

Measurement of suspended particulate matter beneath the sea ice during rapidly-melting summer season

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To date, many studies have been conducted to investigate the variability in sea-ice concentration, but few studies on melting-origin particle flux have been conducted on the sea ice mainly because a considerable fraction of perennial sea ice limits the free access to a target area. Therefore, it is a timely chance to turn eyes to the drifting sea ice for expanding research fields. With this challenging rationale, this study has attempted to investigate the dynamic behavior of suspended particulate matters (SPM) under the sea ice. Main objectives are (1) to report the role of rapidly-melting summer sea ice as a new source of SPM, and (2) to estimate the vertical and temporal variation in size and settling flux of SPM under sea ice using novel holographic and acoustic techniques.

Due to the high melt rates of the sea ice during the summertime, a large amount of particulate matters embedded in the sea ice are released into the underlying water column. Using the acoustic and optic mooring package, a mooring experiment was performed on the sea ice to estimate the vertical and temporal variation in SPM. SPM concentration under the sea ice varied in the range of 60–100 mg l⁻¹ during rapidly-melting period. Results suggest that the combined effects of increasing insolation, decreasing ice and snow cover, and increasing ice algal production can create favorable conditions for enhancing the concentration and settling flux of SPM during summer.