New Tools for Optical Measurements in Sea Ice

Christian Katlein1,2, Simon Lambert-Girard2, Christophe Perron2, Raphael Larouche2, Yasmine Alikacem2, Simon Thibault3, Pierre Marquet3,4, Marcel Babin2, Lovro Valcic5, Philipp Anhaus1, Mario Hoppmann1, Marcel Nicolaus1

Light measurements in ice

- Currently there is only very limited data on light measurements within sea ice
- In ice light measurements are crucial for the correct determination of the inherent optical properties (IOP)
- The solid nature of sea ice makes non-destructive measurements challenging

To help address these problems we present the following novel tools with low impact on the sampled ice

- IMB style multispectral autonomous light sensor chain
- A new in-ice profiler similar to previously used ones, but based on the field proven RAMSES-ARC sensor
- First prototypes of optical sensors for an endoscopic probe allowing in-situ investigations with minimal disturbance of the medium

In-ice profiler with angular resolution

To investigate the vertical decay of light and its changing angular distribution within a 2” hole in sea-ice, we designed and deployed different fore-optics for the TriOS RAMSES-ARC hyperspectral radiance sensor.

Light sensor chain

For long term monitoring of the in-ice light field, we developed a 2m long chain with 48 multispectral (RGB+PAR) sideward looking irradiance sensors. A prototype was deployed in August 2018 at the geographic North Pole and several units of an improved version will be used during MOSAIC.

Sea ice endoscope

A multimodal endoscopic approach for characterizing sea ice optics, physics, biology and biogeochemistry at small scale – Marcel Babin, Session 10, Tuesday morning

Acknowledgement

FAWAG-Fundation for Atmospheric Research (AMOS), a Sentinel North collaborative research initiative. Takuvik, Université Laval and the James-Irons International Scientific Collaboration. The authors gratefully acknowledge the support of the French Polar Institute (IPEV), the Alfred-Wegener Institute (AWI), the Canadian Centre for Remote Sensing, the German Federal Ministry of Education and Research (BMBF), the European Commission (Horizon 2020) and the Government of Quebec and the Natural Sciences and Engineering Research Council of Canada (NSERC).