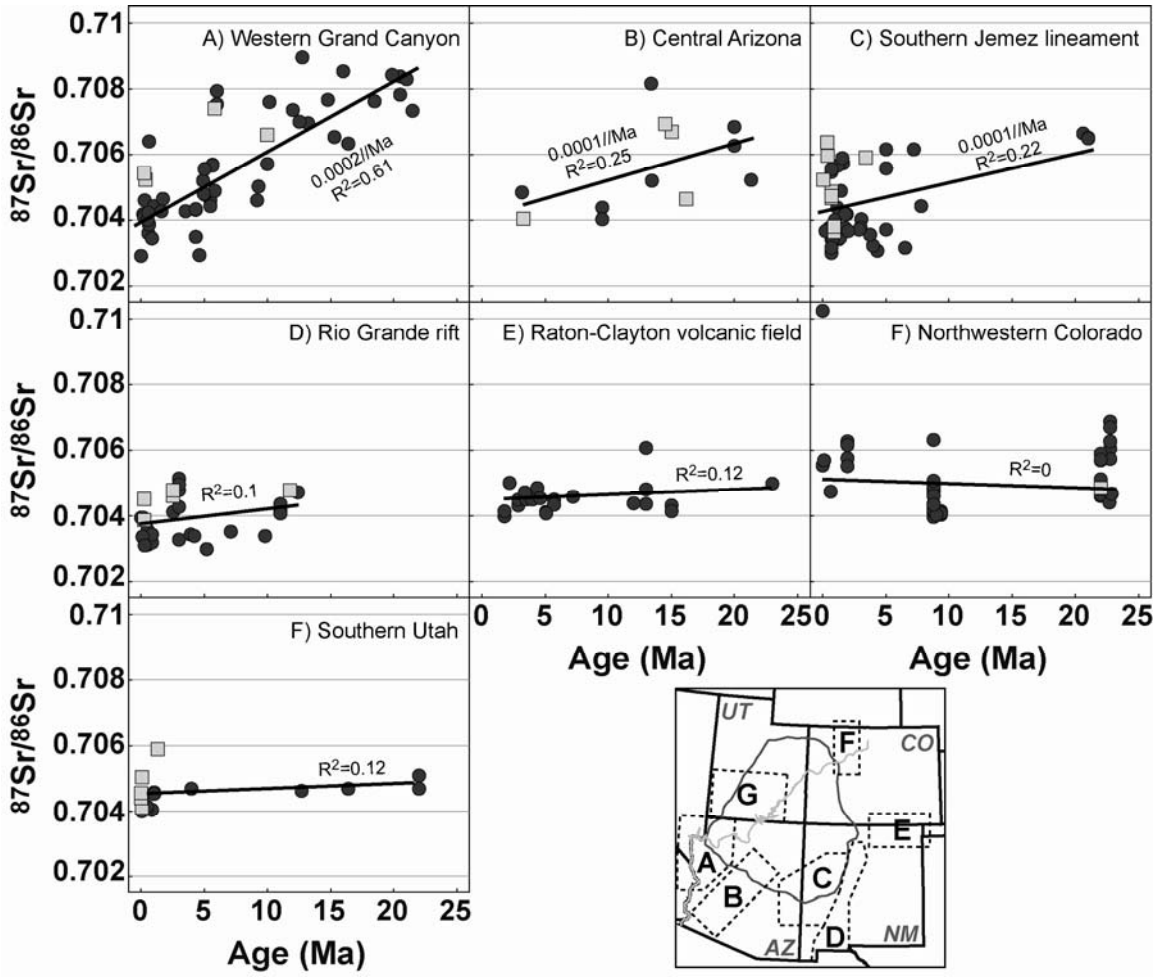
AP26	38.7514	-111.7983	Mattox et al., 1997	16.4000		ALKALI BASALT	-8.7	
LC1	37.8633	-112.7733	Mattox et al., 1997	0.4500		ALKALI BASALT	-8.3	
CR1	38.4983	-111.4769	Mattox et al., 1997	4.0000		TRACHYBASALT	-7.0	
EV1	38.4000	-112.1650	Mattox et al., 1997	12.7000		TRACHYBASALT	-5.2	
DH-08	31.9227	-108.2822	McMillan et al., 2000	11.8000		THOLEIITE	1.0	0.704772
WPB003	31.9152	-107.1883	McMillan et al., 2000	0.5000		ALKALI BASALT	4.7	0.703552
WPB002	31.9152	-107.1883	McMillan et al., 2000	0.5000		ALKALI BASALT	5.3	0.703534
DH-01	32.5569	-106.9668	McMillan et al., 2000	9.8000		ALKALI BASALT	6.0	0.703366
WPB001	31.9152	-107.1883	McMillan et al., 2000	0.5000		TEPHRITEBASANITE	6.3	0.703140
DH-07	31.8615	-107.7571	McMillan et al., 2000	3.9000		TEPHRITEBASANITE	6.4	0.703400
DH-14	32.9615	-107.4942	McMillan et al., 2000	4.2000		TRACHYBASALT	7.0	0.703377
DH-06	31.8615	-107.7571	McMillan et al., 2000	5.2000		TEPHRITEBASANITE	7.2	0.702976
DH-03	32.4802	-107.1606	McMillan et al., 2000	7.1000		TEPHRITEBASANITE	7.2	0.703489
DH-05	31.8615	-107.7571	McMillan et al., 2000	3.0000		TEPHRITEBASANITE	7.3	0.703256
QV906	34.7900	-108.3000	Menzies et al., 1991	0.6900	± 0.69	ALKALI BASALT	*-5.1*	0.705460
QBC401	34.8900	-107.7500	Menzies et al., 1991	0.6900	± 0.69	THOLEIITE	*0.8*	0.704730
QBT301	34.9200	-108.0500	Menzies et al., 1991	0.6900	± 0.69	ALKALI BASALT	*1.4*	0.705550
QBB901a	34.9100	-107.8200	Menzies et al., 1991	0.6900	± 0.69	ALKALI BASALT	*1.4*	0.703640
QV901	34.7500	-108.2800	Menzies et al., 1991	0.6900	± 0.69	THOLEIITE	*2.4*	0.704650
QB902	34.6600	-108.1000	Menzies et al., 1991	0.6900	± 0.69	ALKALI BASALT	*4.8*	0.703410
QB203	34.6500	-108.1000	Menzies et al., 1991	0.6900	± 0.69	THOLEIITE	*5.4*	0.704860
QBO602	35.0800	-108.0100	Menzies et al., 1991	0.6900	± 0.69	ALKALI BASALT	*6.1*	0.703150
QBO607	35.0700	-108.0600	Menzies et al., 1991	0.6900	± 0.69	ALKALI BASALT	*6.6*	0.702990
DM-98-3-6-2	37.2375	-105.0328	Miggins, 2002	23.0000		TEPHRITEBASANITE	-3.4	0.704961
B-S-4-DM	37.0106	-105.2681	Miggins, 2002	15.0000		ALKALI BASALT	-2.6	0.704303
DM-99-67	37.0614	-105.0133	Miggins, 2002	22.0000		TRACHYBASALT	-2.3	
DM-98-22-7	37.0292	-105.2272	Miggins, 2002	12.0000		BASALTIC TRACHYANDESITE	-2.2	0.704361
B-S-4-DM	37.0106	-105.2681	Miggins, 2002	15.0000		ALKALI BASALT	-2.2	0.704131
DM98-4	36.9428	-104.4156	Miggins, 2002	4.0000		ALKALI BASALT	-1.6	0.704481
DM-99-51	37.0714	-105.3483	Miggins, 2002	4.4000	± 0.2	ALKALI BASALT	-1.6	0.704835
DM-99-67	37.0614	-105.0133	Miggins, 2002	22.0000		TRACHYBASALT	-1.5	
DM-99-53	37.2111	-105.4281	Miggins, 2002	4.6000	± 0.02	ALKALI BASALT	0.1	0.704512
SV-2	34.5382	-115.3700	Miller et al., 2000	18.5000		ALKALI BASALT	-5.2	0.707680
OPAL-4	35.0939	-117.1120	Miller et al., 2000	18.5000		UNKNOWN	-4.4	0.707080
ECVF1549	35.4000	-116.9700	Miller et al., 2000	18.5000		UNKNOWN	-2.9	0.706640
A3-1	34.3814	-114.7650	Miller et al., 2000	18.5000		TEPHRITEBASANITE	-2.1	0.707620
NBPS-6	34.4957	-116.1490	Miller et al., 2000	18.5000		ALKALI BASALT	-1.2	0.705830
pk914b*	35.5589	-117.1180	Miller et al., 2000	18.5000		THOLEIITE	-0.6	0.705920
KRMR-4	34.8994	-117.5120	Miller et al., 2000	18.5000		UNKNOWN	-0.4	0.706500
ECVF1340	35.5500	-116.9900	Miller et al., 2000	18.5000		UNKNOWN	0.1	0.705790
OPAL-2	35.0939	-117.1120	Miller et al., 2000	18.5000		UNKNOWN	0.2	0.709460
91fi5*	35.3382	-116.7900	Miller et al., 2000	18.5000		THOLEIITE	0.4	0.705480

12-3	34.7817	-116.2440	Miller et al., 2000	18.5000		TRACHYBASALT	0.7	0.705650
EP9315	35.2616	-117.4850	Miller et al., 2000	18.5000		UNKNOWN	2.8	0.704430
FP-11I*	36.7589	-117.7830	Miller et al., 2000	18.5000		ALKALI BASALT	3.5	0.704080
SADL-1	35.0595	-117.6250	Miller et al., 2000	18.5000		THOLEIITE	3.5	0.704650
89fi6*	35.3052	-116.6810	Miller et al., 2000	18.5000		ALKALI BASALT	3.7	0.704480
FP-13I*	36.7589	-117.6170	Miller et al., 2000	18.5000		THOLEIITE	3.9	0.705750
ALVO-3	35.0640	-116.5450	Miller et al., 2000	18.5000		ALKALI BASALT	4.2	0.706030
93fi12*	35.3282	-116.7500	Miller et al., 2000	18.5000		THOLEIITE	4.3	0.704200
FP-5*	36.7589	-117.7830	Miller et al., 2000	18.5000		THOLEIITE	4.7	0.704300
SA9311	34.8994	-117.5120	Miller et al., 2000	18.5000		UNKNOWN	4.7	0.704180
OM9312*	35.1400	-117.2600	Miller et al., 2000	18.5000		THOLEIITE	8.3	0.703810
LB-1	36.0300	-106.2500	Minchak, 1997	12.4200	± 0.34	ALKALI BASALT	-3.6	0.704700
25	36.0300	-106.2500	Minchak, 1997	11.0000	± 1	ALKALI BASALT	-1.3	0.704338
530	36.0270	-106.2441	Minchak, 1997	11.0000	± 1	ALKALI BASALT	-0.8	0.704176
I-3	36.0300	-106.2498	Minchak, 1997	11.0000	± 1	ALKALI BASALT	0.2	0.704055
NP9	37.8386	-112.8186	Nealey et al., 1997	0.4500		TRACHYBASALT	-9.2	0.704058
NWF93-1	37.5692	-112.9433	Nealey et al., 1997	0.8500		ALKALI BASALT	-6.3	0.704026
NE4	37.8000	-113.0000	Nealey et al., 1997	1.3000		THOLEIITE	-5.9	0.705870
NS5	37.7958	-112.9686	Nealey et al., 1997	1.0000		ALKALI BASALT	-3.4	0.704523
NS7	37.7606	-112.9558	Nealey et al., 1997	1.0000		ALKALI BASALT	-3.4	0.704530
MP115	37.7611	-112.8039	Nealey et al., 1997	1.0000		ALKALI BASALT	-2.0	0.704577
NSG9238	37.1500	-113.6000	Nusbaum et al. 1997	0.0010		THOLEIITE	-3.8	0.704384
92NDC2	37.2500	-113.6000	Nusbaum et al. 1997	0.0010		THOLEIITE	-3.8	0.704543
92ND6	37.1500	-113.6000	Nusbaum et al. 1997	0.0010		ALKALI BASALT	-3.7	0.704407
324	34.8625	-107.0562	Perry et al, 1987	0.3200		THOLEIITE	-0.3	0.706360
87	35.8131	-106.1754	Perry et al, 1987	2.5000	± 0.5	THOLEIITE	0.6	0.704760
329	34.6673	-107.3799	Perry et al, 1987	3.4000		THOLEIITE	0.6	0.705890
63	35.0448	-107.3489	Perry et al, 1987	0.3800		THOLEIITE	1.1	0.705940
65	35.4753	-106.4962	Perry et al, 1987	2.5000	± 0.5	THOLEIITE	1.2	0.704590
AWL-40-70	35.0852	-107.7741	Perry et al, 1987	0.0500		THOLEIITE	1.4	0.705210
61	35.5945	-106.2910	Perry et al, 1987	2.5000	± 0.5	ALKALI BASALT	2.2	0.704100
400	34.6606	-107.2969	Perry et al, 1987	7.8000	± 0.1	ALKALI BASALT	3.3	0.704420
425	34.2198	-108.8263	Perry et al, 1987	5.0000		ALKALI BASALT	4.1	0.703710
31	35.2267	-107.5088	Perry et al, 1987	3.0000		ALKALI BASALT	4.1	0.703770
95	35.1276	-106.7504	Perry et al, 1987	0.1900		THOLEIITE	4.1	0.704510
7	35.2382	-107.6731	Perry et al, 1987	2.8900		ALKALI BASALT	4.2	0.703690
411	34.7099	-107.2243	Perry et al, 1987	7.2000		ALKALI BASALT	4.2	0.706140
9	35.1909	-107.6722	Perry et al, 1987	3.7300		ALKALI BASALT	4.5	0.703540
143	34.8803	-106.8292	Perry et al, 1987	0.1400		ALKALI BASALT	4.8	0.703920
106	35.1769	-106.7203	Perry et al, 1987	0.1900		THOLEIITE	4.8	0.703860
22	35.2375	-107.6349	Perry et al, 1987	2.0100		ALKALI BASALT	5.0	0.703660
89	35.5664	-107.1380	Perry et al, 1987	5.0000		ALKALI BASALT	5.1	0.705570

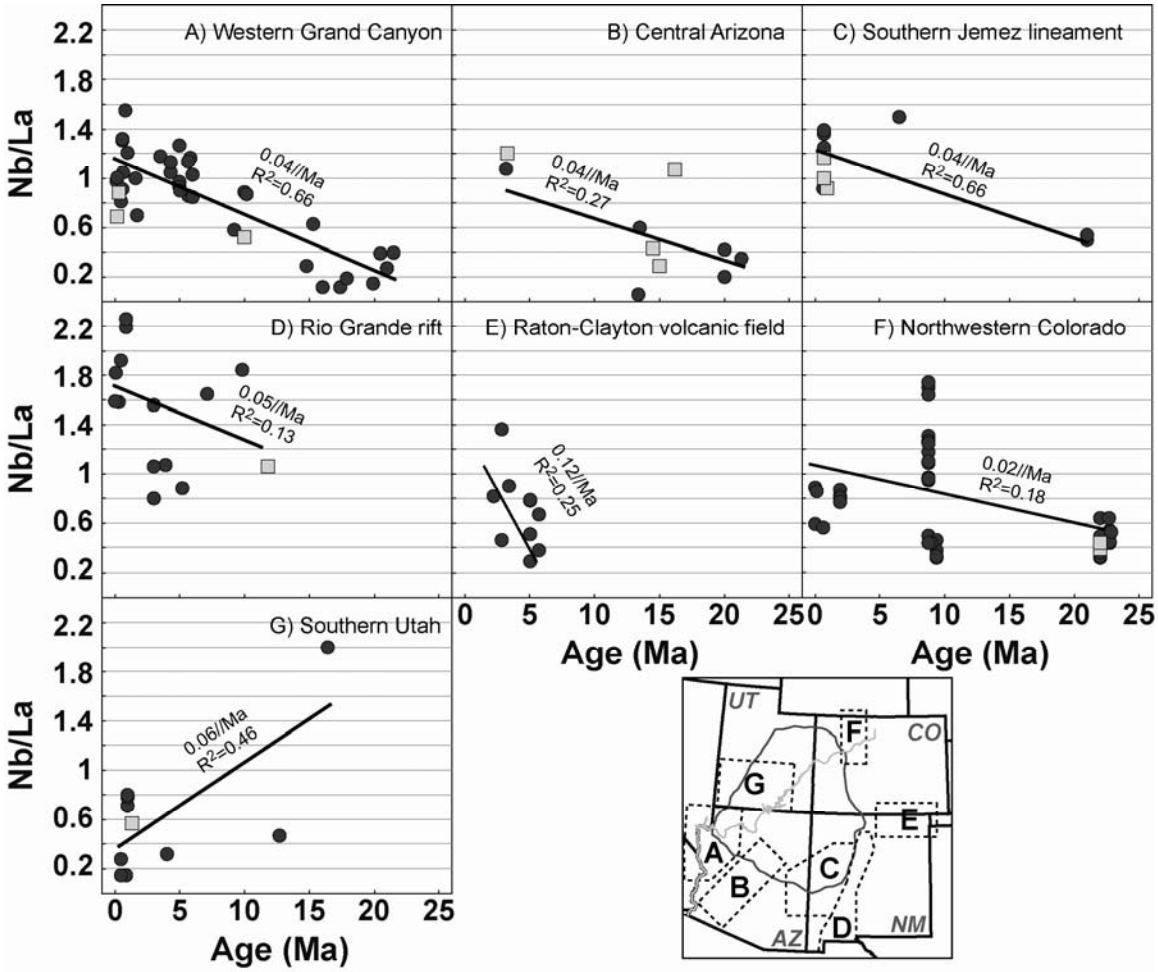
142	34.9806	-108.0638	Perry et al, 1987	0.2000		ALKALI BASALT	5.4	0.703660
328	34.8334	-107.2977	Perry et al, 1987	0.8000		ALKALI BASALT	5.5	0.703430
384	34.5199	-107.4531	Perry et al, 1987	4.0000		ALKALI BASALT	6.1	0.703200
417	34.4748	-107.5551	Perry et al, 1987	4.3000		ALKALI BASALT	6.6	0.703060
MT7	35.2583	-107.6875	Perry et al., 1990	2.8900	± 0.07	ALKALI BASALT	4.2	
MT9	35.2000	107.6667	Perry et al., 1990	3.7300	± 0.09	TEPHRITEBASANITE	4.5	
MT22	35.2083	-107.6667	Perry et al., 1990	2.0100	± 0.05	TRACHYBASALT	5.0	
885-271	36.8335	-103.8289	Phelps et al., 1983	1.8000		TEPHRITEBASANITE	1.0	0.704120
70-9	36.7166	-103.9342	Phelps et al., 1983	1.8000		TEPHRITEBASANITE	1.0	0.703970
24-9	36.7719	-103.8257	Phelps et al., 1983	1.8000		TEPHRITEBASANITE	1.4	0.703970
89UT5	37.7500	-112.7000	Reid and Ramos, 1996	0.0600		TRACHYANDESITE	-10.1	0.704170
93WGB01	37.0046	-117.4516	Reid and Ramos, 1996	0.0100		UNKNOWN	-9.5	0.707550
4*2-1	36.6429	-116.3962	Reid and Ramos, 1996	0.1100		UNKNOWN	-9.3	0.706930
89UT7	37.7500	-112.7000	Reid and Ramos, 1996	0.0600		THOLEIITE	-6.6	0.704100
89UT11	37.1000	-113.5000	Reid and Ramos, 1996	0.0600		THOLEIITE	-6.2	0.704440
89UT8	37.7500	-112.7000	Reid and Ramos, 1996	0.0600		THOLEIITE	-6.0	0.704380
89UT4	37.1000	-113.5000	Reid and Ramos, 1996	0.0600		THOLEIITE	-3.9	0.705030
89UT6	37.7500	-112.7000	Reid and Ramos, 1996	0.0600		THOLEIITE	-3.5	0.704080
89UT1	37.1000	-113.5000	Reid and Ramos, 1996	0.0010		THOLEIITE	-3.3	0.704450
89UT2	37.1000	-113.5000	Reid and Ramos, 1996	0.0600		ALKALI BASALT	-2.9	0.704290
93BP05	37.0158	-118.2178	Reid and Ramos, 1996	0.0130		ALKALI BASALT	-2.3	0.706160
92LV07	37.7002	-118.8703	Reid and Ramos, 1996	0.0800		TRACHYBASALT	-2.3	0.706190
93BP06	37.0158	-118.2178	Reid and Ramos, 1996	0.0130		ALKALI BASALT	-1.5	0.705690
93LV17	37.7002	-118.8703	Reid and Ramos, 1996	0.0100		TRACHYANDESITE	-1.5	0.706290
92LV01	37.7002	-118.8703	Reid and Ramos, 1996	0.0250		TRACHYANDESITE	-0.7	0.706150
89UT3	37.1000	-113.5000	Reid and Ramos, 1996	0.0600		TEPHRITEBASANITE	1.6	0.703990
92LV06	37.7002	-118.8703	Reid and Ramos, 1996	0.0100		THOLEIITE	2.6	0.705260
H7-28	37.1970	-113.3030	Smith et al., 1999 (from NAVDAT)	0.3530		THOLEIITE	-7.5	
H6-15	37.1800	-113.2800	Smith et al., 1999 (from NAVDAT)	0.3530	± 0.045	THOLEIITE	-6.9	
H7-15	37.1540	-113.3340	Smith et al., 1999 (from NAVDAT)	0.3530		ALKALI BASALT	-6.2	
H5-6	37.1970	-113.3160	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	-1.6	
H7-22	37.1600	-113.3240	Smith et al., 1999 (from NAVDAT)	0.1290		ALKALI BASALT	-1.5	
H1-4	37.1870	-113.2950	Smith et al., 1999 (from NAVDAT)	0.1660		TEPHRITEBASANITE	-1.4	
H7-31	37.1940	-113.3030	Smith et al., 1999 (from NAVDAT)	0.1660		TEPHRITEBASANITE	-1.4	
H7-21	37.1660	-113.3350	Smith et al., 1999 (from NAVDAT)	0.2580	± 0.024	ALKALI BASALT	-1.3	
H7-29	37.1970	-113.3020	Smith et al., 1999 (from NAVDAT)	0.1660		TEPHRITEBASANITE	-1.2	
H7-26	37.1900	-113.3100	Smith et al., 1999 (from NAVDAT)	0.1660		TRACHYBASALT	-1.2	
H6-11	37.0940	-113.2940	Smith et al., 1999 (from NAVDAT)	0.1660		TEPHRITEBASANITE	-1.0	
H1-2	37.1720	-113.3850	Smith et al., 1999 (from NAVDAT)	0.2580		ALKALI BASALT	-0.8	
H7-1	37.0730	-113.3210	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	-0.5	
H7-5	37.0690	-113.3150	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	-0.4	
H7-25	37.1890	-113.3050	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	-0.2	

H1-5	37.0620	-113.3080	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	0.0	
H7-4	37.0700	-113.3160	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	0.1	
H7-19	37.0690	-113.3210	Smith et al., 1999 (from NAVDAT)	0.1660		TRACHYBASALT	0.1	
H7-8	37.0710	-113.3200	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	0.2	
H7-3	37.0640	-113.3270	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	0.4	
H7-9	37.0850	-113.3110	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	0.7	
H7-6	37.0710	-113.3160	Smith et al., 1999 (from NAVDAT)	0.1660		ALKALI BASALT	0.8	
H7-11	37.1050	-113.3250	Smith et al., 1999 (from NAVDAT)	0.1660		TEPHRITEBASANITE	1.0	
H7-7	37.0710	-113.3180	Smith et al., 1999 (from NAVDAT)	0.1660		TRACHYBASALT	1.6	
WOO-190-2	36.1239	-133.1966	this study	0.3180	± 0.08	THOLEIITE	-1.5	0.705217
RC06-187.7-1	36.1527	-113.2088	this study	0.2090	± 0.023	THOLEIITE	-1.3	0.705409
LP01-179-04	36.2004	-113.0797	this study	0.4870	± 0.048	ALKALI BASALT	0.4	0.703978
WOO-195-1	36.0923	-113.2649	this study	0.2980	± 0.057	ALKALI BASALT	0.5	0.704583
K07-SHIV-1	36.2904	-113.4773	this study	5.4100	± 0.08	UNKNOWN	1.1	0.704591
LP01-189-01	36.1295	-113.2036	this study	0.1270	± 0.027	ALKALI BASALT	1.1	0.704174
LP01-184-01	36.1499	-113.1998	this study	0.2000	± 0.072	ALKALI BASALT	2.1	0.704086
RC08-188.1R-1	36.1448	-113.2039	this study	0.6110	± 0.023	ALKALI BASALT	3.0	0.703854
RC07-246-1C	35.8240	-113.6464	this study	0.5670	± 0.015	TEPHRITEBASANITE	5.2	0.703581
RC06-178-1	36.2076	-113.0596	this study	0.5930	± 0.021	TEPHRITEBASANITE	5.7	0.706378
RC08-LS-CHEM	36.3443	-113.1371	this study	0.0010		TEPHRITEBASANITE	7.7	0.702890
5LT180	40.7318	-107.1187	Thompson et al., 1989	9.0000	± 2	BASALTIC TRACHYANDESITE	-8.3	0.704014
5LT160	40.3500	-106.7000	Thompson et al., 1993	22.7000	± 0.5	BASALTIC TRACHYANDESITE	-5.4	0.704394
5LT162	40.3500	-106.7000	Thompson et al., 1993	22.8500	± 0.65	ALKALI BASALT	-4.8	0.704650
10-B86	35.3981	-113.3981	Wenrich et al., 1995	19.9000		ALKALI BASALT	-7.1	0.708410
12-B86	36.1156	-113.8778	Wenrich et al., 1995	17.4000		TEPHRITEBASANITE	-6.2	
13-B86	36.1069	-113.7806	Wenrich et al., 1995	9.2000		ALKALI BASALT	-5.3	0.704590
21-B91	36.8667	-113.4250	Wenrich et al., 1995	1.6000		TRACHYBASALT	-0.8	0.704260
22-B91	36.8514	-113.0806	Wenrich et al., 1995	0.5800		ALKALI BASALT	-0.6	0.704220
27-B91	36.9917	-113.5000	Wenrich et al., 1995	1.7000		TRACHYBASALT	0.2	0.704640
25-B91	36.5444	-113.3778	Wenrich et al., 1995	1.0000		TRACHYBASALT	0.6	0.704400
19-B91	36.9111	-113.3667	Wenrich et al., 1995	3.5000		ALKALI BASALT	1.1	0.704260
24-B91	36.5639	-113.3500	Wenrich et al., 1995	4.3000		ALKALI BASALT	2.6	0.704310
23-B91	36.8069	-113.2083	Wenrich et al., 1995	0.8300		TEPHRITEBASANITE	5.4	0.703440
HHSYN1	32.7683	-106.9610	Williams, 1999 (from NAVDAT)	0.0070		TRACHYBASALT	4.4	0.703917
NM1169	32.0250	-107.1620	Williams, 1999 (from NAVDAT)	0.8520		ALKALI BASALT	5.5	0.703419
KHSYN1	32.7750	-106.9580	Williams, 1999 (from NAVDAT)	0.0820		TRACHYBASALT	6.2	0.703343
M5	32.7883	-107.2040	Williams, 1999 (from NAVDAT)	0.2700		TEPHRITEBASANITE	6.5	0.703087
M2	31.9258	-107.0630	Williams, 1999 (from NAVDAT)	0.2800		TEPHRITEBASANITE	6.6	0.703231
NM879	32.0250	-107.1620	Williams, 1999 (from NAVDAT)	0.4800		TRACHYBASALT	6.6	0.703105
NM1167	32.0250	-107.1620	Williams, 1999 (from NAVDAT)	0.8490		ALKALI BASALT	6.7	0.703158
R9-4-61	37.9850	-116.1150	Yogodzinski et al., 1996	5.5000		ALKALI BASALT	0.9	
R9-1-56	38.1767	-116.0933	Yogodzinski et al., 1996	5.5000		ALKALI BASALT	0.9	

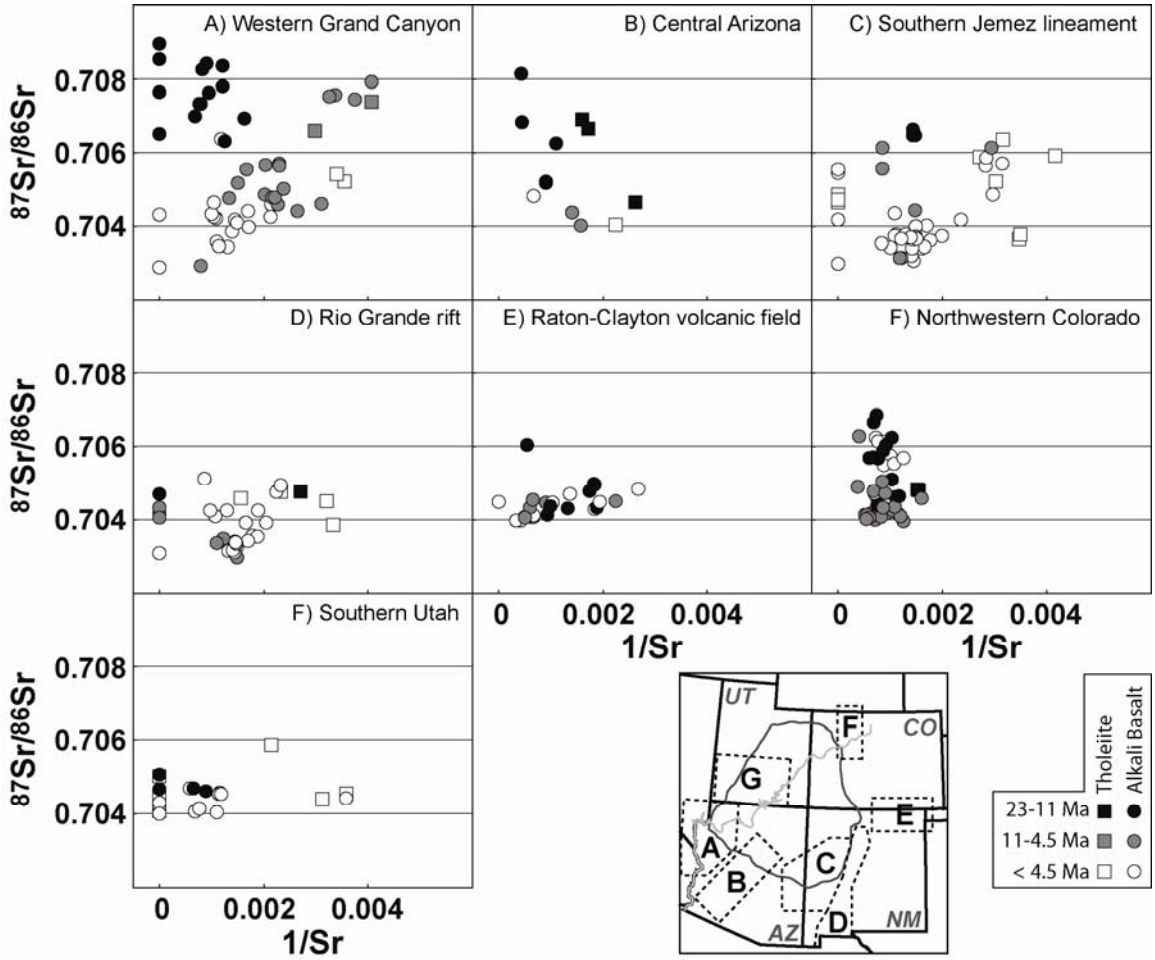
R9-3-60	37.9067	-116.1200	Yogodzinski et al., 1996	5.5000		ALKALI BASALT	1.6	
R0-1-77	37.8450	-116.2150	Yogodzinski et al., 1996	5.5000		ALKALI BASALT	2.1	
R8-1-29	38.0933	-116.1450	Yogodzinski et al., 1996	5.5000		TRACHYBASALT	2.4	
R9-1-48	38.1633	-116.1017	Yogodzinski et al., 1996	5.5000		ALKALI BASALT	3.2	
R8-1-7	38.0617	-116.1317	Yogodzinski et al., 1996	5.5000		TRACHYBASALT	3.5	
R9-1-55	38.1367	-116.1283	Yogodzinski et al., 1996	3.8000		TEPHRITEBASANITE	3.5	
R9-1-46	38.1750	-116.1100	Yogodzinski et al., 1996	3.8000		ALKALI BASALT	3.6	
R9-1-47	38.1733	-116.1067	Yogodzinski et al., 1996	3.8000		TEPHRITEBASANITE	3.8	
R8-1-27	38.0533	-116.1567	Yogodzinski et al., 1996	3.8000		TEPHRITEBASANITE	4.3	
R9-2-59	37.9550	-116.1000	Yogodzinski et al., 1996	5.5000		TRACHYBASALT	4.3	
R8-1-13	38.0733	-116.1217	Yogodzinski et al., 1996	3.8000		ALKALI BASALT	4.5	
R8-1-17	38.0717	-116.1250	Yogodzinski et al., 1996	5.5000		ALKALI BASALT	4.5	
R8-1-22	38.0583	-116.1550	Yogodzinski et al., 1996	3.8000		TEPHRITEBASANITE	4.5	
R8-1-18	38.0733	-116.1233	Yogodzinski et al., 1996	3.8000		TRACHYBASALT	4.5	
R8-1-19	38.0400	-116.1200	Yogodzinski et al., 1996	3.8000		ALKALI BASALT	5.4	
79-41	36.9078	-104.0710	Zhu, 1995 (from NAVDAT)	5.7000	± 2.49	TRACHYBASALT	-3.3	0.704328
855-117	36.9392	-104.2710	Zhu, 1995 (from NAVDAT)	7.2000	± 0.30	TRACHYBASALT	-2.7	0.704557
855-293	36.9419	-104.4150	Zhu, 1995 (from NAVDAT)	3.5000	± 0.20	ALKALI BASALT	-1.6	0.704481
855-153	36.6750	-103.5720	Zhu, 1995 (from NAVDAT)	2.2000	± 0.30	BASALTIC TRACHYANDESITE	-1.5	0.704986
S80-56	37.1728	-103.6570	Zhu, 1995 (from NAVDAT)	3.4000	± 0.20	ALKALI BASALT	-1.0	0.704705
855-110	36.5389	-104.1690	Zhu, 1995 (from NAVDAT)	5.0500	± 3.15	TRACHYBASALT	-0.6	0.704070
S80-63	36.5067	-103.4400	Zhu, 1995 (from NAVDAT)	5.7000	± 2.49	ALKALI BASALT	-0.1	0.704479
S80-66	36.5436	-103.1260	Zhu, 1995 (from NAVDAT)	2.8500	± 0.65	ALKALI BASALT	0.0	0.704471
855-380	36.9164	-104.1770	Zhu, 1995 (from NAVDAT)	4.1200	± 0.25	TEPHRITEBASANITE	1.2	
S80-71 B	36.3033	-103.7480	Zhu, 1995 (from NAVDAT)	2.8500	± 0.65	ALKALI BASALT	1.2	0.704297
855-271	36.8111	-103.8660	Zhu, 1995 (from NAVDAT)	5.0500	± 3.15	TRACHYBASALT	1.3	0.704078
855-116	36.9292	-104.3560	Zhu, 1995 (from NAVDAT)	5.0500	± 3.15	TEPHRITEBASANITE	1.3	0.704064
S80-20	36.7736	-103.8290	Zhu, 1995 (from NAVDAT)	5.0500	± 3.15	TRACHYBASALT	1.7	0.704093
855-1861	36.7653	-104.0610	Zhu, 1995 (from NAVDAT)	5.0500	± 3.15	FOIDITE	2.4	
S80-13	36.7897	-104.1060	Zhu, 1995 (from NAVDAT)	5.0500	± 3.15	TEPHRITEBASANITE	2.4	0.704077



DR Figure 1. **$^{87}Sr/^{86}Sr$ versus eruption age for Neogene basalts from the southwest US, showing a decrease in $^{87}Sr/^{86}Sr$ with decreasing age. This relationship is strongest around the southern plateau margin (zone A-C). Circles represent tholeiites and squares alkali basalts. Inset map shows the locations of the subregions.**



DR Figure 2. Nb/La versus eruption age for Neogene basalts from the southwest US, showing an increase in Nb/La with decreasing age. This relationship is strongest around the southern plateau margin (zone A-C). Circles represent tholeiites and squares alkali basalts. Inset map shows the locations of the subregions.



DR Figure 3. Graph of $^{87}Sr/^{86}Sr$ versus 1/Sr for basalts from around the Colorado Plateau. Inset map shows the locations of the subregions.

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