DIVINER LUNAR RADIOMETER OBSERVATIONS OF THE NORTH AND SOUTH POLAR REGIONS OF THE MOON. D. A. Paige[1], M. A. Siegler[1] and J. P. Williams[1], [1]Dept. of Earth and Space Sciences, UCLA, Los Angeles, CA 90095, dap@moon.ucla.edu.

Introduction: The Diviner Lunar Radiometer Experiment aboard the Lunar Reconnaissance Orbiter (LRO) has been mapping the moon nearly continuously since July, 2009. The instrument has acquired thermal emission and solar reflectance data in nine spectral channels spanning a wavelength range from 0.3 to 400 microns, at spatial resolutions ranging from 0.2 to 1.3 km [1]. Diviner's unprecedented and growing dataset is revealing the extreme nature of the lunar thermal environment and its diurnal and seasonal variability.

Polar Mapping: In the lunar polar regions, Diviner's swath provides two spatially continuous thermal images at latitudes greater than 84 degrees twice per month at a spatial resolution of less than 240 meters. At these highest latitudes, Diviner has obtained sufficient spatial and temporal coverage to determine annual minimum, maximum, and average surface temperatures at both poles. The results show that the coldest regions on the Moon achieve annual average temperatures of less than 38K, and that surface temperature excursions below 23K are briefly observed.

Large areas of the lunar polar regions are currently cold enough to cold-trap water ice as well as a range of both more volatile and less volatile species [2]. The cold trap regions include surface cold-traps in permanent shadow as well as more extensive subsurface cold traps that experience brief periods of direct sunlight. A range of volatile species predicted by Diviner temperature maps were observed in the impact plume of LCROSS in Cabeus Crater in October, 2009 [3,4], suggesting that impacts from primitive bodies from the outer solar system have contributed volatiles to the moon's polar cold traps over time. However, the physical properties of the lunar regolith in the cold traps, and the horizontal and vertical distribution of volatiles within the cold traps is highly uncertain.

References: [1] Paige D. A. et al. (2009) *Space Science Reviews*, DOI: 10.1007/s11214-009-9529-2. [2] Paige D. A. et al. (2010) *Science* 330, 479. [3] Colaprete A. et al. (2010) *Science* 330, 463. [4] Gladstone G. R. et al. (2010) *Science* 330 472.

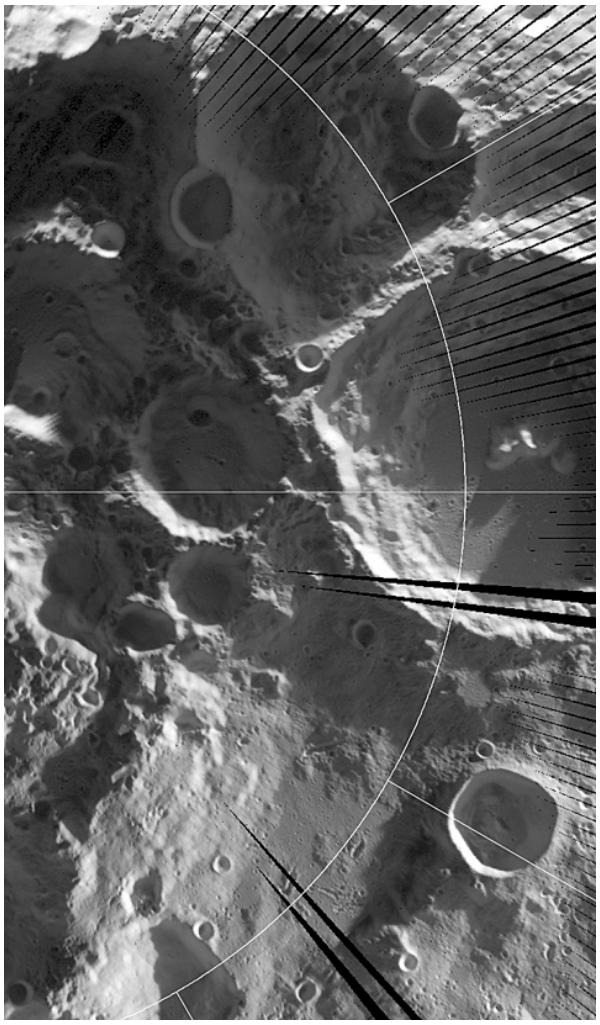

Figure 1. Dviner daytime thermal image of the south polar region of the Moon acquired in August, 2009.