

Summary data for DMS, DMSP and DMSO concentrations and fluxes - NBP05-08

Related publications:

Kiene, R.P., Slezak, D., 2006. Low dissolved DMSP concentrations in seawater revealed by small \del Valle, D.A., Kieber, D.J., Bisgrove, J., Kiene, R.P., 2007. Light-stimulated production of dissolve del Valle, D.A., Kieber, D.J., Toole, D.A., Brinkley, J., Kiene, R.P., Submitted. Biological consumptic del Valle, D.A., Kieber, D.J., Toole, D.A., Bisgrove, J., Kiene, R.P., Submitted. Production of dissolv Kieber, D.A., D.A. Toole, J.J. Jankowski, R.P. Kiene, G.R. Westby, D.A. Del Valle and D. Slezak. 2

Abbreviations:

DMS dimethylsulfide, **DMSOd** dissolved dimethylsulfoxide, **DMSPt** total dimethylsulfoniopropionate, **DMSPd** dissolved d **DMSPp** was calculated as the difference between the measured **DMSPt** and **DMSPd**

NZ = New Zealand

local noon NZ summer time = GMT + 13h

BLD = Below Detection Limit

	Local NZ Date with GMT Date below it	Lat	Lon	Depth (m)	Plot depth	DMS (nM)	DMSPt (nM)	DMSPd (nM)
Station R9	9-Nov-05	-77.192	170.754	5	-5	0.34	4.44	BLD
GMT Time 19:29	8-Nov-05	-77.192	170.754	15	-15	0.31	4.93	BLD
Cast P508013				30	-30	0.30	5.13	BLD
				50	-50	0.28	5.08	BLD
				80	-80	0.28	4.57	BLD
				140	-140	0.26	2.84	BLD
Station R10A	10-Nov-05	-76.231	170.302	1	-1	2.65	24.42	0.23
GMT Time 18:54	9-Nov-05			10	-10	2.57	22.61	1.52
Cast P508019				20	-20	2.59	21.14	0.64
				31	-31	2.51	18.44	0.12
				50	-50	1.56	13.17	0.18
				80	-80	0.47	2.25	BLD
Station R10A	10-Nov-05	-76.229	170.225	100	-100	0.43	3.57	
GMT Time 5:41	10-Nov-05			180	-180	0.26	1.18	
Cast P508021				210	-210	0.22	1.31	
				240	-240	0.40	3.96	
				280	-280	0.31	3.39	
				310	-310	0.21	0.82	
				350	-350	0.30	1.77	
				420	-420	0.14	0.27	
				500	-500	0.17	BDL	
				550	-550	0.19	0.46	
				590	-590	0.21	1.17	
				619	-619	0.21	1.35	
Station R10B	11-Nov-05	-76.217	170.206	10	-10	3.03		
GMT Time 18:42	10-Nov-05			25	-25	3.12		
Cast P508025								
Station R10C	12-Nov-05	-76.21	170.525	10	-10	3.69		
GMT Time 19:06	11-Nov-05			450	-450	0.10		
Cast P508034								
Station R10D	13-Nov-05	-76.109	170.279	15	-15	2.48		
GMT Time 17:22	12-Nov-05							
Cast P508042								
Station R10E	14-Nov-05	-76.075	170.273	1	-1	1.68	11.07	0.98

Volume gravity filtration and dialysis sampling. *Limnol. Oceanogr. Methods* 4, 80-95

Red DMSO by a particle-associated process in the Ross Sea, Antarctica. *Limnology & Oceanography* 52, 2456-2466

Formation of dimethylsulfide (DMS) and its importance in DMS dynamics in the Ross Sea, Antarctica. *Limnol. Oceanogr.*, In revision.

Red DMSO via photo- and biological oxidation of dissolved DMS in the Ross Sea, Antarctica. *Deep-Sea res.*, In revision

2007. Chemical light meters for photochemical and photobiological studies. *Aquat. Sci.* 69: 360-376.

DMSPP (total - dissolved) (nM)	DMSOd (nM)	Chl a (µg/L)	Leucine Incorporation (nM/day)	DMS-bio rate const (per day)	DMS bio rate (nM DMS/day)	DMSPd rate const (per day)	DMSPd turnover rate (nM/day)
4.24	0.128	0.111	0.004	0.05	0.02	0.092	0.018
4.73	0.167	0.086	0.004	0.06	0.02	0.089	0.018
4.93	0.105	0.084	0.005	0.03	0.01	0.053	0.011
4.88	0.171	0.078	0.005	0.04	0.01	0.057	0.011
4.37	0.072	0.077	0.004	0.03	0.01	0.049	0.010
2.64	BDL	0.063	0.004	0.06	0.01	0.118	0.024
24.19	1.52	0.536	0.06	0.10	0.27	0.579	0.133
21.08	1.65	0.483	0.08	0.11	0.27	0.561	0.855
20.50	1.23	0.476	0.09	0.10	0.25	0.677	0.433
18.32	0.97	0.550	0.06	0.10	0.26	0.289	0.034
12.99	0.55	0.263	0.04	0.08	0.13	0.695	0.126
2.05	0.04	0.026	0.01	0.06	0.03	0.315	0.063
		0.034					
		0.012					
		0.020					
		0.005					
		0.036					
		0.007					
		0.027					
		0.002					
		0.001					
		0.006					
		0.025					
		0.013					
10.09	0.70	1.10	0.13	0.11	0.18	1.574	1.535

GMT Time 18:13	13-Nov-05			10	-10	1.64	11.59	0.62
Cast P508050				20	-20	1.55	10.94	0.74
				30	-30	1.43	7.24	0.67
				50	-50	1.02	7.26	0.61
				80	-80	0.59	3.39	0.61
Station R13A	18-Nov-05	-77.586	178.576	2	-2	23.55	24.07	1.55
GMT Time 18:30	17-Nov-05			20	-20	19.36	24.34	1.67
Cast P508059				45	-45	21.08	25.23	0.91
				65	-65	24.51	25.79	0.76
				80	-80	17.38	19.29	1.26
				100	-100	6.68	9.47	0.08
Station R13A	18-Nov-05	-77.642	178.644	61	-61	8.68	4.99	
GMT Time 3:32	18-Nov-05			113	-113	20.23	14.47	
Cast P508061				241	-241	16.28	13.17	
				280	-280	11.06	12.37	
				320	-320	2.69	5.12	
				420	-420	0.74	2.21	
				475	-475	0.33	1.06	
				520	-520	0.36	0.00	
				580	-580	0.42	0.18	
				630	-630	0.49	0.00	
				672	-672	0.49	0.71	
				737	-737	0.24	BDL	
Station R13B	19-Nov-05	-77.570	178.510	1	-1	34.38		
GMT Time 19:48	18-Nov-05			3	-3	29.08		
Cast P508064				5	-5	32.28		
				10	-10	29.65		
				20	-20	35.31		
Station R13C	20-Nov-05	-77.434	177.743	1	-1	21.57		
GMT Time 7:15	20-Nov-05			10	-10	22.23		
Cast P508077				20	-20	10.46		
				40	-40	10.44		
				60	-60	13.21		
				100	-100	10.28		
Station R13E	22-Nov-05	-77.210	177.395	1	-1	70.43	34.61	5.15
GMT Time 18:41	21-Nov-05			6	-6	69.56	36.89	3.07
Cast P508087				10	-10	43.52	36.92	2.50
				20	-20	33.36	37.40	2.58
				50	-50	25.36	15.97	1.00
				80	-80	16.44	12.84	0.92
				121	-121	7.66		
Station R13F	23-Nov-05	-76.907	177.830	5	-5		55.20	
GMT Time 1:51	23-Nov-05			20	-20		55.90	
Cast P508098				75	-75		51.21	
				100	-100		31.27	
				140	-140		11.45	
				175	-175		2.78	
				200	-200		2.39	
				223	-223		1.10	
				260	-260		1.16	
				300	-300		1.21	
				350	-350		1.30	
				390	-390		1.46	
Station R14A	25-Nov-05	-77.622	-179.488	5	-5	45.71	32.27	2.25
GMT Time 3:28	24-Nov-05			10	-10	52.95	29.85	2.68

10.97	0.63	0.83	0.14	0.12	0.19	1.565	0.966
10.20	0.58	0.79	0.14	0.09	0.14	1.457	0.616
6.57	0.41	0.62	0.10	0.11	0.16	0.993	0.662
6.65	0.32	0.45	0.12	0.08	0.08	0.864	0.525
2.78	0.13	0.11	0.07	0.08	0.05	0.879	0.534
22.52	4.21	0.14	0.04	0.09	2.14		
22.67	3.98	1.10	0.04	0.12	2.24		
24.32	4.22	1.13	0.04	0.11	2.26		
25.03	4.50	0.92	0.04	0.10	2.43		
18.02	4.23	0.97	0.04	0.10	1.73		
9.39	2.69	0.48	0.03	0.06	0.37		
	9.46	0.421247					
	13.83	0.228677					
	9.58	1.631496					
	9.42	1.119313					
	2.69	1.471021					
	1.48	0.098023					
	1.00	0.051352					
	0.64	0.03477					
	1.13	0.01003					
	0.82	0.004681					
	0.99	0.005215					
	0.88	0.041456					
	7.07						
	7.35						
	7.22						
	7.47						
	6.31						
29.47	33.77	5.78	0.37	0.20		Note: samples were not prescreened for DMS on cast P508087. Therefore, DMS near surface [] are likely too high	
33.82	32.36	5.44	0.44	0.14			
34.43	28.76	5.71	0.46	0.13			
34.82	30.27	5.14	0.33	0.21			
14.97	7.44	1.64	0.09	0.11			
11.91		1.71	0.09	0.09			
	4.94		0.04	0.13			
	44.13	5.199					
	39.58	5.713					
	33.22	2.728					
	21.40	1.541					
	8.80	0.151					
	1.74	0.033					
	4.25	0.013					
	1.59	0.008					
	4.52	0.023					
	0.94	0.009					
	11.83	0.015					
		0.016					
30.02		5.55	0.59	0.13	5.91		
27.18	24.83	4.86	0.56	0.11	5.82		

Cast P508112				20	-20	59.97	25.86	3.12
				35	-35	53.79	26.24	4.00
				50	-50	54.99	21.88	1.43
				70	-70	19.69	8.69	0.62
				130	-130	5.73		
Station R14B	26-Nov-05	-77.520	-179.488	50	-50	9.68	6.15	
GMT Time 22:40	25-Nov-05			100	-100	9.78	5.14	
Cast P508121				150	-150	7.77	4.29	
				200	-200	3.6	3.00	
				250	-250	4.21	3.66	
				300	-300	11.56	6.84	
				325	-325	4.61	3.32	
				350	-350	4.26	3.49	
				400	-400	1.75	1.93	
				500	-500	0.92	1.00	
				550	-550	0.79	0.98	
				616	-616	1.44	0.15	
Station R14F	30-Nov-05	-77.256	-179.256	2	-2	42.05	49.67	5.42
GMT Time 18:01	29-Nov-05			5.0	-5	49.64		
Cast P508150				10	-10	52.28	44.38	2.53
				20	-20	54.27	26.66	2.64
				30.0	-30	47.58	24.60	3.36
				50	-50	33.43	27.51	5.31
				90	-90	18.20	14.96	5.38
				130	-130	10.36		
Station R14F	30-Nov-05	-77.599	-179.256	20	-20	35.58	30.41	
GMT Time 3:31	30-Nov-05			75	-75	14.08	10.66	
Cast P508153				100	-100	14.28	11.19	
				150	-150	9.42	11.39	
				175	-175	4.88	7.17	
				200	-200	4.33	6.28	
				225	-225	4.05	7.08	
				300	-300	2.95	3.89	
				400	-400	0.99	2.04	
				500	-500	1.11	2.07	
				600	-600	0.73	1.54	
				630	-630	1.41	2.22	

22.74	22.84	4.43	0.61	0.09	5.13
22.24	21.62	4.03	0.67	0.09	4.74
20.45	25.18	2.17	0.39	0.09	4.91
8.07	18.92	0.42	0.07	0.12	2.46
	5.65			0.12	0.70
	5.87	0.2289			
	4.81	0.1985			
	4.13	0.0749			
	3.80	0.1567			
	3.66	0.2033			
	5.31	0.3103			
	3.22	0.0567			
	2.17	0.0492			
	2.03	0.0302			
	1.25	0.1129			
	1.34	0.0027			
	1.21	0.0057			
44.25	40.79	6.84	0.43	0.17	7.13
41.84	39.20	8.47	0.41	0.17	8.93
24.02	39.81	7.12	0.46	0.18	10.02
21.24	33.80	5.05	0.41	0.23	10.93
22.20	32.93	5.10	0.41	0.26	8.59
9.58	12.05	2.37	0.17	0.71	12.95
	16.07		0.13	1.26	13.09
	36.52	7.140			
	10.53				
	9.69	1.320			
	12.29	1.300			
	5.81	0.530			
	3.30	0.090			
	3.45	0.200			
	1.97	0.050			
	1.01	0.010			
	1.12	0.010			
	0.89	0.010			
	0.92	0.010			

Methods - NBP05-08.

DMSP-Total - NBP05-08 - Ten ml of unfiltered seawater was collected directly from Niskin into 15 ml storage tube containing 50 μ l of 50% H_2SO_4 . Two replicate storage tubes per depth, both from the same Niskin. After >12 h to allow DMS to oxidize, a 1.5 ml sub-sample from storage tube was pipetted into 14 ml serum vial and treated with 1 ml of 5 N NaOH. Sample was purged entirely into cryotrap for quantification of DMS by FPD. Corrections were made for Air-NaOH blanks which were low or absent during the cruise.

NOTE: Post cruise, we discovered that the acidification procedure may result in loss of DMSP in samples containing colonial *Phaeocystis* sp.. Acidification causes a very rapid loss of DMSP and some conversion into DMS. This was not noticed on the cruise and no corrections could be made. The amount of loss for these samples is not known. Because we found this only when colonial *Phaeocystis* was present and since during NBP-0409 (January 2005) the phytoplankton population was dominated by single celled *Phaeocystis* and diatoms, it is likely not as severe a problem as it was during NBP-0508 (November cruise). We will publish a paper on effects of acidification on DMSP storage soon.

DMSPd. Unfiltered water samples were collected from Niskins directly into Plastic Gelman magnetic filter tower. About 50 ml of water was allowed to fill the tower but, but only the first 3.5 ml of filtrate was collected into a 15 ml centrifuge tube that already contained 50 μ l of 50% H_2SO_4 . Filter towers were rinsed with Q water and thoroughly dried between each use. Analysis was as for DMSP-total only that 3 ml of sample were analyzed. For more details, see: Kiene, R.P., Slezak, D., 2006. Low dissolved DMSP concentrations in seawater revealed by small volume gravity filtration and dialysis sampling. *Limnol. Oceanogr. Methods* 4, 80-95.

DMSPp-calc - DMSPp was calculated as the difference between DMSP-total and DMSPd. Error was propagated.

DMSOd - Whole water was drip filtered through muffled GF/F into 15 ml centrifuge tubes (< 8 ml collected). The samples were then frozen for later analysis. After thawing the samples were sparged to remove any pre-existing DMS, and then a sub-sample of 1 ml was treated with 0.3 ml of Acros TiCl_3 (30%) and the vial immediately capped with a teflon faced septum. After capping with a new teflon faced septum, vials were heated at 50 deg C for 60 minutes. After cooling to room temperature, the samples were analyzed by sparging the entire sample into the cryotrap. Samples were corrected for TiCl_3 blanks. Q water on the NBP was an inappropriate blank because it had some DMSO in it.

Chlorophyll a - Water samples were filtered onto either GF/F or AE glass fiber filters and extracted in 90% acetone for 24 h at -20 deg C. Fluorescence was determined based on the acidification method.

Bacterial biomass production (Leucine Incorporation) - the uptake rate of ^3H -Leucine is reported for samples treated with 20 nM Leucine and incubated for 1-4 h in the dark. Leucine is incorporated into bacterial proteins. For more details see: Smith, D.C., Azam, F., 1992. A simple, economical method for measuring bacterial protein synthesis rates in sea water using ^3H -Leucine. *Marine Microbial Food Webs* 6, 107-114.

Biological turnover of DMS and DMSPd - ^{35}S -tracer methods were used to obtain the consumption rate constant, k (the fraction of DMS (or DMSPd) consumed per unit time). Tracer incubations lasted 4 - 8 h and were conducted in the dark at the in situ temperature. Further details will be reported in the literature, Slezak et al, in preparation; del Valle, D.A., Kieber, D.J., Toole, D.A., Brinkley, J., Kiene, R.P., Submitted. Biological consumption of dimethylsulfide (DMS) and its importance in DMS dynamics in the Ross Sea, Antarctica. *Limnol. Oceanogr.*, In revision.

