

Deep subsurface carbon cycling in the Nankai Trough (Japan) – evidence of tectonically induced stimulation of a deep microbial biosphere?

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Introduction

Methane carbon ($\delta^{13}\text{C-CH}_4$) and hydrogen isotope data ($\delta\text{D-CH}_4$) of headspace samples and $\delta^{13}\text{C-CH}_4$ of gas void samples are provided in the tables below. For further information and analytical methods see the main article.

Hole	Core	Depth	$\delta^{13}\text{C-CH}_4$	$\delta\text{D-CH}_4$
		[mbsf]	[‰]	[‰]
C0006E	1H-1	1.185	-85.6	
	1H-4	4.22	-96.2	
	2H-2	7.77	-92.4	
	2H-6	12.065	-81.8	-196.9
	2H-8	13.78	-81.7	
	3H-2	17.265	-79.8	
	3H-6	21.635	-77.1	-200.8
	3H-9	24.785	-76.4	
	4H-4	29.9	-74.4	
	4H-6	31.5	-75.3	
	7H-1	40.075	-75.3	
	7H-3	42.895	-73.8	-197.0
	5H-4	37.48	-74.3	
	5H-2	35.82	-76.4	
	8H-1	49.565	-74.5	
	8H-3	51.77	-73.8	
	9H-3	60.51	-72.0	
	9H-4	62.38	-73.0	
	10H-4	64.53	-72.9	
	11H-3	67.679	-71.6	-195.4
	11H-6	70.299	-71.9	
	12H-3	73.695	-72.7	
	12H-5	76.285	-74.5	
	15X-1	80.72	-71.1	
	15X-6	83.363	-74.7	
	16X-1	90.09	-74.3	
	17X-2	100.28	-76.0	-200.6
	18X-1	107.68	-74.8	
	19X-1	116.9	-75.5	
	19X-5	120.06	-76.0	
	20X-6	132.825	-76.6	-205.3
	20X-3	129.57	-75.7	
	21X-2	137.36	-74.8	
	22X-2	146.81	-74.5	
	22X-5	149.975	-75.2	
	23X-3	157.72	-75.1	
	23X-5	159.465	-78.0	-208.4
	24X-1	164.465	-75.3	

	25X-6	180.767	-76.6	
	25X-4	178.437	-76.7	
	28X-2	203.785	-76.0	
	29X-3	215.06	-78.0	
	29X-6	219.02	-78.3	-205.3
	30X-2	223.135	-78.8	
	30X-5	225.965	-76.5	
	31X-2	232.3	-77.5	
C0006F	32X-6	246.395	-76.6	
	26X-5	186.98	-77.9	
	26X-7	190.857	-76.6	
	27X-2	194.635	-76.5	
	34X-2	261.13	-78.6	
	27X-4	197.465	-75.8	
	34X-4	263.5945	-78.1	
	34X-6	265.385	-78.3	
	35X-1	268.67	-78.3	-202.0
	35X-3	270.44	-78.4	
	36X-3	281.535	-79.5	
	36X-6	284.355	-78.4	
	37X-4	292.095	-79.2	
	39X-3	309.665	-79.0	
	39X-6	312.865	-77.3	
	40X-4	320.57	-78.8	
	40X-8	323.74	-79.3	
	40X-6	321.99	-79.2	
	41X-3	328.805	-78.9	
	41X-5	330.453	-78.6	
	42X-2	337.125	-80.2	-202.3
	42X-4	339.555	-78.8	
	42X-7	342.77	-79.8	
	44X-2	356.145	-78.8	
	44X-4	358.97	-79.6	-205.1
	43X-1	345.22	-80.1	
	43X-4	349.09	-80.4	
	45X-3	366.64	-80.5	
	45X-7	371.275	-80.4	
	46X-2	375.145	-82.0	
	46X-4	377.58	-81.2	
	47X-5	387.08	-83.7	
	47X-8	390.295	-81.8	
	48X-4	396.96	-82.5	-201.7

	49X-3	404.66	-83.1	
	49X-6	406.715	-83.1	
	2R-1	405.5	-83.7	
	4R-1	426.285	-84.6	
	5R-1	434.38	-85.4	
	6R-1	439.39	-85.8	
	7R-1	448.89	-85.6	-191.3
	8R-1	458.39	-85.7	
	9R-1	467.98	-85.8	
	11R-1	486.98	-85.5	-195.2
	12R-1	496.41	-84.3	
	13R-1	505.88	-83.3	
	14R-1	515.485	-83.0	
	15R-1	524.98	-81.9	
	15R-2	526.01	-82.3	
	16R-1	534.39	-81.0	-191.1
	17R-1	543.855	-80.3	
	18R-1	553.37	-79.6	
	19R-1	562.88	-79.5	
	21R-CC	580.525	-78.4	-191.5
	20R-1	572.39	-78.4	
	22R-2	591.82	-76.9	
C0007D	3R-1	192.09	-92.9	
	4R-1	200.87	-87.0	
	4R-1	200.3	-88.0	-200.9
	5R-1	210.1175	-83.2	
	5R-1	211.0675	-83.2	-201.9
	6R-1	220.5675	-83.0	
	6R-3	222.515	-82.7	
	7R-1	229.645	-82.0	-202.9
	7R-CC	230.4225	-80.4	
	8R-1	239.575	-81.6	
	9R-1	249.09	-82.1	
	10R-1	258.5825	-82.8	
	11R-1	266.77	-83.8	-206.7
	16R-1	315.0825	-83.4	
	16R-2	316.4975	-83.2	-205.1
	17R-1	324.515	-83.5	
	17R-2	325.9675	-84.6	
	18R-1	334.0675	-84.1	
	18R-3	336.9175	-84.4	
	19R-1	343.575	-84.7	

	20R-1	353.09	-85.4	
	21R-1	362.56	-84.4	
	20R-2	354.4875	-84.9	-200.6
	22R-1	372.075	-85.6	
	22R-3	374.94	-85.8	
	23R-1	381.5675	-85.8	
	23R-4	384.3725	-85.4	
	24R-1	391.075	-86.0	-201.0
	24R-3	393.915	-85.8	
	24R-4	395.3375	-84.5	
	25R-1	400.605	-85.6	
	25R-3	403.44	-85.6	
	26R-1	410.0825	-85.5	-193.1
	27R-1	419.2525	-86.7	
	28R-3	431.91	-92.4	
	28R-1	429.0825	-90.6	-186.8
	29R-2	438.525	-94.7	-177.0
	31R-CC	455.8225	-94.5	-182.4
C0008A	1H-1	1.385		
	1H-4	2.815	-87.6	
	1H-5	4.22	-85.7	
	1H-6	5.41	-104.3	
	1H-8	6.785	-109.5	-192.6
	2H-1	8.325	-107.4	
	2H-3	9.76	-102.0	
	2H-4	11.195	-97.3	-198.7
	2H-5	12.625	-88.3	
	2H-6	14.055	-84.7	-203.6
	2H-7	15.26	-82.4	
	2H-9	16.92	-81.1	
	3H-1	16.915	-83.4	
	3H-2	18.385	-80.6	
	3H-4	19.9	-81.9	-202.9
	3H-5	21.365	-78.9	
	3H-7	22.96	-78.9	
	3H-9	24.395	-77.7	
	3H-10	25.575	-75.6	
	4H-1	26.315	-76.2	
	4H-3	29.16	-76.0	
	4H-5	30.54	-75.9	
	4H-7	33.27	-75.8	
	4H-8	34.58	-74.5	

	5H-1	35.8	-75.8	
	5H-3	38.42	-76.1	
	5H-5	40.015	-75.4	-205.0
	5H-7	42.66	-74.2	
	5H-8	43.975	-73.5	
	6H-1	45.31	-74.7	
	6H-4	49.25	-72.9	
	6H-6	50.805	-73.4	
	6H-8	53.415	-72.9	
	7H-1	54.795	-72.8	
	7H-4	58.605	-73.7	
	7H-6	60.25	-73.8	
	7H-8	62.885	-73.1	
	8H-1	64.31	-72.0	
	8H-4	68.23	-72.7	-210.8
	8H-7	70.85	-72.2	
	9H-1	73.785	-72.2	
	9H-3	76.43	-71.7	
	9H-4	77.54	-70.0	
	10H-2	83.495	-72.1	
	10H-4	86.065	-71.5	
	10H-5	87.205	-72.1	
	10H-7	88.9	-71.6	
	11H-1	91.89	-72.1	
	11H-3	94.705	-72.1	
	11H-6	97.675	-70.8	
	11H-7	99.09	-71.0	
	12H-1	100.885	-71.2	-209.1
	12H-2	102.29	-71.7	
	12H-4	104.895	-69.5	
	12H-6	106.4	-71.9	
	13H-1	110.895	-72.3	
	13H-3	113.72	-69.5	
	13H-4	114.77	-71.6	
	13H-7	117.45	-72.0	
	15H-3	121.445	-70.5	
	15H-5	124.095	-70.0	
	15H-7	126.72	-71.7	
	16H-1	127.875	-70.7	
	16H-4	128.835	-70.2	
	17H-2	132.44	-69.2	
	17H-5	136.12	-69.9	-208.7
	17H-8	139.03	-68.8	

	18H-1	141.325	-70.0	-205.2
	18H-2	142.995	-69.0	
	18H-5	145.455	-68.9	
	19H-1	151.36	-68.3	
	19H-3	152.515	-69.3	
	20H-1	154.035	-69.4	
	20H-2	155.085	-68.4	
	20H-5	157.69	-69.8	
	21H-1	160.11	-65.9	
	21H-2	161.415	-68.8	
	21H-4	164.095	-64.2	
	21H-8	168.485	-69.7	
	22H-1	169.525	-68.4	
	22H-2	169.79	-68.7	-207.6
	22H-5	173.595	-65.9	
	22H-9	177.82	-70.6	
	23H-1	179.015	-66.1	
	23H-3	181.645	-68.5	
	23H-4	182.015	-66.7	
	24H-3	190.285	-68.8	
	24H-5	192.76	-70.1	
	24H-8	195.8	-66.4	
	25H-1	198.185	-67.5	
	25H-3	198.505	-66.6	
	25H-4	199.54	-66.9	
	26H-1	200.89	-68.1	
	26H-3	202.535	-69.0	
	27H-1	210.39	-67.9	
	27H-2	211.7	-68.4	
	27H-4	214.325	-68.4	-204.3
	27H-7	216.96	-68.6	
	28X-2	221.2	-68.1	
	28X-4	222.52	-67.1	
	29X-2	226.06	-66.1	
	29X-4	228.25	-66.9	
	29X-7	230.885	-66.7	
	31X-3	246.26	-68.0	
	31X-5	248.965	-68.1	
	31X-8	251.615	-67.6	
	32X-3	255.82	-68.4	
	32X-6	259.765	-68.5	
	32X-9	262.4	-67.6	
	33X-2	264.065	-67.8	

	33X-3	265.38	-67.8	-203.2
	33X-5	267.03	-66.3	
	34X-1	272.25	-67.9	
	35X-1	281.75	-68.0	
	36X-1	291.25	-68.6	
	38X-1	310.25	-69.1	-202.8

Table S1. Methane carbon ($\delta^{13}\text{C-CH}_4$) and hydrogen isotope data ($\delta\text{D-CH}_4$) of headspace samples from Holes C0006E, C0006F, C0007D, and C0008A.

Hole	Core	Depth	$\delta^{13}\text{C-CH}_4$	
		[mbsf]	[‰]	
C0006E	3H-1	15.87	-82.7	
	3H-9	20.49	-80.4	
	3H-6	23.64	-80.0	
	4H-1	27.655	-79.1	
	4H-3	28.425	-79.1	
	4H-3	25.43	-78.9	
	4H-6	31.105	-78.7	
	5H-2	34.75	-78.1	
	5H-4	36.62	-78.1	
	5H-4	37.421	-77.4	
	8H-5	53.28	-75.7	
	25X-8	181.147	-79.6	
	27X-2	193.72	-80.4	
	27X-4	196.975	-80.3	
	29X-1	212.05	-81.4	
	29X-4	215.67	-81.2	
	30X-6	226.45	-81.5	
		3H-6	22.355	-79.7
	4H-1	25.2	-79.0	
	4H-2	26.54	-79.5	
	4H-3	28.16	-77.9	
	4H-8	34.605	-78.1	
	5H-1	34.9	-77.7	
	5H-2	36.225	-77.3	
	5H-7	42.68	-77.2	
	5H-8	42.785	-76.5	
	6H-2	45.47	-76.3	
	6H-7	52.045	-74.7	

	6H-8b	52.78	-74.0
	6H-8a	53.3	-74.6
	7H-2	55.175	-74.0
	7H-8	62.435	-73.7
	8H-2	64.62	-74.3
	8H-7	70.34	-74.3
	9H-2a	74.035	-74.2
	10H-3	83.745	-74.0
	10H-7	88.79	-73.6
	11H-1	91.72	-73.4
	11H-6	96.485	-73.4
	12H-2	101.675	-73.2
	12H-6	105.43	-73.2
	13H-3	112.42	-73.2
	13H-6a	115.755	-72.7
	15H-4	122.585	-73.1
	15H-8a	127.095	-73.0
	16H-5	129.175	-73.2
	17H-6	136.41	-72.7
	19H-3	152.02	-71.0
	20H-5	157.32	-70.4
	22H-4	171.365	-70.4
	23H-2	179.415	-70.0
	26H-1a	201.53	-70.4
	27H-4	214.59	-69.2
	28H-4	223.71	-69.9
	29X-4	228.55	-69.7
	29X-8	232.405	-69.6
	32X-6	260.285	-70.2

Table S2. Methane carbon isotopes ($\delta^{13}\text{C-CH}_4$) in gas void samples from Holes C0006E and C0006F, and C0008A.