



## How LEND sees the water on the Moon

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The Lunar Exploration Neutron Detector (LEND) is operating on orbit around the Moon on-board the Lunar Reconnaissance Orbiter (LRO) spacecraft more than six years. LEND has been designed and manufactured to investigate presence and determine average amount of hydrogen in upper ( $\sim 1$  m depth) subsurface layer of the Lunar regolith with spatial resolution  $\sim 10$  km from 50 km orbit and to check the hypothesis what the permanently shadowed regions (PSRs) at circumpolar regions are the main reservoirs of a large deposition of water ice on the Moon.

One of most interesting and surprising LEND observations that not all large PSRs contain a detectable amount of hydrogen but there are neutron suppression regions (NSRs) with statistically significant suppression of neutron flux. The NSRs partially overlap or include PSRs in craters Cabeus, Shoemaker, Haworth (on South) and Rozhdestvensky U (on North) but significant part of their area spread out at sunlit territory. This means that hydrogen may be preserved for a long time or even accumulated at a subsurface regolith layer of sunlit areas. The majority of PSRs do not show statistically significant suppressions of neutron flux in comparison with neighbor sunlit vicinity. This implies a hypothesis what a permanent shadow is not only necessary condition for the hydrogen accumulation and preservation in the lunar subsurface.

A method of water equivalent hydrogen (WEH) in top  $\sim 1$  meter regolith estimation using LEND data has been developed. Maps of WEH distribution in North and South polar regions will be presented and discussed. Also, WEH estimation in case of hydrogen bearing regolith layer coverage by a dry regolith will be presented for largest NSRs.