Satellite-based mapping of sediment-laden sea ice

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Little understanding of sediment-laden ice dynamics

This study presents a satellite-based approach at quantifying the distribution of sediment-laden ice that allows for more extensive observations in both time and space to monitor spatiotemporal variations in sediment-laden ice.

METHODS Capturing optical features of sediment-laden ice

Given that the spectral characteristics of sediment-laden ice differ from those other surface types, fractions of sediment-laden ice were estimated from remotely-sensed surface reflectance using the spectral unmixing algorithm.

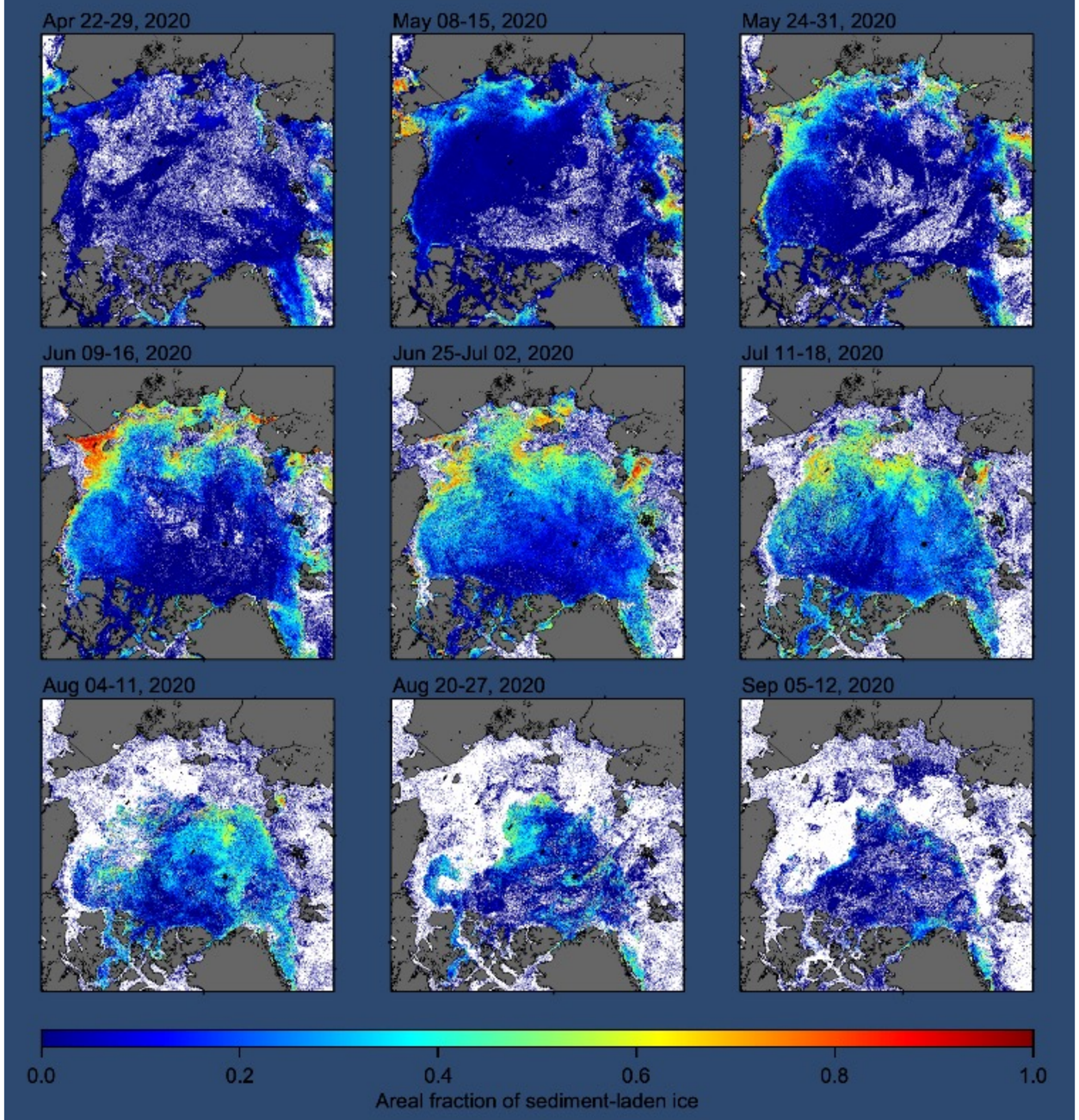
RESULTS Mapping of sediment-laden ice distribution

Satellite-based monitoring of sediment-laden ice has revealed that sediment-laden ice comprises a significant areal fraction of ice-covered areas, even in the Central Arctic Ocean, when ice melt progressed and matured in summer.

IMPLICATIONS Cost-effective and near-real time monitoring

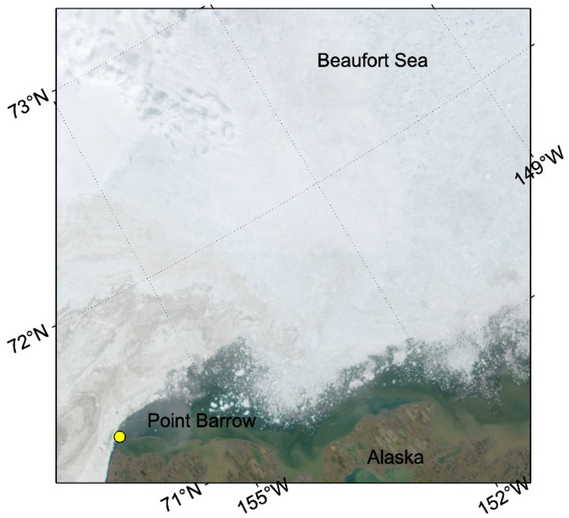
As the role of sediment-laden ice is very different from that of clean ice but still poorly understood, the proposed approach can foster our understanding of the impacts of sediment-laden ice on a wide variety of research fields.

Sediment-laden ice is widely distributed across the Arctic Ocean, with maximum areal fractions of >80% over the Siberian and Chukchi shelves



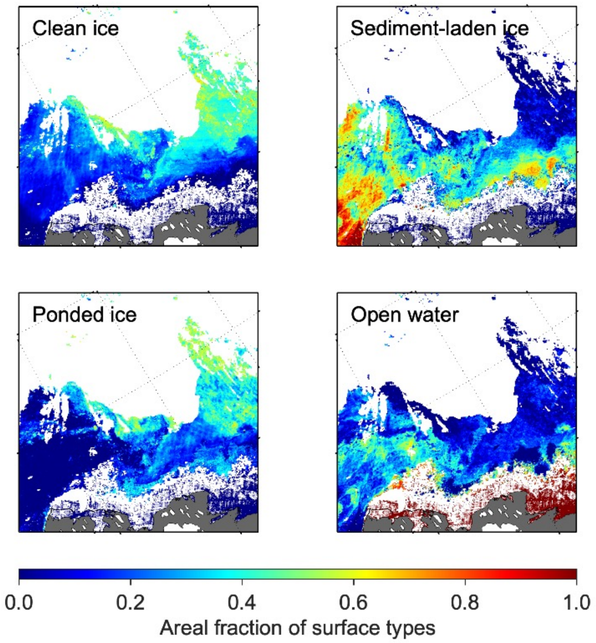
What does sediment-laden ice look like?

MODIS/Aqua true-color image around Point Barrow on July 24, 2006. Sediment-laden ice (brownish ice) is advected toward the east along the Alaska coast.



What does our approach derive?

Areal fractions (per 1-km grid cell) of four surface types corresponding to above MODIS-Aqua true-color image. Our satellite-based approach successfully detect sediment-laden ice from space.



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