Hobbs, K.M., and Fawcett, P.J., 2021, Nonclimatic and extrabasinal processes controlled pedogenesis in paleosols of the Paleocene Nacimiento Formation, New Mexico, USA: GSA Bulletin, <https://doi.org/10.1130/B35803.1>.

Supplemental Material

Appendix A. Full geochemical data from analyzed materials.

Appendix B. X-Ray diffractograms from XRD-analyzed fine fractions of Nacimiento Formation paleosol B horizon materials.

Appendix C. Results of statistical analysis (simple linear regression) of pedotype and geochemical climate analysis data.

Appendix A. Full geochemical data from analyzed materials.

Sample Name	Na2O mass%	MgO mass%	Al2O3 mass%	SiO2 mass%	P2O5 mass%	K2O mass%	CaO mass%	TiO2 mass%	MnO mass%	Fe2O3 mass%
ANGE-02	1.164	1.043	16.019	61.007	0.049	2.132	1.199	0.78	0.019	6.137
ANGE-05	1.174	1.066	15.646	61.685	0.053	2.161	1.171	0.69	0.02	9.404
ANGE-06	1.167	1.056	15.58	61.256	0.053	2.145	1.161	0.687	0.019	9.369
BDNZ-35	1.377	1.048	22.144	56.207	0.019	0.5	1.076	0.783	0.039	5.78
BDNZ-36	1.454	1.067	19.016	57.168	0.082	2.938	0.421	0.801	0.029	9.412
BDNZ-37	1.921	0.272	12.621	67.674	0.027	2.829	0.41	0.514	0.014	1.344
BDNZ-39	2.684	1.24	16.016	68.592	0.106	2.791	1.054	0.462	0.016	2.752
BDNZ-40	1.834	1.429	15.453	62.384	0.032	2.451	0.737	0.677	0.039	6.681
BDNZ-41	1.519	1.612	14.894	58.821	0.097	2.232	0.95	0.657	0.035	9.128
BDNZ-50	1.07	0.963	17.686	63.293	0.042	1.474	0.545	0.718	0.013	4.948
BDNZ-51	0.826	0.82	16.275	67.709	0.021	1.433	0.428	0.811	0.012	3.649
BDNZ-52	1.003	0.872	18.946	59.14	0.045	1.993	0.506	0.899	0.02	7.723
BDNZ-53	1.176	1.016	19.735	56.06	0.039	1.917	0.535	0.794	0.019	9.33
BETS-03	0.896	0.615	20.686	61.845	0.019	0.213	0.688	0.813	0.039	7.511
BETS-04	1.334	0.796	16.901	63.84	0.208	2.193	1.276	0.653	0.015	6.892
BIPO007	0.916	2.28	17.525	56.282	0.072	2.432	1.91	0.822	0.034	9.819
CROW04	0.32	0.427	20.085	63.271	0.016	0.101	0.553	1.033	0.012	3.977
CROW05	0.132	0.163	7.185	81.849	0.014	0.074	0.108	0.963	0.009	0.831
CUME-06	1.056	0.61	10.954	76.733	0.016	1.55	0.308	0.905	0.019	2.748
CUME-14	1.23	1.085	14.991	57.859	0.05	2.027	0.587	0.662	0.047	13.646
ESCA-02	1.102	2.19	18.129	59.994	0.069	1.987	1.86	0.831	0.029	7.438
ESCA-22	0.991	0.61	21.161	60.059	0.018	0.209	0.49	0.82	0.028	5.943
JACA01	0.614	0.338	19.908	66.416	0.016	0.117	0.357	1.247	0.012	6.179
JACA03	0.968	0.714	17.995	64.338	0.015	1.546	0.364	0.647	0.016	3.606
JACA04	0.927	0.58	17.617	65.477	0.012	1.293	0.321	0.504	0.013	3.661
JACA05	1.281	1.092	20.37	60.017	0.013	1.098	0.878	0.786	0.029	5.156
JACA06	1.44	1.479	18.359	65.076	0.021	2.349	0.758	0.838	0.032	6.488
JACA08	0.98	1.557	17.351	61.703	0.069	2.548	1.019	0.823	0.034	8.241
JACA11	1.02	0.597	18.359	65.708	0.012	1.493	0.257	0.595	0.013	2.93
JACA13	0.839	0.57	20.668	60.997	0.013	0.199	0.53	0.813	0.019	6.777
JACA15	0.911	0.553	19.894	59.16	0.013	1.42	0.339	0.503	0.013	3.284
JACA17	0.245	0.312	11.142	73.297	0.016	0.804	0.185	0.75	0.009	2.501
KH28	1.065	0.946	16.739	57.003	0.026	2.264	1.066	0.769	0.082	9.878
KUTZ-17	0.468	0.472	20.159	63.271	0.029	0.111	0.391	0.983	0.027	4.961
KWFT08	1.547	1.403	16.88	64.811	0.017	0.815	0.667	1.099	0.029	5.715
KWFT24	2.181	1.498	17.137	60.237	0.033	2.194	1.152	0.763	0.022	9.55
LIPL-04	1.467	1.001	19.874	61.278	0.041	1.744	0.594	0.697	0.019	4.911
NACI-35	1.915	1.216	16.846	59.019	0.029	2.032	0.87	0.788	0.041	7.129
NACI-36	1.642	1.043	17.84	59.951	0.087	1.555	0.621	0.549	0.027	5.591
NACI-37	0.919	0.897	18.465	60.297	0.054	1.768	0.613	0.797	0.04	6.715
OJEN-04	1.269	1.168	20.195	62.89	0.026	2.167	1.706	0.873	0.034	4.664

Appendix B. X-Ray diffractograms from XRD-analyzed fine fractions of Nacimiento
Formation paleosol B horizon materials.

	Peak List
quartz	01-085-0865
illite	01-073-9866
montmorillonite	01-073-6746
kaolinite	01-078-2110
gypsum	00-021-0816

Quartz Illite Montmorillonite Kaolinite	Peak List
	01-085-0865
	01-073-9866
	01-073-6746
	01-078-2110

Peak List	
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110

Quartz Illite Montmorillonite Kaolinite	Peak List
	01-085-0865
	01-073-9866
	01-073-6746
	01-078-2110

Quartz Illite Montmorillonite Kaolinite	Peak List
	01-085-0865
	01-073-9866
	01-073-6746
	01-078-2110

	Peak List
Quartz	01-085-0865
Illite	
Montmorillonite	01-073-9866
Kaolinite	01-073-6746
	01-078-2110

Quartz
Illite
Montmorillonite
Kaolinite

Peak List	
01-085-0865	
01-073-9866	
01-073-6746	
01-078-2110

Quartz Illite Montmorillonite Kaolinite	Peak List
	01-085-0865
	01-073-9866
	01-073-6746
	01-078-2110

Peak List	
01-085-0865	
01-073-9866	
01-073-6746	
01-078-2110

Quartz
Illite
Montmorillonite
Kaolinite

Peak List	
01-085-0865	
01-073-9866	
01-073-6746	
01-078-2110	

Counts

Quartz
Illite
Montmorillonite
Kaolinite

Peak List	
01-085-0865	
01-073-9866	
01-073-6746	
01-078-2110

Peak List	
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110

Quartz Illite Montmorillonite Kaolinite	Peak List
	01-085-0865
	01-073-9866
	01-073-6746
	01-078-2110

	Peak List
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110
Gypsum	00-021-0816

Quartz
Illite
Montmorillonite
Kaolinite
Gypsum

Peak List	
01-085-0865	
01-073-9866	
01-073-6746	
01-078-2110	
00-021-0816

Peak List	
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110
Gypsum	00-021-0816

Quartz
Illite
Montmorillonite
Kaolinite

Peak List	
01-085-0865	
01-073-9866	
01-073-6746	
01-078-2110

	Peak List
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110
Gypsum	00-021-0816

	Peak List
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110
Gypsum	00-021-0816

Peak List	
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110

Peak List	
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolin	01-078-2110
Gypsum	00-021-0816

Counts

Peak List	
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110
Gypsum	00-021-0816

Peak List	
Quartz	01-085-0865
Illite	01-073-9866
Montmorillonite	01-073-6746
Kaolinite	01-078-2110
Gypsum	00-021-0816

Appendix C. Results of statistical analysis (simple linear regression) of pedotype and
geochemical climate analysis data.

SUMMARY OUTPUT - MAT, PWI

Regression Statistics	
Multiple R	0.467229946
R Square	0.218303822
Adjusted R Square	0.189352112
Standard Error	1.706207603
Observations	29

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	21.95082573	21.95083	7.5402738	0.010604932
Residual	27	78.60089841	2.911144		
Total	28	100.5517241			

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept		-5.286685096	3.271750518	-1.61586	0.1177514	-11.99976265	1.42639246	-11.99976265	1.426392459
	11.4	0.699147662	0.254609938	2.745956	0.0106049	0.176731221	1.2215641	0.176731221	1.221564103

RESIDUAL OUTPUT

MAT, PWI

<i>Observation</i>	<i>Predicted 1</i>	<i>Residuals</i>
1	3.03317208	-2.03317208
2	3.662404976	-2.662404976
3	2.403939185	-1.403939185
4	2.963257314	-1.963257314
5	2.823427782	-1.823427782
6	3.242916379	-2.242916379
7	2.963257314	-1.963257314
8	3.59249021	-2.59249021
9	3.173001613	-1.173001613
10	2.963257314	0.036742686
11	3.242916379	0.757083621
12	3.942064041	0.057935959
13	3.732319742	0.267680258
14	2.753513015	1.246486985
15	5.899677494	-1.899677494
16	4.011978807	-0.011978807
17	3.382745911	0.617254089
18	3.03317208	1.96682792
19	3.942064041	1.057935959
20	4.221723105	0.778276895
21	4.011978807	0.988021193
22	5.060700299	-0.060700299
23	4.151808339	0.848191661
24	3.242916379	1.757083621
25	3.382745911	2.617254089
26	2.893342548	3.106657452
27	6.039507026	-0.039507026
28	3.382745911	2.617254089
29	4.850956001	1.149043999

Regression of Pedotype vs. MAT, PWI

SUMMARY OUTPUT - MAT, S

Regression Statistics	
Multiple R	0.375969049
R Square	0.141352726
Adjusted R Square	0.109550975
Standard Error	1.788217236
Observations	29

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	14.21326032	14.21326	4.444809552	0.044428369
Residual	27	86.33846382	3.197721		
Total	28	100.5517241			

		Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept		-0.764928514	2.12268601	-0.36036	0.721382723	-5.120320445	3.590463417	-5.120320445	3.590463417
	11.2	0.345879457	0.164058294	2.108272	0.044428369	0.009259644	0.682499271	0.009259644	0.682499271

RESIDUAL OUTPUT MAT, S

<i>Observation</i>	<i>Predicted 1</i>	<i>Residuals</i>
1	3.558564703	-2.558564703
2	4.215735672	-3.215735672
3	2.244222765	-1.244222765
4	3.108921409	-2.108921409
5	2.866805789	-1.866805789
6	3.489388812	-2.489388812
7	2.244222765	-1.244222765
8	4.008207998	-3.008207998
9	3.489388812	-1.489388812
10	3.351037029	-0.351037029
11	3.66232854	0.33767146
12	3.212685246	0.787314754
13	4.008207998	-0.008207998
14	3.731504432	0.268495568
15	4.80373075	-0.80373075
16	4.077383889	-0.077383889
17	3.42021292	0.57978708
18	3.66232854	1.33767146
19	4.111971835	0.888028165
20	4.181147727	0.818852273
21	4.111971835	0.888028165
22	4.769142804	0.230857196
23	4.284911564	0.715088436
24	2.69386606	2.30613394
25	2.901393734	3.098606266
26	3.143509354	2.856490646
27	5.04584637	0.95415363
28	3.1780973	2.8219027
29	4.423263347	1.576736653

Regression of Pedotype vs. MAT, S

SUMMARY OUTPUT

MAP

Regression Statistics	
Multiple R	0.404977266
R Square	0.164006586
Adjusted R Square	0.134149679
Standard Error	1.79042918
Observations	30

ANOVA					
	df	SS	MS	F	Significance F
Regression	1	17.60884049	17.60884049	5.493086839	0.026419547
Residual	28	89.75782618	3.205636649		
Total	29	107.3666667			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	-2.861939653	2.762301086	-1.036070857	0.30903462	-8.520256926	2.79637762	-8.520256926	2.79637762
X Variable 1	0.005665468	0.002417283	2.343733526	0.026419547	0.000713888	0.010617048	0.000713888	0.010617048

RESIDUAL OUTPUT

<i>Observation</i>	<i>Predicted Y</i>	<i>Residuals</i>
1	2.276639647	-1.276639647
2	2.293636051	3.706363949
3	2.310632454	-1.310632454
4	2.520254763	2.479745237
5	2.735542539	-1.735542539
6	2.854517363	3.145482637
7	2.950830316	-1.950830316
8	2.962161252	-1.962161252
9	2.990488591	1.009511409
10	3.06980514	-1.06980514
11	3.132125286	-2.132125286
12	3.245434642	2.754565358
13	3.500380693	0.499619307
14	3.506046161	-2.506046161
15	3.523042565	0.476957435
16	3.551369904	0.448630096
17	3.653348324	-2.653348324
18	3.670344728	1.329655272
19	3.84597423	-2.84597423
20	3.925290779	-0.925290779
21	3.936621714	2.063378286
22	4.027269199	-0.027269199
23	4.282215251	-0.282215251
24	4.423851946	0.576148054
25	4.491837559	0.508162441
26	4.525830366	0.474169634
27	4.548492237	0.451507763
28	4.633474255	-0.633474255
29	4.639139722	0.360860278
30	4.973402323	1.026597677

Regression of Pedotype vs. MAP