First results on the performance of ARIEL radiometer in MOSAIC Expedition

ICE-MOD – MOSAIC Project, Programación conjunta internacional

The aim of this project is to improve the quality of the emissivity models and the dielectric constant model (permittivity) of the sea ice at 1.4 GHz (L-band). They will be used in the inversion algorithms for retrieving key sea ice parameters, as for example sea ice thickness and snow depth from the space borne L-band microwave radiometers.

With the beginning of MOSAIC expedition in September 2019 , we have deployed a small L-band radiometer called ARIEL (manufactured by BALAMIS) on the Arctic. In contrast with other heavier instruments, ARIEL can take measurements along long transects, so allowing to acquire sea ice brightness temperatures under very diverse sea ice conditions. Its lightness also allows ARIEL to be part of MOSAiC measurement transect lines composed by other portable instruments like MagnaProbe devices (which measures the sea ice thickness). The measurements acquired with these instruments will also allow us to improve the emissivity models as well as to study the sea ice spatial variability and assess its impact into the signal as recorded in a typical satellite footprint.

ARIEL radiometer with Polarstern behind

ARIEL mounted on a Sled measuring the ice

The improvement of the geophysical models may have an impact on the quality of the retrieved sea ice thickness and snow thickness derived from L-band radiometers missions, as SMOS and SMAP.

We show below the radiometric measurements during one transect. We see that the Ariel radiometer is sensitive to the different types of ice. Moreover the TB values are coherent when the sled is moved forward and backward.


ARIEL TB H and V during the transect.

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We thank the MOSAIC Sea ice team, with special thanks to Luisa Von Albedyll from AWI for operating ARIEL.

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