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Testing Lunar Permanently Shadowed Regions for Water Ice: LEND Results from LRO

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We use data gathered by the Lunar Exploration Neutron Detector (LEND) collimated sensors during more than one year of the mapping phase of NASA's Lunar Reconnaissance Orbiter (LRO) mission to make estimates of the epithermal neutron flux within known large Permanently Shadowed Regions (PSRs) and compare it with the local neutron background measured outside PSR areas in sunlit regions. Individual and collective analyses of PSR properties have been performed. Only three large PSRs so far, Shoemaker and Cabeus in the south and Rozhdestvensky U in the north, have been found to manifest significant neutron suppression. All other PSRs have much smaller suppression, only a few %, if at all. Some even display a positive deviation, excess of neutron emission in respect to sunlit vicinity around them. Testing PSRs collectively, we have not found any average suppression for them. Only the group of 18 large PSRs, with area > 200 km^2, show a marginal effect of small average suppression $\sim$2%, with low statistical confidence. This means that all PSRs, except PSRs in Shoemaker, Cabeus and Rozhdestvensky U craters, are not contains any significant amount of Hydrogen in comparison with sunlit areas around them at same latitude. Also general smooth poleward increasing of Hydrogen abundance at sunlit areas exists.