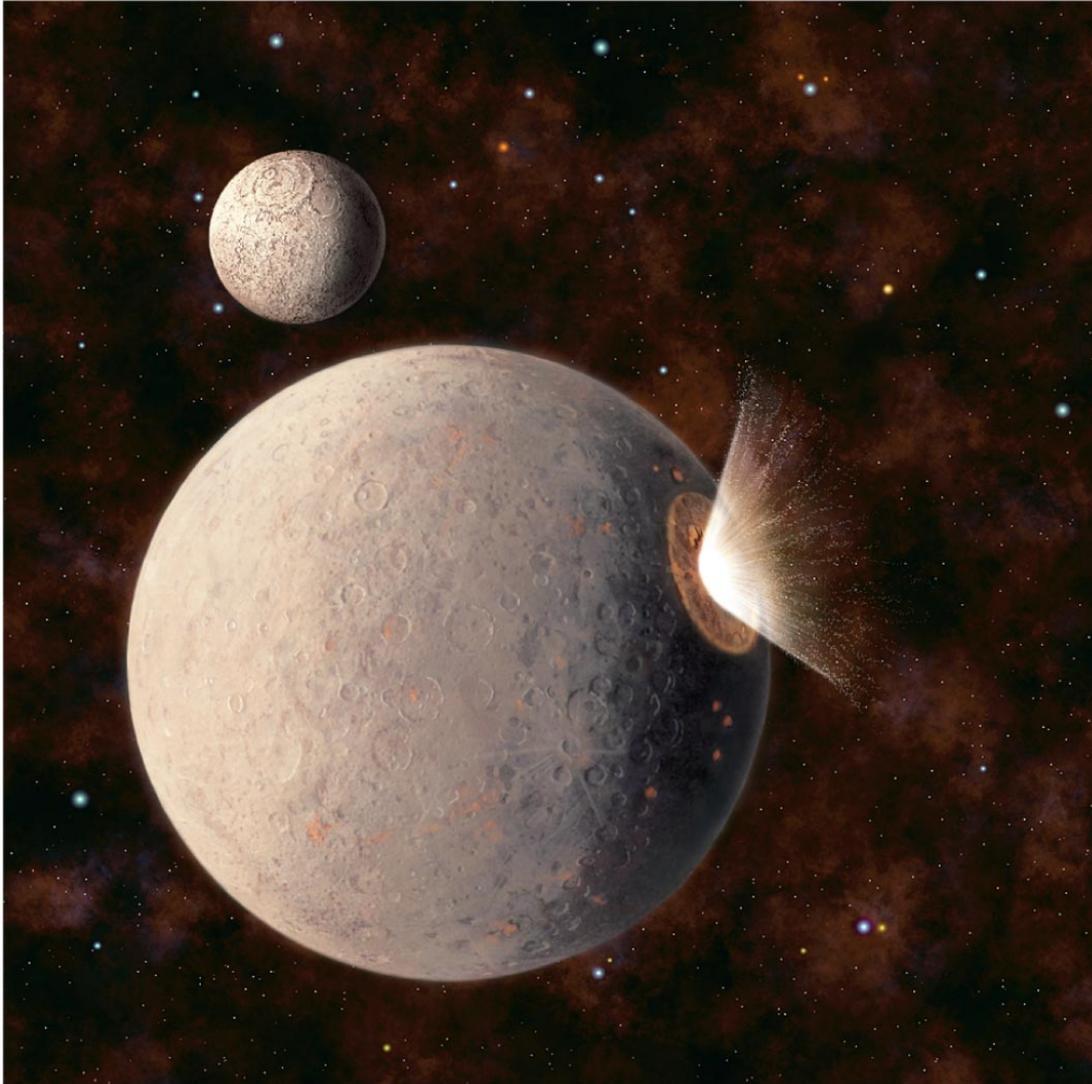
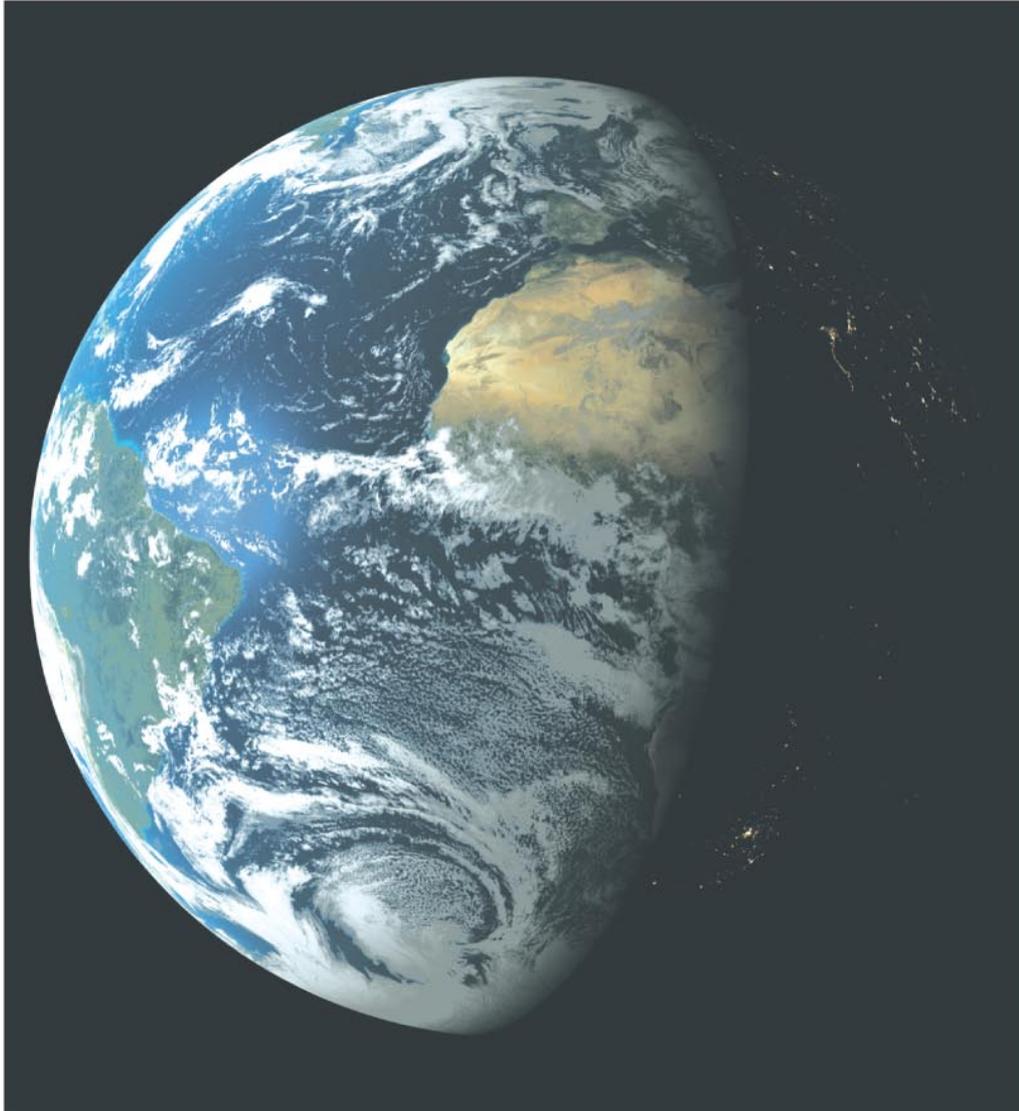


The Era of Heavy Bombardment



- Leftover planetesimals bombarded other objects in the late stages of solar system formation.

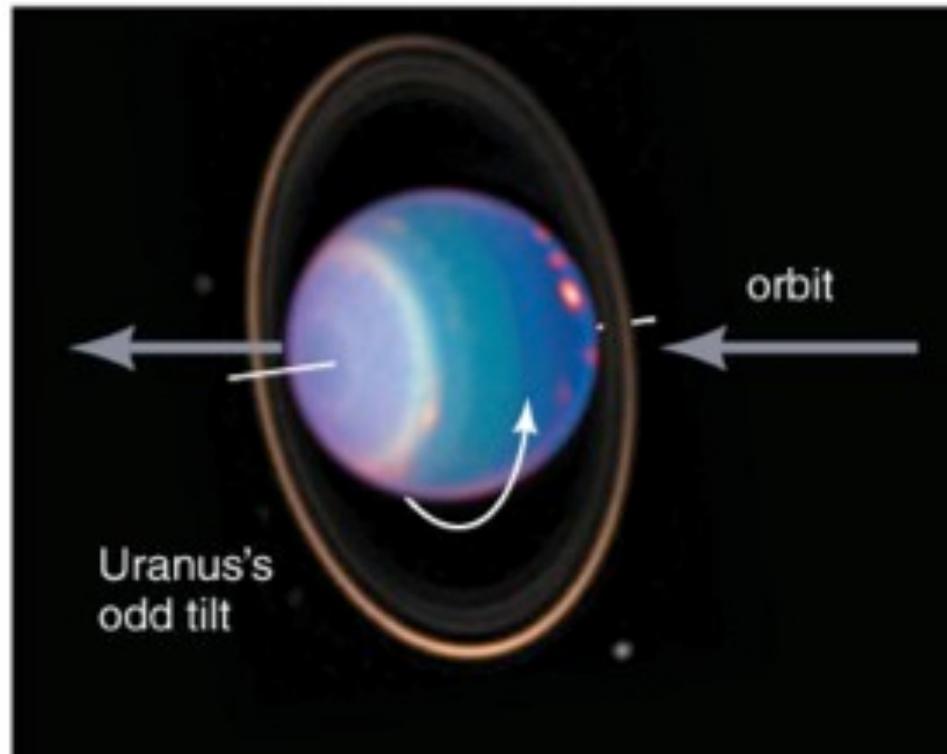
Origin of Earth's Water



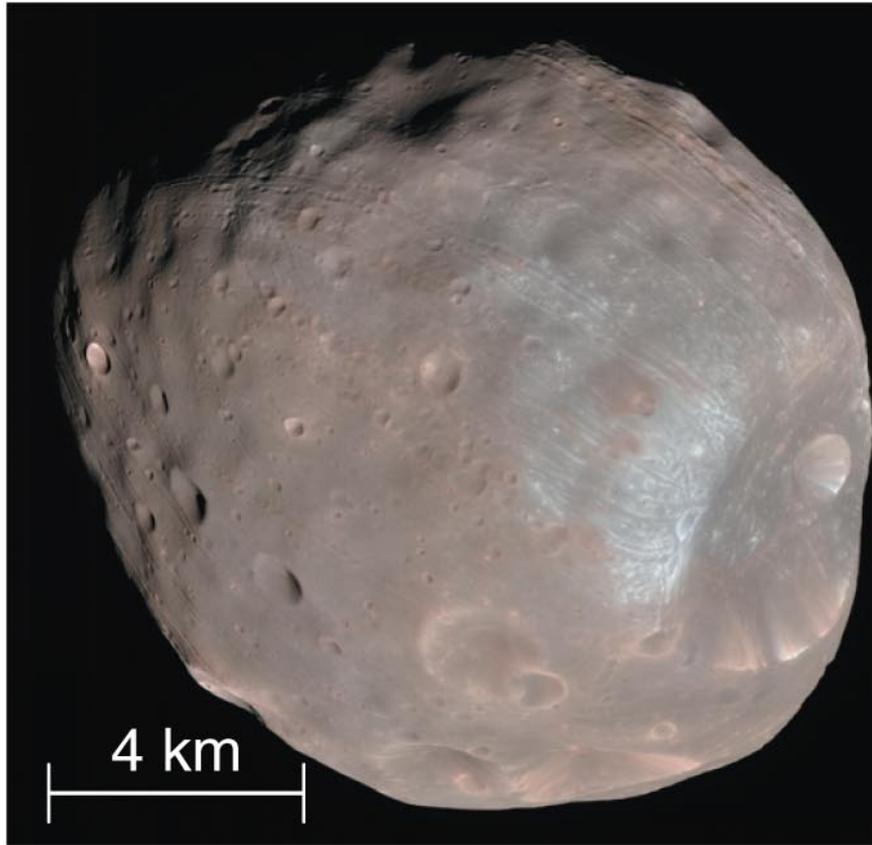
- Earth too close to Sun to have much water when it formed.
- Water may have come to Earth by way of impacts from icy planetesimals.

Tilts of planetary axes

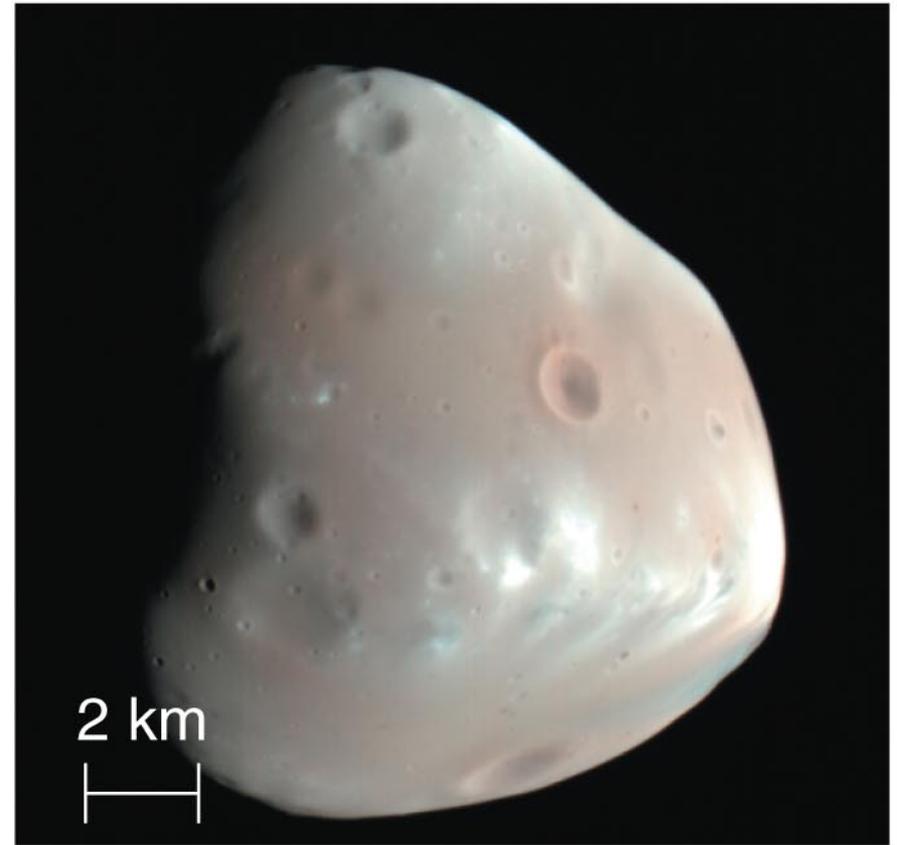
Some planets are significantly tilted in orientation of their spin axis to their orbital plane. Early impacts knocked them off axis!



Captured Moons



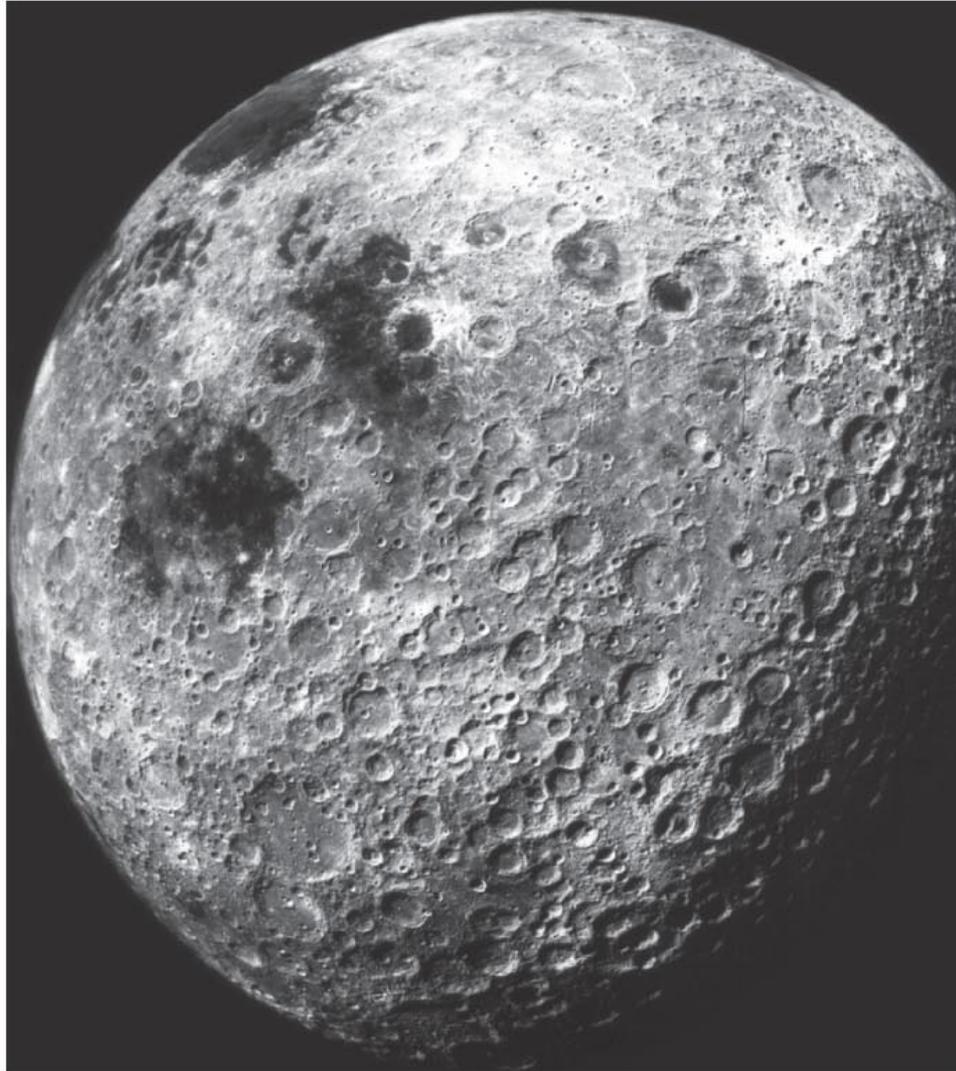
a Phobos

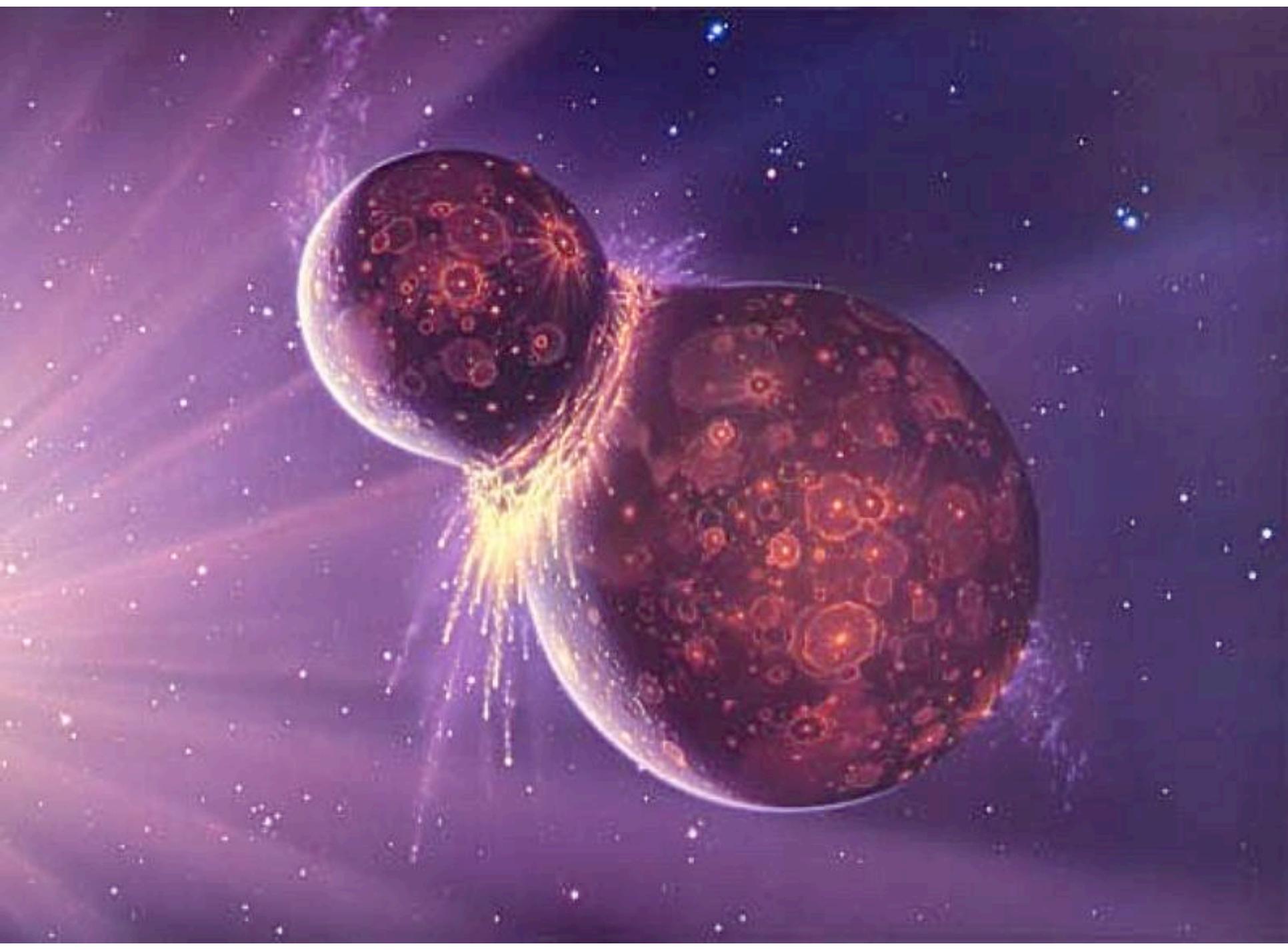


b Deimos

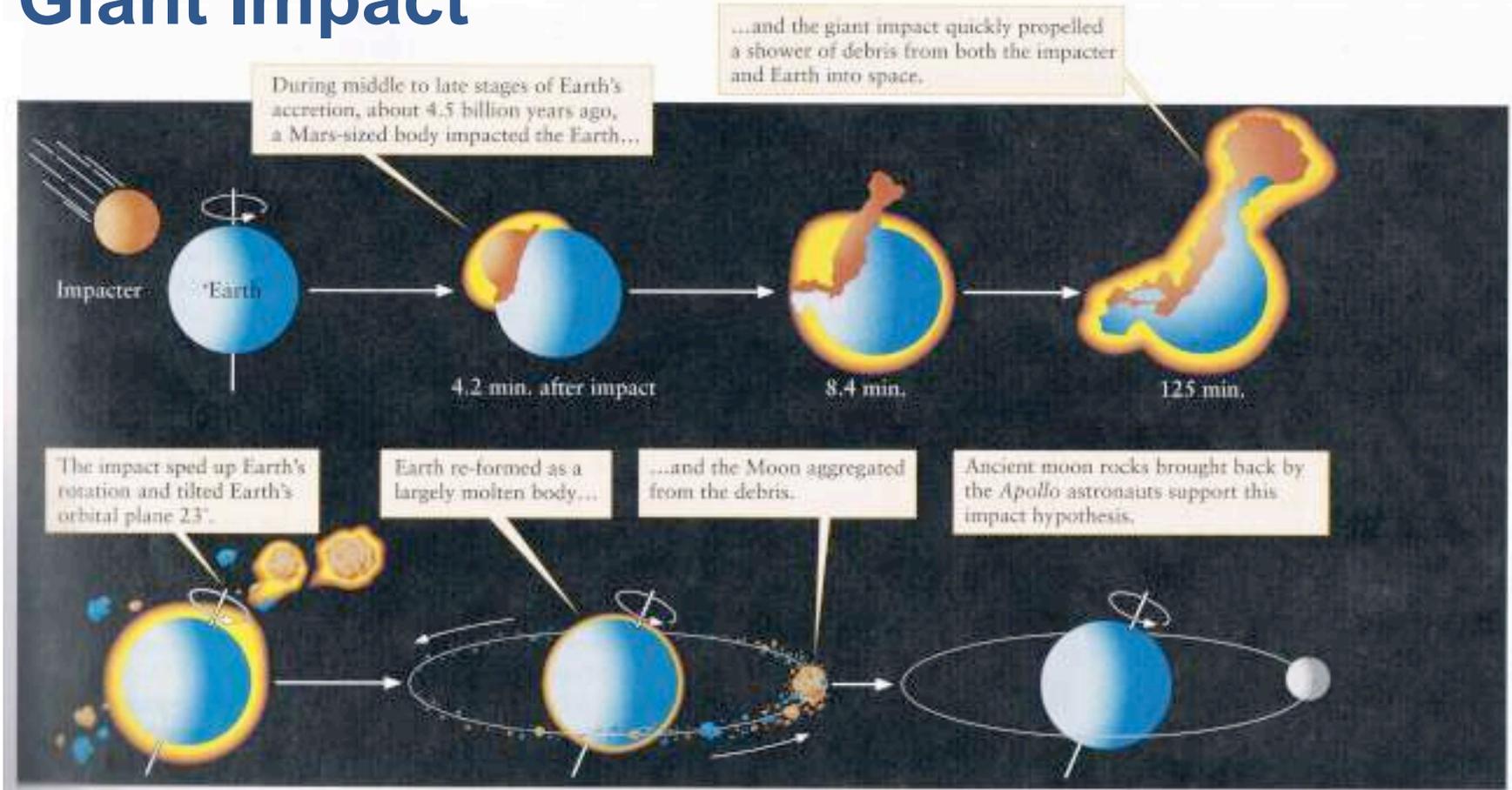
- Unusual moons of some planets may be captured planetesimals.

The Formation of our Moon





Giant Impact



- Mars-size planetesimal strikes Earth
- Vaporizes material and ejects it into space
- Material cools and coalesces to form the Moon.

Giant Impact – Neat Idea, What Evidence?

Sounds kind of crazy – why couldn't the Moon just have formed the same way the Earth did?

1. Composition of the Moon is similar to that of the Earth's mantle (its outer layers) but unlike the Earth, it lacks an big iron core in its center.

2. There is scarcity of **volatiles** in the Moon – compounds like water, or **hydrated (water-containing) minerals**, which are easily vaporized at high temperatures.

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Iron core of impactor merged into the Earth, only the outer parts of Earth and impactor ended up forming the moon.

2. There is scarcity of **volatiles** in the Moon – compounds like water, or **hydrated (water-containing) minerals**, which are easily vaporized at high temperatures.

Ejected material too hot to contain volatiles, so the Moon had no volatiles when it coalesced from that ejected material.