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Spatio-Temporal Variations in Organic Carbon Composition Driven by Different Major Phytoplankton Communities in the Ross Sea, Antarctica

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To investigate the variation in organic carbon composition characterized by different algal assemblages, different forms of organic matter were measured in the northwestern Ross Sea during February-March 2018 and January 2019. The average concentrations of Chl-*a* (Chl-*a*), particulate organic carbon (POC), dissolved organic carbon (DOC), and transparent exopolymer particle (TEP) were 0.74 ± 0.44, 142.49 ± 28.78, 532.49 ± 128.14 μg L^{-1}, and 96.26 ± 35.63 μg Xeq. L^{-1}, in 2018, and 0.23 ± 0.13, 147.99 ± 24.24, 980.45 ± 341.7 μg L^{-1}, and 53.77 ± 33.75 μg Xeq. L^{-1} in 2019, respectively. These concentrations varied with the *P. antarctica* contributions and phytoplankton bloom phases observed in 2018 (31.2 %, relatively healthy state) and 2019 (42.7 %, senescent status). Strong positive relationships between *P. antarctica* contributions vs POC/Chl-*a*, TEP/Chl-*a*, and DOC/Chl-*a* (r^2 = 0.73, 0.76, and 0.68, $p < 0.01$) were observed in 2018. Consistently, significantly higher DOC contributions to the total organic carbon (*t*-test, $p < 0.05$) were observed at *P. antarctica*-abundant stations (80.6 ± 2.6 %) than at diatoms-abundant stations (77.7 ± 4.6 %) in 2018. However, these relationships were not detected in 2019 due to a strong meltwater input. Significantly higher TEP-C contributions to the POC (*t*-test, $p < 0.01$) were observed with deepened mixed layer in 2018 (36.2 ± 14.8 %) than in 2019 (19.6 ± 11.7 %). In conclusion, the organic carbon composition varied with the relative contribution of two major phytoplankton communities and physical environments during the study period in the northwestern Ross Sea.