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

Ningning Sun[1,2], Xu Yu[2,3], Jian Zhen Yu[2,4*], Bo Zhang[1], Yilan Li[1,5,], Ye Hu[1], Zhe Li[1], Zhenlou Chen[1], Guitao Shi[1*]

[1] Key Laboratory of Geographic Information Science (Ministry of Education), School of Geographic Sciences and State Key Laboratory of Estuarine and Coastal Research, East China Normal University, Shanghai , China

[2] Division of Environment and Sustainability, Hong Kong University of Science & Technology, Clear Water Bay, Kowloon, Hong Kong, China

[3] Jiangsu Key Laboratory of Atmospheric Environment Monitoring and Pollution Control, Jiangsu Collaborative Innovation Center of Atmospheric Environment and Equipment Technology, Joint International Research Laboratory of Climate and Environment Change, School of Environmental Science and Engineering, Nanjing University of Information Science and Technology, Nanjing, Jiangsu, China

[4] Department of Chemistry, Hong Kong University of Science & Technology, Clear Water Bay, Kowloon, Hong Kong, China

[5] Department of Chemistry, State University of New York College of Environmental Science and Forestry, Syracuse, NY, USA

*Correspondence:

Jian Zhen Yu (jian.yu@ust.hk)

Guitao Shi (gtshi@geo.ecnu.edu.cn)

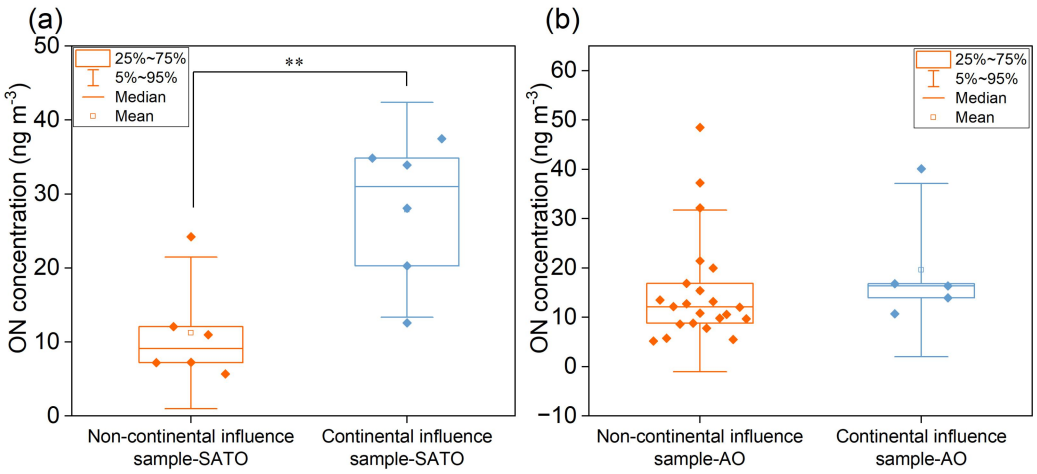

Figure S1. Comparison of measured ON concentrations in different air mass sources of the SATO (a) and AO (b) regions ("**" indicating $p < 0.01$).

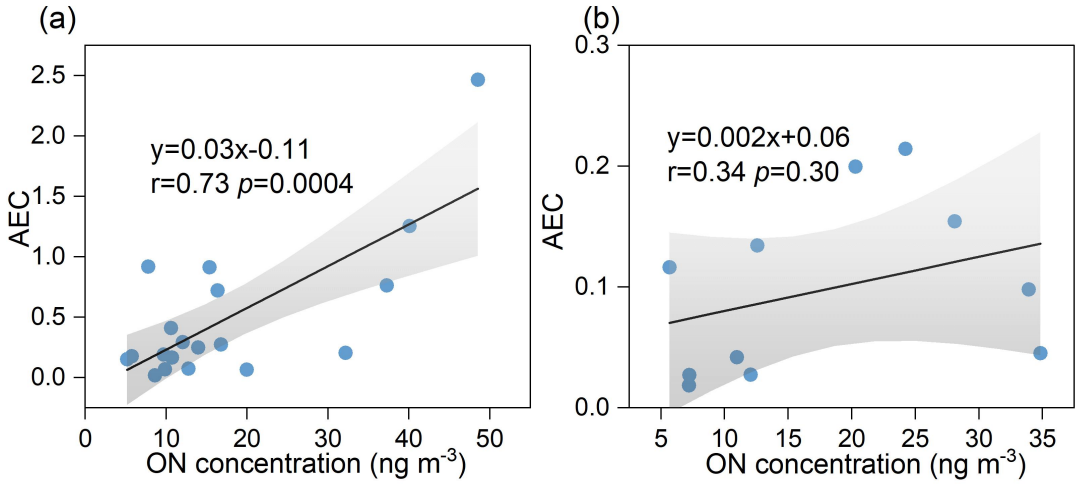

Figure S2. Correlations between AEC and ON concentration in aerosol samples of the AO (a) and SATO (b) regions.

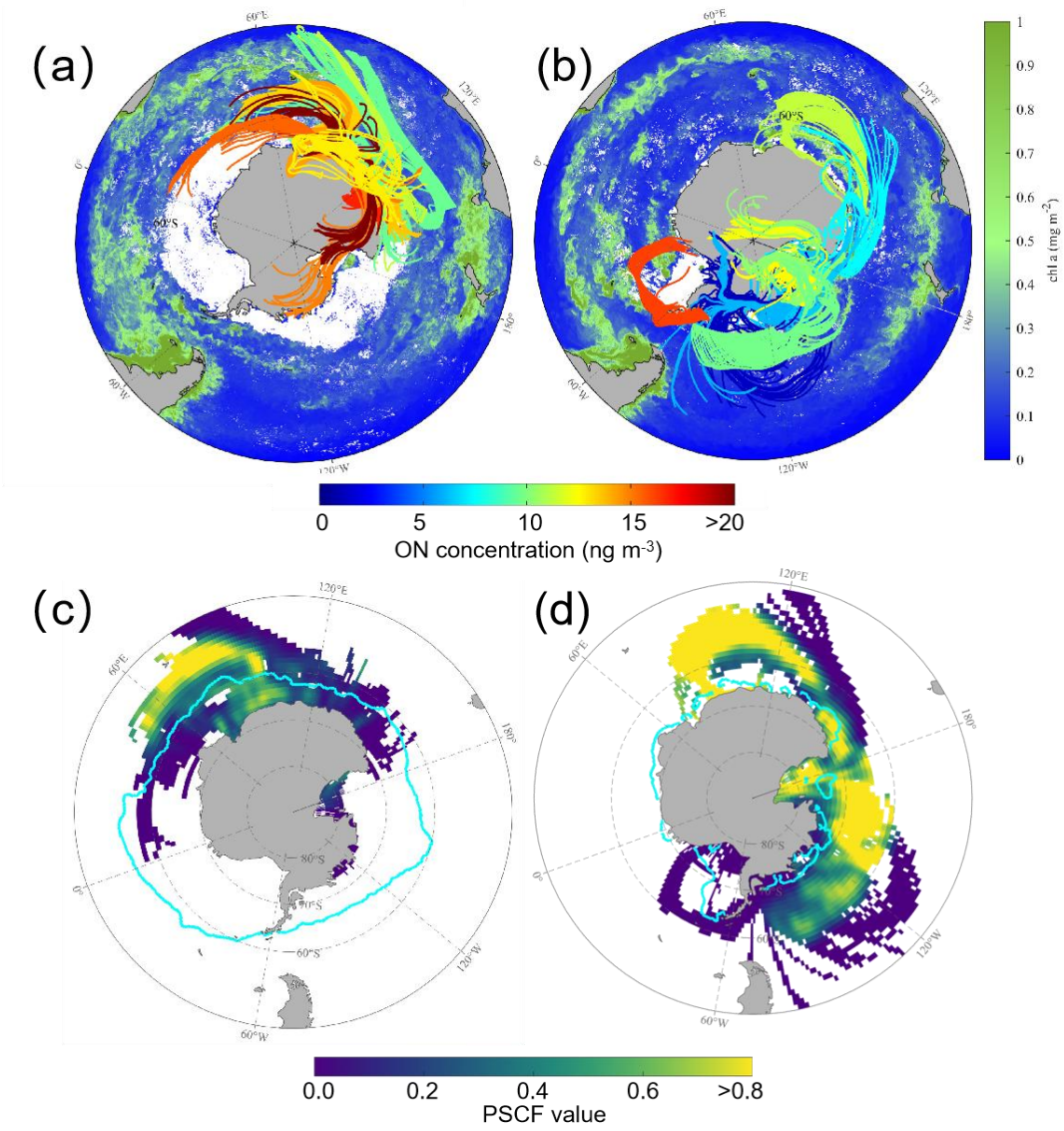

Figure S3. Comparison of measured ON concentrations in different sampling period around Antarctica continent. Samples in air masses with (a, sea ice, SI) and without (b, open ocean, OO) sea ice influence. Apportioning of the origin of organic nitrogen in aerosols by Probability Source Contribution Function (PSCF) analysis. Continuous aerosol mass spectrometry data were combined with air-mass back trajectory analysis to quantify the probability of pixels to be the source of high ON concentrations in aerosols (defined as above the 3rd quartile). (c) SI samples; (d) 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.

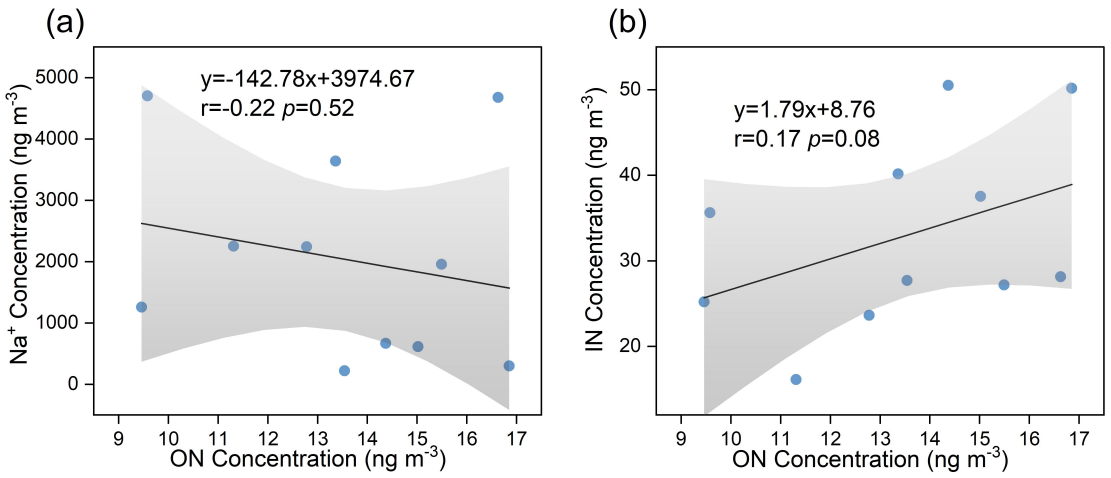

Figure S4. Correlations between Na^+ (a), IN (b) and ON concentration in SI aerosol samples.

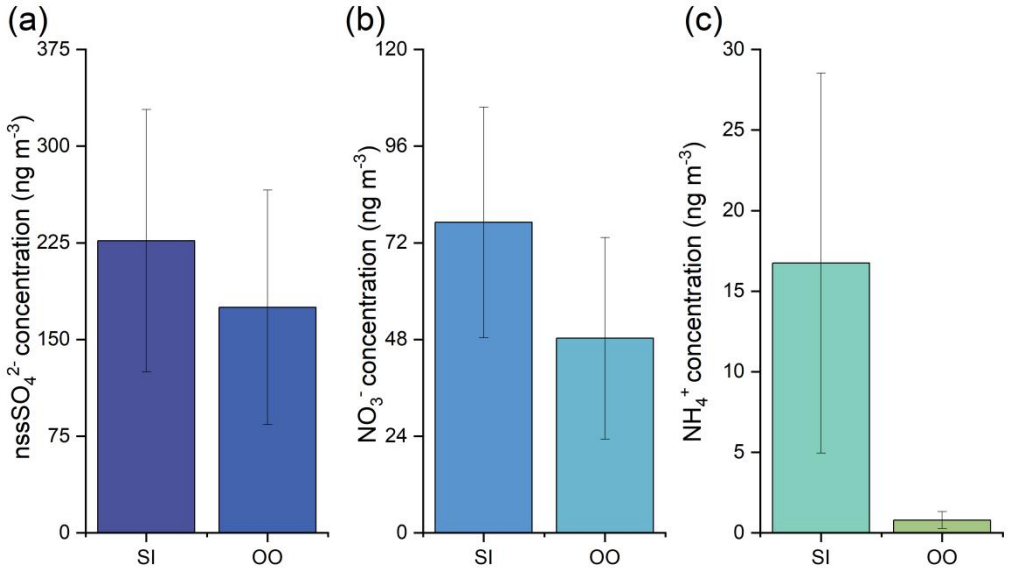

Figure S5. Comparison of the chemical concentrations in SI and OO samples. (a) Concentration of $nssSO_4^{2-}$. (b) Concentration of NO_3^-. (c) Concentration of NH_4^+.

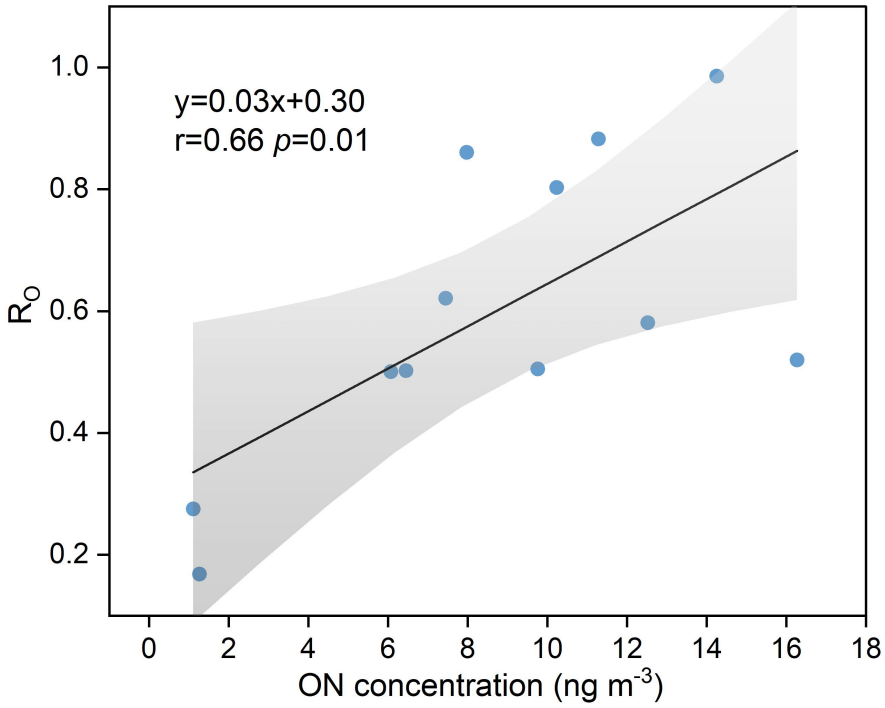

Figure S6. Correlations between R_O and ON concentration in OO aerosol samples.