

## Validating Satellite-Derived Snow Temperatures on the Antarctic Plateau

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In May 2002 NASA launched Aqua, a polar-orbiting satellite equipped with an Atmospheric Infrared Sounder (AIRS) designed to measure surface and atmospheric temperatures, and humidity. AIRS will monitor these variables on a global scale, but must first be validated using "groundtruth" data collected at a number of representative locations. One location, on the Antarctic Plateau, was chosen because intervening atmospheric effects are minimal there; water vapor and aerosol content are extremely low, and the surface is flat and uniform. Dome Concordia (3280 m, 75°S), a station operated under the Italian and French Antarctic programs, was selected as an ideal site because it offered excellent logistical support for the first campaign (January 2003).

The experiment involved making precise surface temperature measurements using the University of Idaho Polar Atmospheric Emitted Radiance Interferometer (PAERI) in conjunction with a mobile observatory deployed by CMDL. The AIRS Mobile Observing System (AMOS) platform consists of a suite of radiometers mounted on a sled that was pulled behind a snowmobile (Figure 1, left). Transects were run around triangular tracks several kilometers in length at times coincident with overpasses of Aqua and the operation of the tower-mounted PAERI. At a 1-second sampling rate, AMOS is able to map the detailed thermal and reflective properties of the snow surface on a spatial scale that approximates the AIRS field of view. After cross-calibrating the AMOS infrared thermometer and the PAERI, integrations of the transect data produce accurate estimates of pixel-scale surface temperatures for validation purposes.

Preliminary results demonstrate the validity of this approach. Examples of data are presented. One fascinating result is illustrated in the Figure 1 (right), which shows how snow temperatures vary, in this instance  $>2^{\circ}\text{C}$ , over distances of  $<10$  m. This is due to heating/cooling effects that result when the sun differentially illuminates snow features called sastrugi. Uncertainties in AIRS retrievals that may result because of those effects will be further investigated during the 2003-2004 campaign at Dome C.

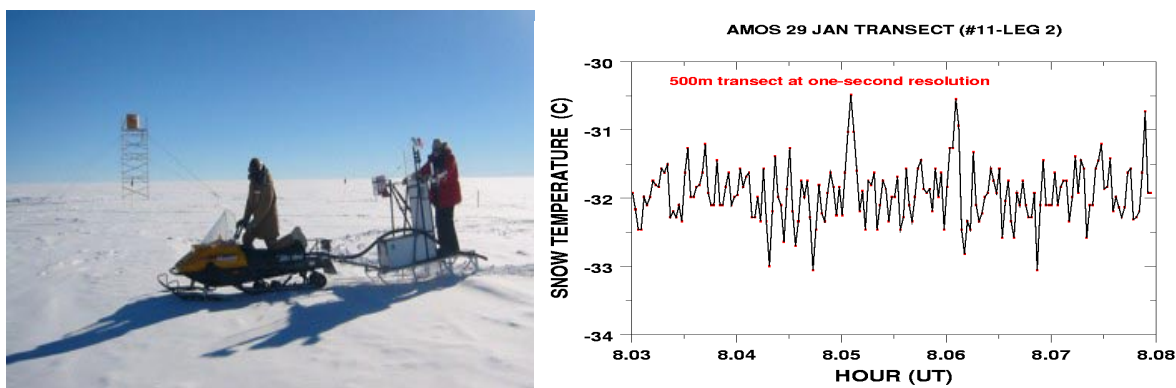


Figure 1. Left: AMOS being towed around a track by snowmobile at times coincident with Aqua overpasses. The PAERI is mounted on the tower behind. Right: Time series of 1-s resolved snow temperatures along 500 m of the track run by AMOS on January 29, 2003.