

**Probing the Hydrogen Content Distribution on Lunar South Pole at the Highest Spatial Resolution using LEND Data.**

Giridhar Nandikotkur<sup>1</sup>, D. Usikov<sup>1</sup>, G. M. Milikh<sup>1</sup>, R. Z. Sagdeev<sup>1</sup>, I. M. Mitrofanov<sup>2</sup>, D.V.Golovin<sup>2</sup>, A.S.Kozyrev<sup>2</sup>, M.L.Litvak<sup>2</sup>, A.V.Malakhov<sup>2</sup>, M.I.Mokrousov<sup>2</sup>, A.B.Sanin<sup>2</sup>, V.I.Tretyakov<sup>2</sup>, A.B.Varenikov<sup>2</sup>, A.A.Vostrukhin<sup>2</sup>, G. Chin<sup>3</sup>, J. Garvin<sup>3</sup>, T. McClanahan<sup>3</sup>, J.Trombka<sup>3</sup>, L. Evans<sup>4</sup>, R.Starr<sup>5</sup>, W. Boynton<sup>6</sup>, K.Harshman<sup>6</sup>, M. J. Finch<sup>6</sup>, G. Droege<sup>6</sup>, V.V.Shevchenko<sup>7</sup>, G.N.Timoshenko<sup>8</sup>, V.N.Shvetsov<sup>8</sup>, and T.M.Tomilina<sup>9</sup>.

<sup>1</sup> *University of Maryland, College Park, MD 20742, USA*

<sup>2</sup> *Institute for Space Research, Moscow 117997, Russia*

<sup>3</sup> *Goddard Space Flight Center, Greenbelt, MD 20771, USA*

<sup>4</sup> *Computer Sciences Corporation, Glenn Dale, MD 20706, USA*

<sup>5</sup> *Catholic University, Washington, DC 20064, USA*

<sup>6</sup> *University of Arizona, Tucson, AZ 85721, USA*

<sup>7</sup> *Sternberg Astronomical Institute of Moscow State University, Moscow 119992, Russia*

<sup>8</sup> *Joint Institute of Nuclear Energy, Dubna, Moscow 141980, Russia*

<sup>9</sup> *A.A.Blagonravov Institute of Mechanical Engineering, Moscow 117334, Russia*

Analysis of data from collimated detectors of the Lunar Exploration Neutron Detector (LEND) experiment, on board NASA's Lunar Reconnaissance Orbiter show multiple sites on the south pole, where the neutron suppression indicates substantial hydrogen enhancement. Some of the neutron suppressed regions are not correlated with the permanently shadowed regions (PSRs) which were previously suggested as the only sites of possible hydrogen enrichment. We present the analysis of a few of the targets with strongest gradients of epithermal neutron signatures, including the Cabeus region that was selected as the impact site by the Lunar Crater Observation and Sensing Satellite (LCROSS). Our analysis probes these targets at the highest spatial resolution of LEND. The level and the spatial scales of neutron suppression shown by the raw data itself are substantially higher than that seen by previous missions (e.g. Lunar Prospector and Clementine). A finite point spread function (PSF) of LEND only dilutes the level and the spatial resolution of the neutron suppression. We will present the hydrogen content distribution for these sites after de-convolving with the instrument PSF. We will compare and contrast our data with the neutron distribution seen by Lunar Prospector. We are also conducting a spatial-Fourier analysis to get independent estimates of the instrument PSF based on observations at different altitudes during the commissioning and the mapping phases.