強風イベントに対する従属栄養性バクテリア群集の応答：西部北極海チュクチ陸棚域における定点観測

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Strong wind events resulted in enhanced bacterial production in the Chukchi Shelf, western Arctic Ocean

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Recent studies have indicated that autumnal phytoplankton bloom is becoming more common in most of the Arctic regions because of the receding of sea-ice pack, which may allow more light penetration and vertical mixing driven by atmospheric forcing. However, it remains unclear how these changes in physical forcing may influence patterns in carbon fluxes mediated by the microbial loop in Arctic waters. This study examined temporal changes (time resolution, 6–24 hours) in heterotrophic bacterial production and abundance in the Chukchi Shelf, western Arctic Ocean, during the fixed-point observation conducted between 10 and 25 of September 2013. During this investigation period, strong wind events were followed by the occurrence of an autumnal phytoplankton bloom, which was presumably triggered by the enhanced upward nutrient fluxes induced by physical disturbances. In the layer above the pycnocline (<20–30 m), bacterial production and abundance increased with the increase of chlorophyll *a* concentration (Pearson's r = 0.73–0.87, $p < 0.05$). Bacterial production to primary production ratios were relatively high and constant throughout the observation period (average ± SD, 0.13 ± 0.02; n = 8). Despite dynamic changes in phytoplankton and bacteria parameters, dissolved free (DFAA) and combined amino acid (DCAA) concentrations remained low (DFAA, 9.8 ± 4.7 nmol L^{-1}, DCAA, 236 ± 32 nmol L^{-1}). These results suggest that there was a tightly coupled flow of labile dissolved organic matter from phytoplankton to bacteria, which fueled high bacterial production during the bloom period. In the layer near the seafloor (56 m), enhanced bacterial production and abundance, which was accompanied by low transmittance, were observed following strong wind events (wind speed, >12 m s^{-1}). This indicates that wind-related turbulence near the seafloor caused bottom sediment resuspension, which in turn enhanced bacterial production. Taken together, our data demonstrate that, in both the upper and deeper layers, bacteria responded dynamically to autumnal strong wind events in the Chukchi Shelf, indicating that bacterially mediated flows of carbon and other bioelements represent a key component of biogeochemical cycles during the autumnal phytoplankton bloom in the Arctic regions.