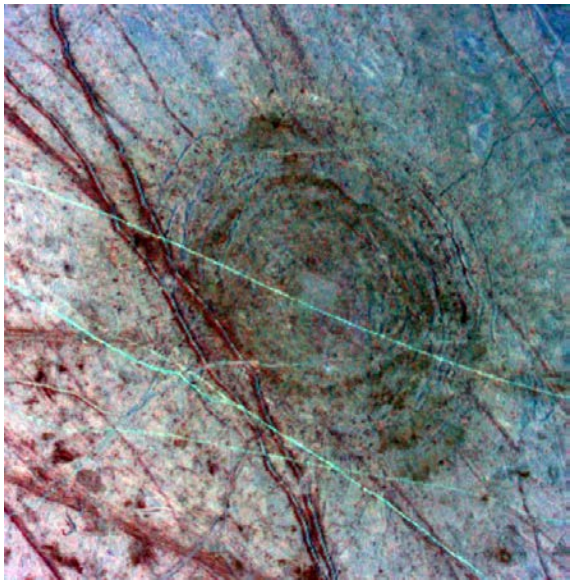
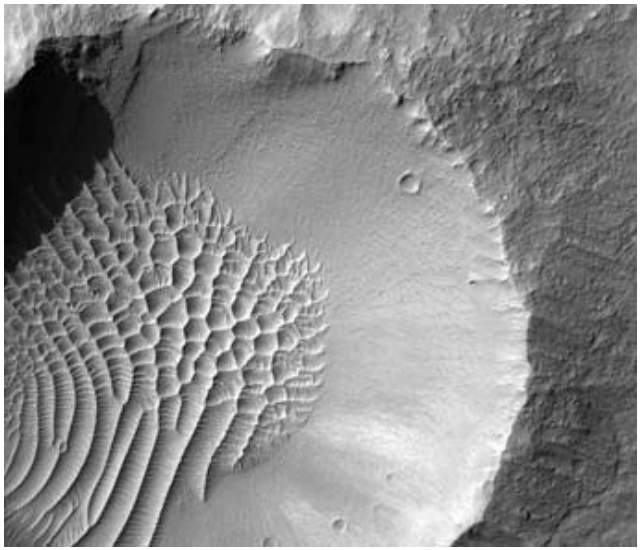
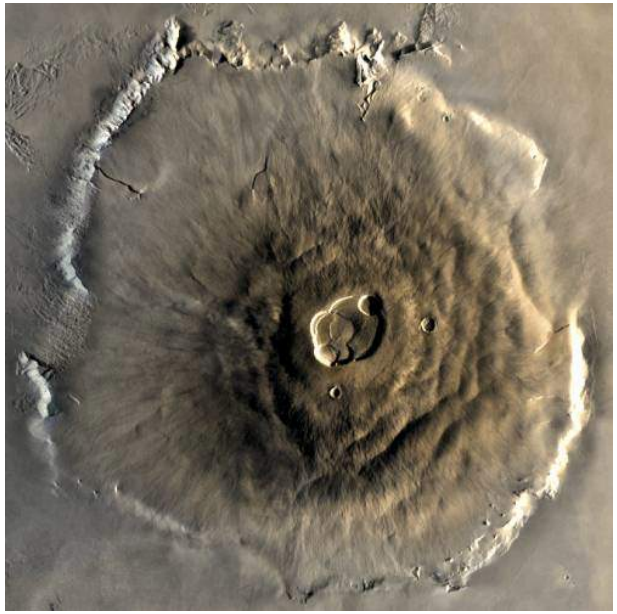
Planetary Surface Processes

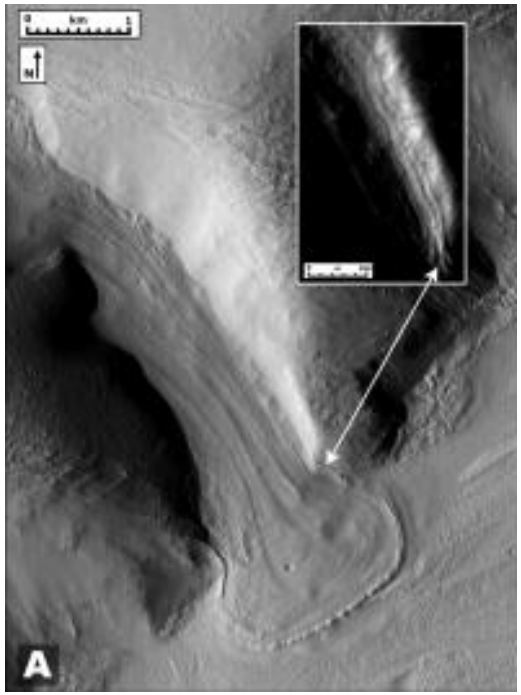
Cratering
Gravity
Tectonics
Volcanism
Winds
Fluvial
Glacial
Chemical weathering



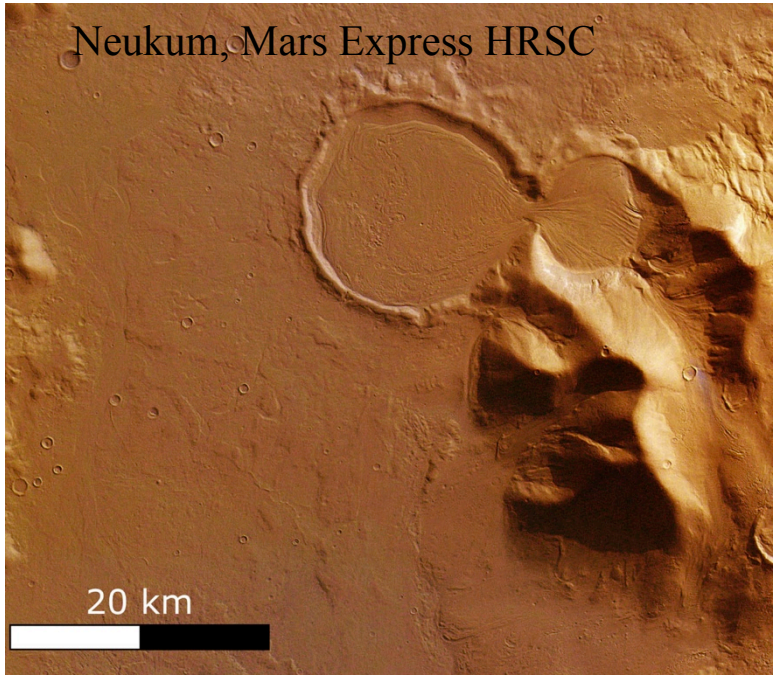


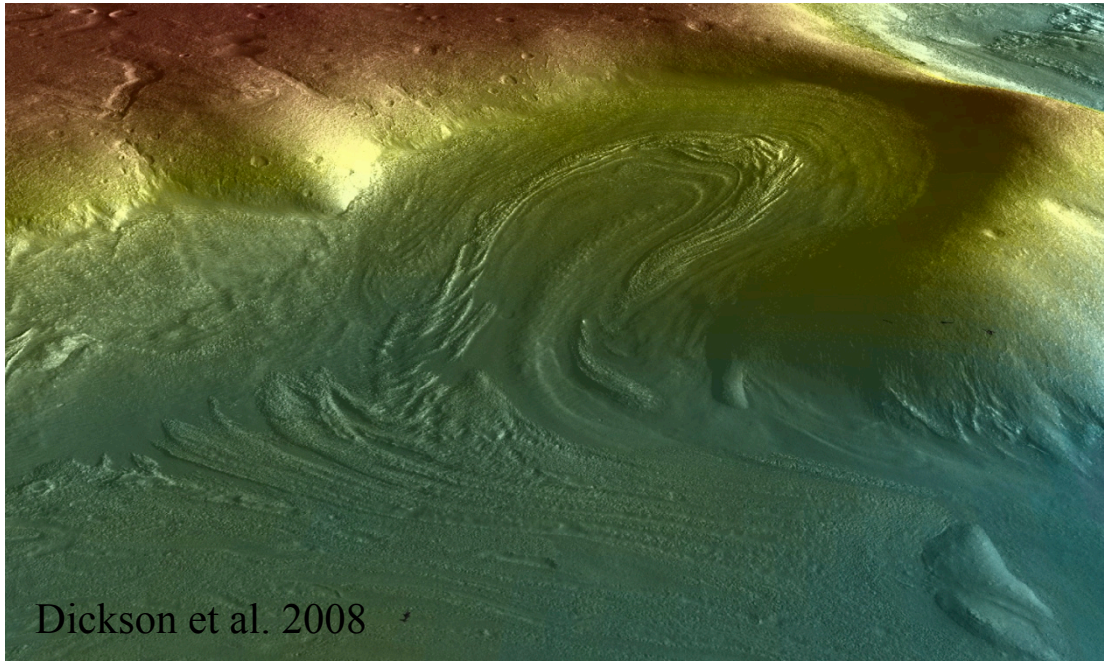


Glaciers on Mars

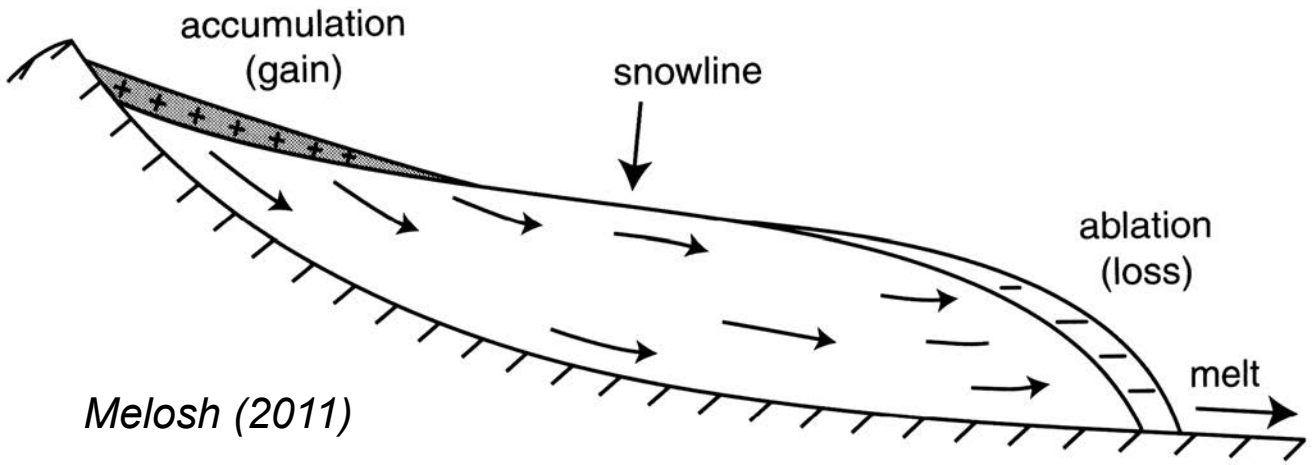


Fastook et al. 2008





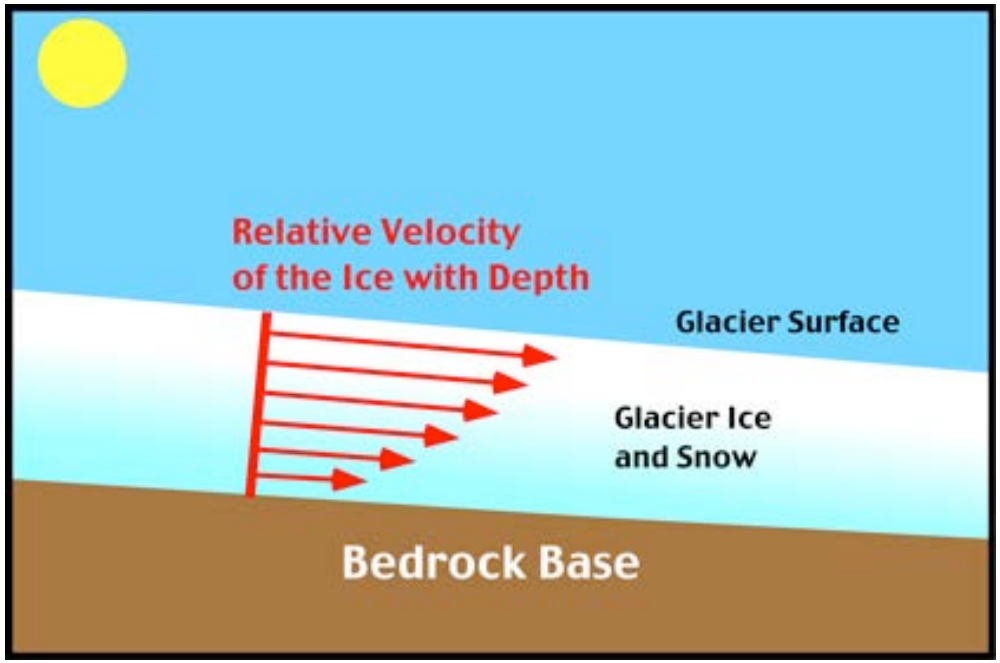
A glacier at equilibrium



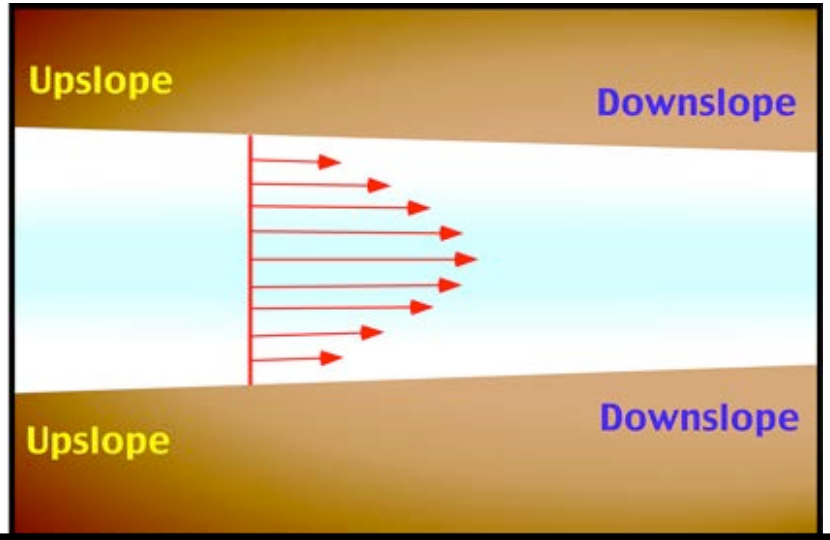
Melosh (2011)

Flow velocity is not uniform

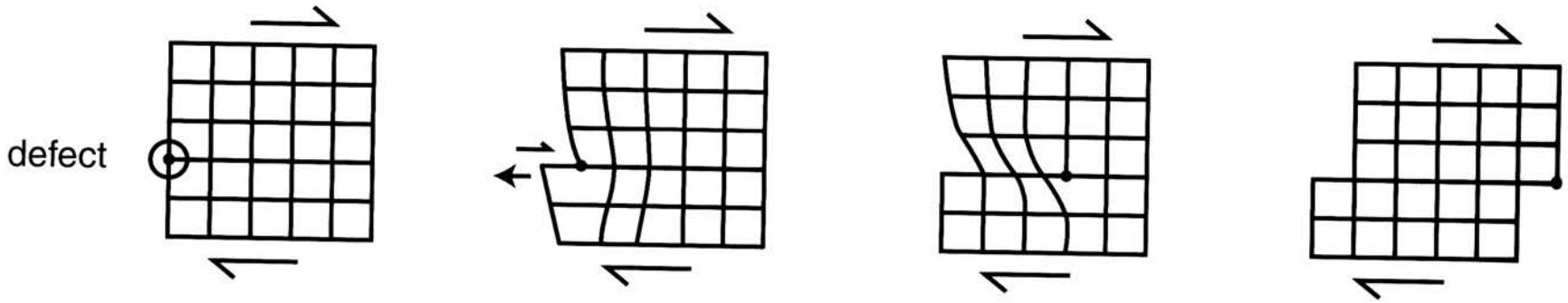
Side view:



Overhead view:

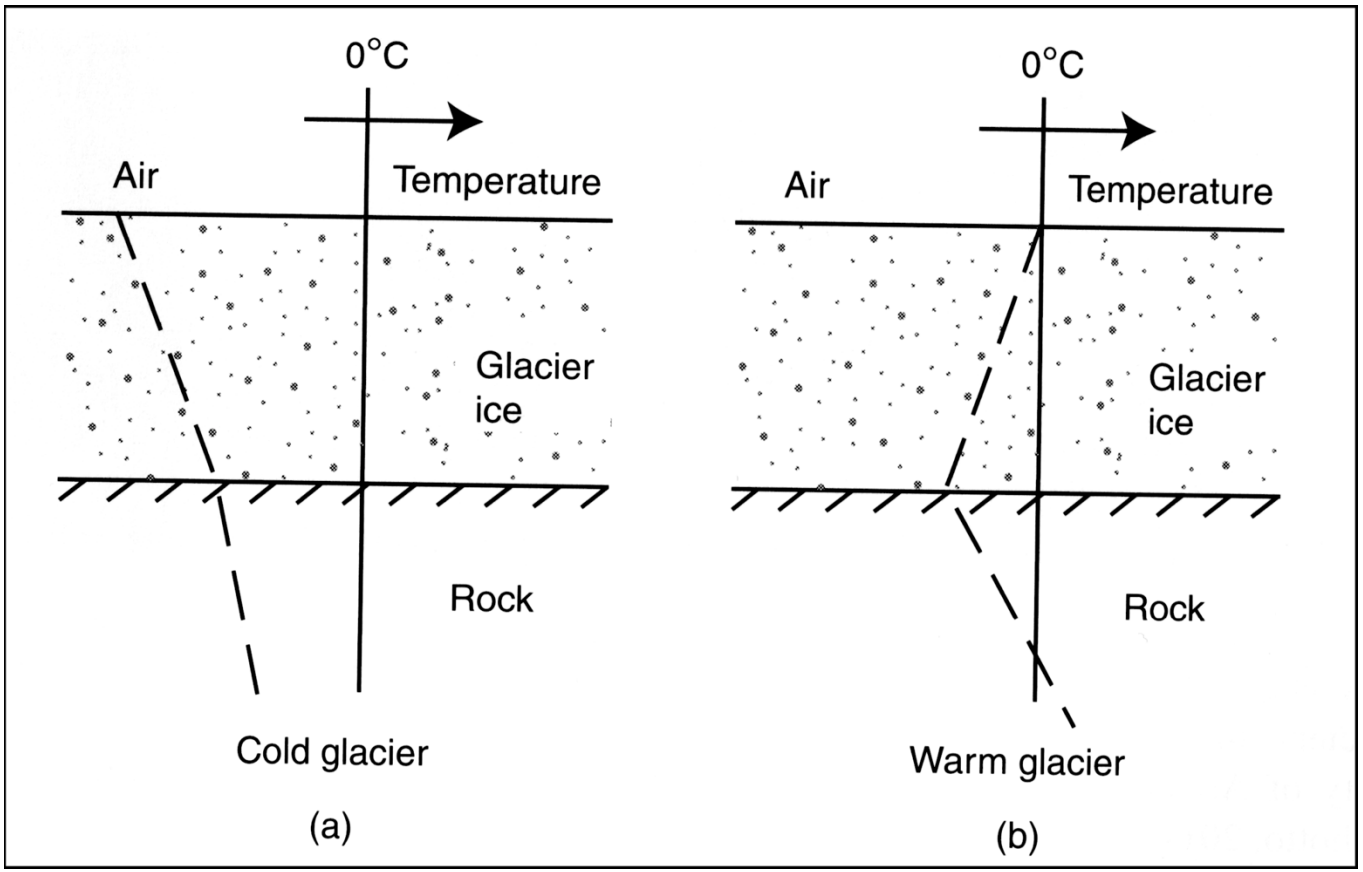


Glacial creep

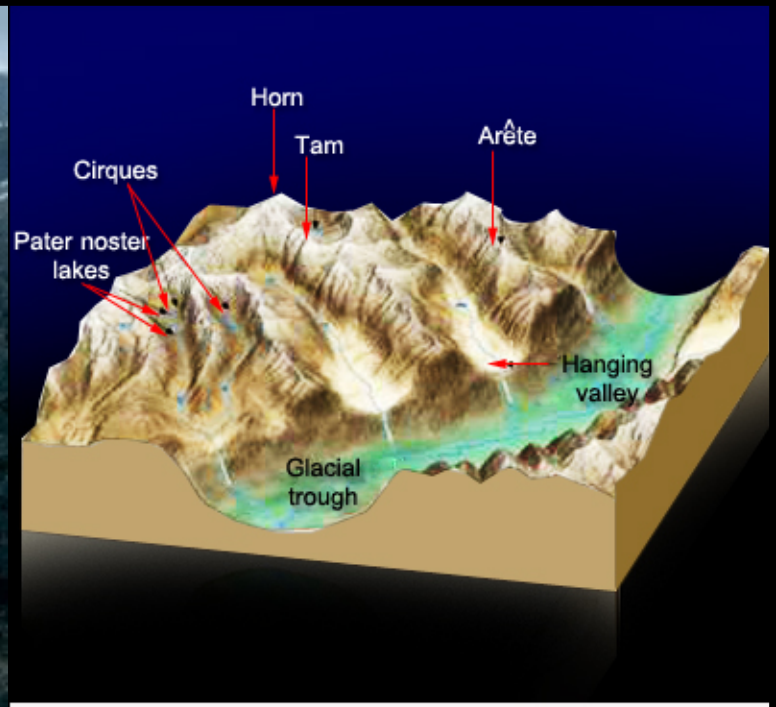


Melosh (2011)

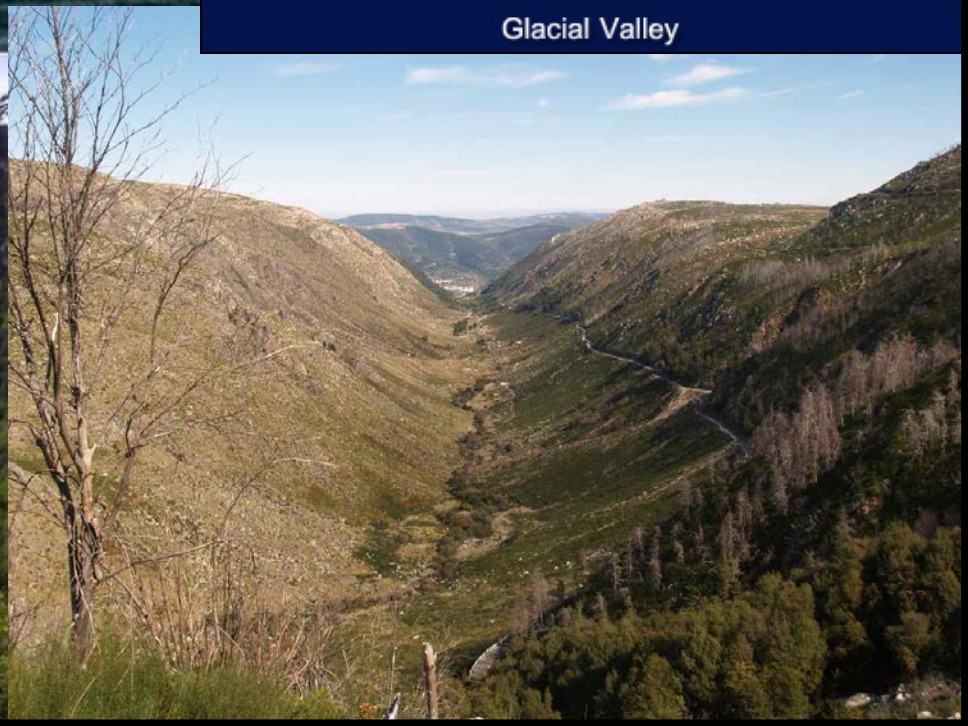
Cold vs. warm-based glaciers



Melosh (2011)



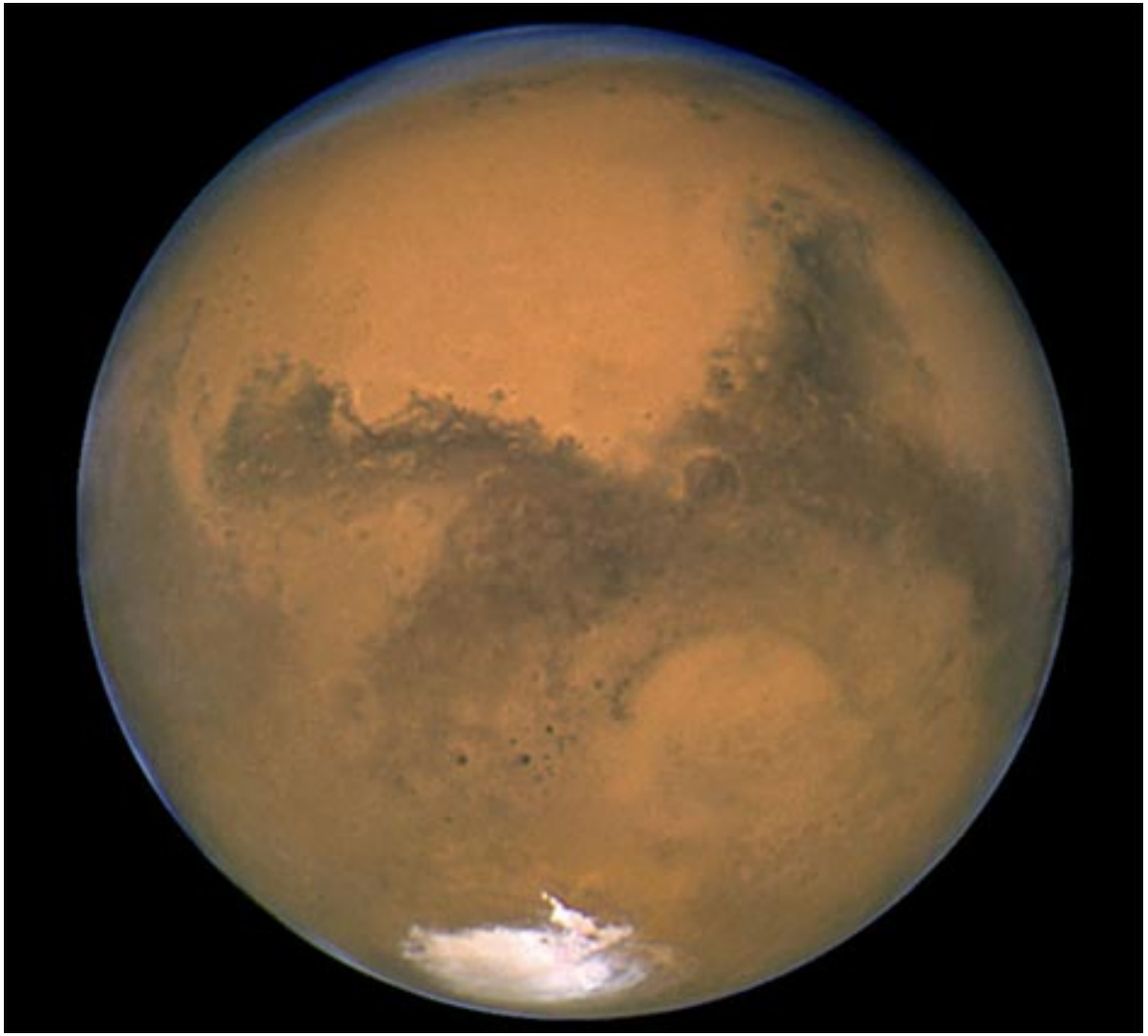
Glacial Valley

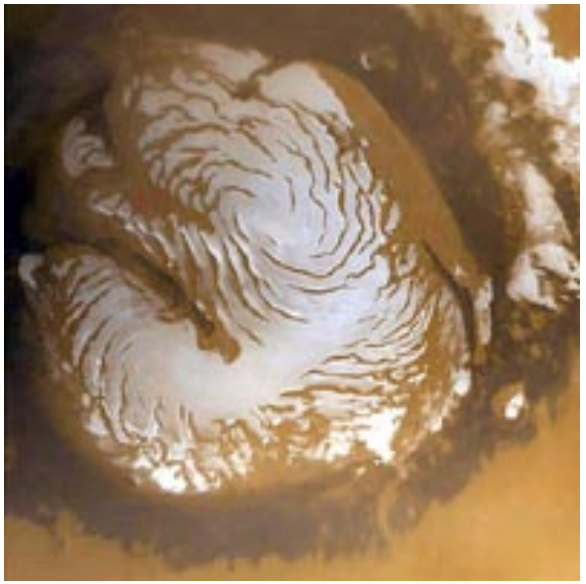


Polar caps:

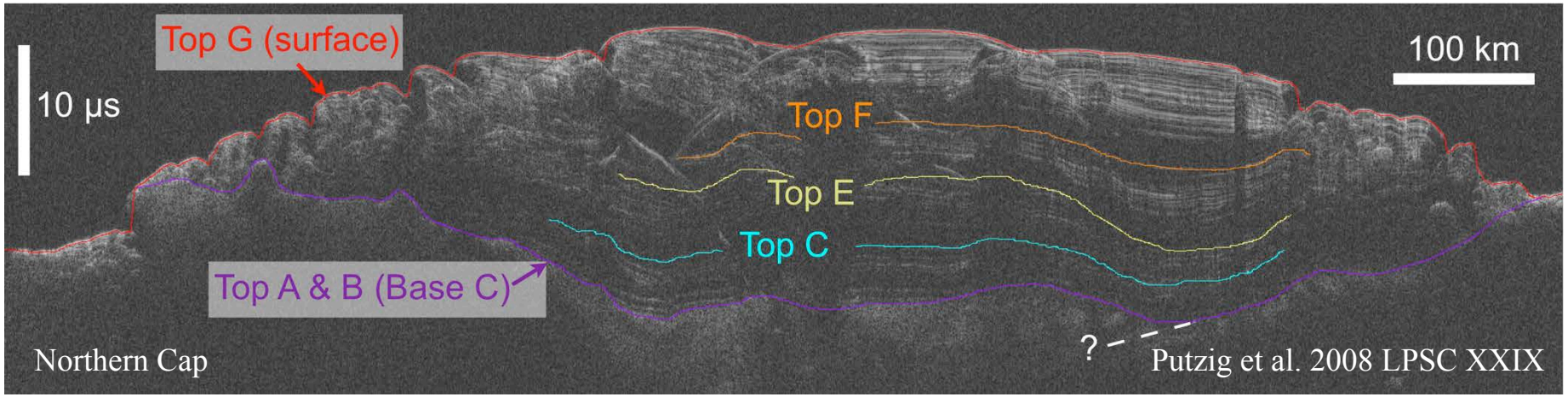
Strong Seasonal Changes

Climate Changes as Spin Axis Wobbles

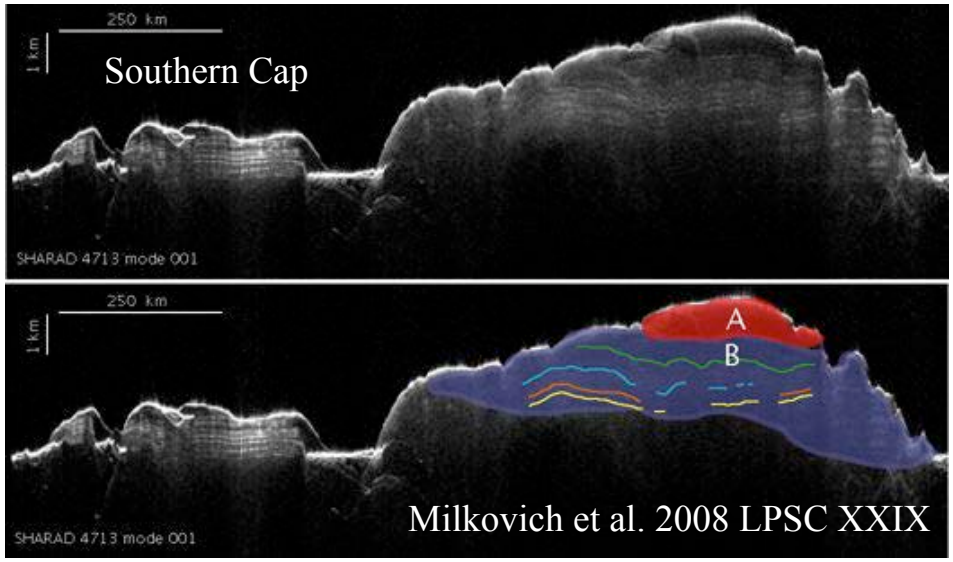


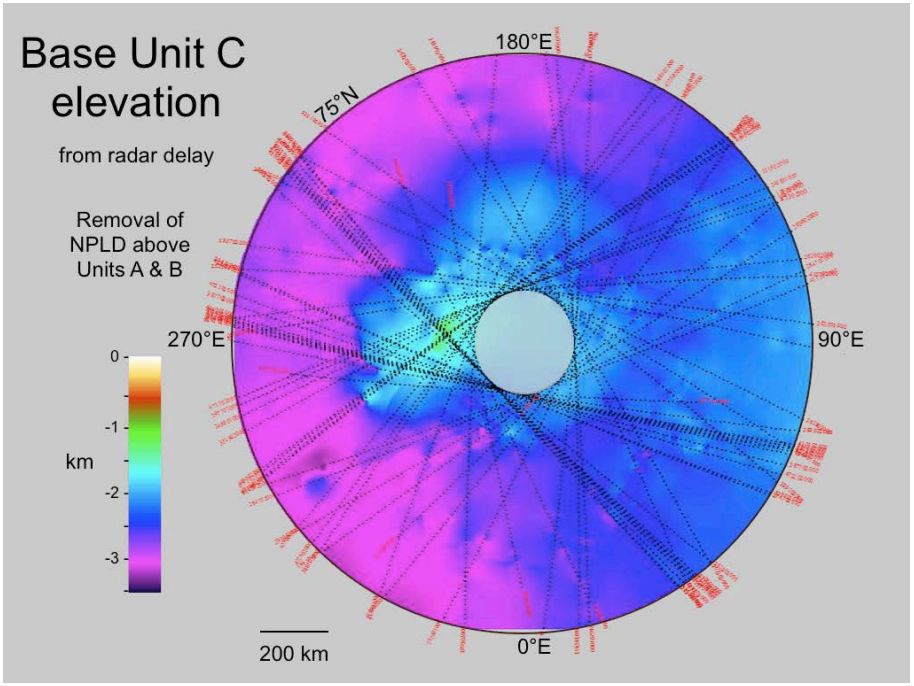


Polar Caps: Radar & Interior Structure

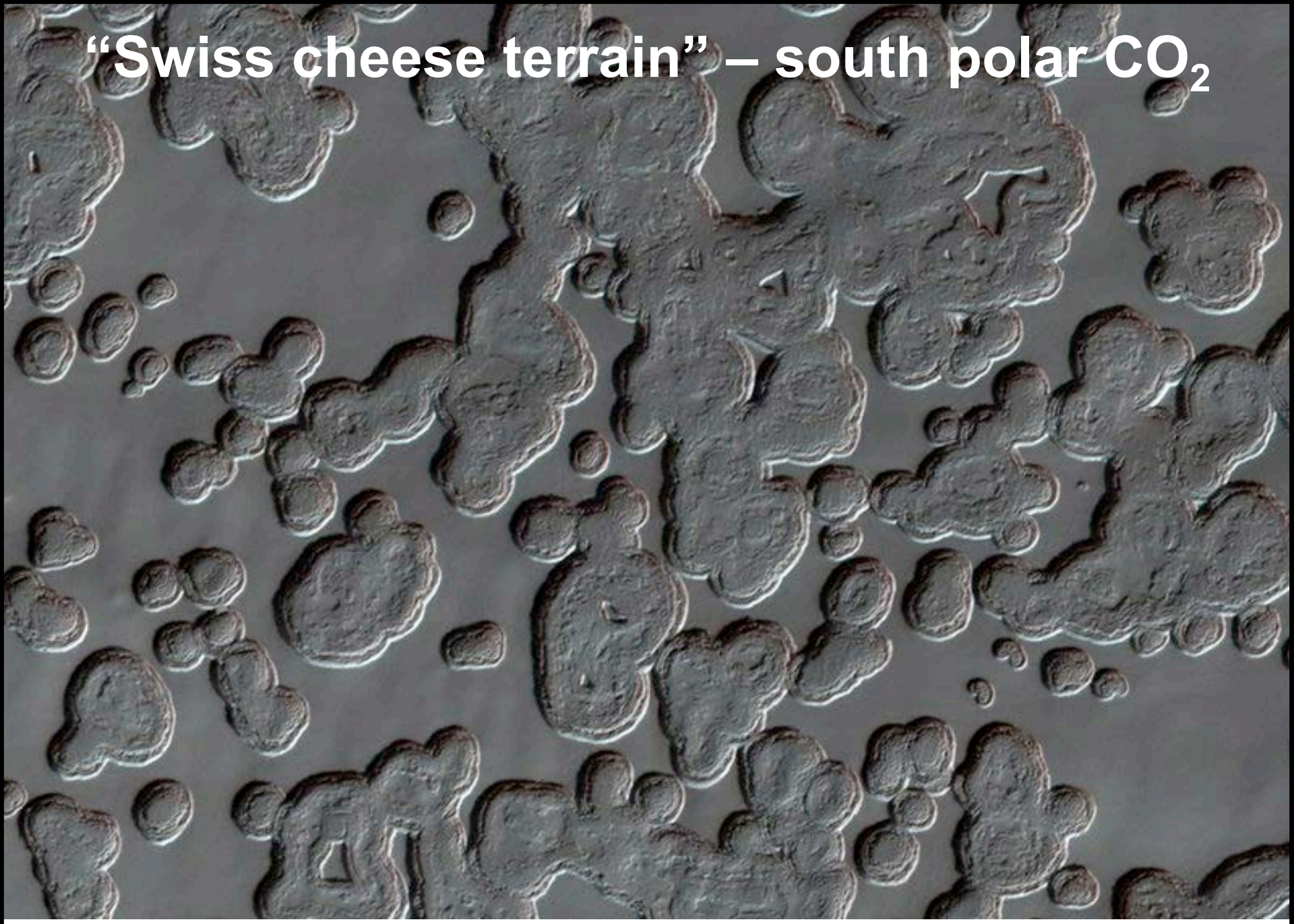


Data from MRO SHARAD.

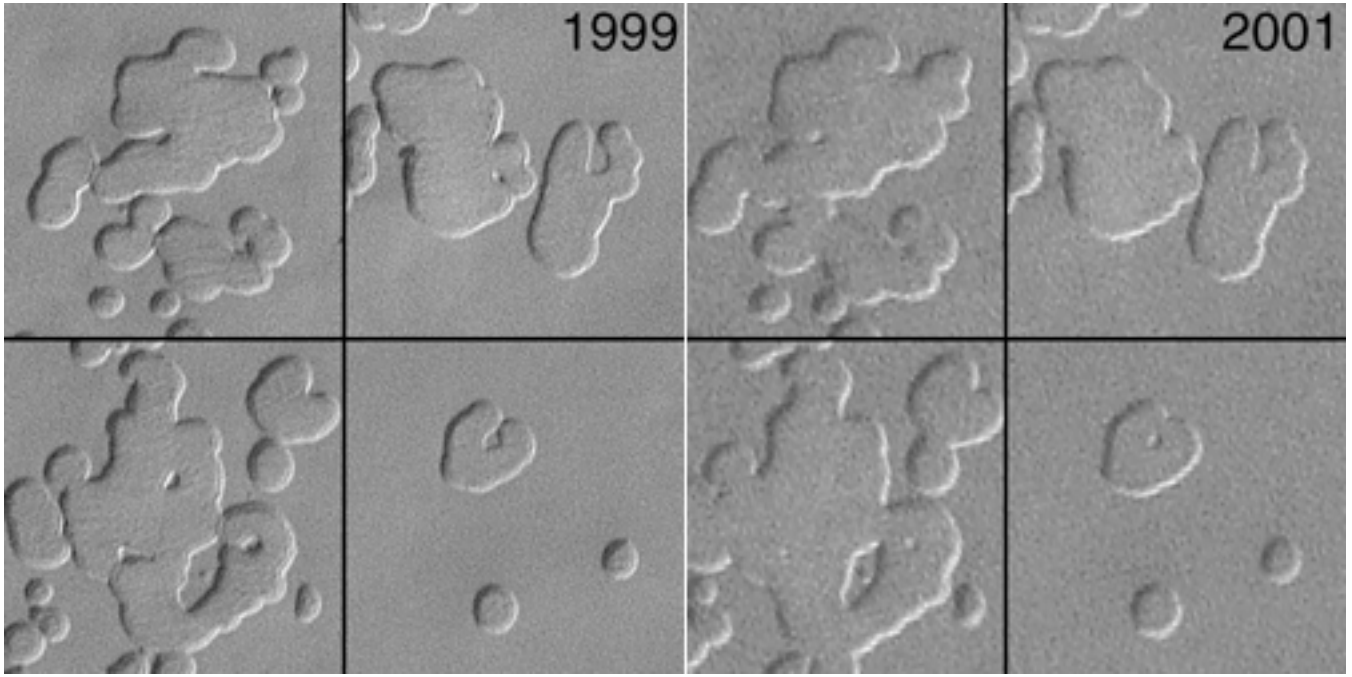




“Swiss cheese terrain” – south polar CO_2

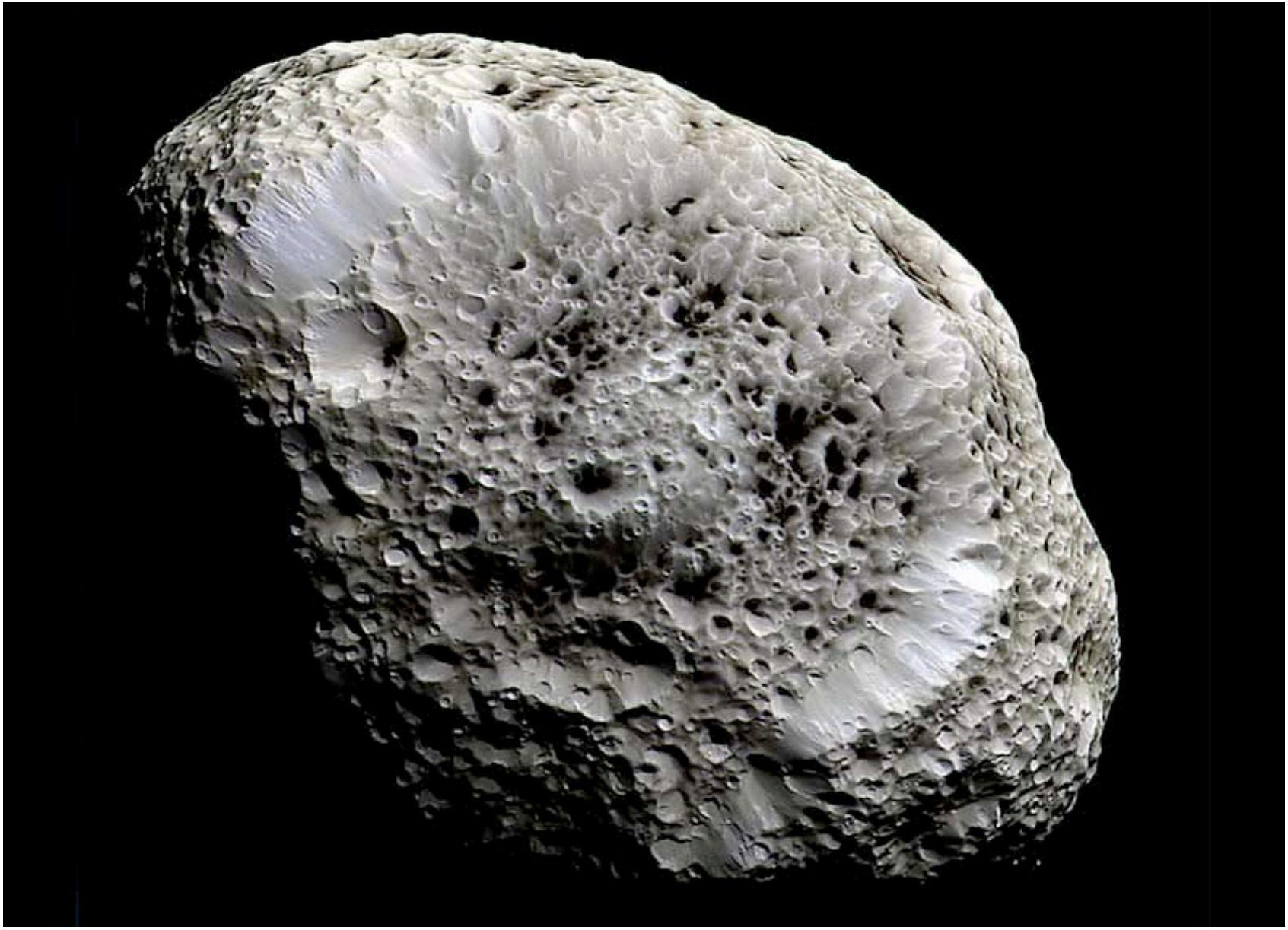


Changes in Swiss cheese terrain



Growth at edges from sublimation due to oblique sunlight

“Sponge terrain” on Hyperion

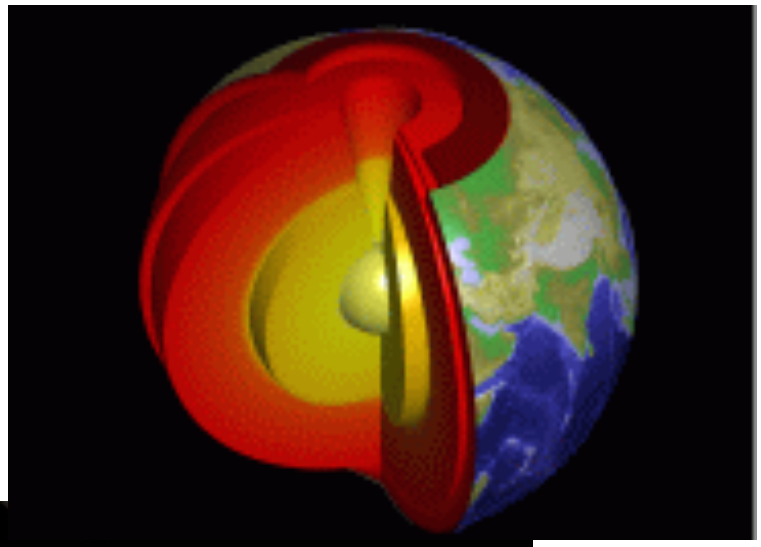


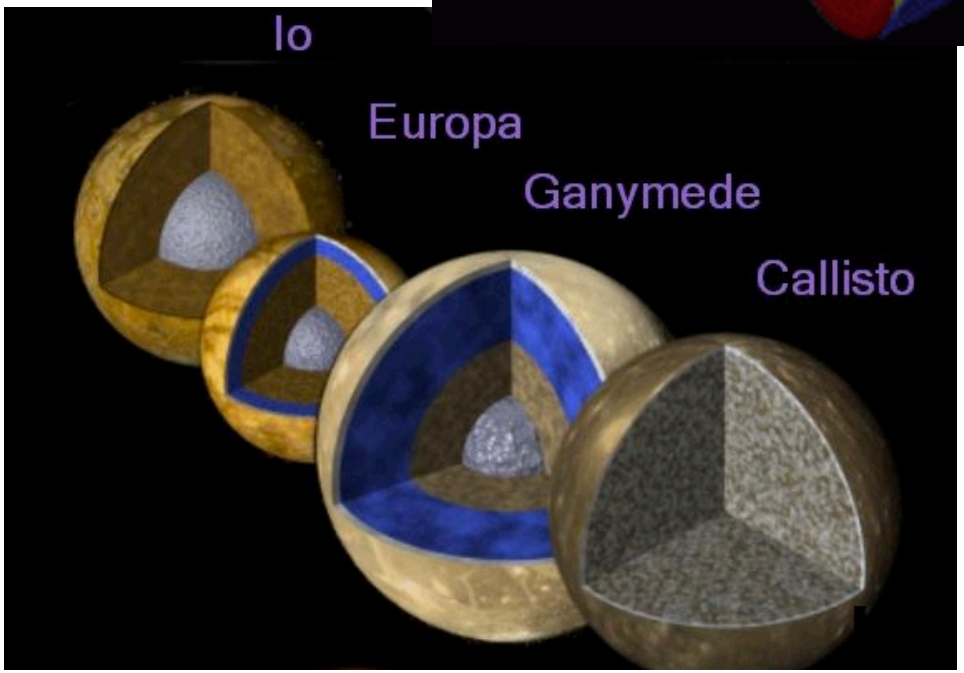
Suncups on Earth

http://climber.org/reports/images/1400/1487-ScimitarPassSatansSunCups.jpg

Planetary Interiors

Read chapter 6!!





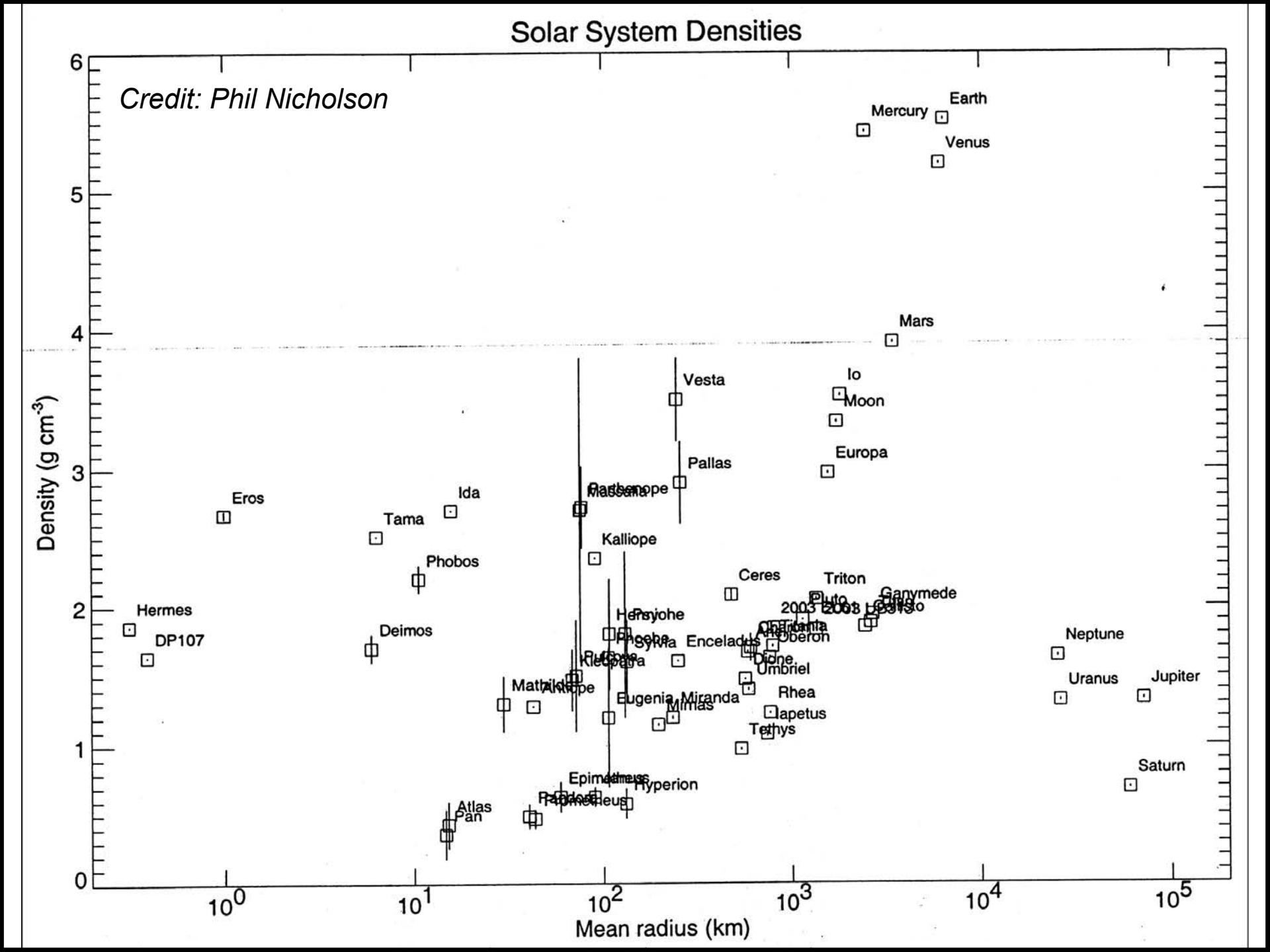
Planetary Interiors

We'd like to know:

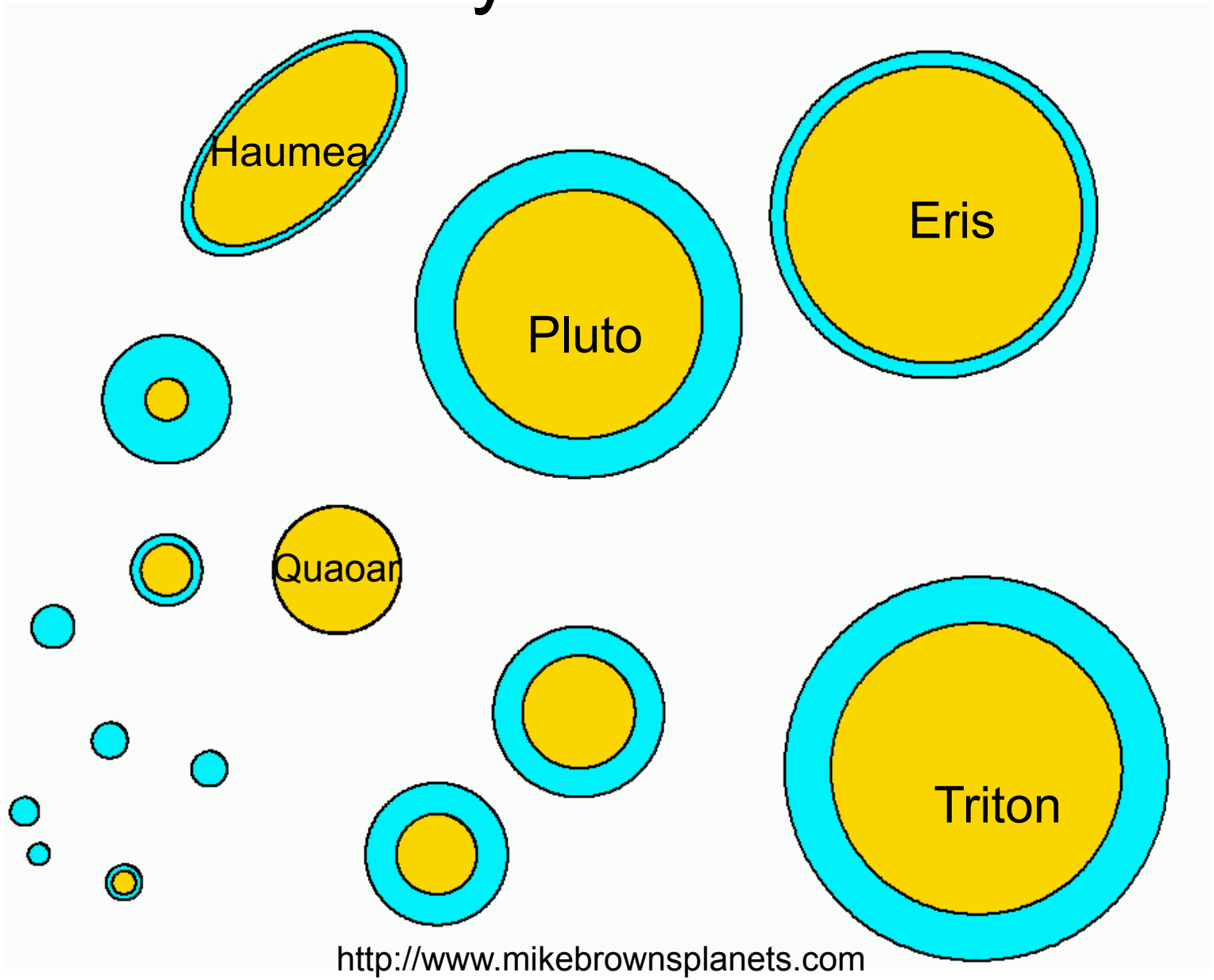
- Composition (bulk, and how it varies w/ depth)
- State of matter (function of temperature, pressure)
- Sources of internal energy

What we can measure:

- Surface/atmospheric composition
- Mass, radius (→density)
- Gravity field
- Rotation and oblateness
- Magnetic field
- Temperature → heat flux
- Seismic wave propagation
- Topography, surface morphology

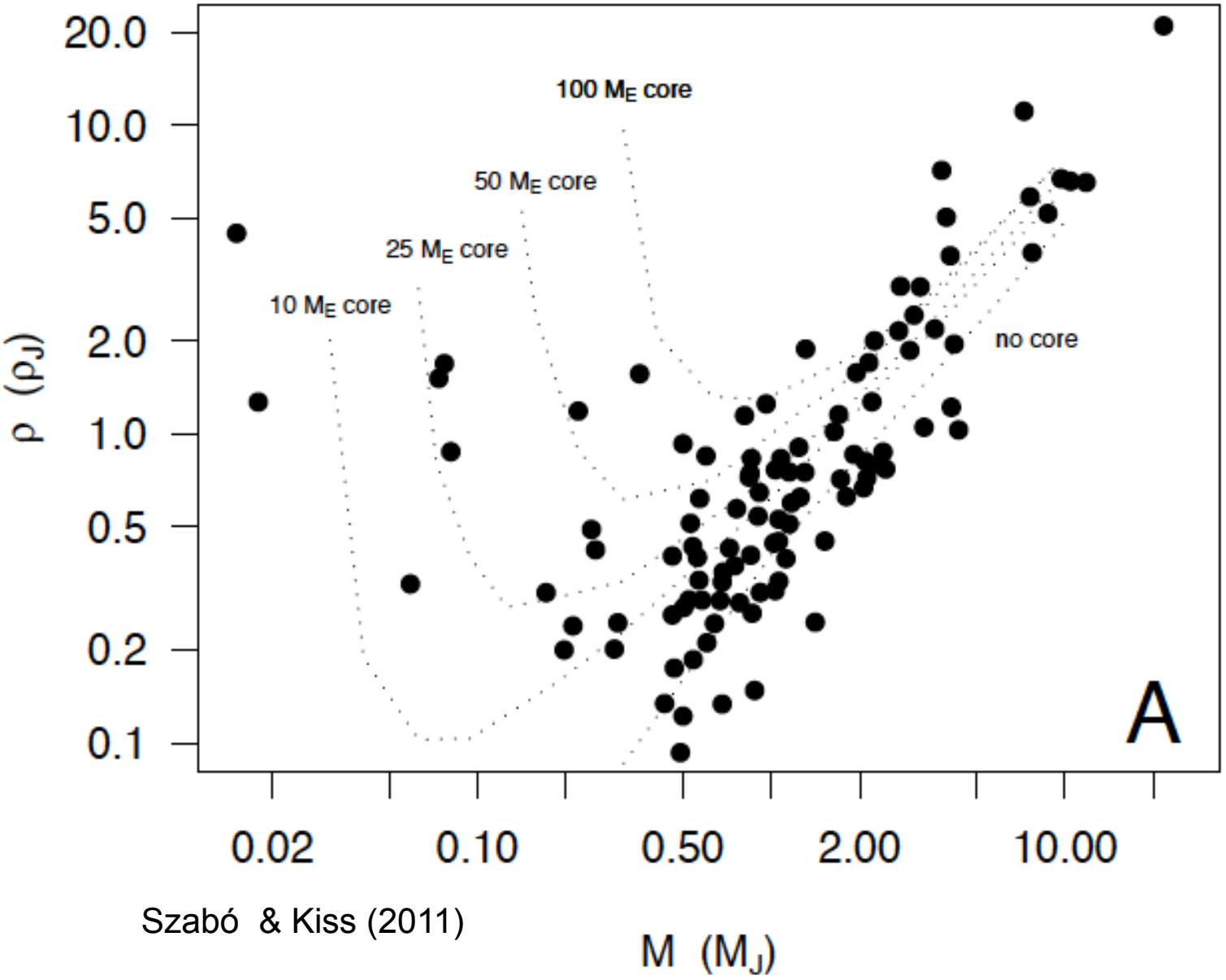

Solar System Densities
Credit: Phil Nicholson
Density (g cm-3)
Mean radius (km)
Mercury
Earth
Venus
Mars
Vesta
Pallas
Io
Moon
Europa
Eros
Ida
Tama
Kalliope
Phobos
Ceres
Triton
Ganymede
Hermes
DP107
Deimos
Neptune
Uranus
Jupiter
Rhea
Iapetus
Tethys
Saturn
Hyperion
Atlas
Pan
Miranda
Mimas
Dione
Umbriel
Oberon
Encelados
Eugenia

Bulk density continued: KBOs



http://www.mikebrownsplanets.com

Bulk density continued: exoplanets



Szabó & Kiss (2011)