Supplementary Materials for:

Are ^{34}S-enriched authigenic sulfide minerals a proxy for elevated methane flux and gas hydrates in the geologic record?

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Contents:

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments.

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Freshwater	Connecticut	Ponds	Sediment - ponds - AVS	-	4	-3.5	4.6	1.6	3.9	1.6	Nakai & Jensen (1964)
Freshwater	North America	Lake [c]	Sediment - Kelly Lake - TS	-	12	-30.2	-14.8	-30.2	4.4	-30.2	Nriagu & Coker (1983) [c]
			Sediment - Lohi Lake - TS	-	18	-5.5	5.5	-4.5	4.1	-4.5	
			Sediment - McFarlane Lake -TS	-	16	-8.5	6.8	-8.5	3.9	-8.5	
			Sediment - Ramsey Lake - TS	-	13	-8.5	9.4	-8.5	5.3	-8.5	
			Sediment - Opeongo Lake - TS	-	17	2.3	8.8	2.3	1.9	2.3	
Freshwater	Southwest Germany	Lake [c]	Lake Steisslingen - Sediment & pyrite	-	29	-24	-6	-16	5	-16	Mayer & Schwark (1999) [c]
Saline lake	West Siberia	Bolson	Chany - Evaporitic sediments - TRIS	-	4	6.0	21.0	12.2	6.3	12.2	Doi et al. (2004)
Saline lake	Owens Lake, California	Bolson [c]	Core 1 - mud - pyrite	-	3	-35.0	-33.0	-33.0	1.0	-33.0	Ryu et al. (2006) [c]
			Core 1 - mud - AVS	-	3	-34.0	-24.0	-24.0	5.3	-24.0	
			Core 2 - mud - pyrite	-	3	-35.0	-31.5	-32.0	1.9	-32.0	
			Core 2 - mud - AVS	-	2	-33.0	-27.0	-27.0	4.2	-27.0	
			Core 3 - mud - pyrite	-	3	-31.0	-33.0	-33.0	1.0	-33.0	
			Core 3 - mud - AVS	-	3	-32.0	-31.0	-31.0	0.6	-31.0	
			Core 4 - mud - pyrite	-	3	-34.5	-27.0	-34.5	3.8	-34.5	
			Core 4 - mud - AVS	-	3	-29.5	-27.0	-27.0	1.4	-27.0	
			Core 5 - mud - pyrite	-	3	-41.0	-39.0	-41.0	1.2	-41.0	
			Core 5 - mud - AVS	-	3	-41.0	-32.0	-41.0	4.7	-41.0	
			Cores 11-20 - mud - pyrite	-	10	-31.6	-15.1	-18.5	6.3	-18.5	
Coastal	Solar Lake, Egypt	Hypersaline lake [c]	Microbial mat - AVS	-	9	-23.0	-16.0	-17.0	2.1	-17.0	Habicht & Canfield (1997) [c]
			Microbial mat - S^o	-	3	-18.0	-15.0	-16.0	1.5	-16.0	
			Microbial mat - pyrite	-	7	-21.0	-14.0	-14.0	2.3	-14.0	
Brackish	Kuban, Dnester, Danube	Riverine estuary	Sediment - pyrite	-	9	-27.0	-1.5	-27.0	8.3	-27.0	Lei et al. (1996)
Coastal	southern California	Saltwater marsh	Newport Marsh - AVS	-	3	-19.9	-15.0	-15.0	2.6	-15.0	Kaplan et al. (1963)
			Newport Marsh - pyrite	-	3	-27.7	-27.1	-20.0	4.3	-20.0	
Coastal	North Sea	Saltwater marsh [c]	Peat, sand, and mud - pyrite	-	33	-26	-1	-1	7	-1	Dellwig et al. (2002) [c]
Coastal	Cape Lookout Bight, NC	Estuary	Mud - core 27 - AVS	-	11	-8.1	0.8	-3.7	3.3	-23.9	Chanton (1985)
			Mud - core 27 - pyrite	-	6	-15.9	-4.6	-15.9	4.1	-15.9	
			Mud - cores A & B - AVS	-	10	-3.1	4.9	-0.2	2.7	-0.2	
			Mud - cores A & B - pyrite	-	9	-16.5	-5.8	-15.5	4.2	-15.5	
			Mud - core 9 - AVS	-	8	-9.22	-0.07	-9.22	2.87	-9.22	
			Mud - core 9 - pyrite	-	10	-19.84	-7.27	-18.60	4.91	-18.60	
			Mud - cores A & B - AVS	-	7	-9.4	-1.5	-9.4	3.5	-9.4	
			Mud - cores A & B - pyrite	-	10	-20.1	-10.0	-20.0	3.7	-20.0	
Coastal	Cape Lookout Bight, NC	Estuary	Muds - pyrite	-	2	-5.8	-4.6	-4.6	0.8	-4.6	Chanton et al. (1987)

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Coastal	North/Baltic Sea	Estuary [c]	Sand, silt, organics - AVS	-	8	-10.0	-12.5	-12.5	1.0	-12.5	Habicht & Canfield (1997) [c]
			Sand, silt, organics - pyrite	-	8	-23.0	-7.0	-7.0	4.6	-7.0	
Coastal	North Sea	Estuary [c]	Very fine sand - Reference area - TRS	-	9	-21	-13	-18	3	-18	Bottcher et al. (1998) [c]
			Very fine sand - Core 1 -TRS	-	16	-20	-10	-10	3	-10	
			Very fine sand - Core 2 -TRS	-	13	-23	-11	-11	4	-11	
Coastal	St. Andrew Bay, FL	Estuary [c]	Mud - Calloway Bayou - AVS	-	16	-26.7	-17.7	-27.2	2.4	-27.2	Bruchert (1998) [c]
			Mud - Calloway Bayou - pyrite	-	16	-27.8	-23.9	-23.9	1.2	-23.9	
			Mud - Watson Bayou - AVS	-	15	-22.10	-9.14	-9.91	3.53	-9.91	
			Mud - Watson Bayou - pyrite	-	16	-26.02	-14.18	-14.18	3.01	-14.18	
Coastal	St. Andrew Bay, FL	Estuary [c]	Watson Bayou mud - TRIS	-	16	-28.8	-23.7	-28.8	1.4	-28.8	Bruchert and Pratt (1999) [c]
			Callaway Bayou mud - TRIS	-	13	-26.0	-18.6	-26.0	2.7	-26.0	
Coastal	North Sea	Estuary	Mud - Jade Bay, Dangast, NE -TRS	-	13	-18.2	-14.6	-15.2	1.7	-15.2	Bottcher et al. (2000a)
			Mud - Jade Bay- pyrite + AVS	-	5	-16.7	-15.4	-15.4	0.6	-15.4	
Coastal	North/Baltic Sea	Estuary [c]	Mud - Aarhus Bay, DK - pyrite	-	3	-35.0	-29.0	-29.0	3.0	-29.0	Habicht & Canfield (2001) [c]
			Mud - Kattegat 3 - pyrite	-	4	-25.5	-24.0	-24.0	0.7	-24.0	
			Mud - Kattegat 6 - pyrite	-	2	-24.5	-24.0	-18.3	7.1	-18.3	
			Mud - Waddewarden - pyrite	-12.0	1	-	-	-	-	-	
Coastal	North Sea	Estuary [c]	Mud - 29 April 1998 - TRIS	-	34	-25.5	-12.5	-16.5	2.9	-17.7	Bottcher et al. (2004a) [c]
			Mud - 4 June 1998 - TRIS	-							
			Mud - 29 June 1998 - TRIS	-							
			Mud - 10 Aug 1998 - TRIS	-							
			Mud - 9 Sept 1998 - TRIS	-							
Coastal	Shark Bay, Australia	Intertidal	Mud - AVS	-	4	-23.2	-11.2	-14.5	5.6	-14.5	Bauld et al. (1979)
Coastal	Spencer Gulf, Australia	High intertidal [c]	Algal mat mud- Station 4 - TRIS?	-17	18	-24	-14	-17	3	-17	Chambers (1982) [c]
			Algal mat mud - Station 8 - TRIS?	-	33	-24	-12	-15	3	-15	
			Algal mat mud - Station 10 - TRIS?	-	27	-27	-9	-16	3	-16	
Coastal	Spencer Gulf, Australia	[c]	Shallow subtidal muds - TRIS?	-	6	-38	-22	-38	6	-38	Chambers (1982) [c]
Coastal	Spain	[c]	Carbonate mud - AVS	-6	2	-11	-6	-6	4	-6	Frederiksen et al. (2007) [c]
	Italy		Carbonate mud - AVS	-	2	-19	-18	-18	1	-18	
	Greece		Carbonate mud - AVS	-	2	-19	-19	-19	0	-19	
			Carbonate mud - pyrite	-	3	-31	-23	-23	4	-23	
Coastal	Vancouver Island	Euxinic	Mud - AVS	-	6	-23.4	-13.8	-22.6	3.9	-22.6	Hurtgen et al. (1999)
			Mud - prite	-	6	-24.9	-20.7	-22.3	1.6	-22.3	
Coastal	Framvaren fjord, Norway	Euxinic	Black mud - total reduced sulfide	-	16	-33.6	-11.6	-33.6	8.9	-33.6	Saelen et al. (1993)

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Coastal	Svalbard	Oxygenated [c]	Mud - Isfjorden - AVS	-	10	-36	-27	-30	3	-30	Bruchert et al. (2001) [c]
			Mud - Isfjorden - pyrite	-	11	-29	-15	-15	4	-15	
			Mud - Kongfjorden - AVS	-	6	-24	-22	-23	1	-23	
			Mud - Kongfjorden - pyrite	-	13	-15	-9	-10	2	-10	
			Mud - Krossfjorden - AVS	-	7	-33	-25	-25	3	-25	
			Mud - Krossfjorden - pyrite	-	12	-26	11	11	15	11	
Coastal	Scotland	Oxygenated [c]	Mud - Loch Diuch fjord -TRIS	-	23	-34.5	-29.0	-30.5	1.6	-30.5	Bottrell et al. (2009)
Coastal	Connecticut	Bay	Sediment - Long Island Sound - AVS	-	2	-12.9	-12.2	-12.2	0.5	-12.2	Nakai & Jensen (1964)
			Sediment - Branford Bay - AVS	-	2	-21.8	-20.8	-21.8	0.7	-21.8	
Coastal	Tsuyazaki Inlet, Japan	Bay	Mud - AVS	-	14	-23.13	-2.59	-8.12	6.21	-8.12	Yamanaka et al. (1999)
			Mud - pyrite	-	10	-26.08	-24.07	-26.08	0.62	-26.08	
Oceanic	southern California	Santa Barbara Basin	Mud - AVS	-	4	-27.2	-4.1	-27.2	10.9	-27.2	Kaplan et al. (1963)
			Mud - pyrite	-	3	-26.6	-17.3	-26.6	5.0	-26.6	
		Santa Monica Basin	Mud - AVS	-	3	-13.8	0.3	-13.8	9.7	-13.8	
			Mud - pyrite	-	3	-15.1	-10.7	-10.7	2.5	-10.7	
		Santa Catalina Basin	Mud - pyrite	-	3	-34.0	-7.7	-29.9	14.2	-29.9	
		San Diego trough	Mud - pyrite	-	3	-34.6	3.1	3.1	20.3	3.1	
Oceanic	southern California	Santa Barbara Basin	Mud - AVS, pyrite, total sulfur	-	7	-24.0	-10.9	-24.0	5.4	-24.0	Goldhaber & Kaplan (1974)
			Mud - various size fractions - TRIS	-	4	-31.0	-29.0	-31.0	0.9	-31.0	
		Santa Catalina Basin	Mud - particle size >44 μm	-	5	-44.5	-40.9	-44.5	1.3	-44.5	
			Mud - particle size <44 μm	-	5	-38.5	-35.2	-35.6	1.4	-35.6	
			Mud - various size fractions - pyrite	-	7	-31.0	-28.0	-31.0	1.3	-31.0	
		Marina del Rey	Mud - various size fractions - TRIS	-	7	-15.0	-13.3	-14.0	0.5	-14.0	
		Santa Catalina Basin	Mud - pyrite	-	9	-40.6	-30.2	-28.0	4.6	-28.0	
		East Cortez Basin	Mud - TRIS	-	6	-41	-33	-37	-	-	
		Long Basin	Mud - TRIS	-	6	-51	-46	-48	-	-	
Oceanic	Cariaco Basin	Euxinic	Mud - DSDP Hole 147B - pyrite	-	10	-32.7	-29.4	-31.8	1.7	-31.8	Goldhaber & Kaplan (1974)
			Mud - various size fractions - pyrite								
Oceanic	Pacific	Context unknown	Sediment - TRIS?	-	19	-39	-9	-39	9	-39	Lein et al. (1976) from Chambers (1982)
Oceanic	Mid-Atlantic Ridge DSDP Leg 37	Ocean ridge flank	Sediment -Site 332 - TRIS	-	2	-53.7	-41.6	-50.7	8.6	-	Krause et al. (1977)
			Sediment -Site 333 - TRIS	-	3		-22.1	-47.7	15.6	-47.7	
			Sediment -Site 335 - TRIS	-	6			-36.9	5.3	-36.9	
			Sediment -Site 335 - pyrite	-54.1	1	-	-	-	-	-	
Oceanic	Hatteras Abyssal Plain DSDP Site 418	Abyssal plain	Sediment - Site 418 - AVS	-45.7	1	-	-	-	-	-	Puchelt & Hubberten (1979)
Oceanic	Gulf of California	Pescadero Basin	Mud - pyrite	-	16	-23.9	-11.5	-22.1	4.6	-22.1	Goldhaber & Kaplan (1980)

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Oceanic	Flank Galapagos Ridge	Ocean ridge flank	Sediment - Site 506 -pyrite	-	12	-48.3	-37.6	-46.6	2.8	-46.6	Migdisov et al. (1983)
	DSDP Leg 70		Sediment - Site 507 - pyrite	-	9	-50.6	-41.8	-46.2	2.6	-46.2	
	Galapagos Mounds		Sediment - Site 509 - pyrite	-	7	-49.3	-40.3	-45.1	3.1	-45.1	
			Sediment - Site 508 - pyrite	-	5	-47.7	-35.8	-45.3	4.9	-45.3	
			Sediment - Site 510 - pyrite	-	6	-49.0	-32.9	-32.9	5.8	-32.9	
Neretic	Kau Bay,	Silled basin [c]	Marine sediment - AVS & pyrite	-	6	-22.5	-17.0	-17.0	2.3	-17.0	Middleburg (1991) [c]
	Halmahera, Indonesia		Transitional sediment- AVS & pyrite	-	7	-14.5	4.0	-14.5	6.9	-14.5	
			FW sediment - AVS & pyrite	-	2	15.5	16.0	15.5	0.4	15.5	
Oceanic	eastern Mediterrean		Sediments & sapropel - Core GC17	-	26	-43	19	11.0	24.1	11.0	Passier et al. (1996)
Oceanic	eastern Mediterrean	Offshore Crete	Sapropel - pyrite	-	5	-49.6	-37.3	-37.4	5.6	-37.4	Passier et al. (1997)
Oceanic	eastern Mediterrean	Euxinic [c]	Laminated mud - Tyro Basin - AVS	-	8	-35.0	-19.0	-37.0	5.4	-37.0	Henneke et al. (1997) [c]
		Brine basin	Laminated mud - Bannock Basin - AVS	-	12	-39.0	-27.5	-39.0	3.9	-39.0	
Oceanic	Mediterrean	Offshore Crete	Sapropel - Site UM26 - pyrite	-	12	-49.6	-36.7	-36.7	4.9	-36.7	Passier et al. (1999a, b)
		Eratosthenes	Sapropel - ODP Site 967 - pyrite	-	12	-47.7	-37.1	-43.4	3.1	-43.4	
		Mediterrean Ridge	Sapropel - ODP Site 969 - pyrite	-	12	-48.0	-33.1	-46.7	4.3	-46.7	
Oceanic	offshore Namibia, Benguela	Upwelling [c]	Dark mud - ODP Site 1084 - pyrite	-	35	-34.5	-40.5	-40.5	1.6	-40.5	Bruchert et al. (2000) [c]
Oceanic	Mediterranean	Strait of Silicy [c]	Organic rich layers - ODP Site 160 - TRS	-	14	-42.5	-29.0	-39.0	4.0	-39.0	Bottcher et al. (2003) [c]
Oceanic	Cariaco Basin	Euxinic [c]	Laminated mud - ODP 1002 -pyrite	-	26.0	-34.1	-17.5	-32.8	3.6	-32.8	Werne et al. (2003) [c]
Oceanic	offshore Namibia, Benguela	Upwelling	Mud - laminated - AVS	-	28	-20.8	3.3	-16.4	9.3	-16.4	Dale et al. (2009)
		seasonal anoxia	Mud - unlaminated - pyrite	-	58	-26.9	13.0	-19.4	13.1	-19.4	
Oceanic	Cascadia, ODP Leg 146	Continental rise [c]	Site 888 muds - TRS	-	8	-49	6	-44	21	-44	Bottrell et al. (2000) [c]
			Site 889/890 muds - TRS	-	12	-45	-45	-45	15	-45	
			Site 891 - TRS	-	10	-36	23	-23	18	-23	
Oceanic	Cascadia Margin, IODP 311	Continental rise [c]	Site 1325B - Pyrite grains	-	29	-30	21	-16	15	-16	Wang et al. (2008) [c]
			Site 1326C - Pyrite grains	-	7	-18	16	-13	15	-13	
			Site 1327C - Pyrite grains	-	23	-28	53	-25	20	-25	
			Site 1329B-C - Pyrite grains	-	33	-35	28	-29	17	-29	
			Site 1329E - Pyrite grains	-	10	-32	31	-32	20	-32	
Oceanic	Arabian Sea	western Indus Fan [c]	Sediment - Station WAST - TS	-	14	-11	15	15	10	15	Bottcher et al. (2000b) [c]
Oceanic	Caribbean Sea	Kogi Rise	Sediment - ODP 999A -TRIS	-	7	-41.4	-30.9	-30.9	3.9	-30.9	Lyons et al. (2000)
		Nicaraguan Rise	Sediment - ODP 1000B - TRIS	-	2	-27.1	-26.9	-26.9	0.1	-26.9	

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Oceanic	New Zealand, ODP Leg 181	Continental slope [c]	Site 1119 mud - TRS	-	5	-29	9	-8	14	-8	Bottcher et al. (2004b) [c]
		Campbell Plateau	Site 1120 mud - TRS	-44	1	-	-	-	-	-	
		Lower rise	Site 1121 mud - TRS	-	2	-47	-47	-47	0	-47	
		Abyssal plain	Site 1122 mud - TRS	-	6	-47	-1	-18	16	-18	
		Lower rise	Site 1123 mud - TRS	-	5	-50	-31	-50	7	-50	
		Abyssal plain	Site 1124 mud - TRS	-	3	-51	-45	-51	3	-51	
		Chatham Rise	Site 1125 mud - TRS	-	4	-51	-24	-51	11	-51	
Oceanic	Peru Margin	Upwelling [c]	Sediments -pyrite	-	17	-47.0	-29.0	-32.0	5.0	-32.0	Boning et al. (2004) [c]
Oceanic	Chile Margin	Upwelling [c]	Sediments - Station 4 - pyrite	-	17	-30.0	-27.5	-28.0	0.7	-28.0	Zopfi et al. (2008) [c]
			Sediments - Station 4 - FeS	-	17	-28.5	-15.0	-15.0	3.4	-15.0	
			Sediments - Station 7 - pyrite	-	10	-36.5	-32.0	-32.5	1.6	-32.5	
			Sediments - Station 7- FeS	-	7	-29.5	-27.0	-27.0	0.9	-27.0	
			Sediments - Station 14 - pyrite	-	23	-37.5	-27.0	-32.5	3.4	-32.5	
			Sediments - Station 14 - FeS	-	23	-33.0	-24.0	-33.0	2.0	-33.0	
			Sediments - Station 18 - pyrite	-	7	-36.5	-28.0	-28.0	4.0	-28.0	
			Sediments - Station 18 - FeS	-	11	-31.5	-18.0	-31.0	4.2	-31.0	
Oceanic	Amazon Fan	AMO	Sediment - GeoB 1437-6 - pyrite	-	13	-45.23	34.95	-45.2	25.4	-45.2	Bottcher, Schulz, et al. (unpublished data)
Oceanic	Blake Ridge	Gas hydrate	Mud - Piston core 11-8 - TRIS	-	11	-46.4	23.6	-39.3	23.0	-39.3	This paper, Borowski et al. (2013)
			Mud - ODP Site 994 - TRIS	-	25	-46.6	18.8	-26.1	15.0	-26.1	
			Mud - ODP Site 995A - TRIS	-	23	-44.1	-6.3	-26.3	12.3	-26.3	
			Mud - ODP Site 995B - TRIS	-							
Oceanic?	Baltic Sea	Oxygenated? [c]	Sediment - TRIS?	-	51	-40	-29	-40	4	-40	Hartmann & Nielsen (1969) [c] data cited in Chambers (1982)
Oceanic?	Baltic Sea, Gotland Deep	Oxygenated [c]	Laminated marine mud - pyrite	-	11	-30	1	-22	11	-22	Sternbeck & Sohlenius (1997) [c]
			Laminated marine mud - FeS	-	3	-14	-2	-14	6	-14	
			Freshwater mud - pyrite	-	5	1	24	3	10	3	
			Freshwater mud - FeS	-	4	14	28	17	6	17	
Oceanic	Baltic Sea, Landsort Deep	Oxygenated [c]	Laminated marine mud - TS	-	5	-37	-28	-28	4	-28	Bottcher & Lepland (2000) [c]
			Freshwater mud - TS	-	17	-40	3	-39	12	-39	
			Marine mud - TS	-	12	-19	3	-5	6	-5	
			Freshwater mud - TS	-	2	21	22	22	1	-	
Oceanic	Black Sea	Euxinic	Marine mud - Station 4740 - AVS	-	5	-22.2	2.2	-22	13	-22	Vinogradov et al. (1962) [e]
			Marine mud - Station 4740 - pyrite	-	5	-33.3	-6.7	-33	10	-33	
			Marine mud - Station 4745 - AVS	-	3	-31.1	-13.3	-31	9	-31	
			Freshwater mud - Station 4745 - AVS	20.0	1	-	-	-	-	-	
			Marine mud - Station 4745 - pyrite	-	4	-33.3	11.1	-33	20	-33	
			Marine mud - Station 4750 - AVS	-31.1	1	-	-	-	-	-	
			Marine mud - Station 4750 - pyrite	-28.9	1	-	-	-	-	-	
			Marine mud - Station 4751 - AVS	-20.0	1	-	-	-	-	-	
			Marine mud- Station 4752 - AVS	-	4	-26.7	-13.3	-27	6	-27	
			Freshwater? mud - Station 4752 - AVS	-	3	-2.2	15.6	16	9	16	

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
			Marine mud - Station 4752 - pyrite	-26.7	1	-	-	-	-	-	Vinogradov et al. (1962) [e] *(continued)*
			Marine mud - Station 4753 - AVS	-26.7	1	-	-	-	-	-	
			Marine mud - Station 4753 - pyrite	-33.3	1	-	-	-	-	-	
			Marine mud - Station 4754 - AVS	-	4	-31.1	8.9	-29	19	-29	
			Freshwater mud - Station 4754 - AVS	-	3	-2.2	17.8	18	10	18	
			Marine mud - Station 4754 - pyrite	-	4	-28.9	-6.7	-27	10	-27	
			Freshwater mud- Station 4754 - pyrite	15.6	1	-	-	-	-	-	
Oceanic	Black Sea	Euxinic	Marine mud - Location 1990 - AVS	-11.3	1	-	-	-	-	-	Migdisov et al. (1974)
			Marine mud - Location 1990 - pyrite	-	2	-29.4	14.6	-29.4	6.5	-	
			Marine mud - Location 1991 - pyrite	-29.2	1	-	-	-	-	-	
Oceanic	Black Sea	Euxinic	Laminated mud - Station 1135 -TRS	-	2	-27.4	-27.0	-27.2	0.3	-	Sweeny & Kaplan (1980)
			Laminated mud - Station 1136 -TRS								
Oceanic	Black Sea	Transitional	Unlaminated mud - Stat. 568 - AVS	-	3	-6.3	6	6.0	6.3	6.0	Vaynshteyn et al. (1986)
		Transitional	Unlaminated mud - Stat. 568 - pyrite	-	4	-42	-18.1	-42.0	10.4	-42.0	
		Euxinic	Laminated mud - Stat. 580 - AVS	-	4	-20.4	5.1	-7.7	9.6	-7.7	
			Freshwater? mud - Stat. 580 - AVS	5.1	1	-	-	-	-	-	
		Euxinic	Laminated mud - Stat. 580 - pyrite	-	5	-28.8	-0.7	-14.8	12.3	-14.8	
			Freshwater? mud - Stat. 580 - pyrite	-0.7	1	-	-	-	-	-	
		Euxinic	Laminated mud - Stat. 620 - AVS	-	2	-27	-19	-9.9	13.5	-9.9	
		Euxinic	Laminated mud - Stat. 620 - pyrite	-	3	-35.5	-33	-35.5	1.3	-35.5	
		Euxinic	Laminated mud - Stat. 601 - AVS	-2.0	1	-	-	-	-	-	
		Euxinic	Laminated mud - Stat. 601 - pyrite	-	5	-40	-1	-40.0	15.5	-40.0	
		Euxinic	Laminated mud - Stat. 546 - AVS	-21.6	1	-	-	-	-	-	
		Euxinic	Laminated mud - Stat. 546 - pyrite	-	2	-30.6	-25	-30.6	4.0	-30.6	
		Euxinic	Laminated mud - Stat. 582 - AVS	-	2	-8.2	-6.7	-8.2	1.1	-8.2	
		Euxinic	Laminated mud - Stat. 582 - pyrite	-34.7	1	-	-	-	-	-	
		Euxinic	Laminated mud - Stat. 571 - AVS	-	2	-3.5	1.1	-3.5	3.3	-3.5	
		Euxinic	Laminated mud - Stat. 571 - pyrite	-	4	-37.5	-20	-37.0	9.0	-37.0	
		Euxinic	Laminated mud - Stat. 545 - AVS	-	2	-9.3	-5.4	-9.3	2.8	-9.3	
		Euxinic	Laminated mud - Stat. 545 - pyrite	-	3	-37.3	-3	-37.3	17.2	-37.3	
		Euxinic	Laminated mud - Stat. 616 - pyrite	-	5	-34.3	-13.1	-34.1	9.1	-34.1	
		Euxinic	Laminated mud - Stat. 584 - AVS	-6.0	1	-	-	-	-	-	
			Laminated mud - Stat. 584 - pyrite	-	3	-33.0	-23.4	-33.0	5.0	-33.0	
Oceanic	Black Sea	Euxinic	Marine mud - Station 840 - pyrite	-	16	-36.3	12.3	-36.3	21.8	-36.3	Strizhov et al. (1989)
			Freshwater? mud - Station 840 - FeS	-	8	-7.7	17.8	2.6	9.5	2.6	
		Euxinic	Mud - Station 813 - pyrite	-	13	-25.5	19.9	-17.5	13.5	-17.5	
			Mud - Station 813 - FeS	-	4	-16.1	45.5	-16.1	29.3	-16.1	
		Euxinic	Mud - Station 795 - pyrite	-	9	-42.4	25.6	-42.4	21.0	-42.4	
			Mud - Station 795 - FeS	-	2	-4.7	25.6	-4.7	21.4	-4.7	
Oceanic	Black Sea	Euxinic	Sediment trap - Station BSC2 - TRIS	-	5	-39.4	-36.2	-36.3	2.6	-36.3	Muramoto et al. (1991)

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Oceanic	Black Sea	Euxinic	Laminated, marine mud - TS	-	2	-27.74	-26.83	-27.74	0.64	-27.74	Calvert et al. (1996)
			Laminated, marine mud - pyrite	-	2	-33.95	-33.21	-33.95	0.52	-33.95	
			Mudflow - TS	-	6	-24.93	-17.00	-24.93	3.01	-24.93	
			Mudflow - pyrite	-	6	-27.32	-19.80	-27.32	2.76	-27.32	
			Sapropel - TS	-	7	-33.14	-19.17	-33.14	5.07	-33.14	
			Sapropel - pyrite	-	7	-37.39	-25.16	-25.16	4.93	-25.16	
			Freshwater mud - TS	-	14	-26.77	17.14	-26.77	13.96	-26.77	
			Freshwater mud - pyrite	-	16	-30.00	17.21	-30.00	13.92	-30.00	
Oceanic	Black Sea	Euxinic	Laminated mud - Station 9 - TRIS	-	11	-38.3	-35.9	-36.8	0.7	-36.8	Lyons (1997)
			Laminated mud - Station 14 - TRIS	-	7	-37.9	-34.6	-37.2	1.1	-37.2	
			Turbidite - station 15 - AVS	-	5	-27.0	-22.8	-25.6	1.5	-25.6	
			Turbidite - station 15 - pyrite	-	5	-28.9	-25.9	-27.8	1.1	-27.8	
			Turbidite - station 18A - TRIS	-	4	-31.8	-30.2	-31.5	0.7	-31.5	
Oceanic	Black Sea	Euxinic [c]	Sediment - Station 22 - pyrite	-	7	-39	-37	-37.0	0.6	-37.0	Wijsman et al. (2001) [c]
			Sediment - Station 24 - pyrite	-	6	-46	-6.0	-45.5	17.7	-45.5	
Oceanic	Black Sea	Euxinic	Laminated mud - GC48 - TRIS	-	4	-37.2	-35.2	-36.3	0.5	-36.3	Wilkin & Arthur (2001)
			Sapropel - GC48 -TRIS	-	17	-38.8	-28.6	-38.8	2.9	-38.8	
			Freshwater muds- GC48 -TRIS	-	5	-23.7	10.9	-23.7	16.9	-23.7	
			Laminated mud - GC66 - TRIS	-35.2	1	-	-	-	-	-	
			Turbidite - GC66 -TRIS	-	5	-25.1	-20.9	-25.1	2.0	-25.1	
Oceanic	Black Sea	Transitional	Limnic mud - Station 4 - AVS	-	9	-7.96	27.30	19.74	10.30	19.74	Jorgensen et al. (2004)
		Euxinic	Marine mud - Station 4 - TRS	-5.37	1	-	-	-	-	-	
		Euxinic	Limnic mud - Station 4 - TRS	-	18	-16.18	30.48	-15.56	12.76	-15.56	
		Euxinic	Limnic mud - Station 5 - AVS	-	9	-5.53	24.71	10.22	11.57	10.22	
		Euxinic	Marine mud - Station 5- TRS	6.97	1	-	-	-	-	-	
		Euxinic	Limnic mud - Station 5- TRS	-	13	4.93	23.60	6.78	6.83	6.78	
		Euxinic	Marine mud - Station 6 - AVS	-21.05	1	-	-	-	-	-	
		Euxinic	Limnic mud - Station 6 - AVS	-	17	-5.46	15.71	1.70	8.27	1.70	
		Euxinic	Marine mud - Station 6- TRS	-	5	-36.51	-19.53	-36.51	7.16	-36.51	
		Euxinic	Limnic mud - Station 6- TRS	-	23	-2.13	20.91	14.07	8.73	14.07	
Oceanic	Black Sea	Euxinic	Sapropel - Station 7 - AVS	-	4	-22	-6	-12.88	8.32	-14.75	Neretin et al. (2004)
			Limnic sediment - Station 7 - AVS	-	20	-8	14	-8.00	5.00	-8.00	(data from Bottcher, personal comm.)
			Sapropel - Station 7 - pyrite	-	17	-37	-10	-37.00	7.39	-37.00	
			Limnic sediment - Station 7 - AVS	-	23	-11	17	15.00	8.26	15.00	
Oceanic	Black Sea	Euxinic [c]	Marine mud - pyrite	-	3	-28.0	-21.5	-28.0	3.6	-28.0	Habicht & Canfield (2001) [c]
Oceanic	Black Sea	Euxinic	Sapropel - GeoB 7620 - AVS	-	3	-33	-12	-33.0	11.2	-33.0	Bottcher et al. (unpublished data)
			Freshwater mud- GeoB 7620 - AVS	-	16	-16	20	-2.0	9.5	-2.0	
			Marine mud - GeoB 7620 - pyrite	-	4	-39	-34	-39.0	2.2	-39.0	
			Freshwater mud - GeoB 7620 - pyrite	-	21	-34	9	-34.0	12.9	-34.0	

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Oceanic	Black Sea	Oxygenated	Marine mud - Station 4746 - AVS	-	2	-22.2	-8.9	-22.2	9.4	-	Vinogradov et al. (1962) [e]
			Marine mud - Station 4746 - pyrite	-4.4	1	-	-	-	-	-	
			Marine mud - Station 2 - AVS	-20.0	1	-	-	-	-	-	
			Marine mud - Station 2 - pyrite	-	2	-35.6	-17.8	-17.8	12.6	-	
			Marine mud - Station 3 - AVS	-	2	-35.6	-20.0	-20.0	11.0	-	
			Marine mud - Station 3 - pyrite	-17.8	1	-	-	-	-	-	
Oceanic	Sea of Azov	Oxygenated	Marine mud - Location 2001 - AVS	-	4	-16.7	32.5	-16.7	22.3	-16.7	Migdisov et al. (1974)
			Marine mud - Location 2001 - pyrite	-	4	-23.6	-3.1	-20.3	10.7	-20.3	
			Marine mud - Location 2005 - AVS	-	3	1.9	11.1	1.9	4.7	1.9	
			Mud - Location 2005 - pyrite	-	5	0.5	13.7	6.2	5.2	6.2	
			Mud - Location 2008 - AVS	-	2	-4.2	6.3	-4.2	7.4	-	
			Mud - Location 2008 - pyrite	-	8	0.5	11.0	4.0	3.8	4.0	
	Black Sea	Oxygenated	Marine mud - Location 1990 - AVS	-	2	-25.9	-21.7	-21.7	3.0	-21.7	
Oceanic	Black Sea	Oxygenated	Unlaminated mud - Stat. 555 - AVS	-	2	-21.6	-10	-21.6	8.2	-21.6	Vaynshteyn et al. (1986)
			Unlaminated mud - Stat. 555 - pyrite	-	3	-23.7	-16	-23.7	3.9	-23.7	
			Unlaminated mud - Stat. 559 - AVS	-12.0	1	-	-	-	-	-	
			Unlaminated mud - Stat. 559 - pyrite	-	4	-34.2	-28.1	-34.2	2.8	-34.2	
			Unlaminated mud - Stat. 598 - AVS	-	3	-12.1	-6.8	-6.8	2.8	-6.8	
			Unlaminated mud - Stat. 598 - pyrite	-	6	-20.6	8	-20.6	9.9	-20.6	
			Unlaminated mud - Stat. 590 - AVS	-	3	-19.8	-12	-19.8	4.0	-19.8	
			Unlaminated mud - Stat. 590 - pyrite	-	3	-25.4	-13	-25.4	6.2	-25.4	
			Unlaminated mud - Stat. 573 - pyrite	-	2	-44.5	-37.3	-23.5	19.8	-27.0	
Oceanic	Black Sea	Oxygenated [c]	Marine mud - Station 2 - pyrite	-	9	-21	-8	-11	5	-11	Wijsman et al. (2001) [c]
			Marine mud - Station 9 - pyrite	-	9	-45	-39	-39	2	-39	
			Marine mud - Station 10 - pyrite	-	5	-47	-45	-46	1	-46	
Oceanic	Marmara Sea	Oxygenated	Sediment - Station 7601 - AVS	-	12	-22	29	-16	19	-16	Bottcher et al. (unpublished data)
			Sediment - Station 7601 - pyrite	-	16	-36	38	-27	23	-27	
			Sediment - Station 7602 - AVS	-	6	-7	34	-7	16	-7	
			Sediment - Station 7602 - pyrite	-	25	-42	24	-32	19	-32	
Oceanic	Florida escarpment	Cold seep	Mud - pyrite	-	2	9.05	9.81	9.05	0.54	9.05	Commeau et al. (1987)
Oceanic	Florida escarpment	Cold seep	Mud -S° & pyrite	-	-	4.5	11.2	-	-	-	Paull & Neumann (1987) [d]
Oceanic	Florida escarpment	Advective	Mud - pyrite	-	21	-28.9	20.8	-10.8	13.4	-10.8	Chanton et al. (1993)
Cold seep	Monterey Bay	Advective	Sediment - pyrite framboids	-	75	-47.9	-4.7	-47.9	8.6	-47.9	Kohn et al. (1998)
Cold seep	Hydrate Ridge, Cascadia	Advective	Sediment - Site 173-1 - AVS	-	14	-7.5	20.3	-7.5	9.6	-7.5	Bottcher et al. (unpublished data)
			Sediment - Site 173-1 - pyrite	-	13	-11.0	7.1	-8.0	5.5	-8.0	
			Sediment - Site 185 - AVS	-	15	-13.4	19.7	-8.7	12.9	-8.7	
			Sediment - Site 185 - pyrite	-	15	-17.9	-1.3	-17.9	4.3	-17.9	

Table S1. Sulfur isotope data for sulfide minerals residing in the world's sediments (continued).

Setting	Location	Environment	Sediment	$\delta^{34}S$ [a] (‰ CDT) [b]	Number samples	Low	High	Mean	Standard deviation	Median	Reference
Cold Seep	Monterey Bay	Advective	Sediment - VC-70 - TRIS	-	9	-19.19	0.46	-19.2	7.7	-19.2	Paull et al. (unpublished data)
			Sediment - VC-73 - TRIS	-	5	-13.97	0.74	-14.0	6.2	-14.0	
Cold seep	Blake Ridge Diapir	Advective	Sediment - ODP 996 - TRIS	-	10	-34.40	-10.88	-11.1	8.7	-11.1	Borowski et al. (unpublished data)
			Sediment - PC 2 & 3 - TRIS	-	3	-23.86	-10.88	-23.9	6.6	-23.9	
Cold seep	Cascadia Margin, IODP 311	Advective [c]	Site 1328B-C - Pyrite grains	-	33	-36	36	-36	17	-36	Wang et al. (2008) [c]

[a] Sulfide mineral species include iron sulfides and pyrite but do not include elemental sulfur (S^o) as a separate phase . Key for sulfur species:
TS = total sulfur; AVS = acid volatile sulfur, ~FeS; TRS = total reduced sulfur; TRIS = total reduced inorganic sulfur.

[b] Significant digits of data tabulated as reported in reference.

[c] Data estimated from graph

[d] Only average of data reported in reference; values not plotted in histogram.

[e] Data of Vinogradov et al. (1962) converted to standard $\delta^{34}S$ notation

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End Borowski et al., supplementary section.