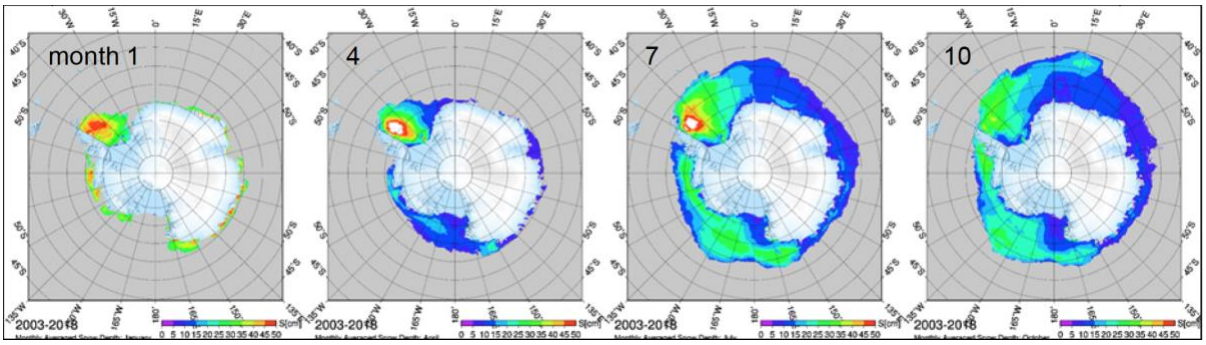
**Master Thesis**

# Snow depth on Antarctic sea ice from satellite microwave radiometers




*Average monthly snow depth for 2003–2018 based on AMSR-E/2 19 and 37 GHz channels.*

The IUP has a longstanding history in retrieving sea ice and atmospheric properties from satellite observations. Within the research group for Remote Sensing of Polar Regions (www.seaice.uni-bremen.de/research-group/) new methods for polar satellite remote sensing are developed and interpreted in a climate system context. For example, we are producing since 2002 daily sea ice maps based on data of passive microwave sensors, see www.seaice.uni-bremen.de. With 5 km spatial resolution these maps belong to the highest resolving sea ice maps available daily and globally.

Snow depth on sea ice is one of the parameters that can be retrieved from satellite microwave radiometers like AMSR-E/2. recently a new method has been developed for the Arctic (Rostosky et al. 2018, 2020). It extends the previous method by Marcus and Cavalieri (1998; above Figure) to lower frequencies, i.e. 7 GHz, which allows retrieval of deeper snow and for multiyear sea ice regions.

In this study this method will be adapted and applied to Antarctic sea ice. Results will be compared to in-situ observations from ships (ASPeCt protocol). Long time series (2003–2020) will be created and analysed for variability and trends.

## What you need and what you will learn

Microwave radiometry basics and some computer programming experience will be helpful, best Python (or IDL, Matlab) under Linux.

You will learn to apply a state-of-the-art satellite algorithm for microwave radiometers to create a new Earth observations dataset. Validate it and analyse its basic statistical properties. Our working group offers an open discussion atmosphere and worldwide contacts to the leading institutions of the field.

## Contact

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Earliest start date is December 2020.

Rostosky et al. (2020). Modeling the Microwave Emission of Snow on Arctic Sea Ice for Estimating the Uncertainty of Satellite Retrieval. *J. Geophys. Res.*, 125(3), e2019JC015465. doi:10.1029/2019JC015465

Rostosky et al. (2018). Snow depth retrieval on Arctic sea ice from passive microwave radiometers—Improvements and extensions to multiyear ice using lower frequencies. *J. Geophys. Res.*, 123(10), 7120–7138. doi:10.1029/2018JC014028

Markus, T., & D.J. Cavalieri (1998). Snow depth distribution over sea ice in the Southern Ocean from satellite passive microwave data. M.O. Jeffries, *Antarctic Sea Ice: Physical Processes, Interactions, and Variability*. Antarctic Research Series, 74, 19–39.