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Introduction: Observations made by Bistatic Radar onboard Clementine spacecraft and Lunar Prospector Neutron Spectrometer (LPNS) suggested that deposits of pure water ice might exist in permanently shadowed regions (PSRs) near the lunar south pole [1]. The LPNS revealed a significant suppression of epithermal neutrons around the both lunar poles above 70° latitude which was interpreted as a possible signature of hydrogen enhancement or even presence of water ice distributed within PSRs areas [2-4]. But complicated model dependent data deconvolution and low spatial resolution of LPNS instrument did not allow to find direct correspondence between deficit of neutron flux and local PSR areas with sizes less than 50 km.

Here we present Lunar Exploration Neutron Detector (LEND) data analysis in attempt to improve our knowledge about variations of moon neutron flux (as a signature of hydrogen distribution) at south and north moon poles with better resolution to be able to distinguish PSRS areas with sizes ~ 10 km. LEND instrument is providing now global mapping of lunar neutron albedo in wide energy range including collimated measurements of epithermal neutrons with spatial resolution 10 km at altitude of 50 km [5-6]. LEND is installed onboard LRO spacecraft launched in June 2009.

Data Analysis: In this analysis we included and discussed LEND data gathered from July, 2 2009 up to February, 1 2011. We concentrated on the data reduction of counting rates accumulated in LEND collimated detectors in order to compare difference in neutron flux inside and outside most of large PSRs with areas more than 50km^2.

We are trying to answer on several questions such as

1) What is the difference in neutron counting rates inside large PSRs in comparison with that in sunlit areas at a similar latitude?
2) Can we state from this statistical data comparison that average accumulated counting rate inside PSRs is significantly lower than one observed in PSRs vicinity at the same latitude proving that PSRs are major reservoirs of Hydrogen.
3) If answer on previous question is negative shall we claim that PSRs may differ from each other? While some of them showing significant depression of neutron flux as a signature of hydrogen enhancement or water ice other ones do not demonstrate any deficit of neutrons?
4) Can we claim that there are sunlit areas (not coinciding with PSRs contours) with significant depression of neutron flux?

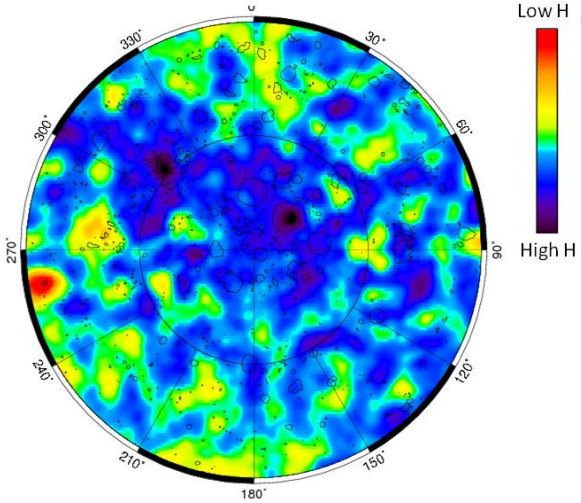

Figure 1. Lunar south pole variations of neutron flux as signature of Hydrogen enhancement measured by LEND instrument onboard LRO spacecraft.

Discussion: First LEND results shows that variations of neutron flux at moon poles are not so evident as was expected and predicted earlier from previous experiments and theoretical models [7]. It is seen from LEND high resolution maps and statistical analysis of PSR's ensemble that PSRs are different and demonstrate different H content: in some cases more but in some cases less than neighboring sunlit areas.

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