INVESTIGATING POTENTIAL SAFE LANDING SITES FOR PROSPECT

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PROSPECT

PROSPECT (Package Resource Observation and in-Situ Prospecting for Exploration, Commercial, Exploitation and Transportation) is one of the instruments that will be on the NASA CLPS mission.

PROPSECT has a drill (ProSEED) that will sample the surface of up to 1 m depth. These samples will be examined by the onboard laboratory (ProSPA).

PROSPECT designed to measure volatiles and sample water ice from the lunar surface, landing site should be volatile rich.

Objectives

- Initial part of the study is to give a broad overview of the south polar region (75-90°S),
  - Elevation and topography of the region, slopes, where is accessible?
  - Illumination, Earth visibility.

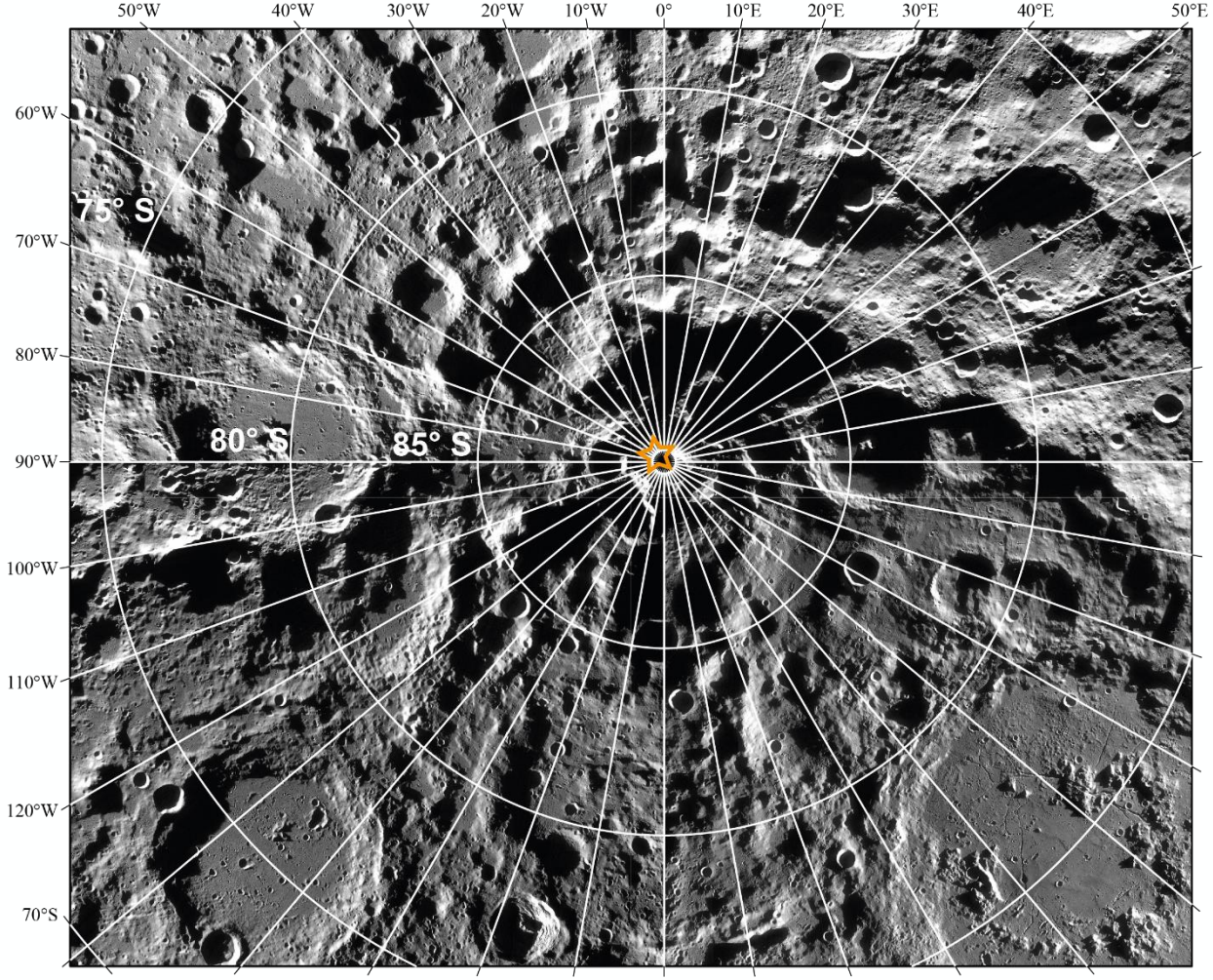
- A particular focus on finding areas that may contain volatiles and water ice for PROSPECT
  - Which locations have a thermal environment consistent for water ice to be stable? (Diviner)
  - Where does surface ice exist? (M^3)
  - What is the mineralogy of the region? (Kaguya)

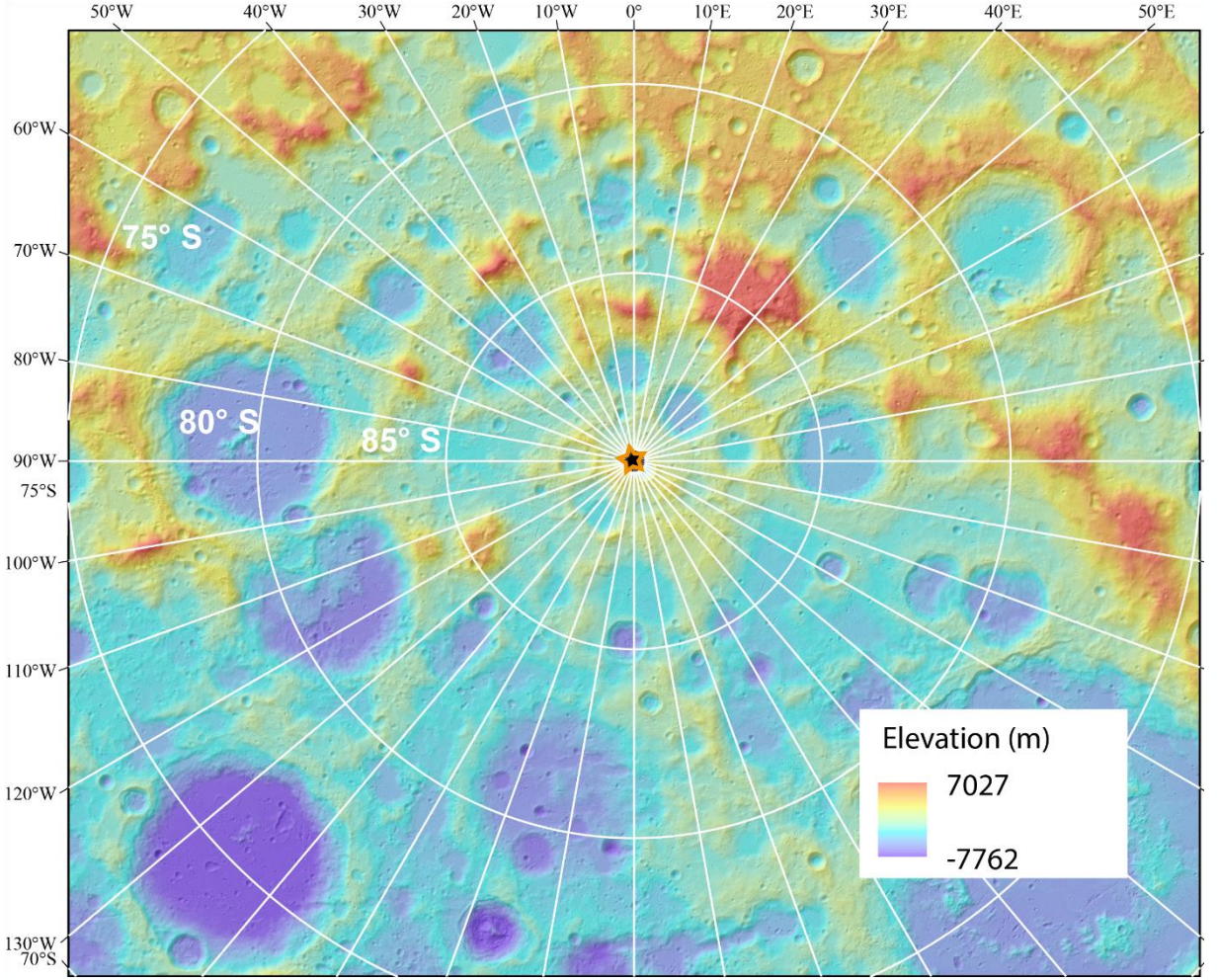
- Constraints of the NASA/CLPS mission (slope, elevation, landing site area, illumination, Earth visibility)

- Going to be further investigating the sites of interest in much more detail with higher resolution datasets e. g. NAC images

Areas of Interest

Regional study investigating the south polar region (75-90° S)
Areas where volatiles and water ice may be present.

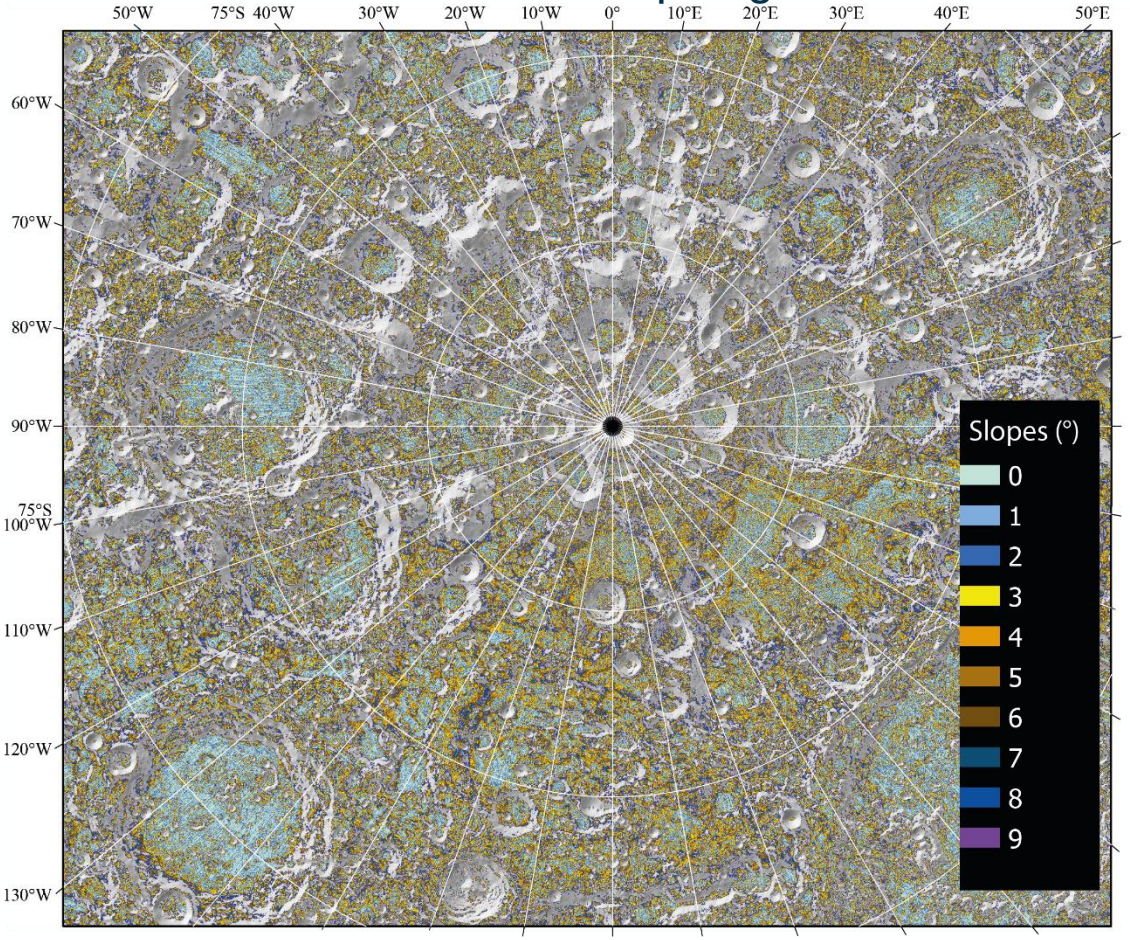




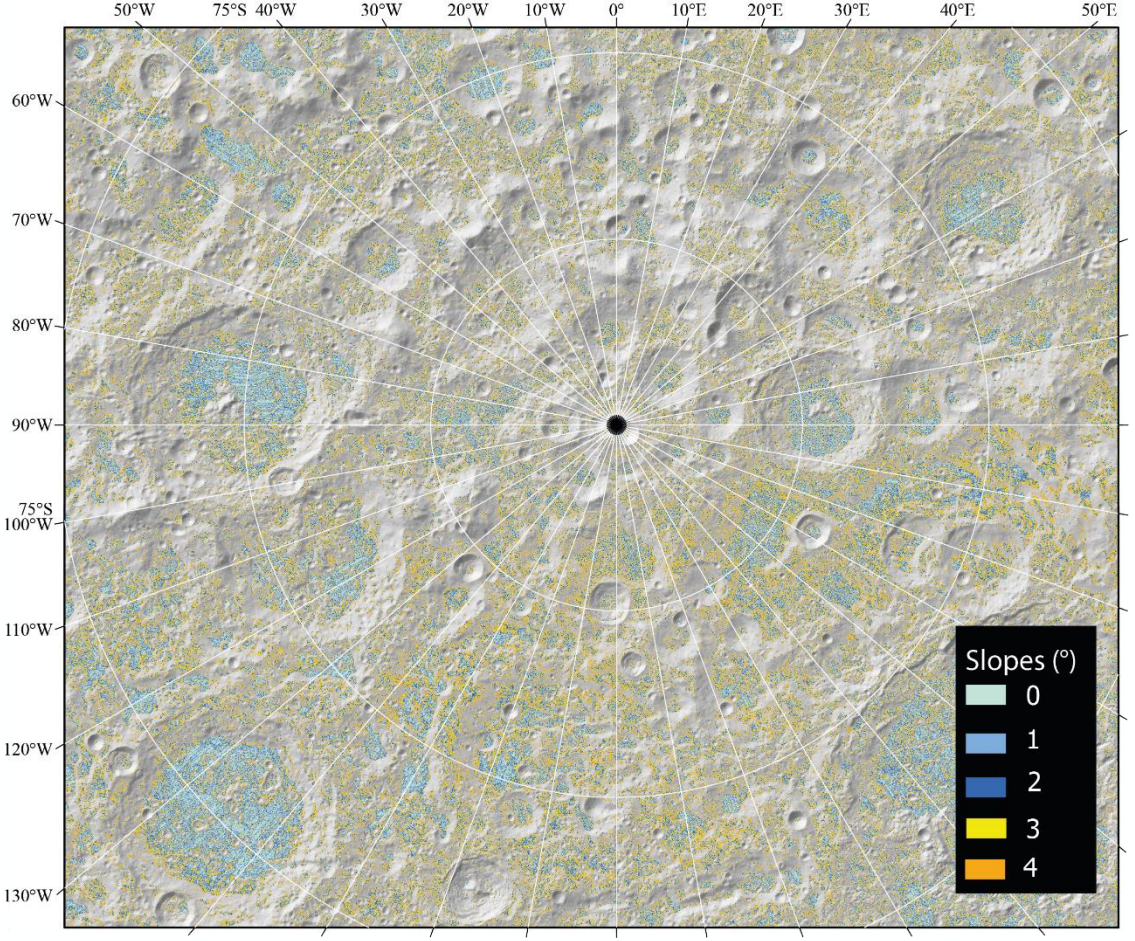
LOLA 30 m/pixel (Smith et al 2010)

Slope Map (Lola 30 m/pixel)

Slopes less than 10°
Areas with no colour show slopes greater than 10°



Slopes less than 5°
Areas with no colour show slopes greater than 5°



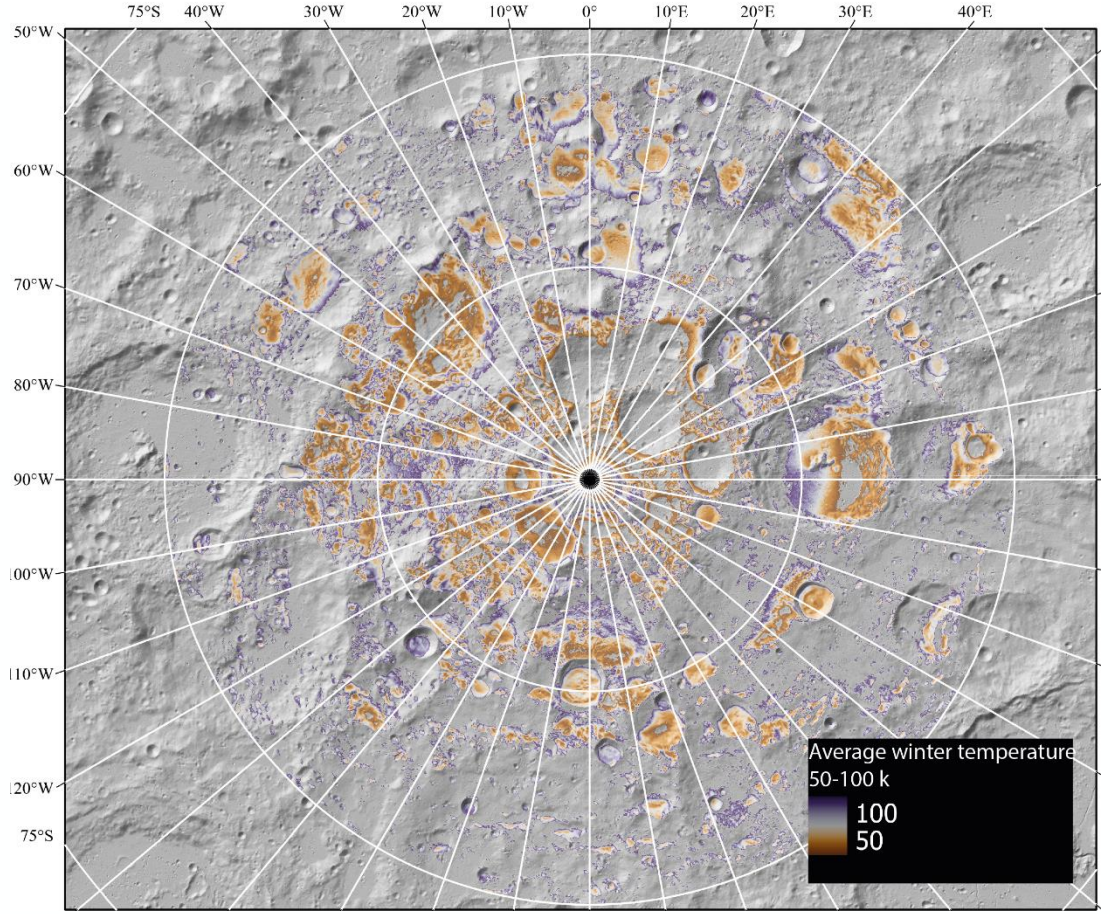
Crater floors and basins have the shallowest slopes, crater walls and ridges have higher slope values.

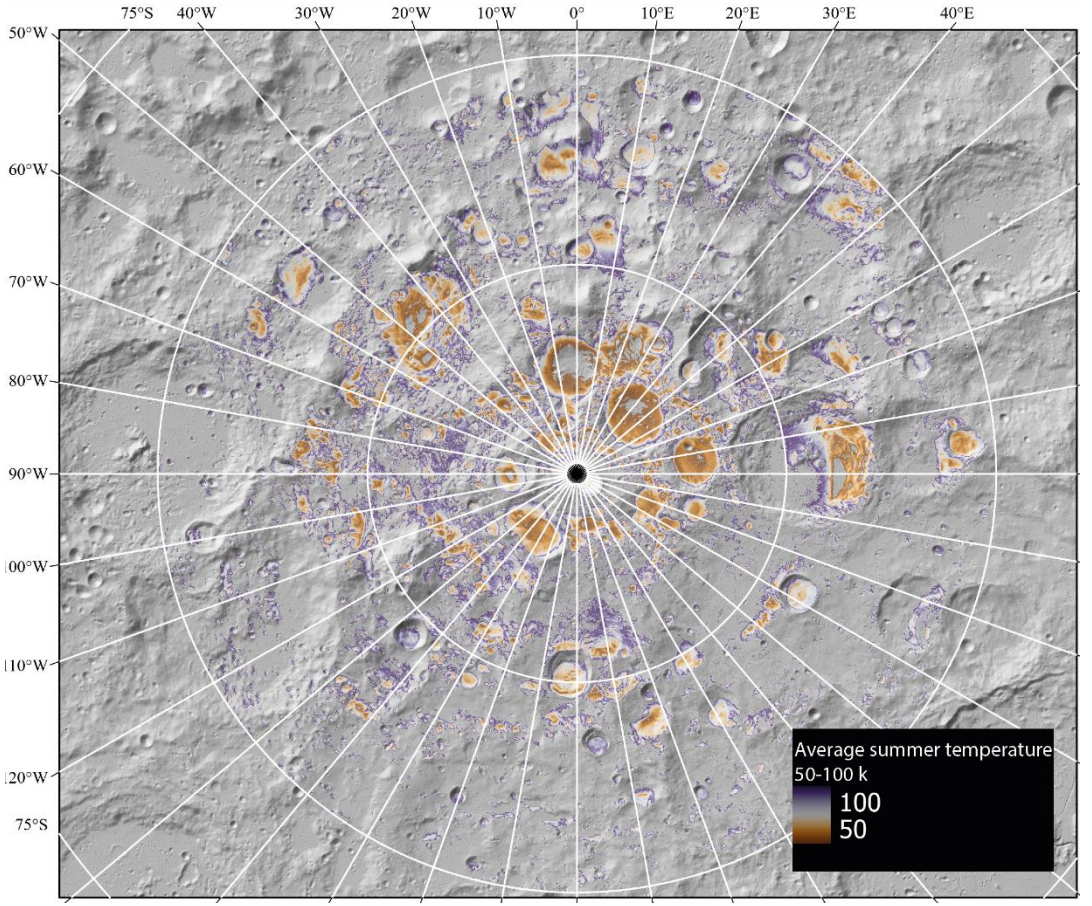
LOLA (Smith et al 2010)

Surface Temperatures

Seasonal diviner data shows areas where temperatures are cold enough for water ice to be stable if present.

Areas found across the region that have temperatures 50-100 k



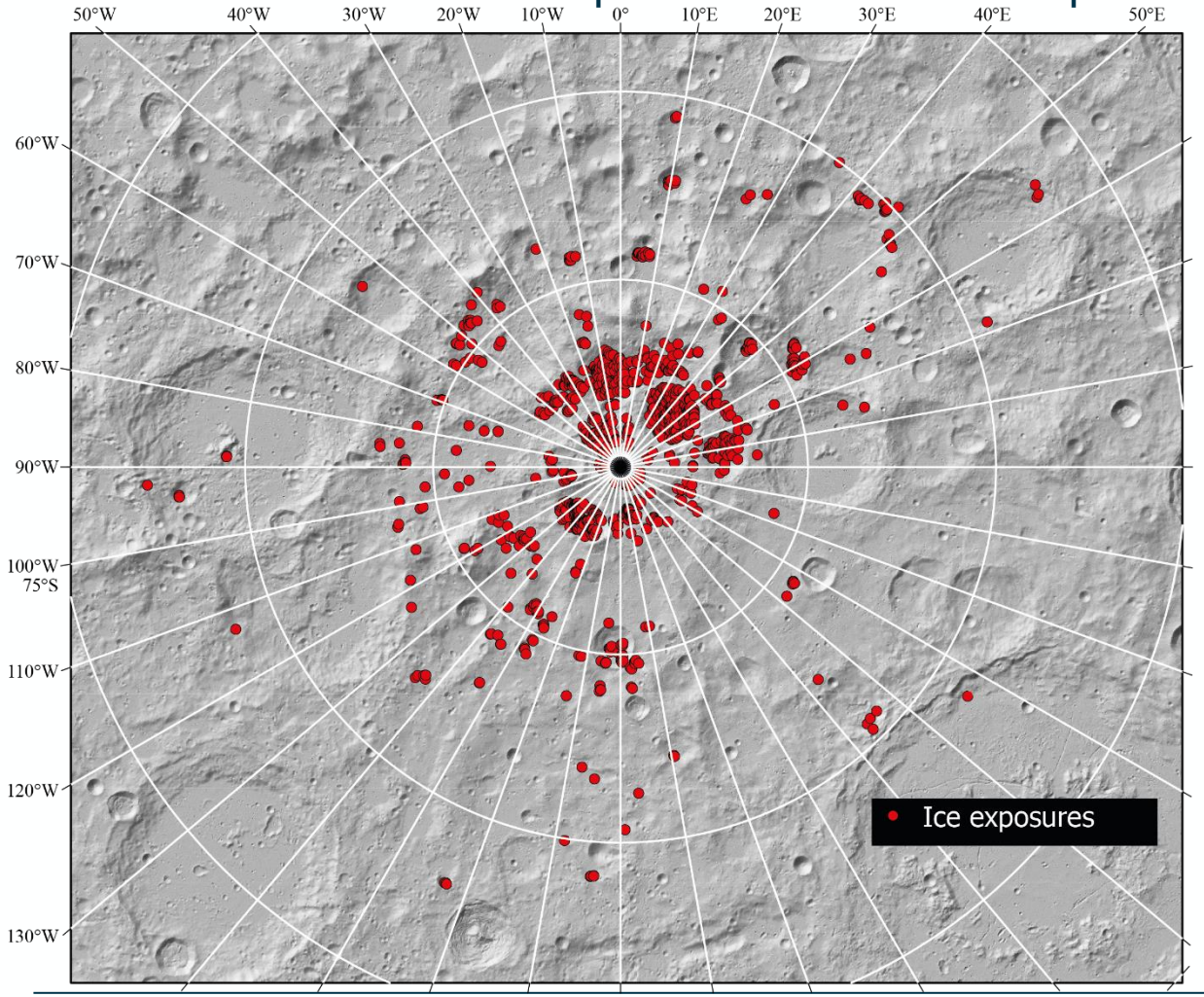


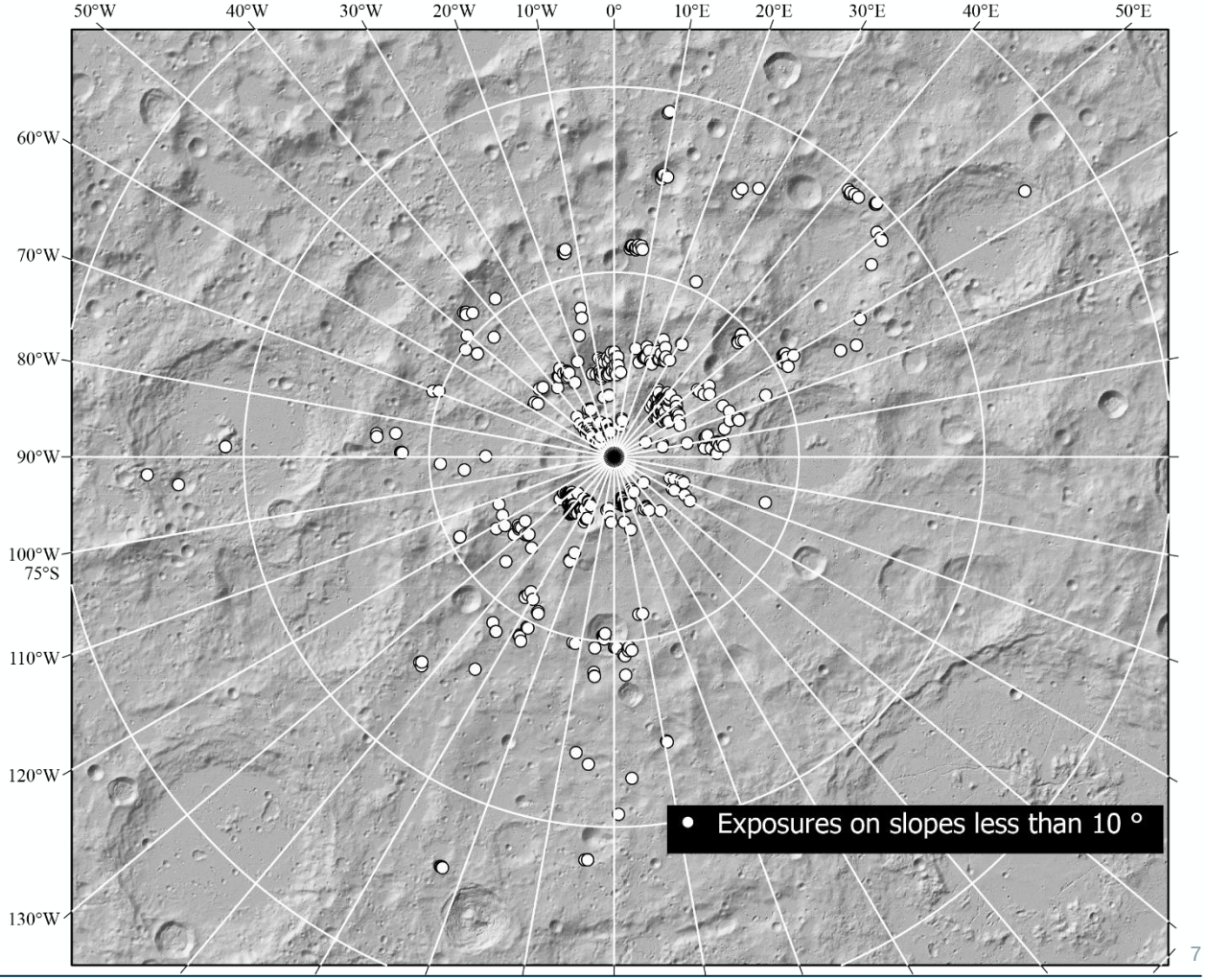
Seasonal Diviner average winter and summer temperatures (Williams *et al* 2019)

Ice Exposures

M^3 data shows points where ice exposures are present at the surface (Li *et al* 2018)

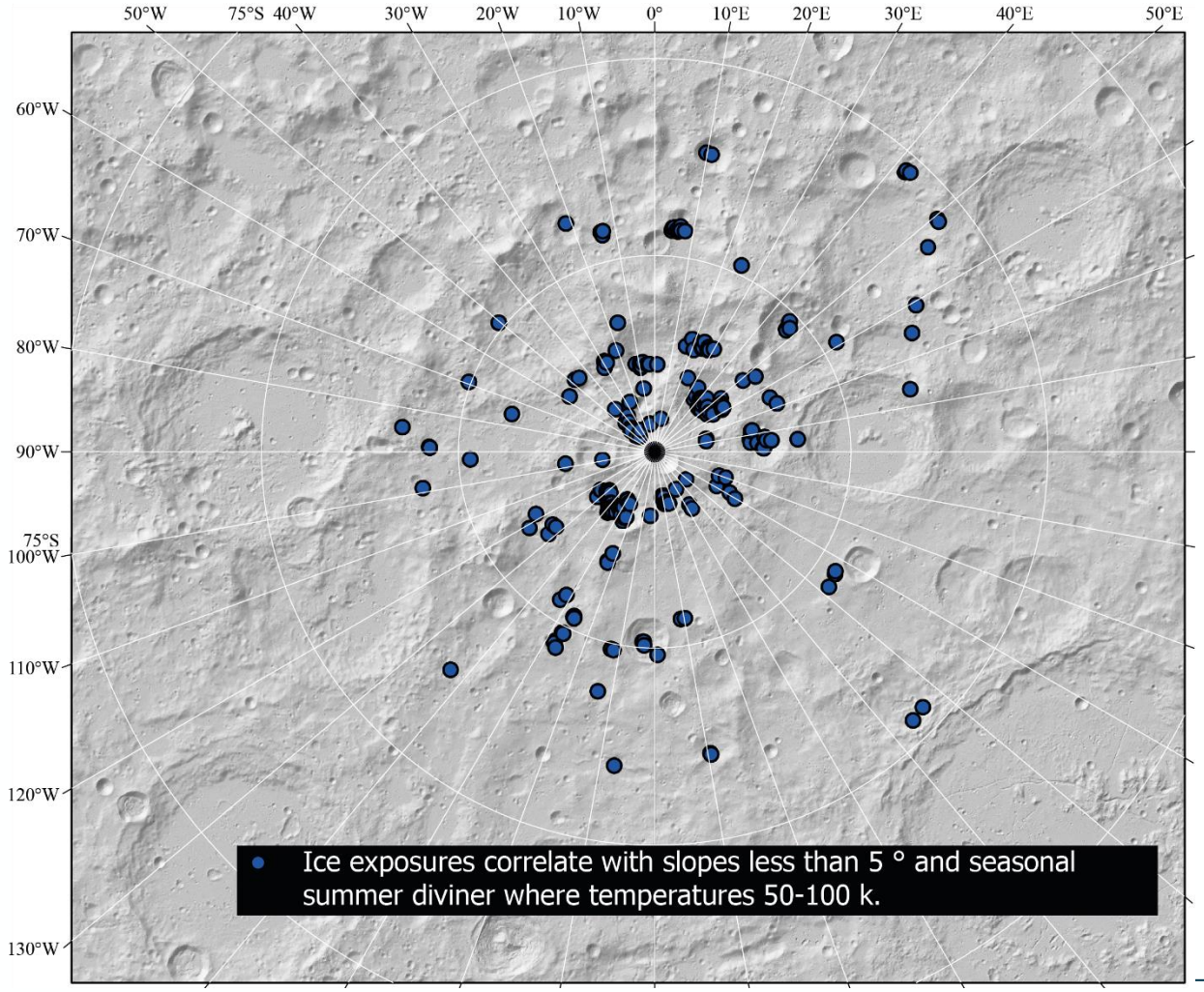
Identified where the ice exposures match with slopes less than 10°

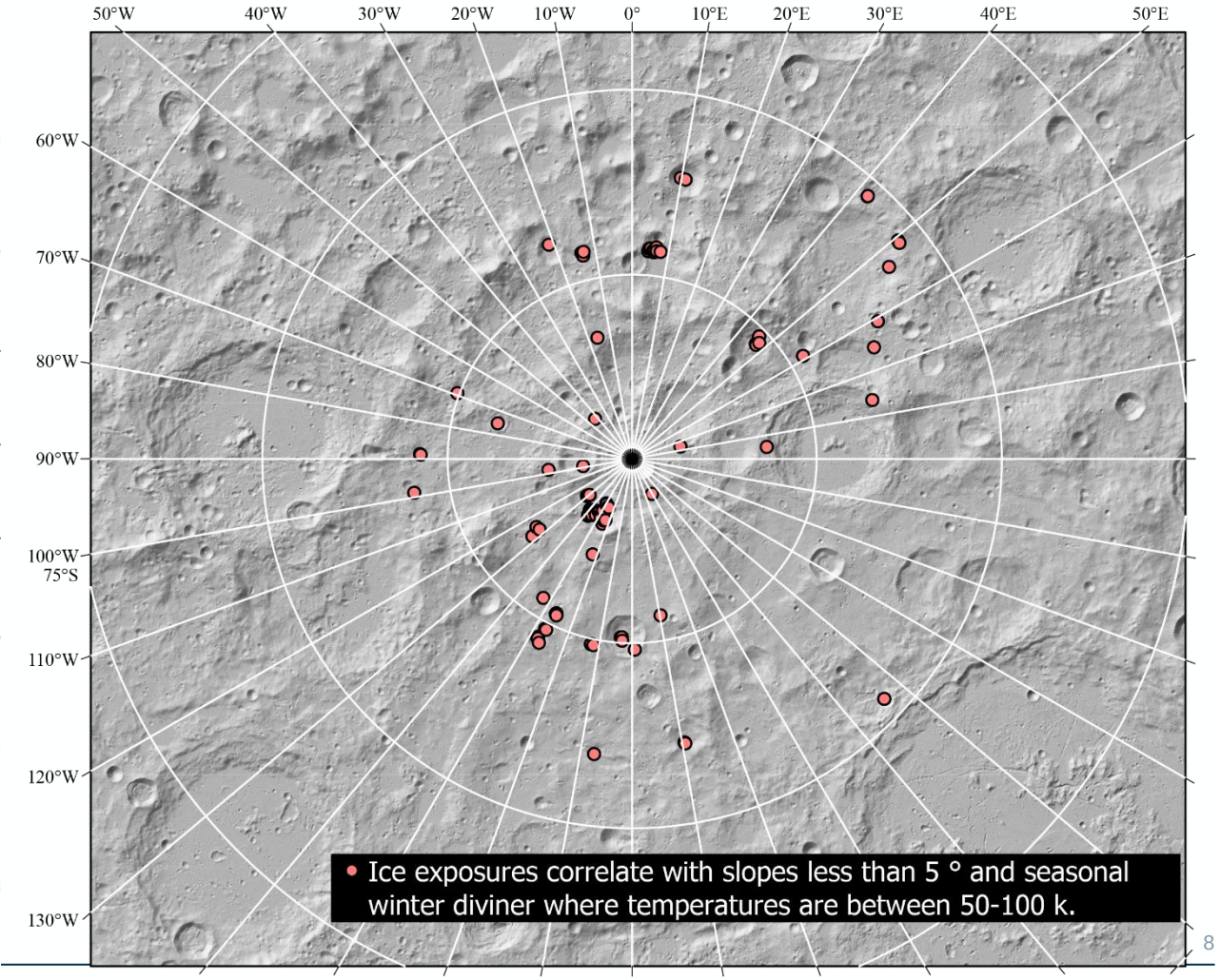




Ice Exposures

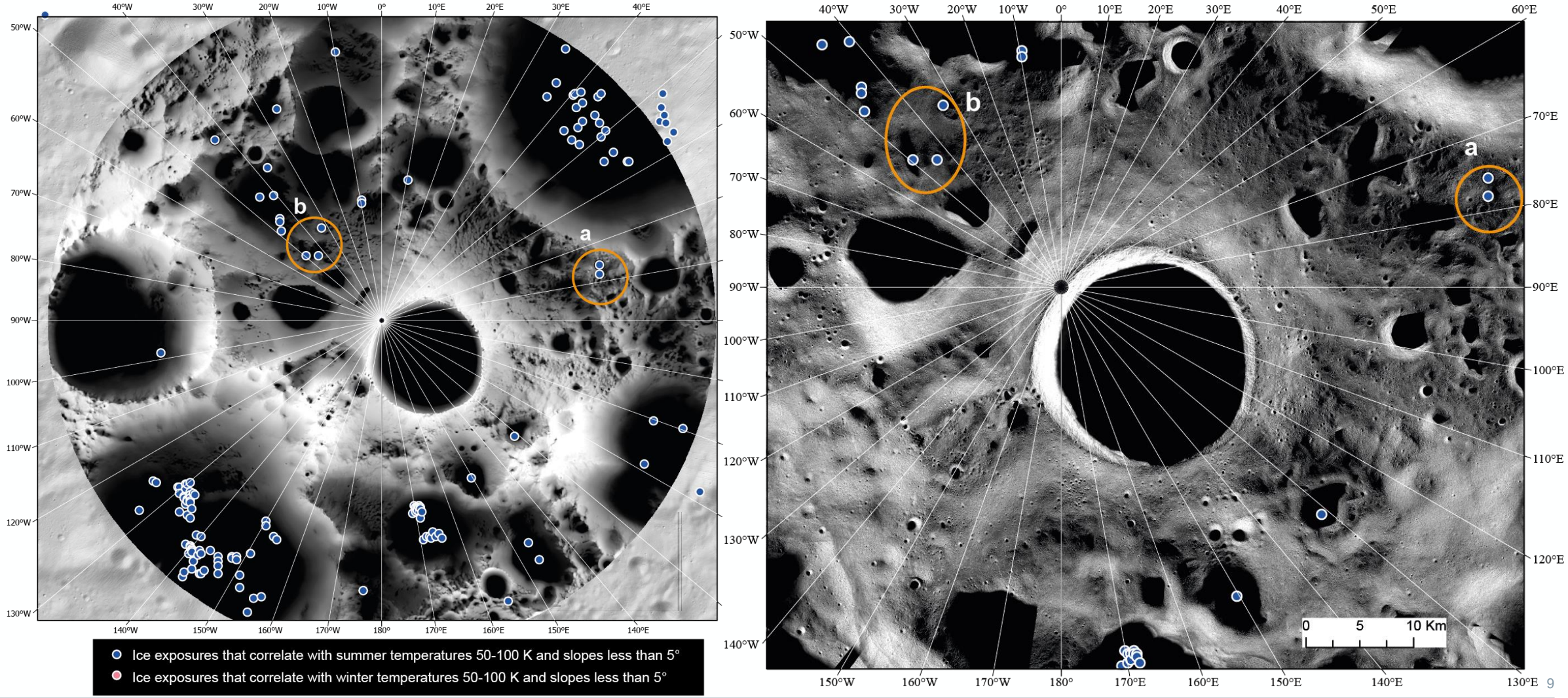
Identified where the M^3 ice exposures occur on slopes less than 5° and where seasonal diviner data shows temperatures 50-100K. (Li *et al* 2018 and Williams *et al* 2019)





Potential Areas of Interest

(Mazarico *et al* 2011) illumination map, ice exposures that correlate with slopes less than 5° and diviner seasonal temperatures (Li *et al* 2018 and Williams *et al* 2019).



Future work

Initial study has started to investigate the south pole region

Areas that may be accessible by a future mission that potentially contain volatiles

Investigate in more detail areas of interest where there may be volatiles and water ice present

Additional datasets e.g. NAC images, Kaguya, Oxford Thermal model, illumination model of 75-90° s.

Geological mapping and mapping of features in accessible areas such as boulders, crater mapping and statistics of these areas.