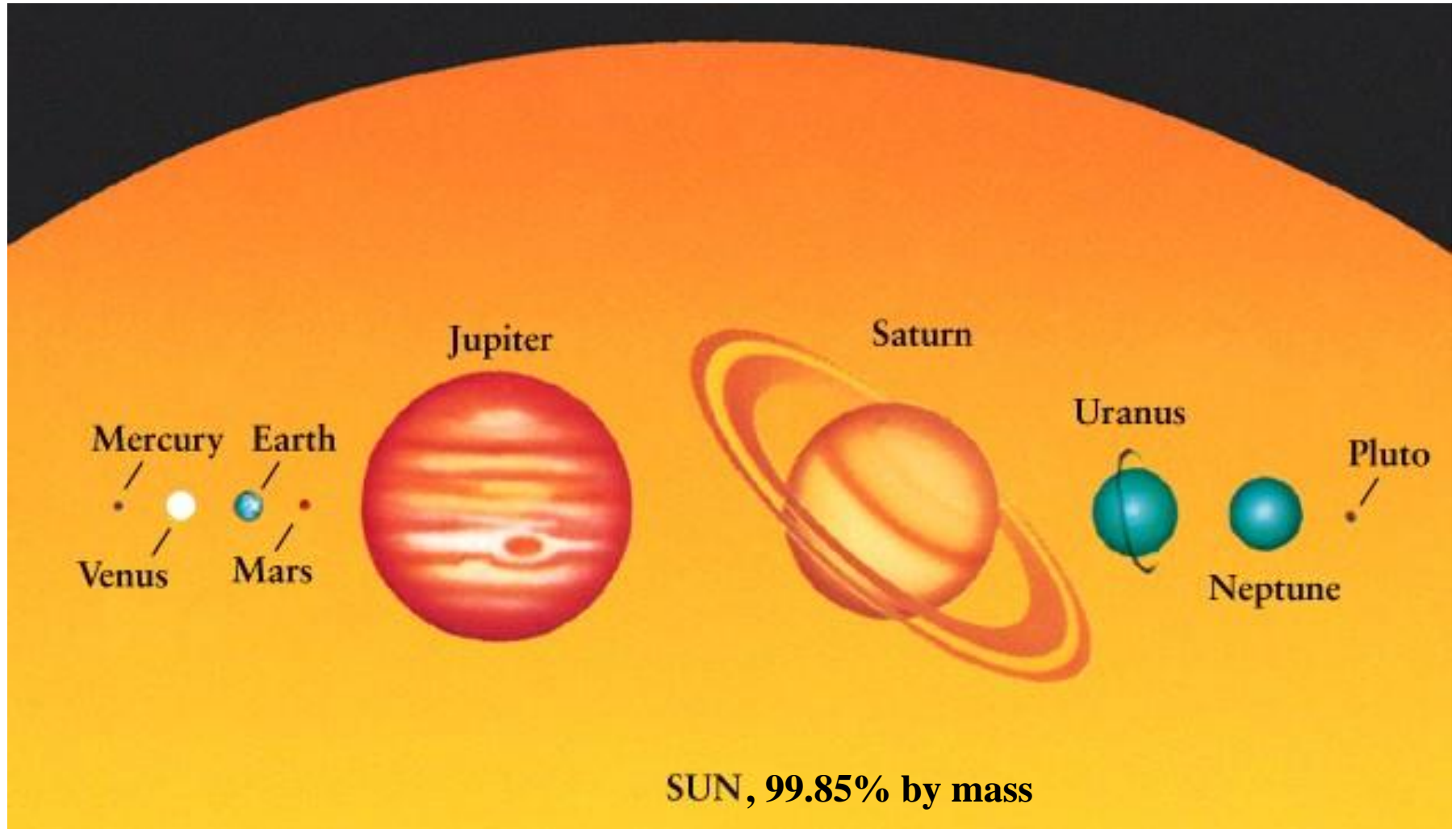


# Solar System Part 2



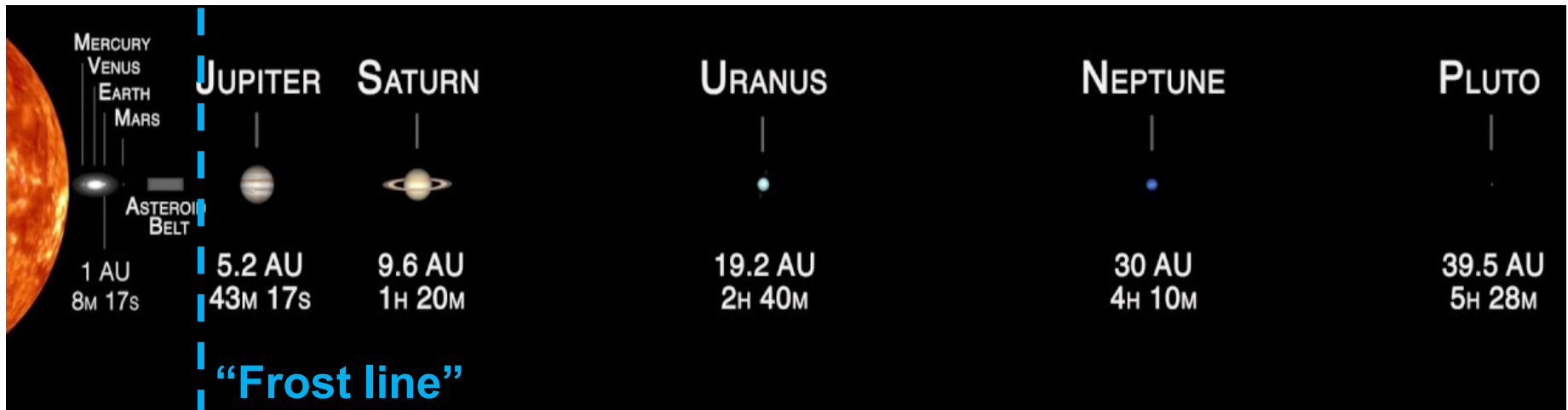
# Solar System: inventory

- **Sun**                    **99.85%** by mass
- **Planets**                **0.1 %** by mass
- **Satellites** (“moons”) and **Rings** of planets
- **Asteroids** (“minor planets”, small *rocky* bodies orbiting the Sun)
- **Comets** (small *icy* bodies orbiting the Sun)
- **Meteoroids** (rocky or metallic bodies smaller than 1 m)
- **Dust** (very small particles)
- **Solar Wind** (ionized gas escaping the Sun)

# Solar System: distances

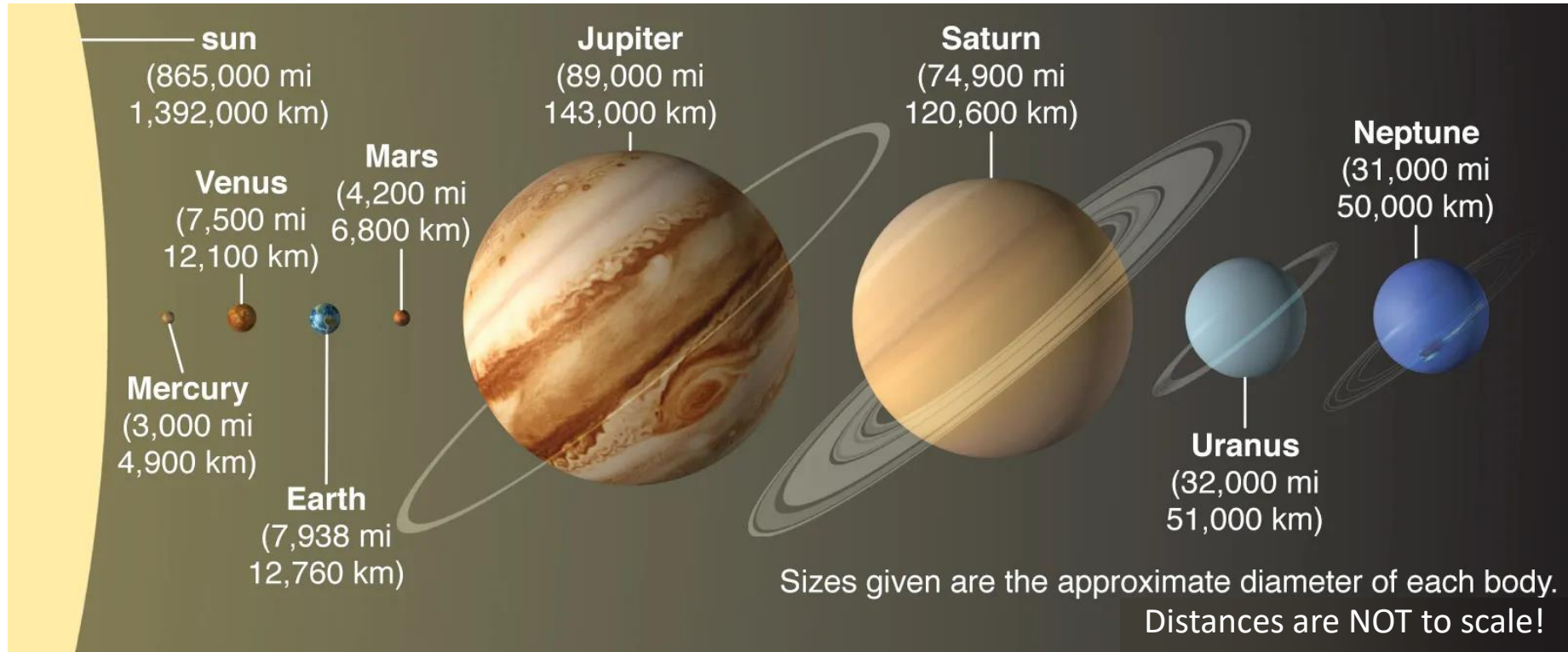
What units are used to measure distance in space?

- 1 Astronomical Unit (1 AU) = **Average distance between the Earth and the Sun** = 150 million km = 93 million miles
- 1 Light Minute (Hour, Second) = **Distance *light* travels in 1 minute (hour, second)** = 18 million km = 11 million miles



All distances shown to scale, all bodies x1000.

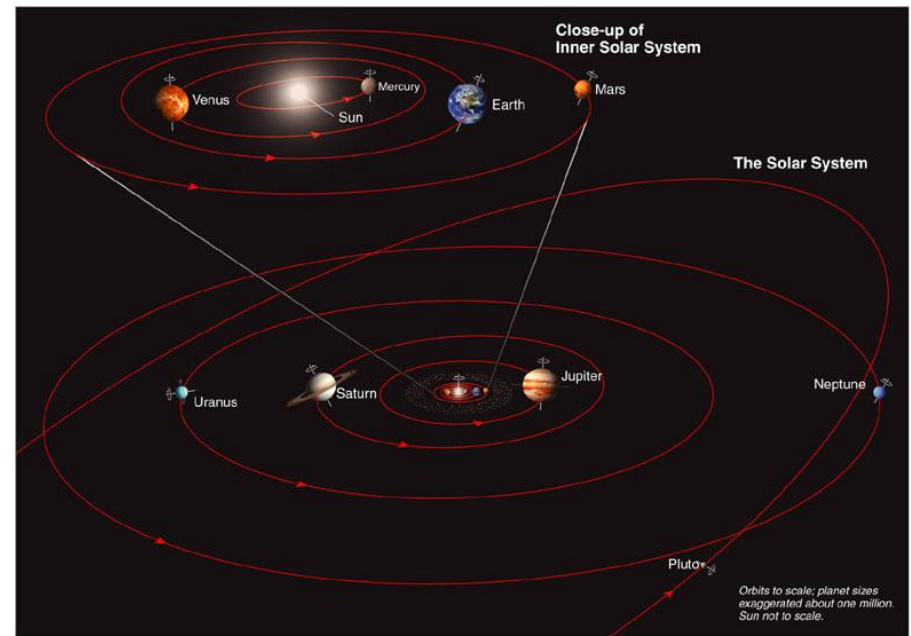
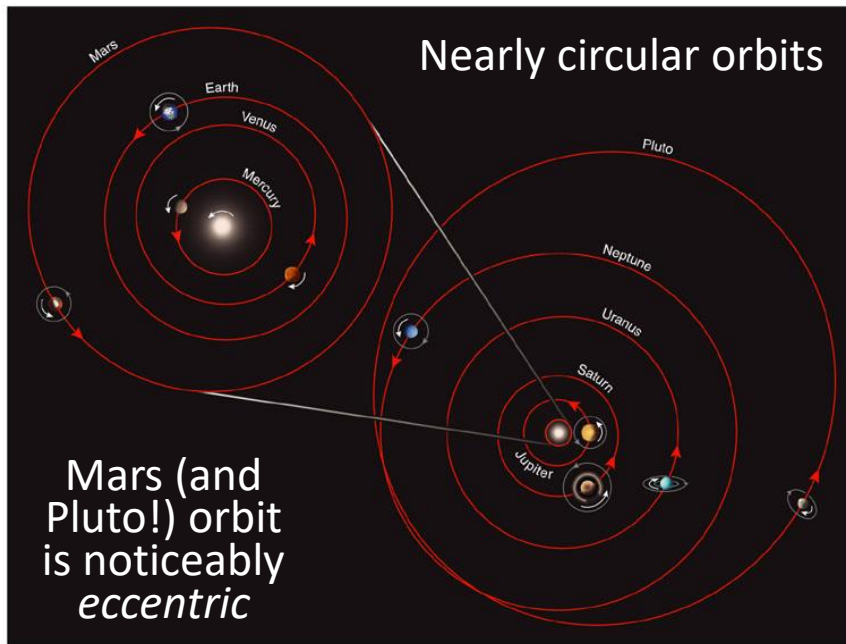
# Sun and Planets: sense of scale



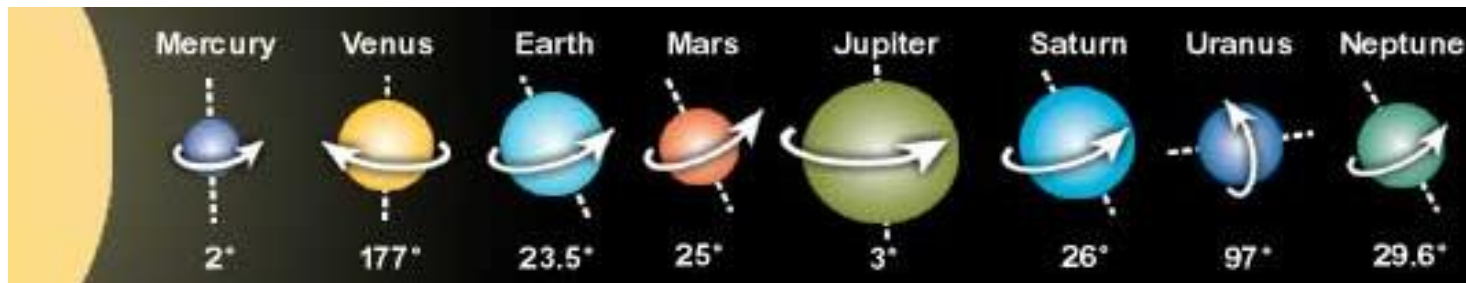
- **The Sun is about 100 times bigger than the Earth.**
- **Compared to the Earth by size: Mars is ~1/2, Mercury is ~1/3, Jupiter is ~11x, Uranus is ~4x.**

# General Characteristics of Major Planets

All planets *revolve* in the same direction following nearly circular orbits, all within  $10^\circ$  of *ecliptics* - Earth's orbital plane.



All **except Venus** *rotate* in the same direction.

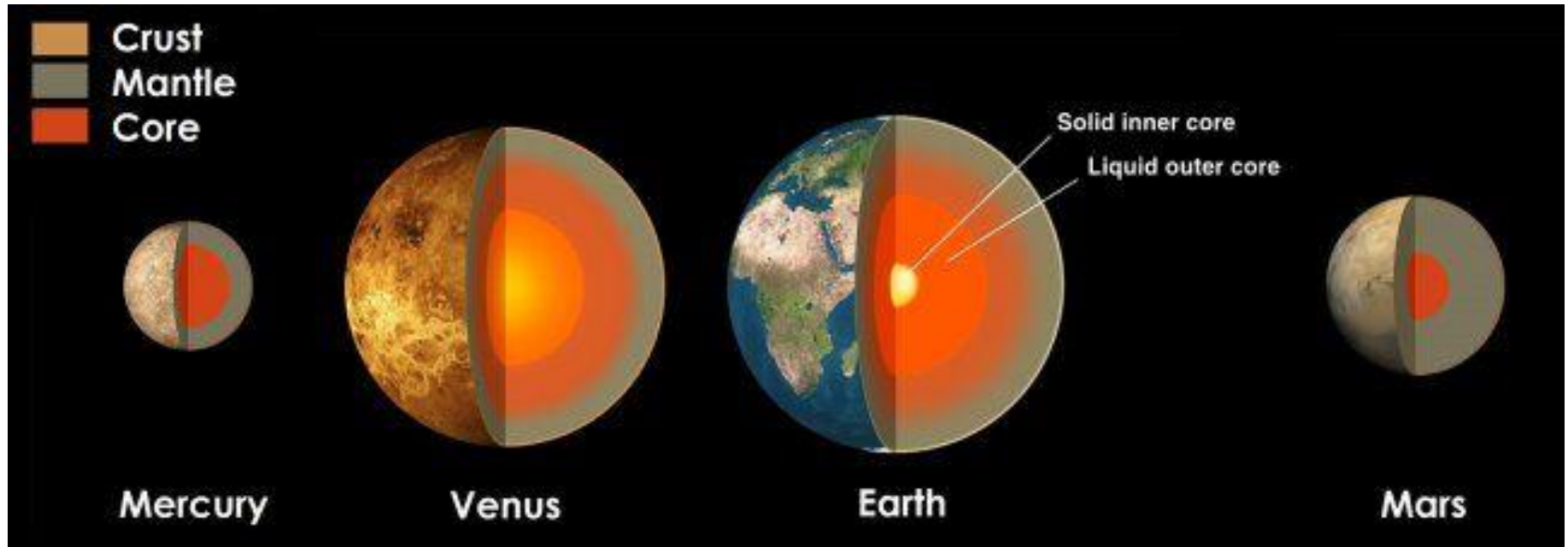


All have various *tilts*.



# Inner (Terrestrial) Planets

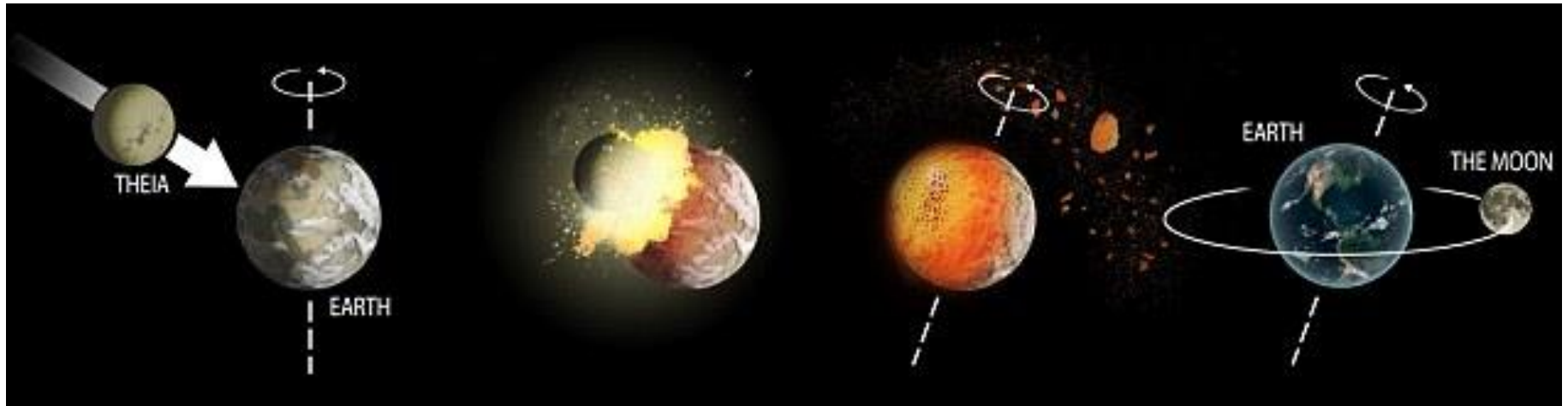
The four “Earth-like” planets closest to the Sun that have a solid “rocky” planetary surface.



- Same basic type of structure, such as a central **metallic core** (mostly iron), with a surrounding **silicate mantle**.
- Possess **secondary atmospheres**, generated through volcanism or comet impacts after planet formation.

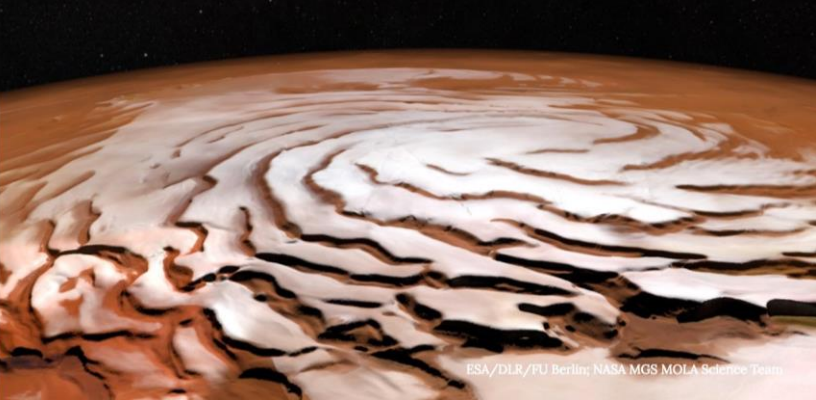
# Formation of the Moon

## The Giant Impact Hypothesis

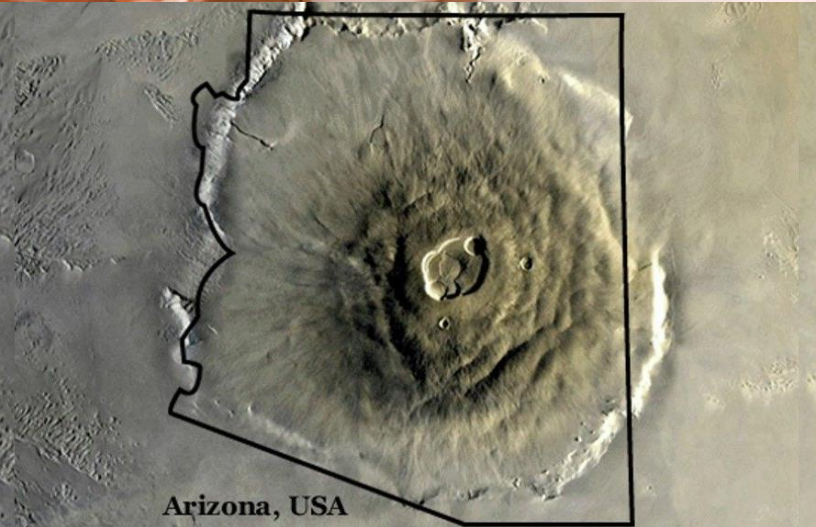


- Suggests that the Moon formed out of the debris left over from a **collision between Earth and an astronomical body the size of Mars**, approximately 4.5 billion years ago, about 20 to 100 million years after the Solar System coalesced.
- The colliding body is sometimes called **Theia**.
- **Recent study**: two anomalously dense massive “blobs” detected within the Earth mantle may be remnants of Theia!

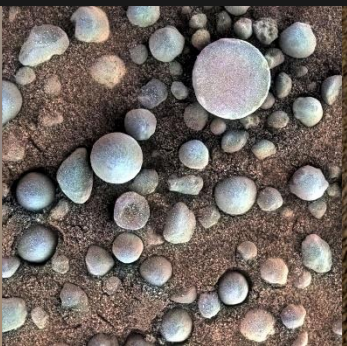
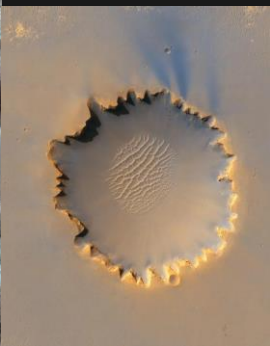
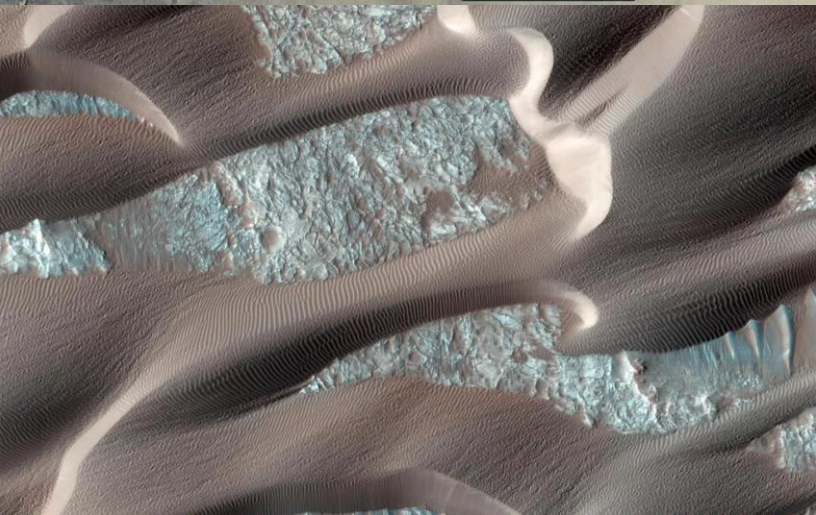
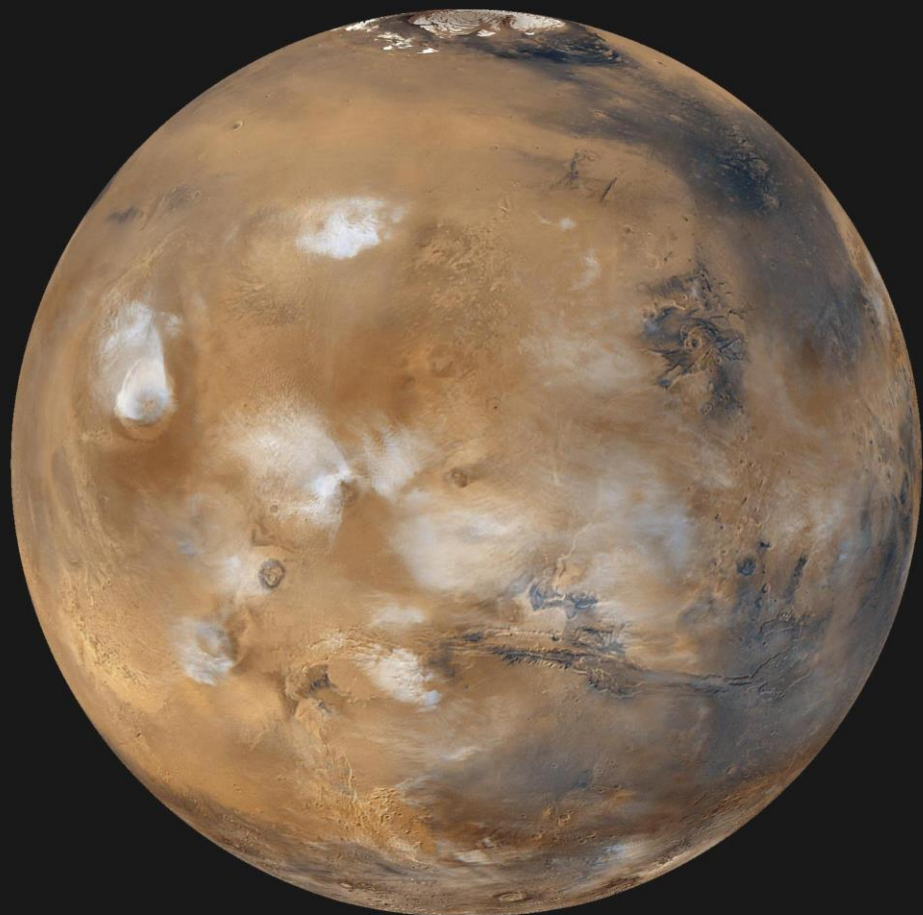




ESA/DLR/FU Berlin; NASA MGS MOLA Science Team



Arizona, USA

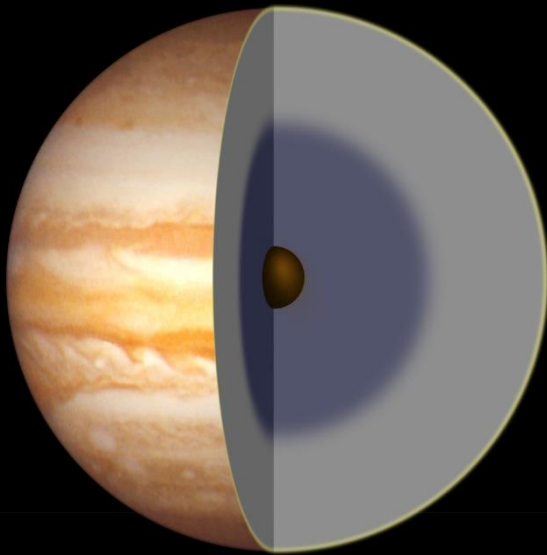




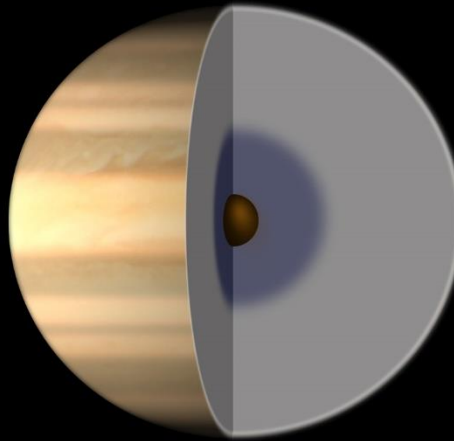
# Outer (Jovian) Planets

## Gas Giants

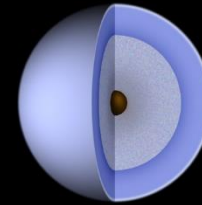
## Ice Giants



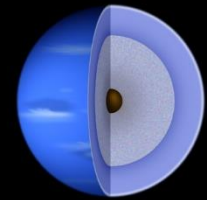
JUPITER



SATURN



URANUS



NEPTUNE

(  EARTH  
for comparison )

 Molecular hydrogen

 Metallic hydrogen

*Primary (captured) atmosphere*

 Hydrogen, helium, methane gas

 Mantle (water, ammonia, methane ices)

 Core (rock, ice)

