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Aerosol organic nitrogen across the global marine boundary layer: distribution patterns and controlling factors

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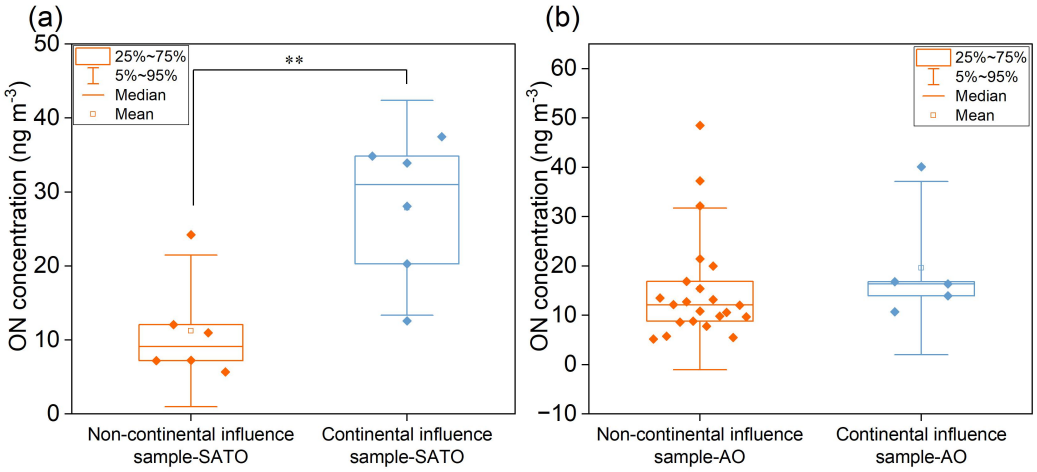

Figure S1. Comparison of measured ON concentrations in different air mass sources of the Southeast Asia-Australia Tropical Ocean region (a, SATO) and the Arctic Ocean region (b, AO) ("**" indicating $p < 0.01$).

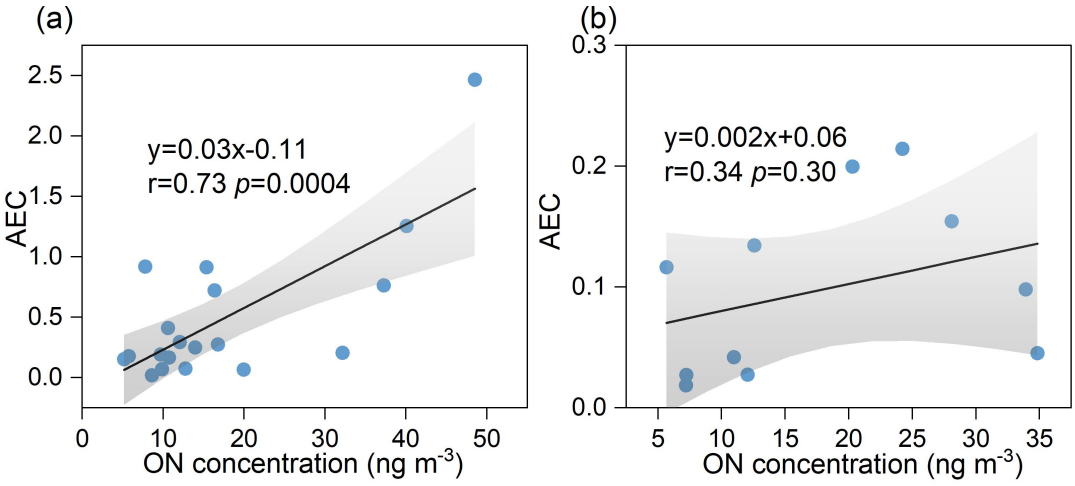

Figure S2. Correlations between AEC and ON concentration in aerosol samples of the the Arctic Ocean region (a, AO) and Southeast Asia-Australia Tropical Ocean region (b, SATO) .

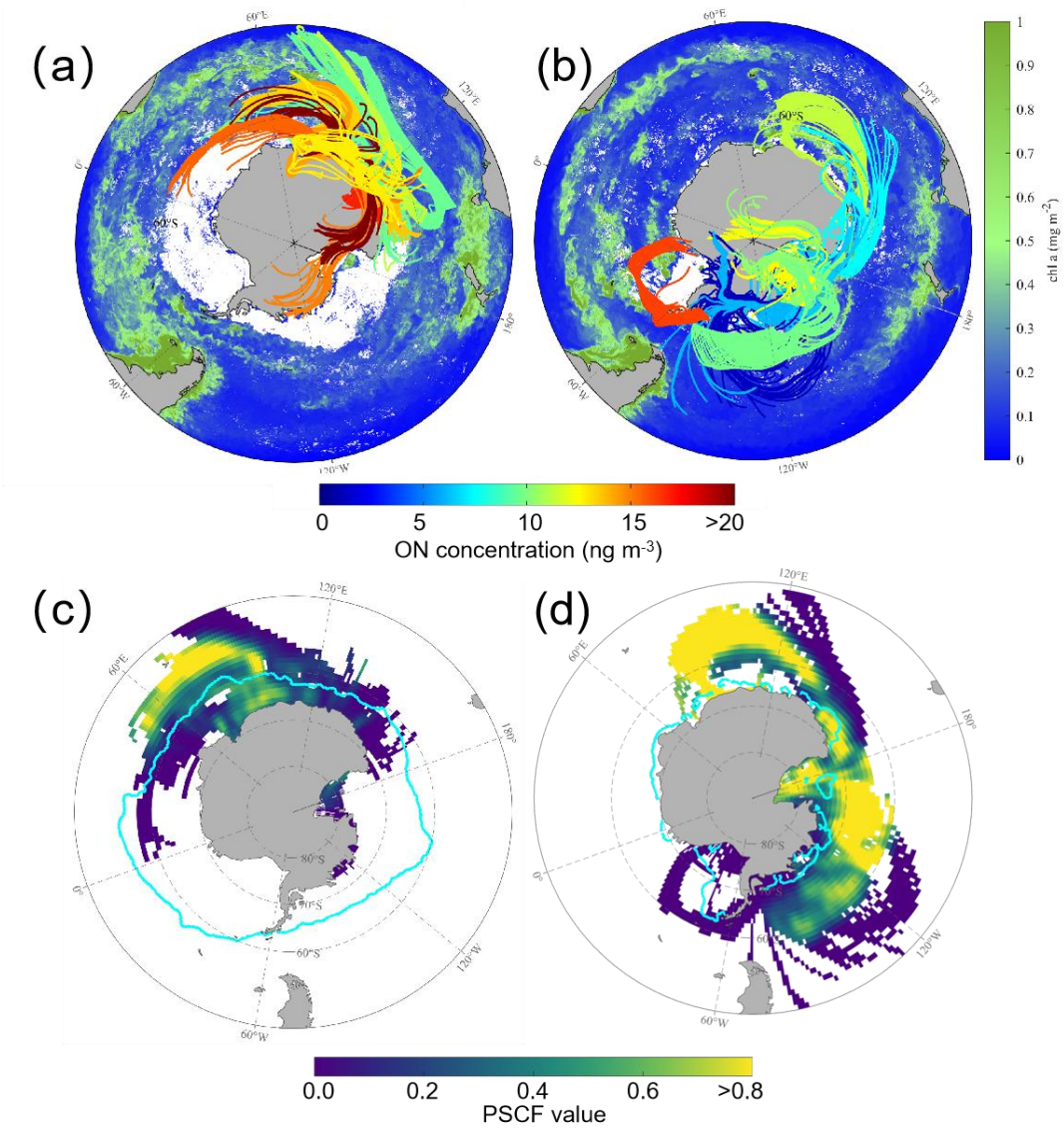

Figure S3. Comparison of measured ON concentrations in different sampling periods around Antarctica continent. Panels (a) and (b) show samples influenced by sea ice (SI) and open ocean (OO) air masses, respectively. (c-d) Identification of potential source regions for aerosol ON using Potential Source Contribution Function (PSCF) analysis. Aerosol ON measurement data were combined with air mass backward trajectories to quantify the probability of grid cells being sources of high ON concentrations (defined as exceeding the 75th percentile). (c) PSCF map for SI samples; (d) PSCF map for OO samples. Color scale indicates PSCF weighting factors. The white area to panel (a) and (b) and blue line to panel (c) and (d) represent the corresponding sea ice extent.

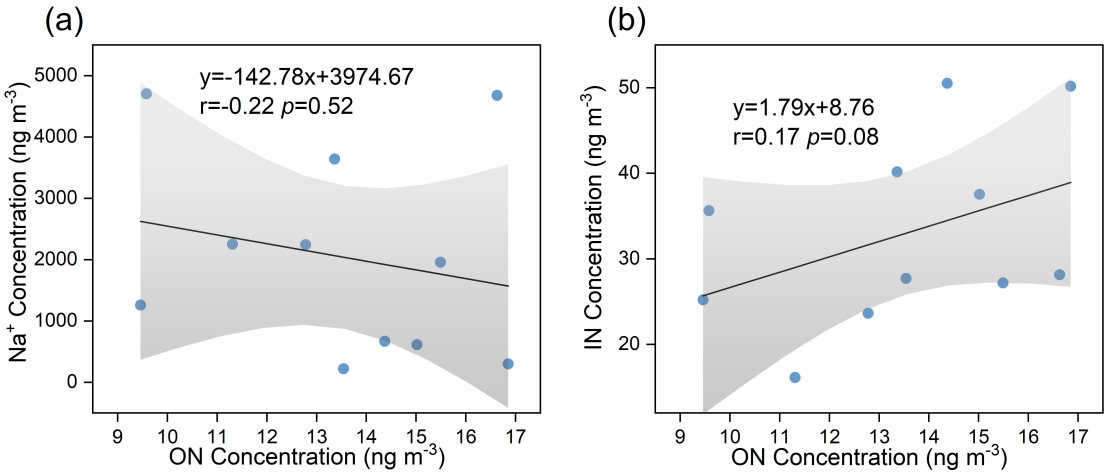

Figure S4. Correlations between Na^+ (a), IN (b) and ON concentration in samples in air masses with sea ice influence.

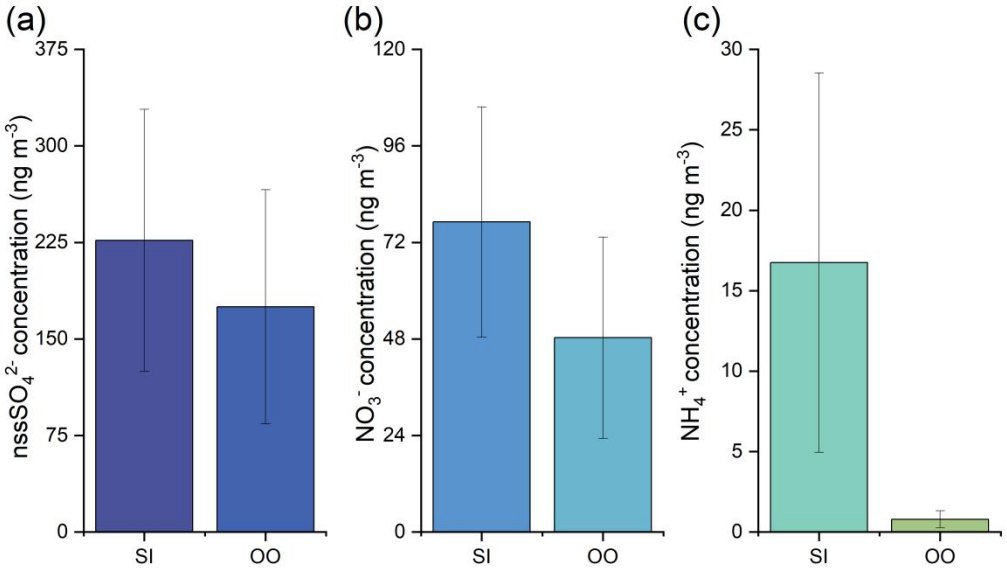

Figure S5. Comparison of the chemical concentrations samples in air masses with (sea ice, SI) and without (open ocean, OO) sea ice influence. (a) Concentration of $nssSO_4^{2-}$. (b) Concentration of NO_3^-. (c) Concentration of NH_4^+.

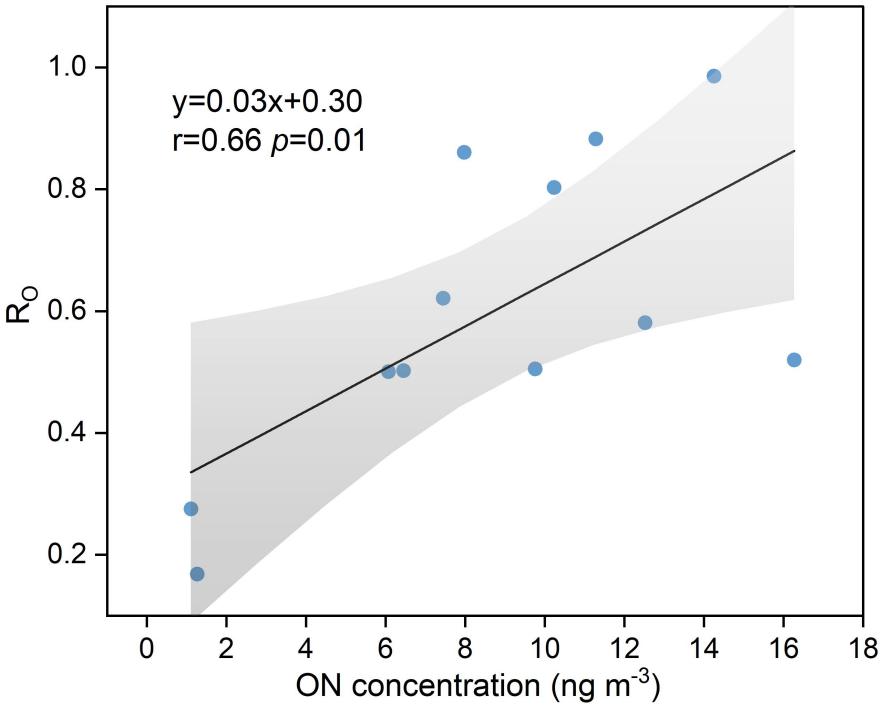

Figure S6. Correlations between oceanic residence time (R_O) and ON concentration in samples in air masses without sea ice influence.

Table S1. Normality assessment and non-parametric statistical tests for comparisons.

Comparison	Group A (n)	Group B (n)	Shapiro–Wilk p (A)	Shapiro–Wilk p (B)	Test applied	p-value
ON (NH vs SH)	51	40	2.27×10^{-11}	1.02×10^{-6}	Mann–Whitney U	8.43×10^{-4}
ON (Sea-ice vs non–sea-ice)	13	11	0.585	7.58×10^{-4}	Mann–Whitney U	2.01×10^{-3}
ON/TN (Sea-ice vs non–sea-ice)	13	11	0.0107	0.69	Mann–Whitney U	9.01×10^{-4}