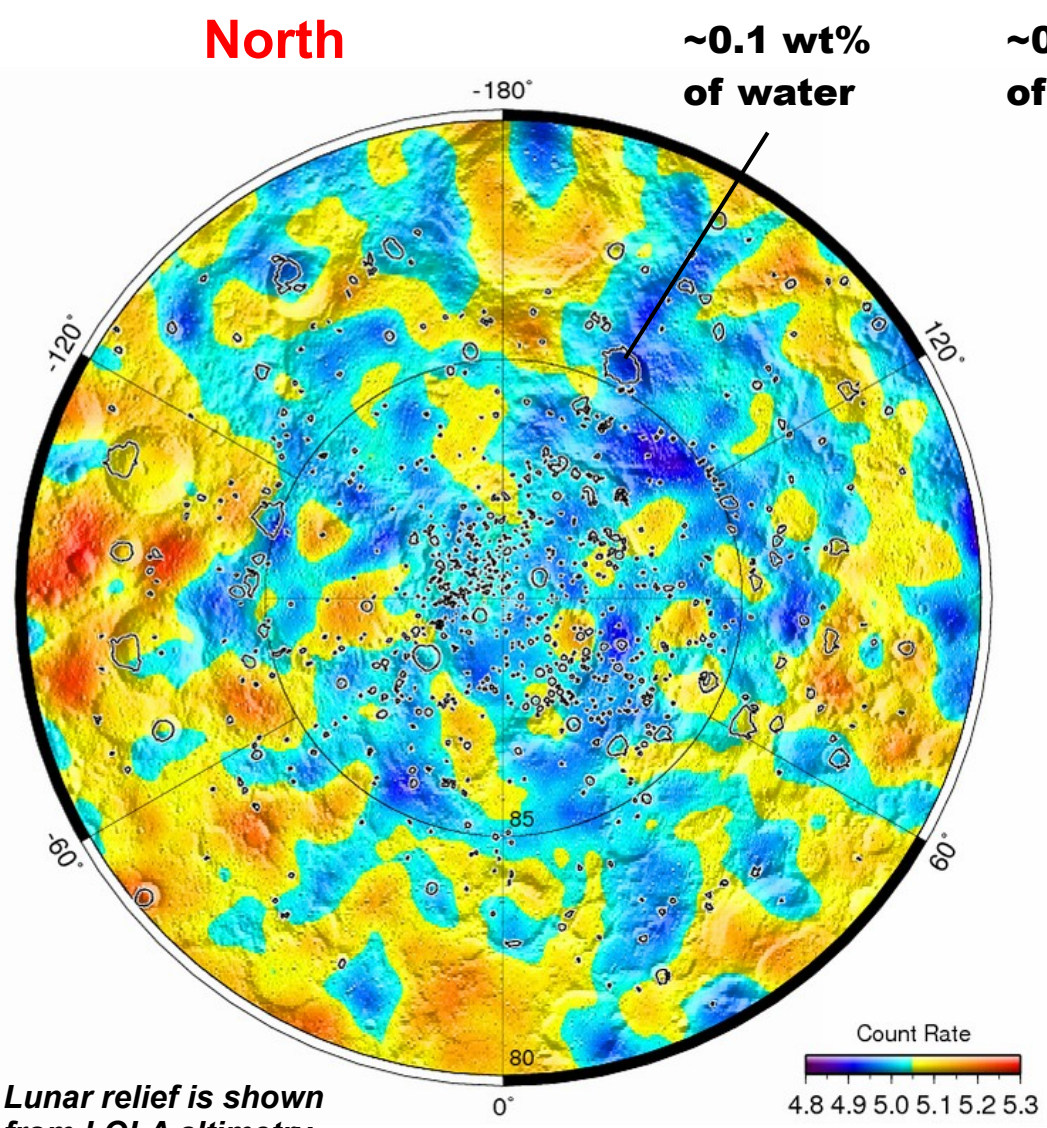
Which Spot on the Moon has the Highest Content of Hydrogen?

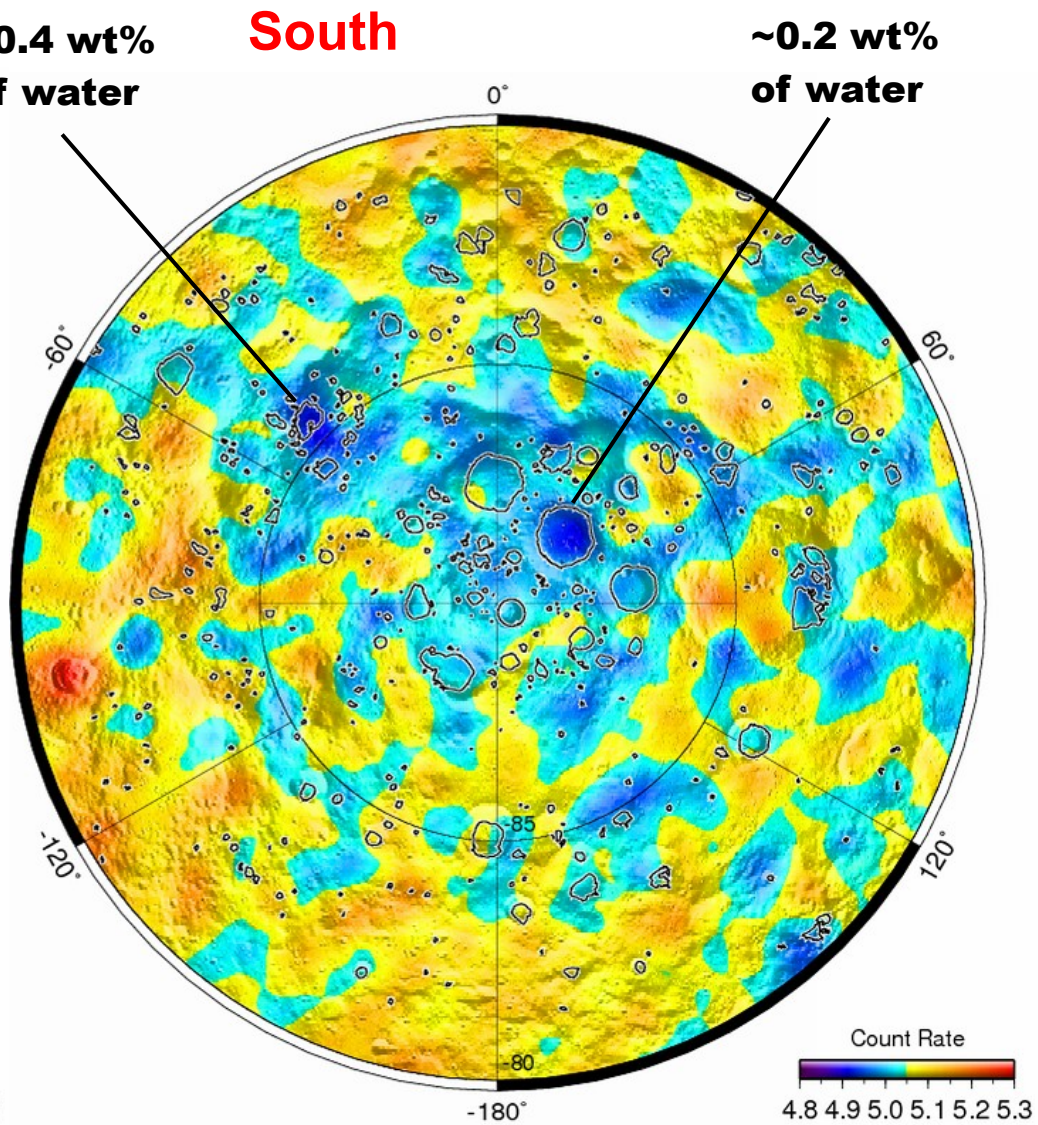
Anton Sanin

on behalf of the LEND Team

Lunar Exploration Neutron Detector

LEND maps of epithermal neutrons at North and South poles above 80° latitude

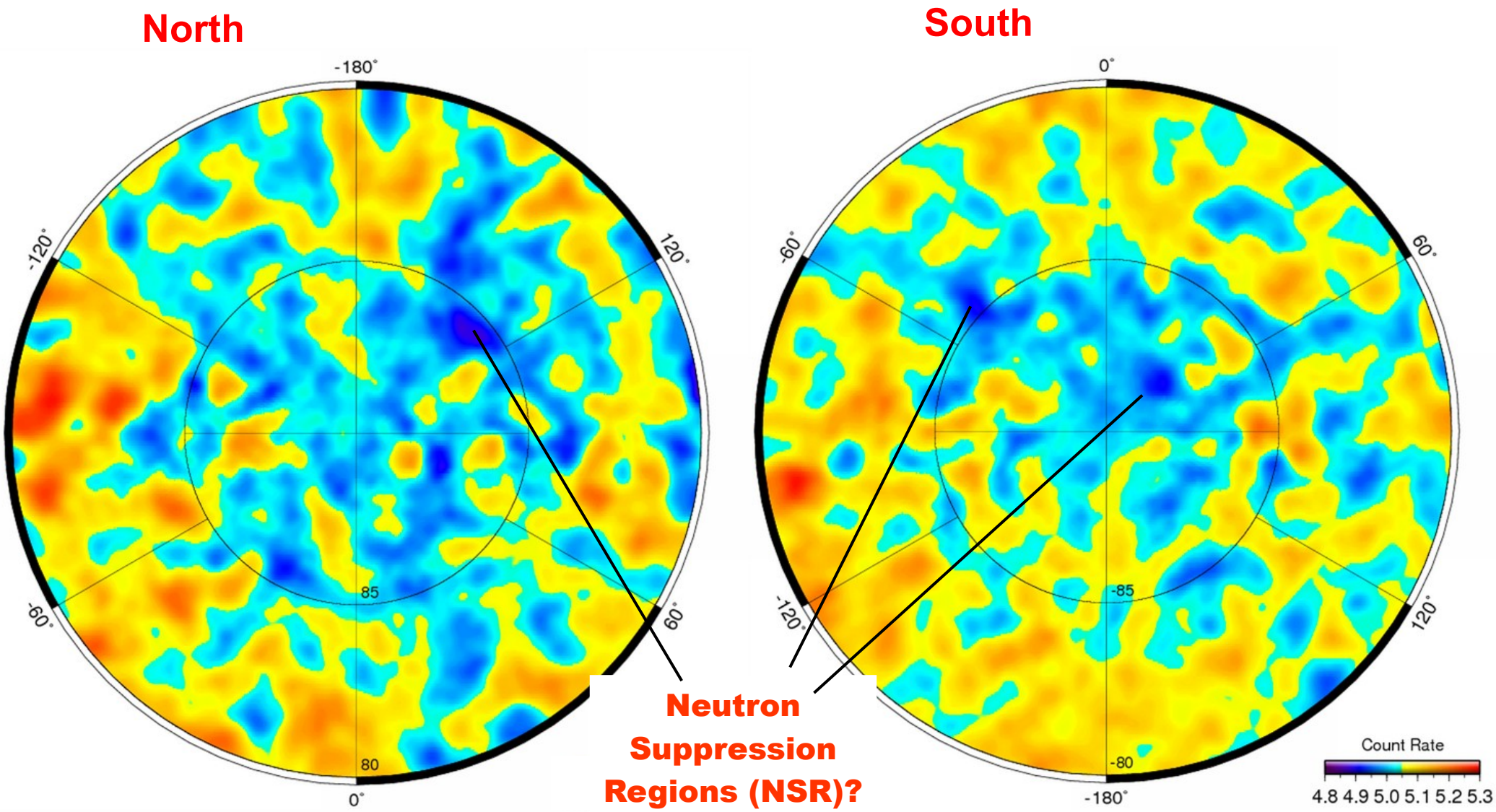




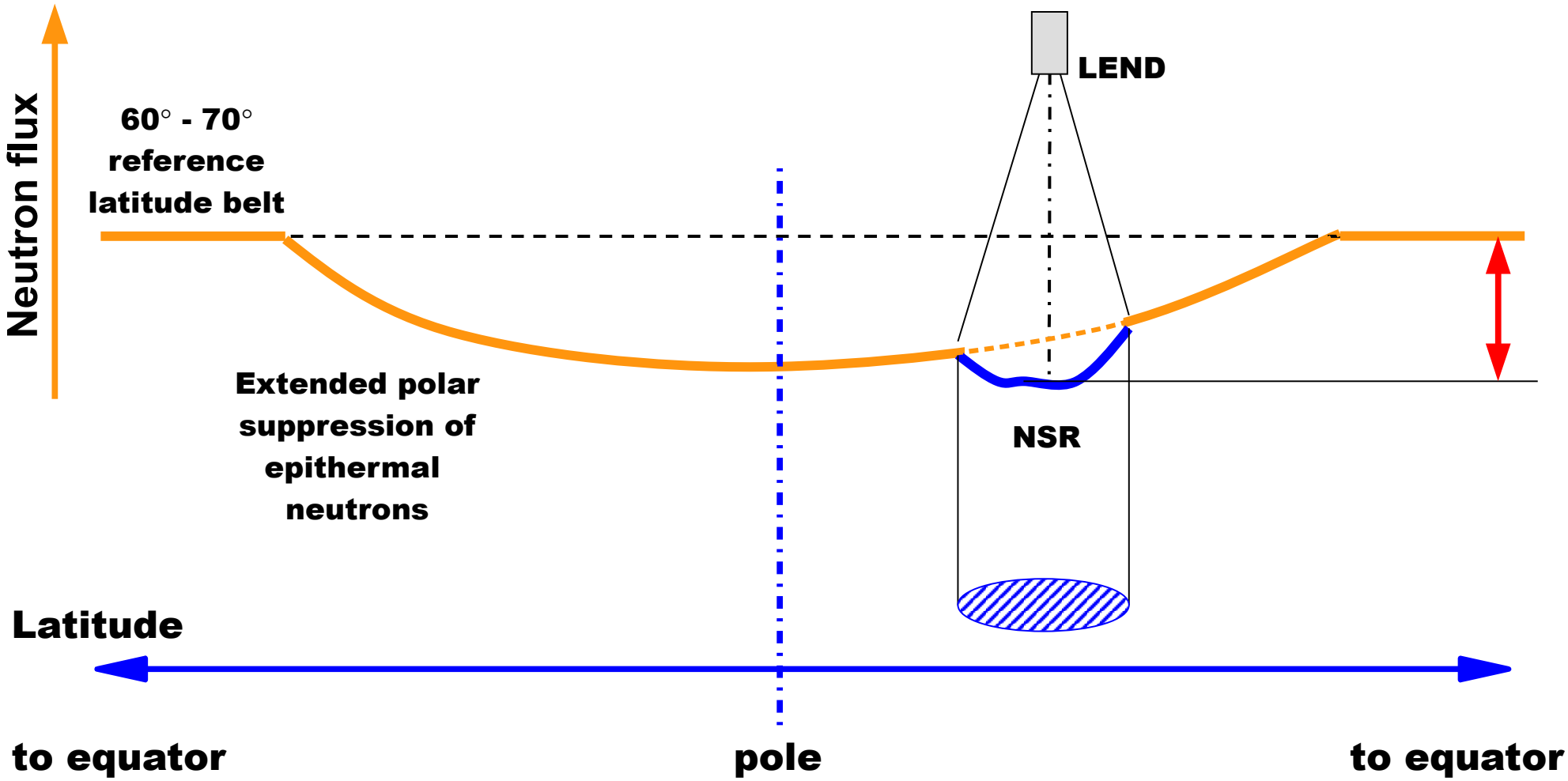
Lunar relief is shown from LOLA altimetry

Lunar Exploration Neutron Detector

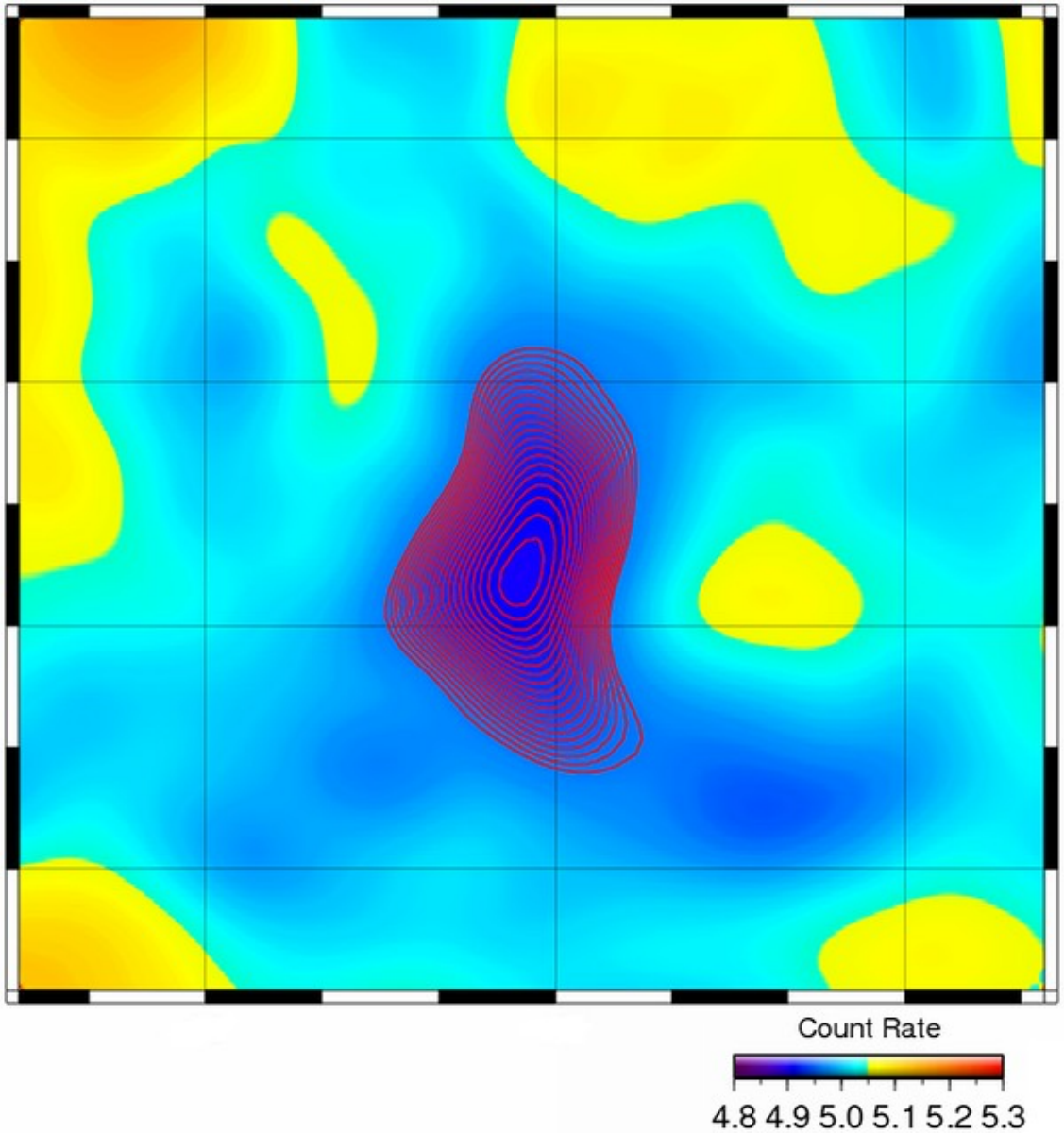
LEND maps of epithermal neutrons at North and South poles above 80° latitude

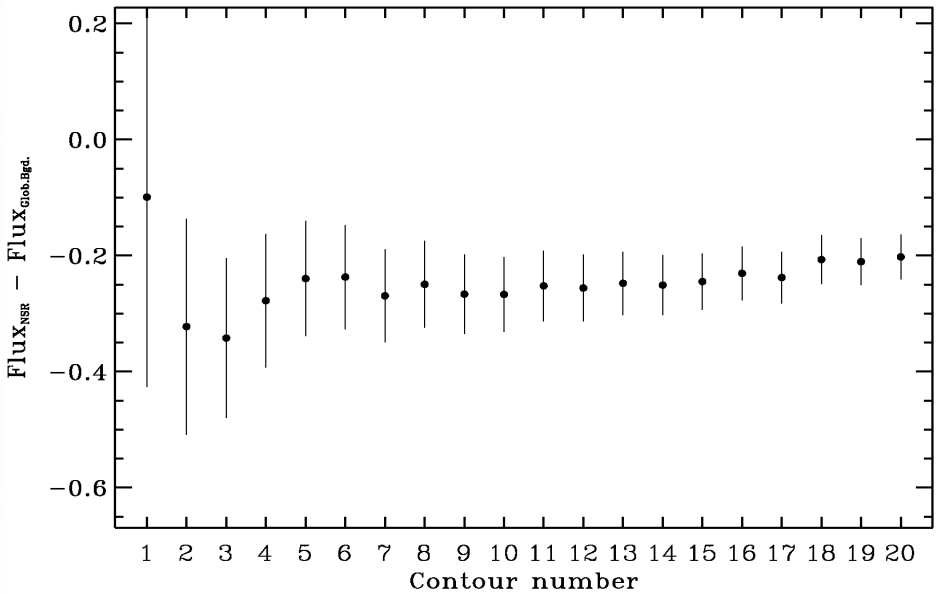


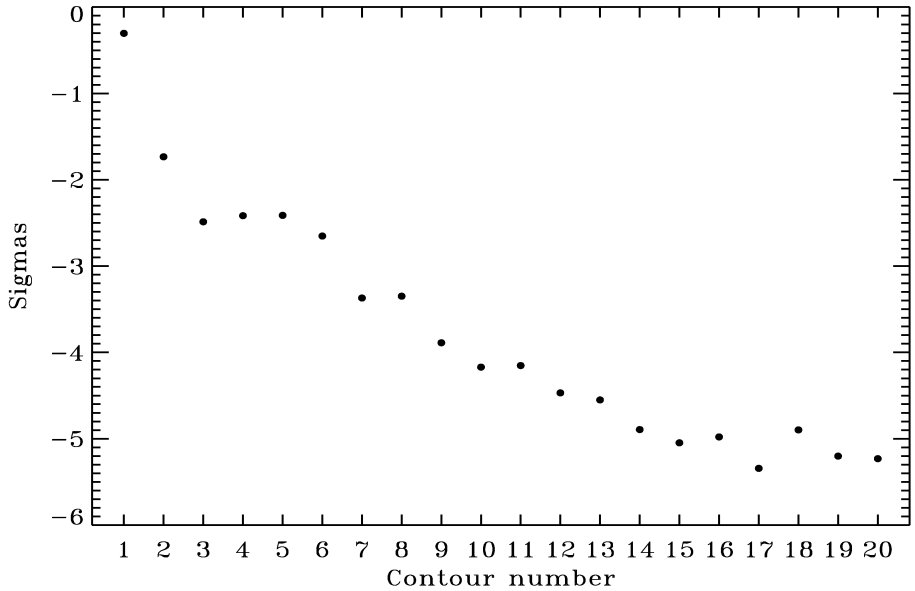
Lunar Exploration Neutron Detector



Lunar Exploration Neutron Detector

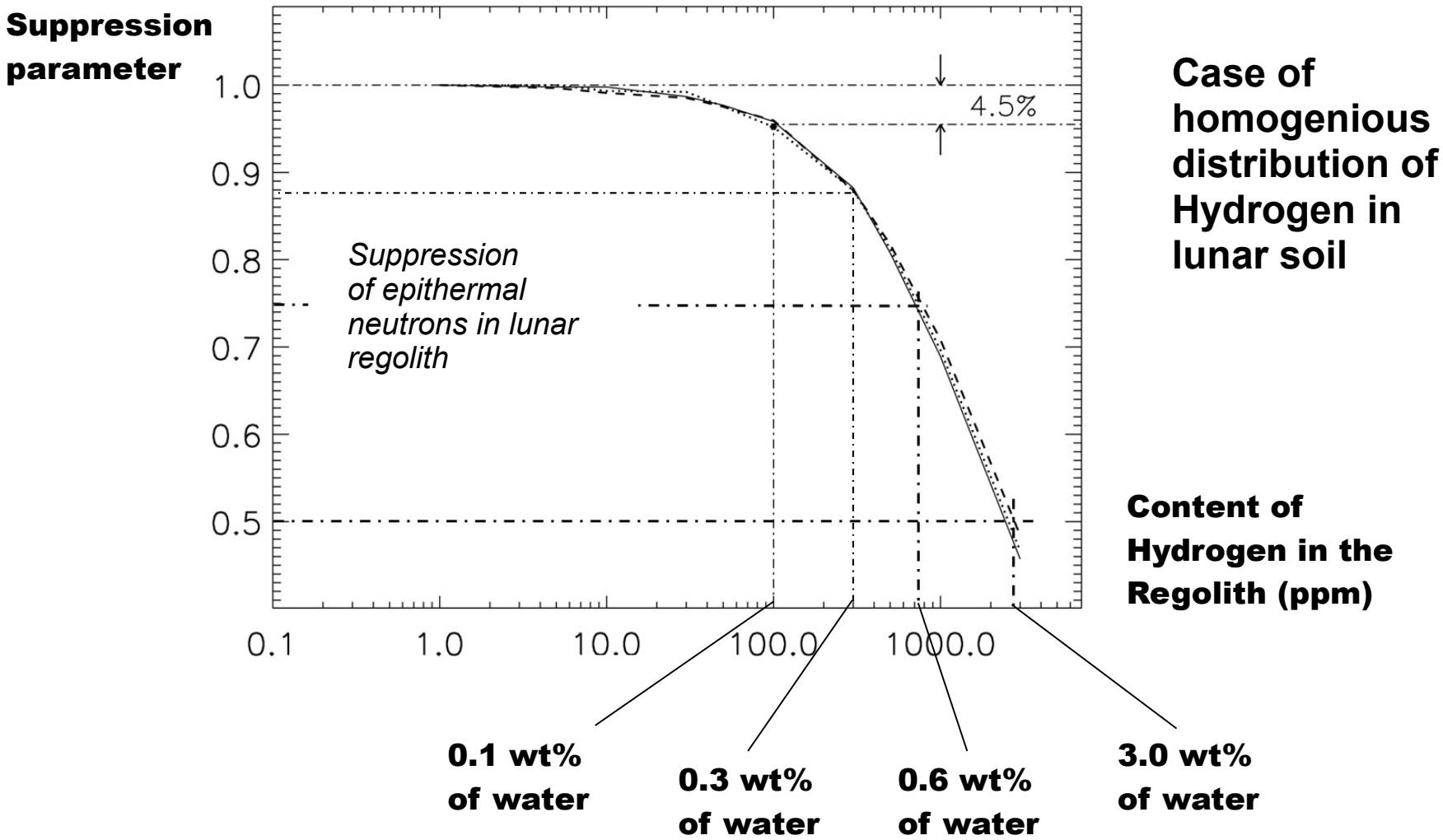




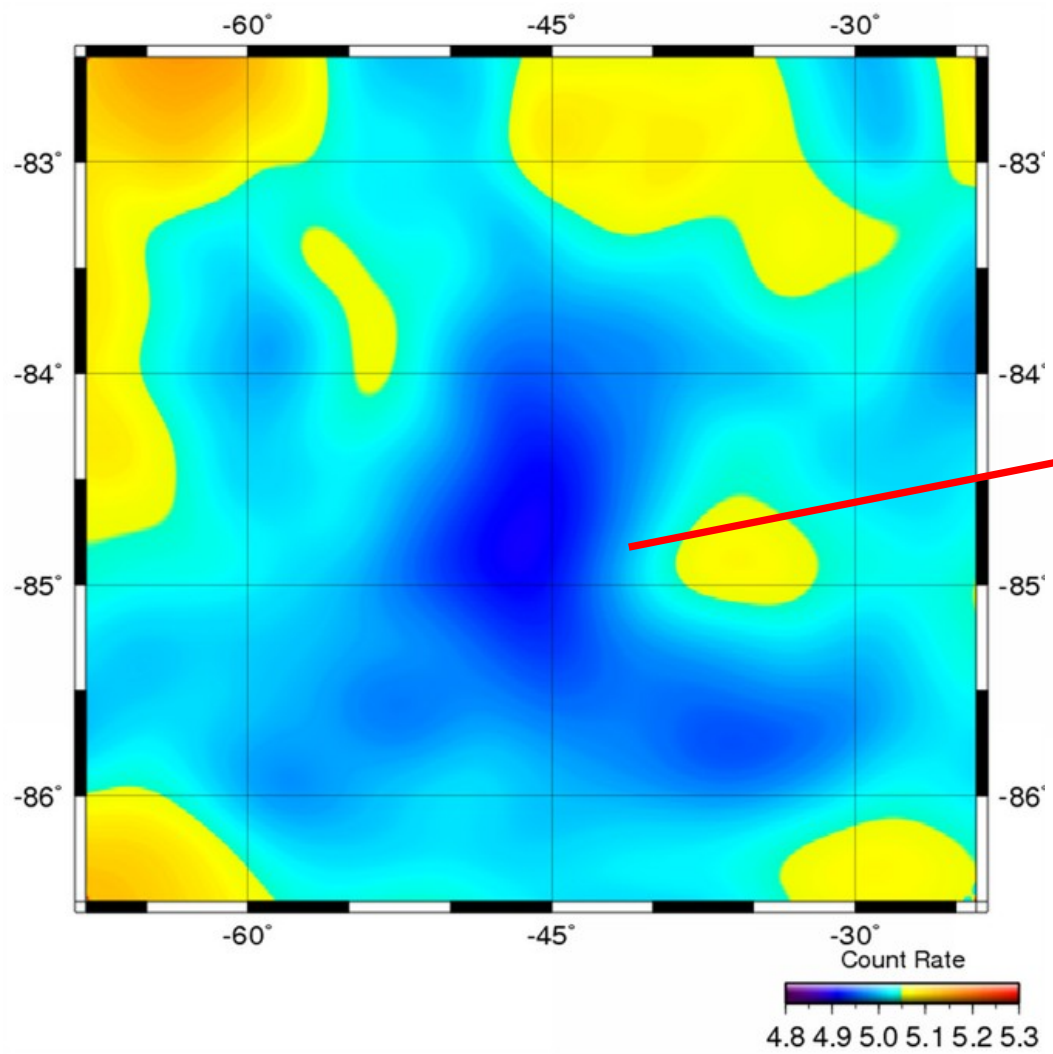


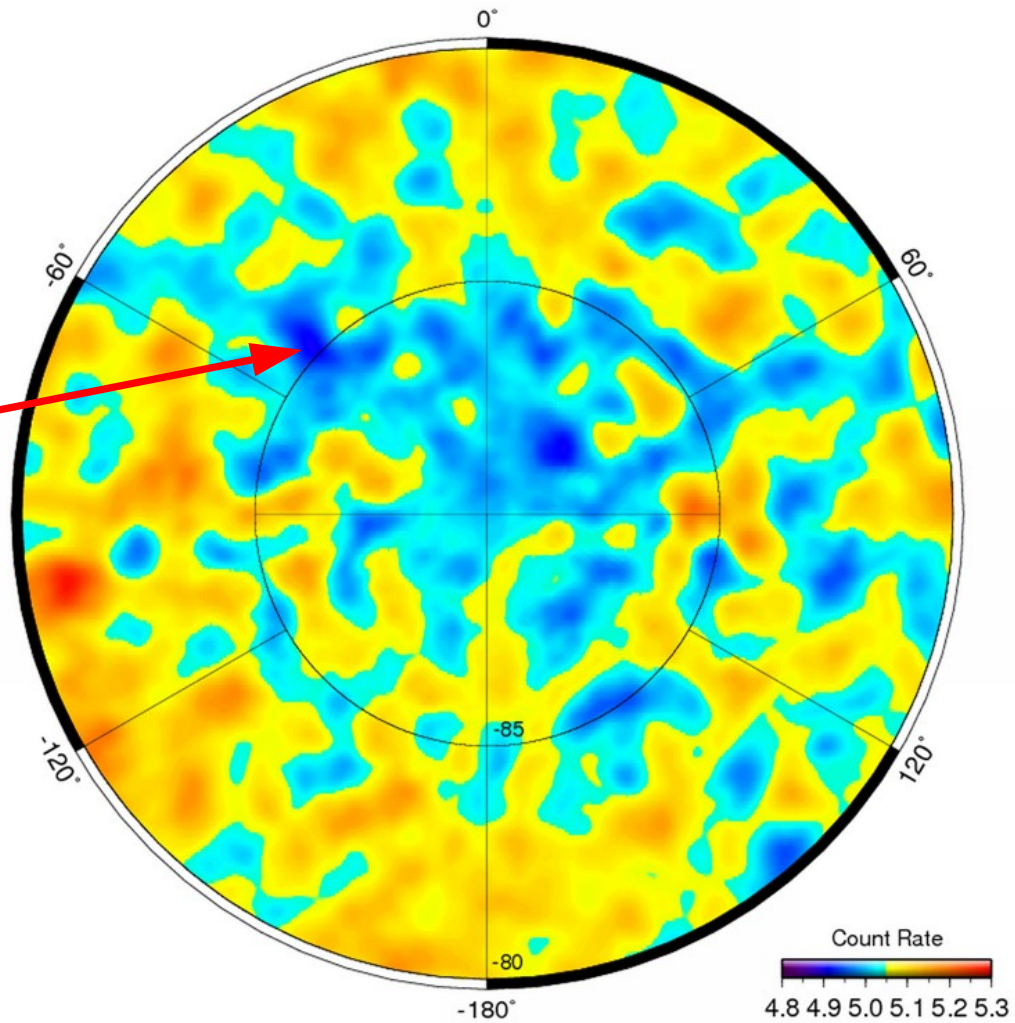
Lunar Exploration Neutron Detector

Relationship between content of Hydrogen (or water) and suppression of epithermal neutrons

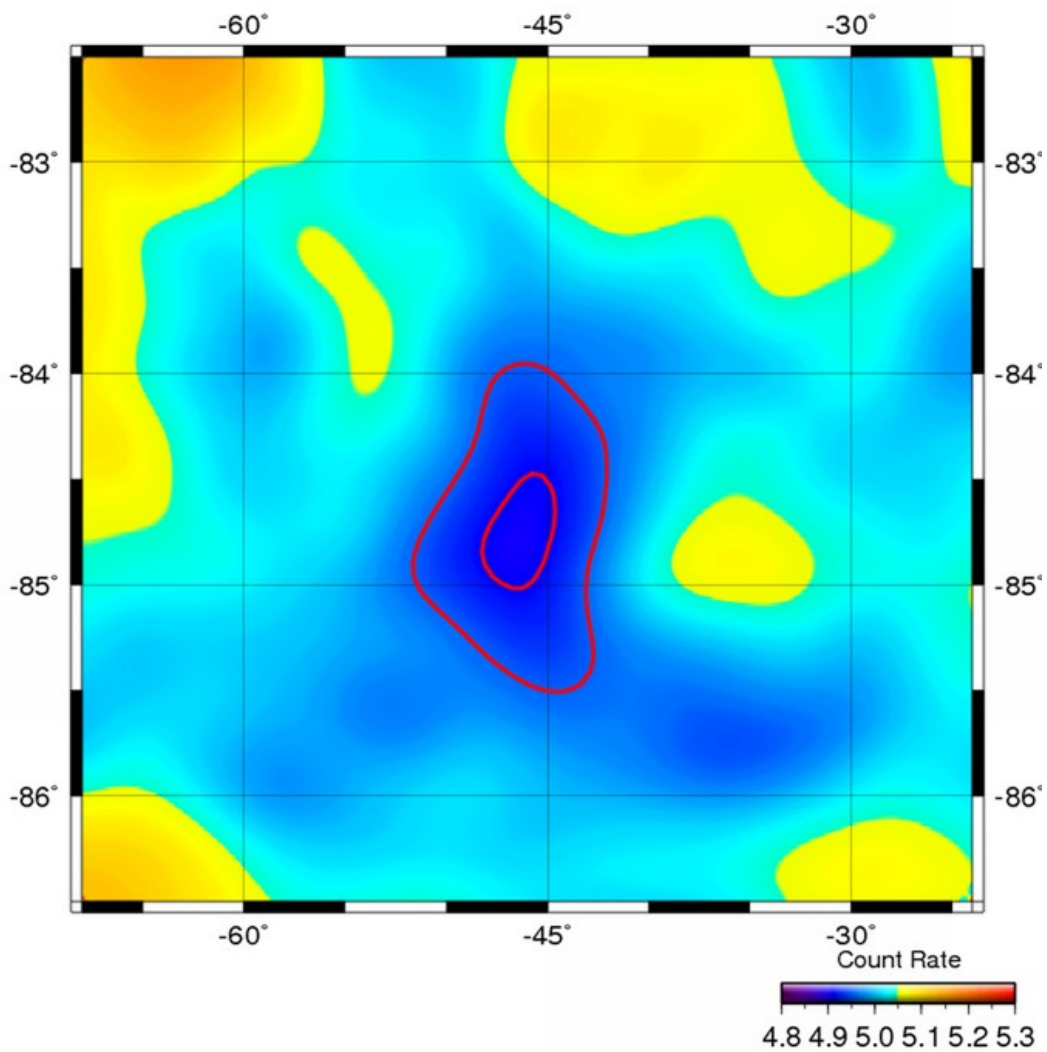


Lunar Exploration Neutron Detector





Lunar Exploration Neutron Detector



Wet area:

$F_{contour} - F_{BGD} = -0.339$

H = 470 ppm

Area = 76 km^2

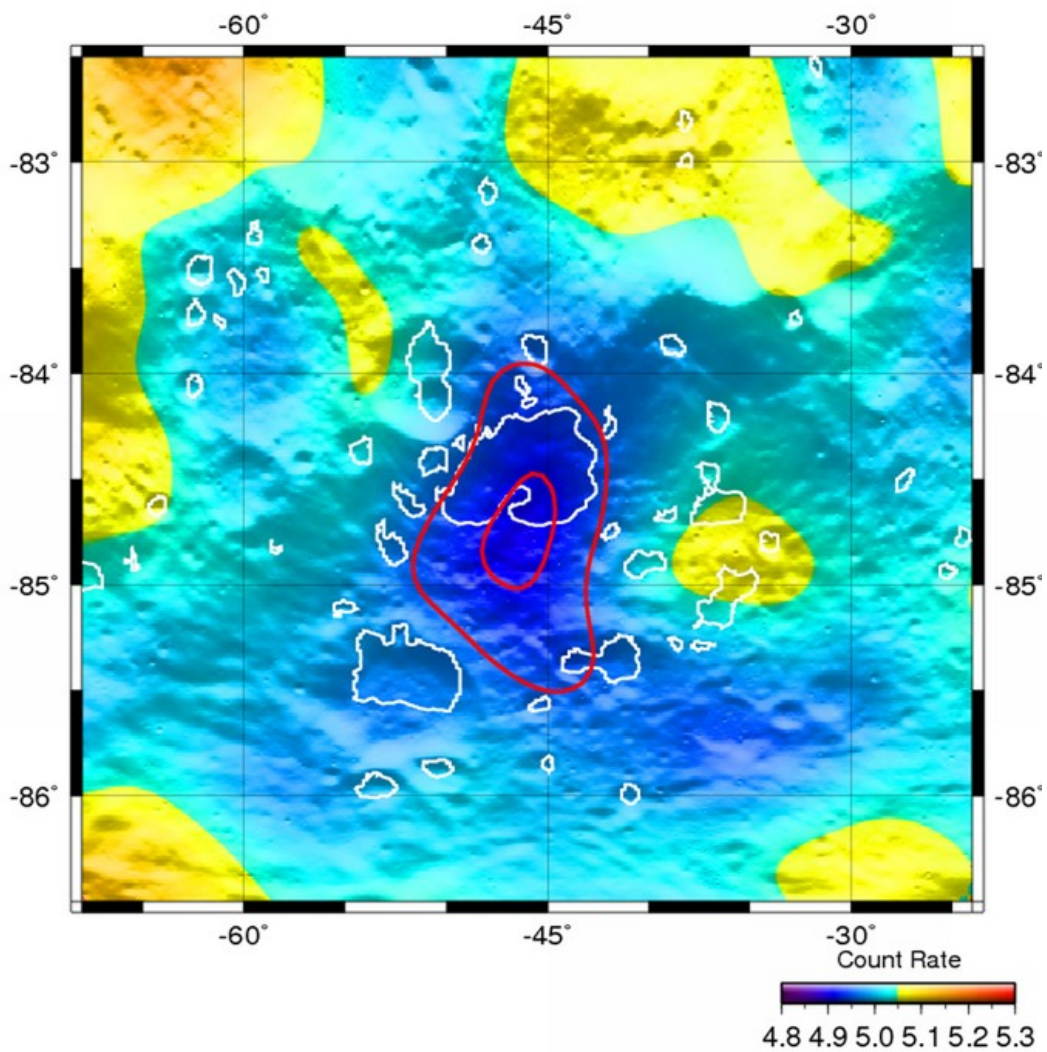
Most significant suppression:

$F_{contour} - F_{BGD} = -0.234$

H = 305 ppm

Area = 718 km^2

Lunar Exploration Neutron Detector



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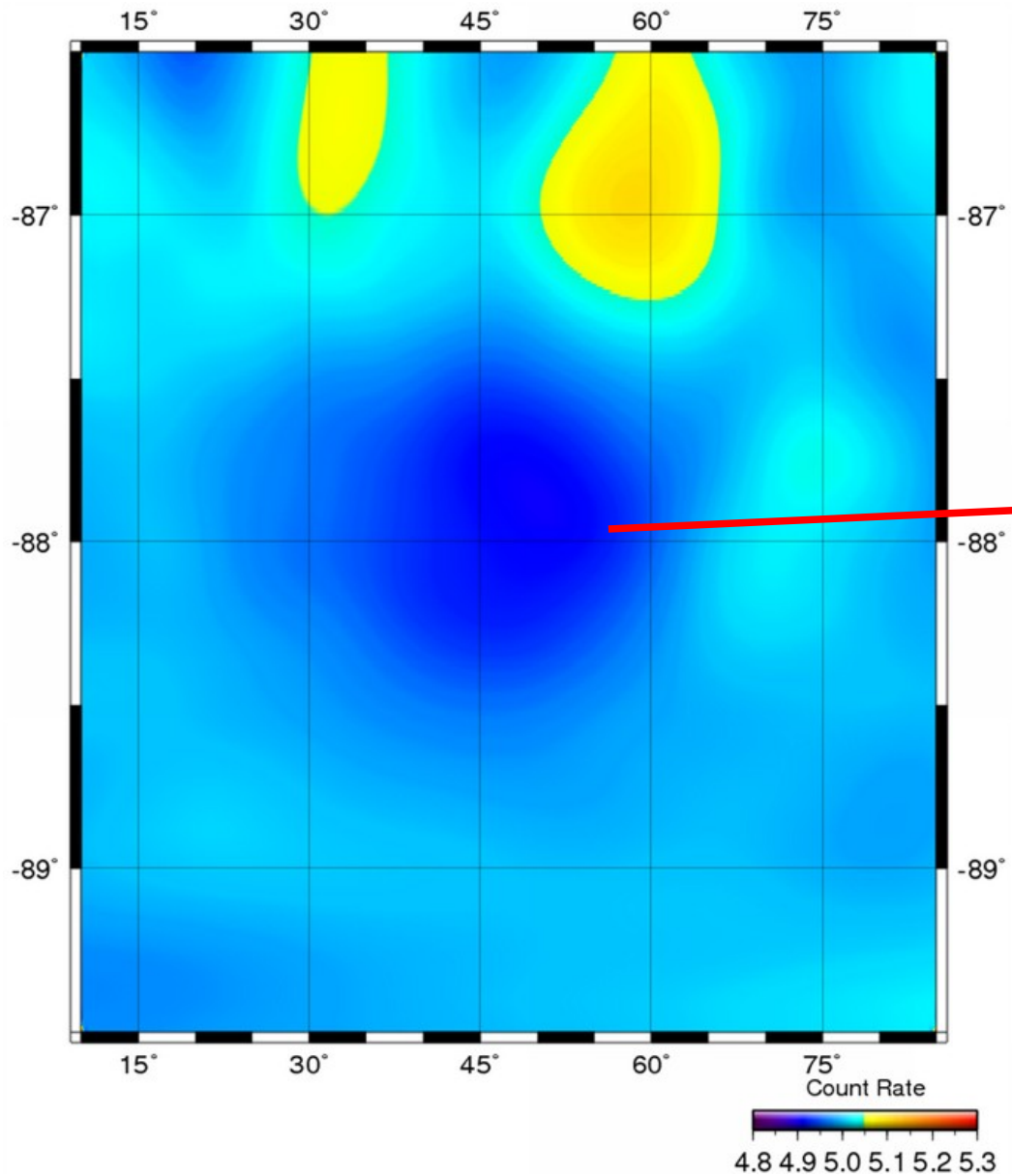
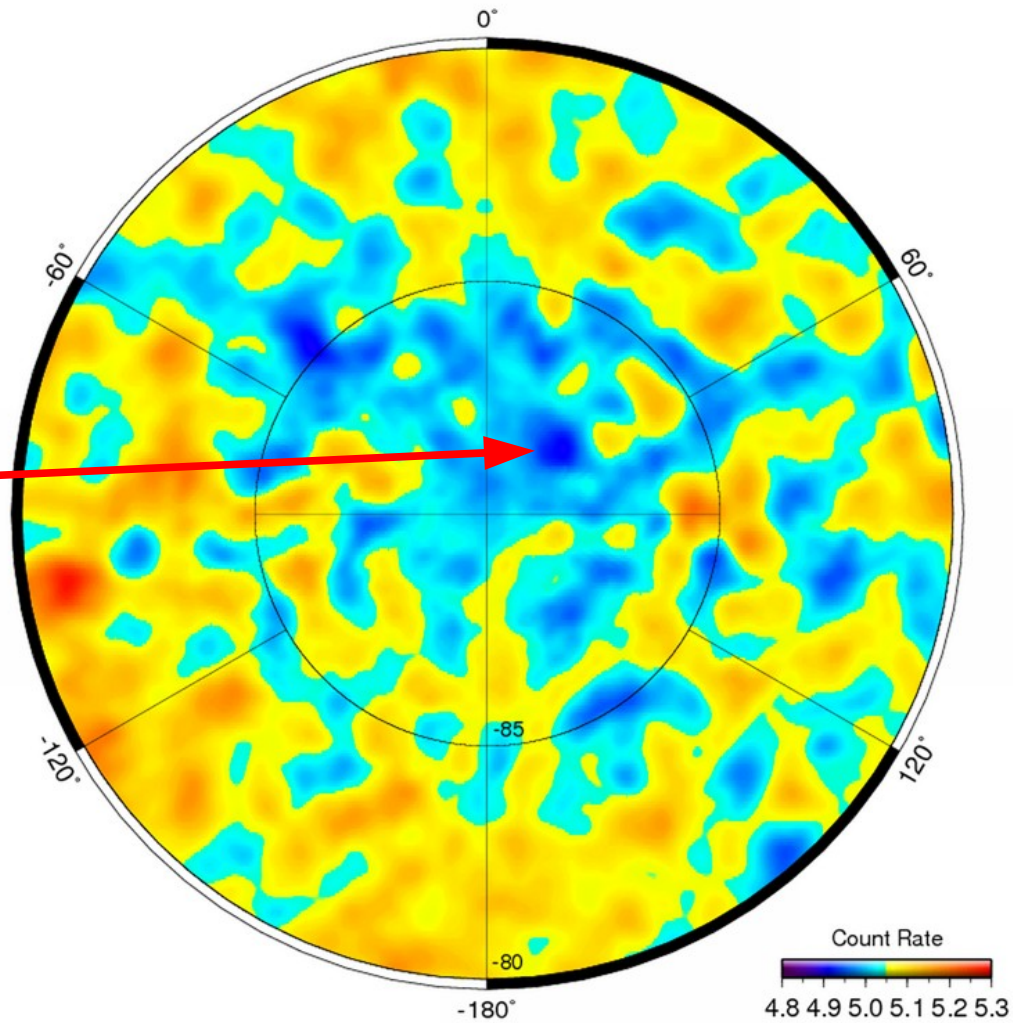
H = 305 ppm

Area = 718 km^2

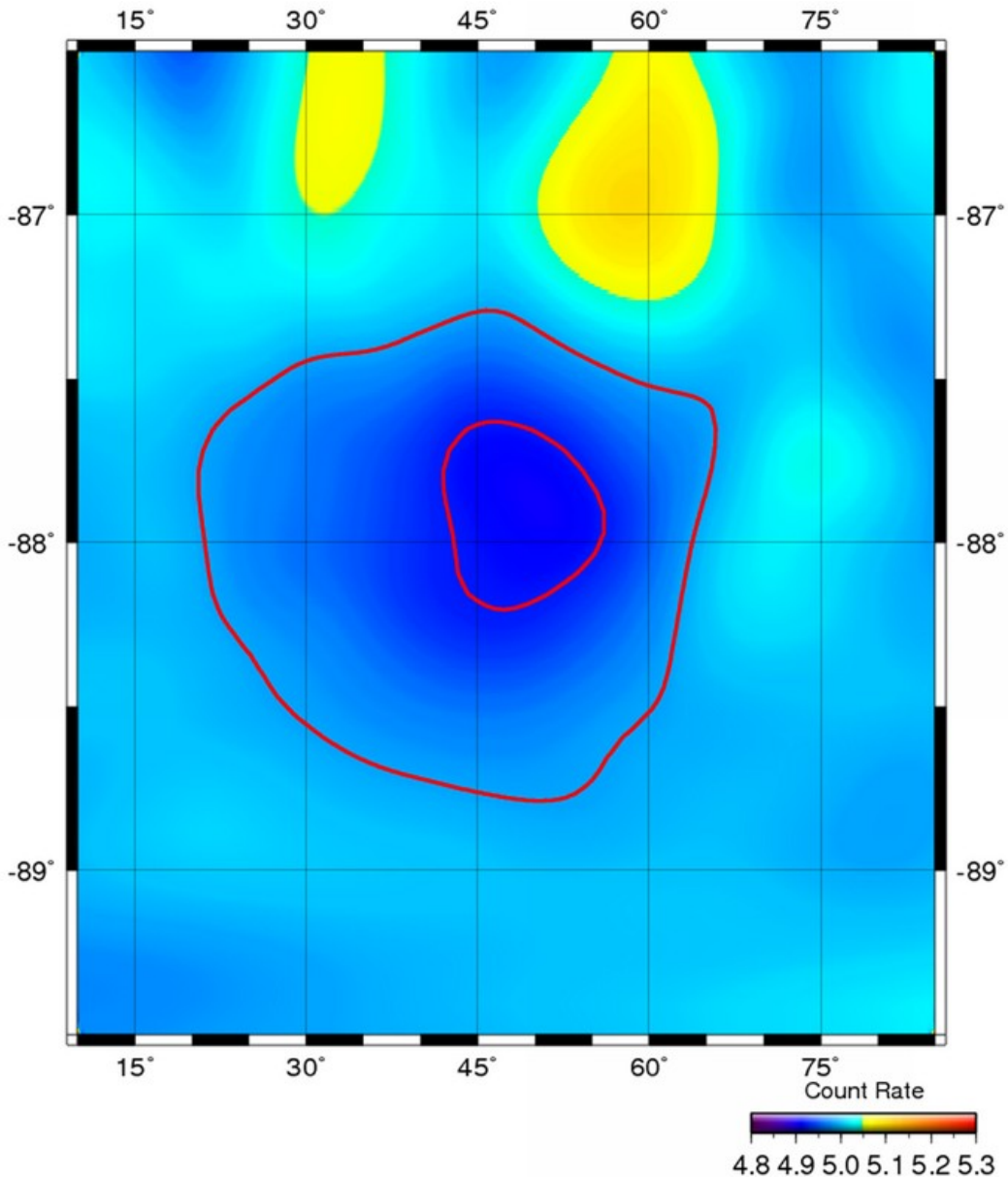
Case #1:
NSR contains PSR and a large region outside of PSR

Lunar Exploration Neutron Detector





Lunar Exploration Neutron Detector



Wet area:

$F_{contour} - F_{BGD} = -0.234$

H = 300 ppm

Area = 162 km^2

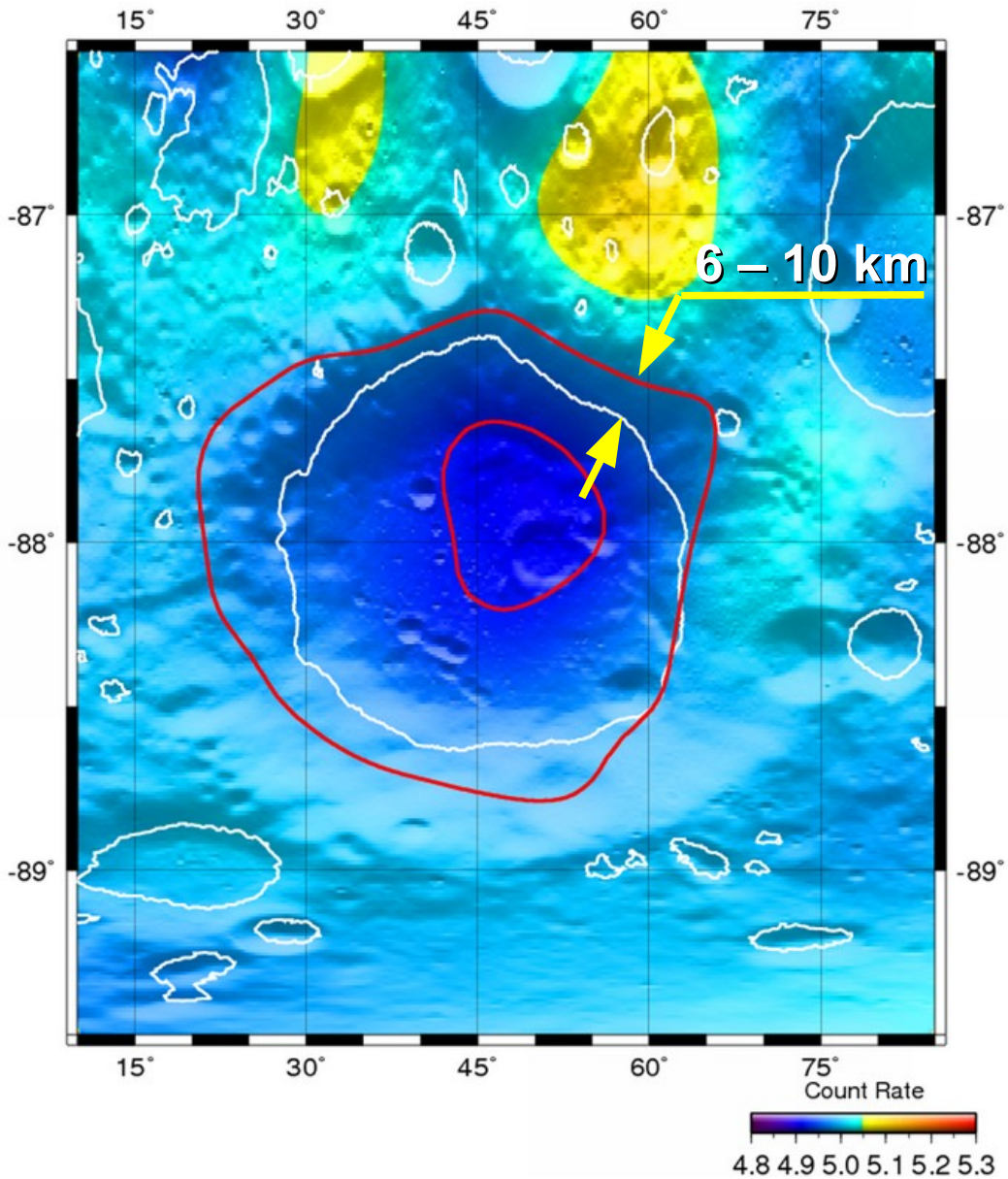
Most significant suppression:

$F_{contour} - F_{BGD} = -0.171$

H = 210 ppm

Area = 1482 km^2

Lunar Exploration Neutron Detector



Wet area:

$F_{contour} - F_{BGD} = -0.234$

H = 300 ppm

Area = 162 km^2

Most significant suppression:

$F_{contour} - F_{BGD} = -0.171$

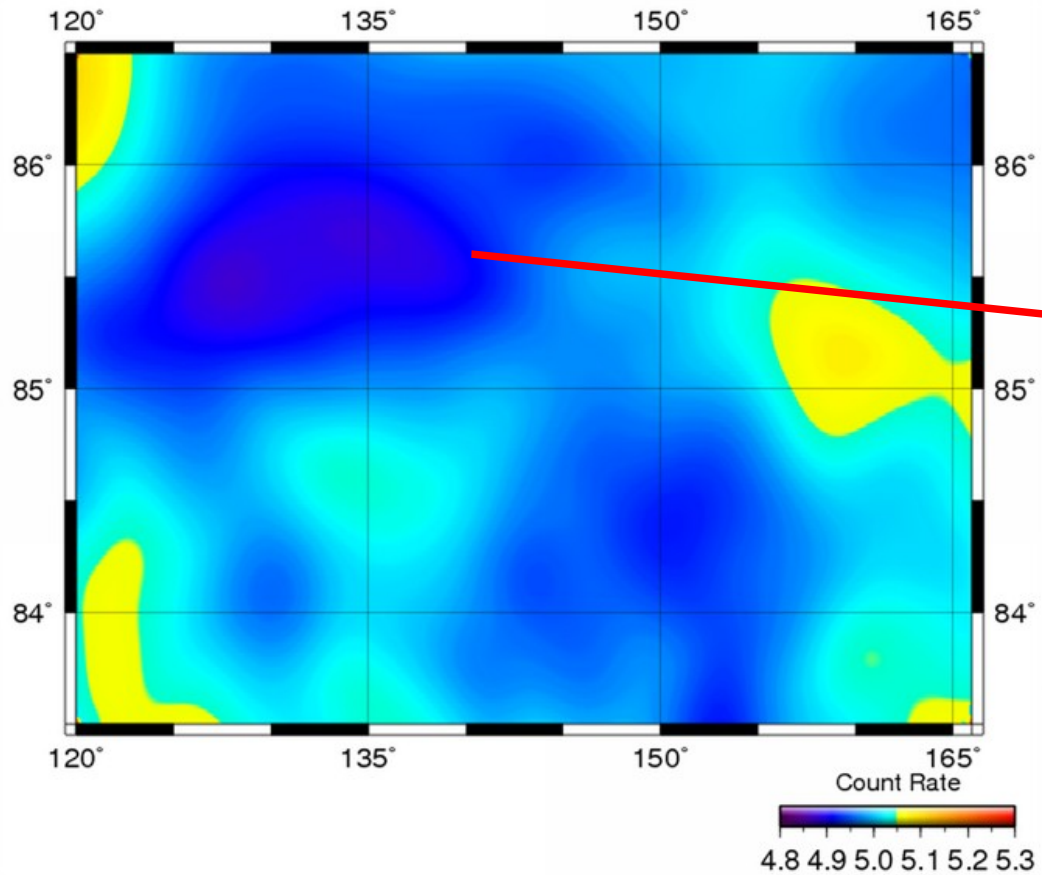
H = 210 ppm

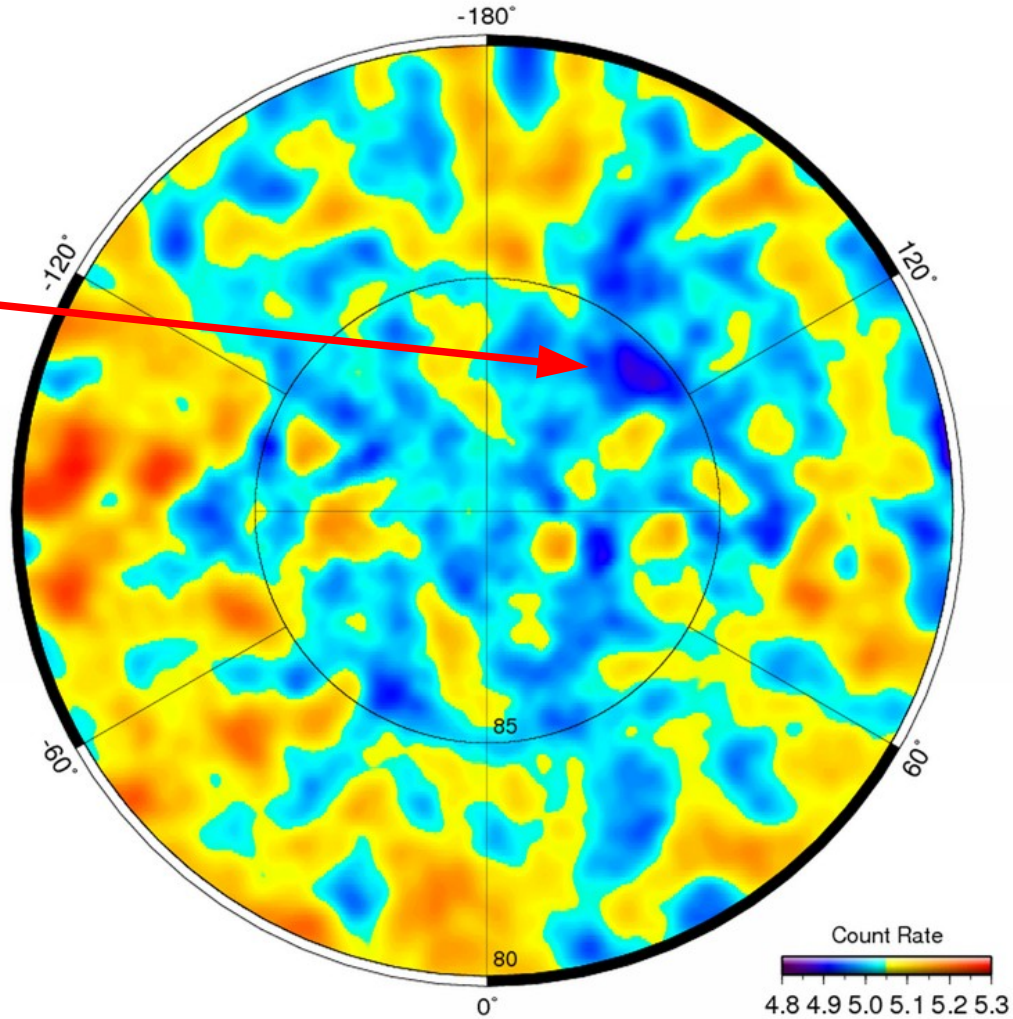
Area = 1482 km^2

Case #2:

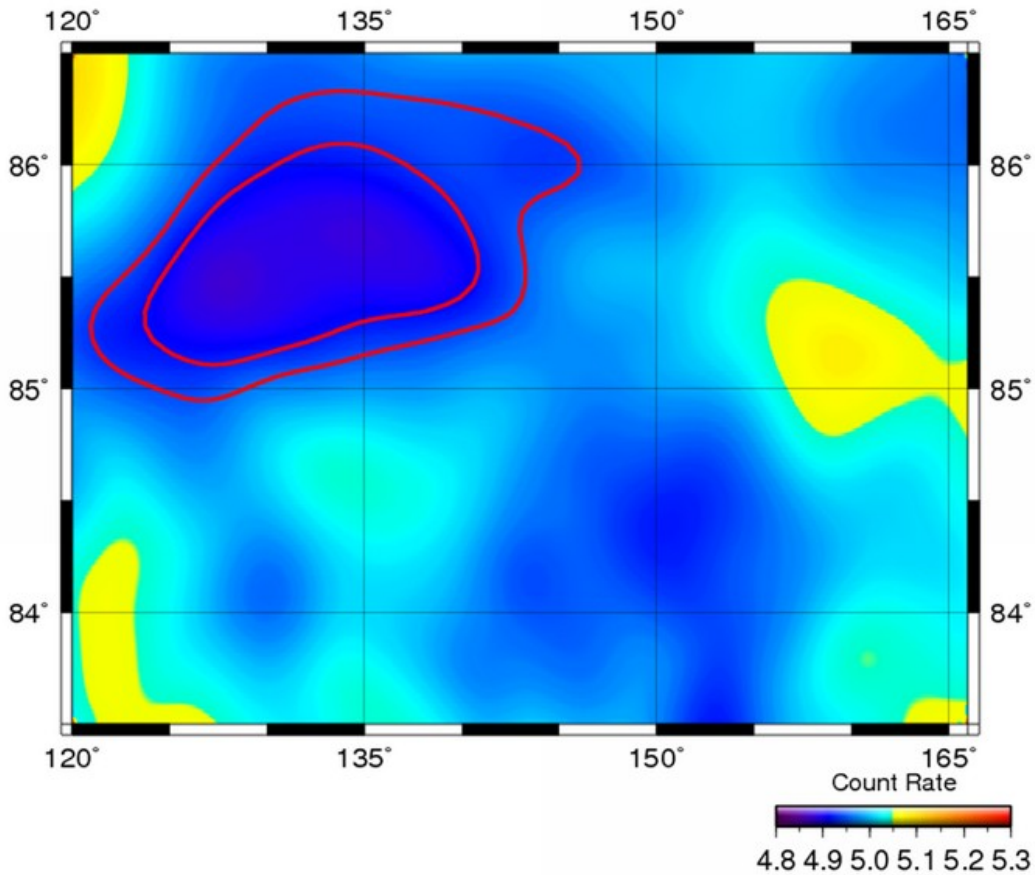
NSR contains PSR and a small region outside of PSR

Lunar Exploration Neutron Detector





Lunar Exploration Neutron Detector



Wet area:

$F_{contour} - F_{BGD} = -0.223$

H = 285 ppm

Area = 687 km^2

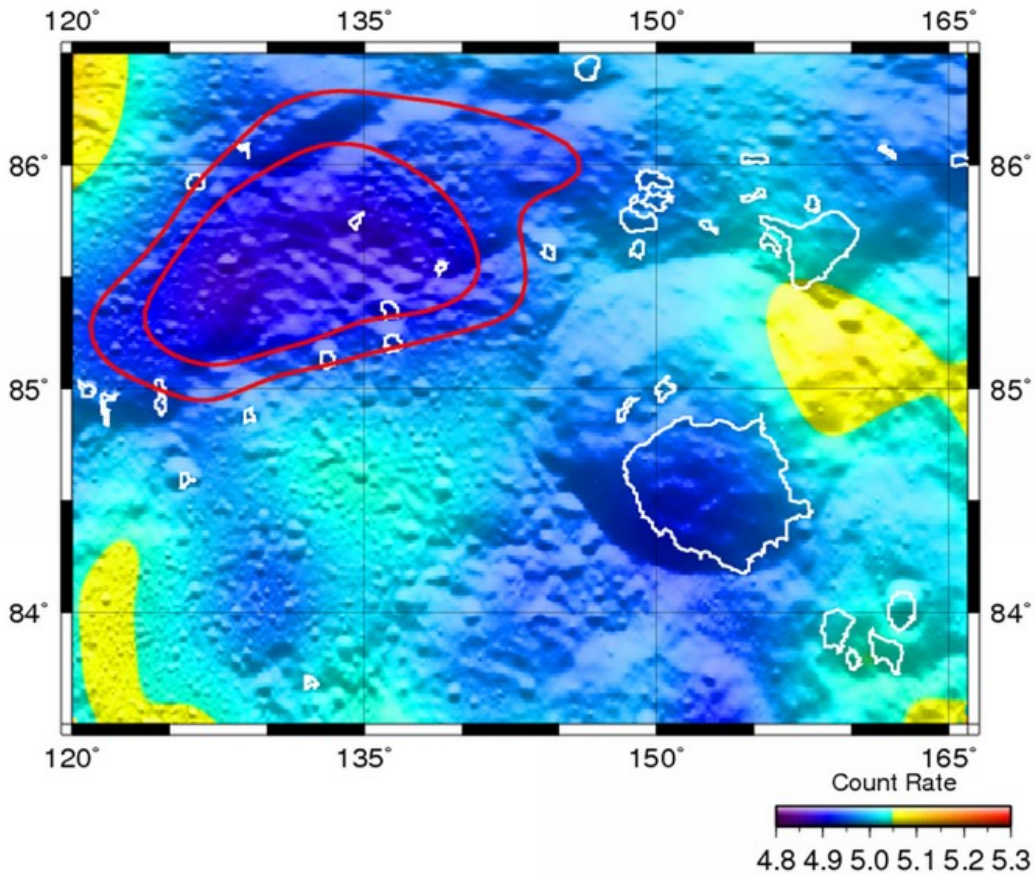
Most significant suppression:

$F_{contour} - F_{BGD} = -0.214$

H = 210 ppm

Area = 1383 km^2

Lunar Exploration Neutron Detector



Wet area:

$F_{contour} - F_{BGD} = -0.223$

H = 285 ppm

Area = 687 km^2

Most significant suppression:

$F_{contour} - F_{BGD} = -0.214$

H = 210 ppm

Area = 1383 km^2

Case #3:

NSR is not related to any large PSR

CONCLUSIONS:

- High resolution (~15 km) polar maps of collimated epithermal neutrons counting rate have been created
- Several Neutron Suppression Regions have been found on these maps using only neutron measurement data
- There are three types of found NSRs:
  - NSR well correlated with a PSR
  - NSR well correlated with a part of PSR and stretch well outside to a areas illuminated by Sun
  - NSR do not correlated with any large PSR