Geophysical Research Abstracts, Vol. 9, 10974, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10974

Measurement capabilities of the Polar Atmospheric Emitted Radiance Interferometer (P-AERI) for the IPY

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The Polar Atmospheric Emitted Radiance Interferometer (P-AERI) has been deployed in the Antarctic and Arctic during various field experiments since 1999: 1) The South Pole Atmospheric Radiation and Cloud Lidar Experiment (SPARCLE) in the austral summer of 1999/2000 and for the full year of 2001, 2) Dome C, Antarctica (75 S, 123 E; 3280 m) for the purpose of satellite validation in the austral summers of 2002/2003 and 2003/2004, and 3) currently at Eureka, Canada (80 N, 86 W) as part of the Study of Environmental Arctic Change (SEARCH) program. The P-AERI is a Fourier-transform interferometer that measures spectral infrared radiances from 3 to 23 micrometers, including the semi-transparent portion of the water vapor rotational band. It can measure radiance at any angle from zenith to nadir at a time resolution down to tens of seconds using a rapid-scanning technique. Surface skin temperature, spectral infrared emissivity, clear-sky downwelling flux, spectral longwave cloud forcing, fractional cloud cover, cloud-base height, infrared cloud optical depth, effective cloud particle size, and particle phase can all be derived from the spectral infrared radiances. There is also the potential to retrieve temperature and humidity profiles in the boundary layer, the boundary-layer height, and column amounts of trace gases such as CO, CH4, and N2O. In the past we have also deployed ancillary instrumentation along with the P-AERI for measuring in-situ properties of clouds using instruments on a tethered balloon system.