Dimethyl sulfide (DMS) climatologies, fluxes, and trends - Part B: Sea-air fluxes

Supplementary Tables :

Table S1: Monthly Binned in situ Flux data at 1º×1º resolution.

Month	Year	Latitude	Longitude	In Situ DMS Flux (μmol m^{-2} d^{-1})	References
9	1991	0	160	1.6	(Marandino et al., 2007)
9	1991	5	126	0.8	
9	1991	13	160	0.6	(Marandino et al., 2008)
9	1991	17	130	3	
9	1991	20	127	1	(Marandino et al., 2009)
9	1991	27	136	2.2	
9	1991	28	147	0.7	(Yang et al., 2011)
9	1991	29	147	2.4	
10	1991	20	-155	0.8	(Bell et al., 2015)
2	1994	16	146	1.4	
2	1994	136	147	1.5	(Blomquist et al., 2017)
3	1994	1	146	1.9	
11	1995	-54	159	0.4	(Omori et al., 2017)
11	1995	-53	138	1.3	
11	1995	-48	137	0.6	(Smith et al., 2018)
11	1995	-47	146	1.2	
11	1995	-44	151	2.6	(Shon et al., 2001)
11	1995	-41	144	6.6	
12	1995	-51	157	3.5	(Leck and Persson, 1996)
12	1995	-50	148	2.8	
12	1995	-47	151	2.6	(Sharma et al., 1999)
12	1995	-46	146	2.2	
12	1995	-46	149	2.2	(Land et al., 2014)
12	1995	-45	144	2.75	
12	1995	-42	142	2.4	
12	1995	-41	139	0.9	

6	2000	41	-71	6.2
11	2003	-8	-109	11.4
11	2003	-8	-108	8.72
11	2003	-8	-107	9.08
11	2003	-8	-106	6.6
11	2003	-8	-105	7.85
11	2003	-8	-104	6.54
11	2003	-8	-103	9
11	2003	-8	-102	8.08
11	2003	-8	-101	7.675
11	2003	-8	-100	6.1
11	2003	-8	-99	7.94
11	2003	-8	-98	8.125
11	2003	-8	-97	6.64
11	2003	-8	-96	7.275
11	2003	-8	-95	6.64
11	2003	-7	-95	8.5
11	2003	-6	-95	6.22
11	2003	-5	-95	4.2
11	2003	-4	-95	5.35
11	2003	-3	-110	5.5
11	2003	-3	-95	7.233333
11	2003	-2	-110	3.716667
11	2003	-2	-95	2.7625
11	2003	-1	-110	2.4
11	2003	-1	-95	1.1
11	2003	0	-110	2.1
11	2003	0	-100	7.1
11	2003	0	-95	7.084615
11	2003	1	-95	8.236364
11	2003	1	-94	6.1
11	2003	1	-93	4.25
11	2003	1	-92	4.9
11	2003	2	-110	9.5
11	2003	2	-95	9.7625
11	2003	2	-92	5.25

11	2003	2	-91	6.975
11	2003	2	-90	7.25
11	2003	3	-110	12.5
11	2003	3	-95	7.844444
11	2003	3	-90	10.35
11	2003	3	-89	13.925
11	2003	3	-88	15.6
11	2003	4	-110	16.64
11	2003	4	-95	6.3875
11	2003	4	-88	16.65
11	2003	4	-87	9.72
11	2003	4	-86	7.35
11	2003	5	-110	5.68
11	2003	5	-95	3.52
11	2003	7	-95	4.566667
11	2003	8	-110	2.25
11	2003	8	-109	2.95
11	2003	8	-107	4.2
11	2003	8	-106	1.7
11	2003	8	-96	3.9
11	2003	8	-95	2.15
5	2004	5	168	1.105333
5	2004	5	169	1.66
5	2004	6	165	3.913333
5	2004	6	166	9.78
5	2004	7	161	3.083333
5	2004	7	162	3.925
5	2004	7	163	4.835
5	2004	8	159	2.4425
5	2004	8	160	2.4425
5	2004	9	155	3.36
5	2004	9	156	3.432857
5	2004	9	157	2.06
5	2004	10	155	4.705
5	2004	12	147	2.535
5	2004	12	148	1.43

6	2004	0	-166	9.3
6	2004	0	-165	8.403333
6	2004	1	-167	8.67
6	2004	1	-165	6.3325
6	2004	1	-164	10.33
6	2004	2	-164	8.845
6	2004	2	-163	10.495
6	2004	4	-162	8.215
6	2004	4	-161	6.26
6	2004	4	-156	3.64
6	2004	5	-160	8.005
6	2004	6	-160	10.6
6	2004	7	-157	6.67
6	2004	8	-158	5.31
6	2004	21	-156	6.05
6	2004	22	-157	3.85
6	2004	23	-155	2.89
6	2004	25	-154	4.605
6	2004	26	-155	4.675
6	2004	28	-154	2.92
6	2004	45	-144	2.19
7	2004	29	-75	1.7
7	2004	29	-74	4.42
7	2004	29	-73	5.1
7	2004	29	-64	7.236
7	2004	29	-63	6.022222
7	2004	30	-73	5.433333
7	2004	30	-72	4.48
7	2004	30	-71	5.8
7	2004	30	-70	6.95
7	2004	30	-66	6.4
7	2004	30	-65	6.465517
7	2004	30	-64	6.2
7	2004	31	-69	5.5
7	2004	31	-66	7.030303
7	2004	31	-65	5.696429

8	2004	28	-71	7.775
8	2004	28	-70	6.3
8	2004	28	-69	9.5
8	2004	29	-69	7.35
8	2004	29	-68	17.05
8	2004	29	-67	4.45
8	2004	29	-66	5.85
8	2004	29	-65	4.5
8	2004	29	-64	2.8
8	2004	30	-60	6.2
1	2006	-35	-103	5.8
1	2006	-34	-103	6.505
1	2006	-33	-103	4.35
1	2006	-28	-103	1.48
1	2006	-27	-103	1.135
1	2006	-26	-103	1.17
1	2006	-24	-103	3.165
1	2006	-23	-103	2.46
1	2006	-19	-105	8.08
1	2006	-18	-105	5.48
1	2006	-16	-106	43.4
1	2006	-15	-107	36.15
1	2006	-12	-108	37.55
1	2006	-11	-109	15.1
1	2006	-11	-108	19.4
1	2006	-10	-109	7.52
1	2006	-9	-110	6.48
1	2006	-7	-110	5.88
1	2006	-6	-110	12.3
1	2006	-4	-110	11.4
1	2006	-3	-110	7.925
1	2006	-2	-110	7.385
1	2006	-1	-110	8.82
6	2007	43	-18	4.516364
6	2007	44	-18	3.2
7	2007	42	-18	1.657576

7	2007	42	-17	1.738462
7	2007	42	-16	1.314286
7	2007	43	-65	9.643333
7	2007	43	-64	3.18
7	2007	43	-18	2.565
7	2007	43	-17	1
7	2007	43	-16	2.356452
7	2007	44	-63	0.475
7	2007	44	-62	2.29
7	2007	44	-61	2.855
7	2007	44	-60	3.345
7	2007	44	-59	0.555
7	2007	44	-18	3.35
7	2007	44	-16	3.6
7	2007	44	-15	1.6
7	2007	45	-59	3.42925
7	2007	45	-58	5.342
7	2007	45	-57	0.698
7	2007	45	-56	0.785333
7	2007	45	-20	5.2
7	2007	46	-56	1.0135
7	2007	46	-55	2.39
7	2007	46	-54	4.677143
7	2007	46	-53	2.85
7	2007	47	-52	1.77
7	2007	47	-51	2.32
7	2007	47	-15	0.2
7	2007	48	-51	2.756667
7	2007	48	-50	4.53
7	2007	48	-49	3.62
7	2007	49	-49	7.515833
7	2007	49	-48	11.24333
7	2007	50	-48	13.4
7	2007	50	-47	16.16
7	2007	50	-46	9.953333
7	2007	51	-46	12.38333

7	2007	51	-45	7.863333
7	2007	51	-44	4.11
7	2007	52	-44	2.56
7	2007	52	-43	4.972857
7	2007	52	-42	5.46
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7	2007	53	-42	5.613333
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7	2007	53	-40	9.71
7	2007	53	-15	19.86667
7	2007	53	-14	33.4
7	2007	54	-14	19.2
7	2007	54	-13	19.88571
7	2007	54	-12	8.866667
7	2007	55	-12	18.4
7	2007	55	-11	16.05
7	2007	55	-10	10.36667
7	2007	55	-9	6.5
3	2008	-54	-37	1.484615
3	2008	-53	-37	0.7
3	2008	-52	-38	2.35
3	2008	-52	-37	2.15
3	2008	-51	-39	2.630435
3	2008	-51	-38	4.568376
3	2008	-51	-37	2.811864
3	2008	-51	-36	0.6
3	2008	-50	-39	5.26
3	2008	-50	-38	3.65
3	2008	-50	-37	2.933333
4	2008	-52	-37	1.7
4	2008	-51	-38	0.7
4	2008	-51	-37	1.326667
4	2008	-50	-40	2.9
4	2008	-46	-46	1.2
4	2008	-45	-47	1.55
4	2008	-45	-46	2.175

10	2008	-20	-86	2.873684
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10	2008	-20	-81	8.86
10	2008	-20	-80	10.08
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10	2008	-2	-83	14
10	2008	-1	-83	3.3
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11	2008	-22	-74	1.92

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11	2008	-22	-70	0.6
11	2008	-21	-85	2.43913
11	2008	-21	-84	2.844444
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11	2008	-21	-79	5.1
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11	2008	-21	-74	1.8
11	2008	-20	-85	2.016667
11	2008	-20	-84	3.495455
11	2008	-20	-78	5.38
11	2008	-20	-77	2.62
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11	2008	-19	-73	1.02
11	2008	-19	-72	1.56
11	2008	-19	-71	1.715385
12	2008	-21	-71	1.5
12	2008	-21	-70	0.9
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1	2012	-23	-120	12.1
1	2012	-23	-100	6.6
1	2012	-20	-100	26.1

2	2012	-46	173	8.749756
2	2012	-46	174	9.959917
2	2012	-45	174	9.940588
2	2012	-45	175	19.82411
2	2012	-44	174	19.03833
2	2012	-44	175	26.07352
2	2012	-44	176	14.77714
2	2012	-44	177	21.17849
2	2012	-44	178	7.062713
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2	2012	-44	180	9.729116
2	2012	-44	181	3.49889
2	2012	-43	175	4.986496
2	2012	-43	179	5.614133
2	2012	-43	180	9.145043
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3	2012	-44	-180	7.5
3	2012	-44	173	9.406773
3	2012	-44	174	11.11755
3	2012	-44	175	17.04101
9	2012	43	-133	14.8
9	2012	47	-180	9.8
9	2012	47	170	7.4
10	2013	53	-49	0.258138
10	2013	53	-48	0.140438
10	2013	53	-47	0.116901
10	2013	53	-46	0.274299
10	2013	53	-45	0.42615
10	2013	53	-44	0.330985
10	2013	53	-43	0.186145
10	2013	54	-47	0.328994
10	2013	54	-46	0.435587
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10	2013	54	-44	0.272545
10	2013	55	-46	0.259339
10	2013	56	-46	0.152437

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10	2013	58	-46	0.292686
10	2013	58	-45	0.734069
10	2013	59	-50	0.372846
10	2013	59	-45	0.369968
10	2013	60	-51	0.148186
10	2013	61	-51	0.143013
10	2013	62	-52	0.116265
10	2013	62	-51	0.173884
10	2013	63	-52	0.116019
11	2013	41	-65	0.790641
11	2013	41	-64	0.859507
11	2013	41	-63	0.672312
11	2013	42	-64	0.778588
11	2013	42	-63	0.136175
11	2013	43	-63	0.208599
11	2013	43	-62	0.119829
11	2013	44	-62	0.131688
11	2013	44	-61	0.168166
11	2013	45	-61	0.12096
11	2013	45	-60	0.238417
11	2013	46	-60	0.239039
11	2013	46	-59	0.20804
11	2013	47	-60	0.440808
11	2013	47	-59	0.184634
11	2013	48	-60	0.305009
11	2013	49	-60	0.237817
11	2013	49	-59	0.334803
11	2013	50	-58	0.289316
11	2013	51	-57	0.3235
11	2013	52	-57	0.191453
11	2013	52	-56	0.188311
11	2013	52	-55	0.2374
11	2013	52	-54	0.346499
11	2013	52	-53	0.411235
11	2013	52	-52	0.371889

11	2013	52	-51	0.374102
11	2013	52	-50	0.391167
11	2013	52	-49	0.357335
11	2013	52	-48	0.229348
11	2013	52	-47	0.294404
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1	2014	33	-175	11.1

5

Supplementary Figures :

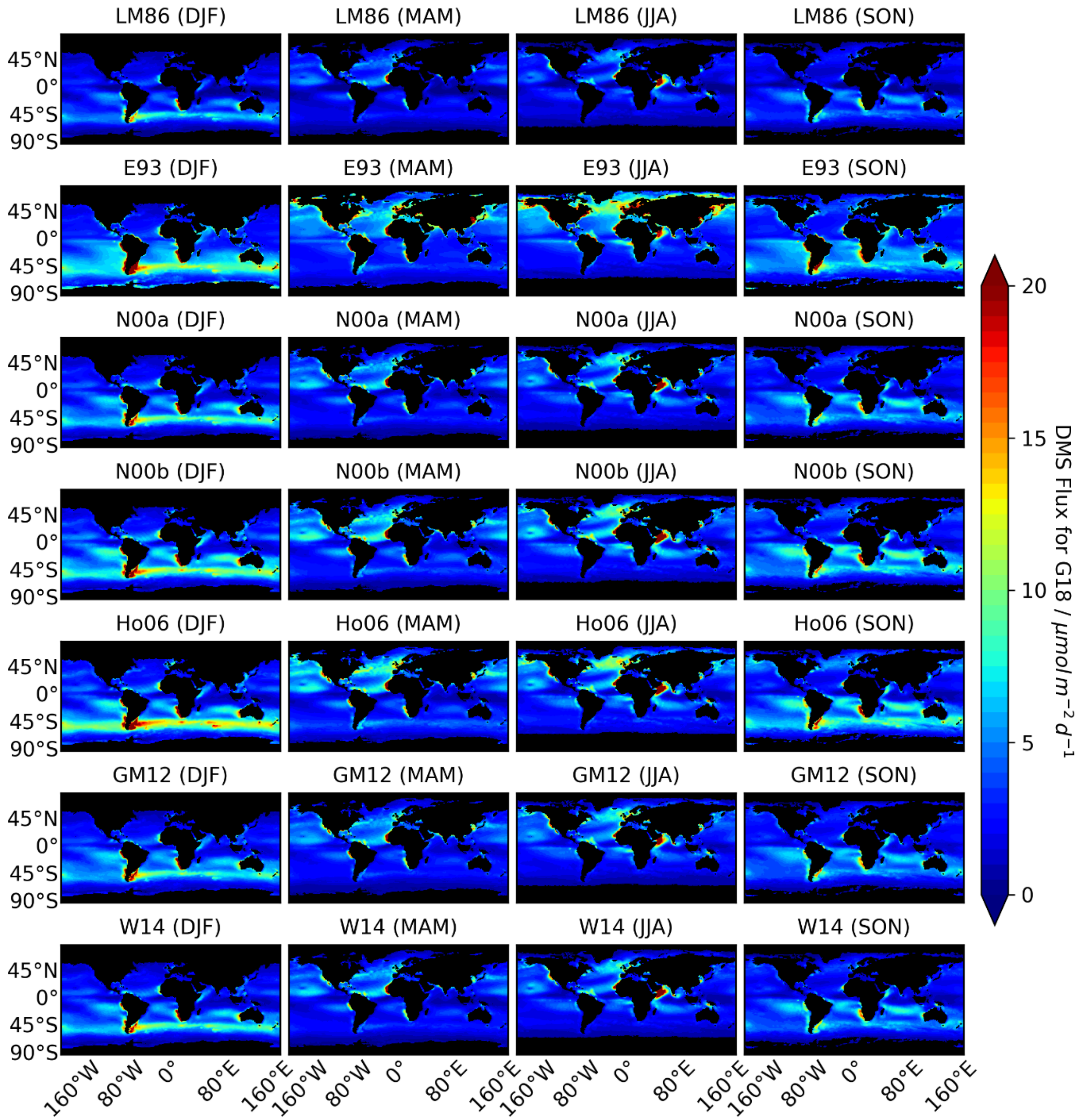

Figure S1: DMS flux estimation using seven different parameterizations for different seasons using the G18 climatology. In the JJA season, the maximum flux of 44.75 µmol m^{-2} d^{-1} is observed in Arabian sea near Oman with N00b. In DJF season, the highest value of 49.34 µmol m^{-2} d^{-1} in the South Atlantic Ocean near coast of Namibia with Ho06 is observed.

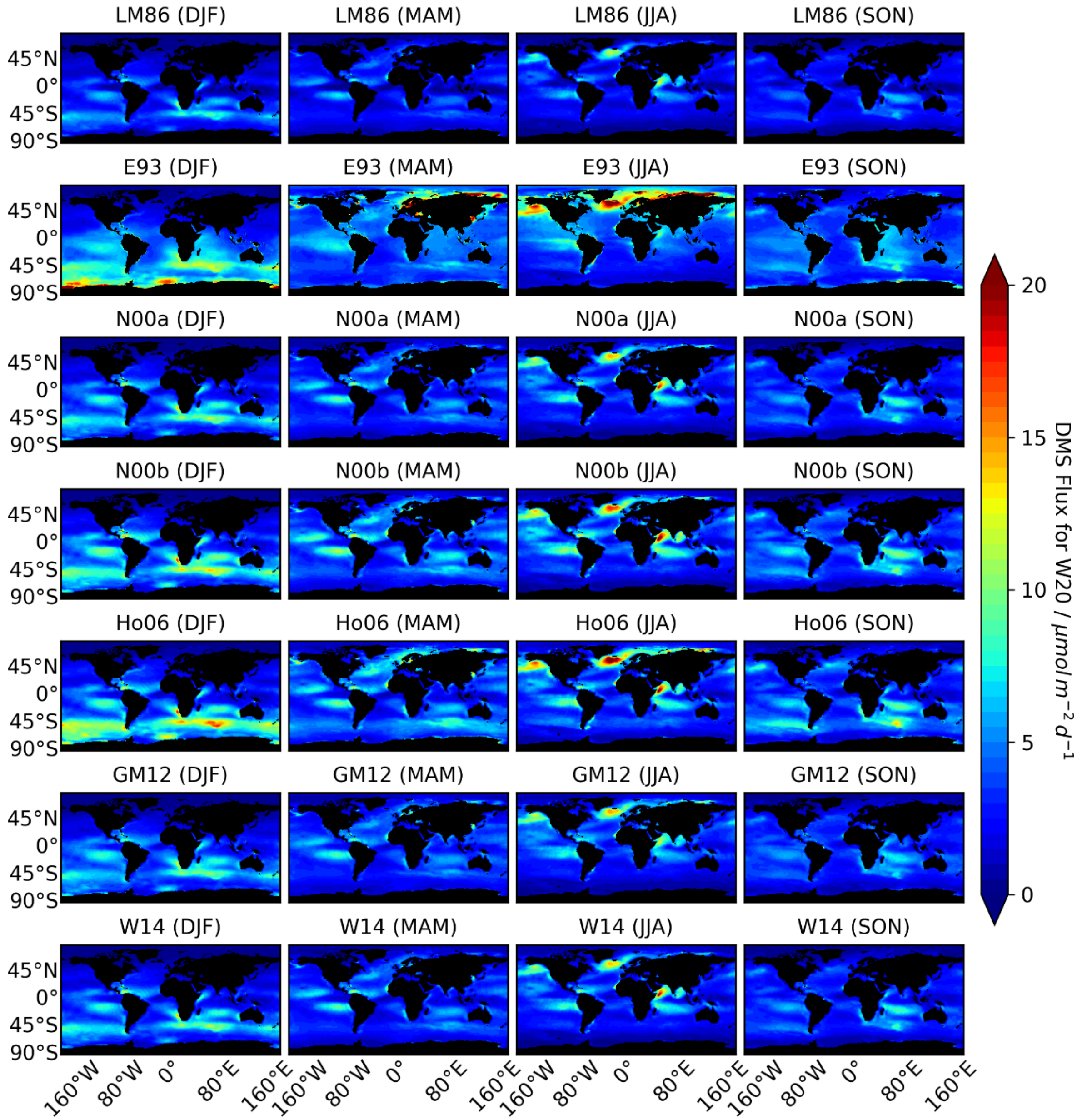

Figure S2: DMS flux estimation using seven different parameterizations for different seasons using the W20 climatology. E93 calculates the highest flux value of 27.86 µmol m^{-2} d^{-1} in the region of Amundsen Sea around the Antarctic coastal region in DJF season while in JJA season it calculated highest flux of 44.94 µmol m^{-2} d^{-1} in Kara Sea region

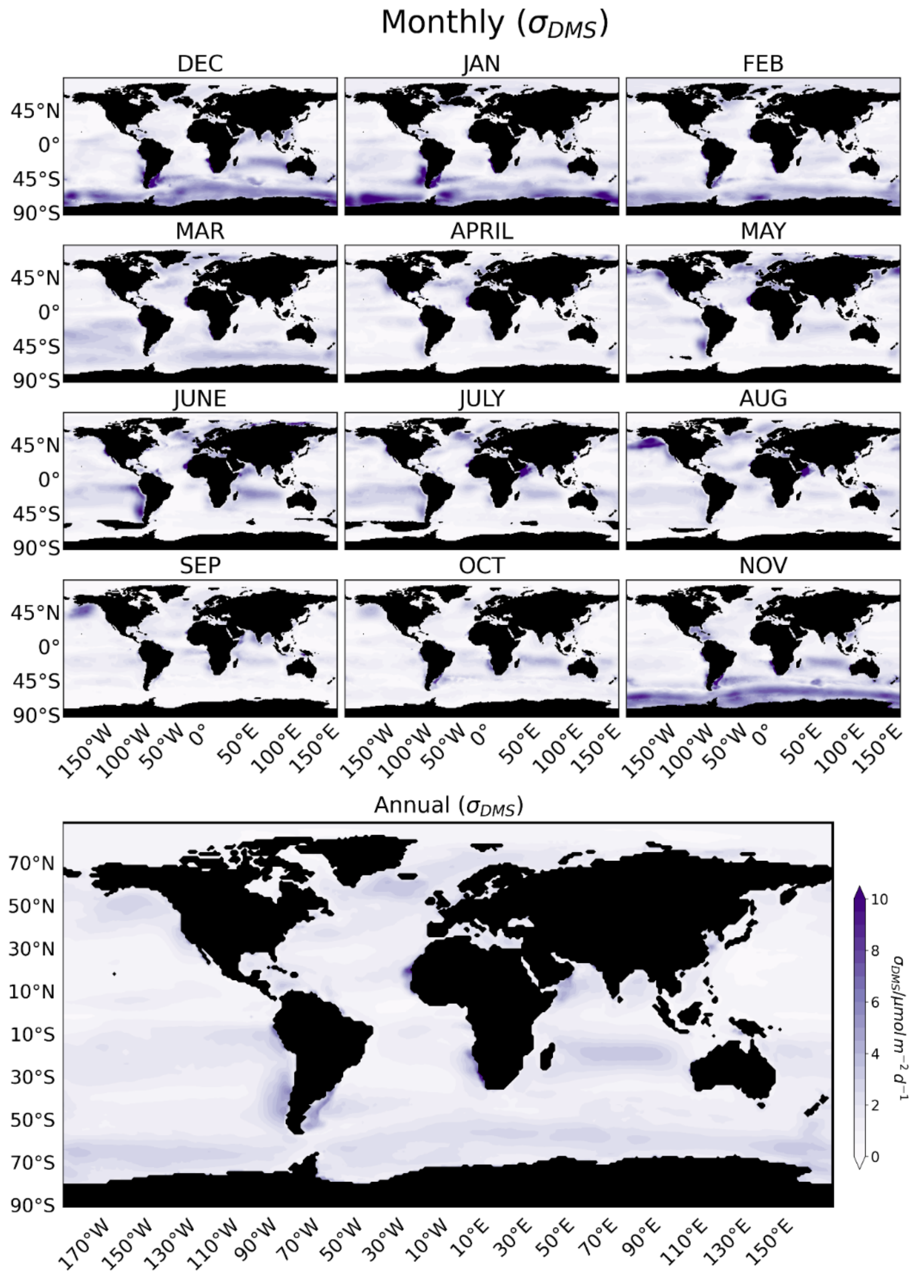

Figure S3: Standard deviation in DMS flux due to the standard deviation in seawater DMS concentration. In DJF, a maximum deviation of 34.64 µmol m^{-2} d^{-1} near the coast of Namibia of the South Atlantic Ocean in January is observed. In the MAM season, the maximum deviation of 20.55 µmol m^{-2} d^{-1} near the Gulf of Kutch in Arabian Sea is observed in May. In the JJA season, it is 23.87 µmol m^{-2} d^{-1} near the coast of Oman in the Arabian Sea in July. In the SON season, the maximum deviation of 18.40 µmol m^{-2} d^{-1} near coast of Namibia in South Atlantic Ocean during November is observed. On an annual scale, the maximum deviation obtained is 11.42 µmol m^{-2} d^{-1} near the coast of Namibia.

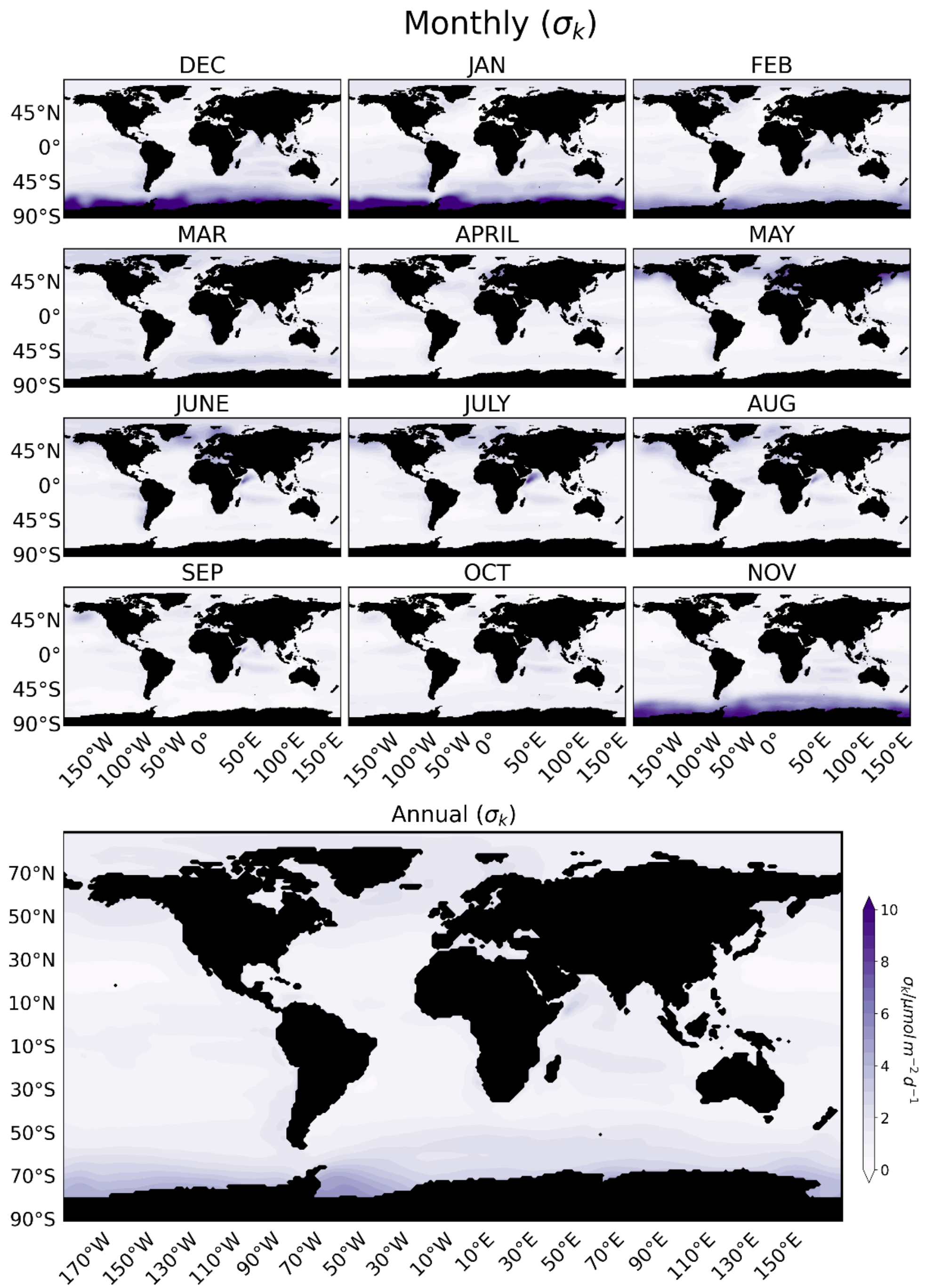

Figure S4: Standard deviation in DMS flux due to the standard deviation between different flux parameterizations. In DJF, a maximum deviation of 21.70 µmol m^{-2} d^{-1} near the Atlantic Peninsula in January is observed. In the MAM season, the maximum deviation of 9.12 µmol m^{-2} d^{-1} is observed in the Gulf of Alaska during May. In the JJA season, the maximum is 8.86 µmol m^{-2} d^{-1} near the Somali basin, which is observed in July. In the SON season, the maximum deviation of 10.43 µmol m^{-2} d^{-1} near the Antarctic Peninsula is observed. On an annual scale, the maximum deviation obtained is 5.35 µmol m^{-2} d^{-1} near the Antarctic Peninsula region.

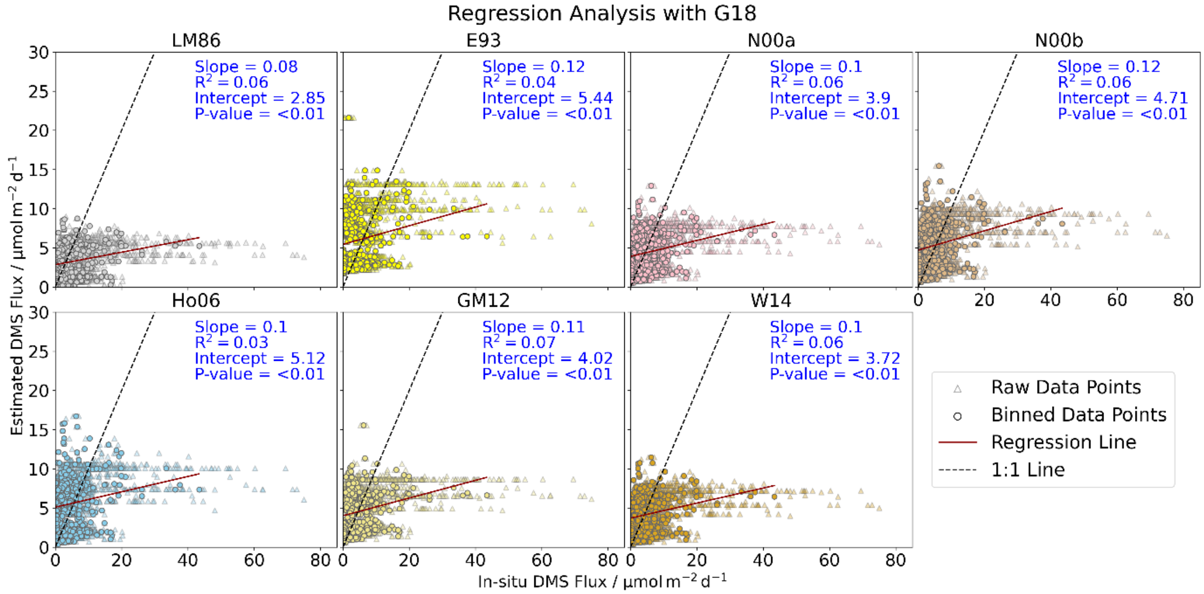

Figure S5: The regression between the in situ and estimated DMS fluxes using G18 with the N00b parameterization and the other six parameterizations show that regression with in situ data seems to be poor with R^2 values ranging from 0.03 to 0.07. Dark red line is the regression between binned in situ DMS flux and estimated DMS flux points. Black dash-line is the 1:1 representation between in situ flux points and estimated flux points.

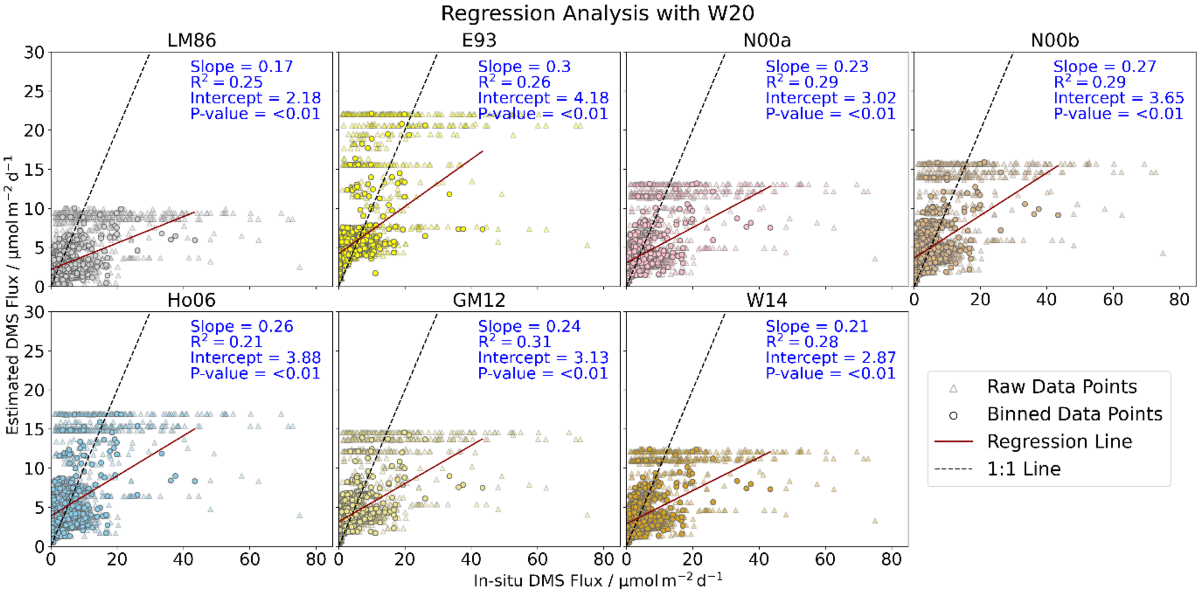

Figure S6: The regression between the in situ and estimated DMS fluxes using G18 with the N00b parameterization and the other six parameterizations show that regression with in situ data seems to be poor with R^2 values ranging from 0.21 to 0.31. Dark red line is the regression between binned in situ DMS flux and estimated DMS flux points. Black dash-line is the 1:1 representation between in situ flux points and estimated flux points

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