Radiometric Observations of the Arctic Environment during the 2008 Arctic Mechanisms of Interaction Between the Surface and Atmosphere (AMISA) Campaign

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The melt and freezeup of Arctic sea ice is dominated by cloud radiation processes that are in turn driven by frontal weather, moisture and heat fluxes, sea ice lead state, and cloud-nucleating aerosols. To better understand these processes and how they impact global climate models, especially regarding the mechanisms that are causing rapid shrinking of Arctic sea ice cover, an experiment using the NASA DC-8 aircraft and Swedish research vessel R/V Oden was conducted in August 2008 to simultaneously observe a number of key variables during the pack ice freezeup. During the Arctic Measurements of Interactions Between the Surface and Atmosphere (AMISA) experiment the NASA DC-8 carried a suite of staring radiometers operating at 1.4 and 6.8 GHz, water vapor and cloud radiometers operating at 23 and 31 GHz (both zenith and nadir-viewing), a nadir temperature profiling radiometer operating at 50-57 GHz, and the PSR imaging radiometers operating at 10, 18, 21, 37, and 89 GHz. The radiometer suite included nadir and zenith long wave IR and short wave flux sensors, dropsondes, aerosol concentration and composition probes, a CAPS cloud particle size and liquid water probe, and high resolution nadir video. The complement of instruments was used for a combination of wide area mapping in the vicinity of the Oden from ~8 km altitude, high resolution surface observation from as low as 100 m, and measurements of clouds, aerosols, and thermodynamic quantities within the Arctic inversion layer using series of ascents and descents. The talk will focus on the AMISA radiometric data and the application of broadband microwave observations to studies of Arctic clouds, heating, weather, and surface state.