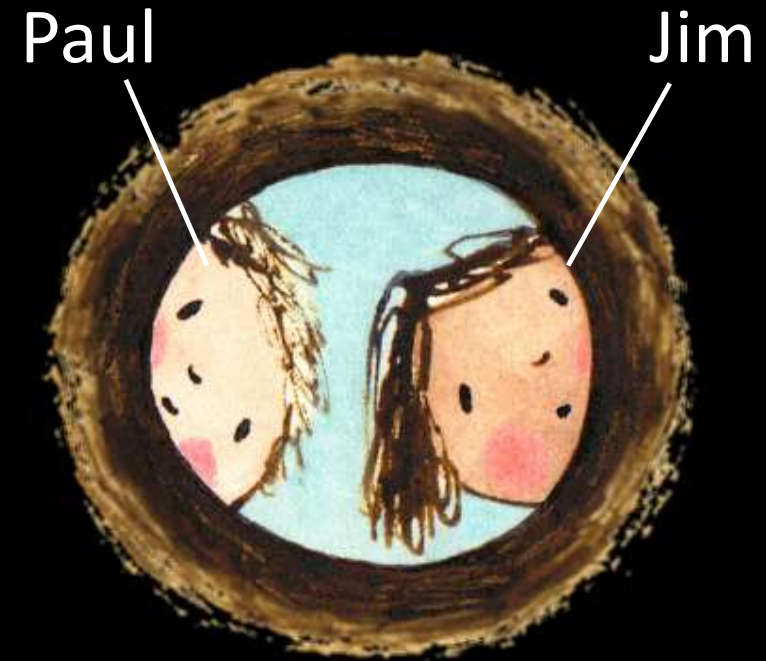


# Further down the rabbit hole...



- Project started trying to identify bright spot in young Moon image
- Led to 3D imaging of the Moon (Paul) & lunar surface modeling (Jim)

Rabbit hole image courtesy <http://dtrhradio.com/>  
Moon image courtesy Andrew Brown

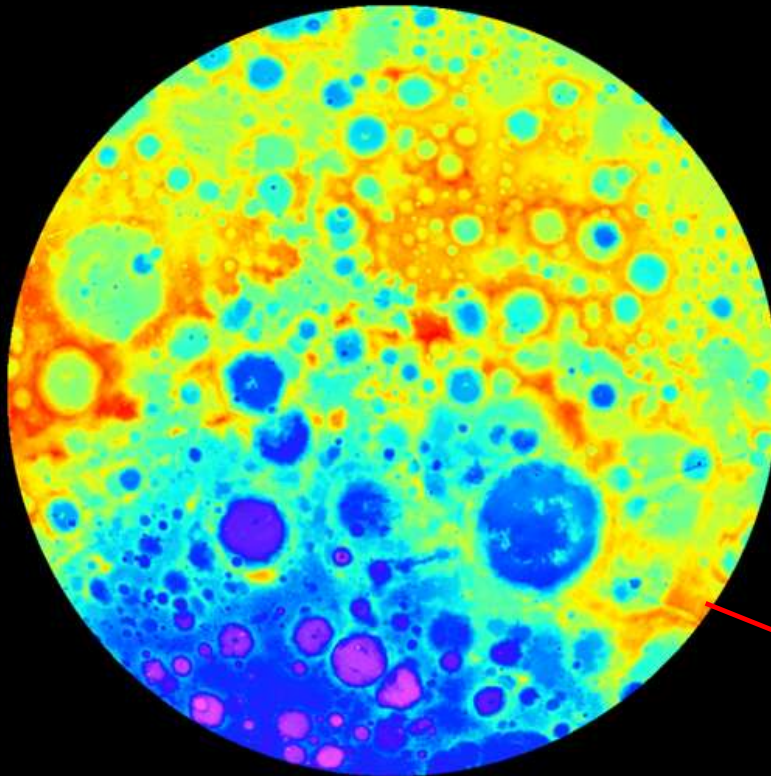
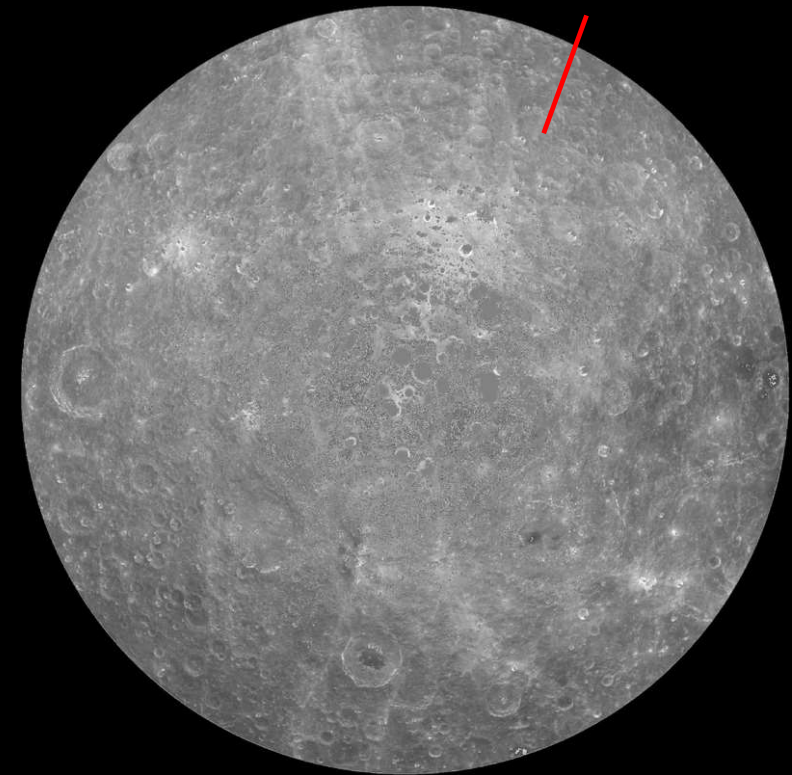
# Simulating Lunar Phases

- Capturing same view of Moon again will be a challenge
  - Need same libration + clear sky to horizon
- What if I create 3D model of Moon and simulate view instead?
  - Total control of libration, lighting, image scale (zoom), camera position, etc.
- Already familiar with 3D modeling (Caligari trueSpace)
- Model inputs readily available on LROC website:

<https://quickmap.lroc.asu.edu/>

# Sample Inputs From LROC Website

Albedo



Digital Elevation Model

(save as monochrome images)

LROC QuickMap

quickmap.lroc.asu.edu/layers?extent=-121.1074152,0.474575037,-27.2582866&proj=17&layers=NrDMAZQTgGnGCMcB08WGIQIo3582ArgDbEwDeARAE4CG+A5g...

Layers

Filter layers...

- SLDEM2015 Azimuth
- SLDEM2015 Slope
- SLDEM2015 (+ LOLA)

Approximate Value at Cursor

Opacity

100%

Render Options

Reset

-9093.00 m 10761.00 m

-9093 10761

Mask Data Outside Range

Fit range to view: Select fit...

Description

High-resolution Lunar Topography (SLDEM2015)

SLDEM2015DEM (60S to 60N) + LOLA (60-90)

The grayscale pixels are color coded to clearly depict the ground level from the lowest elevations (black, -6200 meters) to the highest ones (white, 8400 meters), see palette.

Barker, M. K., Mazarico, E., Neumann, G. A., Zuber, M. T., Haruyama, J., Smith, D. E. "A new lunar digital elevation model from the Lunar Orbiter Laser Altimeter and SELENE Terrain Camera," Icarus, Volume 273, p. 346-355, <http://dx.doi.org/10.1016/j.icarus.2015.07.039>

[U15]

Dynamic layers are rendered on-the-fly by ACT using user-adjustable inputs.

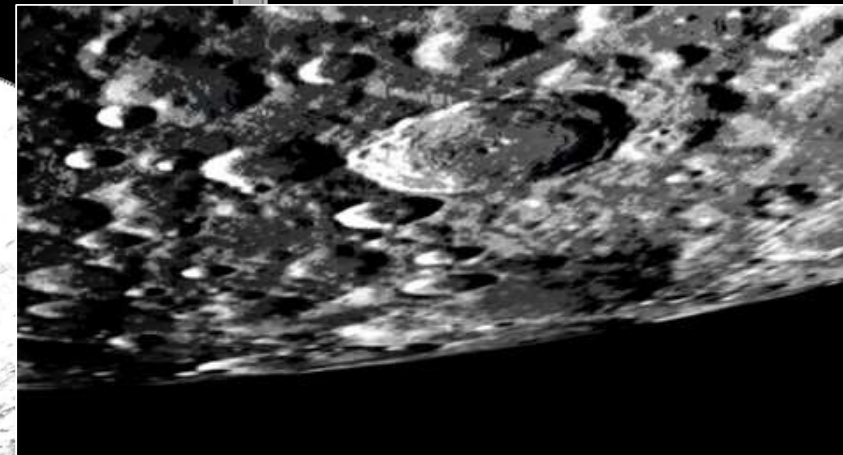
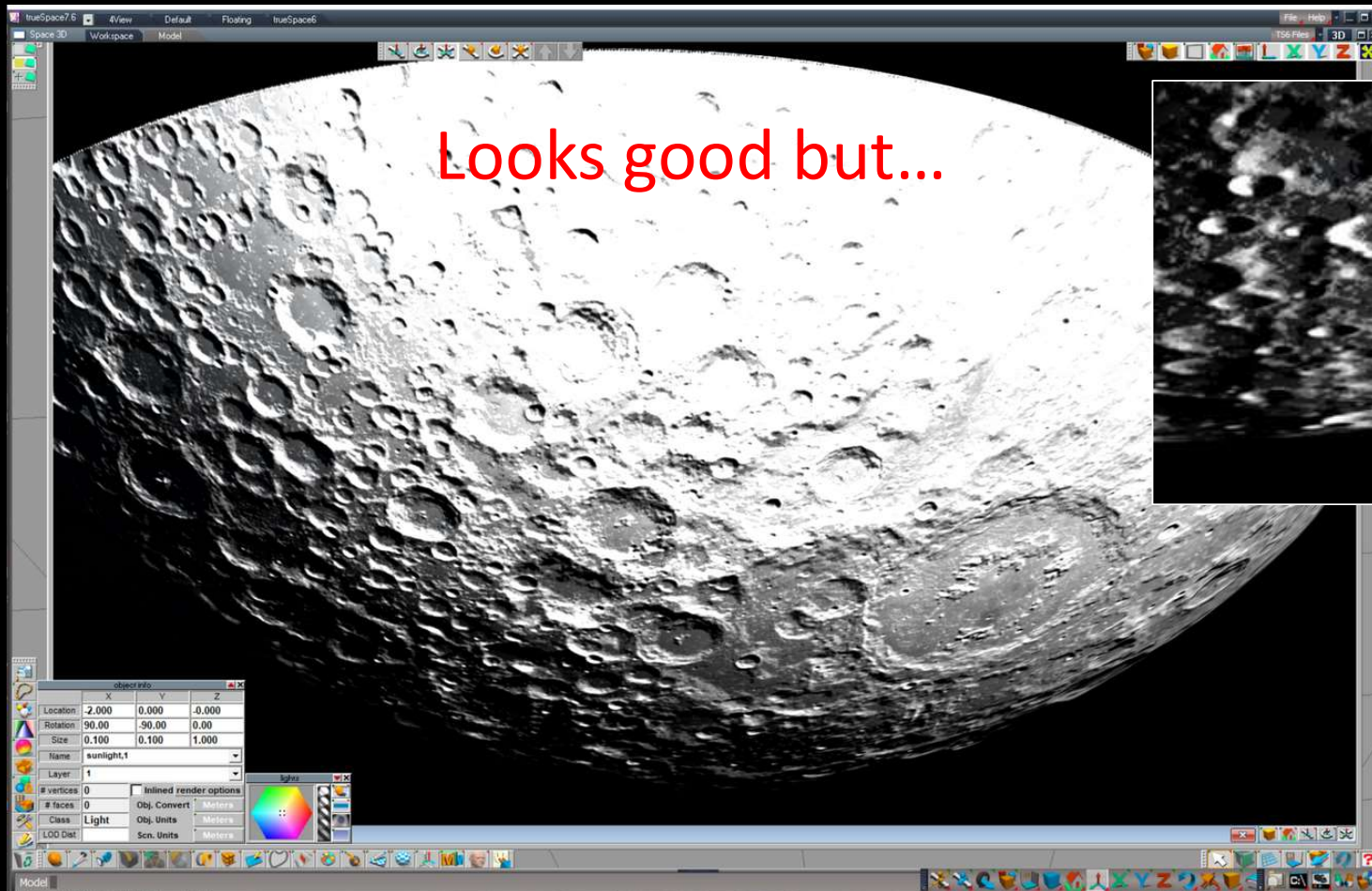
- LOLA Albedo Map
- LRO Mini-RF
- LROC NAC
- LROC Global DTM (GLD100)

Lat: -49.01171 Lon: -24.25801 1994.34 m/px

200 km



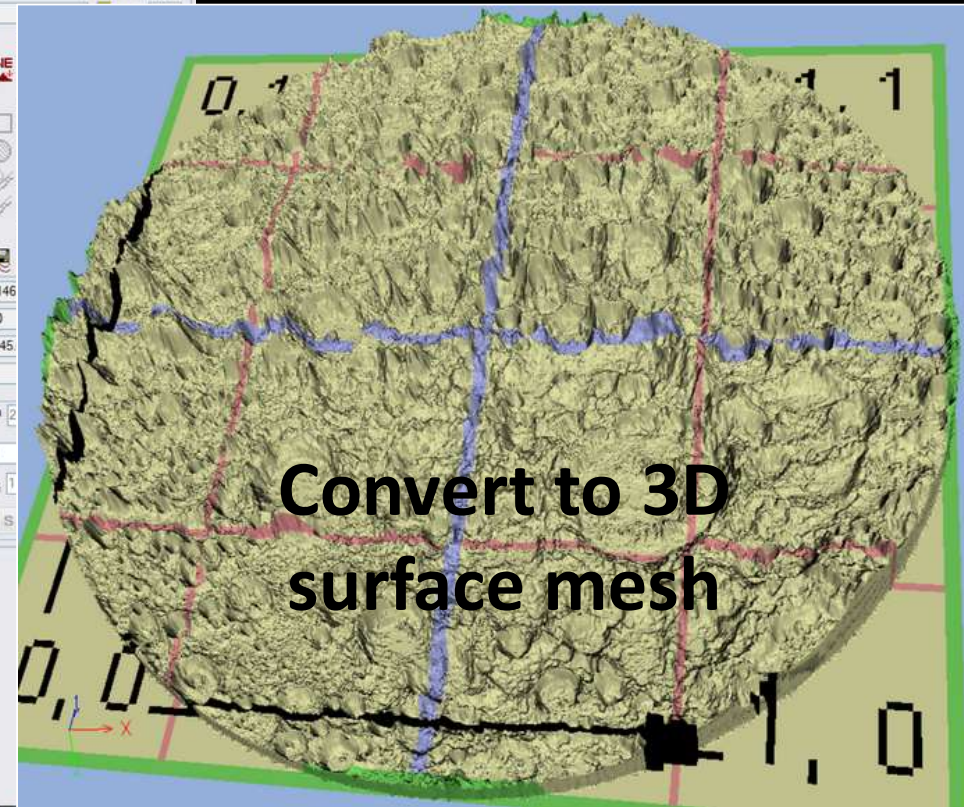
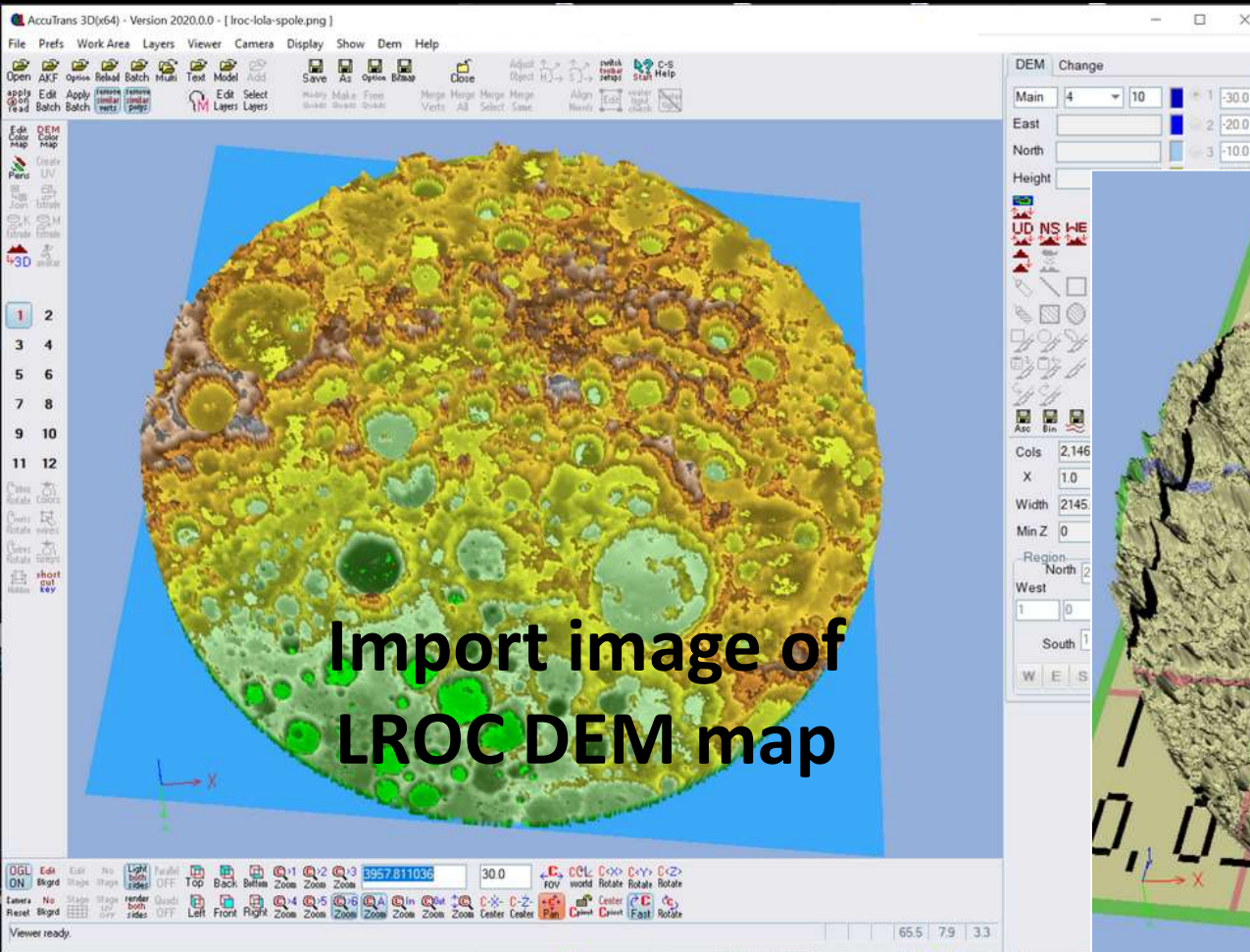
# Attempt #1 – Quick & Dirty (Bump Map)



...bumps not rendered at edge of object

# Attempt #2 – Long Way (3D Surface Model)

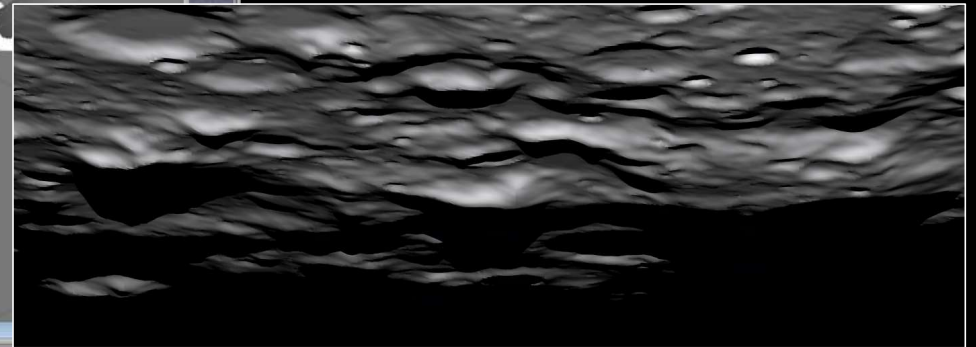
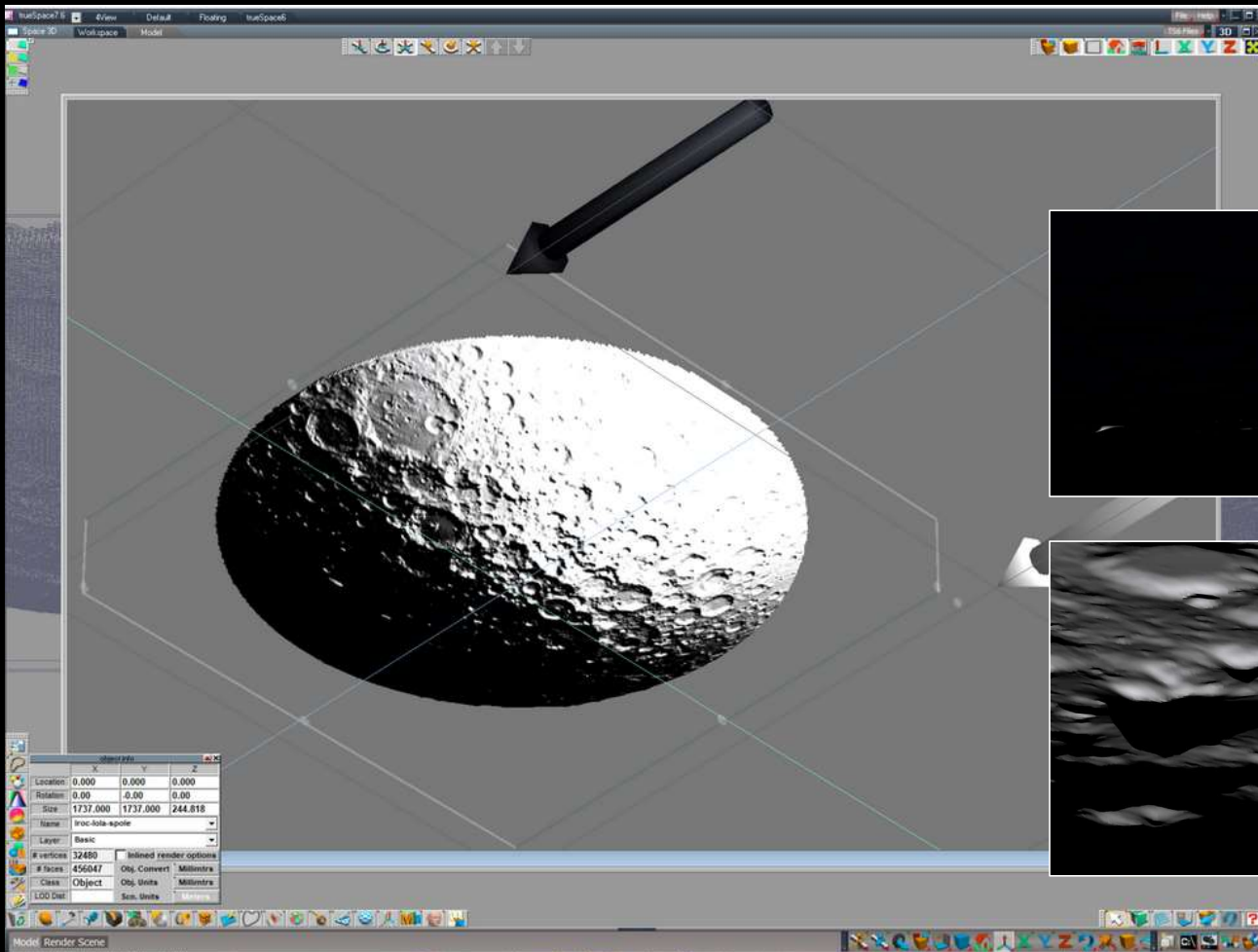
Used trial version of  
Accutrans 3D





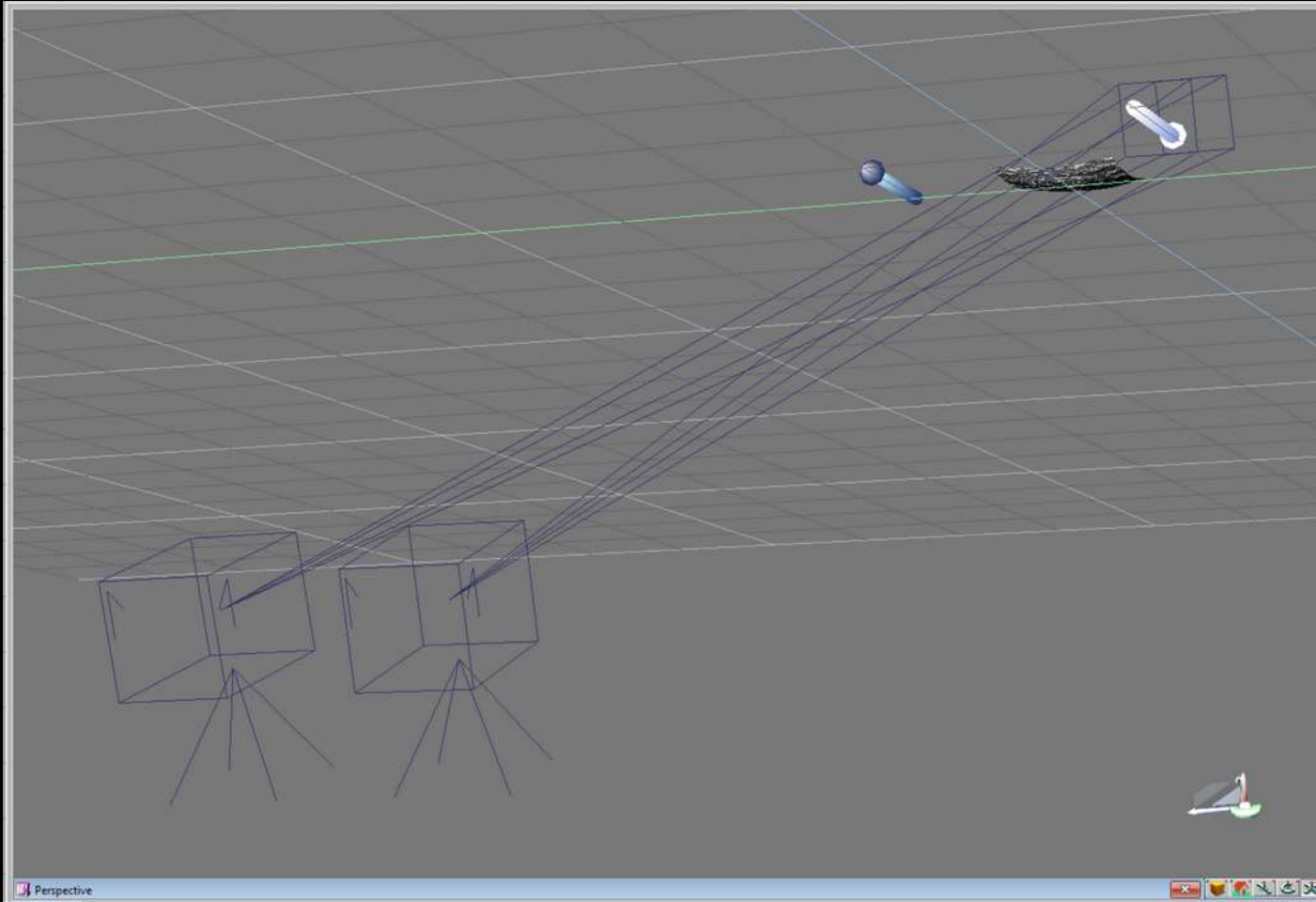
## Attempt #2 – cont'd

- Import 3D mesh
- Add curvature
- Add lights & camera

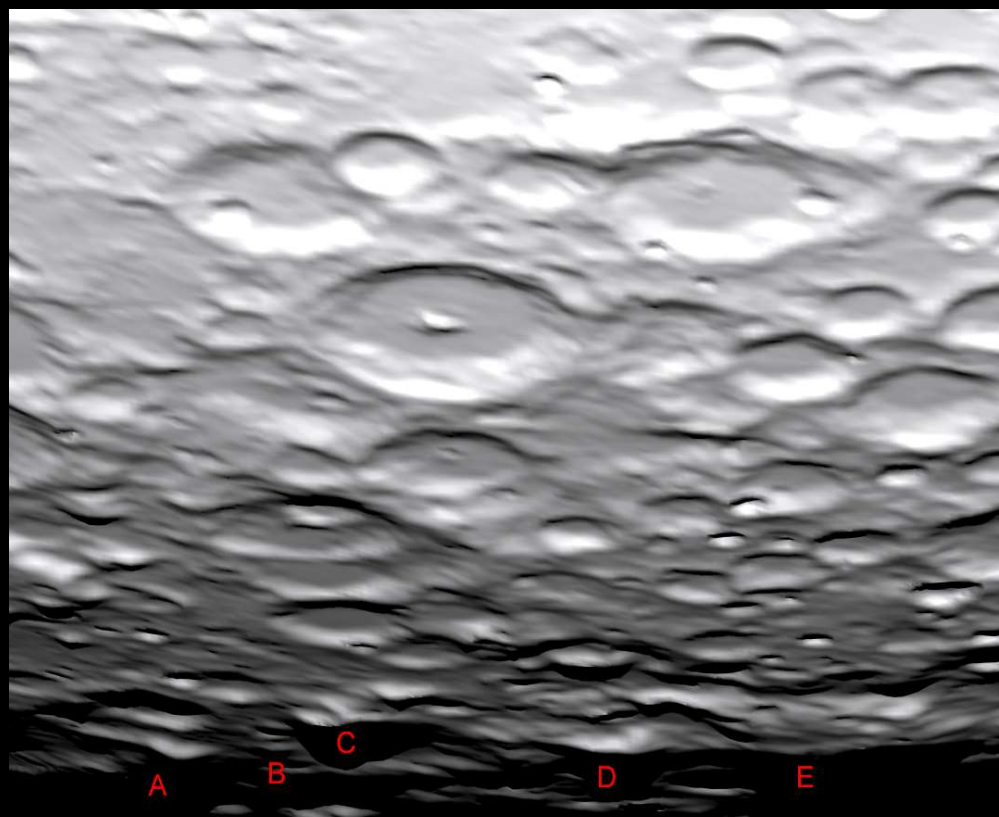


Success!

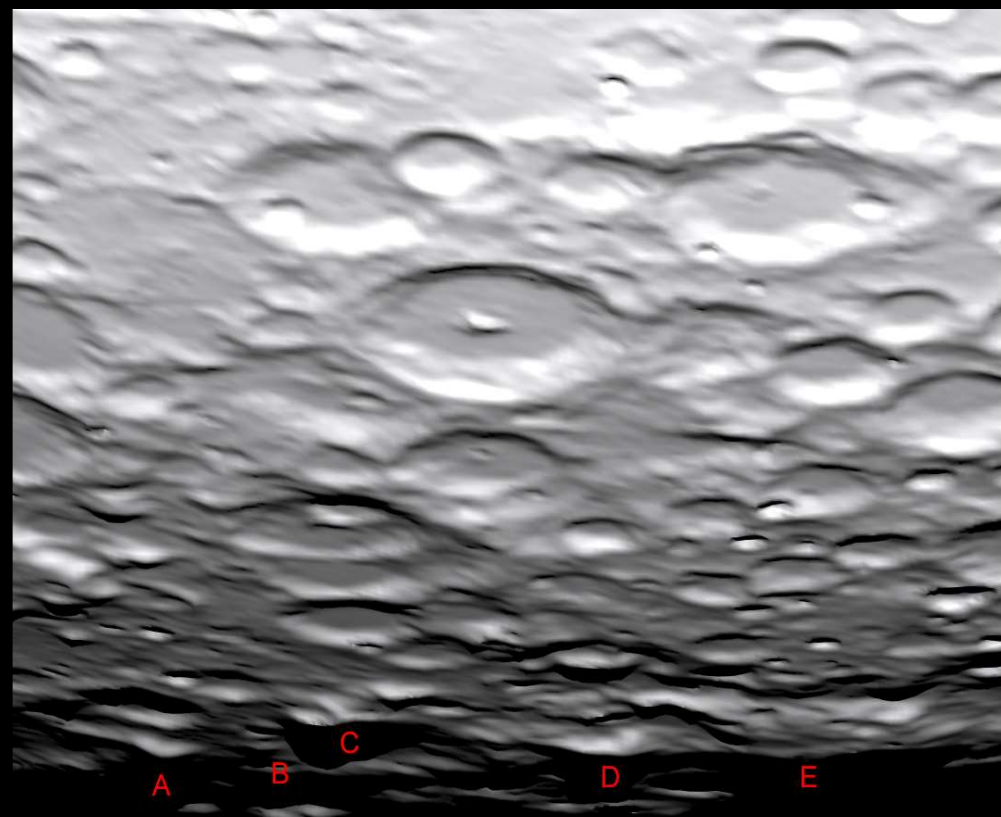
# Stereo Pairs



- Same principal as Paul's cross-eyed method
- Instead of Moon at two different libration angles, use two cameras
- Distance between cameras sets depth of field



Liebnitz Mountains



Liebnitz Mountains



