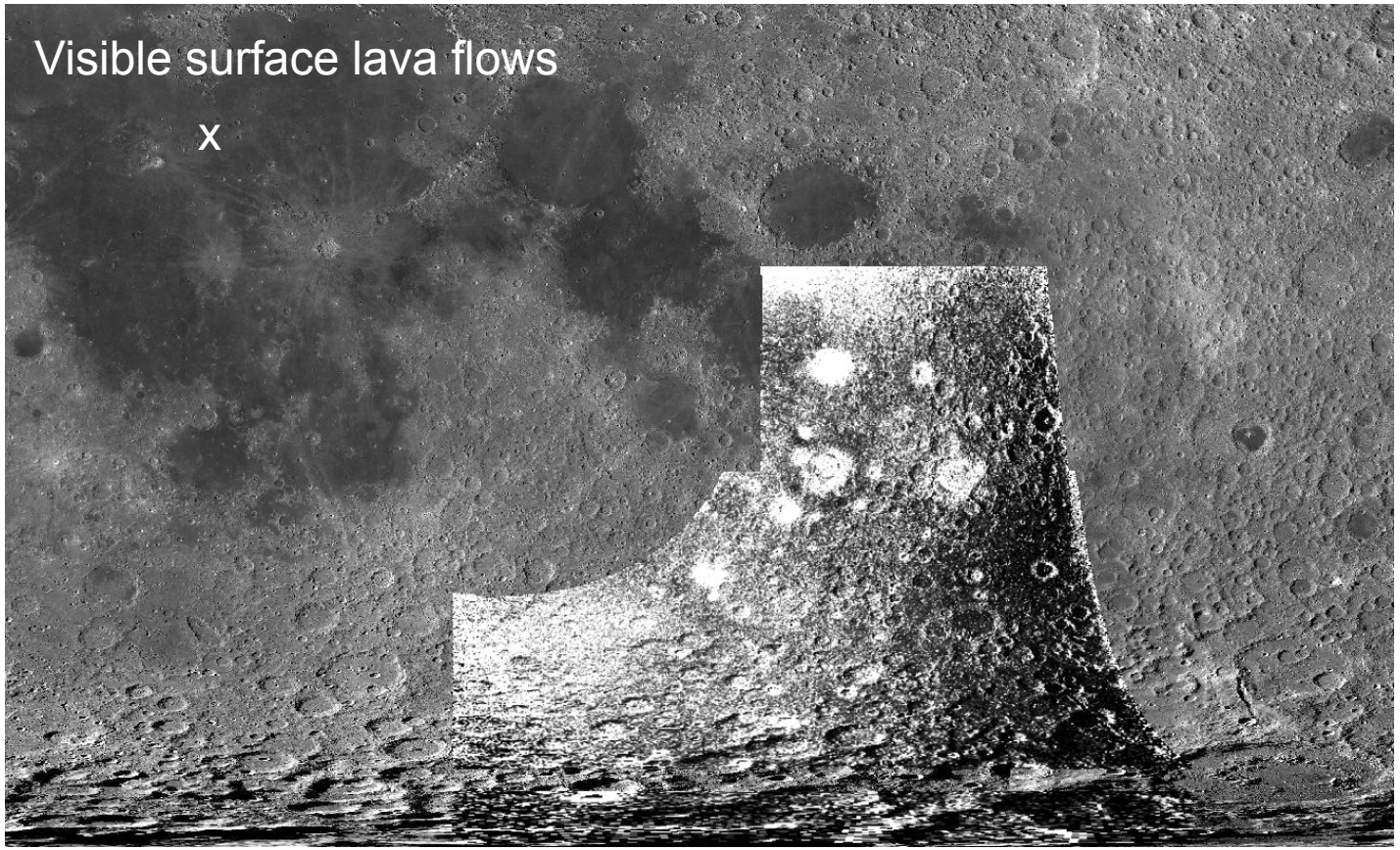
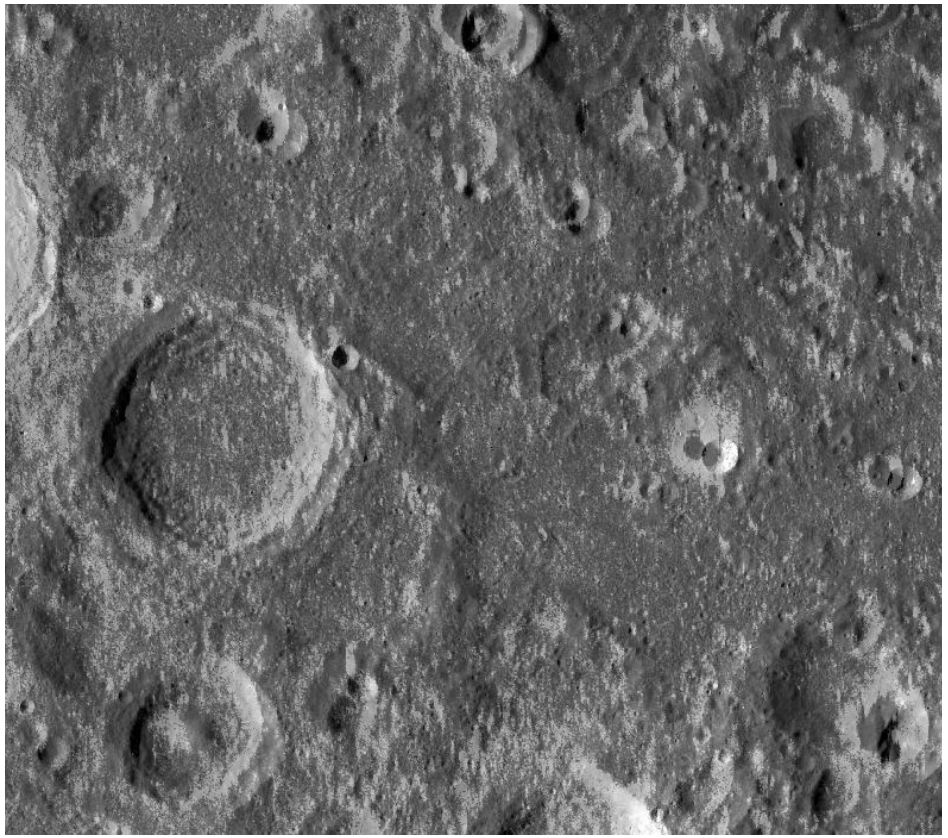
Radar images from the Arecibo Observatory were analyzed to identify buried basalt flows on the Moon

- Some lava flows on the Moon have been buried by crater/basin ejecta since their emplacement
- This makes identifying them using conventional imaging techniques difficult
- Radar can penetrate into the subsurface and interact with its materials

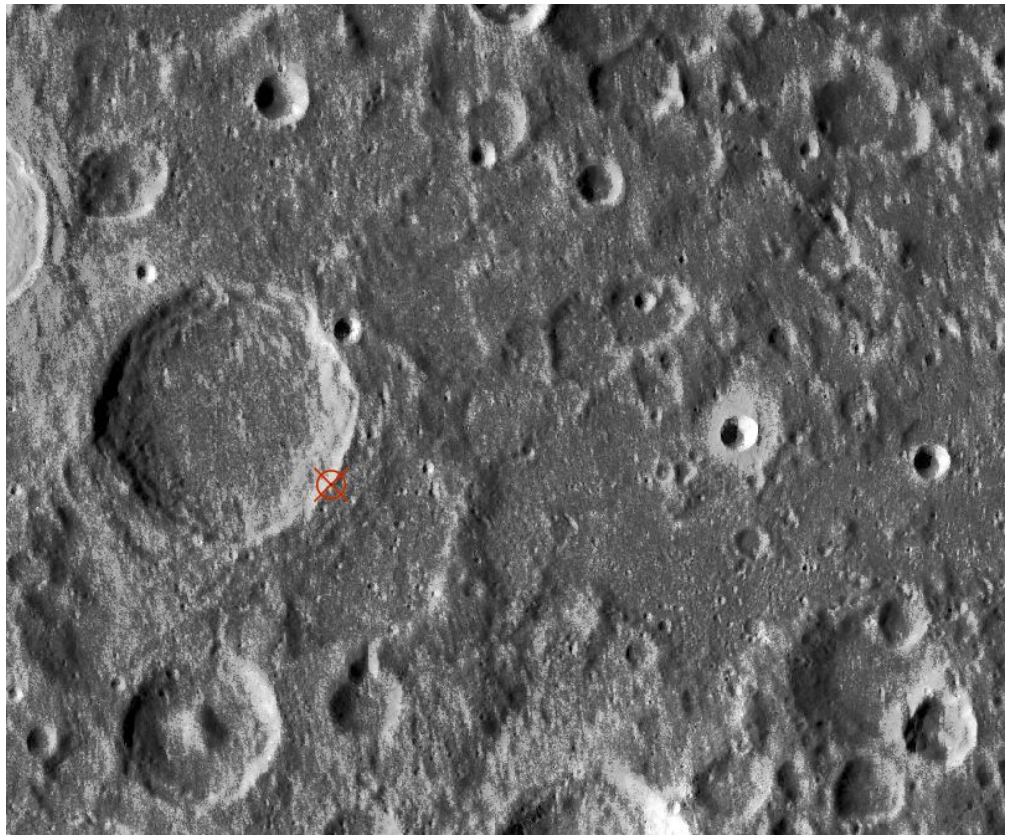


Example radar 'image'

12–16 ground control tie points used to georeference radar images to Moon basemap

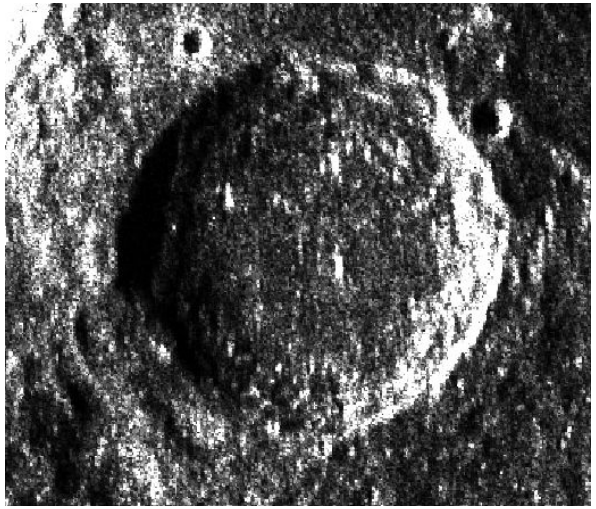


Pre-control point fix

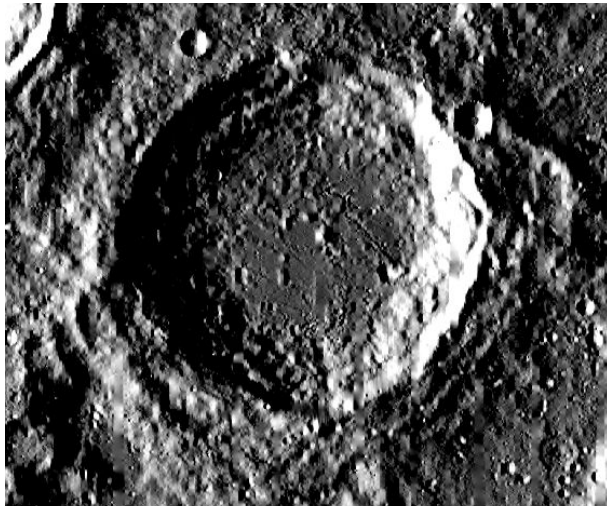


Post-control point fix

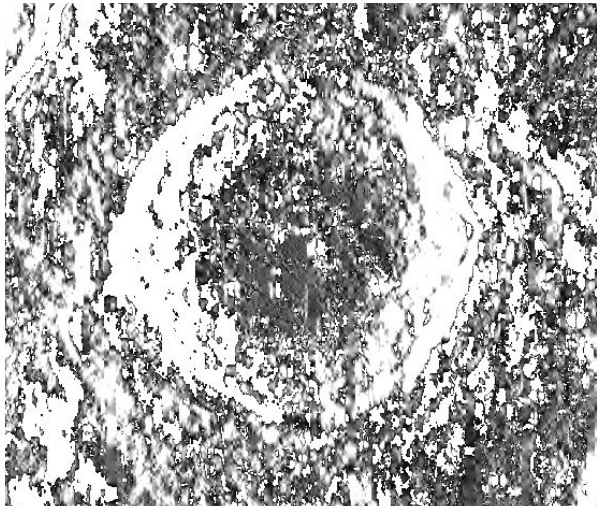
We used a simulated hillshade to correct for pixels on slopes in radar shadow/overexposed where pixel value is artificially low/high



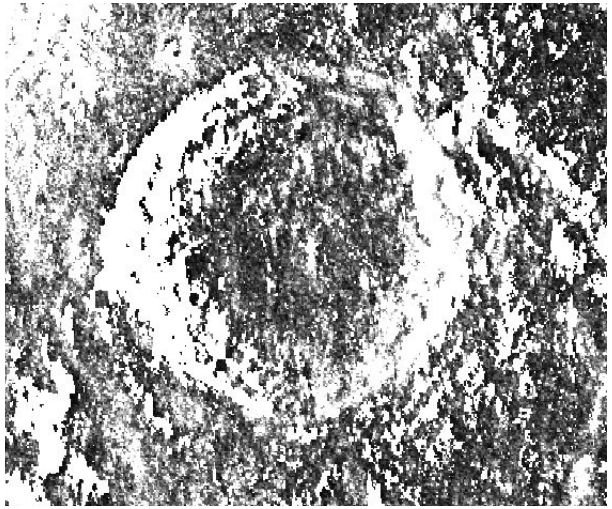
Raw radar image



Hillshade made using unique azimuth and altitude to replicate light and dark zones in radar image

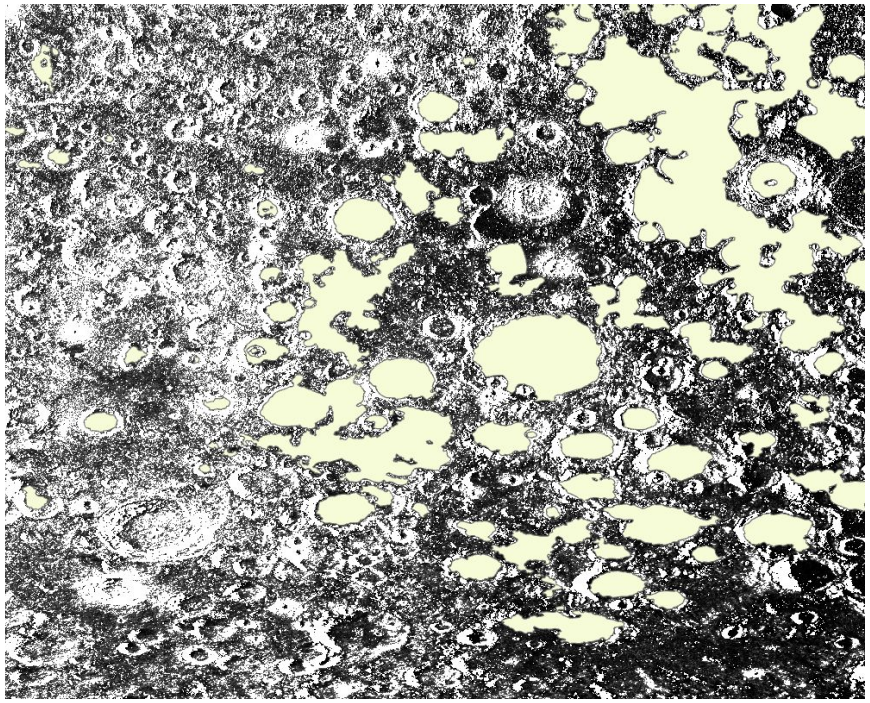


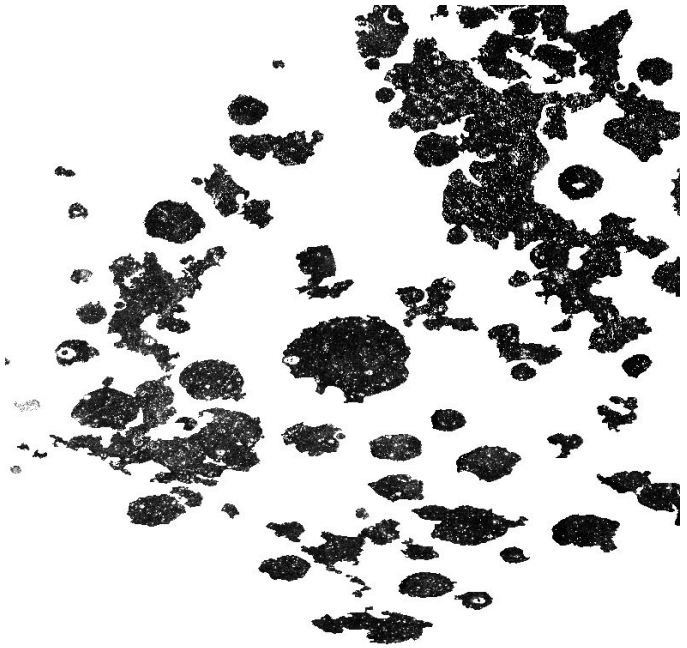
Run extract by attribute on hillshade with clauses to keep only non-extreme value pixels



Use extracted hillshade as mask on raw radar image to make corrected output

We used a shapefile of known surface basalts to extract and calculate their mean radar backscatter



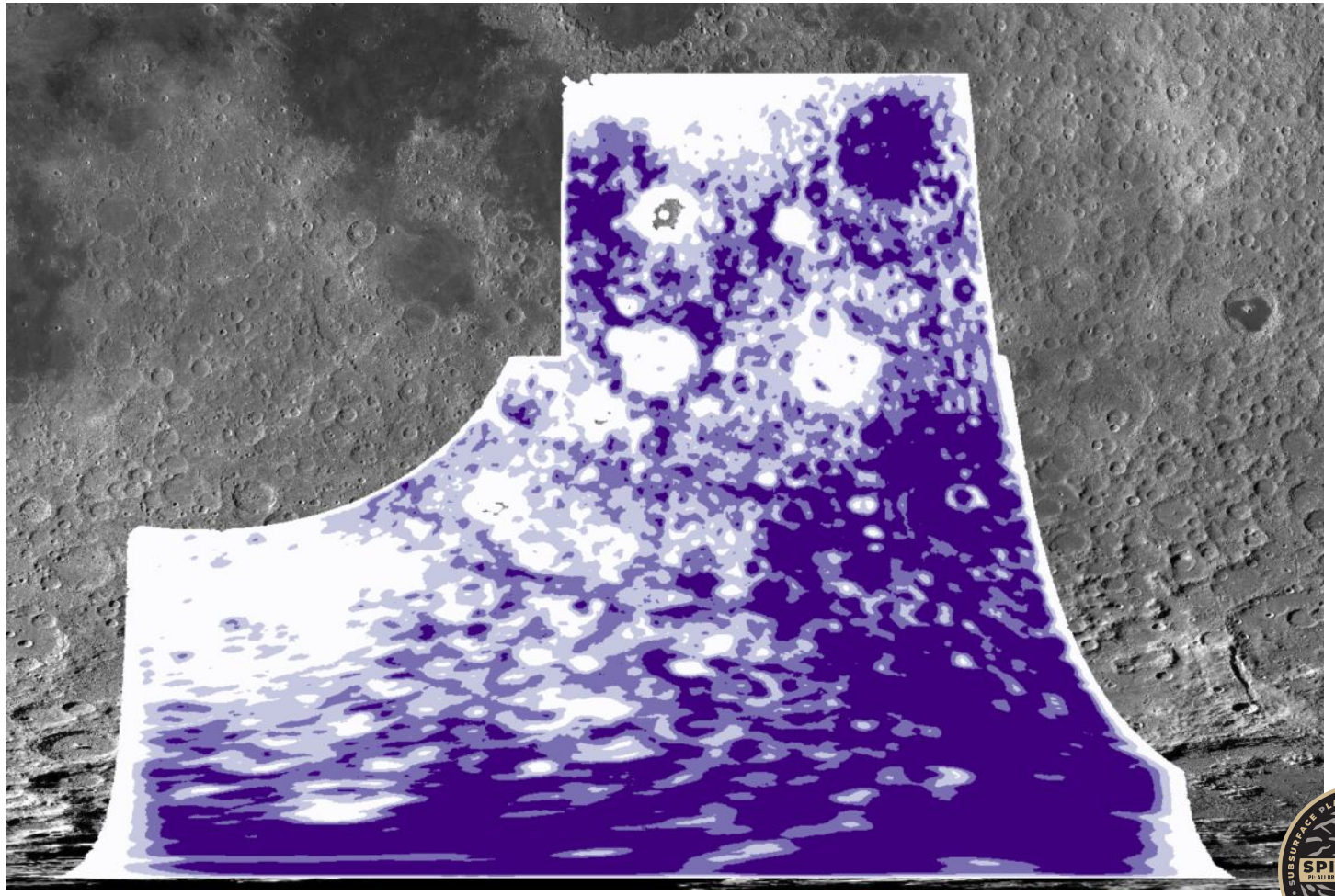


Any pixels with values lower than this mean value are considered potential buried lava flows

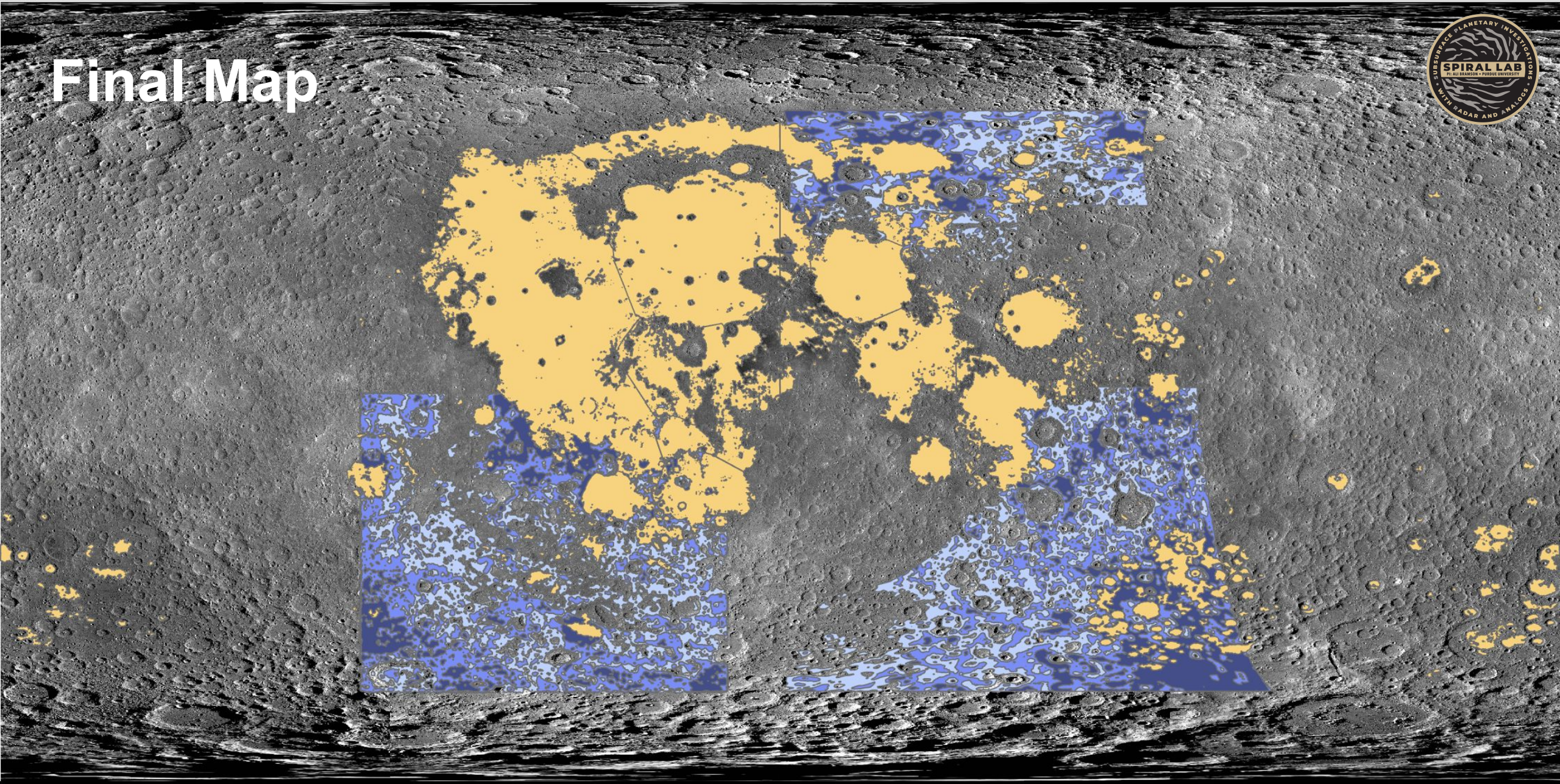
Mean Surface Basalt Radar Value: 0.00338

We converted the raster data to point data and then ran point density to find areas of concentrated low value pixels

- Darker purple areas are areas with higher density of low value pixels
- We propose these areas are associated with basaltic lava flows



Final Map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Cryptomare
Deep