

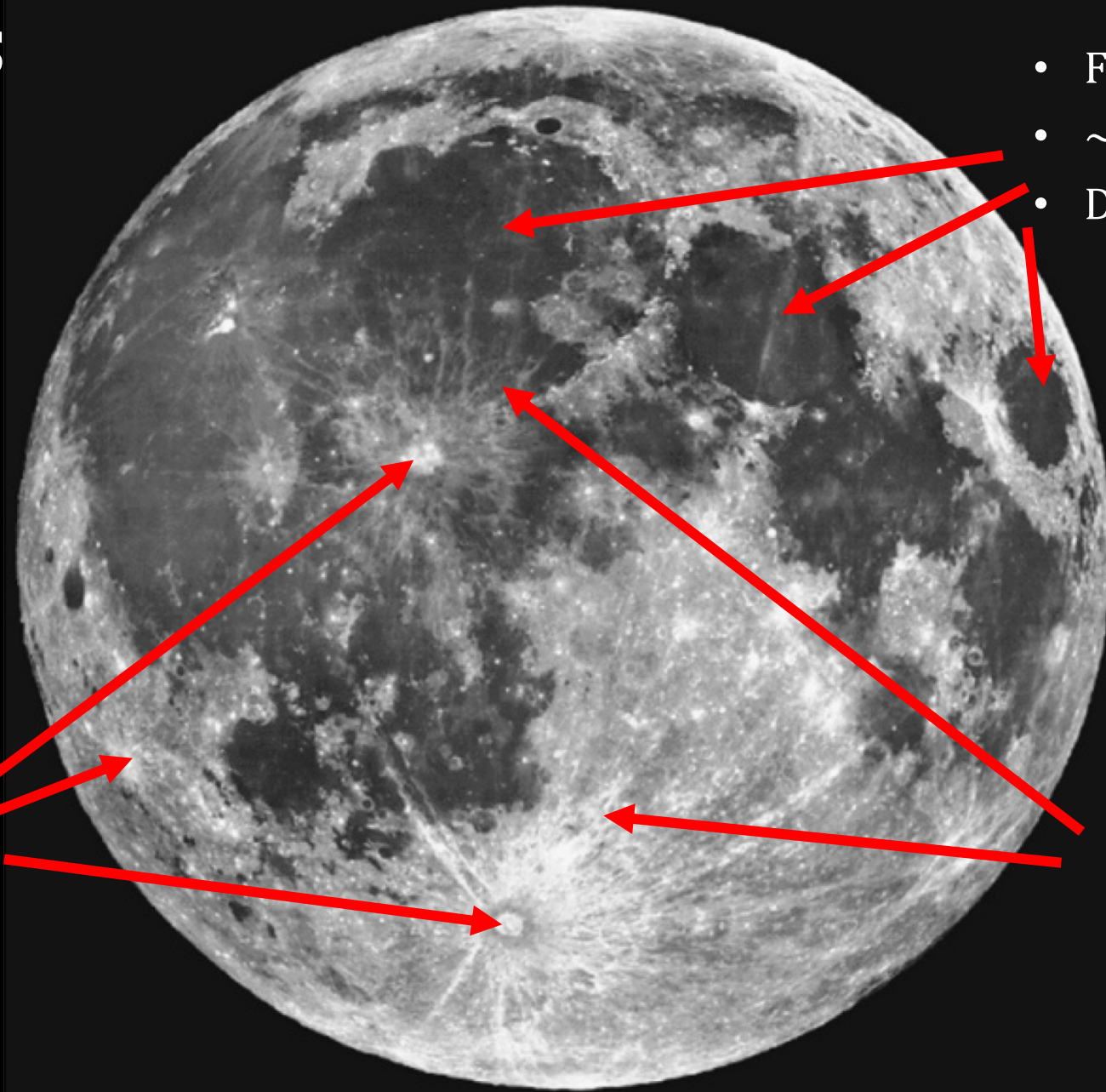
The Surface of the Moon



The Moon's Near Side

Maria (mare, sing.)

- Flat lowlands
- ~3 billion years old (young)
- Dark, heavy metals (Fe)

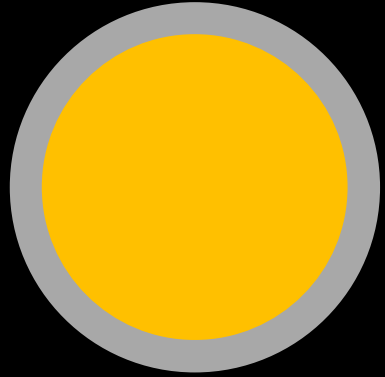


Old Crust

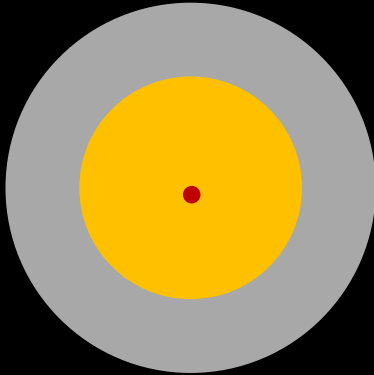
- Bumpy highlands
- ~4 billion years old
- Bright, light silicates

rays of ejecta from
meteor impacts

Maria Formation: ~3-5 Billion Years Ago

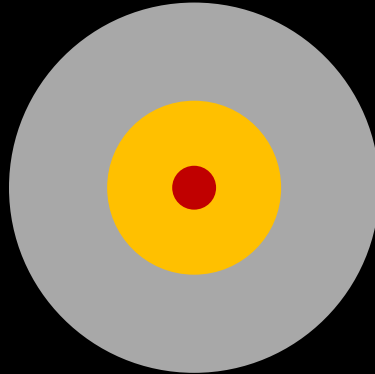


KE from coalescing rocks + GPE from enormous mass = **heated molten core**

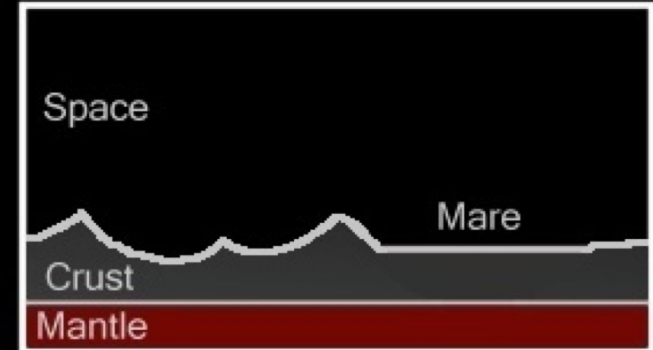
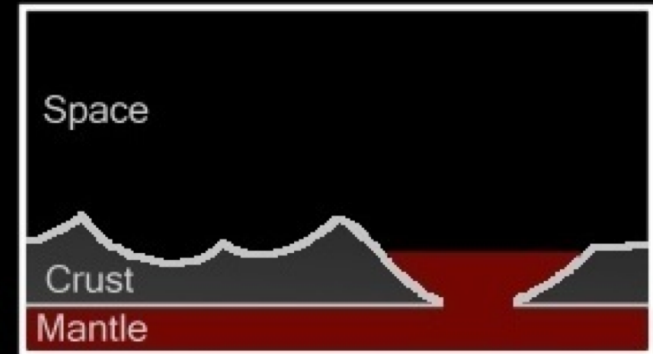
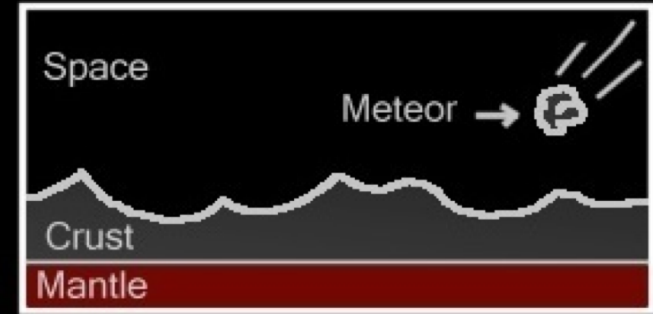
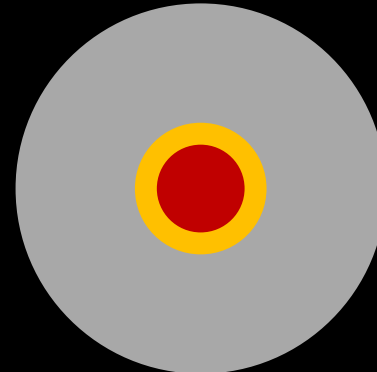


Heat escape through crust + other energy escape = **cooling core**

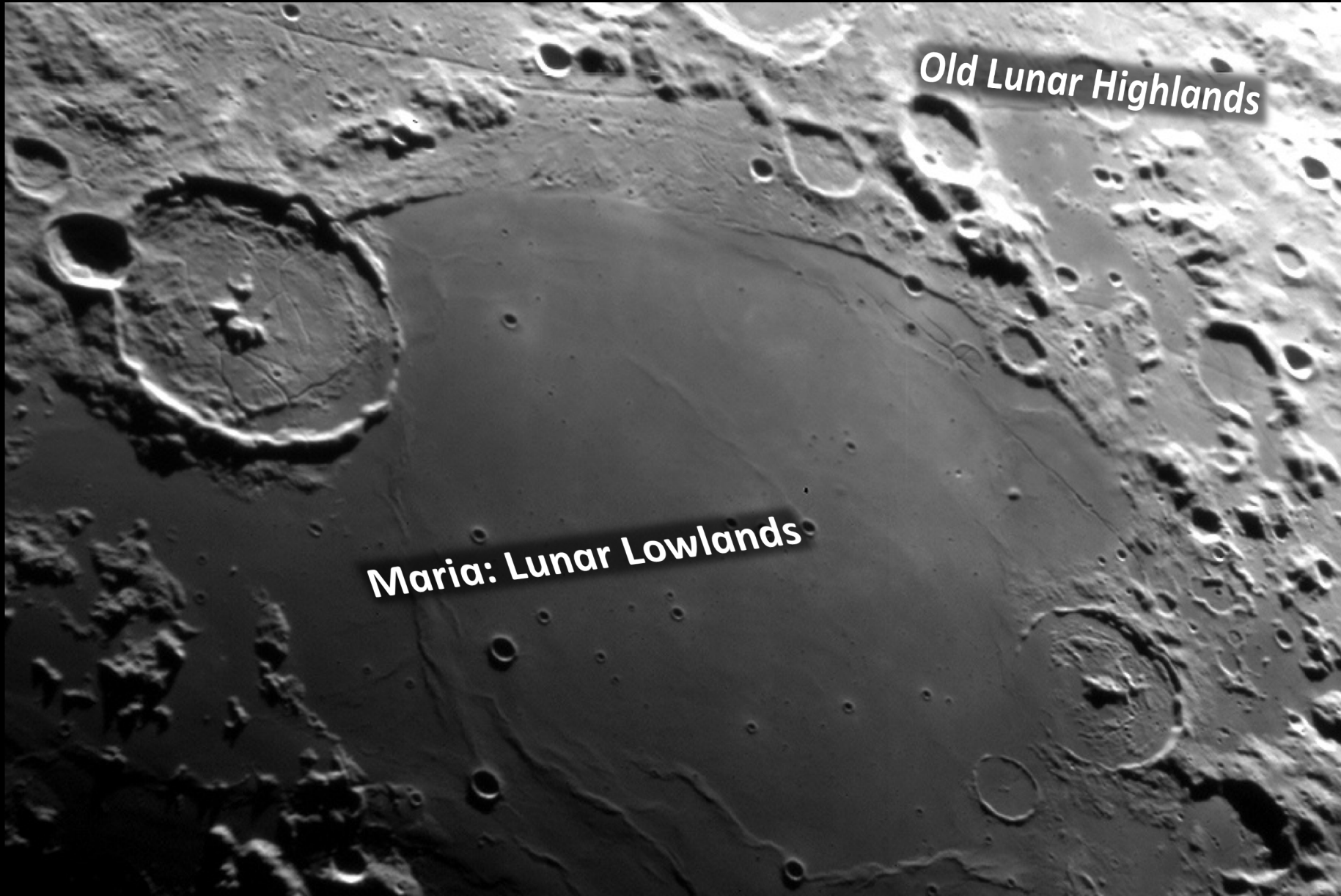
Decreasing temperature + constant mass = **shrinking liquid mantle** + **growing solid core**



Tiny solid core + **tiny mantle** = no geologic activity today!



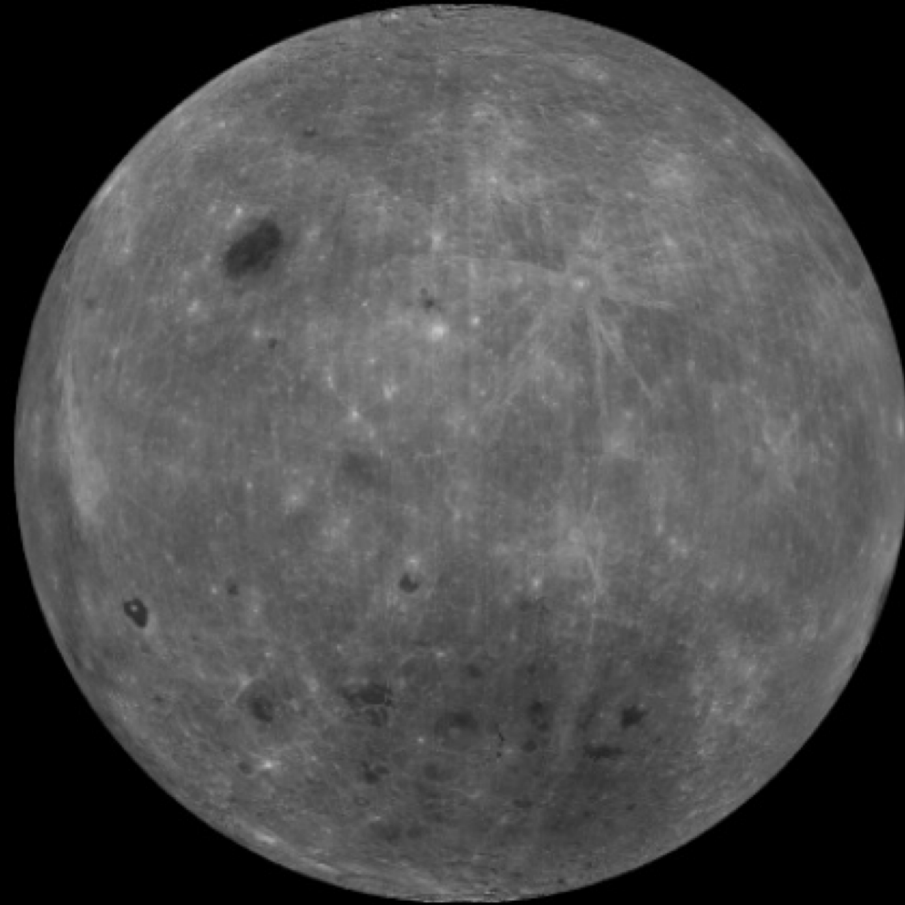
Crater Density, Crater Size, Flatness, & Color as Age Indicators



Why are Almost All Maria on the Near Side? (+5 EC)

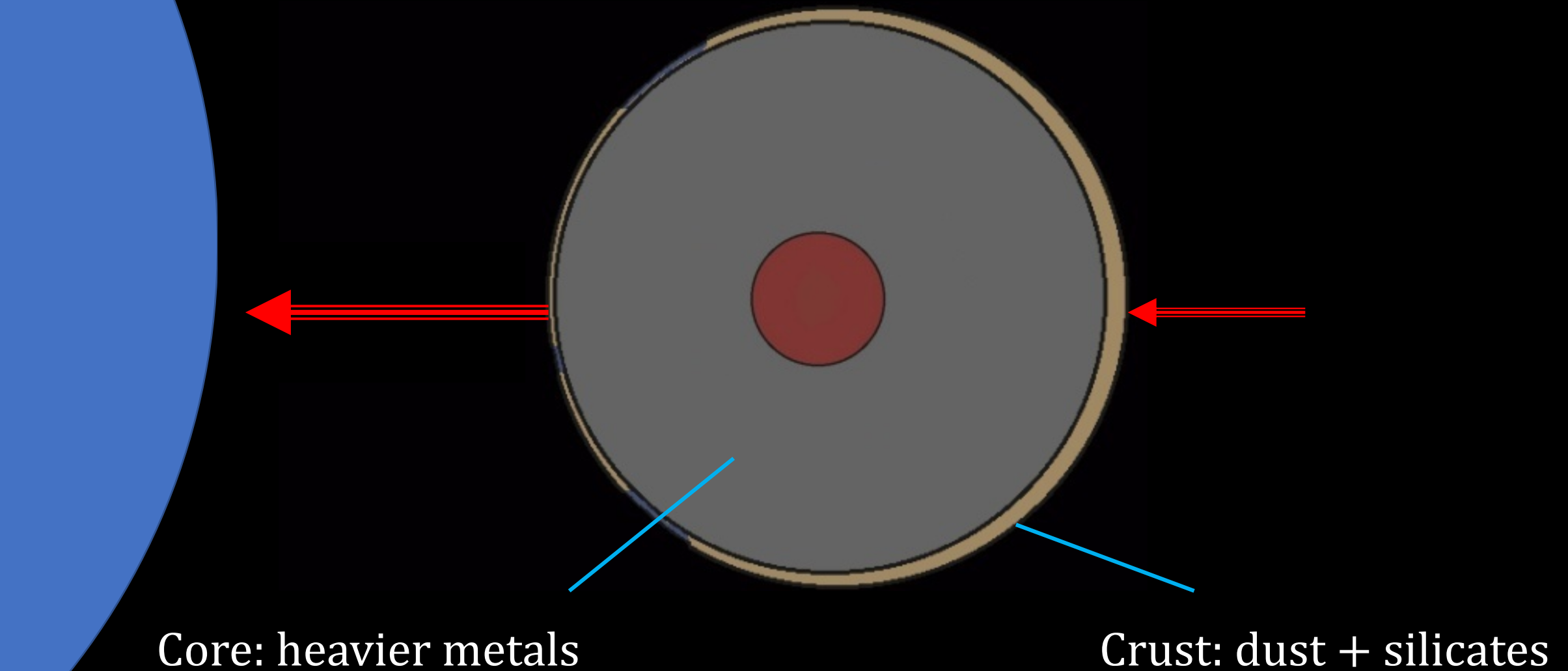


Near Side



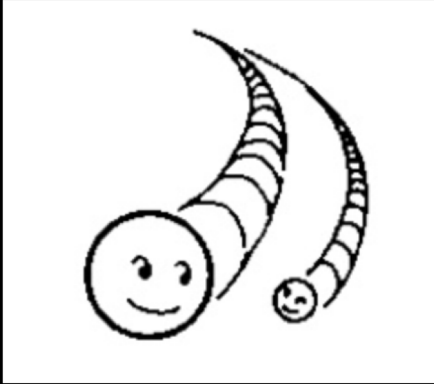
Far Side

Gravity/Material Differential



How the Heck Did the Moon Form Anyway?

Sister Theory:



The Moon formed right alongside Earth.

Problem: Where's all the Moon's iron? Composition lacking.

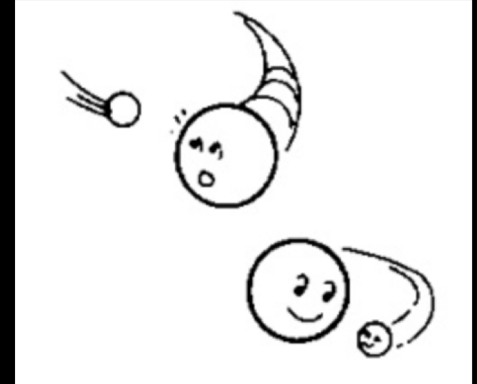
Fission Theory:



Earth was spinning so fast the Moon split off.

Problem: Why is the Moon's orbit inclined to Earth's rotation?

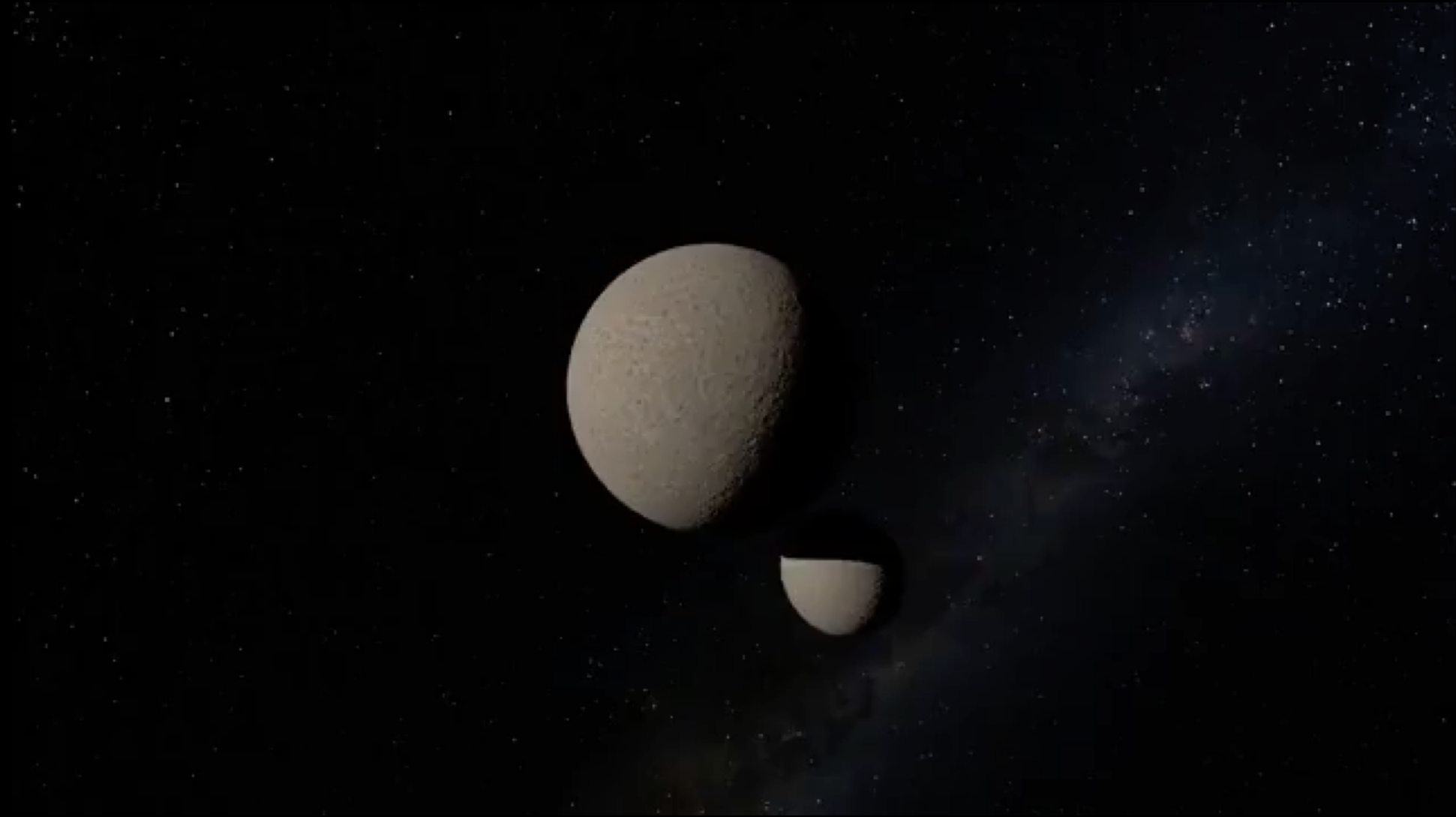
Capture Theory:



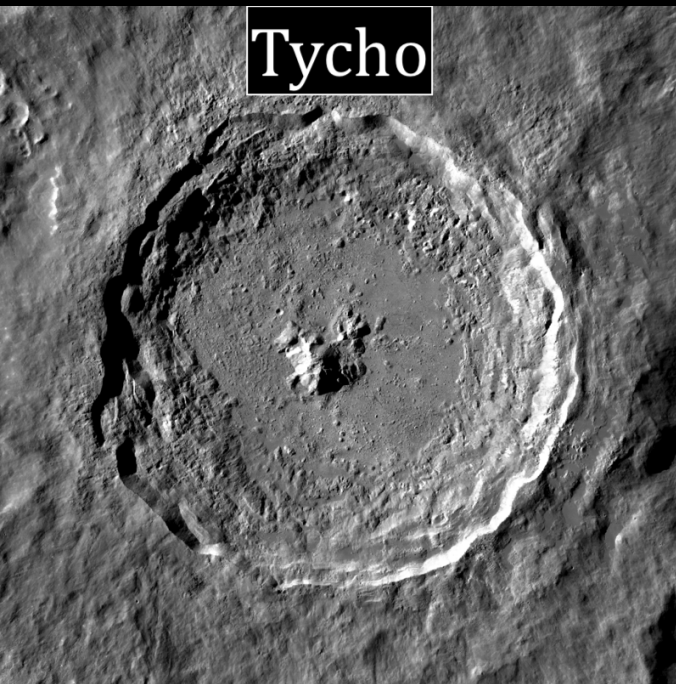
Earth's gravitational field captured the Moon.

Problem: Where did the orbital energy go? Also, rocks are too similar.

Best Solution: The Giant Impact Hypothesis



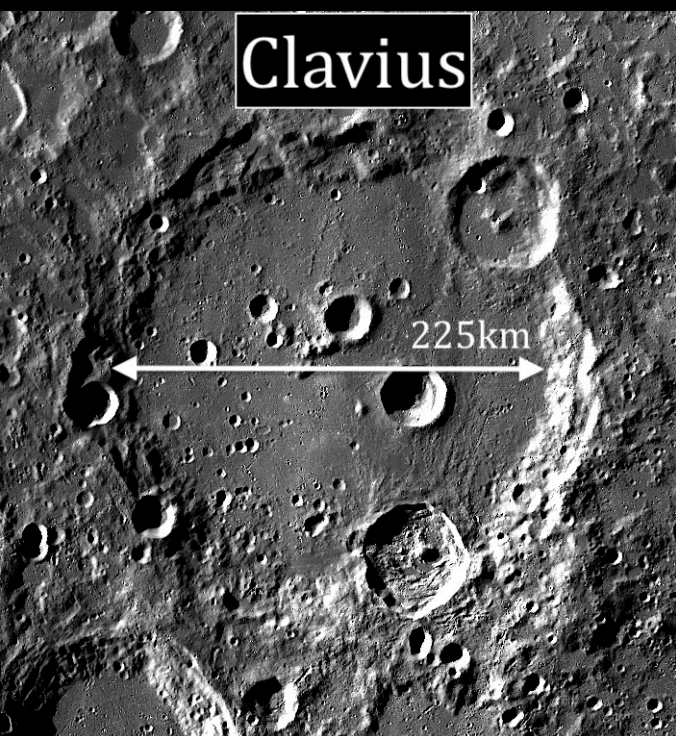
“How did that form? Probably things smashing together and exploding.” -Every Astronomer



Tycho



Copernicus



Clavius

Table 11.1: Composition of the Earth & Moon.

Element	Earth	Moon
Iron	34.6%	3.5%
Oxygen	29.5%	60.0%
Silicon	15.2%	16.5%
Magnesium	12.7%	3.5%
Titanium	0.05%	1.0%

Table 11.2: Chemical Composition of the Earth (crust and mantle) and Moon.

Element	Earth's Crust and Mantle	Moon
Iron	5.0%	3.5%
Oxygen	46.6%	60.0%
Silicon	27.7%	16.5%
Magnesium	2.1%	3.5%
Calcium	3.6%	4.0%

Earth's Interior

