Geophysical Research Abstracts
Vol. 18, EGU2016-8042, 2016
EGU General Assembly 2016

Ice Water Path Retrieval Using Microwave and Submillimetre Wave Observations

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There is an ongoing need for data on ice clouds. The ice water path as an essential climate variable is a fundamental parameter to describe ice clouds. Combined passive microwave and submillimetre wave measurements are capable to sample the size distribution of the ice particles and are sensitive to relevant particle sizes. This makes combined microwave and submillimetre wave measurements useful for estimates of ice water path. Furthermore, instead of being sensitive for the upper ice column as for example for passive visible and passive infrared measurements, combined microwave and submillimetre wave measurements can sample the full ice column. We developed a retrieval algorithm for ice water path based on a neural network approach using combined microwave and submillimetre wave measurements, from about 20 channels in the range between 89 GHz and 664 GHz of the electromagnetic sprectra. We trained a neural network by using 1D radiative transfer simulations which were conducted using the Atmospheric Radiative Transfer Simulator (ARTS). The radiative transfer simulations were fed by atmospheric profiles from a numerical weather prediction model. We will present an analysis of the retrieval. Additionally, we will present results of retrieved IWP from combined ISMAR (International SubMillimetre Airborne Radiometer) and MARSS (Microwave Airborne Radiometer Scanning System) measurements on board of the Facility for Airborne Atmospheric Measurements (FAAM) aircraft during March 2015 over the North Atlantic.