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Light precipitation observations at high latitudes by the radiometer ADMIRARI during the Finnish LPVEx campaign.

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In order to improve the knowledge and understanding of light precipitation microphysics at high latitudes, a joined collaboration between the NASA CloudSat team, the NASA Global Precipitation Measurements-Ground Validation (GPM/GV) program, the University of Helsinki and the Finnish Meteorological Institute (FMI) has been established to lead the Light Precipitation and Verification Experiment (LPVEx) which took place in Finland last Autumn.
The radiometer ADMIRARI participated in LPVEx to perform observations with its multi-frequency (10.7, 21.0 and 36.5 GHz) dual-polarized microwave passive radiometer and its co-scanning micro rain radar (24 GHz) and lidar (905 nm). Unlike at mid-latitude and at tropical latitudes, light precipitation rarely produces information on the polarization difference of the brightness temperatures, a crucial ADMIRARI measurable to differentiate the radiometric signature from cloud and rain.
This work examines selected cases where light precipitation and shallow freezing level environments have been observed. An assessment is done on the capabilities of ADMIRARI to retrieve atmospheric physical parameter during this rain regime. In such conditions the micro rain radar becomes important to identify the presence of rain and to evaluate the radiometer-only inversion algorithm. In addition, for the first time ever for ADMIRARI, measurements have been taken with a co-scanning lidar looking into the same volume as the radiometer and the micro rain radar. Since the lidar's pulse is mostly able to penetrate the rain layer and is not completely attenuated as in the case of liquid water clouds, the lidar can provide crucial information about the presence and location of cloud liquid water during light rain events. The improvements on the retrieval scheme introduced by the ancillary lidar measurements are assessed and discussed.