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Field Locations in the Bowland Basin

Locations are given with six figure national grid references.

CC. Cow Close, Syke, Malham, North Yorkshire. SD 908 622

Upper Bowland Shale, E_{1b} zone (Arthurton et al., 1988, p. 74). A 19 m thick section of dark gray shales with horizons of large, ovoid concretions. Only the lower 8 m is well exposed and accessible.

CH. Clough Head Beck, Pendle Hill, Lancashire. SD 822 438

Alternating calcareous shales and limestones, 18.5m measured, of the Ravensholme Limestone Member of the Lower Bowland Shale. Earp et al. (1963) noted that the Pendleside Limestone at this location (not seen in this study) is overlain by 20 m of B₂ zone shales and are in turn overlain by the 22m-thick Ravensholme Limestone (logged in this study) belonging to the *Goniatites crenistria* (P_{1a}) Zone and just reaching up to P_{1b} zone.

DH. Dinckley Hall, Hurst Green, Lancashire. SD 688 366 to SD 685 366.

Section on the left bank of the River Hodder only accessible at low stages of the river. A 106 m-thick section was measured in the summer of 2021 from the upper part of Lower Bowland Shale to near the top of the Upper Bowland Shale. Several thin calcarenite lenses are developed in the P₂ zones, whilst thin sandstone beds appear in the topmost 15 m of section. The section ends at a sandy beach with an ~15 m thick gap developed up to the base of the Pendle Grit. The biostratigraphy of the Dinckley Hall section has been well documented (Moore, 1936, 1950; Earp et al., 1961)

DB. Dobson's Brook, Chipping, Lancashire. SD 619 441

Small streamside cliffs displaying Lower Bowland Shale (mostly represented by the Park Styles Limestone Member), a 15.7 m thick section comprising mudstones and interbeds of calcarenite and a calcirudite, with some horizons showing minor slumping. According to Aitkenhead et al. (1992, p. 34), the lowest horizon yields *G. hudsoni* (B_{2a} Zone), a horizon at 6 m height yields *G. globostriatus*, *G. hudsoni* and *B. araneum* (B_{2b} Zone) and a horizon at ~15 m height yields *B. globosum* and *B. micronatum* (B_{2b} Zone).

FL. Fell Lane, Cracoe, North Yorkshire. SD 987 598

Section in the walls of a sinkhole that exposes the contact between the Pendleside Limestone with approximately 15 m of the overlying Lower Bowland Shale extending up in a stream section. The former consists of coarse-grained, crinoidal grainstone and the latter consists of interbedded black shales, coarse calcarenites and calcirudites.

The section is described in Black (1940, p. 310), where it is called the Skelterton Beck section, and also in Booker and Hudson (1926, p. 411). Black reports *Goniatites falcatus* and *Posidonia becheri* (P_{1b} Zone) from 1.8 m above the top of the Skelterton Limestone and the base of the P_{1c} Zone is ~1.7 m above this and marked by the presence of *G. waldeckense* and *Dunbarella* sp. The P_{1a} interval is presumed to be in the top of the Skelterton Limestone (i.e. no hiatus is inferred).

LB. Leagram Brook, Chipping, Lancashire. SD 630 452 to SD 629 451

A 22 m thick section of Lower Bowland Shale Formation, dominated by mudstones but with thin limestone beds. It is overlain by a thick succession (~100 m) of calcarenites belonging to the Park Style Limestone Member (Aitkenhead et al. 1992, Fig. 8) not logged in this study. In our logged section Aitkenhead et al. (1992) indicates that the *G. hudsoni* (B_{2a} Zone) occurs at 5.5 m height, *G. globostriatus* (B_{2b} Zone) occurs at 8.6 m height and a *Dimorphoceras* band (basal P_{1a} Zone) occurs at 18.0 m height.

LC. Light Clough, Wiswell, Lancashire. SD 752 377

An expanded section (the thickest known at this stratigraphic level) straddling the Lower/Upper Bowland Shale boundary developed in small stream-side cliffs. Section is dominated by dark gray shales but also with several micritic limestone beds. A 31 m-thick section was logged, and a further ~15 m of shale occurred above this level. The P_{2c} – E_{1a} Zone zonal boundary occurs around 25.6 m height. *Eumorphoceras* was found to become common above this level and *Posidonia membranacea* was common below this level. Earp et al. (1961, p. 87) notes that the base of the P_{2c} Zone occurs ~10 m below our measured section.

MC. Moor Close Gill, Malham, North Yorkshire. SD 933 639 to SD 935 640

An 18 m thick stream-side section of dark gray shales belonging to the Upper Bowland Shale. This is the type locality for *Cravenoceras malhamense* (Arthurton et al., 1988, p. 76) the zonal goniatite of the E_{1c} zone.

RH. River Hodder, Hodder Place, Lancashire. SD 702 399

A 35 m thick section on the right bank of the River Hodder, includes the type location of the *B. hodderense* Beds overlain by Interbedded limestones and mudstones, entirely limestone beds in the topmost 18 m of section belonging to the Pendleside Limestone. Section belongs to the Holkerian and earliest Asbian (B_1 zone) according Earp et al. (1961, p. 69).

SS. School Share, Settle, North Yorkshire. SD 846 623

A 10 m thick section, in a tributary of Scaleber Beck, previously described by Dixon and Hudson (1931). Dark gray shales of the Upper Bowland Shale dominate but with impersistent, limestone boulder beds in the upper 5 m – the School Share Boulder Bed of Arthurton *et al.* (1988). An angular unconformity is seen between the Lower and Upper Bowland Shales between 1.6 and 1.9 m height in the section. P_2 zones occur below the unconformity (Dixon and Hudson (1931) record *Lyrogoniatites* sp. and *Sagittoceras* cf. *meslerianum* at this level) and the E_{1b} Zone occurs just above it, with *P. corrugata* and *E. pseudoblingue* present. Therefore, the E_{1a} Zone is missing at the contact, and possibly part of the upper P_2 zones.

SM. Smelthwaite Farm, Slaidburn, Lancashire. SD 711 494

Highly condensed, but complete section that stretches from the *B. hodderense* Beds to the upper part of the Lower Bowland Shale, reaching the P_{1c} Zone (Earp et al., 1961, p. 81). A 22.9 m thick section was measured, with pale micritic limestones dominating in the lower (poorly exposed) 8 m of section, shales dominate above this, but fine-grained carbonate beds continue to occur, along with calcarenite lenses around the P_{1b} to P_{1c} boundary. Despite the extreme condensation in this section, the range of facies is comparable to that seen in much more expanded basinal sections such as that Dinckley Hall. Therefore the facies suggests a slowly subsiding basinal location that was not developed as an intra-basinal high.

SC. Swardean Clough, Pendleton, Pendle Hill. SD 765391

Somewhat discontinuous 53 m-thick stream section (best sampled after dry weather) exposing the contact between the Pendleside Limestone and an expanded development of the Lower Bowland Shale beginning at 4 m height. Earp et al. (1961) records *B. castletonensis* and *B. delicatulum* (B_2 Zone) at 23.0 m height overlain by *G. crenistria* (P_{1a} Zone) shale. The occurrence of *Actinopteria* sp. and *Posidonia gibsoni* at 49.5 m is also suggestive of the P_{1a} Zone.

TLC. Tory Log Clough, Gisburn, Lancashire. SD 833 447

One of the most continuous sections seen in the Bowland Basin of the Pendleside Limestone to Lower Bowland Shale succession. Our 135 m thick stream section starts in the Pendleside Limestone Formation, includes the Lower Bowland Shale, and finishes in the basal Pendleside Sandstone Member. The Pendleside Limestone consists of alternating beds of limestone and mudstone. Base of

Bowland Shale begins at 56 m where it is dominated black shales of B₂ to P_{1a} age in a poorly exposed lowest 15 m (Earp et al. 1961). The P_{1b} Zone is recorded at 75 m height, the P_{1c} Zone at 90 m height whilst the Pendleside Sandstone is assigned to the P₂ zones (Earp et al. 1961).

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Table S1 Geochemical data on TLC section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
TLC-3	1.7	calcareous shale	0.49	3.96	1.37	0.13	0.49	0.01	0.13	1.01	2.56
TLC-4	2.4	micrite	ND	0.51	1.03	0.74	0.05	0.00	0.16	0.15	0.43
TLC-5	3.2	shale	0.59	3.77	1.19	0.20	0.10	0.01	0.26	0.61	1.91
TLC-7	5.8	shale	1.16	7.59	3.55	0.39	0.06	0.07	0.83	0.26	1.93
TLC-a	6.5	shale	1.06	7.94	3.69	0.12	1.26	0.22	0.02	0.24	2.21
TLC-8	7.7	shale	1.04	7.68	3.35	0.30	0.06	0.08	0.22	0.13	1.97
TLC-10	9.3	calcareous shale	1.32	7.22	3.70	0.40	0.11	0.09	0.94	0.37	2.83
TLC-12	10.6	calcareous shale	0.77	4.52	2.42	0.56	0.19	0.03	0.18	0.26	1.61
TLC-13	12.5	micrite	0.50	2.93	2.34	1.03	0.04	0.03	0.31	0.17	1.23
TLC-14	14.8	shale	0.58	3.47	1.44	0.25	0.34	0.03	0.09	0.21	1.44
TLC-16	15.8	shale	0.87	6.12	3.40	0.41	0.05	0.08	0.61	0.22	1.73
TLC-17	16.3	micrite	0.35	2.39	3.72	2.08	0.05	0.06	0.25	0.17	1.16
TLC-19	17.7	calcareous shale	0.39	2.86	2.39	0.90	0.05	0.04	0.29	0.15	1.20
TLC-20	18.6	shale	0.69	4.49	2.09	0.25	0.13	0.04	0.34	0.20	1.94
TLC-21	19	shale	0.86	6.25	2.58	0.20	0.30	0.05	0.28	0.15	1.88
TLC-23	23.8	shale	1.20	8.39	3.80	0.48	0.07	0.09	0.17	0.33	2.22
TLC-24	26.2	micrite	1.09	3.68	1.71	0.26	0.22	0.01	0.63	0.23	1.75
TLC-27	32.6	calcareous shale	0.73	3.80	2.64	0.66	0.11	0.04	0.51	0.25	1.64
TLC-29	37.1	micrite	0.28	3.20	1.79	0.15	0.59	0.04	0.00	<LOD	0.90
TLC-30	40.2	shale	0.97	7.17	2.79	0.22	0.20	0.05	0.55	0.44	2.02
TLC-31	45.4	micrite	0.06	3.54	2.53	0.41	0.05	0.04	0.79	0.42	1.83
TLC-32	45.8	calcareous shale	0.45	5.22	1.98	0.15	0.02	0.01	0.25	0.32	1.65
TLC-33-2	48.6	calcareous shale	0.22	2.04	1.59	0.58	0.04	0.05	0.25	0.36	5.50
TLC-34	50.6	shale	0.65	10.62	3.30	0.14	0.03	0.05	1.09	0.96	2.24
TLC-35	52.1	shale	0.47	4.64	2.64	0.24	0.10	0.09	0.13	0.14	1.54

TLC-36	54	shale	0.35	3.52	2.14	0.54	0.08	0.04	0.10	<LOD	1.30
TLC-39	56.5	black shale	1.16	7.85	2.07	0.15	0.05	0.07	0.03	<LOD	3.39
TLC-40	56.95	micrite	0.32	6.78	4.00	0.38	0.06	0.15	0.25	0.28	1.86
TLC-41	58.05	black shale	0.50	7.70	3.41	0.18	0.11	0.13	0.56	0.18	1.92
TLC-47	61.2	black shale	1.61	4.91	2.87	1.68	0.17	0.03	0.30	0.27	3.44
TLC-42	63.6	black shale	4.37	9.71	2.87	0.29	0.06	0.02	1.08	2.02	8.08
TLC-44	64.2	black shale	1.66	9.73	2.85	0.52	0.14	0.05	0.13	0.41	4.30
TLC-45	65.2	black shale	2.48	10.60	2.78	0.41	0.05	0.04	0.79	0.45	4.53
TLC-46	65.9	micrite	1.54	4.94	20.71	7.76	0.34	4.57	0.82	<LOD	4.41
TLC-50	66.8	black shale	2.41	10.07	3.32	0.48	0.07	0.03	1.40	1.25	5.96
TLC-51	68	black shale	7.17	8.85	3.67	0.61	0.04	0.02	2.41	27.93	13.22
TLC-53	68.9	black shale	7.38	6.85	13.11	0.64	0.09	0.02	7.02	58.03	7.04
TLC-54	69.3	shale	4.62	9.82	2.96	0.23	0.03	0.00	1.64	2.83	8.91
TLC-55	69.8	black shale	10.54	6.53	4.76	0.40	0.03	0.01	1.56	7.15	9.27
TLC-56	70.8	black shale	4.74	7.62	3.93	0.49	0.04	0.01	2.75	9.61	7.12
TLC-58	73.1	mudstone	3.53	5.21	3.78	0.95	0.02	0.00	2.89	8.08	5.77
TLC-60	75.5	mudstone	1.60	3.52	2.88	1.29	0.03	0.00	1.54	<LOD	2.80
TLC-61	76.7	mudstone	2.04	6.10	1.93	0.38	0.04	0.00	1.34	0.60	52.67
TLC-62	77.8	shale	3.01	1.91	2.67	0.98	0.03	0.00	1.51	46.47	20.90
TLC-63	78.3	shale	4.12	5.90	5.26	1.17	0.03	0.02	4.19	55.33	16.35
TLC-66	81.8	calcaerous mudstone	2.61	4.12	1.44	0.45	0.02	0.00	0.60	26.38	15.50
TLC-67	82.6	calcarenite	ND	2.24	1.93	0.72	0.01	0.00	1.33	7.36	5.55
TLC-68	83.7	calcaerous mudstone	3.17	7.50	2.75	0.72	0.03	0.01	1.90	12.21	10.81
TLC-70	87.1	shale	2.59	8.33	2.53	0.45	0.03	0.01	1.44	1.31	8.97
TLC-71	88.1	shale	1.77	8.89	2.72	0.47	0.04	0.05	0.31	1.36	7.66
TLC-72	89.2	shale	2.51	7.66	2.59	0.55	0.03	0.02	1.26	9.70	10.79
TLC-73	89.9	shale	2.60	11.63	2.67	0.26	0.02	0.03	0.98	0.36	2.68
TLC-74	91.1	shale	1.22	5.76	2.35	0.87	0.04	0.02	1.16	2.78	5.05

TLC-75	92.1	shale	1.96	7.98	4.45	1.13	0.05	0.69	1.60	1.34	4.00
TLC-76	93.2	shale	2.34	7.27	2.28	0.47	0.03	0.05	0.78	0.62	10.62
TLC-77	94.1	calcareenite	ND	0.47	2.66	1.85	0.03	0.15	0.52	0.82	3.59
TLC-78	95.3	shale	2.90	5.39	2.93	0.55	0.05	0.02	2.08	6.66	29.66
TLC-79	96.3	shale	3.06	9.62	3.28	0.52	0.03	0.01	1.45	1.75	9.21
TLC-81	99.4	calcareous shale	1.11	3.41	2.99	1.90	0.07	0.01	0.74	0.96	4.50
TLC-83	102.6	micrite	1.45	2.77	1.50	0.92	0.03	0.01	0.42	0.64	8.27
TLC-84	103.5	shale	2.50	9.52	4.96	0.63	0.03	0.01	0.72	9.33	7.83
TLC-87	105.7	shale	3.33	10.00	2.63	0.47	0.02	0.01	1.96	24.98	11.00
TLC-90	107.8	shale	3.38	10.12	2.13	0.36	0.02	0.01	1.45	43.36	9.73
TLC-92	110.6	mudstone	2.90	7.00	2.02	0.61	0.05	0.01	1.33	35.48	11.48
TLC-93	113.6	shale	3.65	7.61	5.16	1.11	0.05	0.02	4.13	67.04	12.50
TLC-94	115.4	mudstone	3.35	4.05	6.01	1.57	0.05	0.05	5.15	67.30	16.42
TLC-95	117.2	micrite	ND	0.27	0.34	0.24	0.01	0.00	0.06	1.35	0.82
TLC-97	122	shale	2.89	7.06	2.97	0.97	0.03	0.01	1.81	28.32	13.39
TLC-99	124.8	shale	4.87	12.68	4.49	0.69	0.04	0.01	1.75	46.10	18.56
TLC-101	129	shale	2.39	9.46	5.15	1.32	0.10	0.02	3.33	16.56	11.08

Table S2 Geochemical data on LB section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
LB-2	0.2	calcareous shale	0.35	7.02	3.32	0.32	0.03	0.18	0.09	1.04	1.57
LB-3	1	calcareous shale	0.58	7.14	2.86	0.33	0.10	0.12	0.03	<LOD	1.82
LB-4	1.5	calcareous shale	0.43	6.00	2.79	0.28	0.03	0.20	0.02	<LOD	1.10
LB-5	2	calcareous shale	0.58	7.77	2.85	0.19	0.09	0.18	0.00	<LOD	1.70
LB-6	3	dark grey shale	0.88	1.89	4.96	1.92	0.12	0.12	1.67	7.94	14.85
LB-7	3.5	dark grey shale	0.62	1.71	3.84	2.03	0.04	0.00	1.42	0.42	4.69

LB-8-2	4	shale	3.95	7.84	2.25	0.32	0.01	0.01	0.33	0.61	5.94
LB-9	4.8	dark grey shale	1.73	2.52	10.55	1.72	0.05	0.00	8.98	0.69	5.23
LB-10	5.1	dark grey shale	4.36	5.97	3.03	0.84	0.01	0.00	0.59	8.51	9.22
LB-11-2	5.3	micritic limestone	ND	0.89	0.58	0.29	0.00	0.00	0.24	0.54	1.65
LB-11	5.7	micritic limestone	ND	1.35	1.19	0.70	0.00	0.00	0.43	0.76	1.64
LB-12	5.8	grey platy shale	1.76	5.00	2.79	0.97	0.05	0.00	1.35	2.00	10.00
LB-13	6	grey platy shale	3.17	9.22	3.94	0.45	0.02	0.01	2.54	1.99	9.36
LB-14	7	dark grey calcareous shale	4.66	6.32	3.70	0.90	0.03	0.04	1.15	4.32	9.00
LB-16	9	dark grey calcareous shale	4.70	9.00	3.11	0.37	0.11	0.03	1.30	2.56	9.54
LB-17	10	dark grey calcareous shale	2.55	4.33	3.93	2.00	0.06	0.03	1.68	1.55	4.53
LB-18	10.9	platy dark grey shale	1.19	1.73	5.57	4.35	0.07	0.03	0.67	0.19	2.18
LB-19	11.8	calcareous blocky mudstone	4.64	4.93	3.37	0.69	0.03	0.03	2.67	21.26	14.34
LB-20	13	calcareous blocky mudstone	3.64	4.79	1.88	0.46	0.04	0.02	0.45	42.54	19.05
LB-21	13.6	calcareous blocky mudstone	2.09	2.24	1.89	1.21	0.02	0.02	0.66	9.20	9.81
LB-22	14.1	dark grey shale	4.10	4.81	2.07	0.36	0.01	0.02	1.47	4.46	7.29
LB-25	15	dark grey shale	5.31	7.57	4.94	1.03	0.03	0.04	3.14	61.44	19.66
LB-26	16	dark grey shale	2.88	7.48	2.85	0.72	0.03	0.02	1.49	4.55	9.52
LB-27	17	dark grey shale	4.89	2.86	1.78	0.54	0.01	0.02	1.36	58.63	20.18
LB-28	18	dark grey shale	3.86	4.55	4.44	1.16	0.08	0.05	3.17	63.91	29.03
LB-30	20	dark grey shale	3.91	3.59	1.62	0.35	0.01	0.03	1.11	7.34	13.28
LB-32	21	mudstone	1.45	2.57	3.34	0.36	0.02	0.03	1.66	5.30	10.86

Table S3 Geochemical data on RH section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
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RH-2	0.8	mudstone	0.81	3.07	1.68	0.28	0.37	0.02	0.20	2.35	2.93
RH-3	0.9	micrite	ND	0.98	0.95	0.31	0.02	0.02	0.40	0.68	2.00
RH-6	2.5	micrite	0.31	1.81	1.24	0.33	0.04	0.02	0.26	2.88	1.44
RH-7	2.8	micrite	ND	0.82	0.84	0.38	0.09	0.02	0.06	0.11	1.07
RH-13	11.5	mudstone	0.61	7.61	5.37	0.10	0.70	0.24	0.06	0.12	1.56
RH-15	13.1	mudstone	1.23	7.21	2.19	0.23	0.30	0.04	0.24	0.79	1.68
RH-17	14.3	shale	0.76	7.97	2.87	0.06	0.64	0.15	0.00	0.19	1.65
RH-20	15.9	mudstone	0.96	7.29	1.91	0.02	0.61	0.04	0.01	0.48	1.72

Table S4 Geochemical data on FL section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Depth m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
FL-4	1.09	shale	3.93	1.94	1.01	0.13	0.35	<LOD	0.40	4.68	28.27
FL-5	1.14	shale	4.31	2.10	0.87	0.13	0.10	<LOD	0.32	4.57	23.89
FL-7	1.38	shale	4.87	3.10	1.76	0.18	0.26	<LOD	0.96	5.87	23.07
FL-8	1.48	laminated micrite	ND	0.50	0.27	0.05	0.03	<LOD	0.08	2.38	13.86
FL-9	1.53	shale	4.53	1.97	0.87	0.11	0.21	<LOD	0.43	5.77	24.77
FL-10	1.70	laminated micrite	1.72	0.61	0.21	0.02	0.05	<LOD	0.07	5.84	13.40
FL-13	1.80	laminated micrite	1.60	0.53	0.19	0.03	0.00	<LOD	0.06	5.34	12.38
FL-15	1.93	shale	4.72	4.10	2.15	0.22	0.29	<LOD	1.51	9.07	17.81
FL-16	2.05	laminated micrite	2.18	1.57	0.79	0.09	0.00	<LOD	0.70	3.63	13.81
FL-17	2.30	micrite	2.20	2.04	0.71	0.05	0.00	<LOD	0.55	3.04	9.60
FL-18	2.70	shale	4.68	3.44	2.23	0.25	0.04	<LOD	1.18	9.99	23.92
FL-19	3.20	shale	5.85	4.36	2.39	0.16	0.01	<LOD	2.04	18.38	24.67
FL-20	3.30	shale	7.04	4.13	2.85	0.30	0.21	<LOD	1.60	35.93	41.78
FL-23	3.80	laminated micrite	4.18	1.28	0.45	0.09	0.02	<LOD	0.26	43.04	13.66
FL-24	4.40	shale	7.13	4.45	1.46	0.10	0.02	<LOD	1.16	38.40	44.72
FL-25	4.70	laminated micrite	0.81	0.41	0.16	0.02	0.03	<LOD	0.04	6.58	6.50

FL-27	5.90	laminated micrite	1.31	0.96	0.34	0.05	0.00	<LOD	0.10	6.74	7.89
FL-29	6.70	laminated micrite	2.72	1.20	0.53	0.09	0.01	<LOD	0.43	16.16	14.15
FL-31	8.80	laminated micrite	1.35	0.97	0.64	0.21	0.01	<LOD	0.37	1.97	9.68
FL-32	9.30	laminated micrite	0.92	1.88	0.67	0.11	0.02	<LOD	0.31	2.27	12.06
FL-33	10.40	shale	2.72	6.94	2.57	0.51	0.05	<LOD	1.60	13.23	13.97
FL-34	10.80	shale	2.80	5.85	3.03	0.62	0.02	<LOD	1.00	18.61	9.14
FL-35	11.30	shale	2.62	6.43	3.04	0.48	0.05	<LOD	1.91	24.23	12.43
FL-39	12.50	calcareous mudstone	1.87	3.16	1.48	0.30	0.01	<LOD	1.13	3.28	10.95
FL-40	12.80	calcareous shale	3.21	3.82	1.38	0.32	0.02	<LOD	0.28	11.66	8.65
FL-41	13.20	laminated micrite	0.66	0.54	0.28	0.05	0.00	<LOD	0.07	0.85	3.31
FL-44	15.30	laminated micrite	0.43	1.04	0.83	0.41	0.00	<LOD	0.39	1.23	2.93
FL-45	15.50	calcareous shale	1.22	3.31	2.76	1.33	0.07	<LOD	1.38	4.07	5.42
FL-46	15.60	shale	4.04	4.30	4.16	1.29	0.04	<LOD	2.44	2.04	6.67
FL-47	16.20	shale	4.03	5.43	4.67	1.87	0.02	<LOD	2.52	3.38	6.03

Table S5 Geochemical data on SS section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
SS11	0	shale	2.54	6.32	3.37	0.74	0.18	0.09	1.51	15.68	8.74
SS12	0.1	shale	2.54	6.06	3.15	0.64	0.05	0.06	1.70	14.54	9.64
SS13	1.1	shale	2.92	6.58	3.35	0.65	0.05	0.06	2.20	24.85	12.81
SS14	1.5	shale	3.01	7.44	3.67	0.57	0.05	0.05	2.41	19.16	13.19
SS15	1.7	shale	2.84	9.30	2.90	0.28	0.04	0.02	1.73	2.22	8.18
SS16	2.7	shale	3.13	11.99	3.19	0.27	0.04	0.04	1.51	1.58	8.48
SS17	3.7	shale	3.26	12.01	2.01	0.15	0.06	0.04	0.32	1.49	10.96
SS18	4.7	shale	2.77	10.88	1.71	0.12	0.26	0.06	0.01	0.82	9.34
SS19	5.7	shale	2.60	6.79	2.82	0.59	0.04	0.05	1.79	14.67	10.23
SS20	6.7	shale	2.64	6.18	2.53	0.49	0.04	0.05	1.51	14.19	12.89

SS21	7.7	shale	2.73	6.96	2.67	0.51	0.05	0.04	1.72	18.12	11.61
SS22	8.7	shale	2.90	6.07	3.12	0.86	0.05	0.04	1.95	22.56	11.31

Table S6 Geochemical data on MC section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
MC-8	0	platy shale	2.45	3.80	2.72	0.79	0.07	0.02	1.85	41.37	10.78
MC-9	1	platy shale	2.77	3.71	2.27	0.65	0.05	0.02	1.56	46.66	13.38
MC-1	2	flaky shale	2.58	7.71	3.21	0.64	0.05	0.03	2.22	26.70	9.87
MC-2	2.3	flaky shale	2.39	7.48	3.21	0.68	0.05	0.03	2.15	22.68	8.67
MC-3	2.8	flaky shale	2.66	8.36	3.74	0.61	0.05	0.03	2.46	23.27	9.77
MC-4	3.5	flaky shale	2.69	8.19	3.98	0.63	0.05	0.03	2.63	24.53	10.02
MC-5	4.4	flaky shale	2.57	8.15	3.78	0.67	0.06	0.04	2.57	19.07	8.43
MC-6	5.3	flaky shale	3.17	7.36	3.49	0.63	0.05	0.04	2.31	26.51	11.60
MC-7	6.4	block mudstone	2.48	6.20	3.02	0.69	0.05	0.03	1.92	17.78	7.94
MC-10	10	flaky shale	2.54	13.33	3.97	0.35	0.03	0.03	2.01	8.28	9.66
MC-11	11	flaky shale	2.96	13.64	4.43	0.59	0.05	0.07	2.09	1.48	8.07
MC-12	11.9	flaky shale	2.47	14.14	4.35	0.37	0.07	0.06	2.09	1.23	8.13
MC-15	16	flaky shale	2.40	10.41	4.08	0.75	0.08	0.10	1.98	11.26	12.12
MC-16	17.2	flaky shale	2.10	11.02	1.41	0.33	0.06	0.07	0.97	2.35	6.08

Table S7 Geochemical data on DB section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
DB-8	0.1	mudstone	3.69	6.76	2.93	0.04	2.16	0.04	0.01	4.91	6.00
DB-9	0.5	micirte	1.25	1.79	2.07	1.11	0.29	0.01	0.60	1.92	4.32
DB-10	1.1	mudstone	1.26	5.37	2.09	0.09	1.33	0.02	0.01	1.71	3.95
DB-13	2.6	mudstone	3.86	5.05	3.47	0.51	0.22	0.01	1.61	6.01	12.63

DB-14	3.2	mudstone	1.46	10.36	2.04	0.23	0.30	0.01	0.22	0.33	3.13
DB-15	4.2	mudstone	2.34	3.99	2.61	1.15	0.18	0.28	0.39	1.65	8.19
DB-16	4.9	mudstone	1.28	10.86	1.84	0.20	0.09	0.01	0.24	0.22	3.54
DB-19	6.3	mudstone	2.24	7.77	2.17	0.26	0.01	<LOD	0.39	1.04	6.47
DB-20	6.8	mudstone	0.89	2.66	2.21	0.92	0.01	0.01	0.93	0.75	7.45
DB-22	7.8	mudstone	3.90	9.77	3.09	0.31	0.01	<LOD	0.95	1.13	9.02
DB-23	9.8	grey shale	3.01	9.67	2.04	0.12	0.98	<LOD	0.03	0.67	12.27
DB-1	12.1	mudstone	2.52	8.91	4.17	0.51	0.02	<LOD	2.63	1.50	6.92
DB-2	12.7	mudstone	3.03	9.53	3.59	0.36	0.02	<LOD	1.30	1.44	14.42
DB-3	13.4	micrite	1.25	1.25	0.85	0.28	0.04	<LOD	0.46	1.14	3.41
DB-5	14	mudstone	3.61	5.00	2.78	0.44	0.04	<LOD	0.30	3.52	11.01
DB-7	14.6	mudstone	5.09	4.29	1.90	0.33	0.08	<LOD	0.35	24.66	24.06

Table S8 Geochemical data on SC section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
SC-2	0.6	calcarenite	0.31	ND	ND	ND	ND	ND	ND	ND	ND
SC-8	4.1	shale	2.51	7.70	5.35	0.55	0.05	0.04	3.56	1.04	4.07
SC-9	5.2	shale	2.60	8.08	2.79	0.68	0.05	0.06	0.58	0.51	3.92
SC-10	6	shale	1.41	8.92	2.48	0.48	0.17	0.06	0.48	1.04	3.31
SC-12	7.6	shale	2.33	10.58	3.50	0.56	0.05	0.09	1.50	0.99	3.90
SC-13	9.2	shale	2.32	9.77	3.25	0.79	0.05	0.14	0.83	0.92	4.35
SC-14	11	shale	1.88	10.16	3.63	0.82	0.06	0.23	0.70	0.74	4.01
SC-15	12	micrite	0.45	2.32	29.80	13.53	0.31	4.18	0.14	0.12	1.26
SC-16	22	shale	3.13	8.20	1.92	0.41	0.04	0.03	1.08	1.11	4.80
SC-17	23	shale	2.43	5.50	3.36	1.60	0.04	0.02	1.29	0.45	3.48
SC-18	23.8	shale	2.20	6.03	3.75	1.44	0.05	0.03	1.84	0.82	4.02
SC-19	24.1	micrite	0.88	1.81	13.57	7.93	0.19	3.02	0.43	0.00	1.47

SC-20	25	shale	1.96	8.74	2.49	0.31	0.04	0.03	1.10	0.58	7.37
SC-21	26	shale	1.71	8.92	2.58	0.36	0.03	0.05	0.89	0.64	4.93
SC-22	30.5	shale	3.52	6.67	3.27	0.68	0.03	0.03	2.24	25.53	10.22
SC-23	31.4	shale	3.32	7.04	3.24	0.84	0.04	0.03	2.31	25.11	7.11
SC-24	32.4	shale	2.56	6.28	3.61	0.90	0.03	0.03	2.50	30.05	7.21
SC-25	37.2	shale	3.68	5.72	4.00	0.89	0.05	0.03	3.08	30.69	9.79
SC-28	39.6	shale	1.23	2.86	2.81	1.39	0.04	0.02	1.52	<LOD	6.90
SC-29	40.6	shale	1.56	7.11	3.59	0.46	0.02	0.03	2.46	2.55	4.24
SC-30	41.6	shale	1.99	6.08	3.19	1.07	0.04	0.03	1.52	<LOD	2.79
SC-31	42.20	shale	1.90	8.38	1.75	0.25	0.04	0.03	0.61	<LOD	4.34
SC-32	42.8	micrite	0.82	1.97	20.98	12.97	0.35	3.26	0.28	<LOD	2.50
SC-33	43	mudstone	1.46	9.01	1.76	0.26	0.07	0.03	0.39	<LOD	3.89
SC-34	48	shale	3.38	3.37	3.52	1.04	0.03	0.03	2.41	45.87	17.34
SC-36	50	shale	3.49	6.09	4.53	1.20	0.05	0.04	3.17	41.75	8.68
SC-38	52	mudstone	3.76	3.57	4.59	1.35	0.05	0.04	3.04	7.98	10.54
SC-39	52.8	mudstone	2.84	4.49	2.92	0.81	0.03	0.03	1.87	18.63	9.50

Table S9 Geochemical data on LC section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
LC-1	0	dark grey shale	3.30	7.59	3.35	0.80	0.02	0.00	2.30	22.23	8.82
LC-2	1	dark grey shale	3.38	9.03	5.32	1.26	0.07	0.01	3.64	23.13	9.52
LC-3	2.3	dark grey shale	3.76	8.78	5.71	1.39	0.04	0.00	4.19	29.98	13.36
LC-4	3.3	dark grey shale	3.66	9.88	5.91	1.20	0.04	0.01	4.08	32.48	16.06
LC-5	5.2	dark grey shale	3.31	11.07	3.71	0.42	0.03	0.00	2.46	12.19	12.84
LC-6	6.3	dark grey shale	3.50	9.66	5.71	1.10	0.04	0.01	4.25	26.12	16.03
LC-7	7.3	dark grey shale	2.69	2.26	3.15	2.06	0.07	0.01	0.92	8.50	10.33
LC-8	8.1	dark grey shale	3.27	3.13	2.58	1.25	0.07	0.01	1.30	4.38	8.06

LC-9	9.1	dark grey shale	3.72	5.18	2.69	0.50	0.02	0.01	2.02	8.12	3.49
LC-10	10.1	dark grey shale	2.82	3.40	2.76	0.69	0.03	0.02	1.99	7.36	6.90
LC-11	11.1	dark grey shale	3.47	4.93	6.01	1.26	0.11	0.02	4.91	37.90	10.55
LC-12	12.4	dark grey shale	3.60	5.75	5.37	1.47	0.04	0.02	2.84	28.21	12.00
LC-13	13.4	dark grey shale	3.45	6.21	2.63	0.59	0.03	0.03	1.91	26.93	11.08
LC-14	14.4	dark grey shale	3.22	9.60	3.95	0.50	0.02	0.00	3.00	17.43	9.56
LC-15	15.4	dark grey shale	4.28	7.63	2.31	0.33	0.02	0.01	1.70	32.20	10.61
LC-16	16.4	dark grey shale	4.53	8.93	4.70	1.24	0.05	0.00	3.52	34.81	19.07
LC-17	17.5	dark grey shale	5.27	6.28	4.76	1.00	0.48	0.04	3.26	98.51	22.79
LC-19	20	dark grey shale	4.11	3.22	2.63	0.50	0.07	0.01	2.10	12.30	12.11
LC-20	21	dark grey shale	4.33	2.98	2.25	0.41	0.08	0.01	1.73	10.99	7.18
LC-21	22	dark grey shale	3.47	2.86	2.19	0.49	0.02	0.02	1.68	5.00	6.19
LC-22	23	dark grey shale	1.85	1.04	1.14	0.37	0.01	0.01	0.81	4.57	5.97
LC-23	23.9	dark grey shale	3.37	3.37	1.82	0.32	0.03	0.03	1.46	4.64	8.55
LC-24	25	dark grey shale	3.22	3.41	2.67	0.33	0.14	0.03	2.13	6.64	5.42
LC-25	26	dark grey shale	4.63	3.48	3.74	0.47	0.01	0.01	3.33	31.21	7.02
LC-27	28.2	dark grey shale	3.18	6.30	5.52	0.44	0.06	0.01	4.50	7.56	3.74

Table S10 Geochemical data on CC section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
CC-4	0	dark shale	3.33	10.87	5.01	0.83	0.06	0.06	3.20	10.93	14.72
CC-5	1.2	dark shale	4.22	14.08	1.69	0.11	0.03	0.03	0.23	2.22	14.41
CC-6	1.6	dark shale	4.31	12.09	1.81	0.31	0.15	0.04	0.05	2.24	13.98
CC-7	2.8	dark shale	4.76	11.93	5.55	0.32	0.06	0.01	4.09	3.95	16.27
CC-8	3.8	dark shale	3.95	10.30	3.46	0.32	0.32	0.03	1.59	3.50	7.66
CC-10	4.6	mudstone	4.92	12.31	3.35	0.25	0.06	0.02	1.95	2.11	15.14

CC-11	5.2	mudstone	2.97	4.08	1.61	0.55	0.04	0.02	0.86	11.91	12.29
CC-12	5.5	mudstone	1.66	1.22	3.72	2.59	0.07	0.01	0.44	22.42	7.04
CC-13	7	mudstone	3.39	5.50	2.59	0.81	0.06	0.02	1.68	55.30	19.34
CC-14	8	mudstone	3.38	5.23	2.59	0.80	0.11	0.02	1.53	56.14	12.36
CC-2	18.4	mudstone	3.41	5.67	2.73	0.74	0.09	0.03	1.58	64.64	20.12

Table S11 Geochemical data on CH section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC wt%	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
CH-1	0.1	calcaerous mudstone	0.72	6.20	2.70	0.21	0.03	0.06	0.27	0.72	2.61
CH-2	0.4	micrite	ND	0.87	3.45	2.28	0.04	0.04	0.17	<LOD	1.41
CH-3	0.8	calcaerous mudstone	0.94	9.18	3.52	0.08	0.98	0.17	0.07	0.34	2.25
CH-5	2	calcaerous mudstone	0.88	7.42	2.54	0.17	0.17	0.06	0.42	0.16	2.07
CH-7	2.9	micrite	0.20	1.38	1.32	0.61	0.27	0.02	0.05	0.16	0.85
CH-9	4.8	micrite	ND	0.34	1.32	0.61	0.07	0.01	0.48	<LOD	0.32
CH-10	5.6	calcaerous mudstone	0.35	4.35	2.38	0.21	0.69	0.06	0.39	0.25	0.95
CH-12	6.5	micrite	0.31	2.41	2.96	1.49	0.09	0.03	0.32	0.28	1.77
CH-13	6.8	micrite	0.41	3.92	3.34	0.48	0.04	0.09	0.27	0.29	2.20
CH-14	8.6	calcaerous mudstone	0.56	5.77	2.22	0.15	0.17	0.04	0.08	0.28	1.29
CH-15	10.8	micrite	0.31	3.18	1.95	0.19	0.02	0.03	0.50	0.80	1.18
CH-17	14.5	micrite	0.14	1.81	2.50	1.58	0.03	0.03	0.18	<LOD	0.90
CH-18	15	calcaerous mudstone	0.37	5.04	1.94	0.15	0.22	0.05	0.08	0.45	1.03
CH-19	16.4	calcaerous mudstone	0.67	3.80	1.74	0.16	0.04	0.07	1.37	0.45	1.15

Table S12 Geochemical data on DH section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
DH-1	0.0	micrite	1.74	2.54	2.25	0.90	0.12	0.03	1.05	11.27	6.77
DH-2	1.0	shale	3.45	6.95	2.21	0.45	0.09	0.04	1.25	42.76	10.27
DH-3	1.5	shale	3.57	6.75	2.72	0.64	0.04	0.03	1.87	52.06	12.15
DH-4	2.0	shale	3.72	6.70	2.44	0.52	0.04	0.03	1.60	44.16	12.15
DH-5	2.5	shale	3.31	4.79	2.98	0.85	0.05	0.04	1.82	39.20	14.58
DH-6	3.0	shale	3.33	5.49	2.70	0.67	0.04	0.03	1.82	46.00	8.88
DH-8	4.0	calcareous shale	4.13	3.20	3.00	1.03	0.04	0.03	1.92	19.96	6.72
DH-9	4.5	micirte	1.41	1.80	3.74	2.65	0.12	0.02	0.72	3.56	2.32
DH-10	5.0	shale	5.82	9.25	7.14	0.91	0.09	0.04	6.08	17.59	7.08
DH-11	5.5	shale	3.99	8.94	4.56	0.97	0.05	0.05	3.40	44.89	12.50
DH-12	6.0	shale	3.20	8.23	7.38	1.47	0.08	0.06	5.79	44.46	11.75
DH-13	6.5	shale	2.67	10.04	7.77	1.70	0.14	0.06	5.81	35.30	9.73
DH-14	7.0	shale	2.87	8.44	7.29	1.68	0.09	0.06	4.91	33.98	10.82
DH-16	14.0	shale	2.91	10.90	5.08	1.16	0.06	0.06	3.67	30.84	16.23
DH-17	16.0	shale	2.95	8.66	7.97	1.83	0.16	0.07	5.86	41.10	17.57
DH-18	29.5	mudstone	5.04	7.89	10.13	1.81	0.10	0.09	7.92	95.65	21.25
DH-19	30.0	mudstone	2.71	10.17	7.03	1.70	0.08	0.06	4.19	36.92	13.42
DH-20	30.5	mudstone	2.24	10.67	6.53	1.53	0.15	0.06	4.74	31.21	10.98
DH-21	31.0	shale	2.27	7.43	3.41	0.79	0.04	0.04	2.46	28.49	17.64
DH-23	32.0	calcareous shale	4.56	2.70	3.89	2.16	0.10	0.03	1.37	6.31	17.53
DH-25	33.0	calcareous shale	3.00	3.53	2.66	1.28	0.05	0.03	1.08	8.06	6.99
DH-26	33.5	shale	4.31	8.69	4.04	0.86	0.06	0.04	3.00	82.20	16.84
DH-27	34.2	shale	2.59	11.81	5.21	1.06	0.09	0.05	3.58	15.42	11.97
DH-28	34.8	shale	2.17	11.30	4.47	0.69	0.05	0.04	2.91	7.78	5.85
DH-29	35.4	shale	2.79	10.44	4.38	0.82	0.05	0.05	1.84	14.67	8.70

DH-30	35.8	shale	3.20	11.13	5.19	1.18	0.08	0.08	3.52	20.22	13.52
DH-31	36.4	shale	2.76	10.82	4.10	0.70	0.06	0.07	2.21	7.97	6.48
DH-33	36.9	shale	3.09	10.70	4.41	0.81	0.07	0.07	1.34	1.35	4.55
DH-34	37.8	shale	2.99	11.24	4.15	0.94	0.06	0.08	2.20	19.84	9.57
DH-36	38.6	shale	2.64	11.36	4.67	0.99	0.07	0.07	3.09	14.23	7.49
DH-37	39.3	shale	1.98	11.09	3.83	0.53	0.05	0.03	2.18	4.83	5.38
DH-38	39.9	shale	2.46	11.47	3.97	0.51	0.05	0.03	2.44	6.39	6.16
DH-39	40.4	shale	1.59	10.12	5.11	1.54	0.08	0.02	2.64	0.73	2.46
DH-40	40.8	micrite		0.92	1.64	0.96	0.03	0.01	0.68	2.83	6.63
DH-41	41.0	shale	3.21	10.50	3.87	0.61	0.05	0.03	2.55	31.63	9.63
DH-42	41.5	shale	3.29	9.63	3.93	0.71	0.05	0.02	2.75	32.79	7.12
DH-43	42.3	calcareous shale	4.88	4.23	2.09	0.50	0.07	0.01	1.42	60.57	24.46
DH-44	43.0	calcareous shale	4.17	3.18	3.96	1.01	0.06	0.02	3.01	91.13	17.59
DH-45	43.5	calcareous shale	4.45	3.75	1.13	0.31	0.04	0.01	0.74	57.19	15.46
DH-46	44.0	calcareous shale	5.29	3.37	1.17	0.32	0.02	0.01	0.81	73.98	18.79
DH-47	44.7	calcareous shale	3.27	2.91	2.05	0.66	0.16	0.02	1.32	8.54	26.35
DH-48	45.7	calcareous shale	3.77	6.59	3.06	0.61	0.05	0.02	2.38	3.12	4.20
DH-49	46.2	calcareous shale	2.74	4.53	2.74	0.57	0.05	0.02	2.37	4.58	12.34
DH-50	46.8	calcareous shale	3.89	5.80	3.05	0.59	0.03	0.01	2.25	43.64	9.35
DH-51	47.8	shale	3.30	6.13	1.82	0.38	0.05	0.02	1.14	35.21	11.73
DH-52	48.5	shale	4.29	5.63	2.02	0.46	0.04	0.02	1.45	46.49	11.44
DH-53	49.2	mudstone	3.58	9.61	2.63	0.44	0.13	0.02	1.75	36.54	10.34
DH-54	49.9	calcarenite	3.14	10.62	3.50	0.75	0.05	0.03	2.56	21.56	9.34
DH-55	50.5	shale	2.96	9.74	5.34	1.34	0.07	0.03	4.12	38.61	10.37
DH-56	51.3	shale	3.71	8.93	6.47	1.53	0.12	0.04	2.07	62.76	22.90
DH-57	51.7	calcareous shale	3.77	2.10	3.43	2.22	0.08	0.02	0.90	8.76	9.81
DH-58	52.4	shale	3.23	7.48	8.30	2.39	0.75	0.05	4.70	42.38	14.35
DH-59	53.1	shale	4.29	8.65	10.03	2.30	0.21	0.04	7.24	36.71	19.26

DH-60	53.7	calcareous shale	5.43	3.69	2.11	0.41	0.04	0.02	1.55	15.25	23.14
DH-61	54.2	calcareous shale	4.50	4.47	2.88	0.56	0.07	0.02	2.05	11.36	6.20
DH-62	54.7	shale	4.92	4.94	2.89	0.55	0.03	0.02	2.17	10.26	6.77
DH-63	55.2	shale	3.87	4.28	2.72	0.62	0.03	0.03	2.13	9.44	2.04
DH-65	56.2	shale	4.49	5.47	8.88	2.07	0.11	0.04	6.86	59.93	21.41
DH-66	56.7	shale	5.29	7.66	2.23	0.42	0.25	0.01	1.36	21.23	18.22
DH-67	57.2	shale	4.15	3.80	1.55	0.43	0.02	0.01	1.07	27.35	26.19
DH-69	58.3	shale	4.64	5.80	4.57	1.08	0.05	0.02	3.60	60.62	18.62
DH-75	61.1	shale	4.41	3.52	2.32	0.39	0.01	0.01	1.82	23.26	5.97
DH-77	62.1	shale	4.08	3.28	1.49	0.39	0.02	0.01	1.02	34.46	7.93
DH-80	63.6	shale	3.12	7.43	8.08	2.31	0.56	0.04	5.39	39.09	12.37
DH-81	64.1	shale	2.85	6.13	5.14	1.24	0.04	0.02	3.90	36.69	10.46
DH-83	65.1	calcareous shale	3.84	6.16	2.15	0.42	0.03	0.01	1.50	27.20	12.20
DH-84	65.6	calcareous shale	3.19	2.92	1.33	0.41	0.02	0.01	0.89	18.96	8.48
DH-87	67.0	calcareous shale	3.14	2.79	0.96	0.32	0.01	0.01	0.62	31.74	14.06
DH-88	67.7	calcareous shale	3.57	3.55	1.30	0.39	0.03	0.01	0.89	32.41	10.07
DH-89	68.2	shale	3.93	3.89	1.95	0.52	0.03	0.01	1.37	26.39	7.58
DH-90	68.7	shale	3.97	3.90	2.26	0.52	0.03	0.02	1.68	27.79	33.91
DH-91	69.3	shale	3.16	3.84	9.12	2.27	0.23	0.04	6.91	75.05	13.15
DH-92	69.8	calcareous shale	4.39	4.44	1.32	0.42	0.09	0.01	0.55	27.33	15.01
DH-93	70.3	shale	3.82	3.86	5.83	1.56	0.06	0.03	4.46	63.27	27.80
DH-94	70.8	shale	3.76	4.09	6.30	1.65	0.11	0.03	4.67	82.91	20.48
DH-95	71.3	calcareous shale	4.20	4.21	6.83	1.77	0.16	0.04	5.17	81.48	20.84
DH-96	71.8	calcareous shale	4.20	5.29	7.58	1.69	0.11	0.04	5.67	98.93	16.25
DH-98	72.8	shale	3.67	5.49	4.54	1.41	0.05	0.02	3.16	50.23	22.57
DH-99	73.3	mudstone	5.36	6.73	5.22	1.77	0.27	0.03	3.13	65.25	27.91
DH-101	74.4	mudstone	6.09	7.11	10.01	2.35	0.19	0.05	6.91	42.15	21.16
DH-104	76.4	shale	2.91	3.99	3.22	0.95	0.05	0.01	2.19	40.30	29.55

DH-105	76.8	shale	5.26	4.57	6.12	1.43	0.21	0.04	4.63	97.64	24.63
DH-108	78.6	shale	5.17	6.71	5.97	1.37	0.17	0.04	4.30	90.77	34.60
DH-109	79.5	shale	5.89	6.19	5.47	1.39	0.07	0.03	3.82	96.91	38.28
DH-110	80.0	shale	6.49	5.63	7.11	1.64	0.08	0.05	5.22	94.84	34.94
DH-111	80.5	shale	4.51	6.27	5.19	2.02	0.26	0.03	2.84	53.92	31.25
DH-113	81.5	shale	5.23	8.13	7.18	1.77	0.11	0.05	5.36	70.58	19.87
DH-114	82.0	shale	5.71	4.52	12.98	2.21	1.59	0.13	9.32	107.38	26.69
DH-115	82.5	shale	6.05	5.33	6.05	1.71	0.15	0.04	4.40	76.91	38.37
DH-116	83.0	mudstone	6.15	5.94	7.26	1.77	0.09	0.05	4.43	95.57	40.08
DH-117	83.5	mudstone	5.73	6.05	6.72	1.72	0.15	0.04	1.81	81.70	27.14
DH-119	84.7	mudstone	6.26	7.85	9.05	1.84	0.35	0.06	6.50	47.25	20.72
DH-120	85.4	mudstone	4.83	6.40	6.00	1.40	0.08	0.03	4.15	57.24	25.82
DH-121	86.2	laminated shale	3.59	2.72	2.74	1.23	0.05	0.01	1.37	38.95	14.48
DH-122	86.9	shale	2.96	2.65	3.45	1.39	0.12	0.01	1.81	50.83	11.63
DH-123	87.6	shale	3.43	4.75	4.09	0.99	0.05	0.01	3.03	48.30	13.55
DH-125	89.1	shale	5.15	7.50	5.07	1.21	0.06	0.04	3.87	75.75	24.23
DH-127	90.3	laminated shale	3.53	7.39	5.25	1.07	0.07	0.03	3.73	33.06	19.19
DH-129	91.5	shale	4.32	6.97	4.34	1.04	0.05	0.04	2.05	57.05	21.86
DH-130	92.2	shale	4.28	6.90	5.12	1.24	0.08	0.05	3.63	54.25	30.25
DH-131	92.9	shale	4.19	6.80	4.35	1.14	0.07	0.05	2.73	33.54	19.45
DH-133	94.3	shale	3.71	13.25	4.41	0.39	0.06	0.03	2.85	1.80	12.08
DH-136	96.7	shale	5.56	12.05	5.43	0.46	0.06	0.04	3.16	8.18	14.72
DH-137	97.4	shale	3.93	10.96	9.51	1.68	0.10	0.07	7.05	32.24	17.08
DH-138	98.3	shale	3.26	9.45	5.80	1.32	0.10	0.06	4.03	28.56	18.75
DH-140	99.5	shale	2.51	2.34	4.27	2.72	0.11	0.04	0.76	12.13	39.82
DH-142	100.3	shale	5.19	7.41	5.61	1.24	0.08	0.08	3.86	79.73	26.10
DH-143	101.4	shale	4.11	13.80	2.56	0.19	0.14	0.07	0.57	0.60	15.97
DH-144	102.4	shale	4.42	6.66	6.68	2.04	0.10	0.55	2.47	50.27	37.62

DH-146	104.1	shale	3.08	14.31	3.19	0.78	0.08	0.47	0.36	0.99	7.95
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Table S13 Geochemical data on SM section. TOC = total organic carbon, ND = not determined, LOD = limit of quantification

ID	Height m	Lithology	TOC	Al wt%	Fe wt%	Fecarb wt%	Feox wt%	Femag wt%	Fepy wt%	Mo ppm	U ppm
SM-15	3	micirte	ND	0.84	1.47	0.28	0.44	0.09	0.05	<LOD	4.47
SM-16	5.1	calcarenite	ND	0.54	0.84	0.40	0.08	0.02	0.02	<LOD	0.48
SM-17	7.8	crinoidal calcarenite	ND	1.99	2.65	0.72	0.04	0.08	0.14	<LOD	2.33
SM-20	9.7	dark grey mudstone	3.59	6.13	3.37	0.36	0.05	0.07	1.30	1.68	16.98
SM-22	11.7	dark grey platy shale	ND	7.41	3.83	0.37	0.05	0.05	1.93	3.26	8.03
SM-23	12.4	dark grey platy shale	7.94	4.98	2.84	0.52	0.05	0.04	1.40	14.14	15.77
SM-24	12.6	dark grey platy shale	9.45	5.67	3.14	0.41	0.09	0.05	1.52	20.22	15.04
SM-25	12.9	dark grey platy shale	7.36	6.52	3.18	0.29	0.35	0.04	1.18	7.81	10.50
SM-1	13.1	limestone	7.75	5.89	2.73	0.20	0.25	0.03	1.15	17.82	11.49
SM-26	13.4	black shale	6.20	7.30	2.78	0.27	0.06	0.04	1.31	16.81	13.55
SM-3	13.6	mudstone	1.51	6.37	3.11	0.27	0.40	0.02	1.80	29.29	10.41
SM-4	13.8	shale	5.34	3.48	3.65	0.96	0.20	0.02	2.01	7.37	11.64
SM-27	14.1	platy shale	5.65	3.60	3.20	1.23	0.07	0.02	1.31	4.40	11.00
SM-5	14.3	shale	9.85	2.91	1.15	0.19	0.23	0.02	0.22	5.34	43.90
SM-28	14.6	platy shale	4.27	3.30	1.64	0.35	0.03	0.02	0.98	37.71	12.25
SM-7	15.1	shale	4.16	1.74	5.61	0.95	0.29	0.04	2.64	70.37	25.78
SM-29	15.3	platy shale	3.80	2.50	5.01	1.08	0.08	0.03	3.74	64.87	24.15
SM-30	15.8	flaky shale	6.09	3.23	3.46	0.67	0.24	0.02	2.16	55.42	26.67
SM-31	16.2	flaky shale	3.18	3.95	3.82	0.71	0.06	0.03	2.68	13.04	10.47
SM-32	16.5	flaky shale	7.15	7.36	3.24	0.39	0.13	0.02	1.61	6.36	13.02
SM-10	17.1	shale	8.01	3.32	2.65	0.39	0.04	0.01	1.97	63.38	29.13
SM-33	17.2	med grey flaky	8.69	3.13	2.38	0.40	0.51	0.03	1.15	53.34	21.01
SM-34	17.5	platy shale	7.97	4.74	4.13	0.64	0.04	0.03	3.07	52.99	21.67

SM-35	17.6	micrite	ND	0.09	1.71	0.38	0.03	0.01	1.19	4.86	5.87
SM-12	17.8	shale	4.46	4.53	3.27	0.60	0.11	0.02	1.94	61.30	18.51
SM-36	18	dark micrite	2.37	1.50	5.59	1.54	0.09	0.03	3.29	42.94	46.11
SM-37	18.2	platy shale	6.07	4.83	2.54	0.49	0.08	0.02	1.24	6.50	10.69
SM-13	18.3	micrite	ND	1.92	1.34	0.71	0.17	0.01	0.25	1.25	2.80
SM-14	18.5	shale	6.35	2.34	1.47	0.27	0.04	0.01	0.98	31.24	25.65
SM-38	18.9	platy shale	6.02	1.37	0.84	0.23	0.02	0.02	0.39	17.15	11.56
SM-39	19.4	platy shale	3.04	2.28	1.74	0.47	0.02	0.02	1.12	11.58	10.35
SM-40	19.6	platy shale	3.60	6.72	8.00	1.53	0.08	0.05	6.10	39.21	10.64
SM-41	20.7	platy shale	6.11	3.08	4.13	1.05	0.05	0.03	2.93	100.0	19.06
SM-42	20.8	shale	4.69	4.18	2.26	0.77	0.10	0.05	1.03	7.19	37.88
SM-43	21.3	platy shale	5.08	3.83	3.09	1.41	0.07	0.04	1.08	9.46	21.82
