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Evidence of cryptic methane cycling and non-methanogenic methylamine consumption in the sulfate-reducing zone of sediment in the Santa Barbara Basin, California

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Supplemental Material

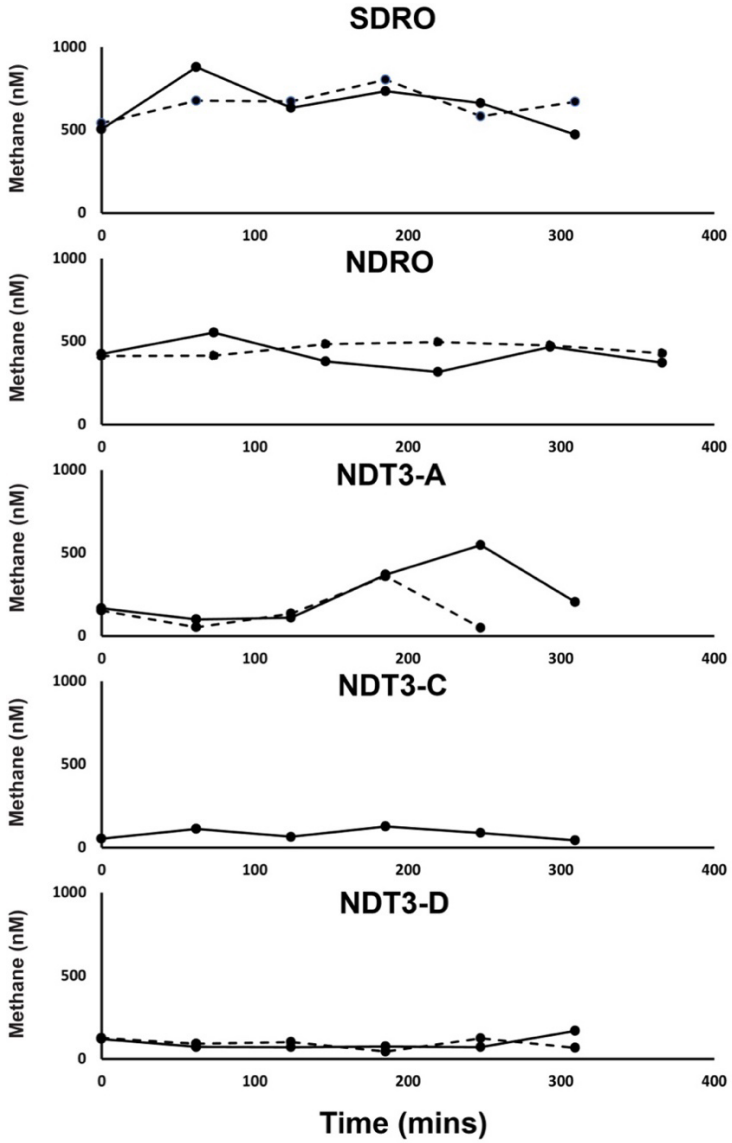

Figure S1. Methane concentrations from benthic flux chamber experiments across the depth transect of the Santa Barbara Basin. Solid lines are methane concentrations from benthic flux chamber 1. Dashed lines are methane concentrations from benthic flux chamber 2.

Table S1. Porewater concentrations of acetate, methanol and methylamine detected within two sediment intervals at each station sampled in this study.

Station, Sediment Depth (cm)	Acetate (µM)	Methanol (µM)	Methylamine (µM)
SDRO, 1-2cm	BQ	BD	BQ
SDRO, 9-10 cm	BD	BD	BD
NDRO, 1-2 cm	BQ	BD	BD
NDRO, 9-10 cm	BD	BD	BD
NDT3-A, 1-2 cm	21	BQ	BQ
NDT3-A, 9-10 cm	BD	BD	BD
NDT3-C, 1-2 cm	BD	BD	BD
NDT3-C, 9-10 cm	BD	BD	BD
NDT3-D, 1-2 cm	BD	BD	BD
NDT3-D, 9-10 cm	BD	BD	BD

Table S2. Porewater concentrations of methane and ex situ rate data and rate constants (k) of AOM from directly from ^{14}C-CH_4 (AOM- CH_4), AOM derived from ^{14}C-mono-methylamine (AOM-MMA), and methanogenesis from ^{14}C-mono-methylamine (MG-MMA).

Station	Sediment Depth For methane (cm)	Methane (μM)	Sediment Depth for Rates (cm)	AOM-CH4 (nmol cm^{-3} d^{-1})	AOM-CH4 k (d^{-1})	AOM-MMA (nmol cm^{-3} d^{-1})	AOM-MMA k (d^{-1})	MG-MMA (nmol cm^{-3} d^{-1})	MG-MMA k (d^{-1})
SDRO	0.5	10.80	0.5	0.92	0.09	9.95	0.92	0.40	0.13
SDRO	1.5	7.04	1.5	0.29	0.04	6.49	0.92	0.45	0.15
SDRO	2.5	6.56	2.5	0.03	0.00	6.03	0.92	0.29	0.10
SDRO	3.5	5.68	3.5	0.01	0.00	0.00	0.00	0.18	0.06
SDRO	4.5	7.65	4.5	0.00	0.00	7.02	0.92	0.32	0.11
SDRO	5.5	5.83	5.5	0.01	0.00	5.37	0.92	0.41	0.14
SDRO	6.5	10.89	6.5	0.00	0.00	10.02	0.92	0.31	0.10
SDRO	7.5	10.12	7.5	0.00	0.00	9.31	0.92	0.29	0.10
SDRO	8.5	-	8.5	0.01	0.00	0.00	0.00	0.33	0.11
SDRO	9.5	-	9.5	0.01	0.00	0.00	0.00	0.28	0.09
SDRO	11	-	10.5	0.02	0.00	9.14	0.90	0.28	0.09
SDRO	13	-	11.5	0.00	0.00	9.15	0.90	0.30	0.10
SDRO	15	-	12.5	0.00	0.00	9.17	0.91	0.24	0.08
SDRO	17	-	13.5	0.00	0.00	9.17	0.91	0.27	0.09
SDRO	19	-	14.5	0.00	0.00	0.00	0.00	0.26	0.09
NDRO	0.5	5.96	0.5	0.05	0.01	5.31	0.89	0.41	0.14
NDRO	1.5	11.10	1.5	0.05	0.00	0.00	0.00	0.29	0.10
NDRO	2.5	3.55	2.5	0.00	0.00	0.00	0.00	0.28	0.09
NDRO	3.5	11.72	3.5	0.02	0.00	0.00	0.00	0.31	0.10
NDRO	4.5	3.96	4.5	0.01	0.00	0.00	0.00	0.43	0.14
NDRO	5.5	9.26	5.5	0.00	0.00	8.35	0.90	0.34	0.11
NDRO	6.5	8.28	6.5	0.00	0.00	7.50	0.91	0.35	0.12
NDRO	7.5	7.67	7.5	0.00	0.00	0.00	0.00	0.36	0.12
NDRO	8.5	9.51	8.5	0.00	0.00	0.00	0.00	0.30	0.10
NDRO	9.5	5.33	9.5	0.00	0.00	0.00	0.00	0.22	0.07
NDRO	11	10.46	10.5	0.00	0.00	0.00	0.00	0.21	0.07
NDRO	13	5.58	11.5	0.01	0.00	0.00	0.00	0.21	0.07
NDRO	15	7.51	12.5	0.00	0.00	0.00	0.00	0.25	0.08
NDRO	17	13.56	13.5	0.00	0.00	0.00	0.00	0.21	0.07
NDRO	19	15.68	14.5	0.00	0.00	-	-	-	-
NDT3-A	0.5	7.88	0.5	0.03	0.00	7.09	0.90	0.45	0.15
NDT3-A	1.5	5.66	1.5	0.07	0.01	5.09	0.90	0.41	0.14
NDT3-A	2.5	5.21	2.5	0.04	0.01	4.66	0.90	0.27	0.09
NDT3-A	3.5	4.03	3.5	0.00	0.00	3.62	0.90	0.29	0.10
NDT3-A	4.5	7.92	4.5	0.01	0.00	7.11	0.90	0.33	0.11
NDT3-A	5.5	2.68	5.5	0.00	0.00	2.40	0.90	0.34	0.11
NDT3-A	6.5	8.81	6.5	0.00	0.00	7.91	0.90	0.32	0.11
NDT3-A	7.5	4.05	7.5	0.00	0.00	3.64	0.90	0.32	0.11
NDT3-A	8.5	8.70	8.5	0.00	0.00	7.78	0.89	0.24	0.08
NDT3-A	9.5	4.62	9.5	0.00	0.00	4.14	0.90	0.24	0.08
NDT3-A	11	5.29	10.5	0.00	0.00	0.00	0.00	0.18	0.06
NDT3-A	13	-	11.5	0.00	0.00	4.71	0.89	0.27	0.09
NDT3-A	15	-	12.5	0.00	0.00	0.00	0.00	0.25	0.08
NDT3-A	17	-	13.5	0.00	0.00	0.00	0.00	0.00	0.00
NDT3-A	19	-	14.5	0.00	0.00	0.00	0.00	0.26	0.09
NDT3-C	0.5	5.21	0.5	1.68	0.32	4.28	0.82	0.33	0.11
NDT3-C	1.5	8.47	1.5	0.08	0.01	6.94	0.82	0.26	0.09
NDT3-C	2.5	9.38	2.5	0.06	0.01	0.00	0.00	0.00	0.00
NDT3-C	3.5	5.82	3.5	0.33	0.06	4.79	0.82	0.28	0.09
NDT3-C	4.5	5.99	4.5	0.05	0.01	4.88	0.81	0.22	0.07
NDT3-C	5.5	6.79	5.5	0.07	0.01	0.00	0.00	0.05	0.02
NDT3-C	6.5	7.22	6.5	0.02	0.00	5.66	0.78	0.19	0.06
NDT3-C	7.5	7.25	7.5	0.03	0.00	0.00	0.00	0.01	0.00
NDT3-C	8.5	11.10	8.5	0.13	0.01	9.17	0.83	0.19	0.06
NDT3-C	9.5	7.24	9.5	0.01	0.00	5.69	0.79	0.22	0.07
NDT3-C	11	7.24	10.5	0.04	0.01	5.14	0.71	0.22	0.07
NDT3-C	13	6.38	11.5	-	-	-	-	-	-
NDT3-C	15	7.73	12.5	-	-	-	-	-	-
NDT3-C	17	9.19	13.5	-	-	-	-	-	-
NDT3-D	0.5	12.29	0.5	4.52	0.37	0.00	0.00	0.05	0.02
NDT3-D	1.5	12.75	1.5	1.76	0.14	15.91	1.25	0.34	0.11
NDT3-D	2.5	10.26	2.5	0.95	0.09	12.76	1.24	0.25	0.08
NDT3-D	3.5	9.93	3.5	0.49	0.05	12.36	1.24	0.25	0.08
NDT3-D	4.5	11.86	4.5	-	-	14.80	1.25	0.22	0.07
NDT3-D	5.5	8.88	5.5	-	-	11.07	1.25	0.19	0.06
NDT3-D	6.5	10.20	6.5	0.12	0.01	12.62	1.24	0.20	0.07
NDT3-D	7.5	9.31	7.5	0.01	0.00	11.48	1.23	0.23	0.08
NDT3-D	8.5	8.58	8.5	0.02	0.00	10.73	1.25	0.22	0.07
NDT3-D	9.5	9.11	9.5	0.41	0.05	9.95	1.09	0.30	0.10
NDT3-D	11	12.19	10.5	0.26	0.02	12.35	1.01	0.38	0.13
NDT3-D	13	11.29	11.5	0.49	0.04	9.05	0.80	0.47	0.16
NDT3-D	15	9.88	12.5	-	-	-	-	-	-
NDT3-D	17	9.14	13.5	-	-	-	-	-	-
NDT3-D	19	10.26	14.5	-	-	-	-	-	-