Internship summary

Centre for Integrated Remote Sensing and Forecasting for Arctic Operations (CIRFA)

Lotte Wendt - 31.05.2021

During the period 1/2/2021 to 30/5/2021, I have completed an internship at the Centre for Integrated Remote Sensing and Forecasting for Arctic Operations (CIRFA) at the University of Tromsø (UiT). CIRFA is a research centre focused on the development of Arctic surveillance techniques including sea ice, oil spill and iceberg remote sensing.

My internship was focused on learning about the basics of Synthetic Aperture Radar (SAR) image analysis. SAR is an active radar remote sensing system, and SAR satellites are a major workhorse of the remote sensing satellite community (well-known SAR satellites are for example Sentinel-1 and Radarsat-2). Because SAR satellites emit radiation pulses in the microwave region actively towards Earth's surface and record the returning signal, they can observe the surface through clouds and at nighttime.

My motivation for this internship was based on my strong interest for remote sensing of the high latitudes. As polar areas experience the polar night and are often cloud-covered, I realized that knowledge about SAR remote sensing would be a great asset when working with data from high-latitude regions.

During the internship I worked on several tasks, which built up on each other:

1. Literature review of
    - SAR theory
    - Sea ice remote sensing and classification through SAR imagery
2. Processing of SAR imagery in the Sentinel Application Platform and python including:
    - SAR statistics
    - Speckle theory
3. Analysis of polarimetric SAR imagery
4. Development of a sea ice classifier based on Lohse et al. 2020

The internship was a great supplement to my knowledge background from the Physical Geography bachelor at INES. The most important learning outcome is how much more confident I have become in using python for image processing. I gained knowledge in SAR image analysis (e.g. speckle processing, terrain corrections) and learnt about classification algorithms. I also received insights into sea ice remote sensing and the challenges connected to sea ice classification as well as improved my understanding of remote sensing physics. The internship was a very rewarding experience and the skillset I developed will be helpful for my future career.

References:

Lohse, J., A. P. Doulgeris, and W. Dierking. 2020. Mapping sea-ice types from Sentinel-1 considering the surface-type dependent effect of incidence angle. Annals of Glaciology: 1-11. DOI: 10.1017/aog.2020.45