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Tuesday, October 9
Oral Session 5
16:20–17:40

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SEASONAL EVOLUTION OF LIGHT TRANSMISSION THROUGH ARCTIC SUMMER SEA ICE

Light transmission through sea ice has been identified as a critical process for energy partitioning at the polar atmosphere-ice-ocean boundary. Transmission of sunlight influences direct sea ice melting by absorption, heat deposition in the upper ocean, and in particular primary productivity. While earlier observations relied on a limited number of point observations, the recent years have seen an increase in spatially distributed light measurements underneath sea ice using remotely operated vehicles (ROV). These measurements allow us to reconstruct the seasonal evolution of the spatial variability in light transmission. Here we present measurements of sea ice light transmittance from 6 years of polar ROV operations. The dataset covers the entire melt cycle of Central Arctic sea ice. Data is combined into a pseudo timeseries describing the seasonal evolution of the changing spatial variability of sea ice optical properties. Snow melt in spring increases light transmission continuously, until a secondary mode originating from translucent melt-ponds appears in the histograms of light transmittance. This secondary mode persists long into autumn, before snow fall reduces overall light levels again. Comparison to several autonomous time series measurements from single locations confirms the detected general patterns of the seasonal evolution of light transmittance variability. These results allow for the evaluation of two different light transmittance parameterizations, implying that light transmission is overestimated in current ice-ocean models.

Christian Katlein, Alfred-Wegener-Institut, ckatlein@awi.de, https://orcid.org/0000-0003-2422-0414
Stefan Arndt, Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Stefanie.Arndt@awi.de, https://orcid.org/0000-0001-9782-3844
H. Jakob Belter, Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Jakob.Belter@awi.de, https://orcid.org/0000-0001-9383-911X
Marcel Nicolaus, Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Marcel.Nicolaus@awi.de, https://orcid.org/0000-0003-0903-1746