Supporting Online Material for

Transient Floral Change and Rapid Global Warming at the Paleocene-Eocene Boundary

Scott L. Wing,* Guy J. Harrington, Francesca A. Smith, Jonathan I. Bloch, Douglas M. Boyer, Katherine H. Freeman

*To whom correspondence should be addressed. E-mail: wings@si.edu

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Methods – Carbon Isotope Analysis

Samples for carbon isotope analysis were collected by digging through the weathered zone to expose solid rock, which was then removed in pieces 5-10 cm in diameter. Several grams of fresh rock were pulverized with a mortar and treated with 1N HCl to remove carbonate, then rinsed with distilled water, and dried at 50° C. More than 90% of samples showed no visible reaction with HCl. Carbon isotope ratios were measured in duplicate using an Elemental Analyzer (EA) and a ThermoFinnigan Delta Plus XP Isotope Ratio Mass Spectrometer (IRMS). Replicate measurements of standards indicate a measurement precision of ± 0.1 ‰. Weight percent organic carbon of samples was measured using an off-line EA. (See Table S1 for measurements of samples and standards.)

Samples were divided into a PETM set, defined by occurrence in the stratigraphic interval that produced Wa-0 mammals, and a pre- and post-PETM set, which occurred either below the lowest intermittent red bed (lowest level for Wa-0 mammals) or above the highest Wa-0 mammals. We calculated a logarithmic regression of $\delta^{13}C_{org}$ against wt. % C_{org} for each set of samples separately (Fig. S1). Anomaly values of $\delta^{13}C_{org}$ in Fig. 2 were calculated as the observed minus expected $\delta^{13}C_{org}$ values using the "Paleocene & Eocene" equation in Fig. S1 to calculate expected $\delta^{13}C_{org}$.

The strong, negative exponential relationship between wt. % C_{org} and $\delta^{13}C_{org}$ in these mud-rock paleosol samples (Fig. S1, Table S1) is consistent with soil profiles from modern fine-grained soils (Fig. S1, *S1, S2*), and may reflect isotopic enrichment due to assimilation of HCO_3^- (via PEP Carboxylase) for anaplerotic reactions by heterotrophic

soil microbes (*S3*). Fine soil particles probably also play a role in retaining the ^{13}C-enriched carbon in the soil (*S2*).

Methods – Pollen and Palynofacies Analysis

Splits of samples used in isotopic analysis were treated for standard palynological analysis: 10% HCl to remove carbonate, then rinsing, then treatment with concentrated HF to remove silica, followed by rinsing, then flotation of organic remains with $ZnCl_2$, and mounting on glass slides for examination under light microscopy.

Slides were scanned by GJH for palynodebris (Table S2). Palynodebris composition is associated with wt. % C_{org}; samples with low weight percent carbon tend to have less well-preserved, light-colored organic matter, whereas samples with higher weight percent carbon have a wide range of types of organic debris.

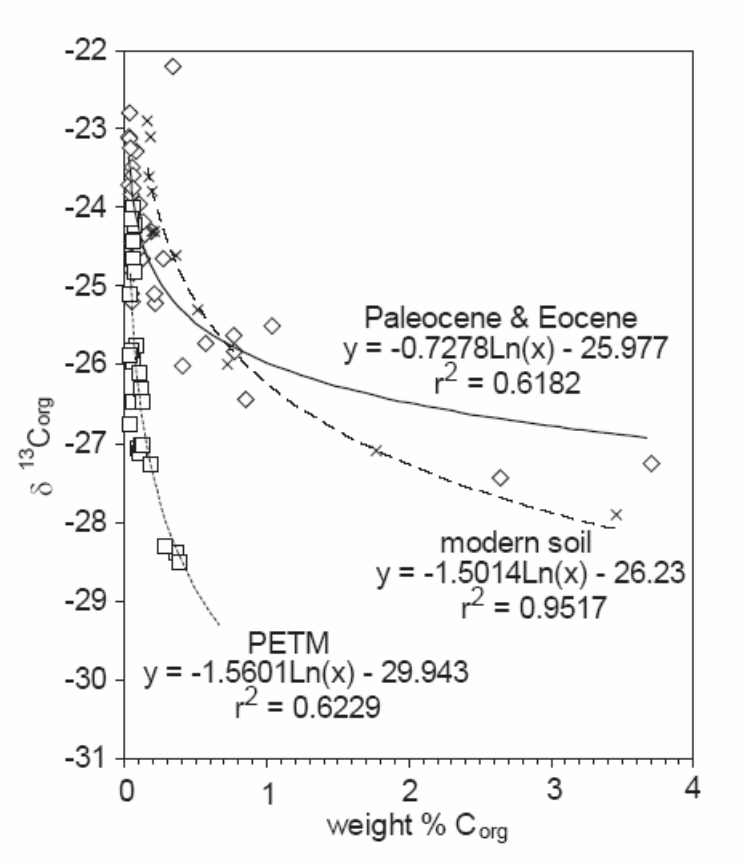

Figure S1. Relationship between wt. % C_{org} and $\delta^{13}C_{org}$. Symbols: ◊ - Paleocene and Eocene samples (solid line), × - modern soil samples (*S2*) (long dashes), □ - PETM samples based on faunal evidence (short dashes). All regressions are logarithmic.

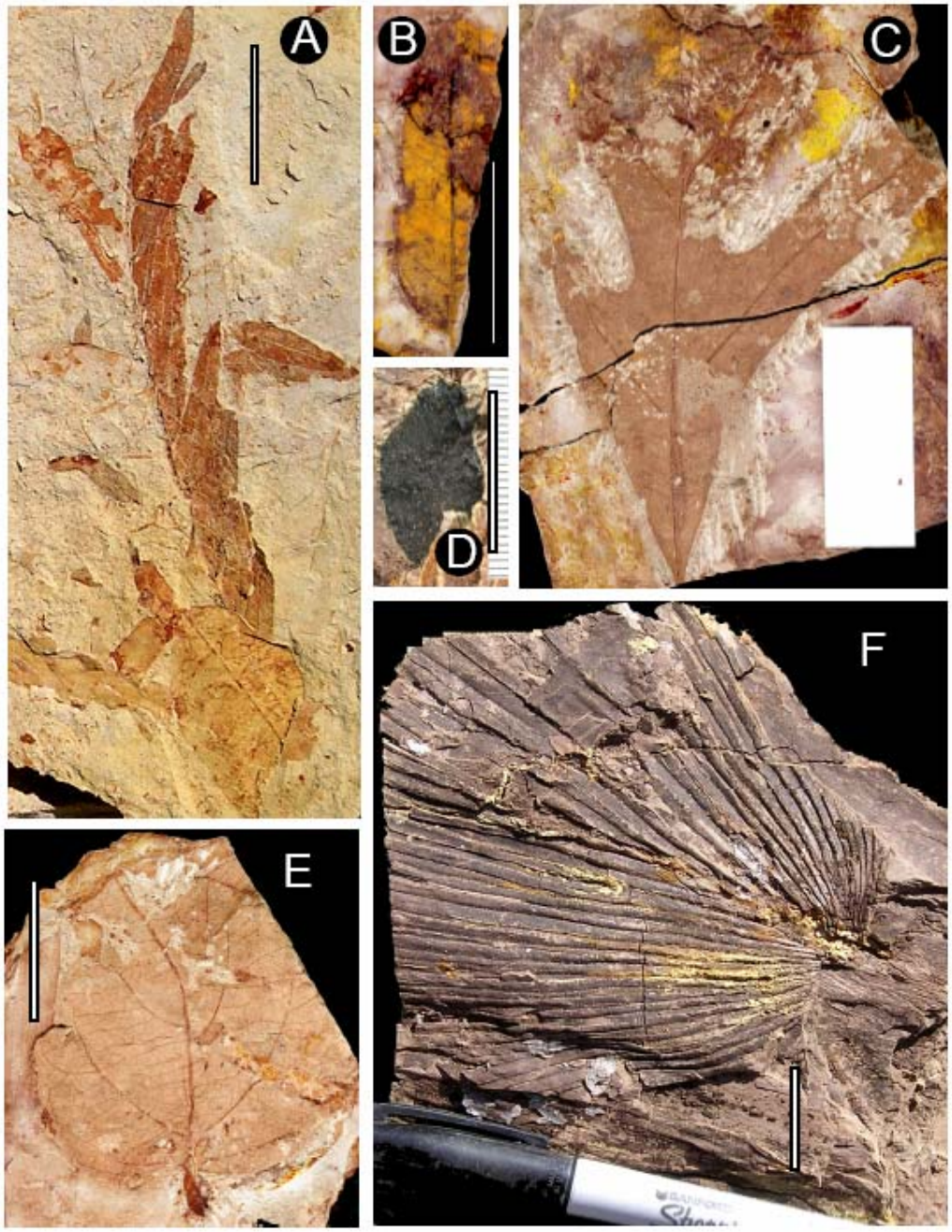

Figure S2. Plant fossils from the lower PETM. A. Indet. 0410-4 – probable mimosoid legume leaf with multiple leaflets; B. Indet. 0410-4 isolated leaflet; C. "*Artocarpus*" *lessigiana*; D. lump of fusain; E. Indet. 0410-2; F. palm leaf fragment. Scale bar is 2 cm in all except C, in which it is 5 cm.

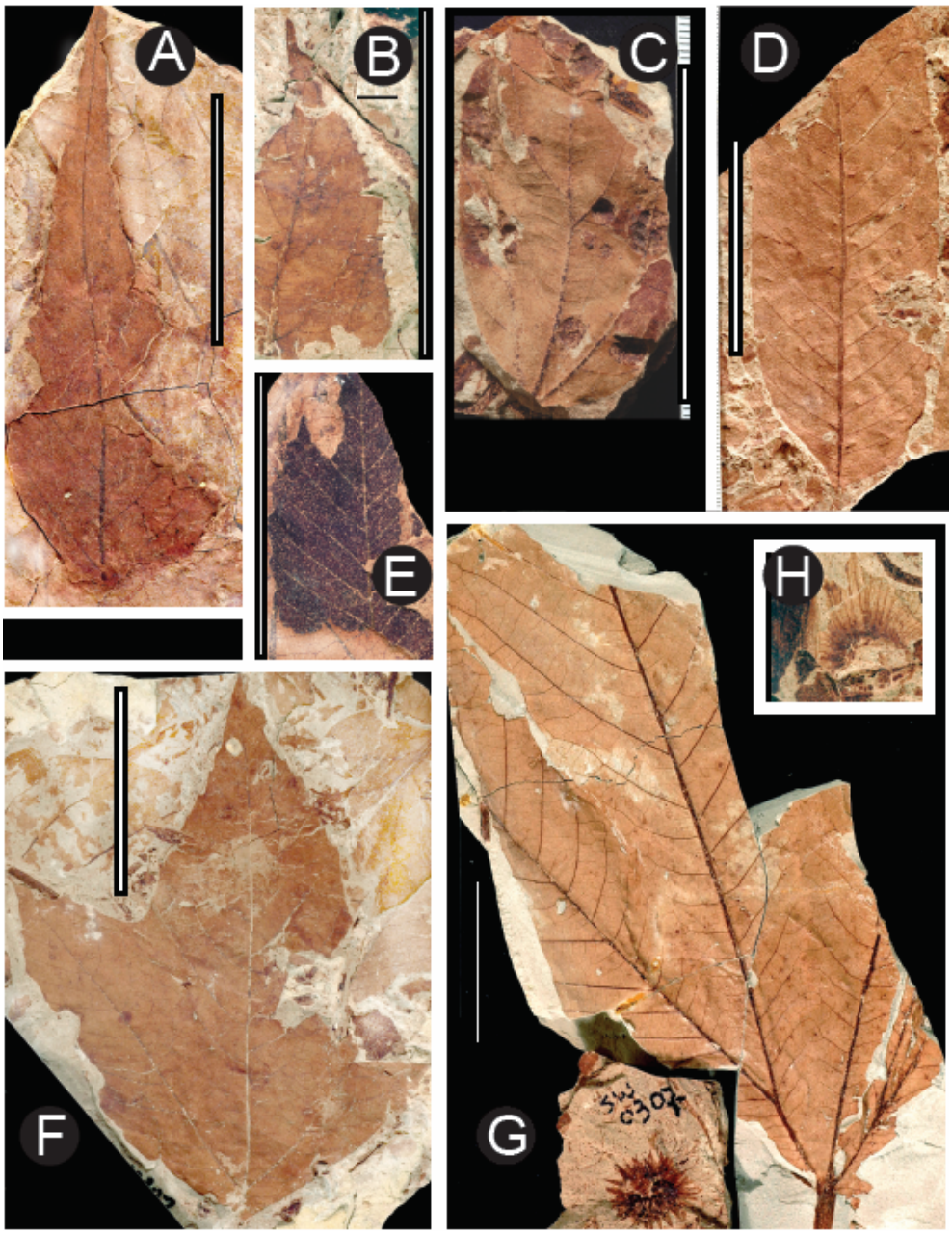

Figure S3. Plant fossils from the upper PETM (SW0307a,b). A. Indet. 0307-3 – a lauraceous leaf with long acuminate apex; B. Indet. 0307-7 – possibly Flacourtiaceae or Salicaceae; C. "*Ficus*" *planicostata*; D. Indet. 0307-10 – possibly Sapindaceae; E. *Fagopsis greenlandica*; F. *Platanus raynoldsii*; G. Leaf and fruit of *Macginitiea nobilis*; H. cyclocaryoid fruit. Scale bar is 5 cm in A-G, 2 cm in H.

Table S1. Measured values of wt. % C_{org}, and measured and predicted values of $\delta^{13}C_{org.}$

	$\delta^{13}C_{org}$ (‰ VPDB)	Standard deviation $\delta^{13}C_{org}$ (‰ VPDB)	Predicted $\delta^{13}C_{org}$ (‰ VPDB)	Anomoly: observed-predicted $\delta^{13}C_{org}$ (‰ VPDB)	Weight % C_{org}	Level (m)
CAB6-04-04	-26.44	0.31	-25.86	-0.57	0.85	73.30
CAB6-04-03	-24.84	0.12	-23.96	-0.88	0.06	56.80
CAB6-04-02	-25.89	0.60	-23.62	-2.27	0.04	49.70
CAB6-04-01.1	-28.52	0.13	-25.28	-3.23	0.39	37.30
CAB6-04-01	-25.84	0.03	-23.77	-2.07	0.05	33.80
CAB1-04-06	-28.39	0.07	-25.23	-3.16	0.36	8.20
CAB1-04-05	-24.66	0.16	-23.86	-0.80	0.05	6.20
CAB7-04-04	-26.12	0.90	-24.36	-1.75	0.11	2.85
CAB3-04-14	-27.02	0.15	-24.48	-2.55	0.13	2.55
CAB3-04-13.2	-27.02	0.34	-24.43	-2.60	0.12	2.10
CAB1-04-04	-25.77	0.10	-24.11	-1.66	0.08	1.70
CAB3-04-13.1	-27.12	0.07	-24.36	-2.76	0.11	1.15
CAB3-04-13	-27.08	0.19	-24.26	-2.82	0.09	0.75
CAB1-04-03.1	-26.48	0.21	-23.90	-2.58	0.06	0.00
CAB3-04-12.2	-25.97	0.24	-23.97	-1.99	0.06	0.00
CAB7-04-03	-26.32	0.02	-24.41	-1.91	0.12	-0.15
CAB7-04-02	-28.31	0.14	-25.05	-3.25	0.28	-0.85
CAB3-04-12.1	-24.01	0.06	-23.85	-0.16	0.05	-0.95
CAB7-04-01.3	-27.27	0.03	-24.74	-2.53	0.18	-1.25
CAB3-04-12	-24.45	0.00	-23.85	-0.60	0.05	-1.35
CAB3-04-11.2	-23.84	0.07	-23.75	-0.09	0.05	-1.90
CAB1-04-03	-24.24	0.12	-24.00	-0.24	0.07	-2.30
CAB3-04-11.1	-23.70	0.23	-23.44	-0.26	0.03	-2.80
CAB3-04-11	-25.09	0.52	-23.68	-1.41	0.04	-3.65
CAB7-04-01.2	-23.59	0.16	-23.90	0.31	0.06	-4.45
CAB3-04-10.1	-22.80	0.19	-23.48	0.68	0.03	-4.70
CAB7-04-01.1	-23.25	0.10	-23.59	0.34	0.04	-4.85
CAB3-04-10	-24.54	0.22	-24.25	-0.30	0.09	-5.65
CAB3-04-09.1	-22.20	0.07	-25.18	2.99	0.34	-6.65
CAB7-04-01	-24.33	0.03	-24.56	0.22	0.14	-8.15
CAB3-04-09	-23.96	0.09	-24.30	0.34	0.10	-8.25
CAB3-04-08.1	-23.12	0.19	-23.51	0.39	0.03	-8.85
CAB3-04-08	-23.10	0.03	-23.35	0.25	0.03	-9.75
CAB3-04-07.1	-23.29	0.14	-24.10	0.82	0.08	-12.00
CAB3-04-07	-27.43	0.17	-26.68	-0.75	2.64	-13.75
CAB2-04-02	-27.25	0.02	-26.93	-0.32	3.71	-13.75
CAB5-04-01	-25.10	0.10	-24.84	-0.26	0.21	-13.75
CAB1-04-02	-24.66	0.18	-24.37	-0.28	0.11	-14.05
CAB2-04-01	-25.50	0.13	-26.00	0.51	1.04	-19.55
CAB1-04-01	-25.23	0.06	-24.85	-0.38	0.21	-19.80
CAB3-04-06	-25.83	0.01	-25.79	-0.04	0.77	-19.95
CAB4-04-01	-25.73	0.06	-25.56	-0.16	0.57	-20.00
CAB3-04-05	-23.48	0.27	-23.80	0.32	0.05	-20.45
CAB3-04-04	-24.65	0.14	-24.46	-0.19	0.12	-25.65
CAB3-04-03	-26.02	0.17	-25.32	-0.69	0.41	-29.45
CAB3-04-02	-24.65	0.12	-25.03	0.38	0.27	-32.75
CAB3-04-01	-24.30	0.13	-24.75	0.45	0.19	-37.45

*highlighted samples are in the PETM based on faunal or stratigraphic evidence

Table S2. Proportional abundance of palynodebris.

		Structureless Amorphous Organic Matter			Structureless Amorphous Resin		Fragmentary phytoclast	Fragmentary phytoclast lath-like	Structured Discrete palynomorph/sporomorph				Phytoclast no definitive structure				Cellular 3-D mass	Phytoclast cellular 2-D sheet		Tubes banded or spiral thickened				Narrow tubes				Phytoclast irregular degraded				Phytoclast residual trace of structure			Phytoclast no definitive structure massive irregular		Phytoclast no definitive structure square, elongate or lath shaped black		Phytoclast no definitive structure fibrous bundles		Phytoclast no definitive structure
		black	brown	yellow-translucent	dark-light brown	light brown-yellow	opaque	opaque	dark-light brown	light brown-yellow	opaque	yellow-translucent	dark-light brown	light brown-yellow	opaque	black	dark-light brown	light brown - yellow	dark-light brown	black	opaque	dark-light brown	light brown-yellow	black	dark-light brown	light brown-yellow	black	dark-light brown	light brown-yellow	black	dark-light brown	light brown-yellow	light-brown/yellow	black	brown	light brown-yellow	black	dark-light brown	light brown-yellow	dark-light brown	light brown-yellow	dark-light brown
CAB1_04_01	0.00	0.02	0.00	0.00	0.00	0.09	0.00	0.02	0.01	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.03	0.64	0.00	0.00	0.00	0.00
CAB1_04_02	0.00	0.00	0.01	0.00	0.00	0.00	0.37	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB1_04_03	0.00	0.00	0.03	0.00	0.02	0.00	0.18	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB1_04_03_1	0.00	0.07	0.04	0.00	0.18	0.06	0.00	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB1_04_04	0.00	0.00	0.01	0.00	0.04	0.04	0.00	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB1_04_05	0.00	0.03	0.01	0.00	0.03	0.01	0.00	0.11	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB1_04_06	0.00	0.01	0.09	0.00	0.01	0.09	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-01	0.00	0.04	0.07	0.00	0.01	0.04	0.00	0.09	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.29	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-03	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-04	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-05	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.06	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-06	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB2_04_01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB2_04_02	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-07.1	0.00	0.02	0.04	0.00	0.04	0.03	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-08.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-09.1	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.12	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-11	0.00	0.02	0.00	0.00	0.03	0.01	0.00	0.17	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-11.1	0.02	0.02	0.02	0.00	0.02	0.05	0.00	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-11.2	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.17	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-12	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.13	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-12.1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-12.2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-13	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-13.1	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-13.2	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB3-04-14	0.00	0.08	0.02	0.00	0.00	0.17	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB4_04_01	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB5_04_01	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB6_04_01_1	0.00	0.01	0.01	0.00	0.00	0.04	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB6_04_03	0.00	0.01	0.02	0.00	0.00	0.02	0.00	0.04	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB6_04_04	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB7_04_01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB7_04_01_1	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB7_04_01_2	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB7_04_01_3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB7_04_02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB7_04_03	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB7_04_04	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB9_04_01	0.00	0.01	0.00	0.00	0.00	0.03	0.00	0.01	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB8_04_01	0.00	0.04	0.00	0.00	0.00	0.03	0.00	0.16	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CAB8_04_02	0.00	0.01	0.01	0.00	0.00	0.03	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table S3. Taxonomic composition of megaflora from localities SW0307 and SW0410.

			# of specimens	
Morphotype number (brief description)	Toothed/ Entire	Area (ln)	SW0307a,b	SW0410
indet 0307-1 (pinnate, eucampto, crowded basal 2s, teeth closely	T	7.88	4	0
indet 0307-3 (pinnate, ovate, long acuminate apex, eucamptodromous secondaries with basal 2-3 pairs oppositely	E	7.88	116	0
indet 0307-7 (cf. Flacourtiaceae sp.3)	T	6.51	2	0
indet 0307-8 (pinnate, ovate, acute apex, brochidodromous	E	6.51	2	0
indet 0307-9 (cf. *Allophylus flexifolia*)	T	7.88	7	0
indet 0307-10 (cf. *Allophylus flexifolia* but with entire margin)	E	7.88	23	0
indet 0307-11 (pinnate, elliptical, sparse teeth near apex)	T	9.11	1	0
indet 0307-14 (pinnate, concentric eucamptodromous	E	8.56	2	0
indet 0307-15 (pinnate, secondaries brochidodromous with straight courses and originating at a very acute angle to the	E	8.01	1	0
indet 0307-17 (pinnate, complex agrophic veins or deeply forked secondaries, tertiaries opposite percurrent, teeth small)	T	8.01	1	0
indet 0307-18 (pinnate, cordate base, secondaries brochidodromous, 3 basal pairs of secondaries)	E	8.56	4	0
indet 0307-22 (branching axis with tiny pinnately veined leaves)	E	3.22	1	0
Macginitiea gracilis	E	9.34	13	0
"Ficus" planicostata	E	7.88	29	0
Fagopsis greenlandica	T	7.26	1	0
Phoebe (type 5)	E	7.26	4	0
Platanus raynoldsii	T	8.56	3	0
indet 0307-13 (woodybracts on axis)	non-foliar		3	0
platanoid bud scale	non-foliar		2	0
nutlike structure	non-foliar		1	0
Macginicarpa	non-foliar		1	0
Amesoneuron (fragments of palm leaves)	non-foliar		1	7
indet 0307-19 (fern with pointed pinnules)	non-foliar		2	0
indet 0307-20 (delicate fern)	non-foliar		1	0
cyclocaryoid fruit	non-foliar		1	0
"Artocarpus" lessigiana	E	8.56	0	18
indet 0410-2 (indefinite pinnate/palmate, ovate, three paris of	E	6.28	0	42
indet 0410-4 (pinnate, acute base, short petiole[ule], tertiaries opposite percurrent - aff. Leguminosae)	E	5.42	0	33
indet 0410-5 (pinnate, semicraspedodromous, secondaries	T	6.51	0	3
indet 0410-6 (pinnate, closely spaced eucamptodromous secondaries, tertiaries opposite perccurrent)	E	6.51	0	2
indet 0410-11 (pinnate, strongly asymmetrical base, semicraspedodromous secondaries, large cvx/cvx teeth)	T	6.28	0	3
cf. *Lygodium* small	non-foliar		0	2
legume fruit	non-foliar		0	1

Table S4. Taxonomic composition of palynofloras from localities SW0307a,b (two subsamples of SW0307) and SW0410.

	Counts					
Pollen Types	**SLW0307a**	**SLW0307b**	**SLW0410**	**Range**	**Origin**	**NOTES**
Deltoidospora	8	7	0	r		
Camarozonosporites sp.	1	0	0	r		
Laevigatosporites	3	5	2	r		
Punctatosporites	3	1	2	E	Unknown	Eocene marker in Bighorn Basin
?Lygodium	0	0	8	?	Unknown	Not previously observed - fern
?Stereisporites	0	0	1	?	Unknown	
Bisaccate pollen	13	16	0	r		
Cycadopoites sp.	5	0	0	r		
Cycadopites scabratus	2		0	r	PRB, WB	Paleocene-Eocene of Powder River and Williston Basins
Monocolpopollenites tranquillus	0	0	4	r		
Taxodiaceae	43	30	39	r		
Alnipollenites	0	4	0	r		
Aquilapollenites	0	3	0	r		
Arecipites	1	0	0	r		
Betulaceae/Myricaceae	8	4	9	r		
Big tricolpate	1	0	0	?	Unknown	Not previously observed - large tricolpate pollen
?Bombax	1	1	0	?	Unknown	Not previously observed - ?*Bombax* not seen on Gulf Coast
Brosipollis sp.	0	0	1	E	Unknown	Eocene marker on the Gulf Coast
Caprifoliipites	1	0	0	r		
Caryapollenites spp.	25	8	2	r		
Erdtmanipollis cretaceus	0	0	1	r		
Ericaceae	1	1	0	r		
Eucommia	0	3	0			
Fraxinoipollenites	5	3	1	r		
Intratriporopollenites sp. cf. *I. tetraforaminipites*	0	2	0			
Intratriporopollenites vescipites	1	0	0	r		
?Lanagiopollis	2	1	0	?	Gulf Coast	Palaeocene and Eocene on the Gulf Coast.
?Leguminosae?	0	0	12	?	Unknown	Not previously observed - tricolporate/tricolpate morphotype
Malvasipollis	2	0	0	r		
Momipites spp.	11	8	0	r		
Nyssa	0	1	0	r		
Pandaniidites typicus	6	2	0	r		
Periporopollenites (chenopod type)	0	1	0	r		
Platycarya platycaryoides	0	5	0	E	Intercont.	Eocene marker in Bighorn Basin
Platycarya swasticoidus	3	2	0	E	Intercont.	Distinctive form of *Platycarya* found on the Gulf Coast in the Eocene only
Retitrescopites sp.	0	0	1	r		
Rousea	4	6	0	r		
Sparganiaceae	0	0	4	r		
Striatopollis sp.	10	2	0	?	Unknown	Not previously observed - striate tricolpate pollen
TCP/*tricolpate*	0	0	1	?	Unknown	Not previously observed - tricolpate or tricolporate grain
Triporopollenites granulatus	0	4	0	r	PRB, WB	Paleocene-Eocene of Powder River and Williston Basins
Tricolpites hians	56	12	0	r		
Cf. *T. hians* (big type)	0	2	0	E	Unknown	Eocene marker on the Gulf Coast
Ulmipollenites	3	5	0	r		
Big psilate? TCP	0	1	0	?	Unknown	Not previously observed - large, psilate tricolpate pollen
TOTAL	219	140	88			
r - rangethrough, E - Eocene, ? - unknown						

Supplemental Online Material References

S1. G. J. Bowen, D. J. Beerling, *Global Biogeochem. Cy.* **18,** 1026 (2004).

S2. J. G. Wynn, M. I. Bird, V. N. L. Wong, *Geochim. Cosmochim. Ac.* **69**, 1961 (2005).

S3. A. Miltner, H.-H. Richnow, F.-D. Kopinke, M. Kästner *Org. Geochem.* **35**, 1015 (2004).