Supplementary information

Low contributions of dimethyl sulfide (DMS) chemistry to atmospheric aerosols over the high Arctic Ocean

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Supplementary figures:

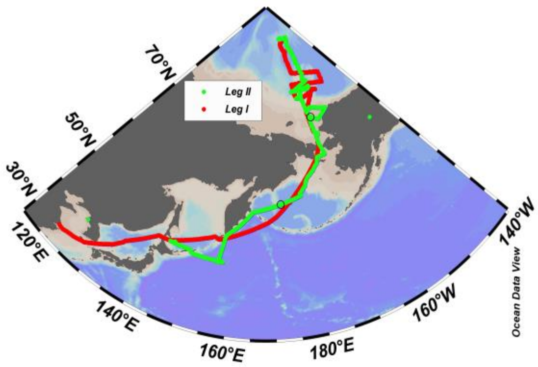

Fig. S1. The cruise tracks of the observation in the Arctic Ocean.

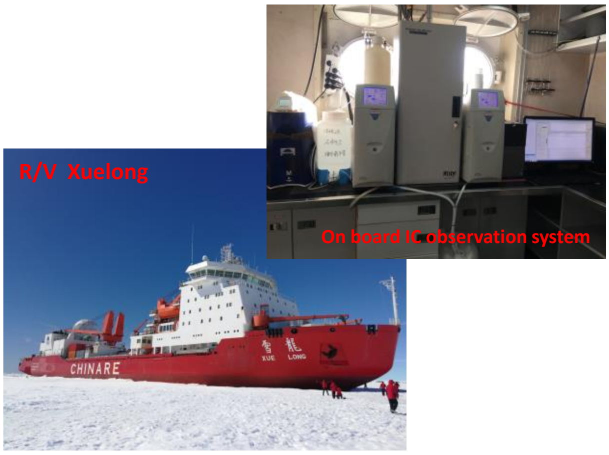

Fig. S2. Gases and aerosols monitoring system. An underway aerosols monitoring system were deployed on the R/V “Xuelong” to carried out the observation in the Arctic Ocean (AO). An ambient Ion Monitor-Ion Chromatograph (AIM-IC, URG9000D, Thermo Fisher Scientific Co. Ltd) was used to determine the gaseous and aerosol water soluble ions.

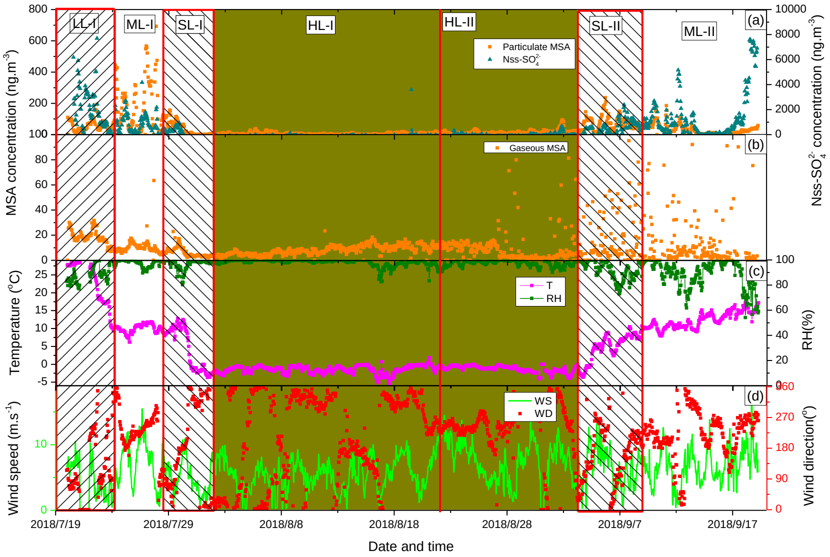

Fig. S3. Time series of MSAg, MSAp, nss-SO_4^{2-} and major metrological parameters during the observation period, (a) time series of MSAp and nss-SO_4^{2-}; (b) time series of MSAg; (c) time series of temperature and RH; (d) time series of wind speed and wind directions.

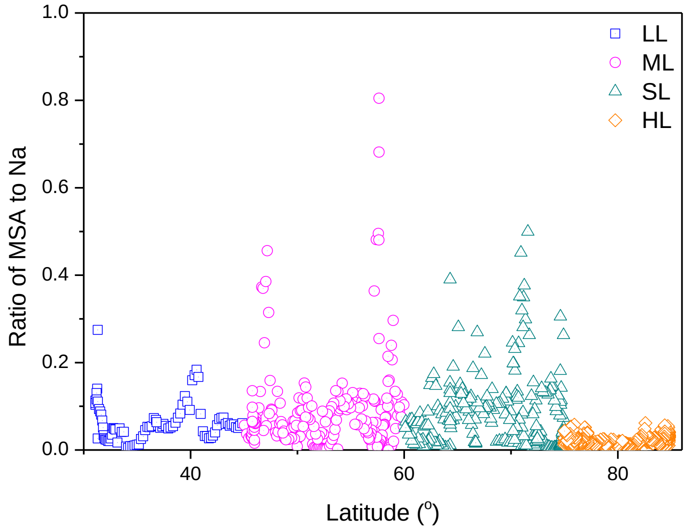

Fig. S4. Latitudinal distributions of MSA^- to Na^+ ratios in different regions.

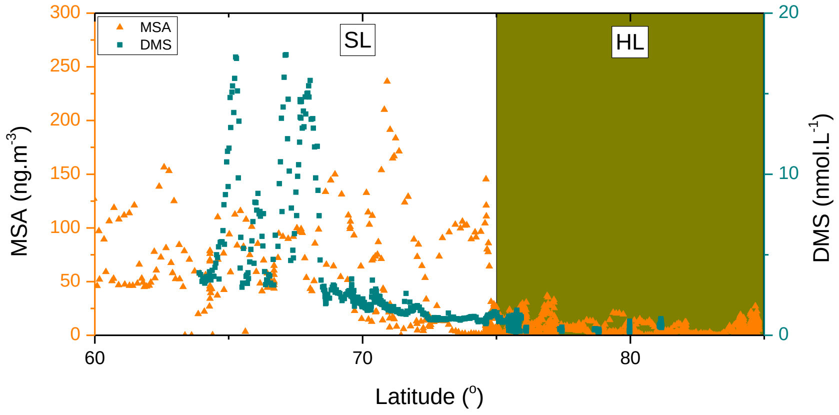

Fig. S5. Latitudinal distributions of MSA and DMS concentrations.

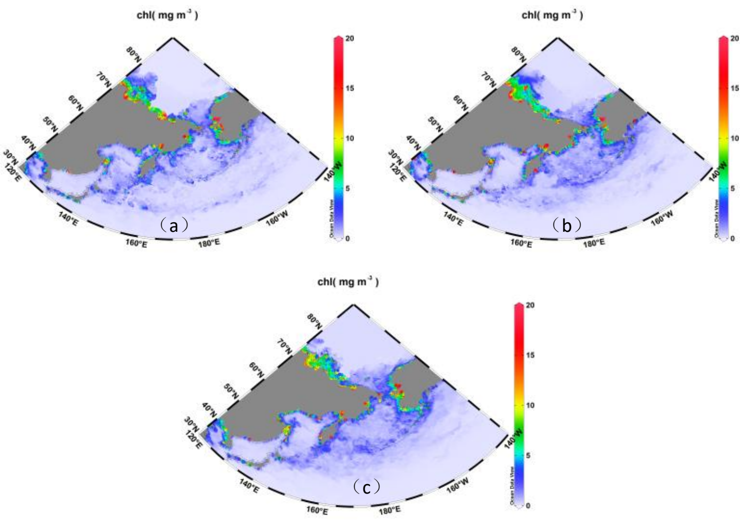

Fig.S6 Chlorophyll-a concentrations during the observation periods, (a) Average chlorophyll-a concentrations in July; (b) Average chlorophyll-a concentrations in August; (a) Average chlorophyll-a concentrations in September.

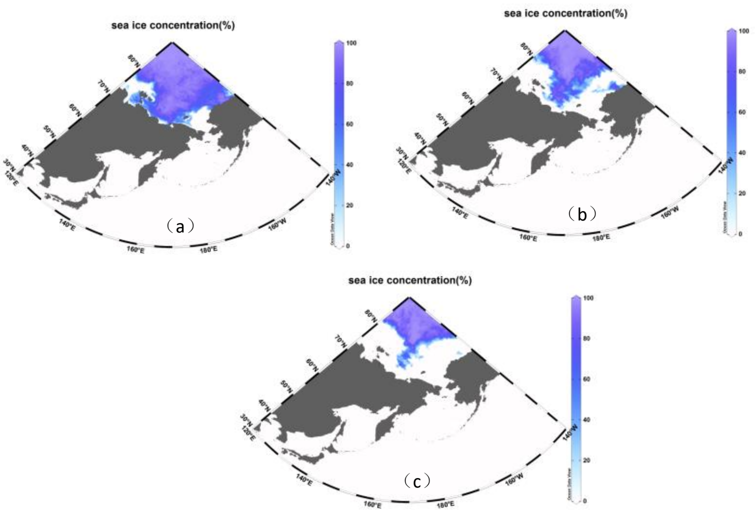

Fig.S7 Sea ice concentrations during the observation periods, (a) Average sea ice concentrations in July; (b) Average sea ice concentrations in August; (a) Average sea ice concentrations in September.

Supplementary tables:

Table S1 Calibration of anion for online aerosol monitoring system

Peak No.	Peak Name	Cal. Type	Eval. Type	Coeff. of Determination (r^2)	C0 (Offset)	C1 (Slope)
1	F^-	Lin, With Offset	Area	0.99982	0.1096	306.9753
2	$C_2H_3O_2^-$	Lin, With Offset	Area	0.99918	0.0051	77.396
3	$C_3H_5O_2^-$	Lin, With Offset	Area	0.99982	-0.0171	32.505
4	HCO_2^-	Lin, With Offset	Area	0.99933	-0.0215	113.7341
5	MSA^-	Lin, With Offset	Area	0.99987	-0.0028	63.5009
6	$C_4H_7O_2^-$	Lin, With Offset	Area	0.99931	0.0058	38.6108
7	$C_5H_9O_2^-$	Lin, With Offset	Area	0.99935	-0.0015	33.9728
8	Cl^-	Lin, With Offset	Area	0.99994	0.0323	184.942
9	NO_2^-	Lin, With Offset	Area	0.99937	0.004	143.8679
11	Br^-	Lin, With Offset	Area	0.99993	-0.0035	74.9207
12	NO_3^-	Lin, With Offset	Area	0.99914	-0.0253	113.7953
15	SO_4^{2-}	Lin, With Offset	Area	0.99919	0.042	130.6983
17	$C_2HO_4^-$	Lin, With Offset	Area	0.99986	0.0052	111.7235

Table S2 Calibration of cation for online aerosol monitoring system

Peak No.	Peak Name	Cal. Type	Eval. Type	Coeff. of Determination (r^2)	C0 (Offset)	C1 (Slope)
2	Li^+	Lin, With Offset	Area	0.99977	-0.0574	669.4003
3	Na^+	Lin, With Offset	Area	0.99979	0.0433	199.8333
4	NH_4^+	Lin, With Offset	Area	0.99938	0.0720	210.4199
5	K^+	Lin, With Offset	Area	0.99908	-0.0184	114.8985
6	MMA^+	Lin, With Offset	Area	0.99950	-0.0311	148.0498
7	DMA^+	Lin, With Offset	Area	0.99978	0.0026	79.8318
8	TMA^+	Lin, With Offset	Area	0.99935	-0.0033	62.5532
9	DEA^+	Lin, With Offset	Area	0.99941	0.0010	53.3213
10	TEA^+	Lin, With Offset	Area	0.99921	-0.0018	36.4090
11	Mg^{2+}	Lin, With Offset	Area	0.99991	-0.0189	369.8892
12	Ca^{2+}	Lin, With Offset	Area	0.99933	0.0428	236.5497

Table. S3 Gaseous and particulate MSA levels in different regions

Region	Longitude (°)	Latitude (°N)	$MSA_{g(min)}$ ($ng \cdot m^{-3}$)	$MSA_{g(max)}$ ($ng \cdot m^{-3}$)	$MSA_{g(Avg.)}$ ($ng \cdot m^{-3}$)	$MSA_{p(min)}$ ($ng \cdot m^{-3}$)	$MSA_{p(max)}$ ($ng \cdot m^{-3}$)	$MSA_{p(Avg.)}$ ($ng \cdot m^{-3}$)
Leg I	121.6 E – 150 W	31.3 – 85	1.5	63.5	9.4±7.1	-	692.4	41.9±90.4
Leg II	143 E – 155 W	45 – 85	-	268.9	17.0±34.3	-	236.4	31.5±35.4
LL-leg I	121.6 E – 139.7 E	31.3 – 45	12.2	31.6	21.0±12.3	12.2	192.7	57.9±38.5
LL-leg II	-	-	-	-	-	-	-	-
ML-leg I	139.9 E – 179.7 E	45 – 60	4.3	63.5	10.0±5.9	7.6	692.4	168.6±167.6
ML-leg II	143.8 E – 178.8 W	44.9 – 60	-	92.0	13.9±15.2	1.6	185.2	29.3±32.0
SL-leg I	158.2 W – 179.9 W	60 – 75	1.7	22.9	5.5±3.5	-	165.4	29.4±39.7
SL-leg II	163 – 177	60 – 75	-	228.4	24.2±46.8	6.7	236.4	68.3±44.2
HL-leg I	134.6 W – 172.3 W	75 – 85	1.5	23.3	8.5±3.6	-	36.7	6.0±6.4
HL-leg II	155.8 W – 173.8 W	75 – 85	-	81.3	8.4±11.2	-	39.4	13.4±7.2