PALEOMAGNETIC METHODS

The SF and MC tuffs were sampled for paleomagnetic analysis at seven mesa-top sites in central Baja California (Fig. 2). 188 samples (1”-diameter cores) were collected, consisting of 48 samples of SF, 92 samples of the Tmr3 unit of MC, and 48 samples of the Tmr4 unit of MC. At drill sites where n>10, multiple, randomly-oriented samples were collected via a gas-powered, water-cooled, portable paleomagnetic drill (Supplementary Fig. DR1A). At drill sites where n<10, oriented block samples were collected in the field and randomly-oriented samples were drilled from these block samples in the laboratory. Core orientations in the field and the laboratory were obtained with a Pomeroy orienting device (Fig. DR1B).

Samples were cut into 1-cm tall specimens for demagnetization experiments. All specimens were subjected to progressive alternating field (AF) demagnetization, typically including 13 steps to a magnetic field strength of 80 millitesla (mT) (Fig. DR2). AF partial demagnetization steps gradually demagnetize the secondary low-stability component and isolate the primary high-stability component of natural remanent magnetization (NRM) of a specimen. This primary NRM, typically a thermoremanent magnetism, is representative of Earth’s magnetic field at the time the sampled rock cooled below the Curie temperature. Because ignimbrites cool much faster than significant changes in the secular variation of Earth’s magnetic field, the NRM directions determined from multiple specimens collected from the same ignimbrite cooling unit should agree within uncertainty (Lewis and Stock, 1998). NRM and low-temperature measurement steps preceded all AF steps. All experiments were conducted using an automated 2G Enterprises superconducting rock magnetometer in a magnetically shielded μ-metal room at the Paleomagnetics Laboratory of the California Institute of Technology (Kirschvink et al., 2008). No thermal demagnetization steps were performed, as thermal and AF demagnetization typically yield similar results for these tuffs (Nagy, 2000).

Best-fit of lines and planes for demagnetization paths were estimated for each specimen (Kirschvink, 1980). Typically, directions resolved from higher AF steps were utilized to obtain best-fit lines and planes, while NRM, low-temperature, and low AF steps revealed inconsistent vector directions, indicative of variable magnitudes of a secondary NRM component (Fig. DR2).

At tectonically deformed sites within the rift, paleomagnetic remanence directions are corrected for the tilt (bedding dip) of the sampled outcrop (Bennett et al., 2013; Hernández-Méndez et al., 2008; Lewis and Stock, 1998; Oskin et al., 2001; Oskin and Stock, 2003; Stock et al., 2006; Stock et al., 1999). Regionally, the basal tuff contacts in central Baja California are typically horizontal or ~1° southwest-dipping, which reflects the gently, southwest-draining landscape that these tuffs blanketed. All SF outcrops are horizontal (Figs. DR3 and DR4). Many MC outcrops are also horizontal (Fig. DR5), but some fill southwest- to west-draining paleo-channels carved into the post-12.5 Ma landscape (Figs. DR4 and DR6). Basal contacts and internal eutaxitic foliation of flattened pumice in these paleo-channel fills locally dip 25° - 45° towards the center of paleo-canyons. Steeply-dipping paleo-channel fills were avoided during sample collection, as we targeted horizontal to gently dipping (≤5°) outcrops. We assume that the observed tuff inclinations in central Baja California are primary and formed prior to the ignimbrite cooling below the Curie temperature. Thus no tilt corrections are performed.

For each new drill site, mean paleomagnetic remanence directions (Declination, Inclination) and their α_{95} confidence cones and precision parameters (κ) were determined (Table DR1). The paleomagnetic remanence directions from intra-rift drill sites were then compared to directions determined at the new reference sites in order to calculate the rotation (R), rotation error (ΔR), flattening (F), and flattening error (ΔF) of the intra-rift site (Demarest, 1983).

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Supplementary Table DR1. Summary of paleomagnetic data and updated rotation values for the Tmr3 (MC3) and Tmr4 (MC4) cooling units of the Tuffs of Mesa Cuadrada and the Tuff of San Felipe (SF), northern Gulf of California, México.

		Location		Euler Pole		Bedding		In Situ		Tilt-Corrected		Fisher Statistics		Bingham Statistics				USING MESA CUADRADA REFERENCE SITES (Lewis and Stock, 1998)				USING NEW REFERENCE SITES (This Study)							
Drill Site, Reference	Unit	Lat. (°N)	Long. (°W)	Distance (km) ‡	n/n_0	Strike	Dip	D	I	D	I	α_{95}	κ	κ_1	α_{95}	κ_2	α_{95}	R	ΔR	F	ΔF	R	ΔR	F	ΔF	Differential R (TSF-TMC)	Δ Differential R (TSF-TMC)	% of PRE-6.4 Ma Clockwise Rotation	
BAJA CALIFORNIA MICRO-PLATE																													
NEW REFERENCE SITES																													
Arroyo Derecho	MC4	30.21	115.01	3717	28/28	-	0	352.2	42.7	352.2	42.7	1.4	364.2	-189.5	1.4	-0.1	1.4												
Mesa Nube	MC4	30.17	114.89	3711	15/15	-	0	355.1	40.7	355.1	40.7	1.6	529.5	-364.5	1.3	-261.2	1.6												
Southwest Mesa Nube	MC4	30.10	114.98	3724	5/5	-	0	352.9	44.9	352.9	44.9	2.7	3367.5	-1403.4	1.2	-337.7	40.5												
MC4 Mean	MC4				48/48	-	0	353.2	42.1	353.2	42.1	1.1	393.4	-198.5	1.0	-0.2	1.1					0	0	0	0				
Arroyo Derecho (a)	MC3	30.21	115.02	3718	31/31	-	0	16.7	54.6	16.7	54.6	2.0	165.7	-195.3	1.3	-55.3	2.4												
Arroyo Derecho (b)	MC3	30.21	115.01	3717	26/26	-	0	18.5	57.4	18.5	57.4	1.1	617.9	-579.0	0.8	-223.0	1.3												
Mesa Nube	MC3	30.18	114.89	3711	27/27	-	0	11.8	58.6	11.8	58.6	0.7	1487.8	0.4	-457.1	0.9													
West Mesa Nube	MC3	30.14	114.99	3721	5/5	-	0	12.7	51.1	12.7	51.1	4.8	208.6	-3370.3	0.8	-83.9	4.9												
Southwest Mesa Nube	MC3	30.10	114.98	3724	3/3	-	0	17.6	48.5	17.6	48.5	7.9	164.9	-309.0	3.3	-132.8	5.0												
MC3 Mean	MC3				92/92	-	0	15.6	56.2	15.6	56.2	1.0	236.8	-172.5	0.8	-92.5	1.1					0	0	0	0				
Mesa El Cartabón	SF	30.14	115.21	3726	19/19	-	0	209.6	-4.9	209.6	-4.9	1.6	458.1	-416.7	1.1	-170.7	1.8												
Mesa El Burro	SF	30.18	115.14	3728	11/13	-	0	215.4	0.3	215.4	0.3	3.7	141.5	-258.8	1.9	-51.7	4.2												
Mesa El Pinole	SF	30.32	115.27	3736	18/18	-	0	213.4	-2.9	213.4	-2.9	1.3	696.0	-535.7	1.0	-281.8	1.4												
SF Mean	SF				48/50	-	0	212.4	-3.0	212.4	-3.0	1.3	240.3	-319.9	0.8	-76.7	1.7					0	0	0	0				
COASTAL BAJA CALIFORNIA																													
MC - Mesa Cuadrada (Previous Reference Sites)																													
Lewis and Stock (1998)	MC4	30.53	114.96	3688	8/10	102	24	355.8	28.0	348.8	50.3	2.6	482.7	nr	nr	nr	nr	0	0	0	0	-4.4	3.4	-8.2	2.2	10.3	4.5		
Lewis and Stock (1998)	MC3	30.53	114.96	3688	3/3	169	3	13.7	53.0	9.5	53.9	8.9	129.8	nr	nr	nr	nr	0	0	0	0	-6.1	11.5	2.3	6.7	12.0	11.9		**All TMC**
Lewis and Stock (1998) *	SF	30.53	114.96	3688	5/6	169	7	221.7	-3.6	218.3	-6.9	4.1	442.5	-310.0	2.8	-0.6	3.3	0	0	0	0	5.9	3.4	3.9	3.3				14.6
SIW - Santa Isabel Wash																													**TMC error**
site L of Nagy (2000)	MC3	30.38	114.92	3697	8/8	-	0	29.3	52.1	29.3	52.1	4.8	135.0	nr	nr	nr	nr	19.8	12.9	-1.8	7.7	13.7	6.3	4.1	3.8	3.6	6.3	21%	4.8
Stock et al. (1999)	SF	30.38	114.92	3697	11/11	-	0	229.7	-9.1	229.7	-9.1	2.0	497.7	-613.7	1.2	-200.0	2.1	11.4	4.0	2.2	3.6	17.3	1.9	6.1	1.9				
																													All TSF
SFJ - San Fermin																													36.0
Lewis and Stock (1998)	MC4	30.54	114.83	3679	3/5	165	2	58.0	53.6	57.1	55.5	16.7	37.2	nr	nr	nr	nr	68.3	23.1	-5.2	12.7	63.9	22.9	-13.4	12.6	-20.9	23.6	0%	
Lewis and Stock (1998)	MC3	30.54	114.83	3679	5/6	165	2	34.7	50.8	33.1	52.4	6.7	105.5	nr	nr	nr	nr	23.6	14.2	1.5	8.4	17.5	8.6	3.8	5.2	25.5	10.2	59%	**TSF error**
Lewis and Stock (1998) *	SF	30.54	114.83	3679	6/6	179	27	255.0	5.0	255.4	-11.2	7.1	98.9	-62.1	5.2	-0.8	6.4	37.1	6.5	4.3	6.4	43.0	5.7	8.2	5.6				10.5
SFH - San Fermin																													
Lewis and Stock (1998)	MC4	30.55	114.74	3672	2/2	183	27	57.5	34.4	38.9	53.7	29.4	37.2	nr	nr	nr	nr	50.1	39.3	-3.4	20.7	45.7	39.2	-11.6	20.6	30.5	40.6	0%	
Lewis and Stock (1998)	MC3	30.55	114.74	3672	6/6	183	27	61.5	34.8	43.7	55.5	8.1	58.0	nr	nr	nr	nr	34.2	16.0	-1.6	9.2	28.1	11.3	0.7	6.4	48.1	15.4	63%	
Lewis and Stock (1998) *	SF	30.55	114.74	3672	4/5	183	27	292.1	36.2	288.6	10.6	13.6	46.8	-552.8	2.1	-19.5	11.6	70.3	11.0	-17.5	10.8	76.2	10.6	-13.6	10.4				
SFF - San Fermin																													
Lewis and Stock (1998)	MC4	30.60	114.79	3671	5/5	65	6	37.8	34.6	41.8	37.4	15.3	17.9	nr	nr	nr	nr	53.0	15.3	12.9	12.0	48.6	15.0	4.7	11.8	15.7	15.7	24%	
Lewis and Stock (1998)	MC3	30.60	114.79	3671	6/6	228	24	77.5	49.6	46.2	55.8	7.5	67.9	nr	nr	nr	nr	36.7	15.5	-1.9	8.9	30.6	10.6	0.4	5.9	33.7	11.6	52%	
Lewis and Stock (1998) *	SF	30.60	114.79	3671	5/5	149	13	278.2	16.6	276.7	-3.0	6.4	116.1	-118.4	4.1	-73.8	5.2	58.4	5.9	-3.9	5.9	64.3	5.0	0.0	5.0				
SFB - San Fermin																													
Lewis and Stock (1998)	MC4	30.65	114.79	3667	3/3	47	31	351.6	32.5	13.4	54.9	5.8	297.8	nr	nr	nr	nr	24.6	8.2	-4.6	4.8	20.2	7.7	-12.8	4.4	25.9	10.2	56%	
Lewis and Stock (1998)	MC3	30.65	114.79	3667	9/9	47	31	353.7	43.3	27.1	50.0	6.2	61.5	nr	nr	nr	nr	17.6	13.7	3.9	8.3	11.5	7.8	6.2	5.0	34.6	10.3	75%	
Lewis and Stock (1998) *	SF	30.65	114.79	3667														40.2	7.8	-3.8	7.8	46.1	6.9	0.1	6.9				
SFE - San Fermin																													
Lewis and Stock (1998)	MC3	30.66	114.83	3669	7/7	211	5	50.1	41.1	45.8	42.6	3.4	275.5	nr	nr	nr	nr	36.3	12.0	11.3	7.2	30.2	3.9	13.6	2.8	10.8	5.7	26%	
Lewis and Stock (1998) *	SF	30.66	114.83	3669	7/7	47	20	251.8	-7.1	253.4	-2.8	5.7	93.3	-82.0	4.2	-1.5	6.2	35.1	5.5	-4.1	5.5	41.0	4.6	-0.2	4.6				
SFD - San Fermin																													
Lewis and Stock (1998) *	SF	30.73	114.85	3665	8/8	10	56	239.2	-46.2	253.0	1.8	6.5	64.0	-671.1	1.4	-23.9	7.3	34.7	6.0	-8.7	6.0	40.6	5.2	-4.8	5.2				
SRB - Santa Rosa Basin																													
Stock et al. (1999)	SF	30.85	114.97	3665	11/11	170	25	259.4	13.2	259.4	-11.5	2.7	261.6	-232.2	2.0	-120.4	2.7	41.1	3.9	-4.6	3.8	47.0	2.4	8.5	2.4				

ISLA TIBURON																													
SA - Sierra Alta																													**All TMC**
Oskin et al. (2001)	SF	29.18	112.46	3624	6/7	12	38	219.7	-31.9	235.1	-15.8	5.4	128.6	-299.8	2.4	55.1	5.5	14.5	6.0	8.9	5.4	25.0	4.5	12.8	4.3				21.2
PR - Punta Reina																													**TMC error**
Oskin et al. (2001)	MC4	29.07	112.49	3635	5/9	341	23	339.7	37.0	358.1	38.3	5.9	177.4	-114.4	4.2	-0.4	4.7	9.3	6.6	12.0	5.0	7.2	5.9	3.8	4.6	14.0	6.8	66%	7.4
Oskin et al. (2001)	MC3	29.07	112.49	3635	13/13	341	23	0.1	64.4	35.6	53.7	2.9	188.4	-440.6	1.3	-63.5	3.5	26.1	12.1	0.2	7.1	22.3	4.1	2.5	2.4	-1.1	5.3	0%	
Oskin et al. (2001)	SF	29.07	112.49	3635	10/12	30	24	230.6	-1.7	231.3	-1.3	4.6	100.8	-109.2	3.0	-43.9	4.8	10.7	5.0	-5.6	4.9	21.2	3.8	-1.7	3.8				**All TSF**
PRS - Punta Reina south																													20.7
Oskin et al. (2001)	MC4	29.05	112.49	3637	8/9	25	10	16.3	32.2	22.7	35.1	3.3	292.2	-170.8	2.7	-0.4	3.0	31.6	5.0	14.6	3.3	31.8	3.4	7.0	2.7				**TSF error**
Oskin et al. (2001)	MC3	29.05	112.49	3637	11/12	25	10	23.0	60.3	40.9	61.0	2.8	240.9	-1151.0	0.9	-78.0	3.4	31.4	12.3	-7.1	7.0	27.6	4.8	-4.8	2.3				3.3
SM - Sierra Menor																													
Oskin et al. (2001)	MC4	28.98	112.46	3641	9/11	112	12	7.1	34.0	2.6	44.7	3.5	217.0	-122.4	3.0	0.0	3.0	13.8	5.0	5.6	3.4	11.7	4.1	11.5	2.9	4.2	5.0	26%	
Oskin et al. (2001)	MC3	28.98	112.46	3641	11/12	195	16	46.0	53.0	23.8	55.6	4.7	96.0	-53.2	4.2	0.0	4.2	14.3	13.2	-1.7	7.6	10.5	6.7	0.6	3.8	5.4	7.3	34%	
Oskin et al. (2001)	SF	28.98	112.46	3641	11/13	330	15	225.4	-10.8	226.0	2.7	4.0	121.5	-181.4	2.2	-46.4	4.4	5.4	5.0	-9.6	4.6	15.9	3.3	-5.7	3.3				
BV - Bahía Vaporeta																													
Oskin and Stock (2003)	SF	28.92	112.47	3646	16/18	nr	nr	nr	nr	232.9	16.4	7.8	23.0	nr	nr	nr	nr	12.3	7.0	-23.3	7.0	22.8	6.5	-19.4	6.3				

		Location		Euler Pole Distance (km) ‡		Bedding		In Situ		Tilt-Corrected		Fisher Statistics		Bingham Statistics				USING MESA CUADRADA REFERENCE SITES (Lewis and Stock, 1998)				USING NEW REFERENCE SITES (This Study)							
Drill Site, Reference	**Unit**	**Lat. (°N)**	**Long. (°W)**		n/n_0	**Strike**	**Dip**	**D**	**I**	**D**	**I**	α_{95}	κ	κ_1	α_{95}	κ_2	α_{95}	**R**	**ΔR**	**F**	**ΔF**	**R**	**ΔR**	**F**	**ΔF**	**Differential R (TSF-TMC)**	**Δ Differential R (TSF-TMC)**	**% of PRE-6.4 Ma Clockwise Rotation**	
COASTAL SONORA																													
SK - Sierra Kunkaak (NE Tiburón) **																													**All TMC**
This Study	MC4	29.17	112.35	3618	13/13	339	33	334.1	31.1	355.3	32.7	2.6	231.2	-173.1	2.1	-112.1	2.6	8.8	4.0	17.6	2.9	4.4	2.7	9.4	2.2	25.0	2.7	85%	21.7
This Study	MC3	29.16	112.35	3619	22/22	332	54	325.3	48.9	21.6	37.6	1.6	378.9	-507.2	0.9	-123.6	1.9	14.4	11.5	16.3	6.8	8.3	2.1	18.6	1.5	21.1	1.9	72%	
This Study	SF	29.16	112.32	3617	24/24	2	29	230.3	-33.5	239.5	-13.1	1.3	-547.5	-472.9	0.9	-205.1	1.4	23.5	3.3	6.2	3.3	29.4	1.5	10.1	1.5				**TMC error**
SB - Sierra Bacha																													9.9
Darin (2011)	SF	29.55	112.37	3589	19/19	359	55	nr	nr	235.5	4.7	2.6	181.3	nr	nr	nr	nr	19.5	3.8	-11.6	3.8	25.4	2.3	-7.7	2.3				**All TSF**
PC - Punta Chueca																													35.5
Bennett et al. (2013)	MC3	28.99	112.08	3615	11/11	342	37	331.6	71.9	53.3	56.3	1.8	596.5	-449.0	1.4	-302.2	1.7	46.1	11.7	-2.4	6.8	40.0	2.9	-0.1	1.8	12.8	5.0	24%	**TSF error**
Oskin et al. (2001)	SF	29.02	112.08	3612	13/13	13	73	210.1	-59.6	262.9	-11.6	2.2	323.9	-1150.0	0.8	-108.8	2.7	42.4	4.0	4.7	3.7	52.8	2.1	8.6	2.0				7.5
BK - Bahia Kino																													
Oskin et al. (2001)	SF	28.88	112.01	3619	10/11	10	71	199.7	-55.4	245.6	-10.4	3.9	138.2	-167.1	2.4	-57.6	4.2	25.0	5.0	3.5	4.5	35.5	3.3	7.4	3.3				
CENTRAL SONORA																													
HE - Hermosillo**																													
This Study	SF	28.98	111.00	3544	5/7	170	21	204.5	-1.1	202.5	-10.0	4.8	269.0	-173.5	3.4	-0.5	3.8	-13.4	5.1	3.1	5.0	-7.6	3.9	7.0	3.8				**All TSF**
SL - Sierra López																													9.7
Stock et al. (2006)	SF	29.40	111.20	3523	4/4	nr	nr	nr	nr	222.0	-8.1	9.8	nr	nr	nr	nr	nr	6.0	8.2	1.2	8.1	11.9	7.6	5.1	7.5				**TSF error**
LC - La Colorada																													19.8
Stock et al. (2006)	SF	28.80	110.59	3532	16/16	nr	nr	nr	nr	253.5	2.6	4.0	nr	nr	nr	nr	nr	37.5	4.5	-9.5	4.5	43.4	3.3	-5.6	3.3				
NWH - NW Hermosillo																													
Stock et al. (2006)	SF	29.27	111.09	3526	7/7	nr	nr	nr	nr	207.8	-5.9	2.7	nr	nr	nr	nr	nr	-8.2	3.8	-1.0	3.8	-2.3	2.4	2.9	2.4				
SMH - San Miguel de Horcasitas																													
Hernandez-Mendez et al. (200	SF	29.34	110.57	3486	10/10	nr	nr	nr	nr	201.5	4.0	8.5	nr	nr	nr	nr	nr	-14.5	7.4	-10.9	7.4	-8.6	6.8	-7.0	6.8				
EG - El Gavilán																													
Hernandez-Mendez et al. (200	SF	29.38	110.62	3486	6/6	nr	nr	nr	nr	196.6	-11.3	14.5	nr	nr	nr	nr	nr	-19.4	12.0	4.4	11.7	-13.5	11.6	8.3	11.4				
EP - El Portal, Sierra Libre																													
Hernandez-Mendez et al. (200	SF	28.60	110.82	3563	5/5	nr	nr	nr	nr	219.4	1.0	14.0	nr	nr	nr	nr	nr	3.4	11.2	-7.9	11.2	9.3	10.8	-4.0	10.8				

CEJ - Cerro La Ceja																											
Hernandez-Mendez et al. (200	SF	29.68	111.10	3493	5/5	nr	nr	nr	nr	238.2	-1.8	6.0	nr	nr	nr	nr	nr	22.2	5.6	-5.1	5.6	28.1	4.7	-1.2	4.7		
																	Average, both SF and MC3	**22.2**	**8.2**	**-2.4**	**6.5**	**25.4**	**5.3**	**1.3**	**4.5**		
																	Average, SF only	**19.9**	**6.0**	**-4.2**	**5.9**	**26.9**	**4.9**	**0.1**	**4.8**		
																	Average, MC3 only	**27.3**	**13.2**	**1.5**	**7.7**	**21.8**	**6.3**	**4.1**	**3.7**		
																	Error Weighted Average									**16**	**48%**

n/n_0 - number of samples used to determine site mean vector/number of samples analyzed
D - Declination, in degrees
I - Inclination in degrees (positive is down, negative is up)
α95 - cone of 95% confidence about mean direction
κ - the precision parameter (Fisher, 1953)
R - Rotation, in degrees; for Isla Tiburón and Sonora sites, 2.3° has been added to R to account for finite rotation of reference locality due to Pacific-North America plate displacement
ΔR - Rotation error, in degrees
F - Flattening, in degrees
ΔF - Flattening error, in degrees
R, ΔR, F, ΔF, α95 all calculated according to Beck (1980) and Demarest (1983)
κ_1, κ_2, and corresponding α95 values calculated according to Onstott (1980)
nr - value not reported in published study
* Bingham statistics published in Stock et al. (1999)
** We report two new intra-rift paleomagnetic sites in this study.
‡ Distance from Pacific-North America Euler pole of Demets and Dixon (1999)
Paleomagnetic data were analyzed using PaleoMag v3.1b1 (Jones, 2002) to estimate the best-fit of lines and planes for demagnetization paths for each specimen, as described in Kirschvink (1980).

Figure DR1. Field photographs of paleomagnetic field techniques. (A) drilling cores with portable, gas-powered paleomagnetic drill and water cooling system, (B) recording the orientation of a drilled paleomagnetic core prior to collection from outcrop using Pomeroy core orienter and Brunton compass, (C) typical tuff outcrop after collection of paleomagnetic cores.

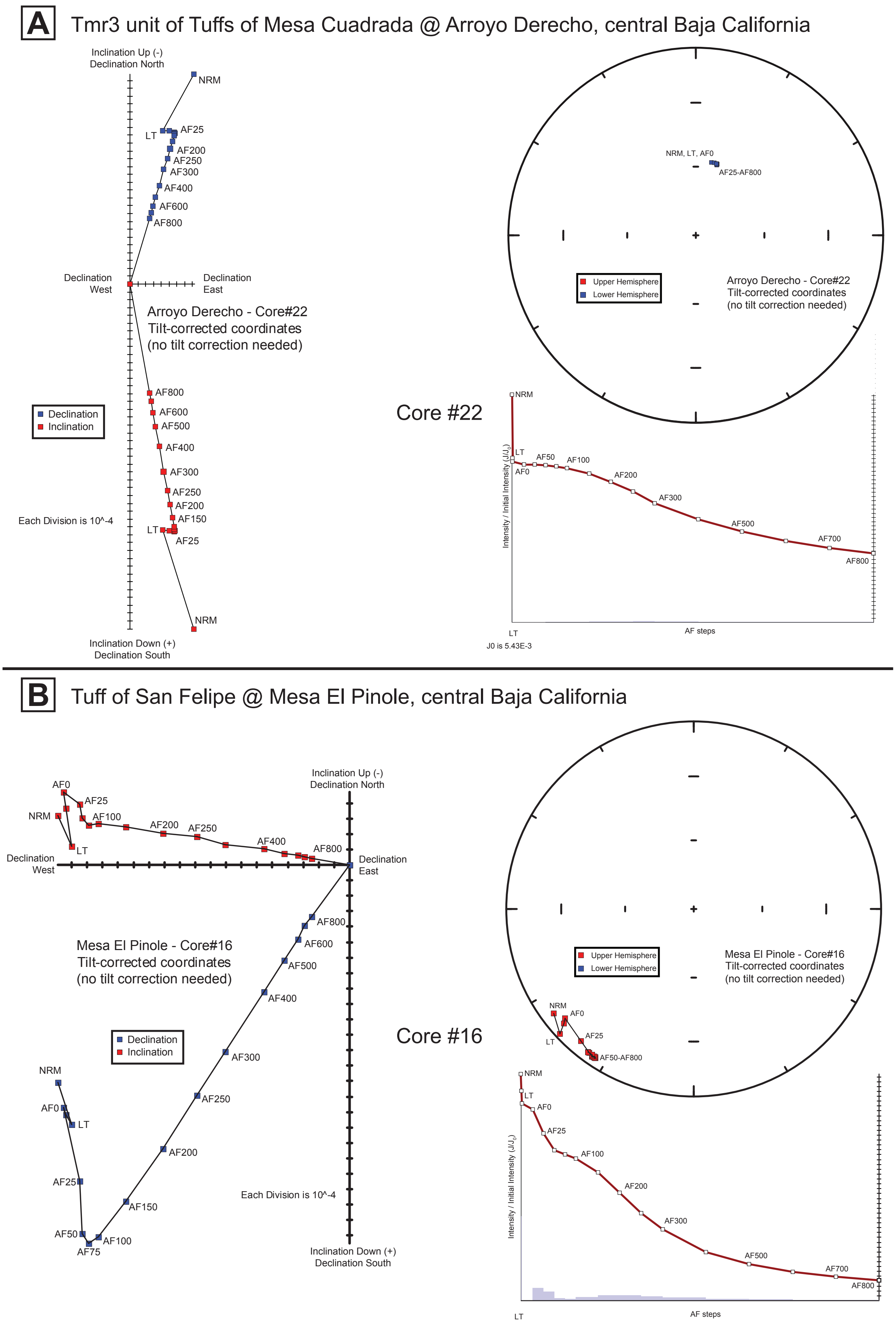

Figure DR2. Representative paleomagnetic demagnetization results for the Tmr3 unit of the Tuffs of Mesa Cuadrada (A) and Tuff of San Felipe (B) in central Baja California. For each, vector-component Zijderveld diagram (left) and equal area stereonet (upper right) displays vector orientations for all NRM, LT, and AF partial demagnetization steps. J/J0 plot shown for each core (lower right).

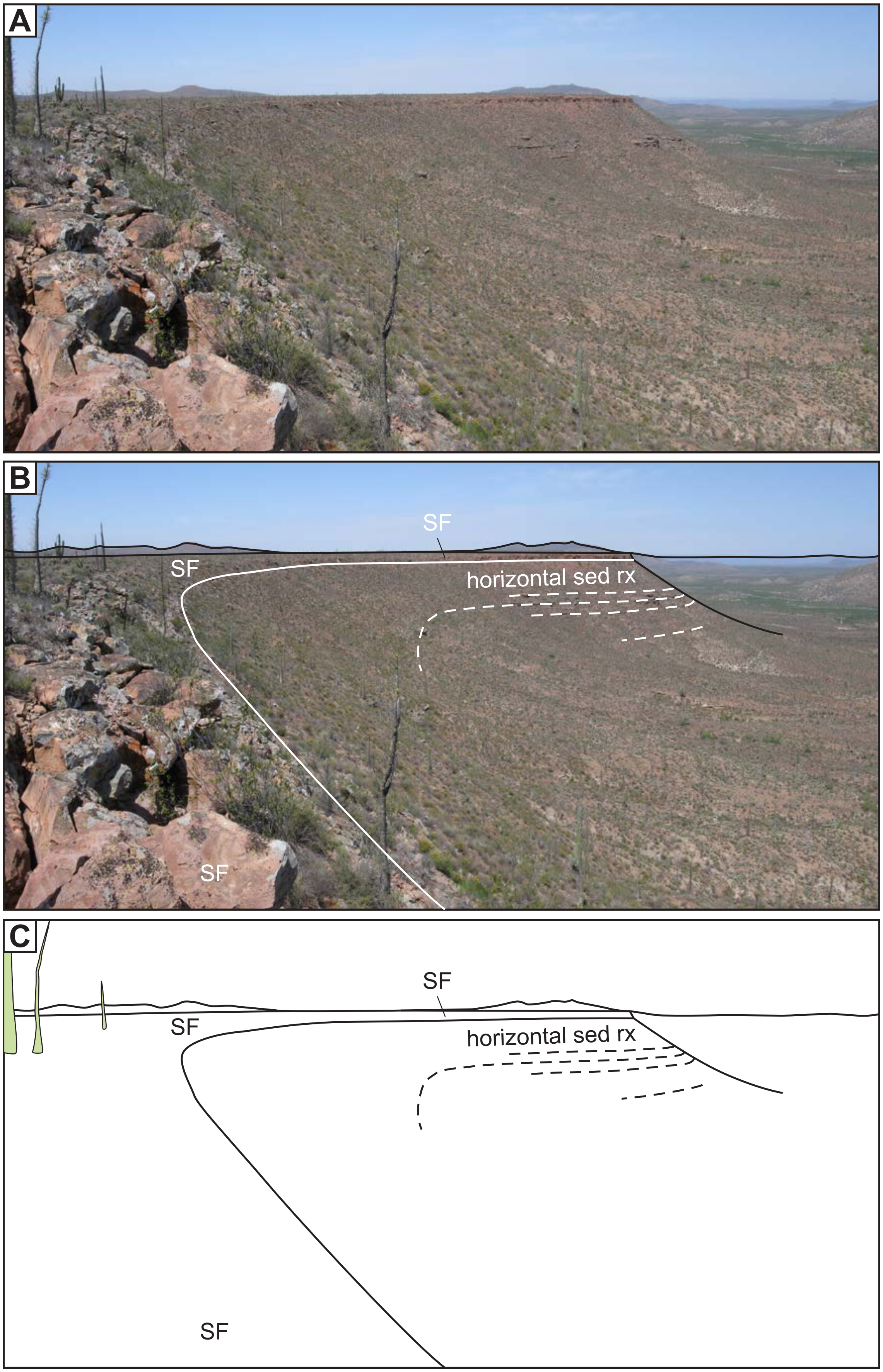

Figure DR3. Field panorama (A), annotated panorama (B), and line drawing (C) of mesa-top outcrops of the 12.5 Ma Tuff of San Felipe (SF) at Mesa El Cartabon. See Figure 2 for location. Deposits of SF conformably overlie pre-12.5 Ma sub-horizontal sandstone and conglomerate deposits with no observed paleotopography between these units. Looking approximately west in center of panorama. Panorama photograph taken standing on SF, ~0.5 km east of the Mesa El Cartabon drill site (Fig. 2).

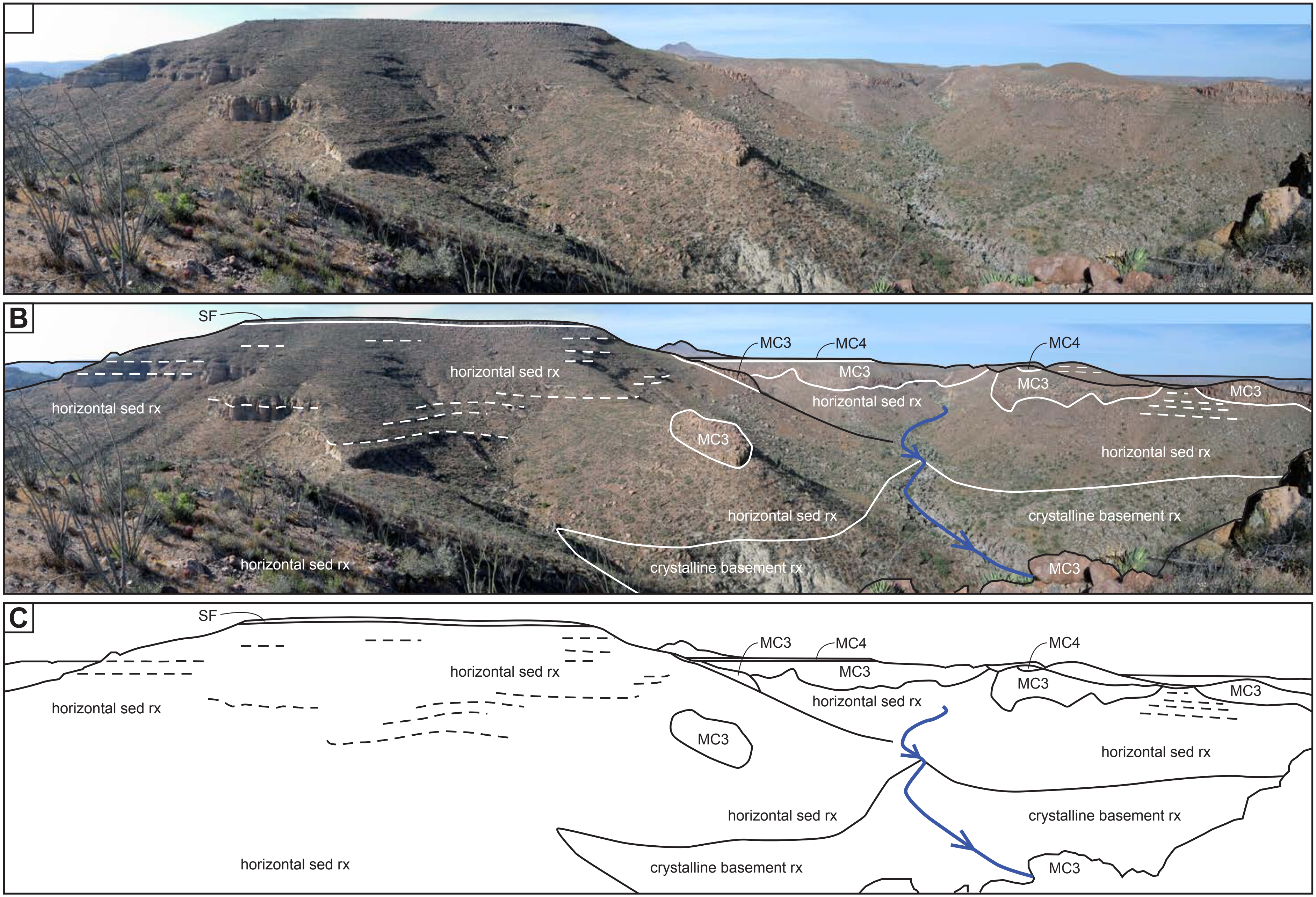

Figure DR4. Field panorama (A), annotated panorama (B), and line drawing (C) of mesa-top outcrops of both the 6.4 Ma Tuffs of Mesa Cuadrada (MC) and the 12.5 Ma Tuff of San Felipe. Deposits of SF conformably overlie pre-12.5 Ma sub-horizontal sandstone and conglomerate deposits in the upper left half of this panorama view, with no observed paleotopography between these units. Deposits of the Tuffs of Mesa Cuadrada (MC3) fill in paleotopography carved down through the Tuff of San Felipe and into underlying, sub-horizontal sandstone and conglomerate deposits. The upper portion of Tmr3 is slightly vapor-phase altered and less resistant than its lower portion. In the right half of this panorama, MC3 fills a paleo-canyon carved into the post-12.5 Ma landscape, where inclined, perched MC3 outcrops dip up to ~40° towards the center of the paleo-canyon. Paleo-canyon flow direction is to the southwest (toward the viewer). The modern-day canyon (blue line) occupies the same approximate position as the paleo-canyon. The Tmr4 cooling unit of the Tuffs of Mesa Cuadrada (MC4) locally caps deposits of MC3. Looking approximately northeast in center of panorama. Panorama photograph taken standing on MC3, ~8 km east-southeast of the Mesa El Pinole drill site (Fig. 2).

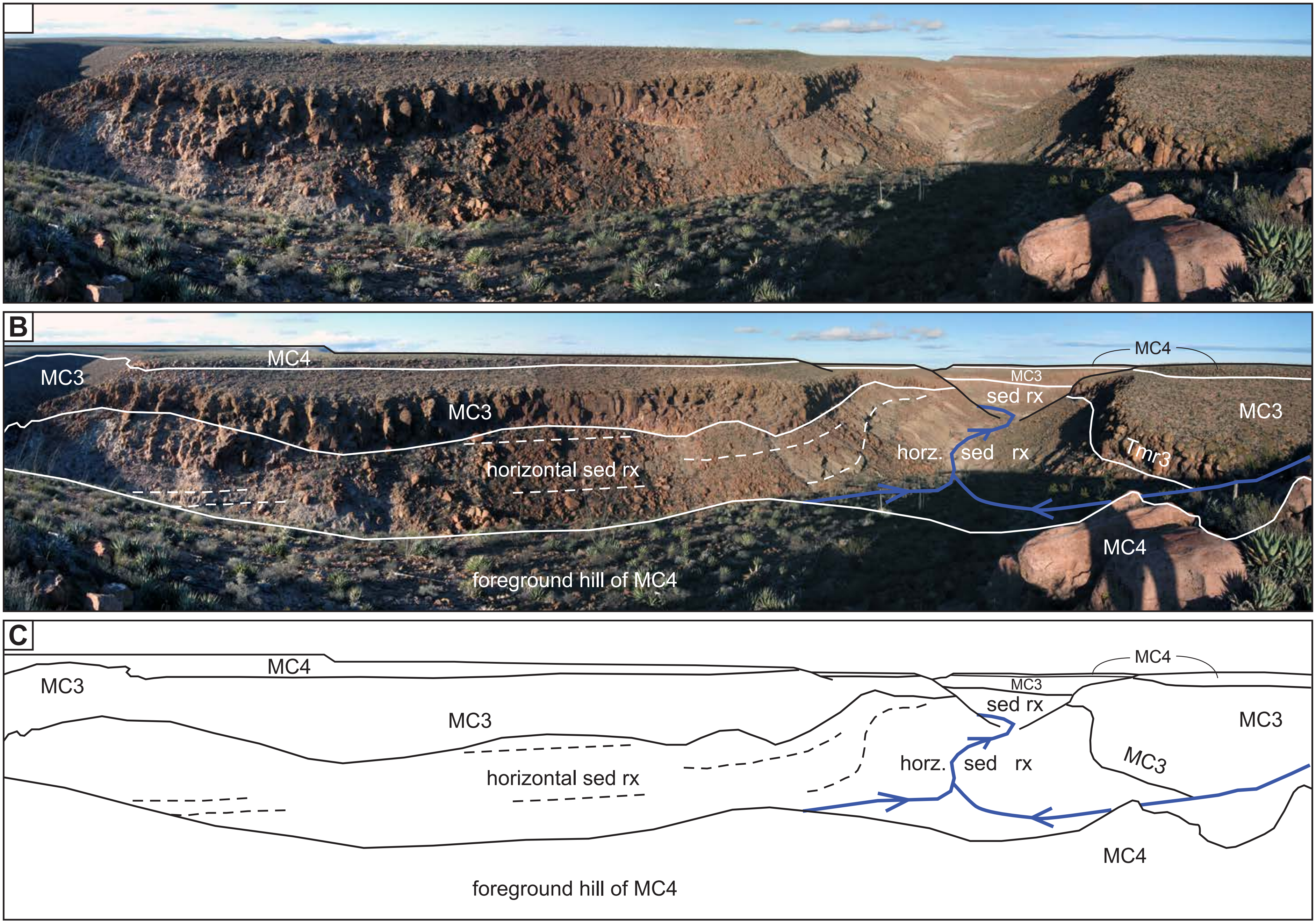

Figure DR5. Field panorama (A), annotated panorama (B), and line drawing (C) of mesa-top outcrops of the 6.4 Ma Tuffs of Mesa Cuadrada (MC) at Mesa Nube. See Figure 2 for location. A single cooling unit of the Tmr3 ignimbrite (MC3) fills in gentle paleotopography carved into pre-12.5 Ma sub-horizontal sandstone and conglomerate deposits. The upper portion of Tmr3 is slightly vapor-phase altered and less resistant than its lower portion. The Tmr4 cooling unit of the Tuffs of Mesa Cuadrada (MC4) caps Mesa Nube. Looking approximately east in center of panorama. Panorama photograph taken standing on MC4, ~1 km northeast of the Mesa Nube drill site (Fig. 2).

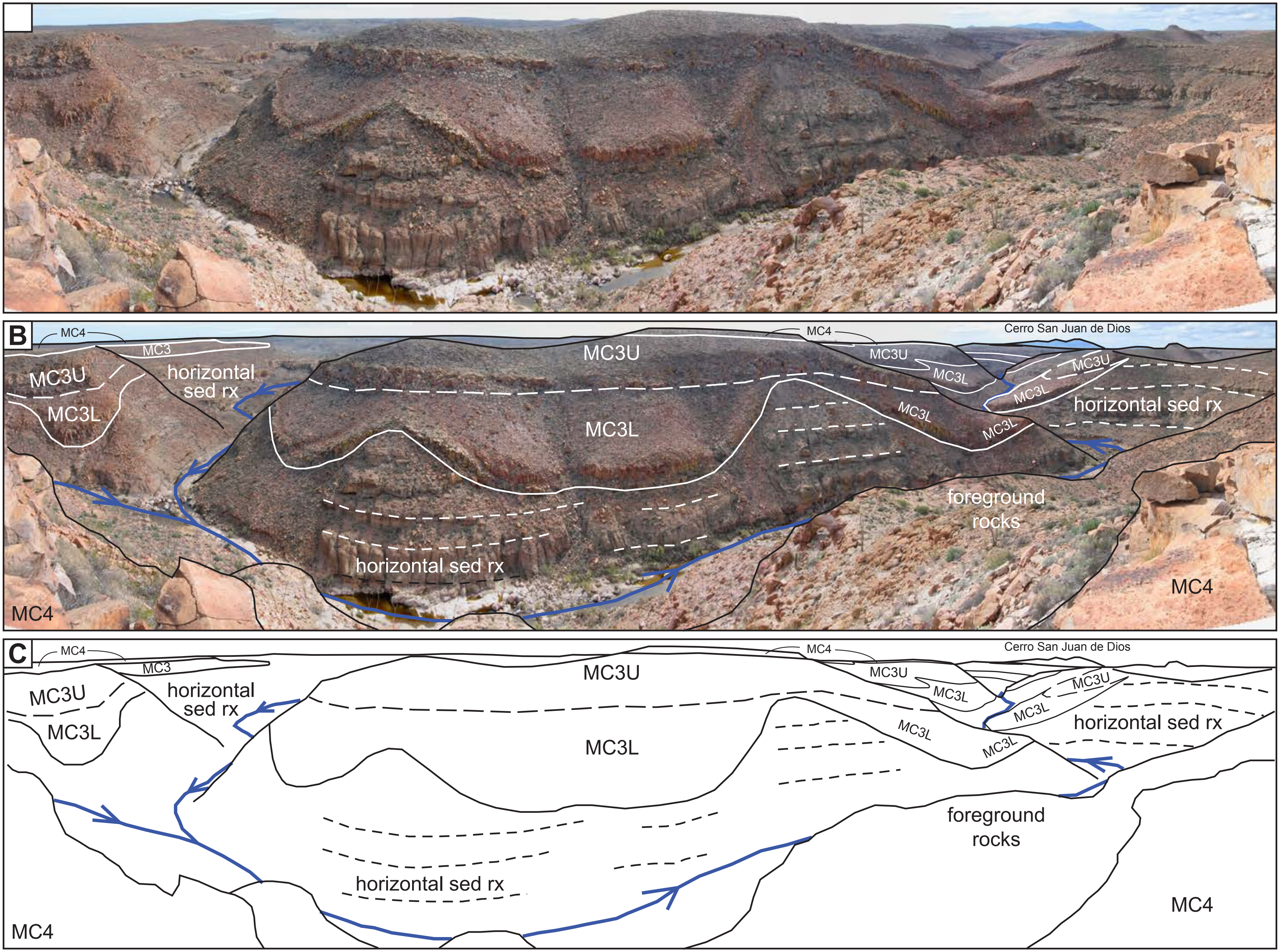

Figure DR6. Field panorama (A), annotated panorama (B), and line drawing (C) of mesa-top outcrops of the 6.4 Ma Tuffs of Mesa Cuadrada (MC) in Arroyo Derecho. See Figure 2 for location. The lower cooling unit of the Tmr3 ignimbrite (MC3L) fills in paleotopography carved into pre-12.5 Ma sub-horizontal sandstone and conglomerate deposits. In the right half of this panorama, this basal cooling unit fills a paleo-canyon, where inclined MC3L outcrops dip up to ~40° towards the center of the paleo-canyon. Paleo-canyon flow direction is to the southwest (generally away from the viewer). The modern-day Arroyo Derecho canyon (blue line) occupies the same approximate position as the paleo-canyon.The basal contact of the upper Tmr3 cooling unit (MC3U) is sub-horizontal. The upper portions of both MC3L and MC3U are slightly vapor-phase altered and less resistant than their respective lower portions. The Tmr4 cooling unit of the Tuffs of Mesa Cuadrada (MC4) caps the landscape. Looking approximately southwest in center of panorama. Panorama photograph taken standing on MC4 cooling unit of MC, ~4.5 km east-northeast and up-canyon of the Arroyo Derecho drill site (Fig. 2).