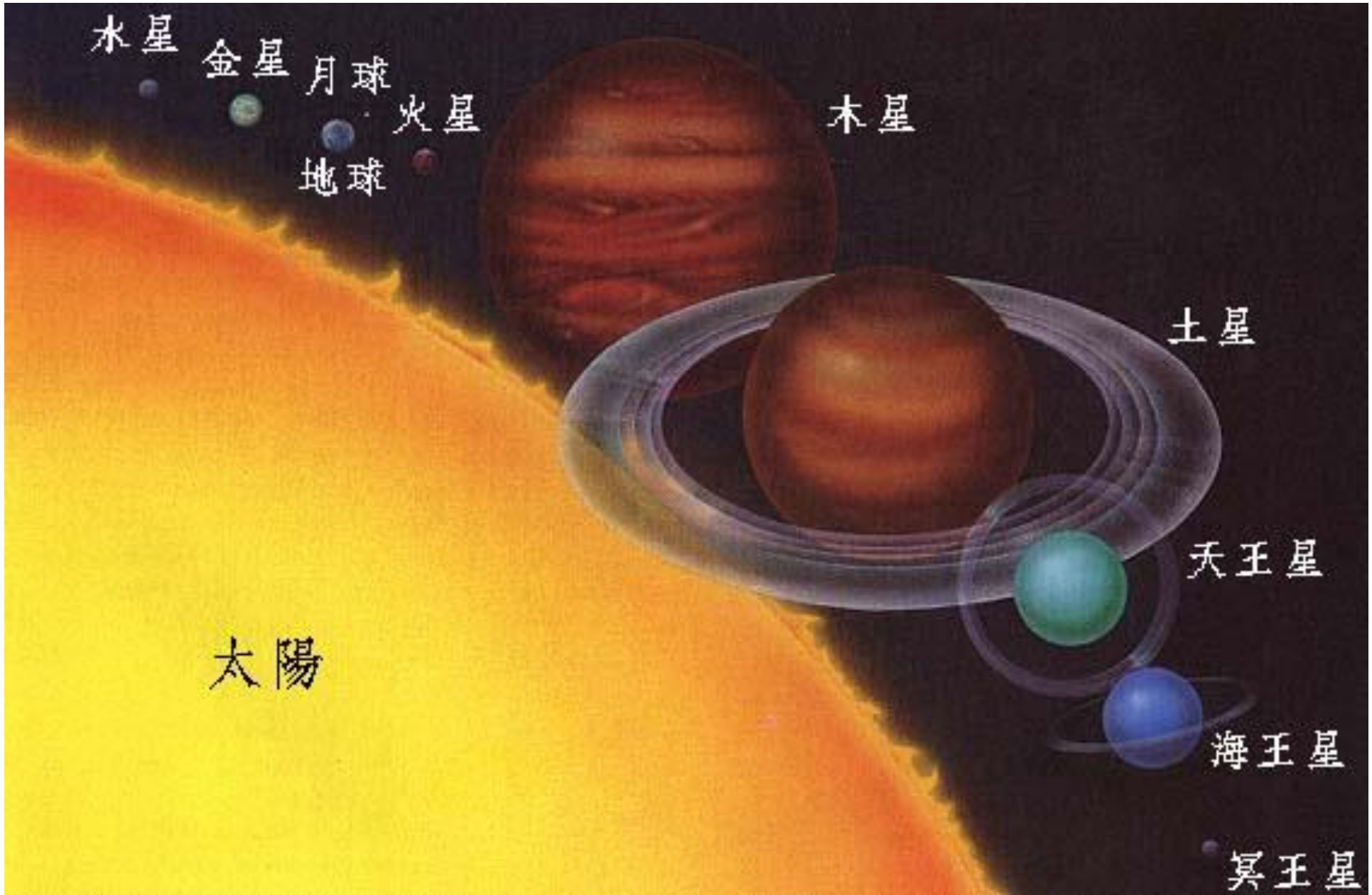
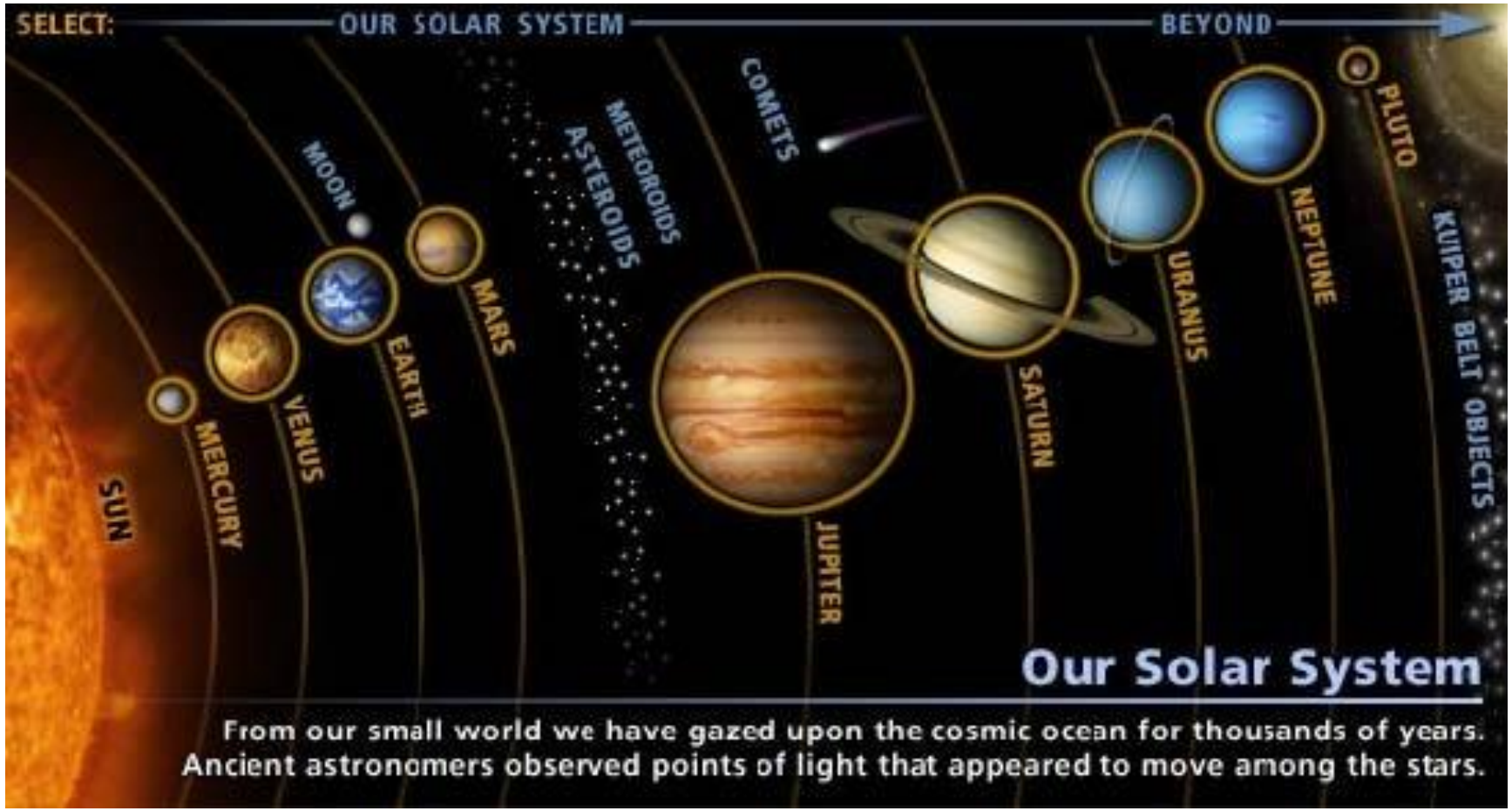
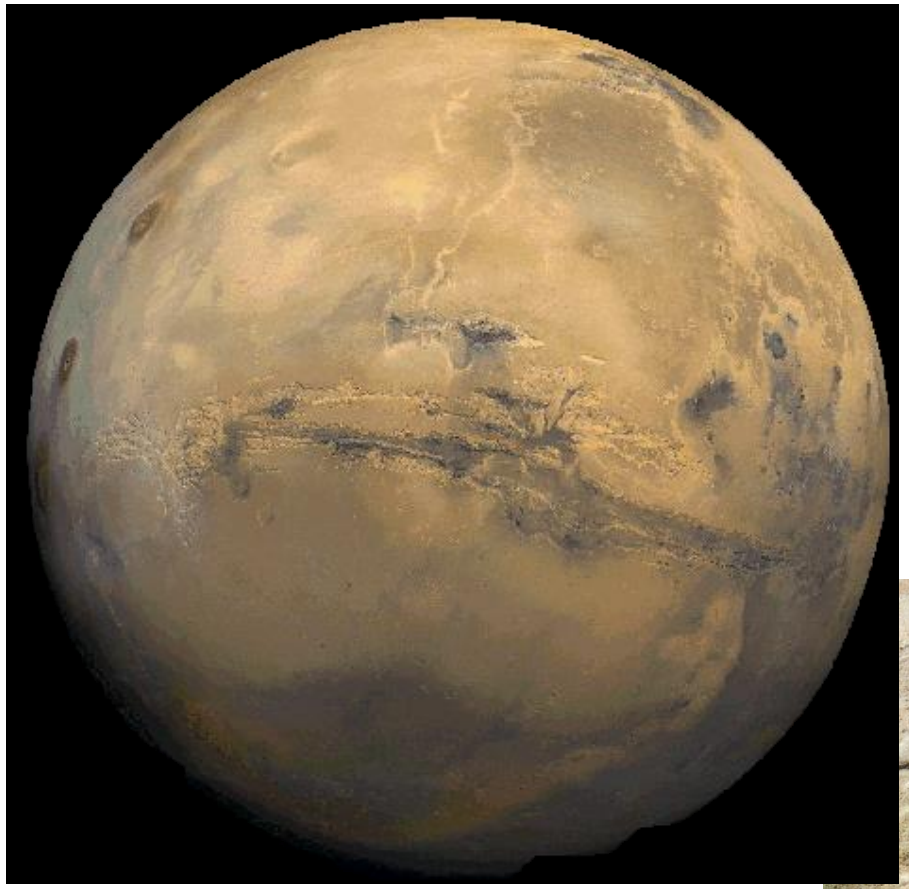
Interplanetary Space

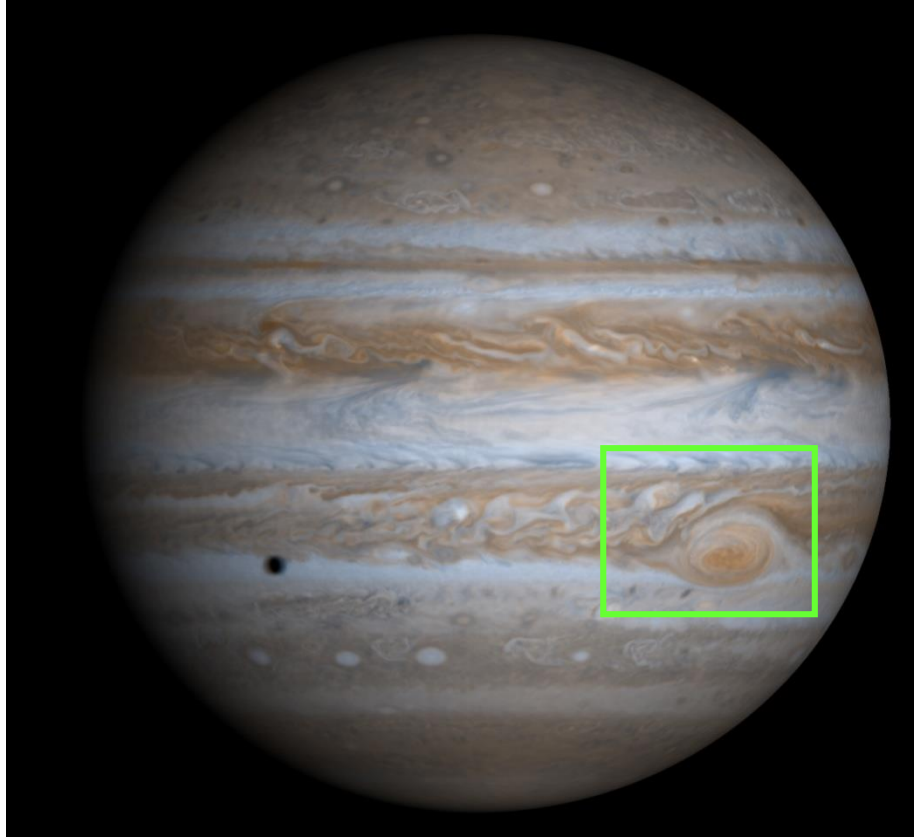
行星際太空

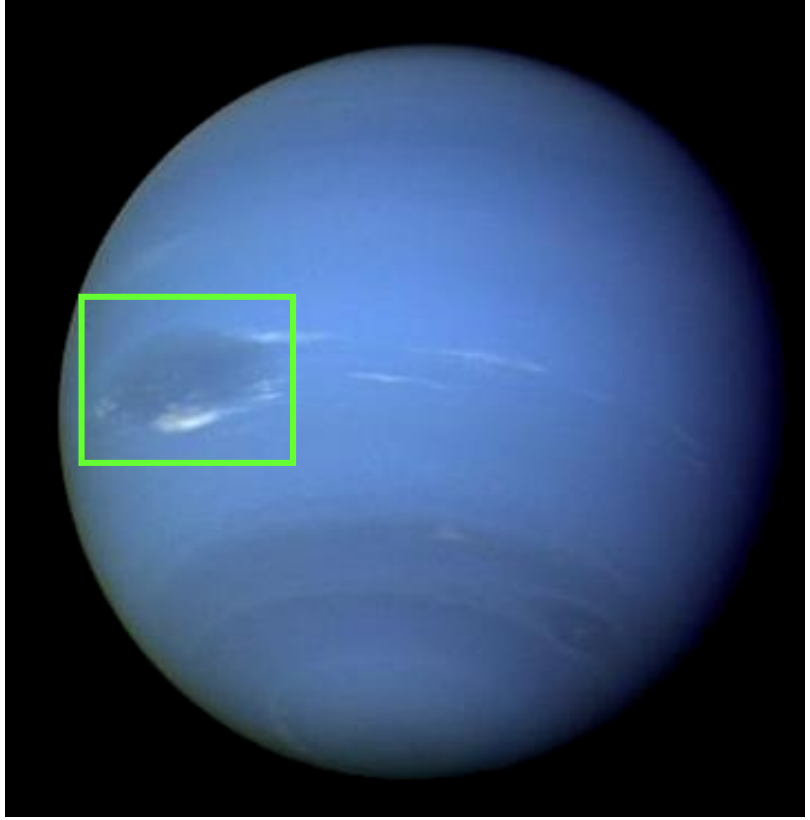


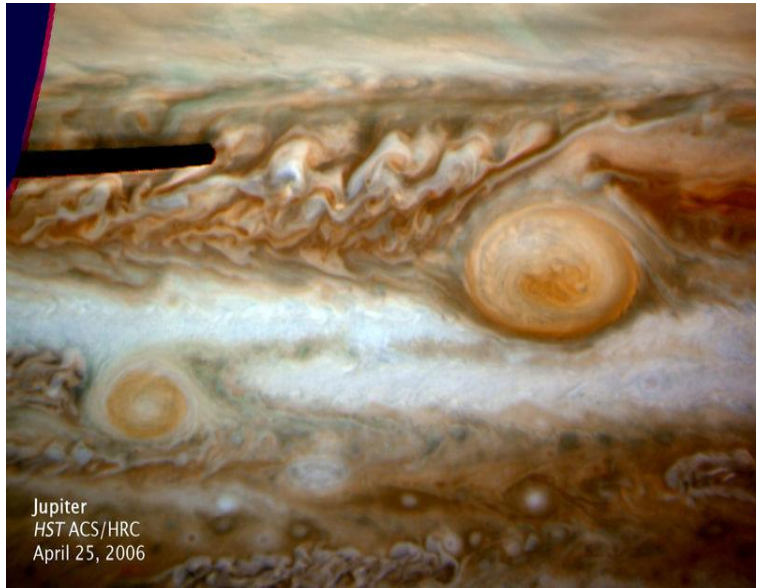

SELECT:
OUR SOLAR SYSTEM
BEYOND
SUN
MERCURY
VENUS
EARTH
MOON
MARS
METEOROIDS
ASTEROIDS
COMETS
JUPITER
SATURN
URANUS
NEPTUNE
PLUTO
KUIPER BELT OBJECTS
Our Solar System
From our small world we have gazed upon the cosmic ocean for thousands of years.
Ancient astronomers observed points of light that appeared to move among the stars.

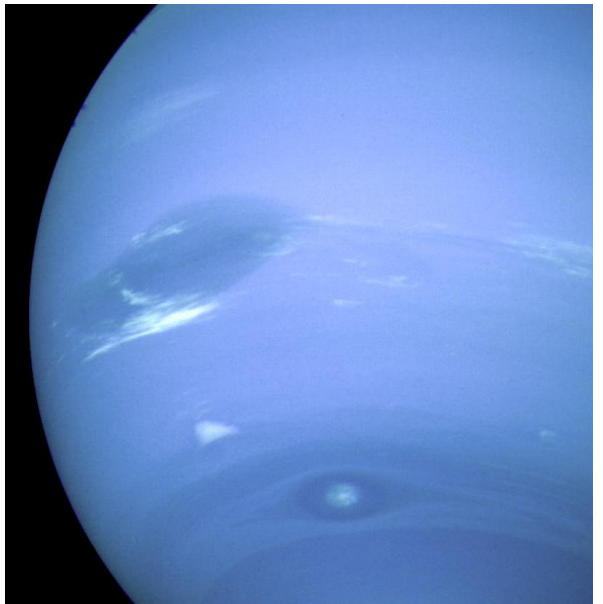
	表面溫度	自轉週期	公轉週期	衛星數	密度	重量	體積
水星	-170~430	58.65	88.97日	0	5.43	0.055	0.056
金星	420~485	243	245日	0	5.24	0.815	0.857
地球	-60~50	0.9973	365.26日	1	5.52	1	1
火星	-100~15	1.0260	686.98日	2	3.93	0.107	0.151
木星	-150	0.414	11.86年	61	1.33	317.83	1316
土星	-175	0.444	29.46年	31	0.69	95.16	745
天王星	-180	0.718	84.02年	25	1.27	14.54	65.2
海王星	-200	0.671	164.77年	13	1.64	17.15	56
冥王星	-215	6.38	247.8年	1	2.13	0.0022	0.006

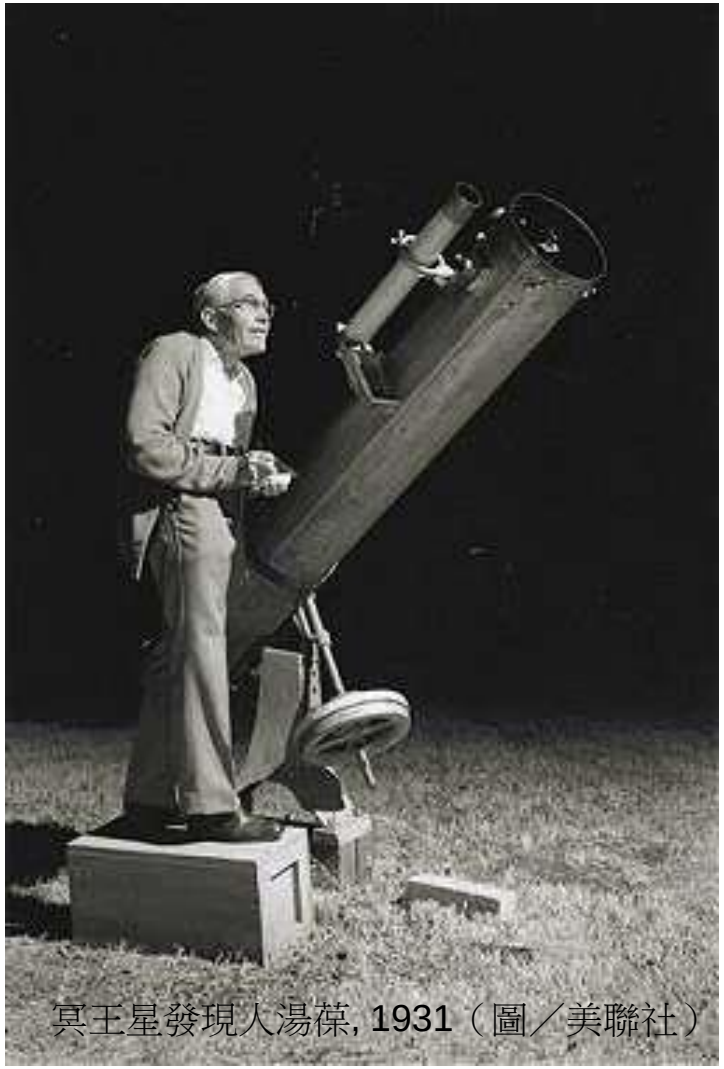




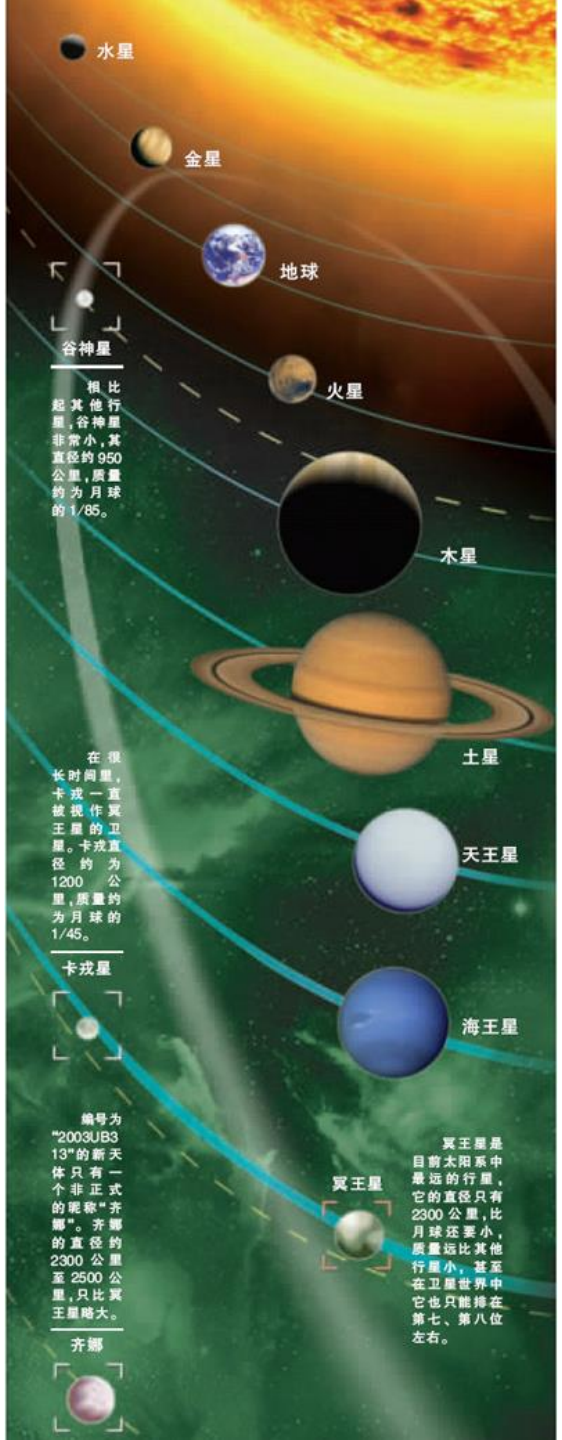



Jupiter
HST ACS/HRC
April 25, 2006

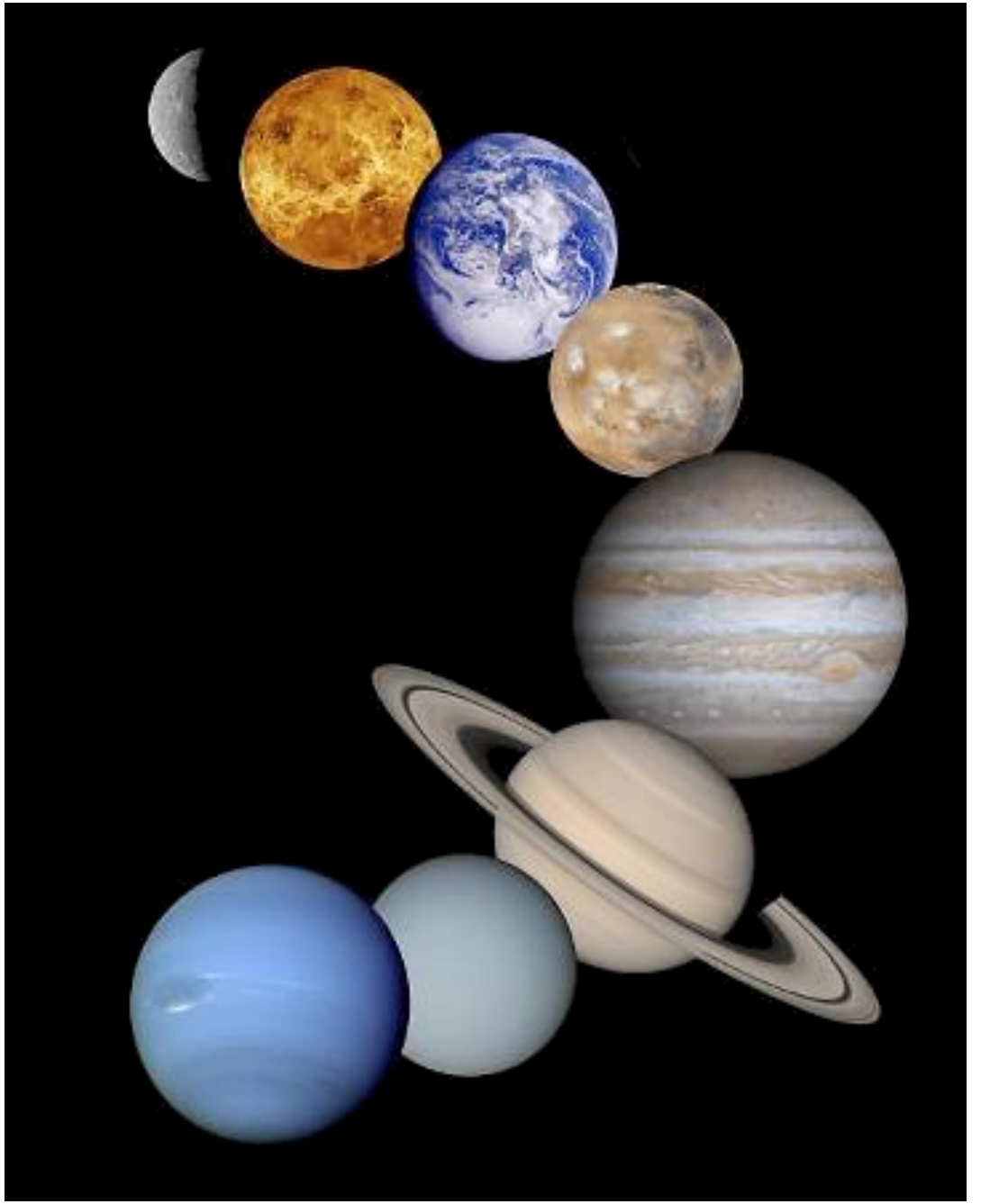




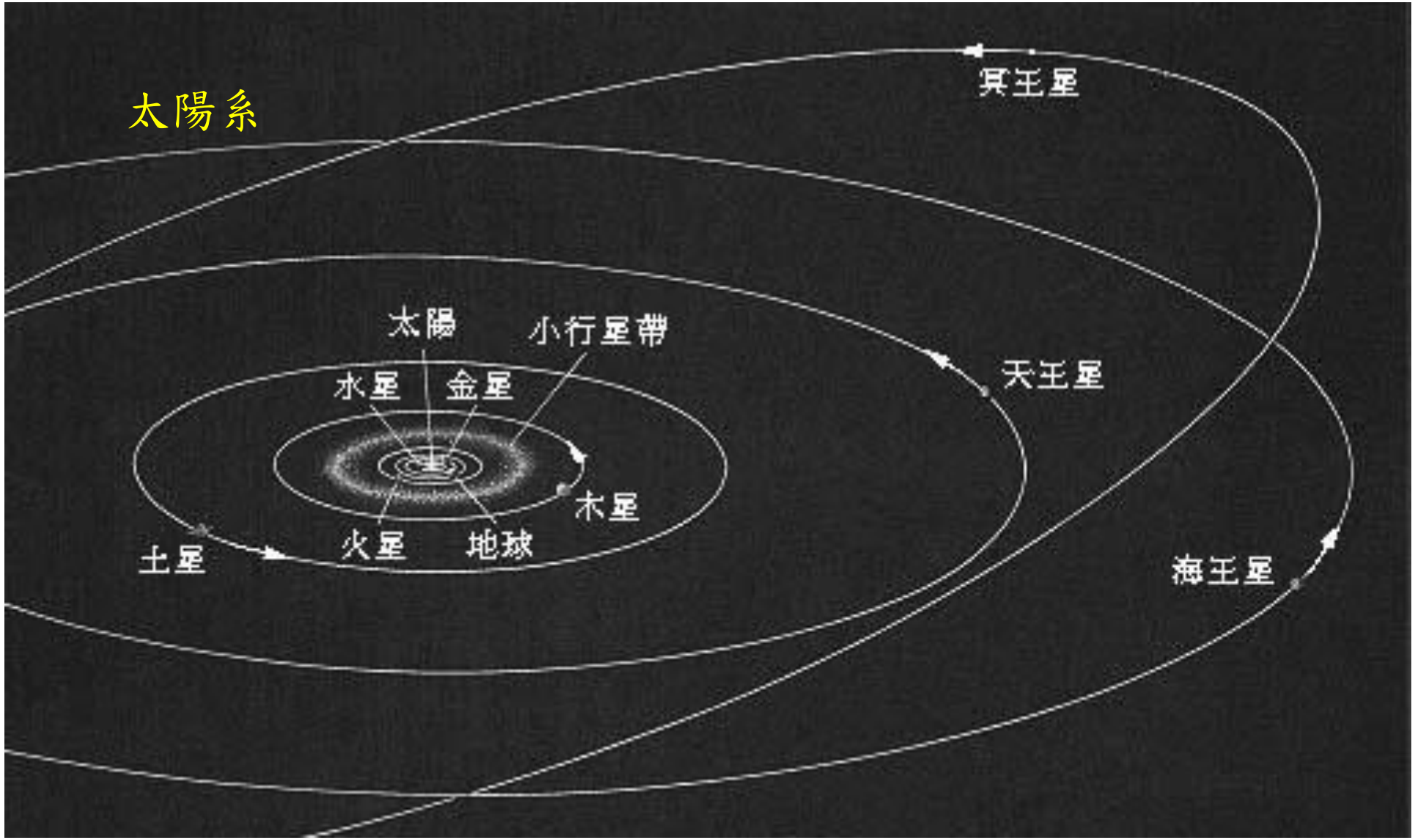
冥王星發現人湯葆, 1931（圖／美聯社）




行星大家
圈牛奶

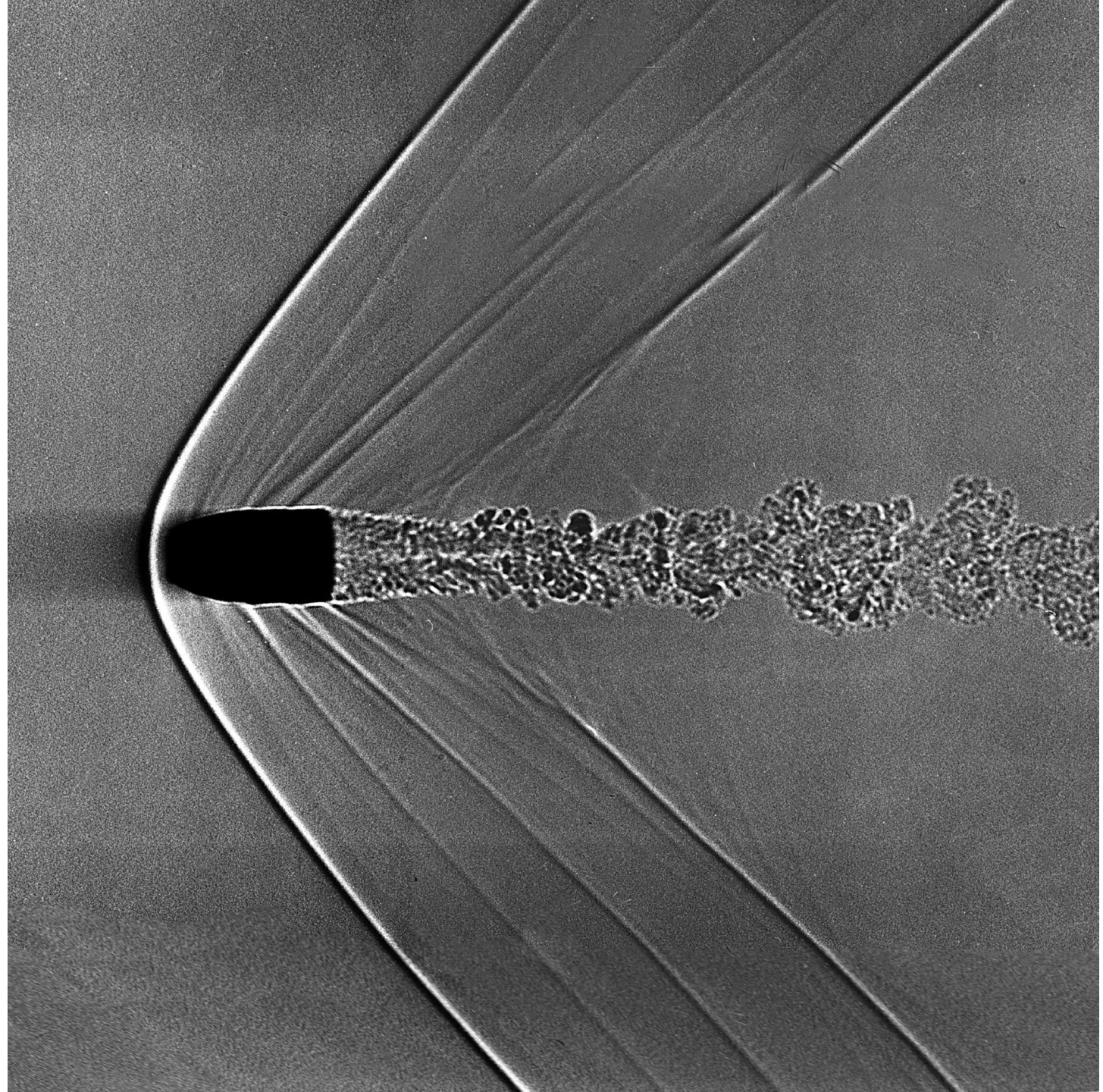


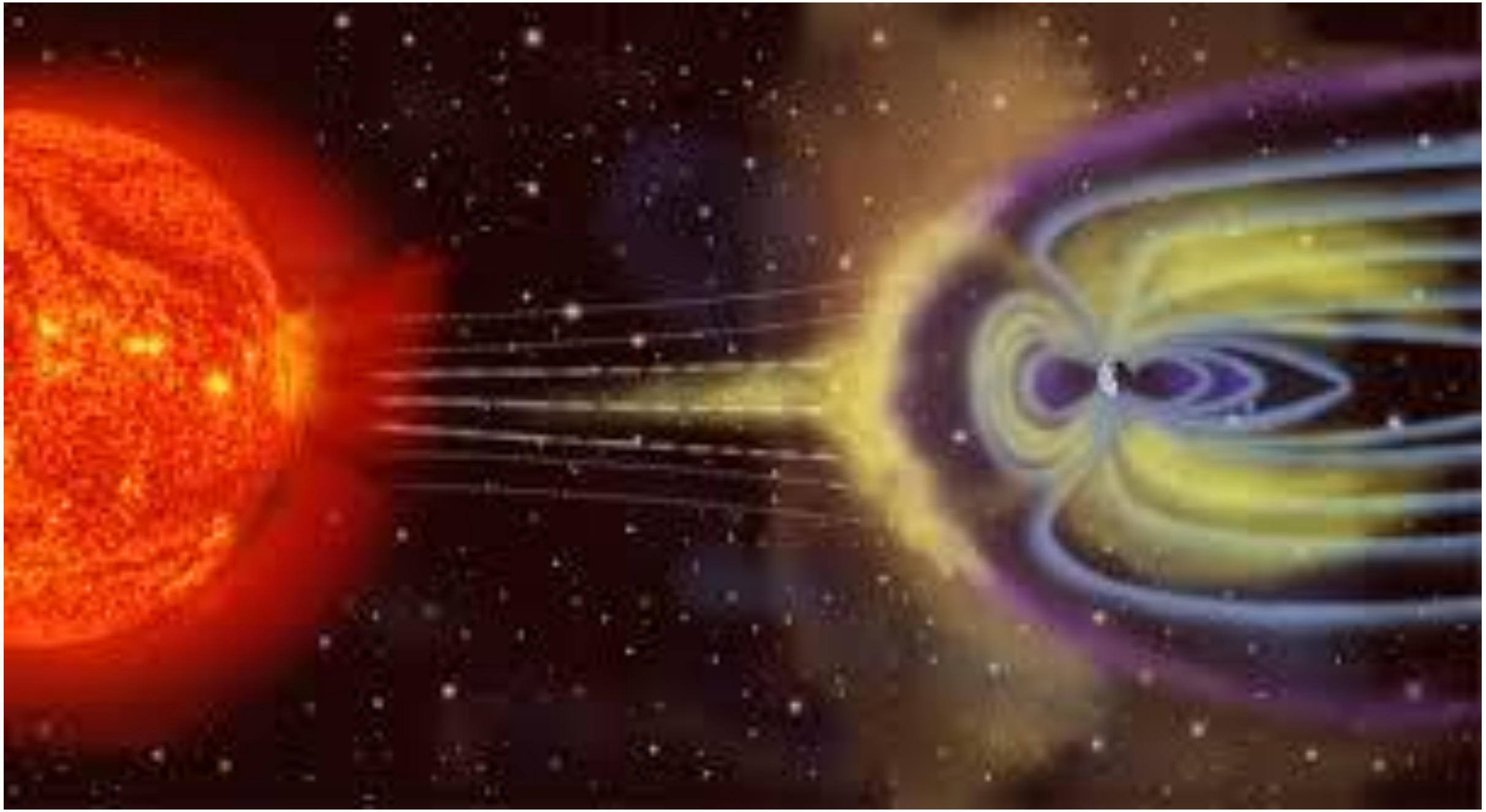
八大行星分別為水星、金星、地球、火星、木星、土星、天王星、海王星。

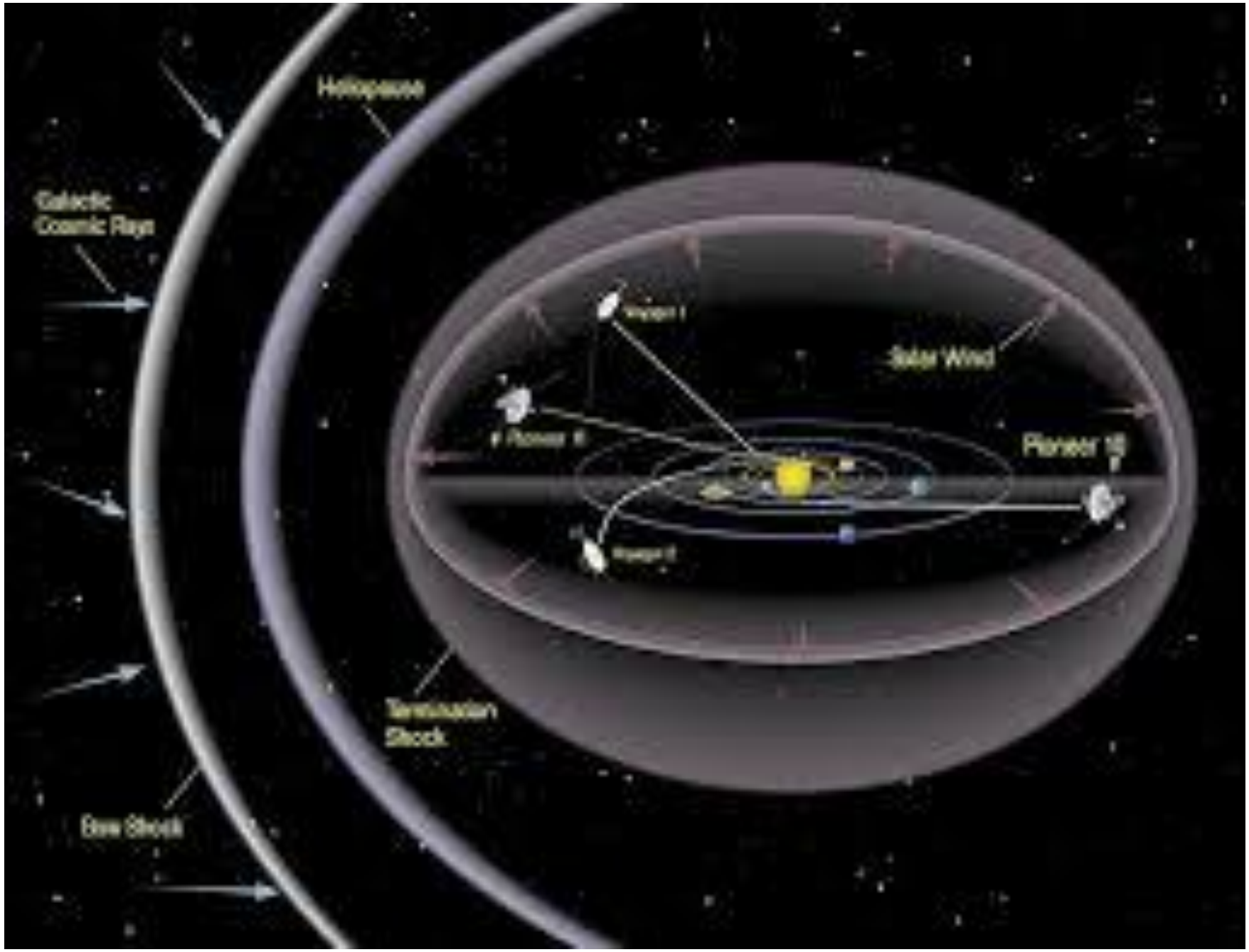


		大氣層	
		○	×
磁層	○	地球 木星 海王星	水星 天王星 土星
	×	金星 火星	

Shock

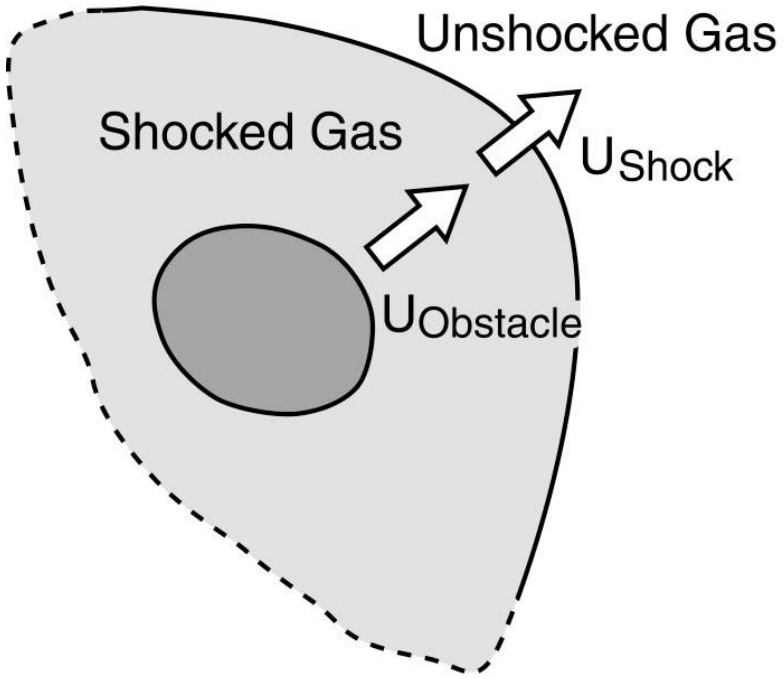




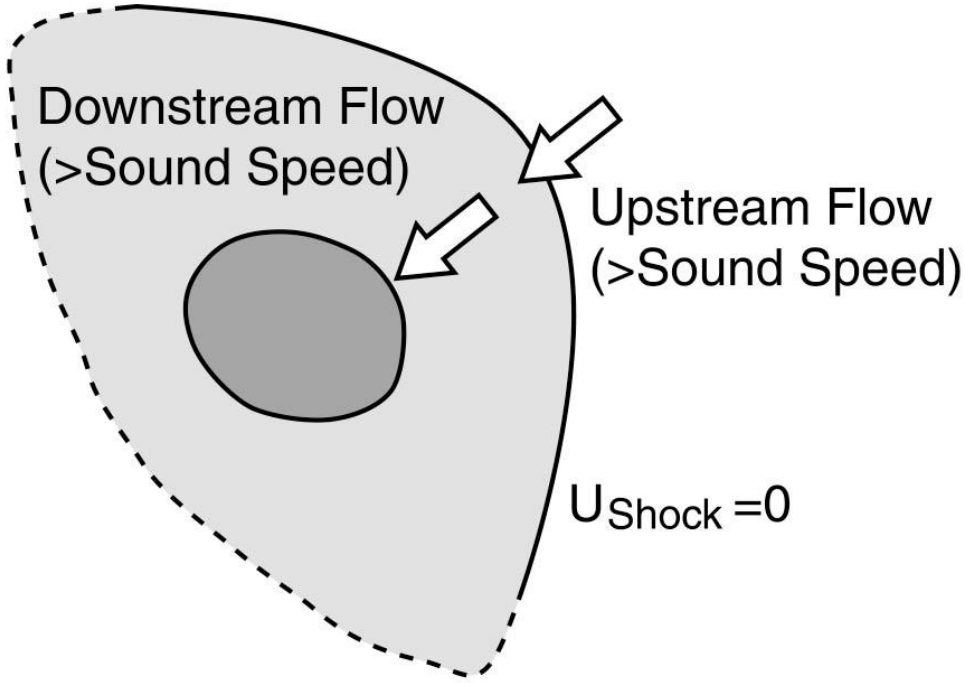

Heliopause
Galactic
Cosmic Rays
Solar Wind
Pioneer 10
Termination
Shock
Bow Shock

• A shock is a discontinuity separating two different regimes in a continuous media.
– Shocks form when velocities exceed the signal speed in the medium.
– A shock front separates the Mach cone of a supersonic jet from the undisturbed air.
• Characteristics of a shock :
– The disturbance propagates faster than the signal speed. In gas the signal speed is the speed of sound, in space plasmas the signal speeds are the MHD wave speeds.
– At the shock front the properties of the medium change abruptly. In a hydrodynamic shock, the pressure and density increase while in a MHD shock the plasma density and magnetic field strength increase.
– Behind a shock front a transition back to the undisturbed medium must occur. Behind a gas-dynamic shock, density and pressure decrease, behind a MHD shock the plasma density and magnetic field strength decrease. If the decrease is fast a reverse shock occurs.
• A shock can be thought of as a non-linear wave propagating faster than the signal speed.
– Information can be transferred by a propagating disturbance.
– Shocks can be from a blast wave - waves generated in the corona.
– Shocks can be driven by an object moving faster than the speed of sound.

- Shocks can form when an obstacle moves with respect to the unshocked gas.
- Shocks can form when a gas encounters an obstacle.



Moving Obstacle



Stationary Shock

- The Shock's Rest Frame
  - In a frame moving with the shock the gas with the larger speed is on the left and gas with a smaller speed is on the right.
  - At the shock front irreversible processes lead to compression of the gas and a change in speed.
  - The low-entropy upstream side has high velocity.
  - The high-entropy downstream side has smaller velocity.
- Collisionless Shock Waves
  - In a gas-dynamic shock collisions provide the required dissipation.
  - In space plasmas the shocks are collision free.

- ❑ Microscopic Kinetic effects provide the dissipation.
- ❑ The magnetic field acts as a coupling device.
- ❑ MHD can be used to show how the bulk parameters change across the shock.