

Supplementary Material

The role of clay minerals in the preservation of Precambrian organic-walled microfossils

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Sample descriptions

Shale samples are from the collections of S.M. Porter and are housed in the sample collections of UC Santa Barbara. Mineral concentrations, total organic carbon (TOC) concentrations, and fossil preservational quality data were collected for each sample (Table S1 and S3). Samples were collected from outcrop (n=52) or drill cores (n=26); the variance in preservation quality in samples from outcrop and drill core do not significantly differ (Fligner-Killeen test of homogeneity of variances; $p=0.49$). Each sample, whether it is from outcrop or drill core, spans ~ 5 cm of vertical strata. Geochemical and paleontological data therefore are averages over several mm-scale laminae within the sampled shale. Because microfossil extraction (via acid maceration) of these samples was conducted before this study, more precise stratigraphic resolution within this dataset is not possible.

For localities with more than two samples, we provide additional context on depositional environment and thermal maturity.

Alinya Formation—Giles-1 drillcore in the Officer Basin of South Australia contains approximately 60 meters of the Alinya Formation. Samples are from the upper unit, which is characterized by repeating intervals of siltstones, shale, and evaporite deposits, suggesting deposition in a subtidal shelf to coastal sabkha environment (Morton, 1997; Zang, 1995). From ramped pyrolysis analysis, kerogen was determined to be well-preserved and still within peak maturity ($T_{\max}=439\text{--}475^{\circ}\text{C}$; Gravestock and Morton, 1997; Zang and McKirdy, 1994).

Aralka and Areyonga formations—Samples from the Aralka and Areyonga formations come from two drill cores (BR05DD01 and Wallara-1 drill cores) in the Amadeus Basin, Northern Territory, Australia. The Areyonga Formation contains interbedded diamictites and shales

associated with the Sturtian glaciation and was deposited in a shallow glaciomarine setting (Lindsay, 1989). The overlying Aralka Formation (only present in Wallara-1) consists of dolomitic shale and siltstone associated with marine transgression (Preiss, 2000). Thermal maturity is estimated by vitrinite reflectance equivalence in samples from Wallara-1, yielding values indicative of peak maturity (Gibson et al., 2005).

Lower Bylot Supergroup — The Arctic Bay and Iqqittuq formations of the Bylot Supergroup were deposited in shallow marine shelf to deltaic environments. The Arctic Bay Formation is composed of cyclic intervals of shale interbedded with siltstone and sandstone, overlain by organic-rich shale and siltstone with little evidence for cyclicity (Jackson & Iannelli 1981; Turner, 2009; Turner and Kamber, 2012). The Iqqittuq Formation conformably overlies the Arctic Bay Formation and is composed of carbonate and siliciclastic cycles interpreted as a prograding mixed siliciclastic-carbonate ramp (Gibson et al., 2017; Turner, 2009). The Bylot Supergroup has experienced relatively deep burial of > 4000m (Fustic et al., 2017). Ramped pyrolysis analyses reveal a $T_{\max}$ of $556 \pm 39^{\circ}\text{C}$, which is indicative of post maturity (Fustic et al., 2017).

Chuar Group — The Chuar Group sediments were deposited in an intracratonic basin and exhibits meterscale cycles of variegated and organic-rich shales capped by sandstone and dolomite intervals (Dehler et al., 2001). These meter-scale cycles suggest shallowing from relatively deeper water environments to shallow subtidal to intertidal environments. There is no evidence for a steep slope in the basin and the shoreline gradient is estimated to be a very low

angle. Ramped pyrolysis analyses yield $T_{\max}$ values of ~420 to 490 °C (Lillis, 2016) and ~439 to 444 °C (Zumberge et al., 2020), which range from immature to late mature.

Undifferentiated Proterozoic (Colville Hills E-15)— A 300m-thick Proterozoic sequence of shale, siltstone, sandstone and minor stromatolitic carbonates uncomfortably underlies Cambrian Mount Cap Formation in the Colville Hills E-15 drill core, Northwest Territories, Canada (Maqueen and Mackenzie, 1973). U-Pb detrital zircon places a maximum age constraint of < 1914 Ma, but the age is likely much younger (Rainbird et al., 1996). Due to the lack of regional deformation that is observed in neighboring units of this age (i.e., the *ca.* 1.9 Coronaton Supergroup), the absence of Grenville-aged detrital zircons (*ca.* 1300-950 Ma; Johansson et al., 2022 and references therein), and seismic stratigraphic similarities (Cook and Maclean, 2004; Cook and Maclean, 1995), the Proterozoic interval of Colville E-15 is suggested to correlate with the *ca.* 1660–1270 Ma Dismal Lakes Group (Cook and Maclean, 2004; Rainbird et al., 1996; Cook and Maclean, 1995). Ramped pyrolysis indicates variable but generally high thermal maturation ($T_{\max}$ of 435–560 °C) suggesting shales are mature to post-mature (Macauley, 1987).

Uinta Mountain Group— The Uinta Mountain Group is a 4–7 km thick sandstone- and shale-dominated unit exposed in the Uinta Mountains of northeastern Utah (Hansen, 1965). Evidence of subaerial exposure (e.g., mudcracks), and fluvial deposits, as well as interbedded shale and sandstone marine deposits suggest a shallow inner shelf to marginal marine environment (Dehler et al., 2005; Dehler et al., 2007). The Uinta Mountain Group is estimated to be peak mature, estimated by thermal alteration index values of 2.5–2.8 (Sprinkel and Waanders, 2005).

Geologic unit	Drill-core / Outcrop	Location	Age group (Ma)	Latitude (degrees)	Longitude (degrees)	Samples	Collected by	Taxonomy reference	Age references
Aralka Formation	Wallara-1	Amadeus Basin, Australia	720-635	-24.6153	132.3397	6	L.A. Riedman, C. Calver, E. Domack	Riedman et al., 2014	Kendall et al., 2006; Walter et al., 1995
Tapley Hill Formation, Umbertana Gp.	SCYW-1A	Adelaide Rift Complex, Australia	720-635	-30.1249	137.1566	1	L.A. Riedman, C. Calver, E. Domack	Riedman et al., 2014	Kendall et al., 2006; Grey et al., 2003
Areyonga Formation	Wallara-1 and BR05DD01	Amadeus Basin, Australia	720-635	-24.6153 -24.4557	132.3397 130.3825	4	L.A. Riedman, C. Calver, E. Domack	Riedman et al., 2014	Hill et al., 2011 and references therein; Walter et al., 1995
Uinta Mountain Group	Outcrop	Uinta Mountains, USA	1000-720	40.6333	-110.9533	4	C. Brehm, C.M. Dehler	Nagy and Porter, 2005	Dehler et al., 2010; Dehler et al., 2017
Bedgroup 19, Eleonore Bay	Outcrop	Greenland	1000-720	73.5500	-25.0833	1	I. Fairchild	S.M. Porter, C.R. Woltz	Halverson et al., 2018; Hoffman et al., 2012; Stouge et al., 2011
Chuar Group	Outcrop	Grand Canyon, USA	1000-720	36.1448	-111.8313	20	B. Bloeser, A.H. Knoll, S.M. Porter	Porter and Riedman, 2016	Dehler et al., 2017; Rooney et al., 2018
Lossit Limestone	Outcrop	Scotland	1000-720	55.6728	-6.1264	1	S.M. Porter	C.R. Woltz	Noble et al., 1996; Halliday et al., 1989; Dempster et al., 2002
Alinya Formation	Giles-1	Officer Basin, Australia	1000-720	-28.4317	132.3867	9	L.A. Riedman	Riedman and Porter, 2016	Macdonald et al., 2010
Svanbergfjellet Formation	Outcrop	Svalbard, Norway	1000-720	80.1517	18.3350	2	G.P. Halverson	L.A. Riedman	Halverson et al., 2007; Halverson et al., 2005
Bylot Supergroup	Outcrop	Baffin Islands, Canada	1250-1000	72.3913	-80.9076	24	P. Crockford, T. Gibson, G.P. Halverson, S. Wörndle	H. Agić and S.M. Porter	Gibson et al., 2018
Undifferentiated Proterozoic	Mobil Colville Hills E-15	NW Territories, Canada	1650-1250	67.0717	-126.3069	6	B. Bloeser	C.R. Woltz	Rainbird et al., 1996; Macqueen and Mackenzie, 1973

Table S1: Summary table of sample locations, lithological units, ages and references

Analytical and Statistical Methods

Organic-walled microfossil (OWM) extraction

OWMs were extracted through acid maceration, either by Waanders Palynology Consulting Inc. (Pennsylvania, USA) or by Laola Pty. Ltd. (now Core Labs, Australia). Five to 10 grams of each sample was washed in DI water to remove surface contamination, then immersed in dilute HCl and left for 24 hours. This process was repeated until no reaction occurred. Samples were then rinsed in distilled water to reach circumneutral pH, transferred to polypropylene containers, and placed in 48% hydrofluoric acid to dissolve over several days. Spent HF was decanted and the process repeated until the sample no longer reacted. The insoluble organic residue was separated via heavy liquid (ZnBr_2), concentrated by centrifuging, and strew mounted on glass slides. Preservation quality was assessed using a Zeiss Axioskop 40 transmitted light microscope.

Documenting OWM preservational quality

Indices of preservational quality used in this study were developed by Woltz et al. (2021) using features that can be observed in any microfossil and that relate to the level of deterioration, for example, the density of pitting on the vesicle surface and the level of deterioration on wall margin (c.f. Grey and Willman, 2009). A rank scale of 3 to 1, corresponding to excellent to poor preservational quality, was implemented in a similar way to rank criteria that have been used to track decay in modern experiments (e.g., Briggs and Kear, 1993; Bartley, 1996; Butler et al., 2015). Criteria for the assignment of each rank (Table S2) and fossil examples (Figure S1) were frequently reviewed during data collection to avoid observational biases. Microfossils received

the same rank for both criteria in 64% of the observations, and largely disagree—that is, where a microfossil received a rank of 1 on pitting and 3 on margin deterioration or vice versa — in only 2% of the observations (in 69 of 3443 microfossil observations). Neither criterion correlated with microfossil size, degree of fragmentation, or opacity, suggesting that criteria record degradational processes during fossilization, rather than later thermal maturation or physical breakdown during microfossil extraction. Grey and Willman (2009) attribute some pitting features to microbial degradation. As indices used here positively correlate with the number of taxa observed within a sample (Figure S2), they at least partially reflect the degree of microbial degradation: greater microbial degradation will result in the elimination of taxa constructed from more labile biopolymers and thus decrease the total number of taxa that are observed.

For each sample, 50 microfossils were selected by taking the surface area of the slide, dividing its dimensions into a 5x4 grid, and selecting a starting grid by random number generation. Every microfossil was rated in each field of view to avoid selection biases until 50 microfossils were observed. For samples with few microfossils, the entire slide was analyzed, and every fossil was rated. Estimates on appropriate sample sizes for categorical data suggest that observations between 29 to 59 can accurately (with 95% confidence) estimate the proportion of microfossils receiving a rank of 3 even when they are relatively rare (composing 5 to 10% of the population; Haidar et al., 2018). Although a larger sample size would undoubtedly reduce the error in our measurements (and it would be necessary to represent relative abundance of different species), we find that a sample size of 50 is sufficient for our purposes. A test using sample SP12-69-16, from Woltz et al., (2021) suggests a sample size of 50 sufficiently captures sample-level preservational quality, as the results from 100 microfossils were not significantly different

to those from 50 microfossils (using a two tailed student's t-test, $p = 0.84$, $p = 0.70$ for index I and II, respectively).

As the goal of this study was to collect population-level measurements of fossil quality, common and undoubtedly polyphyletic species dominate the dataset, including *Leiosphaeridia* spp. (n=1906), and *Synsphaeridium* spp. (n=166). A more targeted approach that seeks out monophyletic species of interest would be necessary to collect enough observations for statistically powerful comparisons. Future work should target particular species of interest to test degradational/preservational relationships, as variation in their original organic compositions would differentially impact their preservation (Manning-Berg et al., 2019; Manning-Berg et al., 2022).

Statistical analyses

Multiple logistic regression analyses were conducted using the 'stats' package in R (R Core Team, 2022) and were visualized using 'ggplot2' (Wickham, 2016). Since well-preserved fossils are more likely to occur within the same shale samples (as they are taken from the same population), the standard errors were corrected using cluster-robust variance estimations (i.e., sandwich estimation) with the 'clubSandwich' package (Pustejovsky, 2022; Zeger and Liang, 1986) and the significance of predictor variables (e.g. TOC and clay minerals) was evaluated using cluster-robust Wald's z-tests (type "CR0"; Pustejovsky, 2022). To illustrate differences in uncertainty at the sample level, the proportion of well-preserved microfossils with Clopper–Pearson 95% confidence intervals (which estimates confidence intervals for binomial proportions; Thulin, 2014) were compared to TOC, total clay, illite and berthierine/chamosite concentrations (Figure S5 and S6). For reference, multiple logistic regression lines are overlain

and show general agreement with many of the confidence intervals of the samples (at least in relationships that are significant).

Lastly, bootstrapped uncertainties for each variable were calculated using the `Boot` function in the ‘car’ package (car: companion to applied regression; Fox and Weisberg, 2019) and were plotted with ‘ggplot2’ (Wickham, 2016). Resampling was done at the sample level and the significance of the coefficients agree with those calculated from the Wald’s z-tests (above).

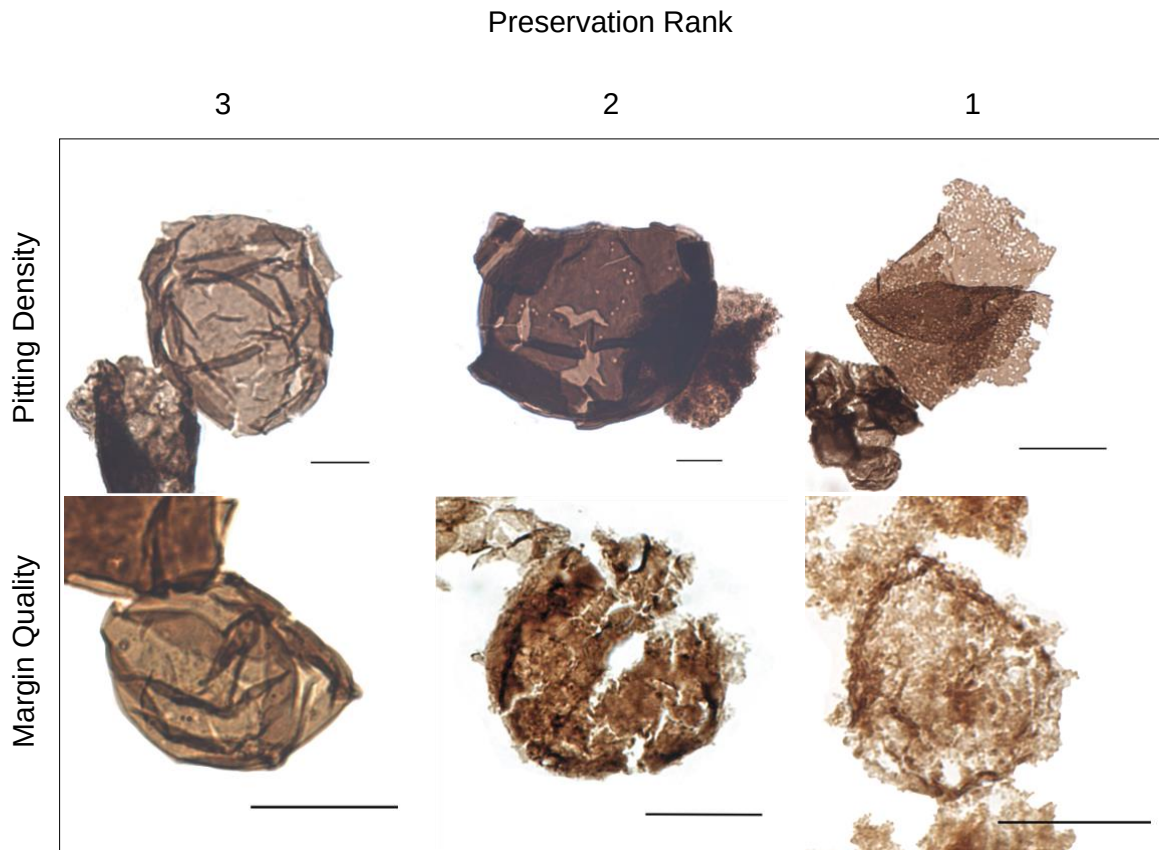


Figure S1: Fossil examples of *Leiosphaeridia* spp. reproduced from Woltz et al. (2021) for each rank of preservational quality. Specimens receive a rank of 3 to 1, corresponding to high quality to low quality preservation for the indices of i) pitting density, and ii) margin quality. See Table 2 for a description of criteria. Scale bar is 15 μm .

Preservation	Rank	Density of Pitting	Margin Quality
High	3	Low to no pitting. Cell surface is generally smooth – allows for minor pits and perforations.	Cell/cyst margin is intact and exhibits the original fossil shape. No fraying.
Medium	2	Random distribution of pitting. Fine and irregularly shaped perforations.	Between one third and two thirds of the margin is intact and exhibits original fossil shape. Portions of the margin appear distressed, tattered, and small areas are missing leaving cavities.
Low	1	High degree of pitting, randomly distributed and perforations often merge resulting in larger cavities.	Less than one third of the margin is distinct and exhibits original fossil shape. Most of the margin appears distressed, tattered, and areas are missing leaving large cavities. Margin is heavily frayed.

Table S2: Description of criteria reproduced from Woltz et al. (2021) used to rank the preservational quality on a scale of 1 (poorly preserved) to 3 (well preserved).

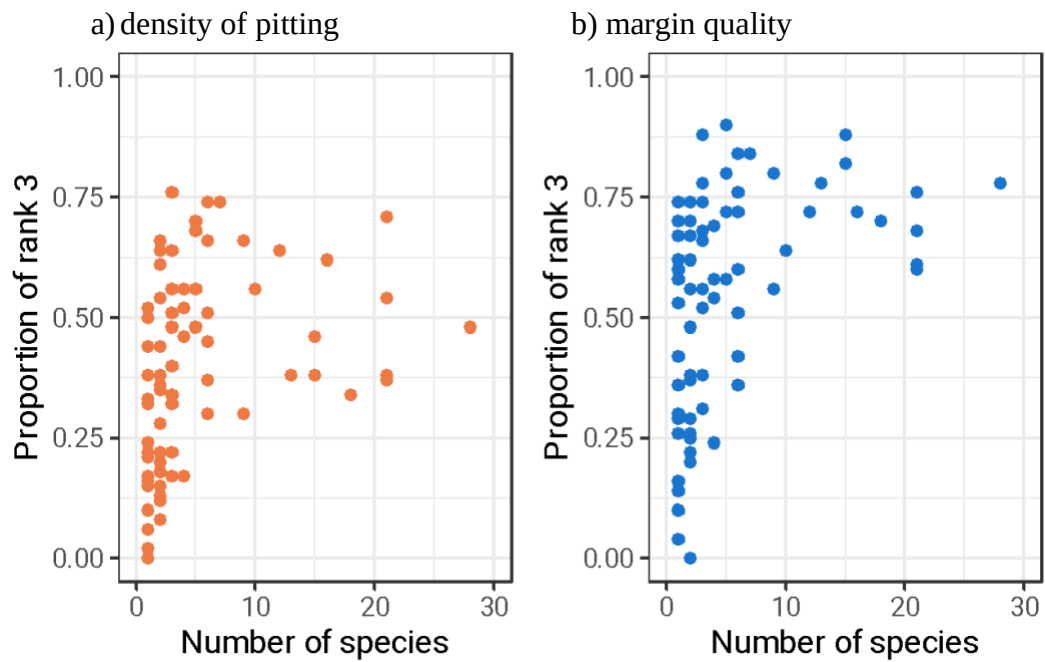


Figure S2: Consistent with processes of degradation, the number of species observed positively correlates with the proportion of well-preserved microfossils measured by a) the density of pitting and b) margin quality. Taxonomic information is from Porter and Riedman, 2016; Riedman et al., 2014; Riedman and Porter, 2016; Sprinkel and Waanders, 2005; and Woltz et al., 2021.

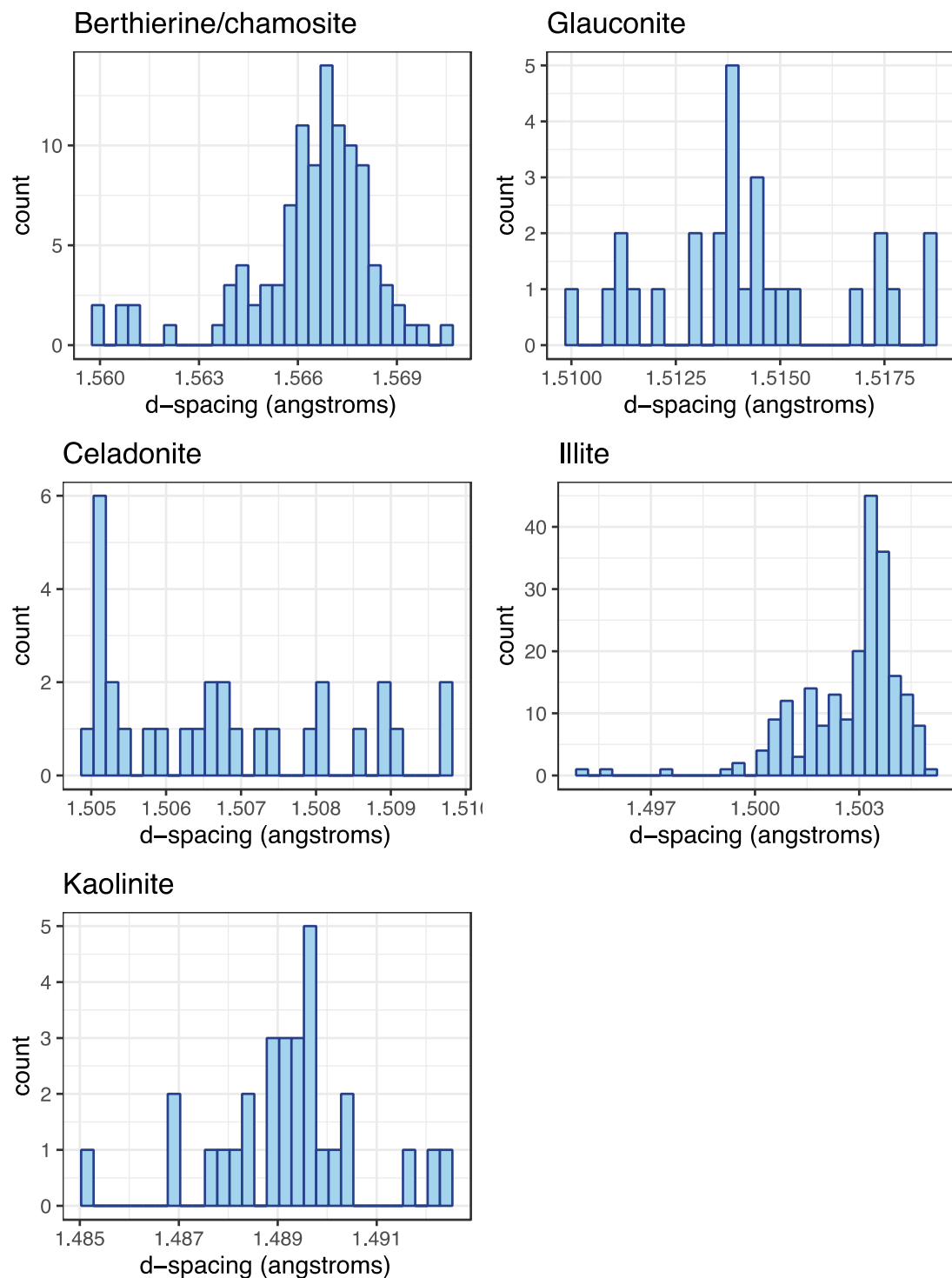


Figure S3. Distribution of d-spacing of the 060 peaks of berthierine/chamosite (1.560–1.572 Å), glaucosite (1.510–1.519 Å), celadonite (1.505–1.510 Å), illite (1.494–1.506 Å), and kaolinite (1.485–1.493 Å).

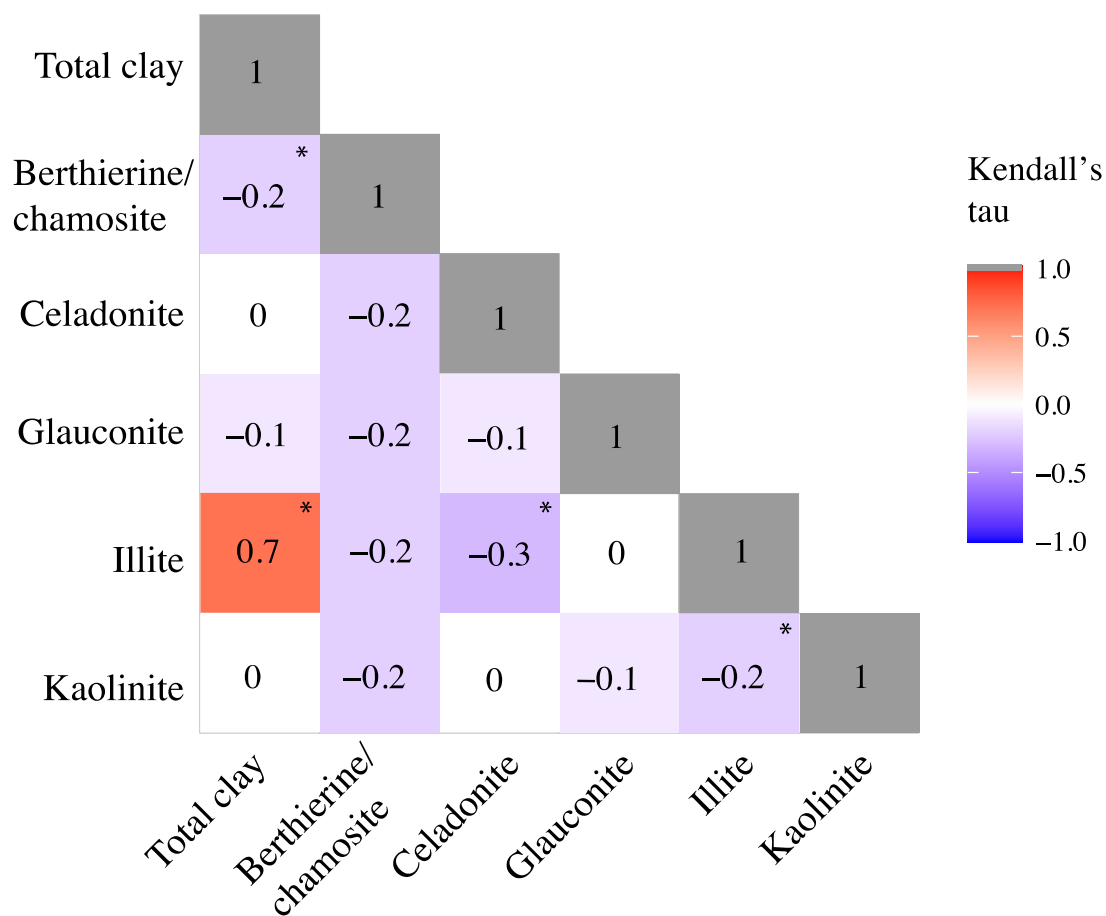
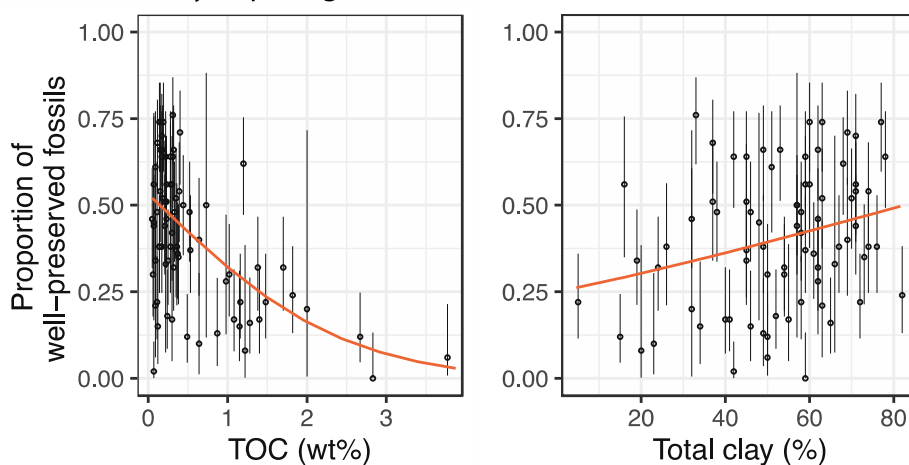


Figure S4: Kendall's rank correlation coefficients between predictor variables. Color corresponds to the strength and direction of each correlation after using a Bonferroni correction. Significant correlations are marked with an asterisk in the upper right corner.

a) Index I: density of pitting



b) Index II: margin quality

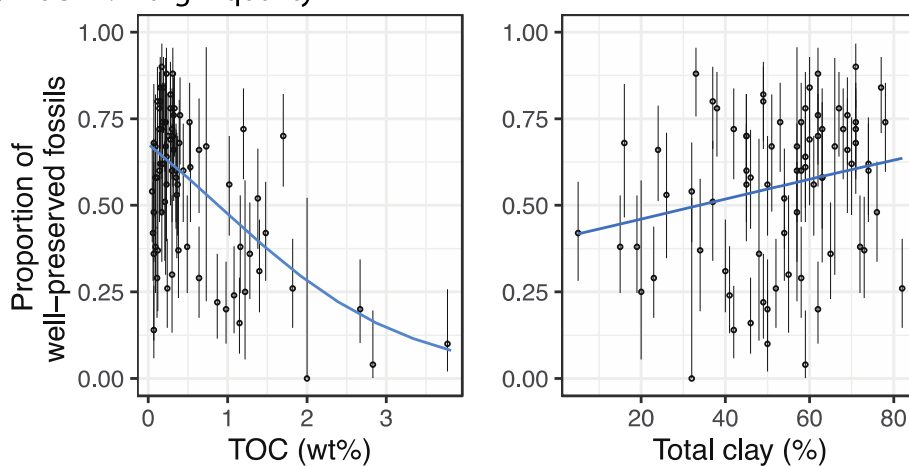
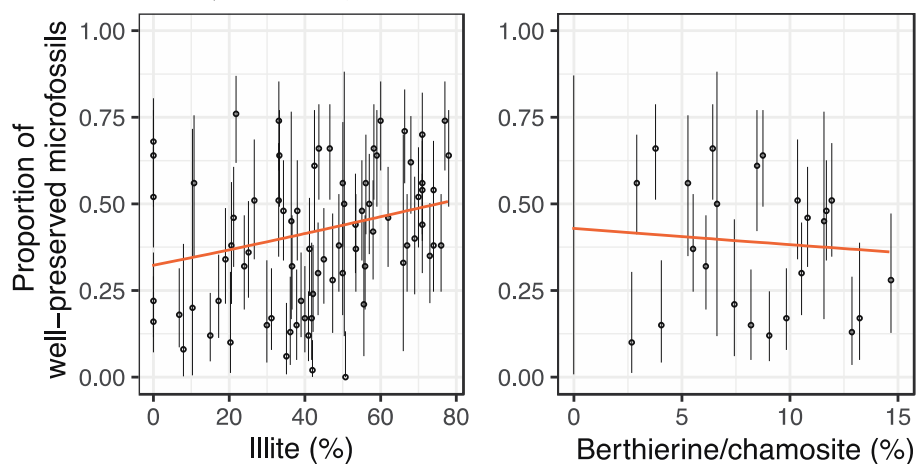


Figure S5: TOC and total clay concentrations compared to the proportion of well-preserved fossils measured by a) Index I: density of pitting and b) Index II: margin quality. The points are the observed proportions of well-preserved microfossils and black vertical lines are estimates of their 95% confident intervals based on the proportion of well-preserved fossils, number of observations, and significance level ($\alpha = 0.05$). Multiple logistic regression lines are included for comparison.

a) Index I: density of pitting



b) Index II: margin quality

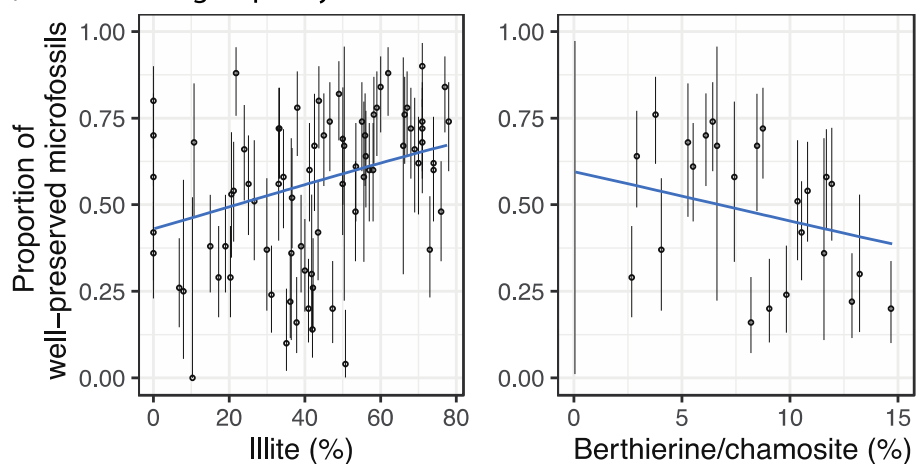
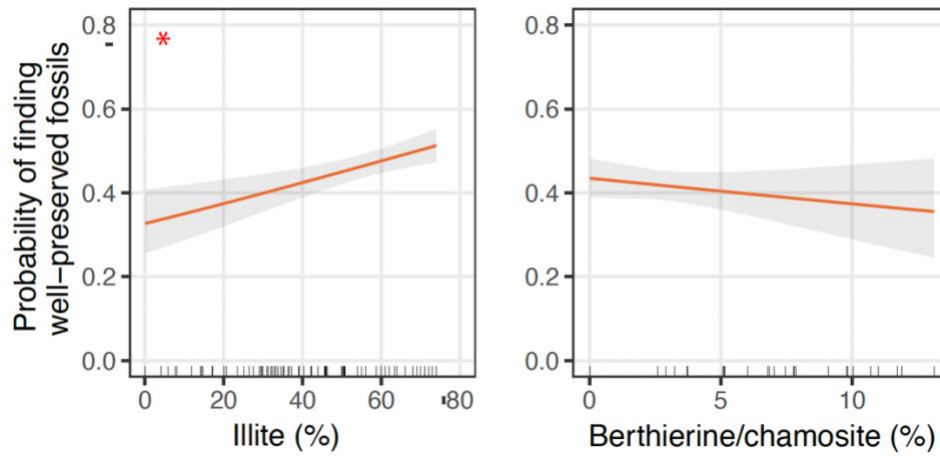


Figure S6: Illite and berthierine/chamosite concentrations compared to the proportion of well-preserved fossils measured by a) Index I: density of pitting and b) Index II: margin quality. The points are the observed proportions of well-preserved microfossils and black vertical lines are estimates of their 95% confidence intervals based on the proportion of well-preserved fossils, number of observations, and significance level ($\alpha = 0.05$). Multiple logistic regression lines are included for comparison.

a) Index I: density of pitting



b) Index II: margin quality

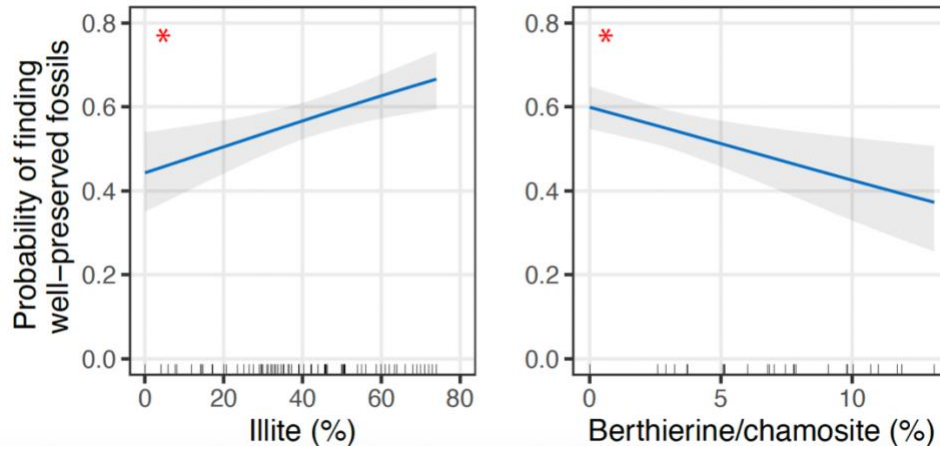
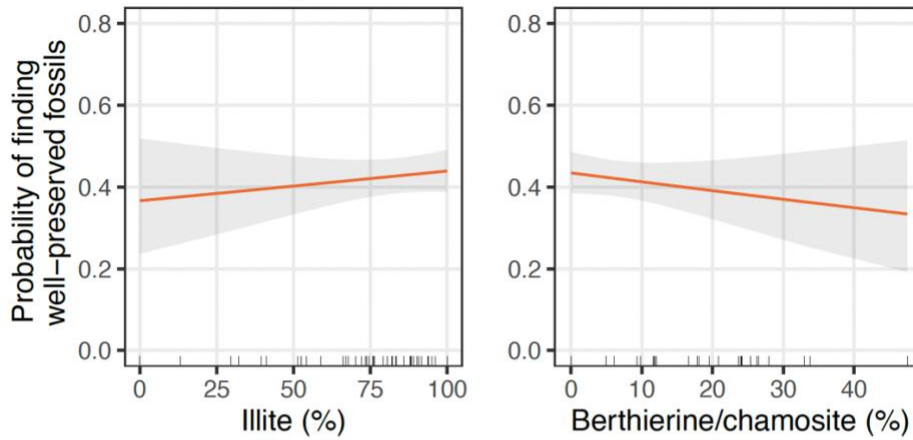


Figure S7: Multiple logistic regression models that use rescaled clay concentrations after the removal of carbonate minerals from total rock composition. Illite positively correlates and berthierine/chamosite negatively correlates with the probability of finding a well-preserved microfossil according to a) Index I (orange) and b) Index II (blue). Significance of predictor variables was determined by the Wald's z-test and relationships with $p < 0.05$ are marked with a red asterisk. Gray shaded regions are the 95% confidence intervals calculated from cluster-robust standard errors. Values of each shale sample are marked as black tick marks along each x-axis.

a) Index I: density of pitting



b) Index II: margin quality

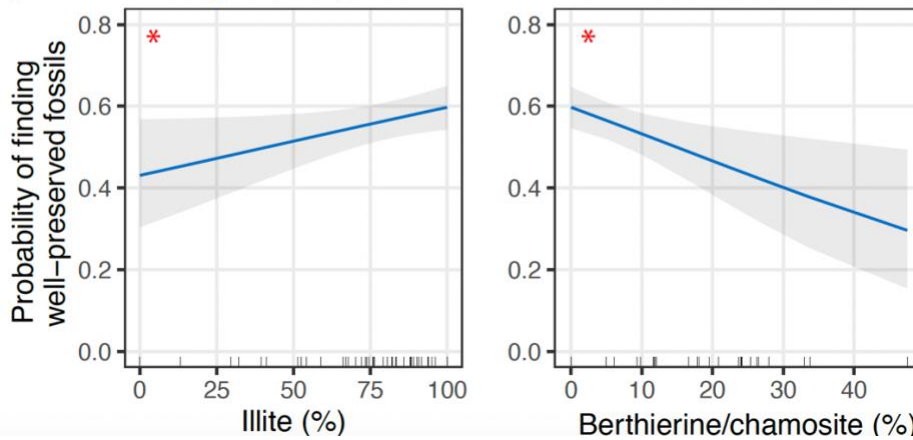


Figure S8: The effect of illite and berthierine/chamosite—calculated as a percent of the total clay fraction (rather than % of rock as in Figure 3 of the main text)—on preservational quality according to a) Index I (orange) and b) Index II (blue) using logistic regression analysis. Significance of predictor variables was determined by the Wald’s z-test and relationships with $p < 0.05$ are marked with a red asterisk. Gray shaded regions are the 95% confidence intervals calculated from cluster-robust standard errors. Values of each shale sample are marked as black tick marks along each x-axis.

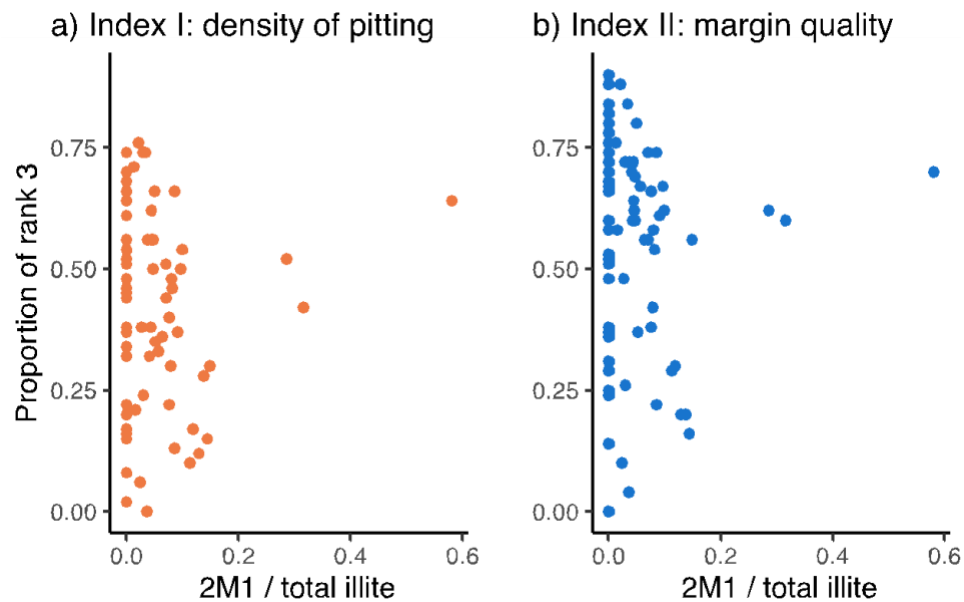


Figure S9. The proportion of well-preserved microfossils within a) index I and b) index II compared with the ratio of 2M1 illite to total illite within each sample. No discernable pattern is evident.

Sample ID	Geologic Unit	Fossil count pitting = 3	Fossil count pitting = 1, 2	Fossil count margin = 3	Fossil count margin = 1,2	TOC (wt%)	Preservation reference	TOC reference
Giles-1 1237.74	Alinya Formation	24	26	29	21	0.11	this study	Woltz et al., 2021
Giles-1 1242.72	Alinya Formation	18	17	18	17	0.21	Woltz et al., 2021	Woltz et al., 2021
Giles-1 1244.0	Alinya Formation	1	4	0	5	2.00	Woltz et al., 2021	Woltz et al., 2021
Giles-1 1255.45	Alinya Formation	15	35	28	22	1.02	Woltz et al., 2021	Woltz et al., 2021
Giles-1 1255.6	Alinya Formation	33	17	37	13	0.18	this study	this study
Giles-1 1257.73	Alinya Formation	23	27	27	23	0.05	this study	Woltz et al., 2021
Giles-1 1265.46	Alinya Formation	31	19	36	14	1.20	Woltz et al., 2021	Woltz et al., 2021
Giles-1 1265.57	Alinya Formation	19	31	30	20	0.53	Woltz et al., 2021	Woltz et al., 2021
Giles-1 1265.71	Alinya Formation	32	18	36	14	0.17	Woltz et al., 2021	Woltz et al., 2021
Greenland 19	Andrée Land Group	8	42	18	32	1.28	Woltz et al., 2021	Woltz et al., 2021
Wallara-1 1284.4	Aralka Formation	2	19	15	36	0.64	Woltz et al., 2021	Woltz et al., 2021
Wallara-1 1286.4	Aralka Formation	3	3	4	2	0.73	Woltz et al., 2021	Woltz et al., 2021
Wallara-1 1298.5	Aralka Formation	5	29	8	42	1.15	Woltz et al., 2021	Woltz et al., 2021
Wallara-1 1300.4	Aralka Formation	8	21	10	40	0.98	Woltz et al., 2021	Woltz et al., 2021
Wallara-1 1301.9	Aralka Formation	4	28	11	39	0.87	Woltz et al., 2021	Woltz et al., 2021
Wallara-1 1304.3 A	Aralka Formation	6	43	10	39	2.67	Woltz et al., 2021	Woltz et al., 2021
BR05 489.4	Areyonga Formation	4	23	10	17	0.12	this study	Woltz et al., 2021
BR05 493.6	Areyonga Formation	4	15	11	8	0.09	this study	Woltz et al., 2021
BR05 517.16	Areyonga Formation	20	19	22	17	0.23	this study	Woltz et al., 2021
Wallara-1 1411.2	Areyonga Formation	20	13	22	11	0.09	this study	Woltz et al., 2021
PWC 1405 347.0	Bylot Supergroup	22	28	37	13	0.21	Woltz et al., 2021	Woltz et al., 2021
PWC 1405 632	Bylot Supergroup	16	34	35	15	1.70	Woltz et al., 2021	Woltz et al., 2021
SW 1604 145.1	Bylot Supergroup	17	33	35	15	0.25	this study	Woltz et al., 2021
SW 1604 146.7	Bylot Supergroup	14	11	17	8	0.07	this study	Woltz et al., 2021
SW 1604 149.6	Bylot Supergroup	5	6	4	7	0.07	Woltz et al., 2021	Woltz et al., 2021
SW 1604 152.1	Bylot Supergroup	15	35	21	29	0.06	Woltz et al., 2021	Woltz et al., 2021
SW 1604 16	Bylot Supergroup	23	27	44	6	0.23	this study	Woltz et al., 2021
SW 1604 176.4	Bylot Supergroup	34	14	38	12	0.40	Woltz et al., 2021	Woltz et al., 2021
SW 1604 181.0	Bylot Supergroup	24	26	39	11	0.33	this study	Woltz et al., 2021
SW 1604 221.6	Bylot Supergroup	27	23	34	16	0.39	this study	Woltz et al., 2021
SW 1604 3.2A	Bylot Supergroup	19	31	30	20	0.14	this study	this study
SW 1604 58.5	Bylot Supergroup	19	31	39	11	0.14	this study	this study
SW 1604 6A	Bylot Supergroup	19	31	41	9	0.28	this study	this study
SW 1605 22.7	Bylot Supergroup	32	18	37	13	0.22	this study	this study
SW 1605 63.3	Bylot Supergroup	33	17	38	12	0.32	Woltz et al., 2021	this study
SW 1605 84.4	Bylot Supergroup	34	16	40	10	0.12	this study	this study
T1412-139.0	Bylot Supergroup	18	31	30	20	0.35	this study	Woltz et al., 2021
T1412-153.7	Bylot Supergroup	21	29	30	20	0.30	this study	Woltz et al., 2021
T1412-194.3	Bylot Supergroup	24	26	37	13	0.52	Woltz et al., 2021	Woltz et al., 2021
T1413 96.4	Bylot Supergroup	9	41	13	37	0.24	Woltz et al., 2021	Woltz et al., 2021
T1413-104	Bylot Supergroup	6	44	19	31	0.49	this study	Woltz et al., 2021
T1413-244	Bylot Supergroup	1	11	3	9	1.22	this study	Woltz et al., 2021
T1413-327	Bylot Supergroup	11	39	21	29	1.48	Woltz et al., 2021	Woltz et al., 2021
T1606-56	Bylot Supergroup	22	28	24	26	0.07	this study	Woltz et al., 2021

Table S3: Sample names, geologic unit, fossil counts of well-preserved vs. moderately and poorly preserved microfossils, TOC and mineral concentrations.

Sample ID	Geologic Unit	Fossil count pitting = 3	Fossil count pitting = 1, 2	Fossil count margin = 3	Fossil count margin = 1,2	TOC (wt%)	Preservation reference	TOC reference
AWA 245	Chuar Group	12	38	13	37	1.82	Woltz et al., 2021	Woltz et al., 2021
AWA 247	Chuar Group	11	39	19	31	1.16	Woltz et al., 2021	Woltz et al., 2021
AWA 265.5	Chuar Group	2	29	3	28	3.77	Woltz et al., 2021	Woltz et al., 2021
SP12-53-17	Chuar Group	17	33	19	31	0.09	Woltz et al., 2021	Woltz et al., 2021
SP12-53-3	Chuar Group	7	34	16	35	1.40	Woltz et al., 2021	Woltz et al., 2021
SP14-53-4	Chuar Group	25	25	30	20	0.44	this study	Woltz et al., 2021
SP14-53-6	Chuar Group	18	32	28	22	0.37	this study	Woltz et al., 2021
SP14-53-7	Chuar Group	11	40	15	36	0.11	Woltz et al., 2021	Dehler et al., 2005
SP14-63-25	Chuar Group	1	49	7	43	0.07	this study	Woltz et al., 2021
SP14-63-28	Chuar Group	16	34	26	24	1.38	Woltz et al., 2021	Woltz et al., 2021
TW17-63-J11	Chuar Group	28	22	31	19		this study	
TW17-63-J15	Chuar Group	37	13	36	14	0.14	this study	Woltz et al., 2021
TW17-63-J4	Chuar Group	33	17	40	10	0.15	this study	Woltz et al., 2021
TW17-63-J7	Chuar Group	38	12	44	6	0.31	this study	Woltz et al., 2021
TW17-63-T1	Chuar Group	8	38	12	38	1.08	Woltz et al., 2021	Woltz et al., 2021
TW17-63-T14	Chuar Group	35	15	45	5	0.17	this study	Woltz et al., 2021
TW17-63-T20	Chuar Group	37	13	42	8	0.15	this study	Woltz et al., 2021
TW17-63-T23	Chuar Group	28	22	32	18	0.23	Woltz et al., 2021	Woltz et al., 2021
TW17-63-T25	Chuar Group	37	13	42	8	0.19	this study	Woltz et al., 2021
Wal31	Chuar Group	0	26	1	25	2.83	Woltz et al., 2021	Woltz et al., 2021
Islay-2	Lossit Limestone	32	18	35	15	0.31	this study	this study
G471 6.1	Svanbergfjellet Formation	26	24	29	21	0.35	this study	Kunzmann et al., 2015
G471 8.3	Svanbergfjellet Formation	28	22	36	14	0.30	this study	Kunzmann et al., 2015
SCYW 1289.73	Tapley Hill Formation	4	19	7	16	0.30	this study	Woltz et al., 2021
RP01A-50	Uinta Mountain Group	19	31	24	26	0.17	Woltz et al., 2021	Dehler et al., 2007
RP01A-63	Uinta Mountain Group	27	23	31	19	0.15	Woltz et al., 2021	Dehler et al., 2007
RP03B-25	Uinta Mountain Group	26	24	31	19	0.18	Woltz et al., 2021	Dehler et al., 2007
WR100101-3	Uinta Mountain Group	14	21	23	12	0.64	this study	Sprinkel and Waanders, 2005
Colville E-15 4720	Undifferentiated Proterozoic	3	6	6	3	0.22	this study	this study
Colville E-15 5115	Undifferentiated Proterozoic	16	30	17	29	0.38	Woltz et al., 2021	Woltz et al., 2021
Colville E-15 5180	Undifferentiated Proterozoic	16	34	33	17	0.32	this study	Woltz et al., 2021
Colville E-15 5236	Undifferentiated Proterozoic	32	18	39	11	0.28	this study	Woltz et al., 2021
Colville E-15 5422	Undifferentiated Proterozoic	18	14	22	10	0.28	this study	Woltz et al., 2021
Colville E-15 5587	Undifferentiated Proterozoic	12	20	17	15	0.36	this study	Woltz et al., 2021

Sample ID	Percent relative to total clay					Percent of total rock					
	Berthierine (%) relative	Glauconite (%) relative	Celadonite (%) relative	Kaolinite (%) relative	Illite (%) relative	Total Clay (%)	Berthierine (%)	Glauconite (%)	Celadonite (%)	Kaolinite (%)	Illite (%)
Giles-1 1237.74	25.4	0.0	0.0	0.0	0.0	74.6	46.0	11.7	0.0	0.0	34.3
Giles-1 1242.72	28.0	0.0	0.0	0.0	0.0	72.0	37.0	10.4	0.0	0.0	26.6
Giles-1 1244.0	47.5	0.0	0.0	20.3	0.0	32.2	32.0	15.2	0.0	0.0	10.3
Giles-1 1255.45	0.0	0.0	0.0	0.0	0.0	100.0	50.0	0.0	0.0	0.0	50.0
Giles-1 1255.6	12.1	0.0	0.0	0.0	0.0	87.9	53.0	6.4	0.0	0.0	46.6
Giles-1 1257.73	33.8	0.0	0.0	0.0	0.0	66.2	32.0	10.8	0.0	0.0	21.2
Giles-1 1265.46	0.0	0.0	0.0	0.0	0.0	100.0	68.0	0.0	0.0	0.0	68.0
Giles-1 1265.57	9.3	0.0	0.0	0.0	0.0	90.7	59.0	5.5	0.0	0.0	53.5
Giles-1 1265.71	20.8	0.0	0.0	0.0	0.0	79.2	42.0	8.7	0.0	0.0	33.3
Greenland 19	0.0	0.0	100.0	0.0	0.0	0.0	65.0	0.0	0.0	65.0	0.0
Wallara-1 1284.4	11.6	0.0	0.0	0.0	0.0	88.4	23.0	2.7	0.0	0.0	20.3
Wallara-1 1286.4	11.6	0.0	0.0	0.0	0.0	88.4	57.0	6.6	0.0	0.0	50.4
Wallara-1 1298.5	17.8	0.0	0.0	0.0	0.0	82.2	46.0	8.2	0.0	0.0	37.8
Wallara-1 1300.4	23.7	0.0	0.0	0.0	0.0	76.3	62.0	14.7	0.0	0.0	47.3
Wallara-1 1301.9	26.3	0.0	0.0	0.0	0.0	73.7	49.0	12.9	0.0	0.0	36.1
Wallara-1 1304.3 A	18.1	0.0	0.0	0.0	0.0	81.9	50.0	9.0	0.0	0.0	41.0
BR05 489.4	11.9	0.0	0.0	0.0	0.0	88.1	34.0	4.0	0.0	0.0	30.0
BR05 493.6	11.8	0.0	0.0	0.0	0.0	88.2	63.0	7.4	0.0	0.0	55.6
BR05 517.16	26.5	0.0	0.0	0.0	0.0	73.5	45.0	11.9	0.0	0.0	33.1
Wallara-1 1411.2	16.6	0.0	0.0	0.0	0.0	83.4	51.0	8.5	0.0	0.0	42.5
PWC 1405 347.0	0.0	0.0	0.0	0.0	0.0	100.0	71.0	0.0	0.0	0.0	71.0
PWC 1405 632	9.8	0.0	0.0	0.0	0.0	90.2	62.0	6.1	0.0	0.0	55.9
SW 1604 145.1	0.0	0.0	0.0	0.0	0.0	100.0	45.0	0.0	0.0	0.0	45.0
SW 1604 146.7	32.9	0.0	0.0	0.0	0.0	67.1	16.0	5.3	0.0	0.0	10.7
SW 1604 149.6	24.1	0.0	0.0	0.0	0.0	75.9	48.0	11.6	0.0	0.0	36.4
SW 1604 152.1	19.5	0.0	0.0	0.0	0.0	80.5	54.0	10.5	0.0	0.0	43.5
SW 1604 16	0.0	0.0	0.0	0.0	0.0	100.0	62.0	0.0	0.0	0.0	62.0
SW 1604 176.4	0.0	3.8	0.0	0.0	0.0	96.2	69.0	0.0	2.6	0.0	66.4
SW 1604 181.0	0.0	0.0	0.0	0.0	0.0	100.0	38.0	0.0	0.0	0.0	38.0
SW 1604 221.6	0.0	0.0	0.0	0.0	0.0	100.0	71.0	0.0	0.0	0.0	71.0
SW 1604 3.2A	0.0	0.0	0.0	0.0	0.0	100.0	74.0	0.0	0.0	0.0	74.0
SW 1604 58.5	0.0	0.0	0.0	0.0	0.0	100.0	67.0	0.0	0.0	0.0	67.0
SW 1604 6A	0.0	0.0	0.0	0.0	0.0	100.0	49.0	0.0	0.0	0.0	49.0
SW 1605 22.7	0.0	0.0	0.0	0.0	0.0	100.0	78.0	0.0	0.0	0.0	78.0
SW 1605 63.3	6.1	0.0	0.0	0.0	0.0	93.9	62.0	3.8	0.0	0.0	58.2
SW 1605 84.4	0.0	0.0	100.0	0.0	0.0	0.0	37.0	0.0	0.0	37.0	0.0
T1412-139.0	0.0	8.4	0.0	0.0	0.0	91.6	45.0	0.0	3.8	0.0	41.2
T1412-153.7	0.0	0.0	0.0	0.0	0.0	100.0	58.0	0.0	0.0	0.0	58.0
T1412-194.3	0.0	0.0	5.0	0.0	0.0	95.0	58.0	0.0	2.9	0.0	55.1
T1413 96.4	0.0	0.0	86.9	0.0	0.0	13.1	52.0	0.0	0.0	45.2	6.8
T1413-104	0.0	0.0	0.0	0.0	0.0	100.0	15.0	0.0	0.0	0.0	15.0
T1413-244	0.0	60.5	0.0	0.0	0.0	39.5	20.0	0.0	12.1	0.0	7.9
T1413-327	0.0	100.0	0.0	0.0	0.0	0.0	5.0	0.0	5.0	0.0	0.0
T1606-56	0.0	6.4	0.0	0.0	0.0	93.6	57.0	0.0	3.6	0.0	53.4

Sample ID	Percent relative to total clay					Percent of total rock					
	Berthierine (%) relative	Glauconite (%) relative	Celadonite (%) relative	Kaolinite (%) relative	Illite (%) relative	Total Clay (%)	Berthierine (%)	Glauconite (%)	Celadonite (%)	Kaolinite (%)	Illite (%)
AWA 245	0.0	0.0	0.0	0.0	48.6	51.4	82.0	0.0	0.0	39.9	42.1
AWA 247	0.0	0.0	0.0	0.0	45.8	54.2	72.0	0.0	0.0	33.0	39.0
AWA 265.5	0.0	0.0	0.0	0.0	29.8	70.2	50.0	0.0	0.0	14.9	35.1
SP12-53-17	0.0	0.0	0.0	0.0	0.0	100.0	19.0	0.0	0.0	0.0	19.0
SP12-53-3	0.0	0.0	0.0	0.0	0.0	100.0	40.0	0.0	0.0	0.0	40.0
SP14-53-4	0.0	0.0	0.0	0.0	0.0	100.0	57.0	0.0	0.0	0.0	57.0
SP14-53-6	0.0	0.0	0.0	58.8	41.2	61.0	61.0	0.0	0.0	35.9	25.1
SP14-53-7	0.0	0.0	0.0	70.4	29.6	58.0	58.0	0.0	0.0	40.8	17.2
SP14-63-25	0.0	0.0	0.0	0.0	100.0	42.0	42.0	0.0	0.0	0.0	42.0
SP14-63-28	0.0	0.0	0.0	32.2	67.8	54.0	54.0	0.0	0.0	17.4	36.6
TW17-63-J11	0.0	0.0	0.0	41.1	58.9	45.0	45.0	0.0	0.0	18.5	26.5
TW17-63-J15	0.0	0.0	0.0	47.4	52.6	63.0	63.0	0.0	0.0	29.9	33.1
TW17-63-J4	0.0	0.0	0.0	10.9	89.1	49.0	49.0	0.0	0.0	5.3	43.7
TW17-63-I7	0.0	0.0	0.0	33.9	66.1	33.0	33.0	0.0	0.0	11.2	21.8
TW17-63-T1	24.0	0.0	0.0	0.0	76.0	41.0	41.0	9.8	0.0	0.0	31.2
TW17-63-T14	0.0	0.0	0.0	0.0	100.0	71.0	71.0	0.0	0.0	0.0	71.0
TW17-63-T20	0.0	0.0	0.0	0.0	100.0	77.0	77.0	0.0	0.0	0.0	77.0
TW17-63-T23	4.9	0.0	0.0	0.0	95.1	59.0	59.0	2.9	0.0	0.0	56.1
TW17-63-T25	0.0	0.0	0.0	0.0	100.0	60.0	60.0	0.0	0.0	0.0	60.0
Wal 31	0.0	0.0	0.0	14.0	86.0	59.0	59.0	0.0	0.0	8.3	50.7
Islay-2	0.0	0.0	99.2	0.8	0.0	45.0	45.0	0.0	0.0	44.6	0.4
G471 6.1	0.0	0.0	100.0	0.0	0.0	63.0	63.0	0.0	0.0	63.0	0.0
G471 8.3	0.0	0.0	0.0	0.0	100.0	71.0	71.0	0.0	0.0	0.0	71.0
SCWV 1289.73	24.0	0.0	0.0	0.0	76.0	55.0	55.0	13.2	0.0	0.0	41.8
RP01A-50	0.0	0.0	0.0	0.0	100.0	76.0	76.0	0.0	0.0	0.0	76.0
RP01A-63	0.0	0.0	0.0	0.0	100.0	74.0	74.0	0.0	0.0	0.0	74.0
RP03B-25	0.0	0.0	0.0	0.0	100.0	70.0	70.0	0.0	0.0	0.0	70.0
WR100101-3	0.0	0.0	0.0	0.0	100.0	69.0	69.0	0.0	0.0	0.0	69.0
Colville E-15 4720	0.0	0.0	0.0	0.0	100.0	66.0	66.0	0.0	0.0	0.0	66.0
Colville E-15 5115	0.0	0.0	0.0	0.0	100.0	73.0	73.0	0.0	0.0	0.0	73.0
Colville E-15 5180	0.0	0.0	0.0	0.0	100.0	24.0	24.0	0.0	0.0	0.0	24.0
Colville E-15 5236	0.0	0.0	0.0	0.0	100.0	59.0	59.0	0.0	0.0	0.0	59.0
Colville E-15 5422	0.0	16.6	0.0	0.0	83.4	60.0	60.0	0.0	10.0	0.0	50.0
Colville E-15 5587	0.0	20.9	0.0	0.0	79.1	26.0	26.0	0.0	5.4	0.0	20.6

Sample ID	Total clay (carbonate removed)	Carbonate (%)		Berthierine (%)		Glauconite (%)		Celadonite (%)		Kaolinite (%)		Illite (%)		2M1 / total illite
		Carbonate (%)		no carbonate		no carbonate		no carbonate		no carbonate		no carbonate		
Giles-1 1237.74	39.6	14.0	10.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.5	0.08	
Giles-1 1242.72	27.8	25.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	0.00	
Giles-1 1244.0	25.0	22.0	11.9	0.0	0.0	0.0	0.0	0.0	0.0	5.1	8.1	50.0	0.15	
Giles-1 1255.45	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.9	0.09	
Giles-1 1255.6	48.8	8.0	7.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.6	0.08	
Giles-1 1257.73	22.1	31.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.0	0.04	
Giles-1 1265.46	68.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.5	0.09	
Giles-1 1265.57	59.0	0.0	5.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.9	0.00	
Giles-1 1265.71	40.3	4.0	8.4	0.0	0.0	0.0	0.0	65.0	0.0	0.0	0.0	0.0	0.00	
Greenland 19	65.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.1	0.11	
Wallara-1 1284.4	21.6	6.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	48.3	0.10	
Wallara-1 1286.4	54.7	4.0	6.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	36.3	0.14	
Wallara-1 1298.5	44.2	4.0	7.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.5	0.14	
Wallara-1 1300.4	58.3	6.0	13.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.1	0.09	
Wallara-1 1301.9	47.5	3.0	12.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.7	0.13	
Wallara-1 1304.3 A	48.5	3.0	8.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	27.6	0.00	
BR05 489.4	31.3	8.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.3	0.02	
BR05 493.6	60.5	4.0	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.1	0.07	
BR05 517.16	39.5	12.0	10.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.1	0.00	
Wallara-1 1411.2	46.9	8.0	7.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	0.07	
PWC 1405 347.0	71.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	55.3	0.04	
PWC 1405 632	61.4	1.0	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	45.0	0.00	
SW 1604 145.1	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	7.6	0.00	
SW 1604 146.7	11.4	29.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	34.6	0.00	
SW 1604 149.6	45.6	5.0	11.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.4	0.08	
SW 1604 152.1	50.2	7.0	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	58.9	0.00	
SW 1604 16	58.9	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	66.4	0.01	
SW 1604 176.4	69.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	32.4	0.00	
SW 1604 181.0	32.4	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	0.00	
SW 1604 221.6	71.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.0	0.04	
SW 1604 3.2A	74.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	67.0	0.00	
SW 1604 58.5	67.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	49.0	0.00	
SW 1604 6A	49.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	78.0	0.00	
SW 1605 22.7	78.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.5	0.00	
SW 1605 63.3	60.1	3.0	3.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	
SW 1605 84.4	31.2	16.0	0.0	0.0	0.0	0.0	0.0	31.2	0.0	0.0	0.0	0.0	0.00	
T1412-139.0	36.8	18.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.7	0.00	
T1412-153.7	50.5	13.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.5	0.32	
T1412-194.3	56.8	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	54.0	0.00	
T1413 96.4	49.4	5.0	0.0	0.0	0.0	0.0	0.0	42.9	0.0	0.0	0.0	6.5	0.00	
T1413-104	14.8	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.8	0.00	
T1413-244	14.6	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.00	
T1413-327	3.7	27.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	
T1606-56	57.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	53.4	0.00	

Sample ID	Total clay (carbonate removed)	Carbonate (%)		Berthierine (%)		Glauconite (%)		Celadonite (%)		Kaolinite (%)		Illite (%)		2M1 / total	
		Carbonate (%)	no carbonate	Carbonate (%)	no carbonate	Carbonate (%)	no carbonate	Carbonate (%)	no carbonate	Carbonate (%)	no carbonate	Carbonate (%)	no carbonate	illite	illite
AWA 245	82.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	39.9	42.1	0.03	0.03
AWA 247	72.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	33.0	39.0	0.08	0.08
AWA 265.5	50.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.9	35.1	0.02	0.02
SP12-53-17	19.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	19.0	0.00	0.00
SP12-53-3	40.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.0	0.00	0.00
SP14-53-4	57.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	57.0	0.05	0.05
SP14-53-6	61.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	35.9	25.1	0.06	0.06
SP14-53-7	58.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	40.8	17.2	0.00	0.00
SP14-63-25	42.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	42.0	0.00	0.00
SP14-63-28	54.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.4	36.6	0.00	0.00
TW17-63-J11	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5	26.5	0.05	0.05
TW17-63-J15	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	29.9	33.1	0.03	0.03
TW17-63-J4	49.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.3	43.7	0.05	0.05
TW17-63-J7	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	21.8	0.02	0.02
TW17-63-T1	41.0	0.0	0.0	9.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	31.2	0.00	0.00
TW17-63-T14	71.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	0.00	0.00
TW17-63-T20	77.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	77.0	0.00	0.00
TW17-63-T23	59.0	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	56.1	0.05	0.05
TW17-63-T25	60.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	60.0	0.03	0.03
Wal 31	59.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.3	50.7	0.04	0.04
Islay-2	45.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	44.6	0.4	0.4	0.0	0.58	0.58
G471 6.1	63.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.0	0.0	0.0	0.0	0.00	0.00
G471 8.3	71.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	71.0	0.04	0.04
SCYW 1289.73	49.0	11.0	11.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	37.2	0.12	0.12
RP01A-50	76.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	76.0	0.03	0.03
RP01A-63	74.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.0	0.10	0.10
RP03B-25	70.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	70.0	0.29	0.29
WR100101-3	69.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	69.0	0.08	0.08
Colville E-15 4720	63.4	4.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	63.4	0.06	0.06
Colville E-15 5115	73.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	73.0	0.05	0.05
Colville E-15 5180	24.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	24.0	0.00	0.00
Colville E-15 5236	59.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	59.0	0.00	0.00
Colville E-15 5422	60.0	0.0	0.0	0.0	0.0	0.0	10.0	0.0	0.0	0.0	0.0	0.0	50.0	0.05	0.05
Colville E-15 5587	26.0	0.0	0.0	0.0	0.0	0.0	5.4	0.0	0.0	0.0	0.0	0.0	20.6	0.00	0.00

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