

Supplementary Materials for
**Limited contribution of ancient methane to surface waters of the U.S.
Beaufort Sea shelf**

Katy J. Sparrow, John D. Kessler, John R. Southon, Fenix Garcia-Tigreros, Kathryn M. Schreiner,
Carolyn D. Ruppel, John B. Miller, Scott J. Lehman, Xiaomei Xu

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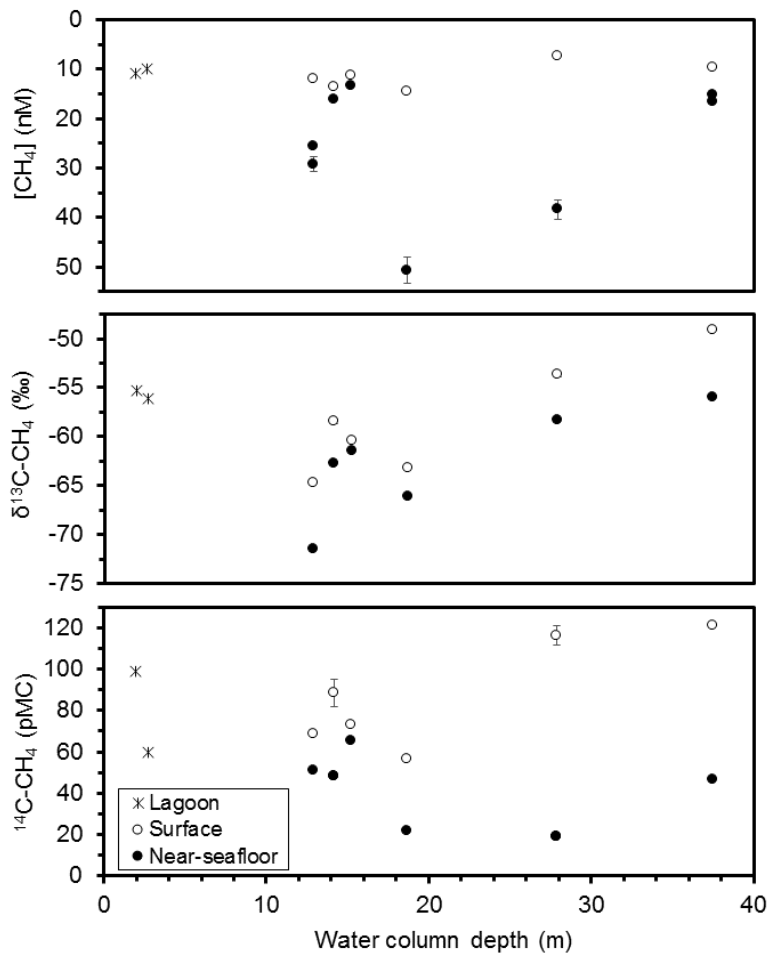


fig. S1. Dissolved CH₄ concentration and isotopic data plotted by station depth. Data for [CH₄], δ¹³C-CH₄, and ¹⁴C-CH₄ are shown for lagoon samples (asterisks), surface samples (white circles), and near-seafloor samples (black circles). Note that the y-axis is reversed for [CH₄] data. Error bars that are not visible are smaller than the markers. [CH₄] uncertainty is 5.2% of the measurement (39). Uncertainty for δ¹³C-CH₄ data reflects measurement uncertainty. Uncertainty for ¹⁴C-CH₄ data incorporates the collection, preparation, and measurement uncertainties (20).

table S1. Dissolved $^{14}\text{C-CH}_4$, $\delta^{13}\text{C-CH}_4$, and $[\text{CH}_4]$ data with relevant sample information.

Station	Water depth (m)	Distance offshore (km)	Sample type	Ancient C-sourced CH_4 fraction, f_s	Atmospheric-sourced CH_4 fraction, f_a	<i>In situ</i> produced CH_4 fraction, f_i
1	2	3	lagoon	0.18 ± 0.06	0.47 ± 0.18	0.35 ± 0.25
2	3	2	lagoon	0.50 ± 0.04	0.23 ± 0.12	0.27 ± 0.17
3	14	12	surface	0.26 ± 0.06	0.37 ± 0.18	0.37 ± 0.24
			near-seafloor	0.60 ± 0.04	0.18 ± 0.10	0.22 ± 0.13
4	15	10	surface	0.39 ± 0.05	0.29 ± 0.15	0.33 ± 0.20
			near-seafloor	0.45 ± 0.05	0.25 ± 0.14	0.30 ± 0.18
5	13	18	surface	0.42 ± 0.05	0.27 ± 0.14	0.31 ± 0.19
			near-seafloor	0.58 ± 0.04	0.19 ± 0.10	0.23 ± 0.14
6	19	27	surface	0.53 ± 0.04	0.21 ± 0.12	0.26 ± 0.16
			near-seafloor	0.83 ± 0.02	0.07 ± 0.04	0.10 ± 0.06
7	28	48	surface	0.10 ± 0.03	0.72 ± 0.10	0.18 ± 0.13
			near-seafloor	0.86 ± 0.02	0.06 ± 0.04	0.08 ± 0.05
8	38	69	surface	0.07 ± 0.03	0.79 ± 0.07	0.14 ± 0.10
			near-seafloor	0.61 ± 0.03	0.17 ± 0.10	0.22 ± 0.13

$^{14}\text{C-CH}_4$ content and conventional ^{14}C age uncertainty incorporates the collection, preparation, and measurement uncertainties (20). $\delta^{13}\text{C-CH}_4$ uncertainty is the measurement uncertainty associated with IRMS or CRDS (\dagger). $[\text{CH}_4]$ uncertainty is 5.2% of the measurement (39). Asterisks (*) indicate $^{14}\text{C-CH}_4$ and $\delta^{13}\text{C-CH}_4$ samples that are preparation duplicates that were made after optimizing the collection stage of the preparation technique (20). Section signs (§) indicate duplicate $[\text{CH}_4]$ samples. Double daggers (§§) indicate a $[\text{CH}_4]$ sample that was analyzed in a single run on the GC-FID rather than in duplicate runs. The degree of CH_4 saturation, where 100% represents full equilibrium with the atmosphere, is reported only for surface water samples.