LEND PDS Data
LPSC 2015

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PDS Products

- PDS Geosciences node
  - http://pds-geosciences.wustl.edu/missions/lro/lend.htm
- EDR
  - Science – EDR_SCI
  - Housekeeping – EDR_HK
- PDR
  - Science with Spatial – RDR_RSCI
  - Reduced Science – RDR_DLD
  - Averaged Science – RDR_ALD
DLD and ALD data sets
Geosciences Web Site

- http://pds-geosciences.wustl.edu
Available Tools

- NASA View
  - PDS provided
- LEND PDS Viewer
  - University of Arizona provided
How data can be used

- DLD – the building blocks to maps
  - Spatially
  - Temporally
LEND South Pole Hydrogen Deposits and Lunar Topography: A trace of a LRO spacecraft orbital track – shown above in red on the LEND hydrogen South pole topography map – through the Shoemaker crater neutron suppressed region. The plot shows that the neutron suppression – shown in green – corresponds directly with the Shoemaker crater LRO topography – shown in red.

The bottom lunar SP map was created using IDL and GMT in the following way:
1. Created SP LEND CSETN v294 boxcar smoothed polar stereo graphic map.
2. Converted cps map to H ppm map and performed a uniform background substraction.
3. Exported data into GMT format for mapping
4. Using GMT, overlayed LEND data (shown in color) on top of LOLA topography and added PSRs.
5. Added trace for top graph to the plot.

Top plot was created in the following way:
1. Used IDL to do LOLA and LEND traces through Shoemaker crater as a function of distance in km from the pole.
2. Exported data to Igor pro to create plot.
CSETN sum Epithermal Neutron v29r Boxcar Smoothed Weighted Mean and Sigma Maps
JGB June 2014 DLDs; Applied SP orbital averages, nadir limit = 1.9 deg. & No UA alt. corr.; Circular Orbit;
Time Period = [9/15/2009 19:35:59 UTC, 12/11/2011 17:17:31 UTC] = [274736160 LROsec, 345316652 LROsec]; outTo = 82 deg. lat; interp

Created using IDL.
This LEND CSETN Gaussian smoothed weighted mean map was created in the following way:

1. Used IDL to create a km map centered on Cabeus crater with a polar stereo graphic grid overlaid on the map.
2. Exported LEND image into Igor Pro.
3. Imported LOLA data for the region into Igor Pro.
4. Created LOLA contour map and overlayed it on LEND image in Igor Pro.
5. Added legends
This LEND CSETN smoothed weighted mean map was created in the following way:

1. Used IDL to create smoothed wm map and exported data LEND and LOLA data to Igor Pro.
2. Used Igor pro to create LEND data map with LOLA contour overlay.
Cabeus Gaussian Smoothed WM Map (smoothing degree = 0.333, sigma reach = 1.5
([center lat, center lon] = [-84.9, -44.7], extent = 80 km, South Pole, interp)
This trace was created using IDL and exporting data into Excel. The corresponding LEND IDL images are to the left.
Polar Ice Deposits: LRO evidence shows that the Moon’s polar regions, especially PSRs, are cold enough to retain water ice. Over several years, LEND has scanned the Moon’s South pole measuring how much hydrogen is trapped in the soil. Areas with suppressed neutron activity – shown above in blue – show the highest concentration of hydrogen atoms, strongly suggesting the presence of \( \text{H}_2\text{O} \) molecules.

This image is a snapshot of the lunar SP created for a NASA Goddard Space Flight Center movie for Tim McClanahan. It is an overlay of LEND CSETN data (shown in the blue to white continuum) created using IDL on lunar topography. The names of the craters were also added to the image.
Animation

- South Pole fly-in