

Supporting Information

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Fig. S1. Gradational contact between mauve-colored floodplain and fluvial sandstones and overbank mudstones of the Ischigualasto Formation (lower half of photo) to the predominantly red fluvial siltstones and sandstones of the overlying Los Colorados Formation (cliffs in background) near outlet of Quebrada de la Sal and the base of the sampled section of the Los Colorados Formation.

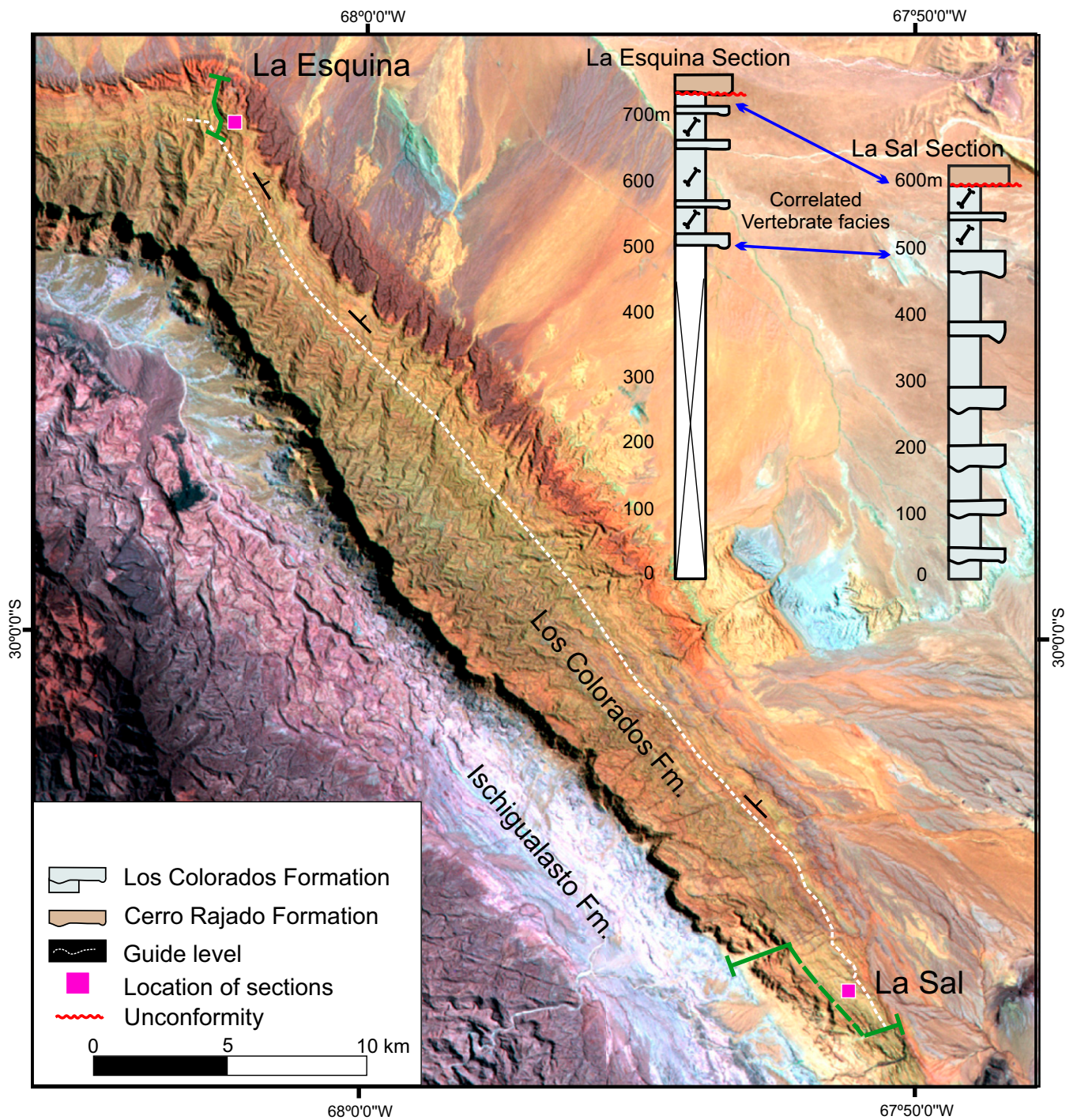


Fig. S2. Satellite image of the southern Ischigualasto-Villa Union Basin showing the continuity of exposures of the Los Colorados Formation between the La Sal section (green lines, dashed where the two subsections were linked), where the paleomagnetic sampling was done, and the La Esquina section (green line), where the La Esquina local fauna was defined. The dashed white line highlights the guide level used to correlate the sections. Lithostratigraphic profiles of each section with dominant sandstone bodies jutting out and finer-grained sediments recessed are shown in the upper right to illustrate how the vertebrate host sedimentary facies were identified and related in both sections, as well as the unconformable contact with Cerro Rajado Formation.

Table S1. Site-mean and formation-mean ChRM directions and corresponding VGPs for La Sal section of the Los Colorados Formation in the Ischigualasto–Villa Union basin (30°S, 68°W)

Height (m)	ID	n	k	ChRM		VGP		rLat (°)	Magzone
				Dec (°)	Inc (°)	Lon (°)	Lat (°)		
10	TIBH	3	33	199.2	66.2	259.2	-66.3	-83.8	LC1r
21	TIBI	3	56	2.3	-51.5	70.1	87.1	74.7	LC2n
30	TIBJ	3	27	21.3	-49.7	29.0	71.6	77.1	LC2n
50	TIEA	2	11	217.2	61.8	236.1	-57.7	-74.7	LC2r
57	TIBL	2	210	200.1	67.0	260.0	-65.2	-82.6	LC2r
68	TIBM	1	1	162.6	34.3	53.3	-70.7	-52.9	LC2r
76	TIBN	2	75	222.8	51.9	217.3	-53.6	-66.8	LC2r
80	TIEQ	2	8	247.4	61.7	235.5	-35.7	-53.1	LC2r
84	TIBO	1	1	193.1	56.4	238.0	-77.1	-83.7	LC2r
94	TIBP	2	33	201.5	54.1	221.9	-71.3	-80.9	LC2r
104	TIBQ	2	500	209.8	70.2	259.1	-57.7	-75.5	LC2r
115	TIBR	1	1	47.6	-59.7	50.7	50.2	66.6	LC3n
125	TIBS	3	65	17.6	-56.3	51.7	73.8	84.0	LC3n
136	TIBT	3	76	197.4	61.1	247.8	-71.5	-89.0	LC3r
145	TIBU	3	291	202.9	62.3	245.1	-67.3	-85.1	LC3r
155	TIBV	2	5	180.5	52.5	284.3	-86.9	-74.3	LC3r
165	TIBW	1	1	181.2	61.6	288.0	-77.2	-78.9	LC3r
172	TIEP	2	176	38.0	-64.6	62.1	56.4	74.1	LC4n
180	TICA	2	19	11.5	-62.5	81.7	73.4	86.3	LC4n
196	TICB	1	1	9.3	-63.4	88.5	73.3	84.5	LC4n
206	TICC	2	467	170.8	74.9	300.2	-57.8	-65.8	LC4r
215	TICD	1	1	358.7	-31.7	286.4	77.1	60.4	LC5n
228	TICE	1	1	213.3	60.9	235.3	-60.8	-77.4	LC5r
243	TICF	3	56	227.9	61.9	234.7	-50.0	-67.0	LC5r
252	TICG	4	21	231.6	67.1	244.4	-46.8	-64.8	LC5r
270	TICH	2	11	203.8	55.9	226.3	-69.1	-81.5	LC5r
298	TICK	2	92	153.5	67.2	329.4	-61.8	-60.0	LC5r
299	TIET	1	1	227.0	60.7	232.5	-50.7	-67.4	LC5r
309	TICL	2	549	103.7	81.8	310.6	-32.5	-40.0	LC5r
323	TICM	2	10	186.4	30.7	136.9	-75.3	-62.5	LC5r
332	TICN	2	131	174.8	51.4	355.9	-85.1	-70.0	LC5r
344	TICO	2	22	26.1	-66.4	72.9	62.7	80.8	LC6n
362	TICQ	2	58	2.2	-63.5	106.1	74.8	79.6	LC6n
371	TICR	2	23	0.4	-52.5	105.8	86.9	74.2	LC6n
381	TICS	2	338	6.0	-57.5	82.2	80.5	80.9	LC6n
388	TICT	1	1	25.8	-52.8	37.5	67.8	78.0	LC6n
406	TICU	2	35	160.1	59.3	344.7	-70.9	-62.9	LC6r
414	TICV	1	1	155.4	40.4	33.7	-67.0	-51.0	LC6r
416	TIEB	2	186	35.9	-64.2	61.9	57.9	75.6	LC7n
427	TICW	3	66	21.7	-54.3	42.5	71.1	81.0	LC7n
435	TICX	2	77	350.4	-60.8	142.6	75.9	70.9	LC7n
444	TICY	2	345	39.2	-64.2	60.8	55.7	73.4	LC7n
454	TICZ	2	6	15.6	-33.9	346.7	71.8	65.8	LC7n
462	TIEC	2	2	343.8	-63.9	146.6	69.9	66.7	LC7n
480	TIEE	2	390	214.9	58.3	229.0	-60.1	-75.5	LC7r
494	TIEF	2	2950	217.3	66.8	247.3	-55.9	-74.0	LC7r
505	TIEG	2	259	207.6	62.3	241.5	-64.2	-81.7	LC7r
525	TIEH	2	12	348.0	-45.4	215.5	79.0	62.1	LC8n
531	TIEI	2	217	45.9	-63.8	58.5	51.2	68.7	LC8n
544	TIEJ	2	243	11.0	-60.3	76.6	75.7	85.8	LC8n
551	TIEK	2	427	31.4	-61.3	57.0	62.0	78.9	LC8n
564	TIEL	2	590	19.8	-75.3	96.0	55.2	70.3	LC8n

Mean characteristic remanent magnetization (ChRM) direction (52 sites): $D = 15.4^\circ$, $I = -60.4^\circ$ ($A95 = 3.8^\circ$). Mean virtual geomagnetic pole (VGP) position (52 sites): Longitude (Lon) = 70.8°E , Latitude (Lat) = 71.8°N ($A95 = 5.0^\circ$). Sampling level in stratigraphic height in meters from base of Los Colorados Formation for each sampling site (ID) at which a ChRM was isolated in number of samples (n) with a Fisher precision parameter (k; assigned 1 for only one sample) for mean direction (Dec, declination; Inc, inclination) in bedding coordinates and corresponding VGP position. rLat is latitude of VGP with respect to mean paleomagnetic north pole; Magzone is magnetic polarity zone where suffix n is for normal polarity and r is for reverse polarity. A95 is radius of circle of 95% confidence about the mean direction.