

# Validation of total water vapor retrieval with an airborne millimeter-wave radiometer over Arctic sea ice

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## Abstract

Measurements of the airborne SEPOR-POLEX campaign in the Arctic in March 2001 were used to validate a total water vapor (TWV) algorithm. This is a modified version of an algorithm developed by Miao et al. using SSM/T2 data in the Antarctic. Data from a passive microwave radiometer with channels at 157,  $183 \pm 7$ ,  $183 \pm 3$  and  $183 \pm 1$  GHz have been used. Dropsondes were launched from the aircraft during the flights to provide ground truth for the validation of the algorithm. The surface emissivity is assumed to be the same for the frequencies used. In general, there is a good agreement with TWV derived from dropsondes using the 183 GHz data only. This assumption leads to systematic errors in the estimation of TWV if the 157 GHz data is used in combination with measurements at 183 GHz. The high surface emissivity in regions of new ice is shown to lead to errors as a result of the strong influence of the surface. The difference in emissivity between 157 GHz and 183 GHz is larger over open water than over the sea ice and therefore the error in TWV using the lower frequencies is larger in these regions.