The DC-8 Submillimeter-Wave Cloud Ice Radiometer

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An **airborne radiometer** is being developed to demonstrate the capability of radiometry at submillimeter-wavelengths to characterize **cirrus clouds**. At these wavelengths, cirrus clouds scatter upwelling radiation from water vapor in the lower troposphere. Radiometric measurements made at multiple widely spaced frequencies permit flux variations caused by changes in scattering due to crystal size to be distinguished from changes in cloud ice content. Measurements at dual polarizations can also be used to constrain the mean crystal shape. An airborne radiometer measuring the upwelling submillimeter-wave flux should then able to retrieve both bulk and microphysical cloud properties. The radiometer is being designed to make measurements at four frequencies (183 GHz, 325 GHz, 448 GHz, and 643 GHz) with dual-polarization capability at 643 GHz. The instrument is being developed for flight on NASA's DC-8 and will scan cross-track through an aircraft window. Measurements with this radiometer in combination with independent ground-based and airborne measurements will validate the submillimeter-wave radiometer retrieval techniques.

The goal of this effort is to develop a technique to enable spaceborne characterization of cirrus, which will meet a key climate measurement need. The development of an airborne radiometer to validate cirrus retrieval techniques is a critical step toward development of spaced-based radiometers to investigate and monitor cirrus on a global scale. The radiometer development is a cooperative effort of the University of Colorado, Colorado State University, Swales Aerospace, and Jet Propulsion Laboratory and is funded by the NASA Instrument Incubator Program.

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