Solar System Debris

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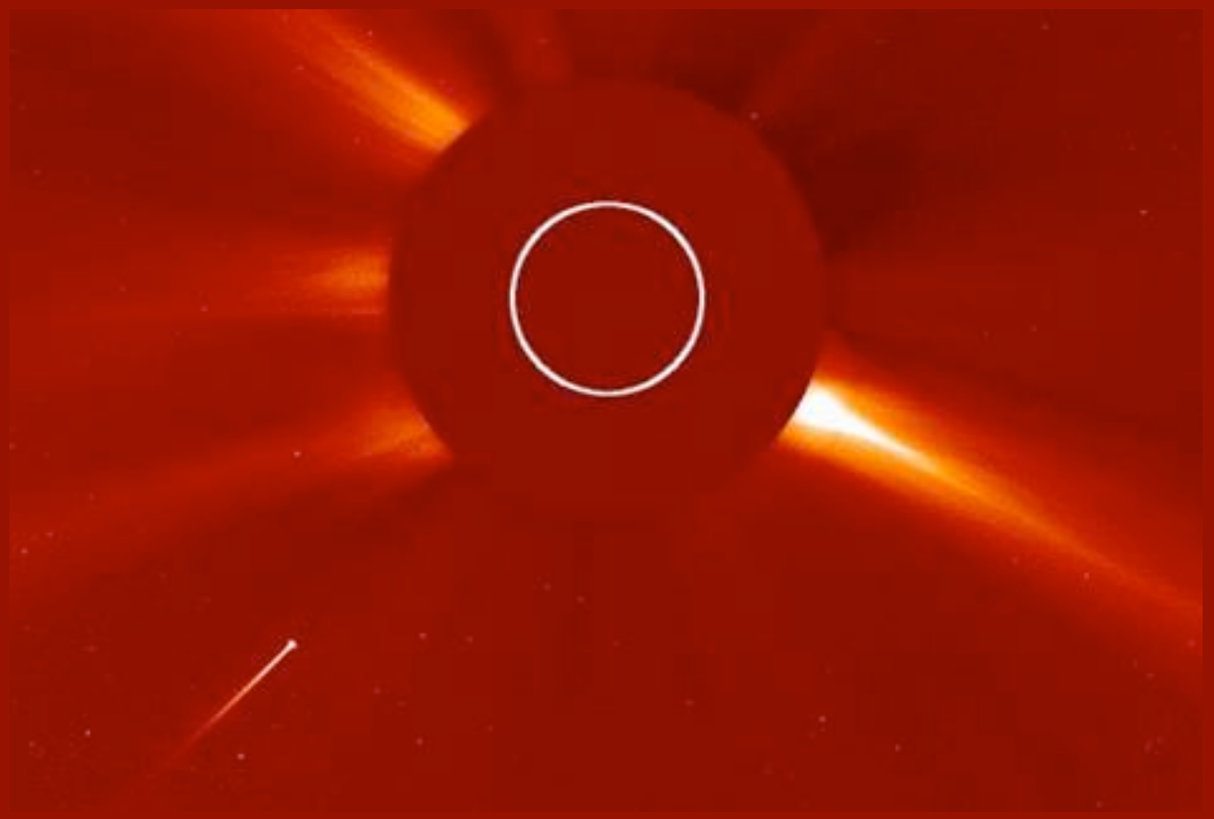
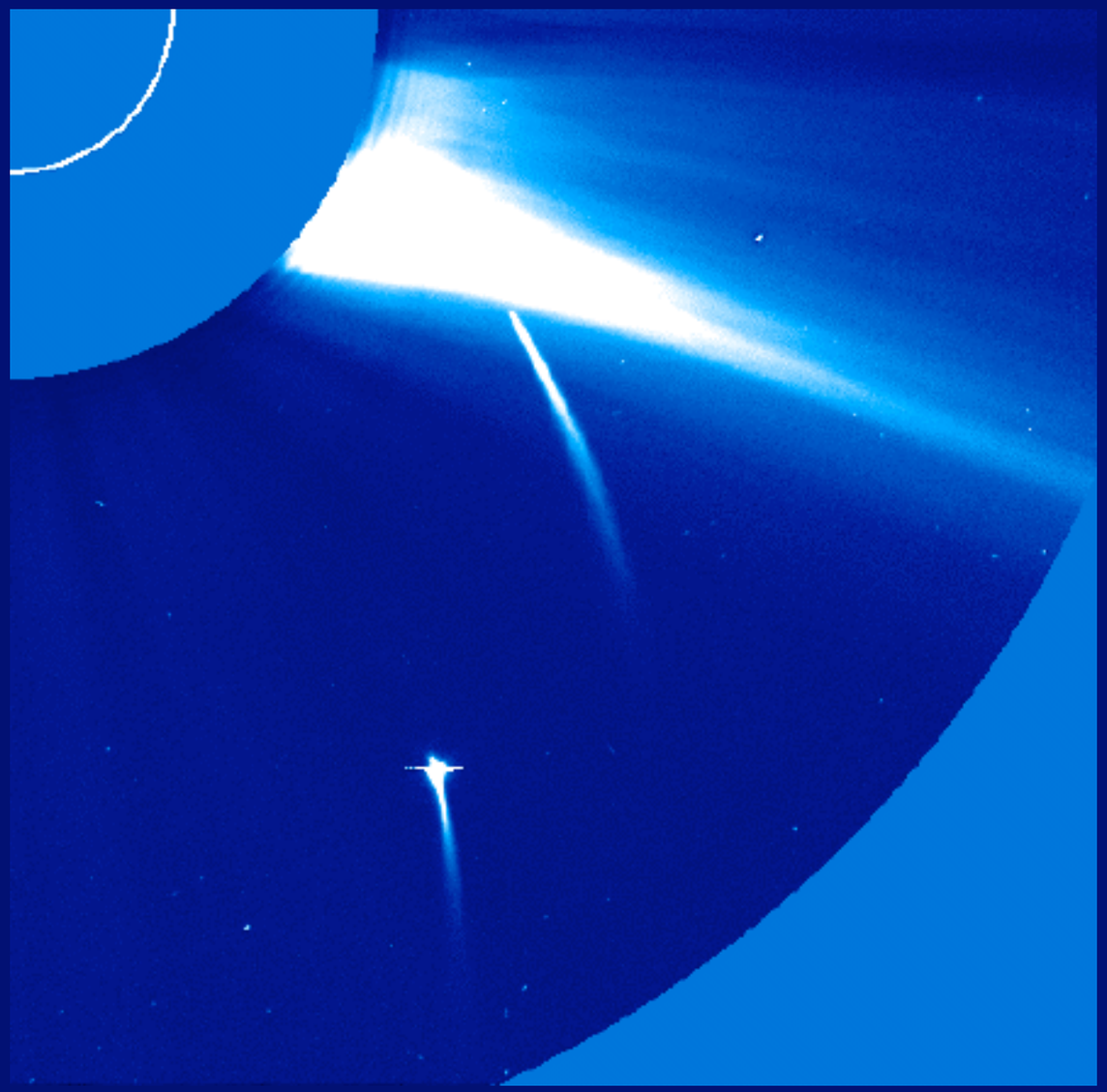
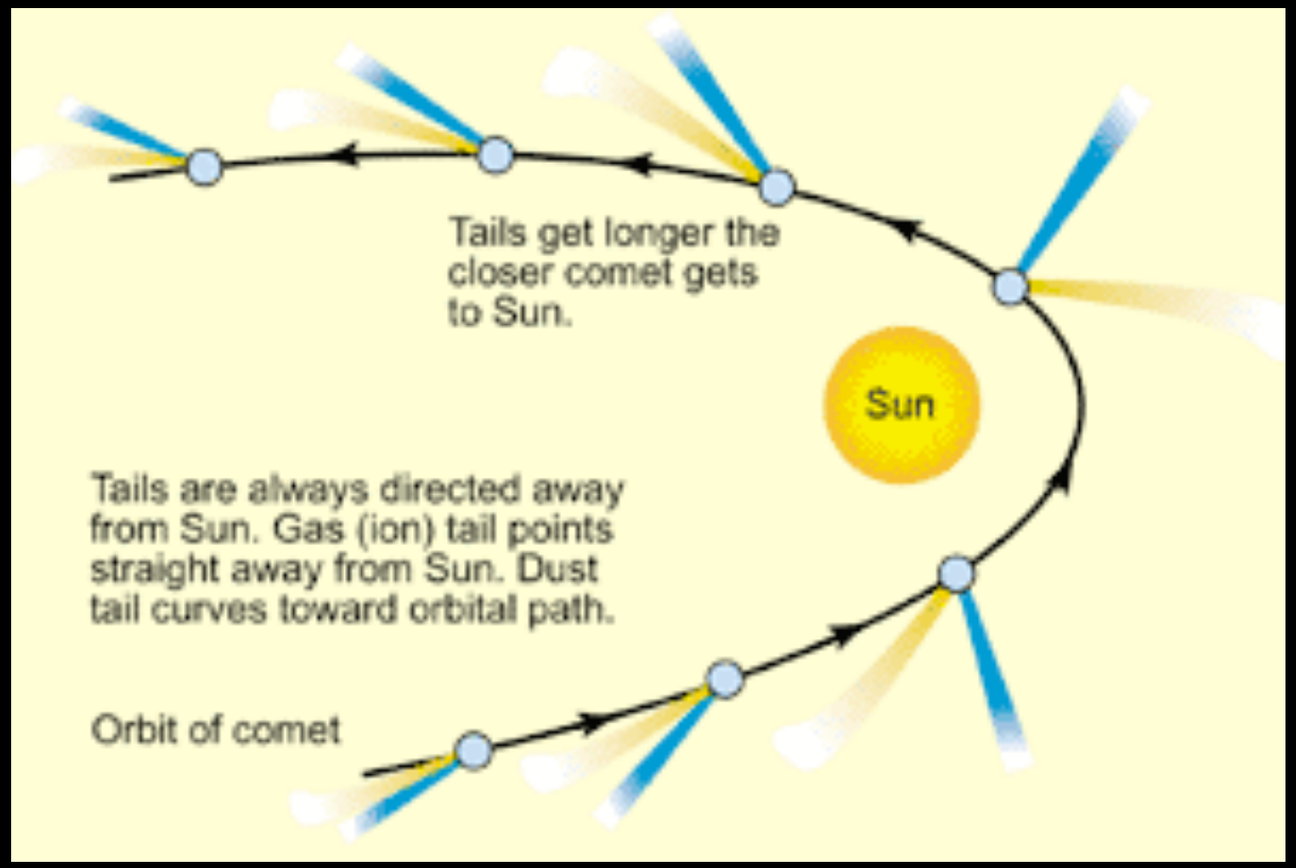
Meteors are pieces of rock & ice, coming from asteroids & comets, which fall into the Earth's atmosphere (so-called ``shooting stars"). A few large ones strike planetary surfaces & produce *impact craters*.

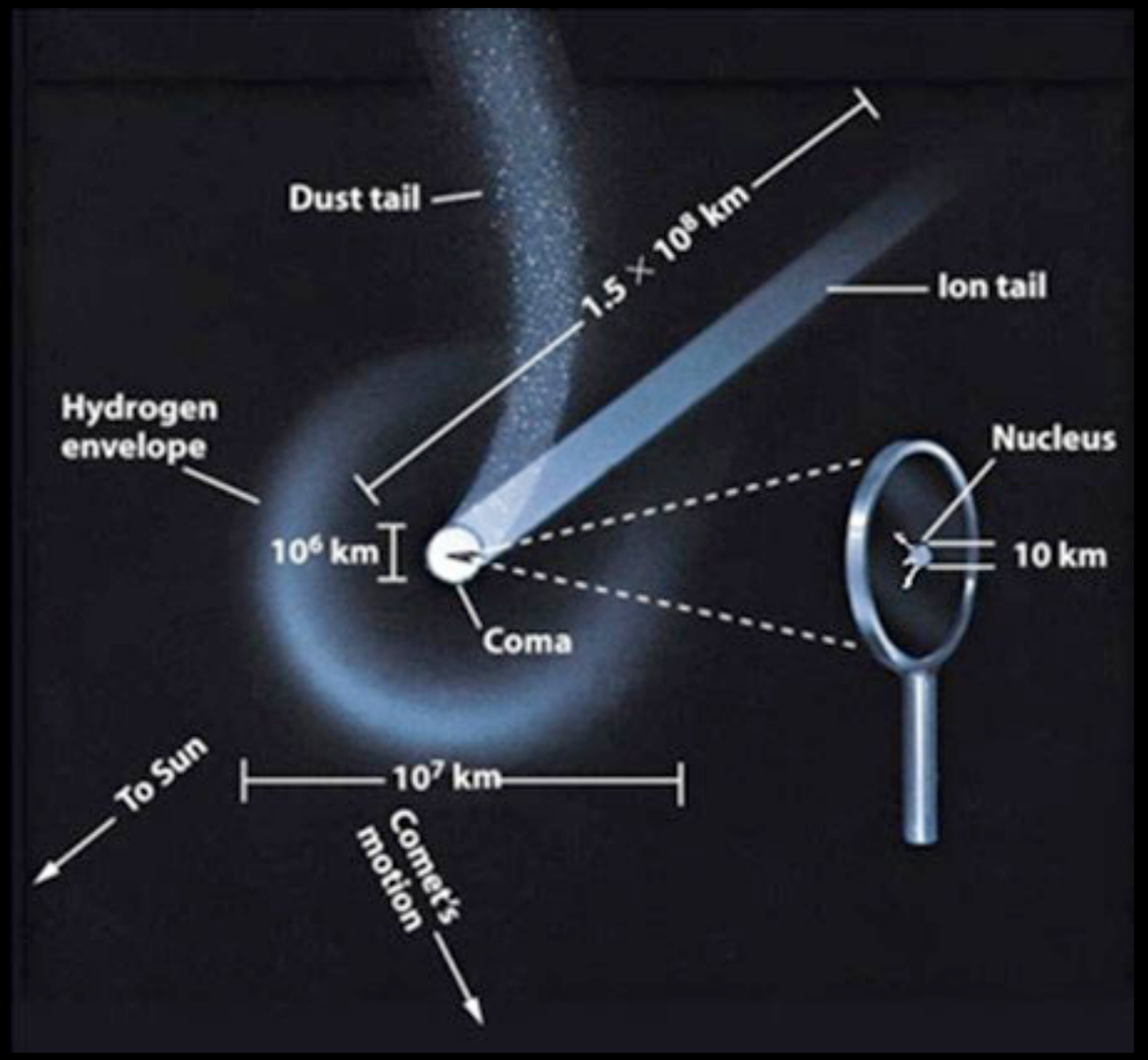
Comets


Rick Scott
Joe Orman

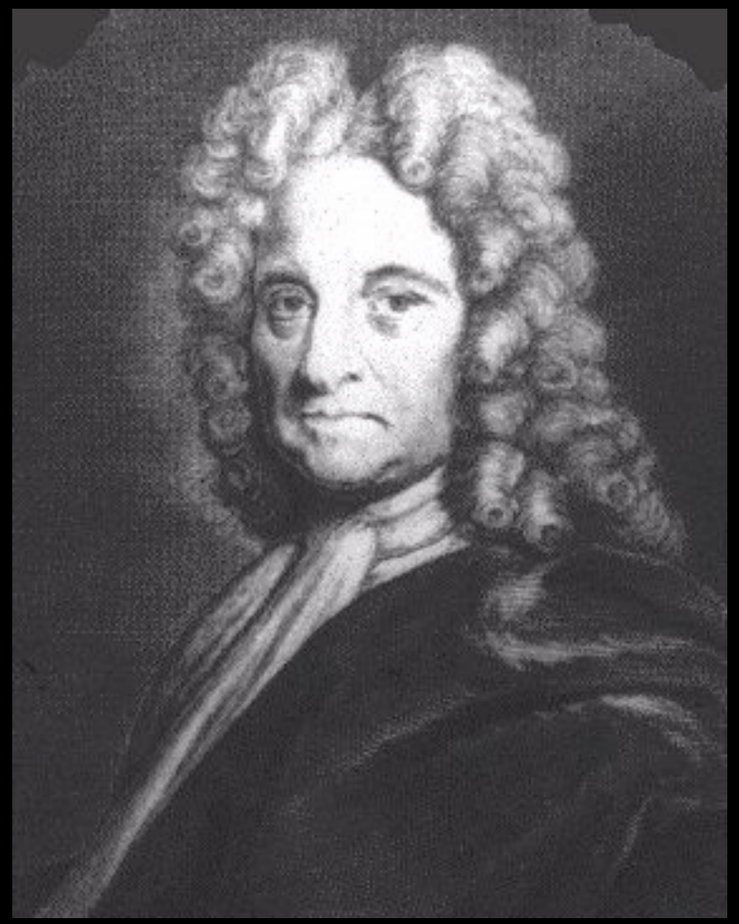


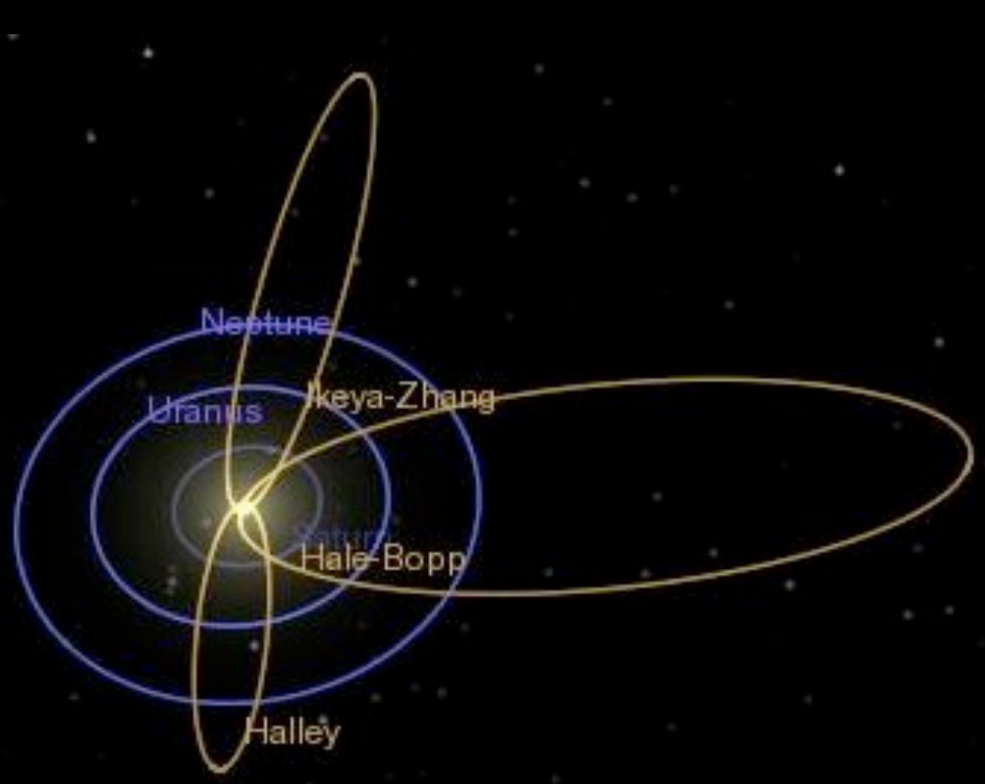


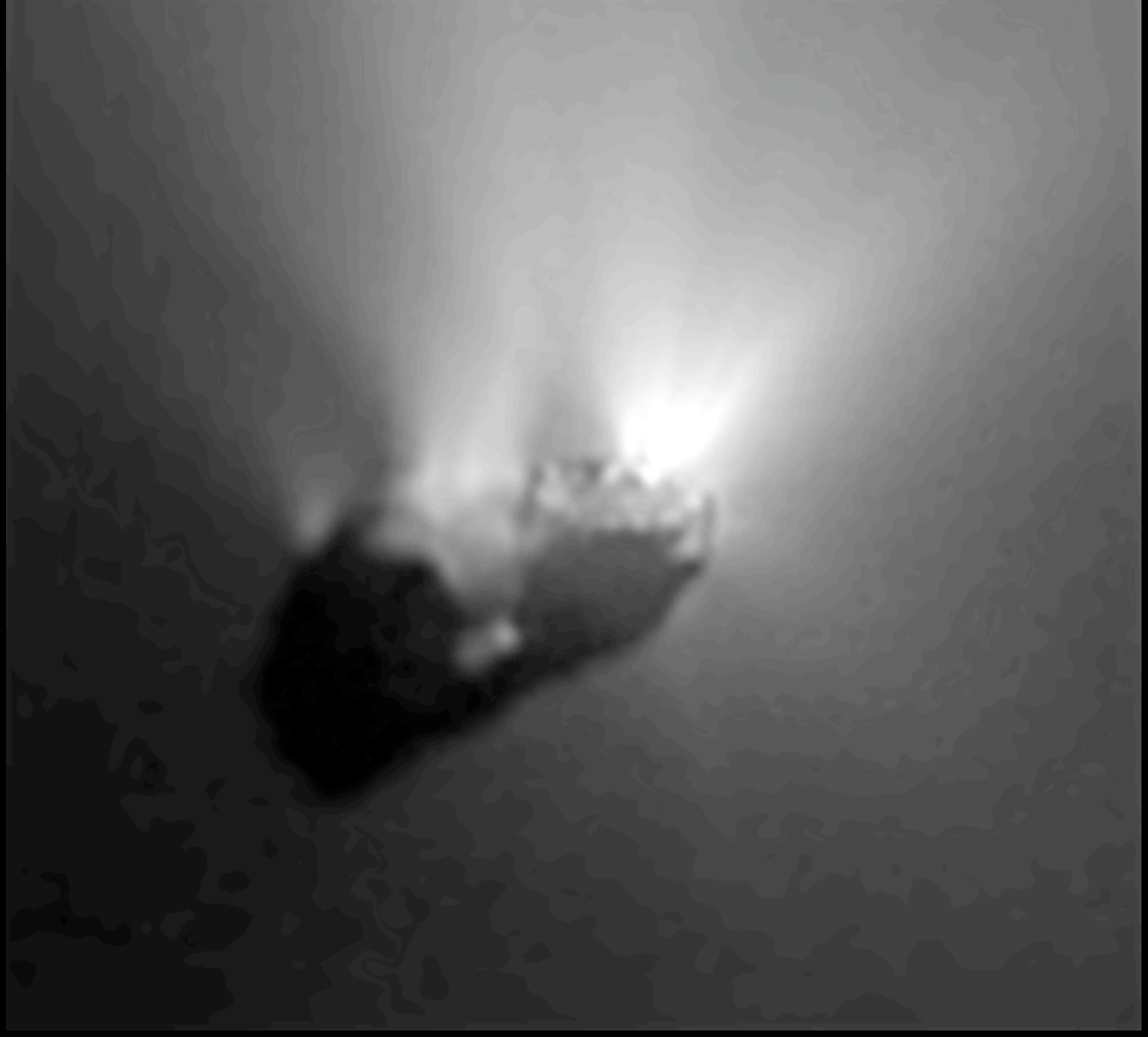

Tails get longer the closer comet gets to Sun.
Sun
Tails are always directed away from Sun. Gas (ion) tail points straight away from Sun. Dust tail curves toward orbital path.
Orbit of comet


Dust tail
1.5 × 10⁸ km
Ion tail
Hydrogen envelope
Nucleus
10 km
10⁶ km
Coma
10⁷ km
To Sun
Comet's motion

Comet Halley is one of the most famous comets

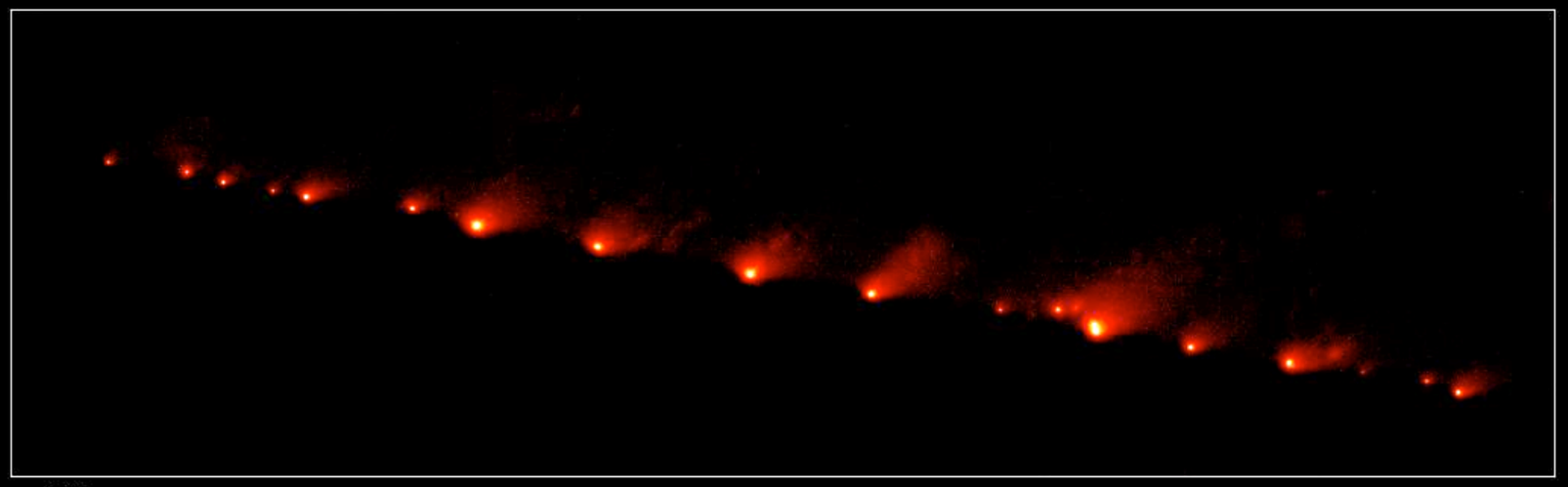






Shoemaker-Levy 9 Collision with Jupiter July 16-22, 1994

Comet P/Shoemaker-Levy 9 (1993e) • May 1994

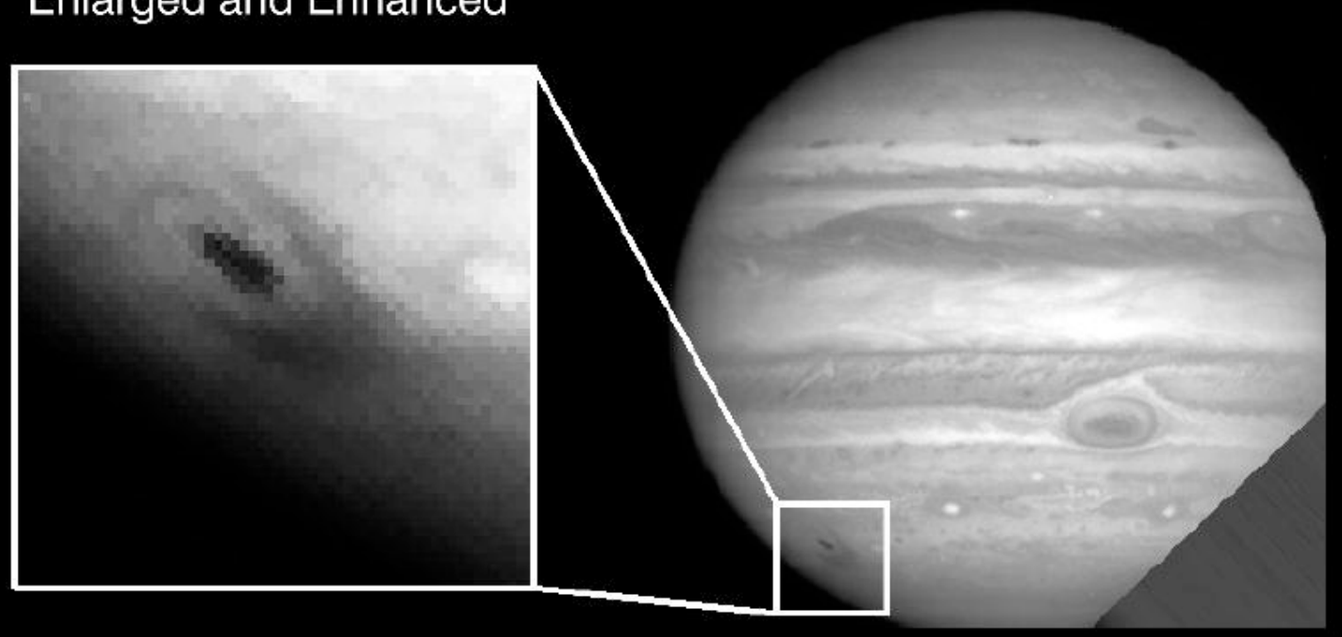


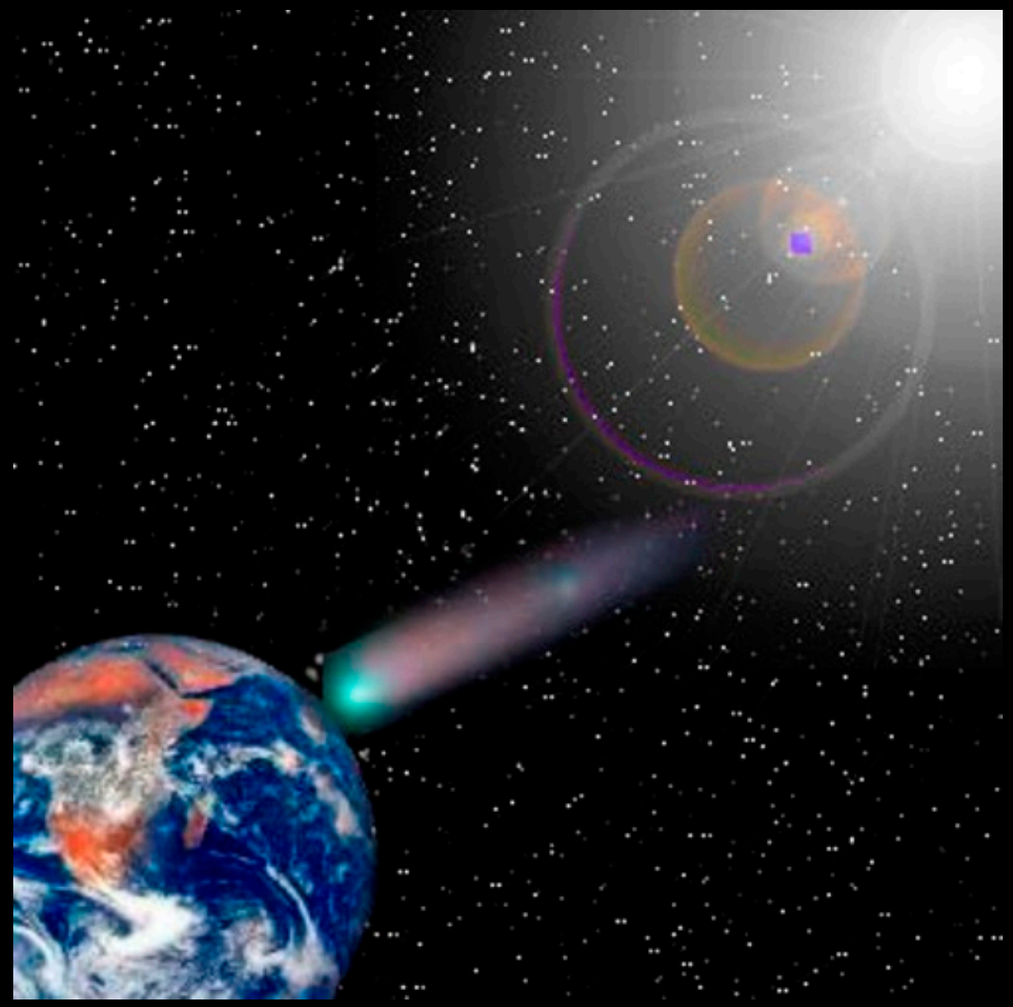
Hubble Space Telescope • Wide Field Planetary Camera 2

SPACE TELESCOPE SCIENCE INSTITUTE

Jupiter July 16, 1994

After
Impact site
Enlarged and Enhanced



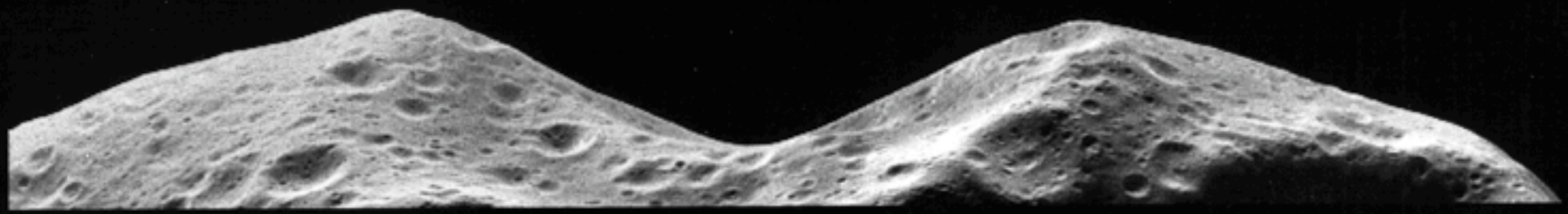


Asteroids

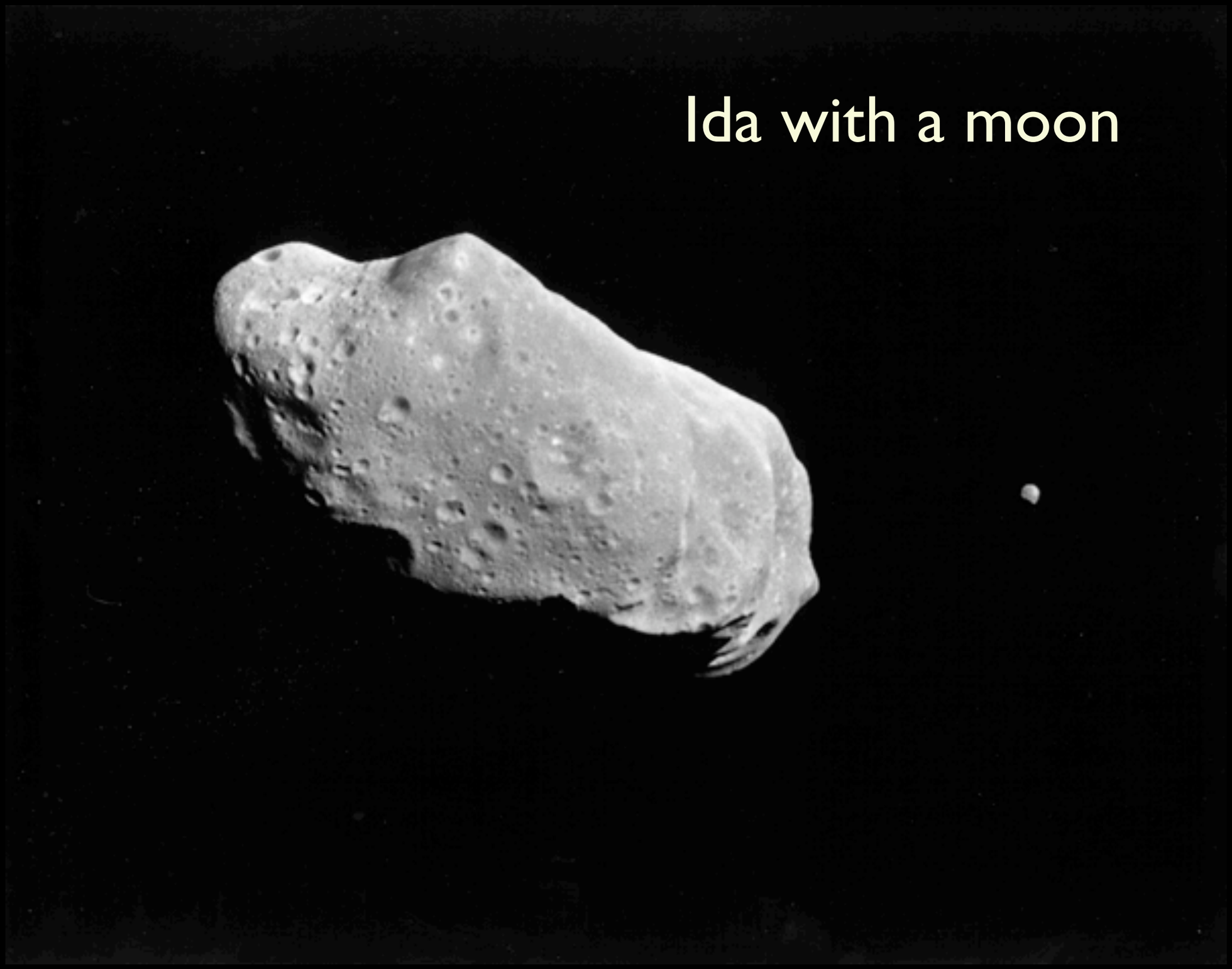
Asteroid Gaspra

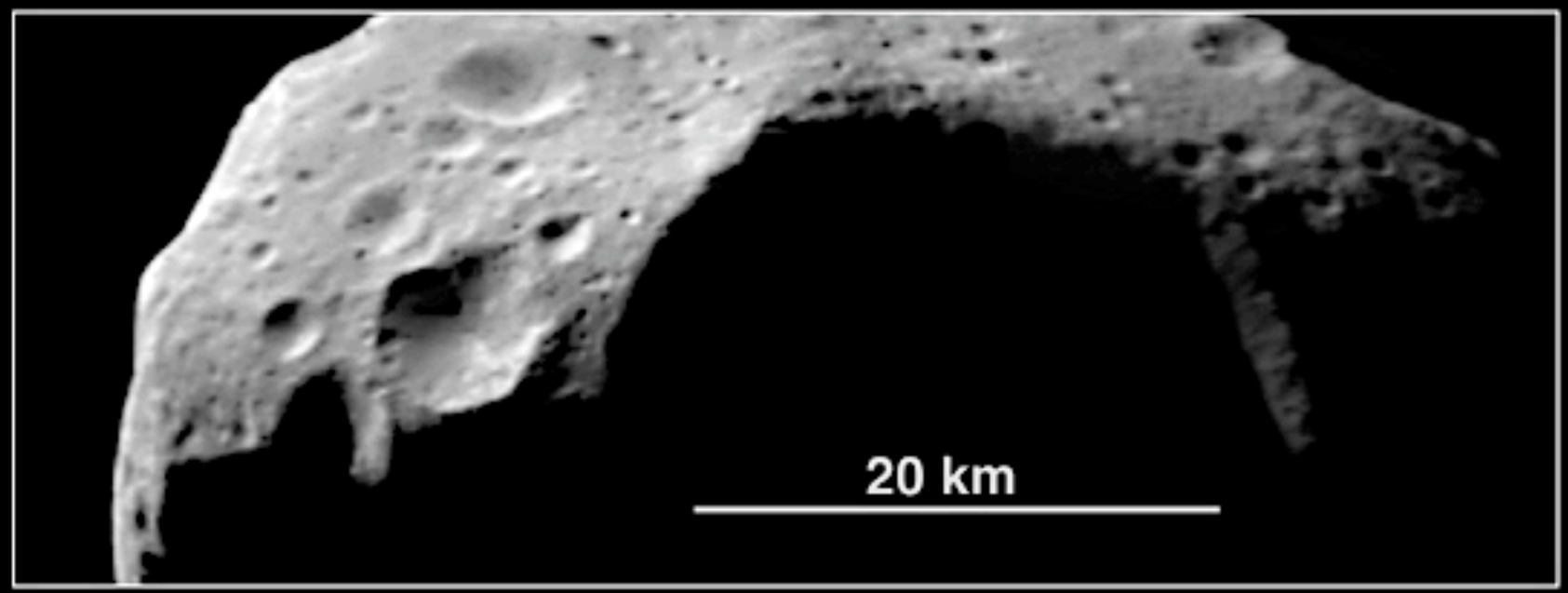
Gaspra and two moons of Mars

Ida



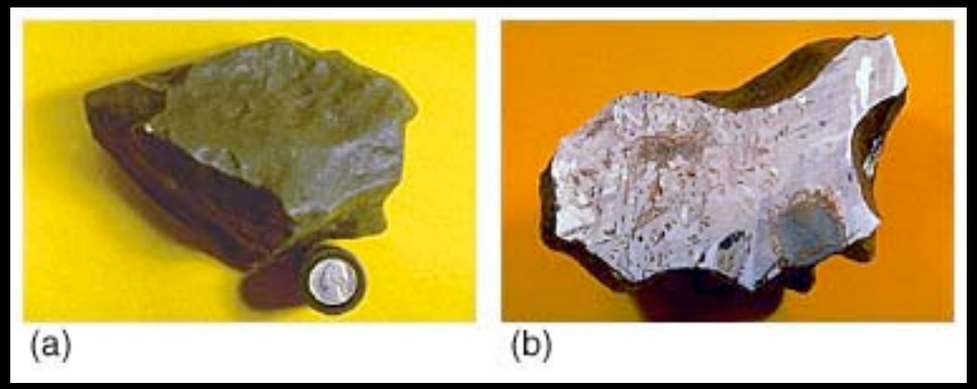
Ida with a moon

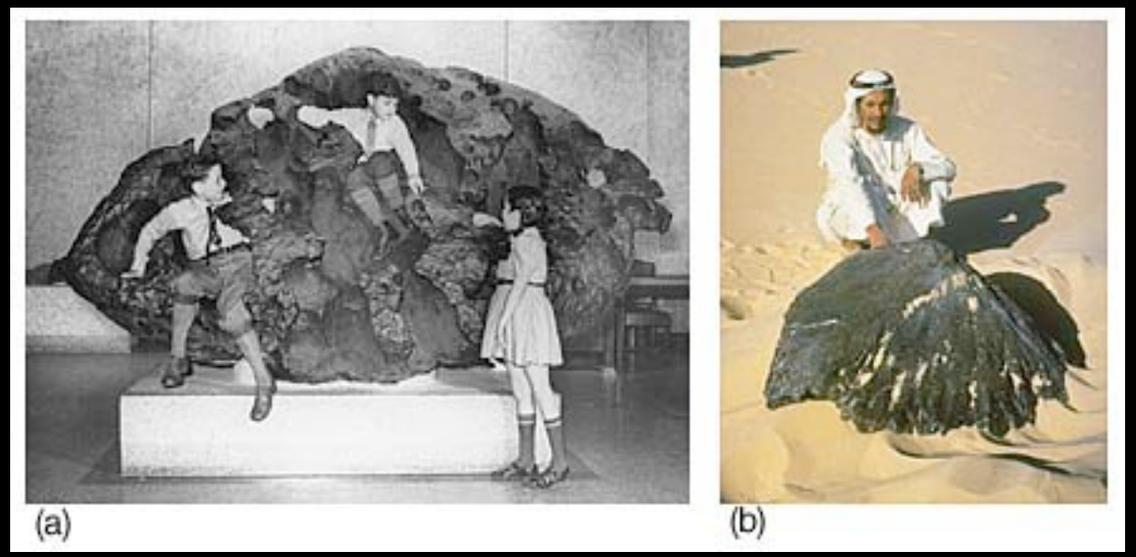




Mathilde

Meteorites found on Earth





Tunguska:
a mysterious explosion in Siberia in the beginning of 20th century

The Tunguska Event, sometimes referred to as the Tunguska explosion, was a massive explosion that occurred near the Podkamennaya (Under Rock) Tunguska River in what is now Krasnoyarsk Krai of Russia, between 7:00 and 8:00 AM on June 30, 1908.

The explosion was most likely caused by the airburst of a large (around 20 m (66 ft) across) meteoroid or comet fragment at an altitude of 5 to 10 kilometers (3-6 mi) above the Earth's surface.

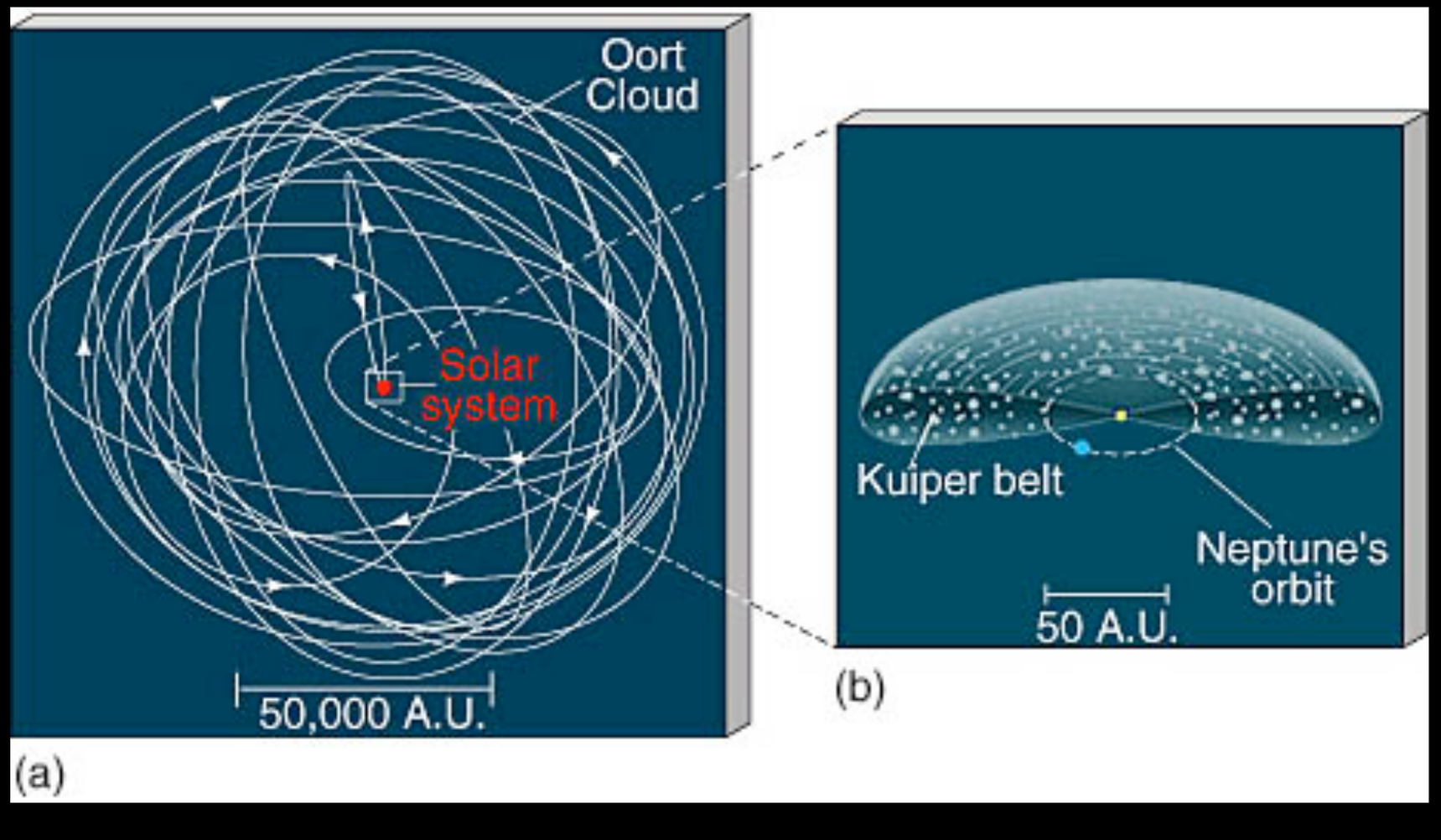
Orbit of Binary
Kuiper Belt Object
1998 WW31

Pluto's
orbit

Kuiper Belt and outer
Solar System planetary orbits

The Oort Cloud
(comprising many
billions of comets)

Oort Cloud cutaway drawing adapted from Donald K. Yeoman's illustraton (NASA, JPL)



Solar System Debris

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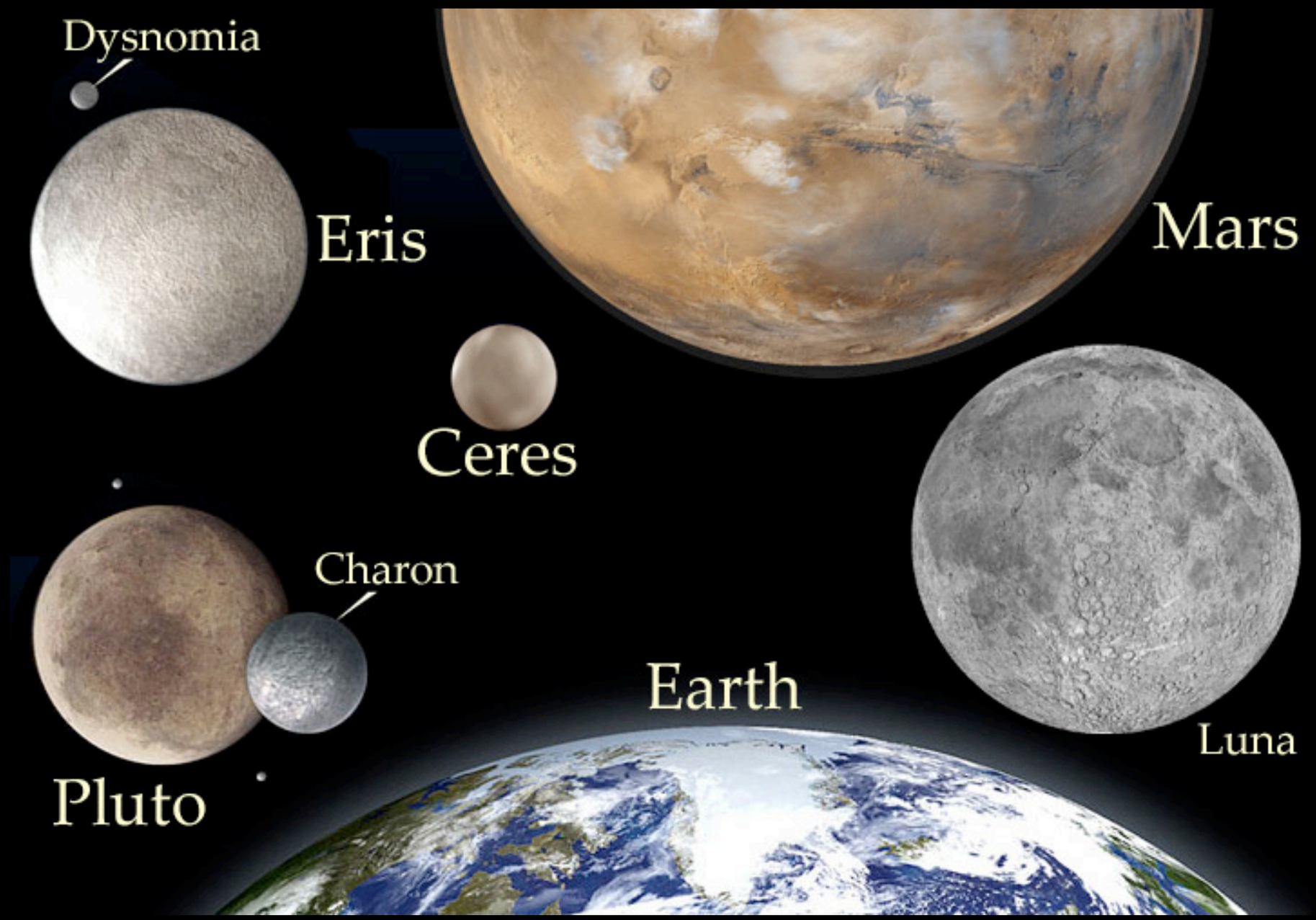
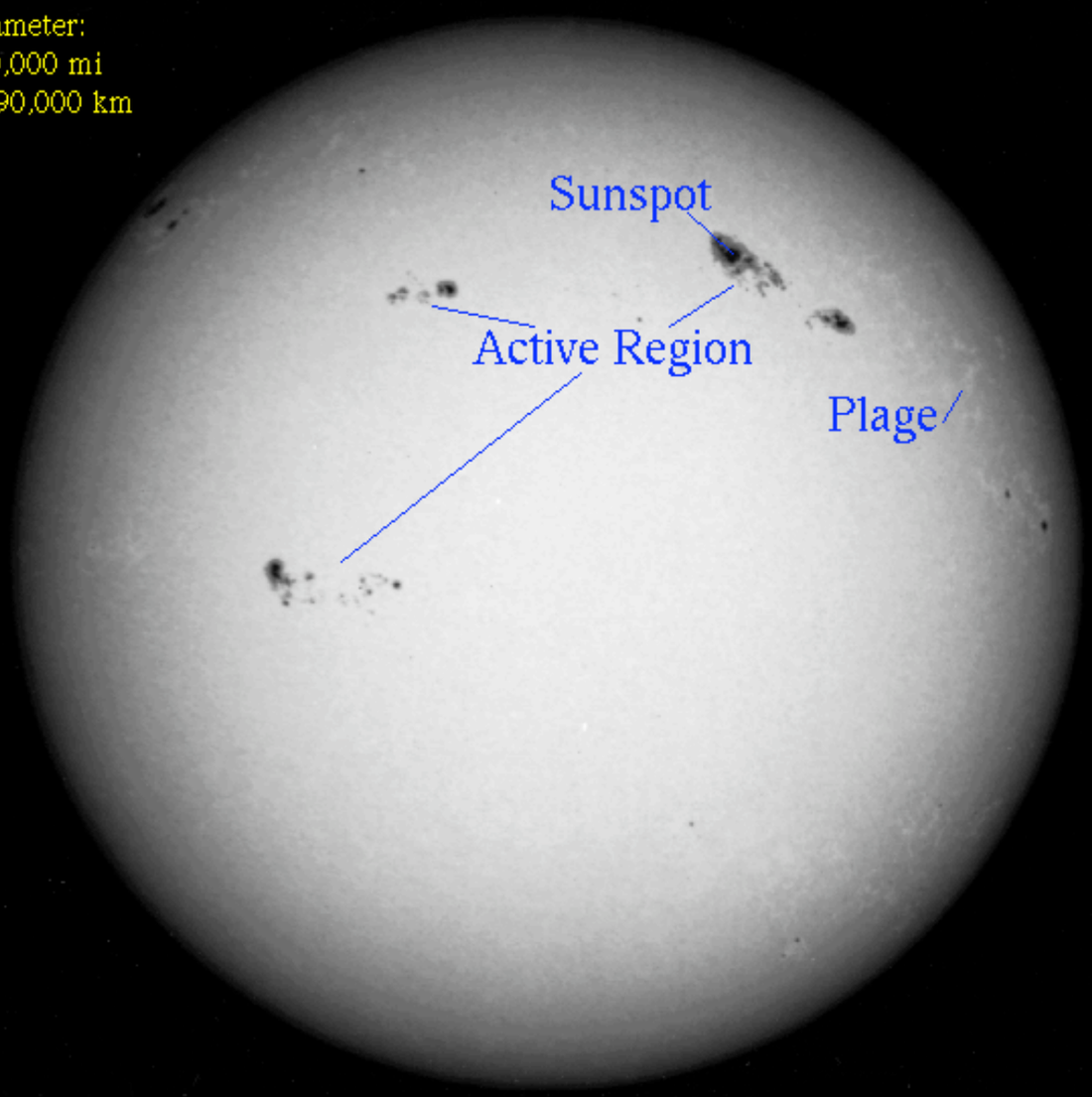
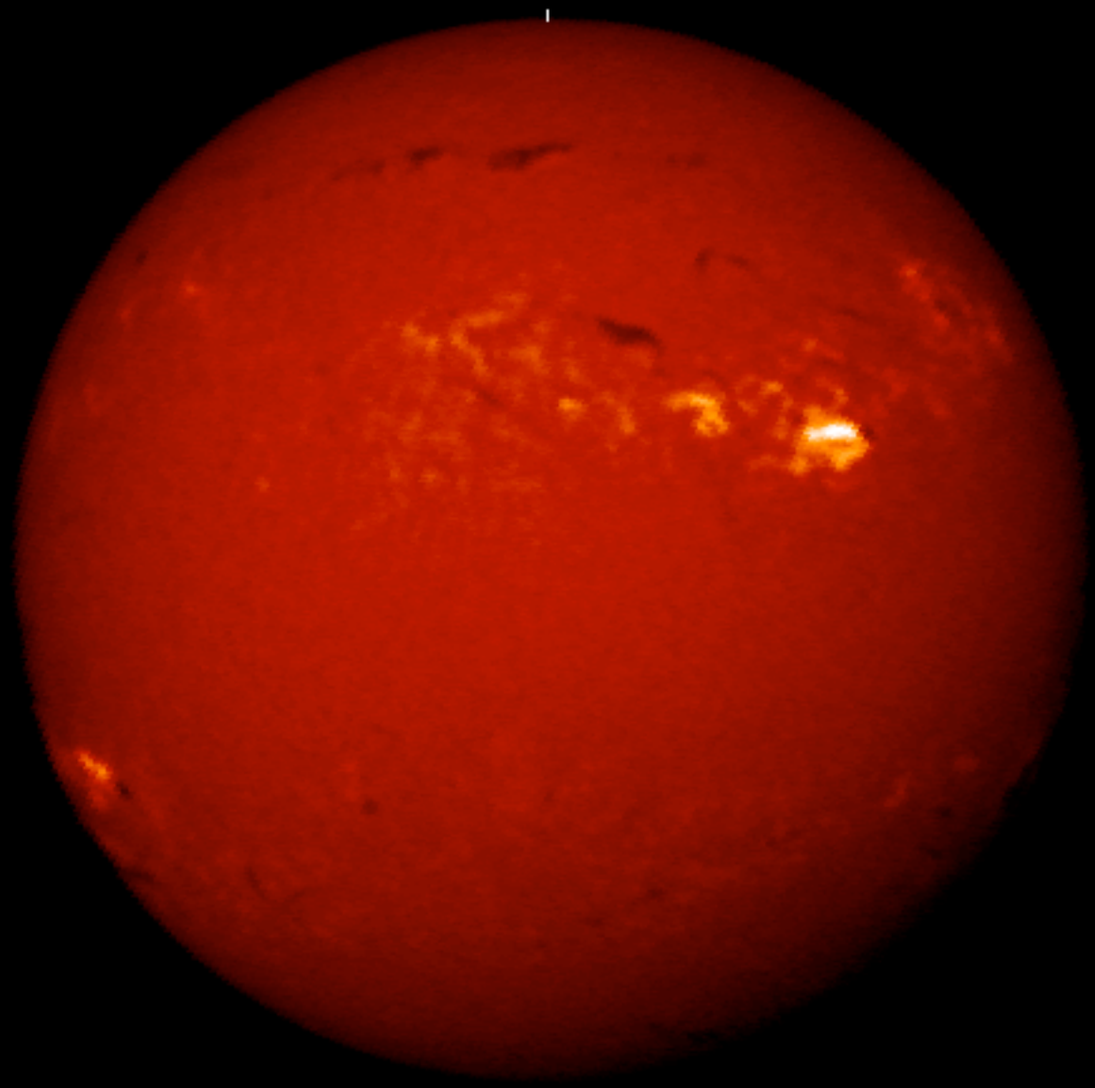
Dwarf planets: comparison with Mars/Earth/Moon

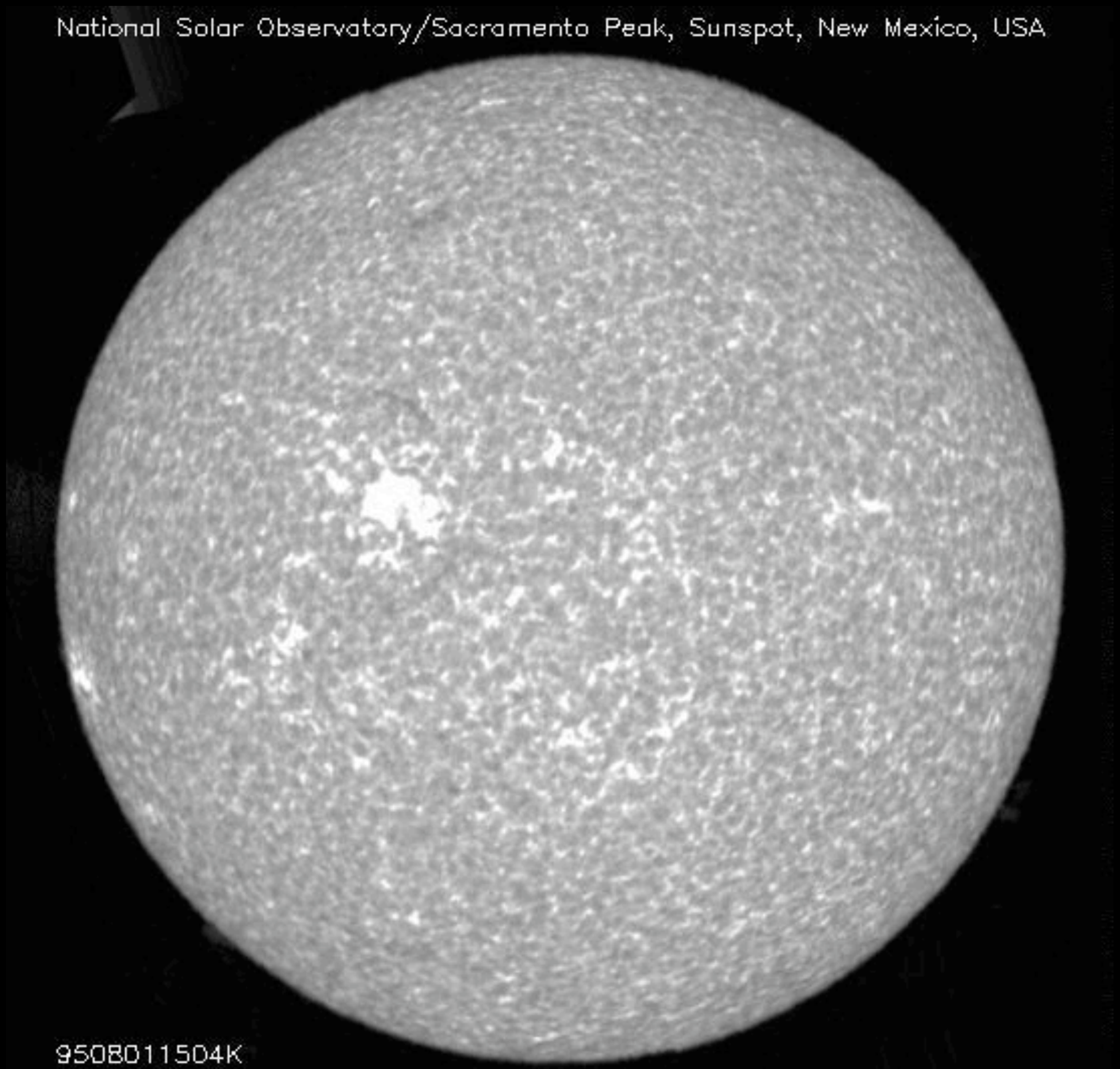


SUN

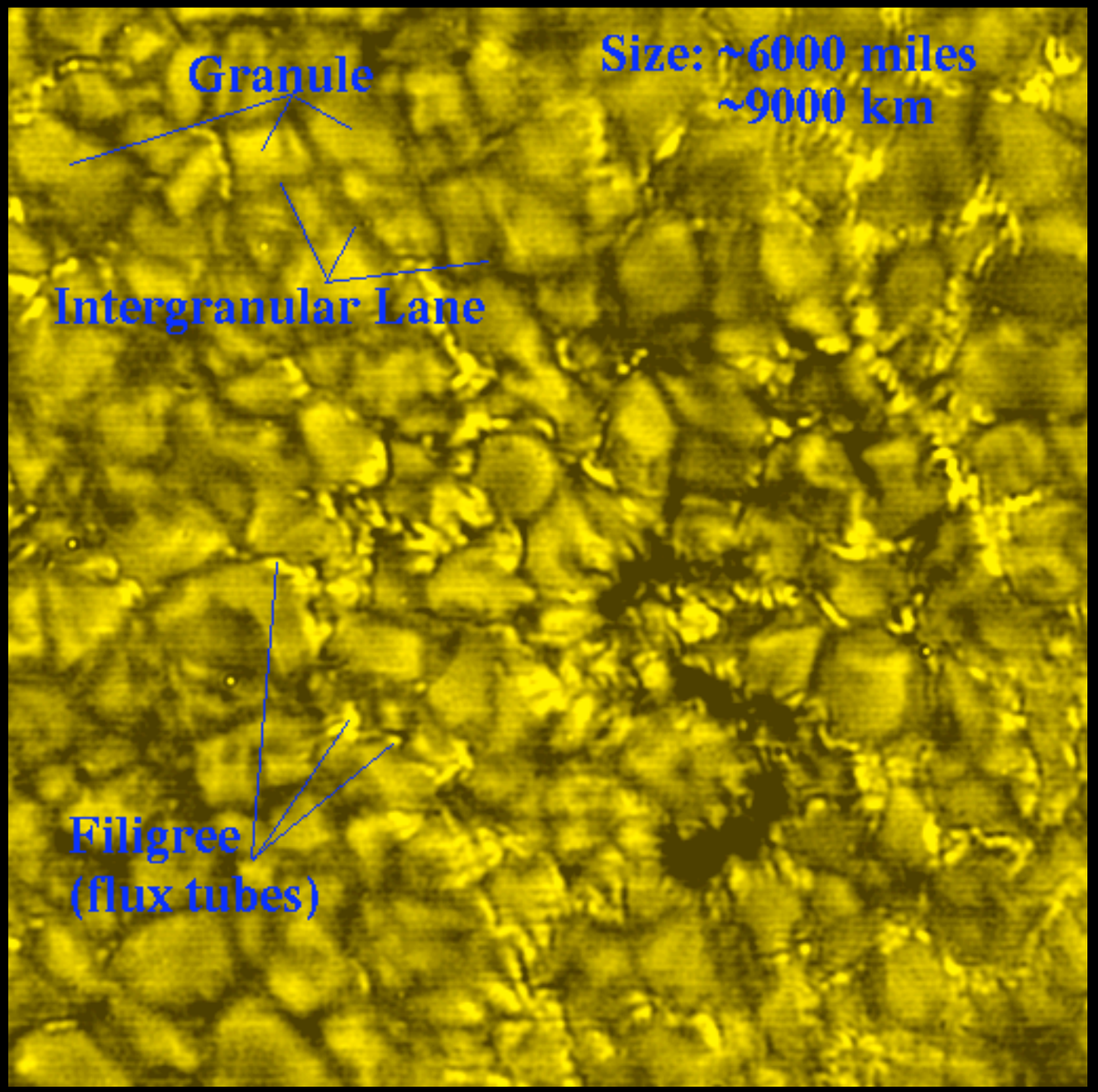
Diameter:
860,000 mi
1,390,000 km






National Solar Observatory/Sacramento Peak, Sunspot, New Mexico, USA
950801115O4K

Granulation: effects of convevtion



convection: computer modeling

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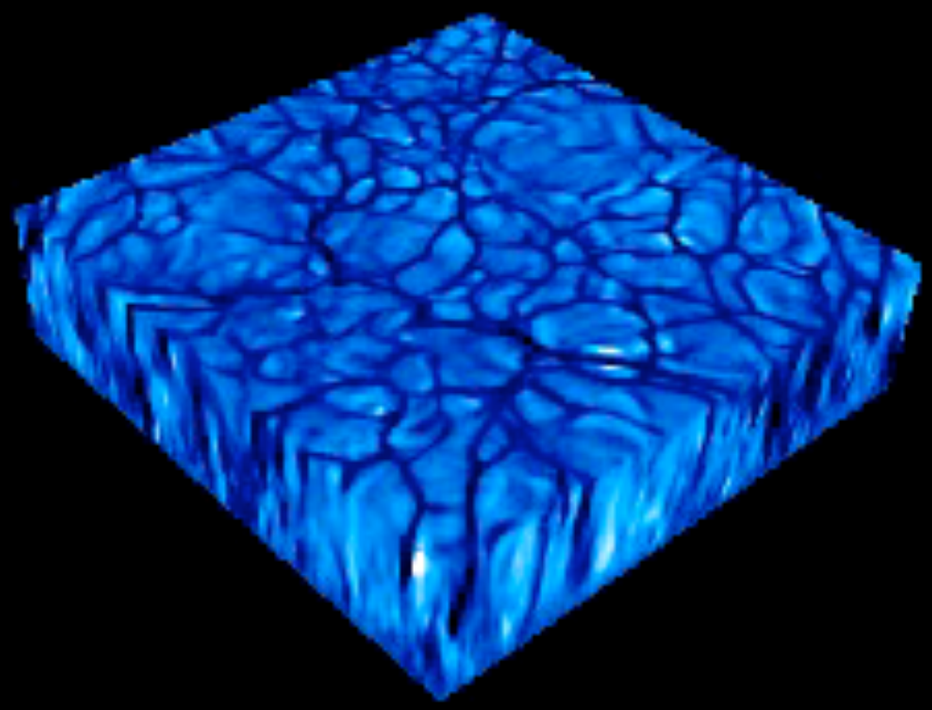
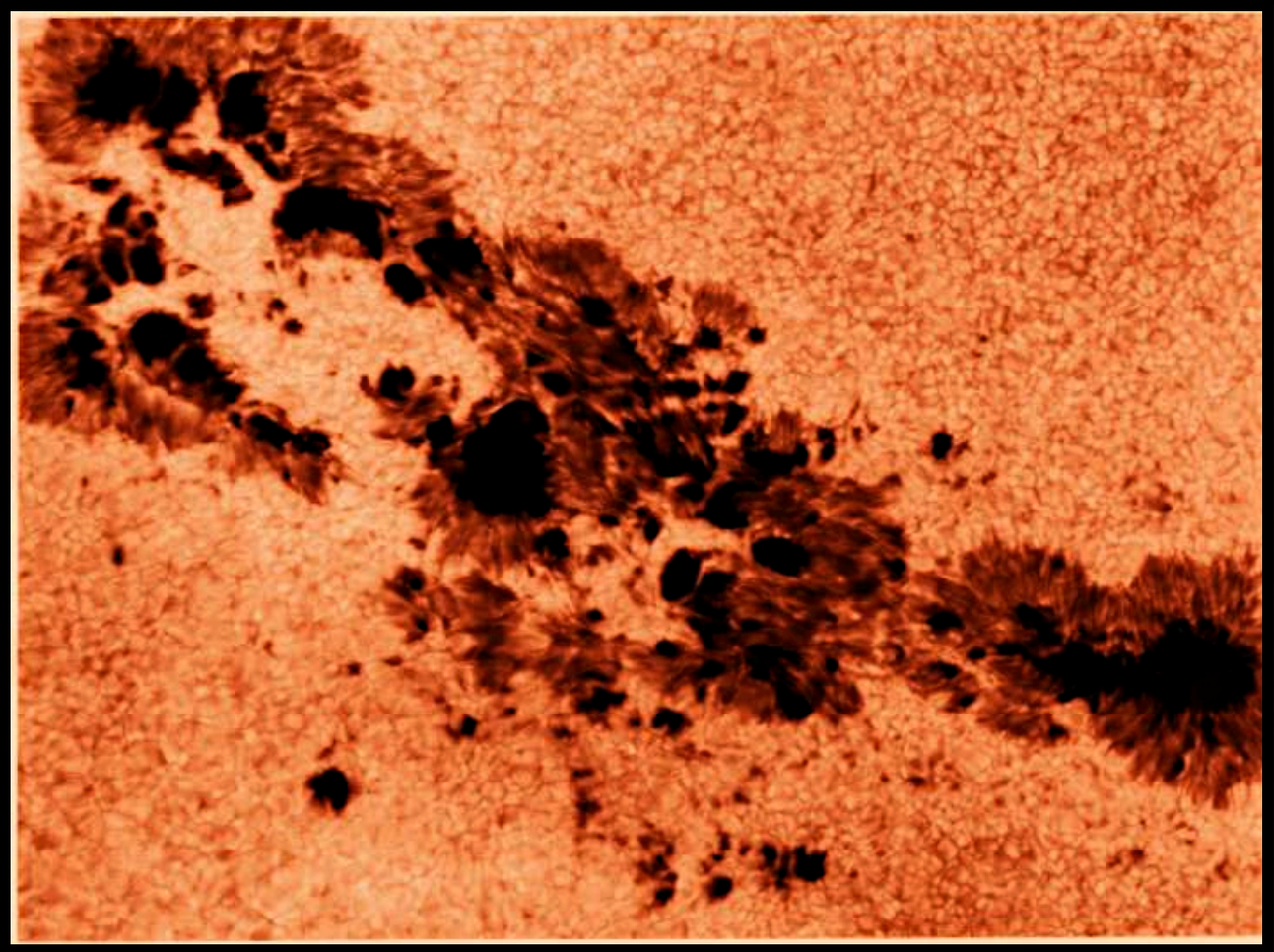
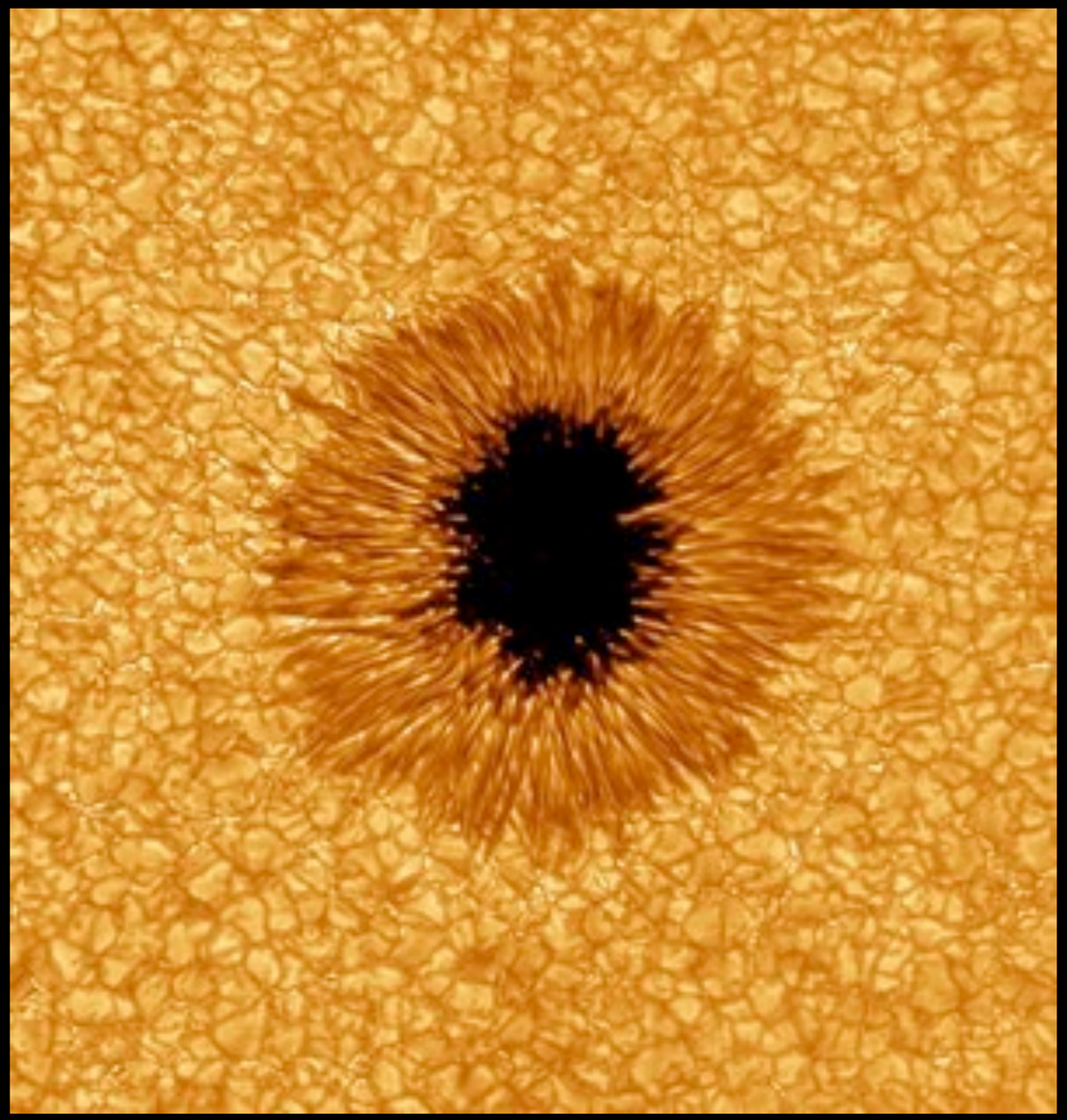


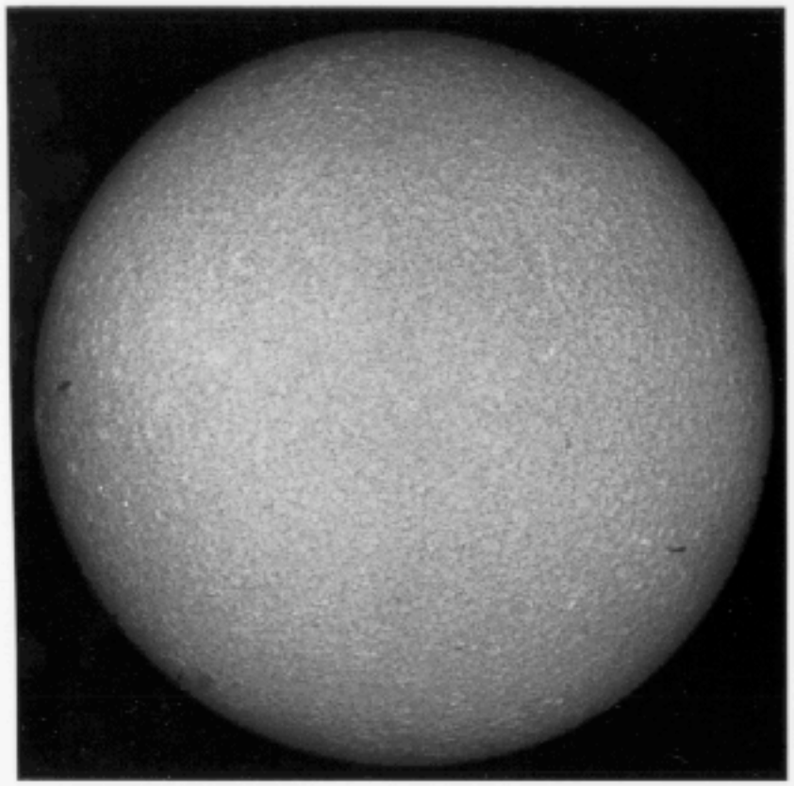
Sunspots: magnetic fields and convection



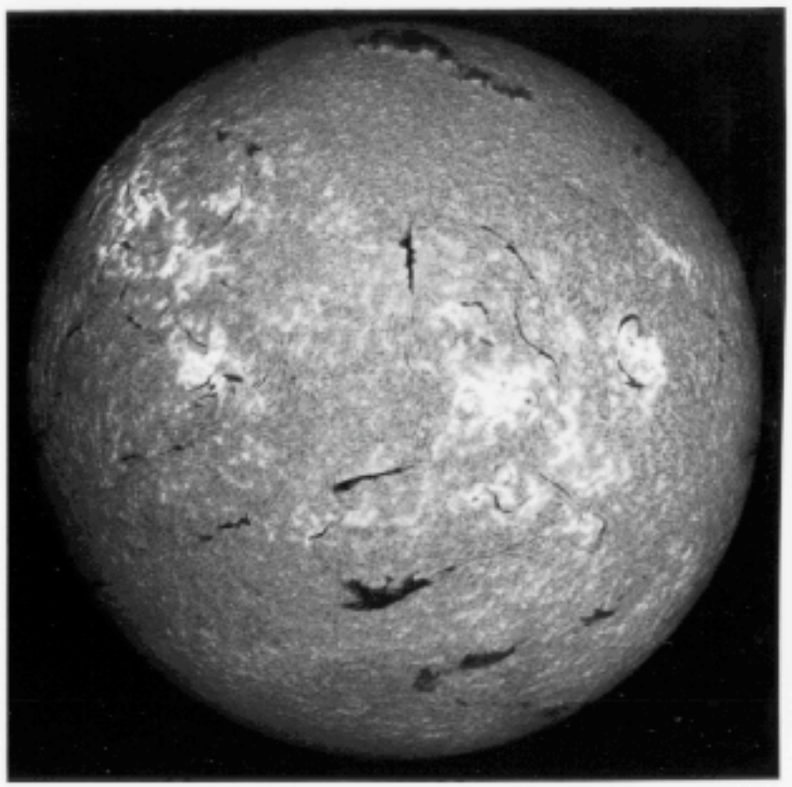


Sunspots: 11 years cycle of solar activity

MINIMUM

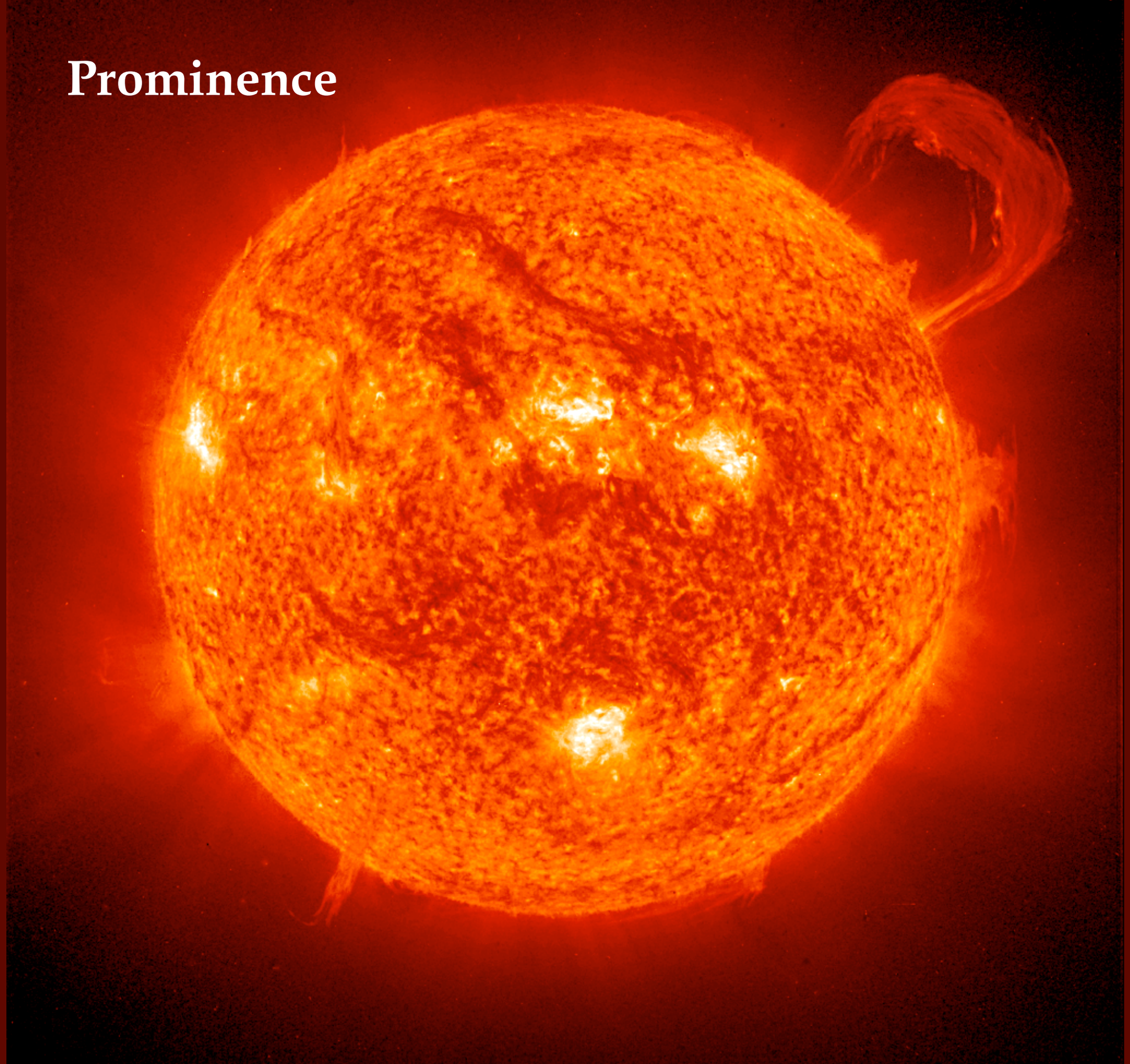


MAXIMUM

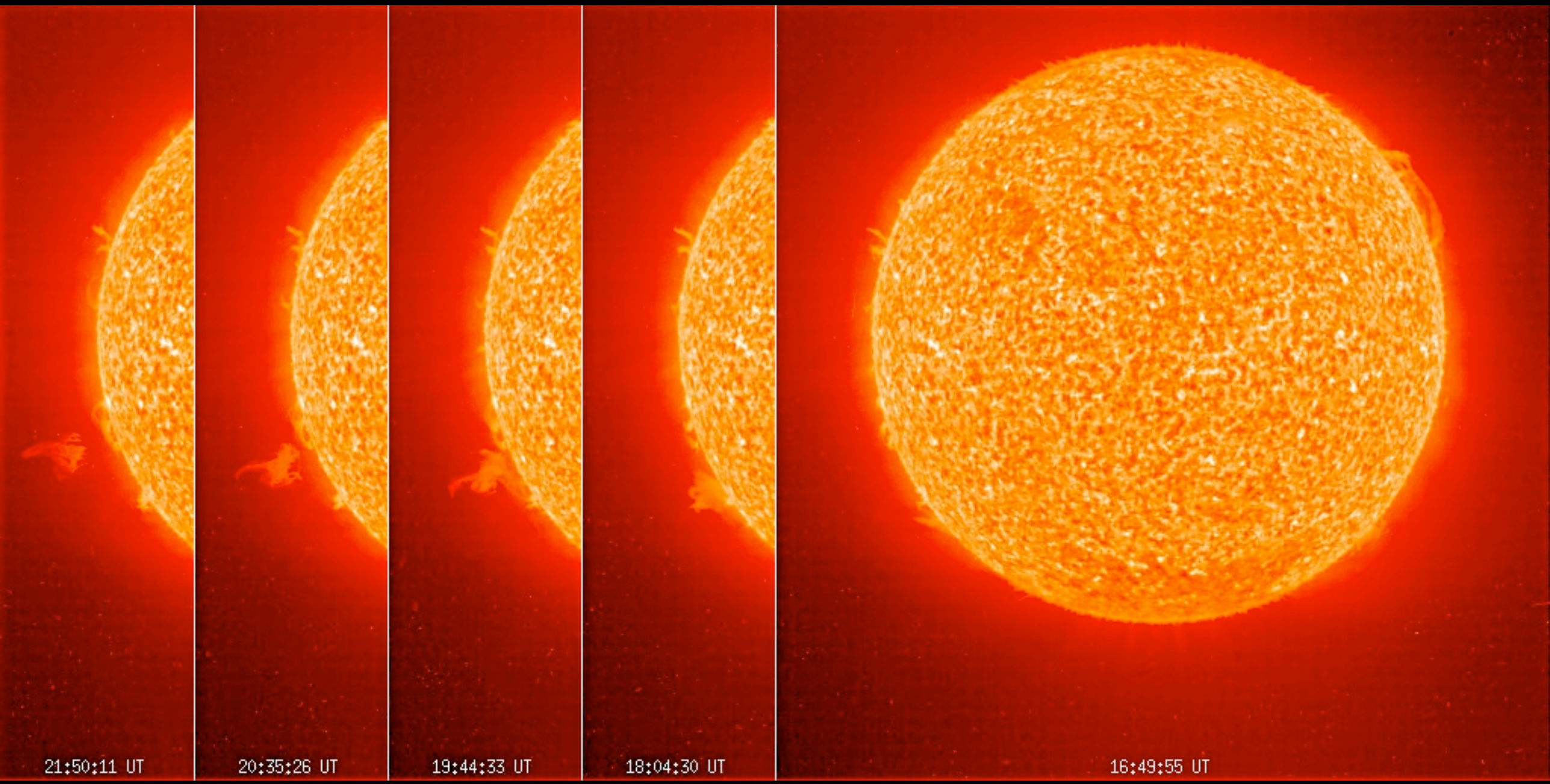


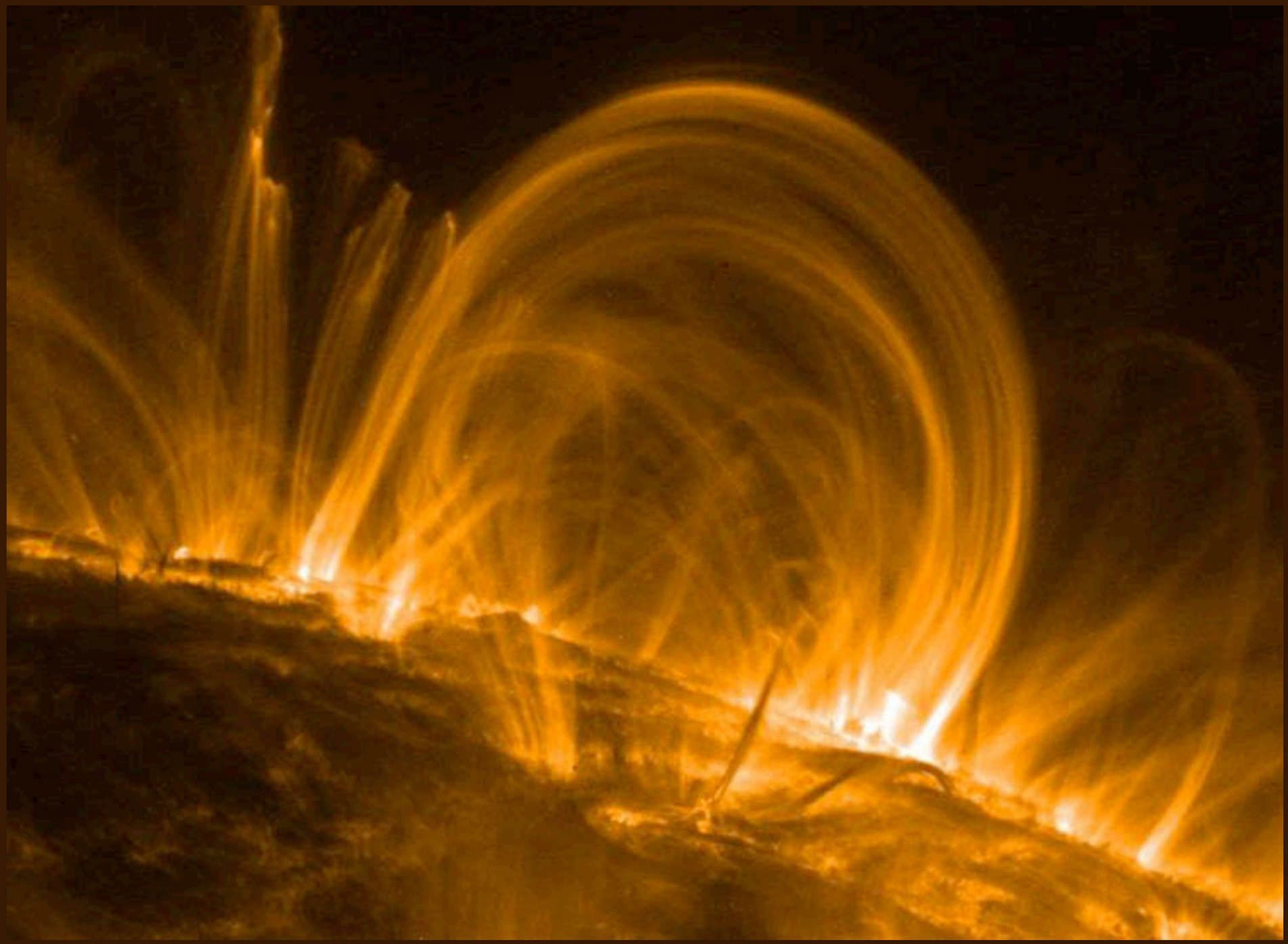
NATIONAL SOLAR OBSERVATORY / SACRAMENTO PEAK, N.M.

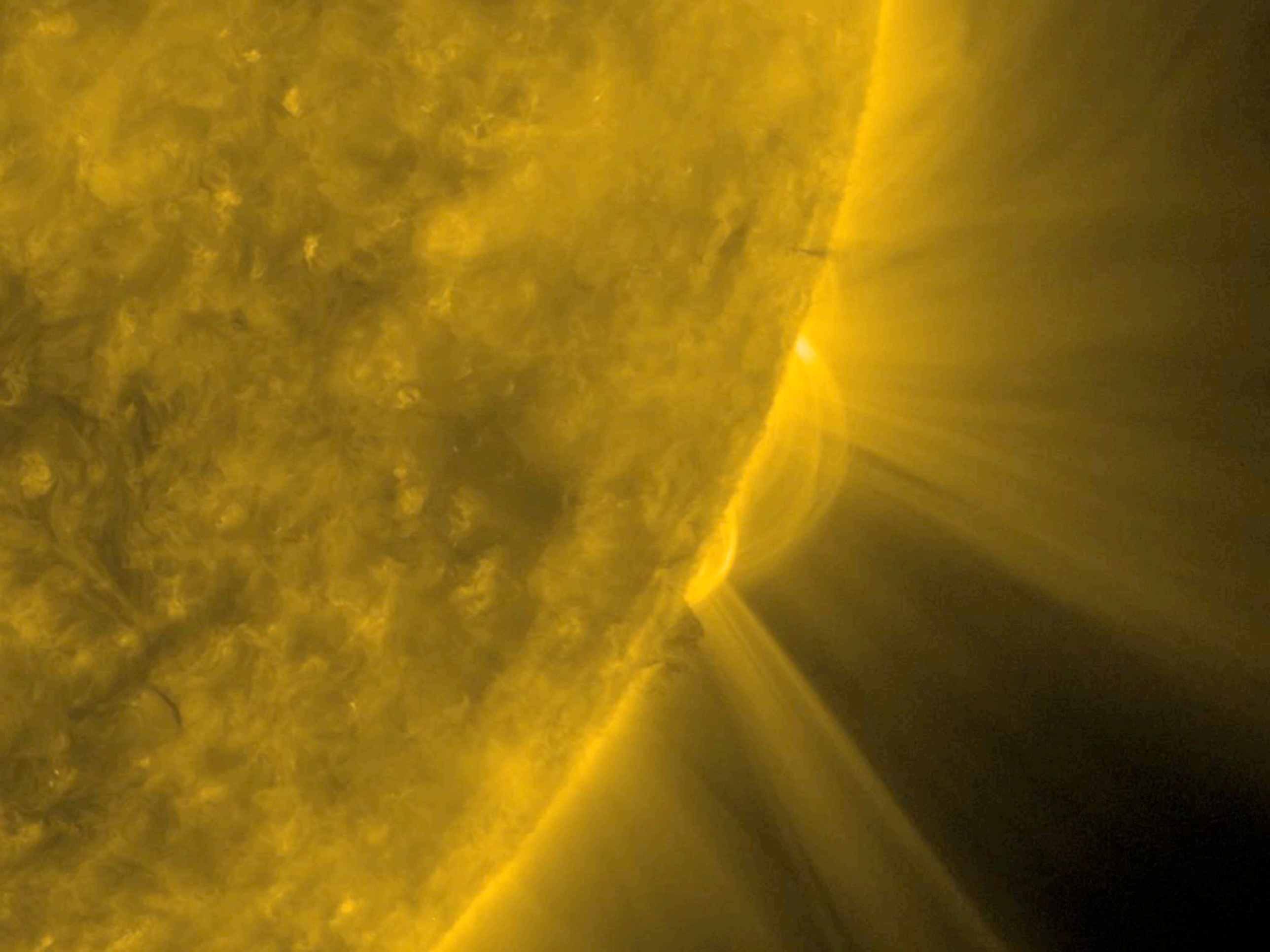
Prominence

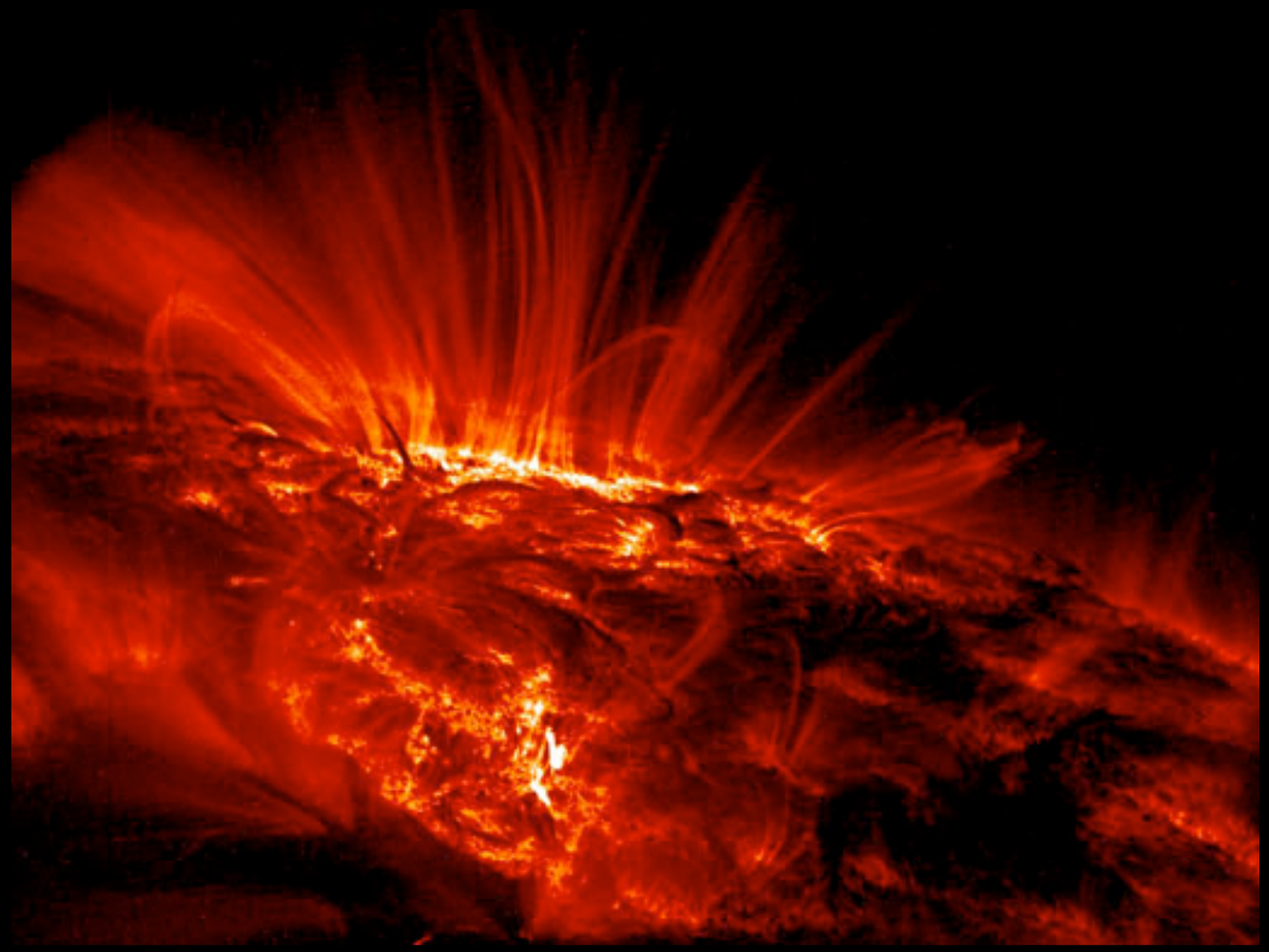


Prominence

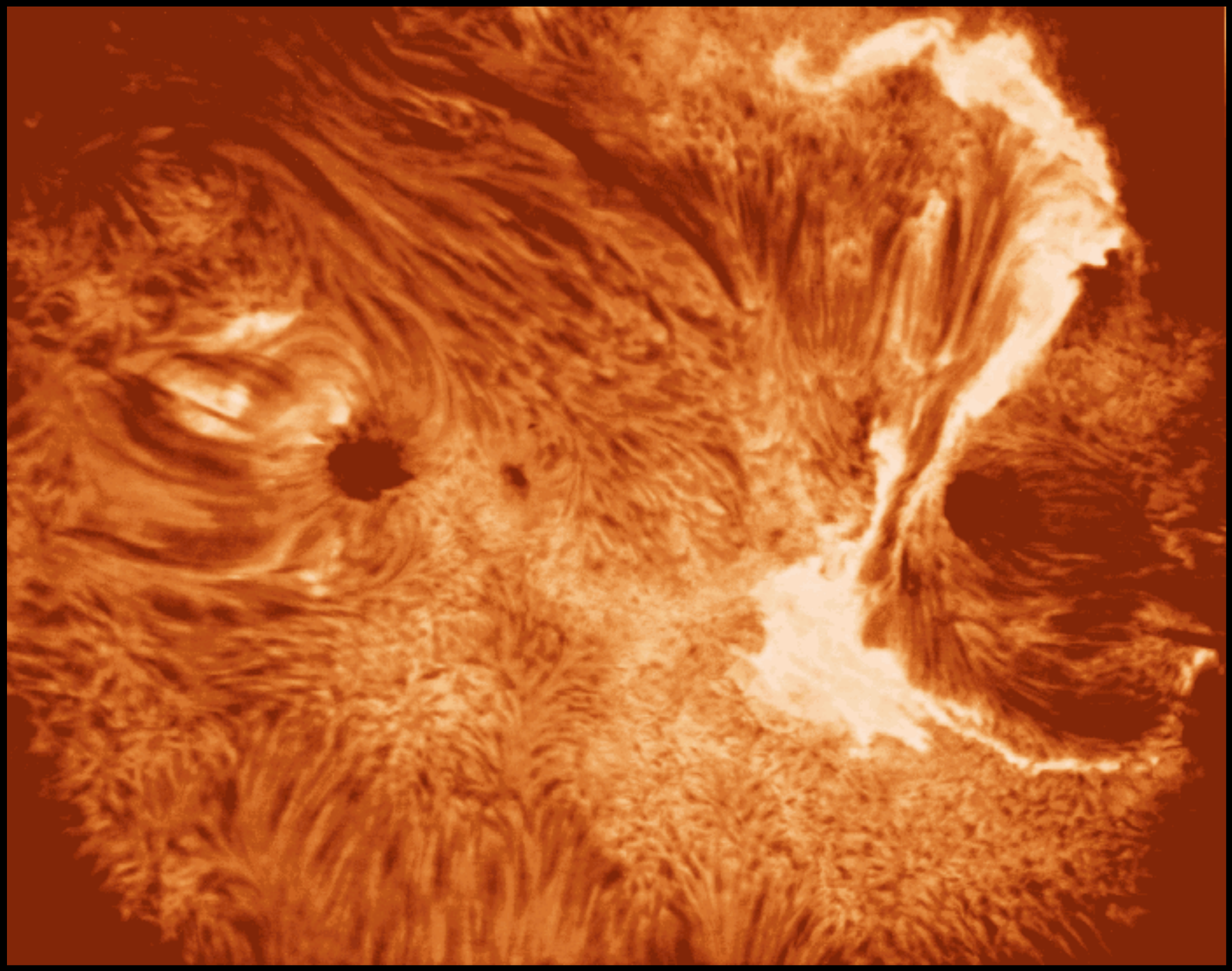




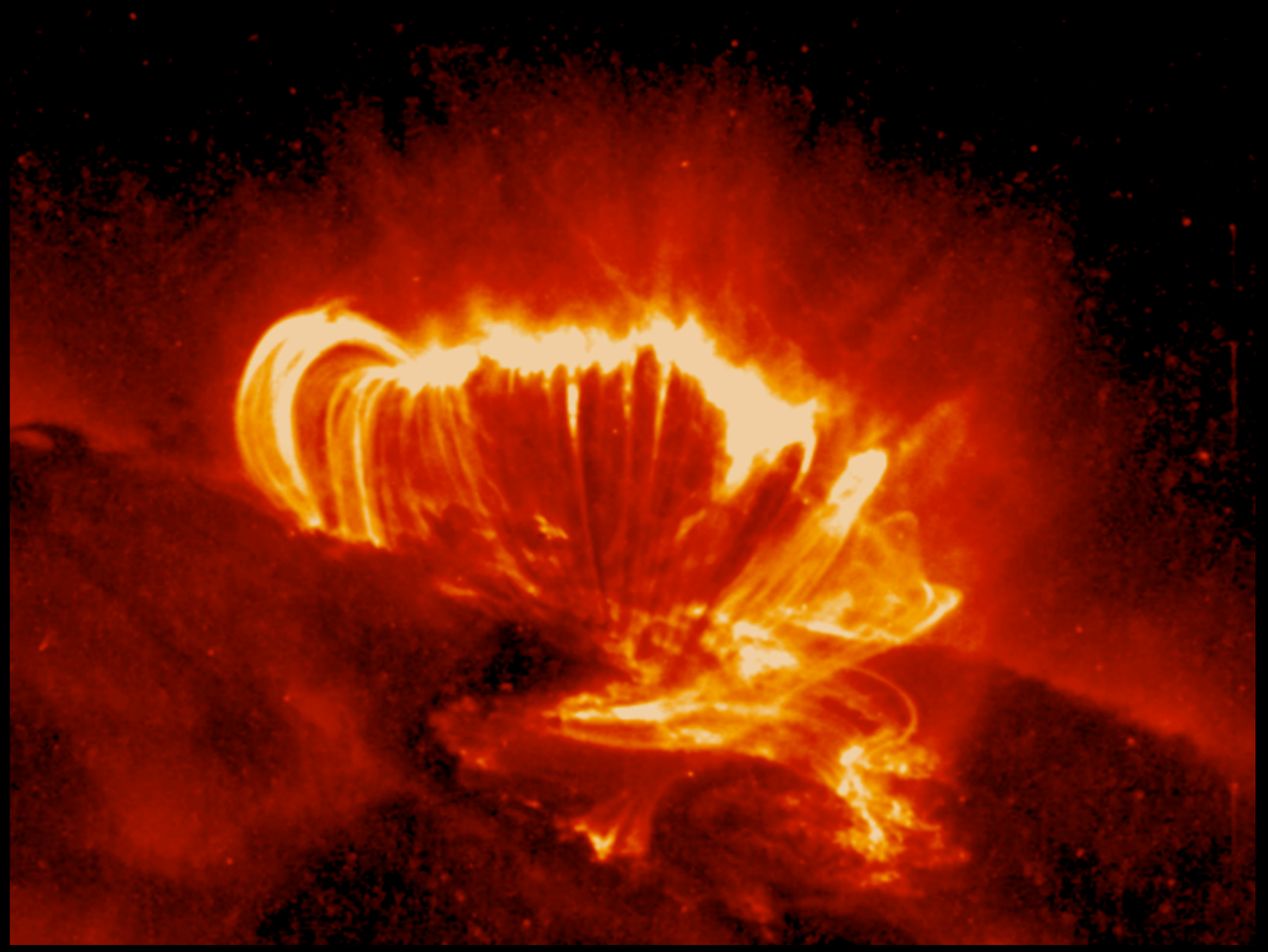




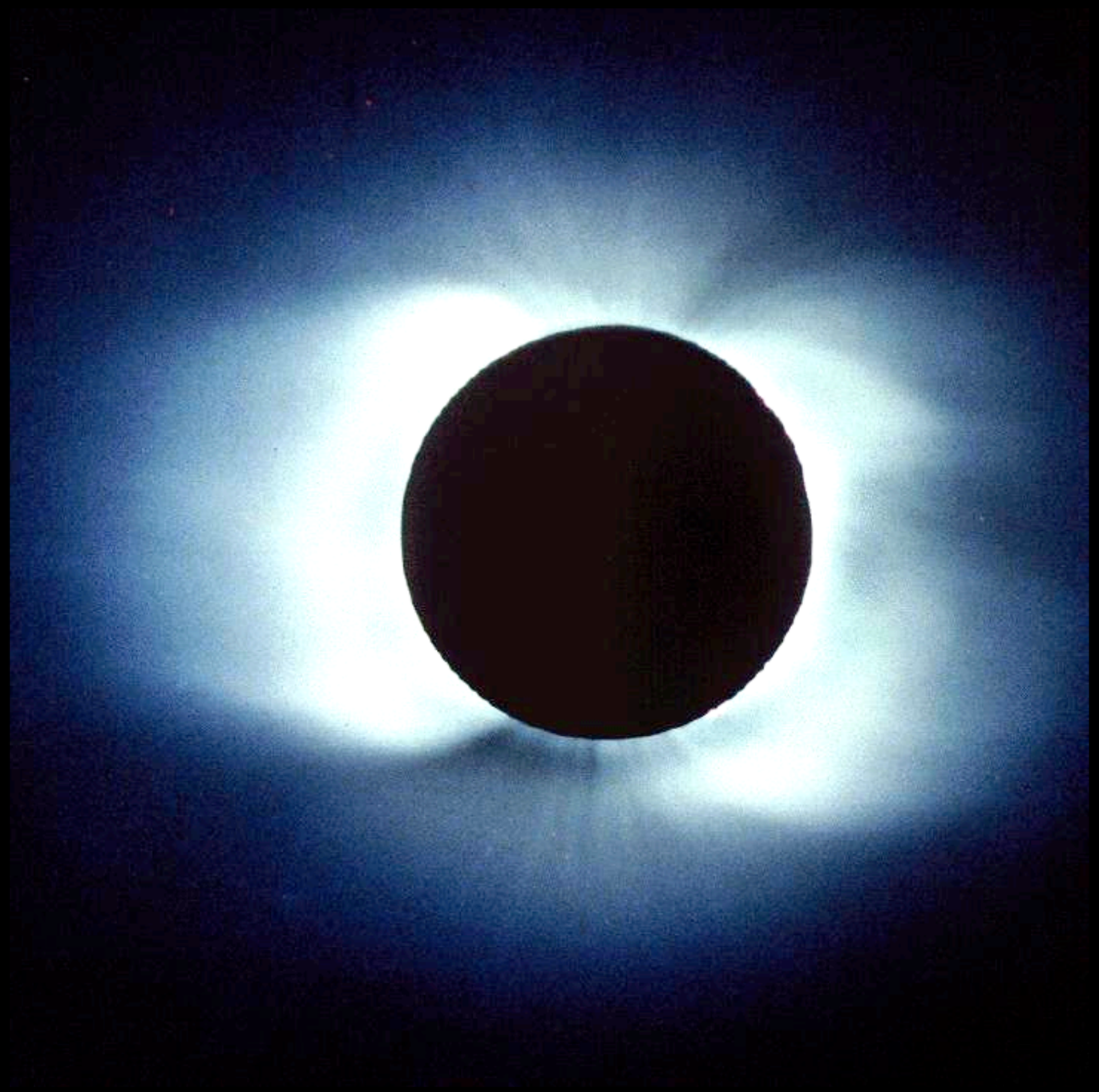
Solar Flares: catastrophic eruptions



The TRACE spacecraft observes an X-ray flare over solar active region

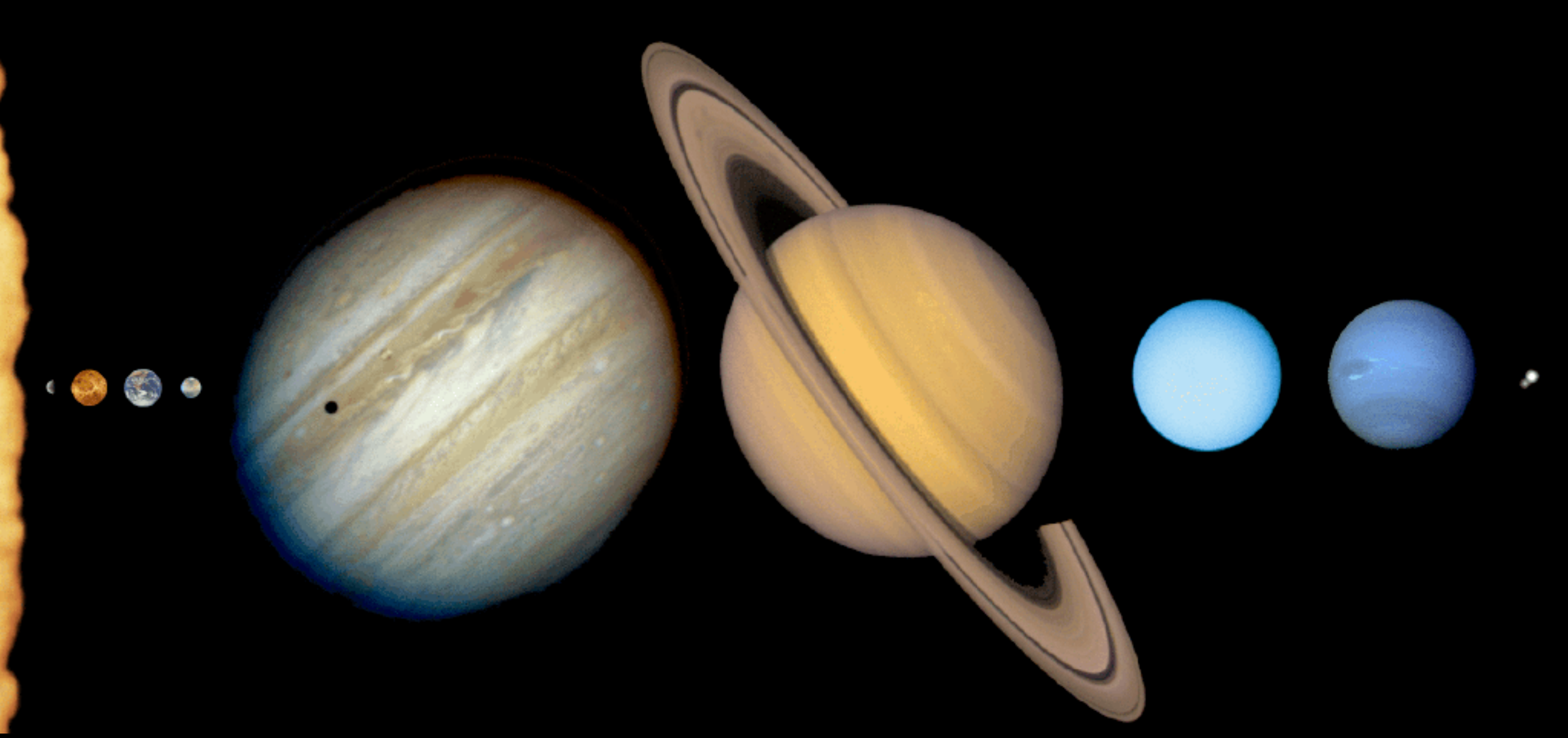


Solar Corona



The Closest Star: The Sun

- The Sun is the closest example of a star.
- The Sun generates its energy (heat & light) by *thermonuclear reactions* at its core.
- Convection: rising bubbles of hot gas
- Convection: granules
- Sunspots and Magnetic fields
- Active Sun: Prominences and Flares
- Every 11 yrs, the Sun undergoes a higher level of activity including the formation of many *sunspots* & *solar flares*.



Solar System: brief review

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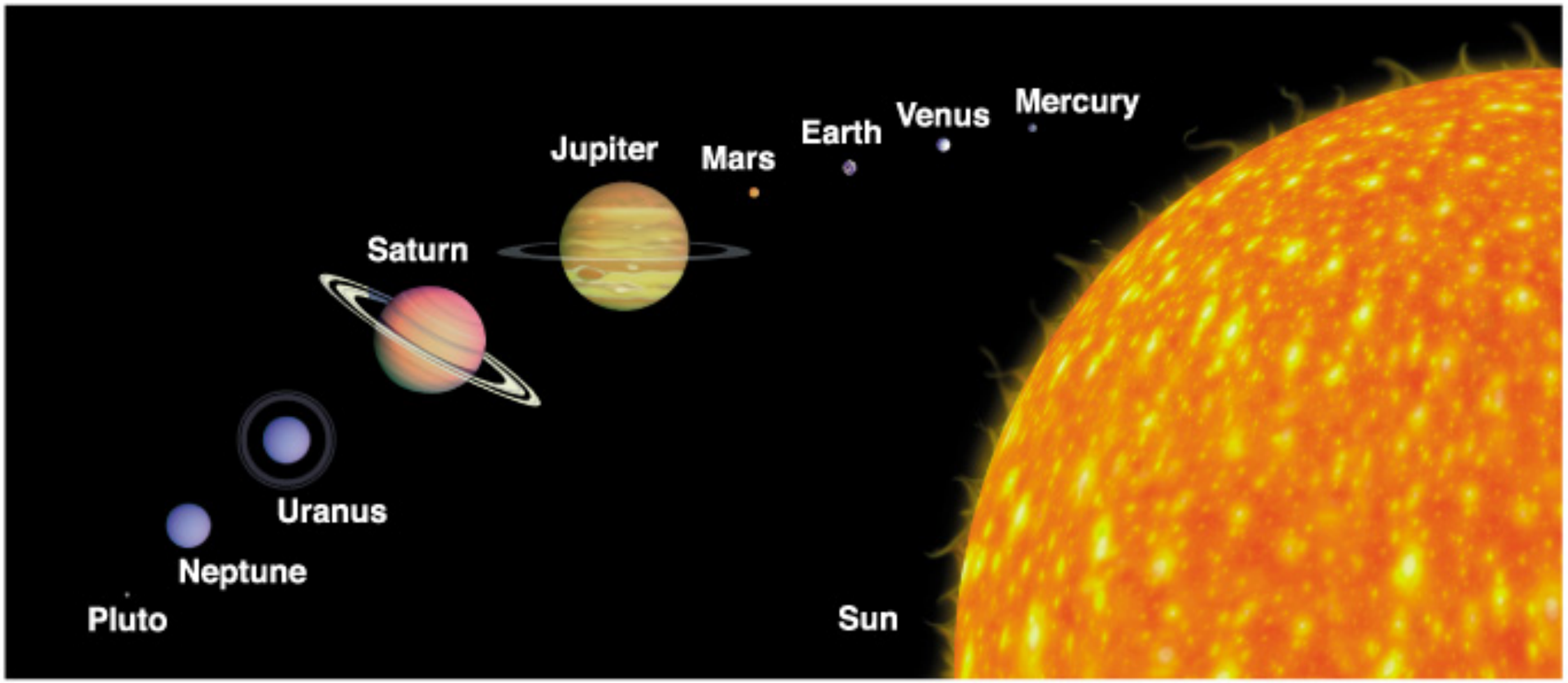
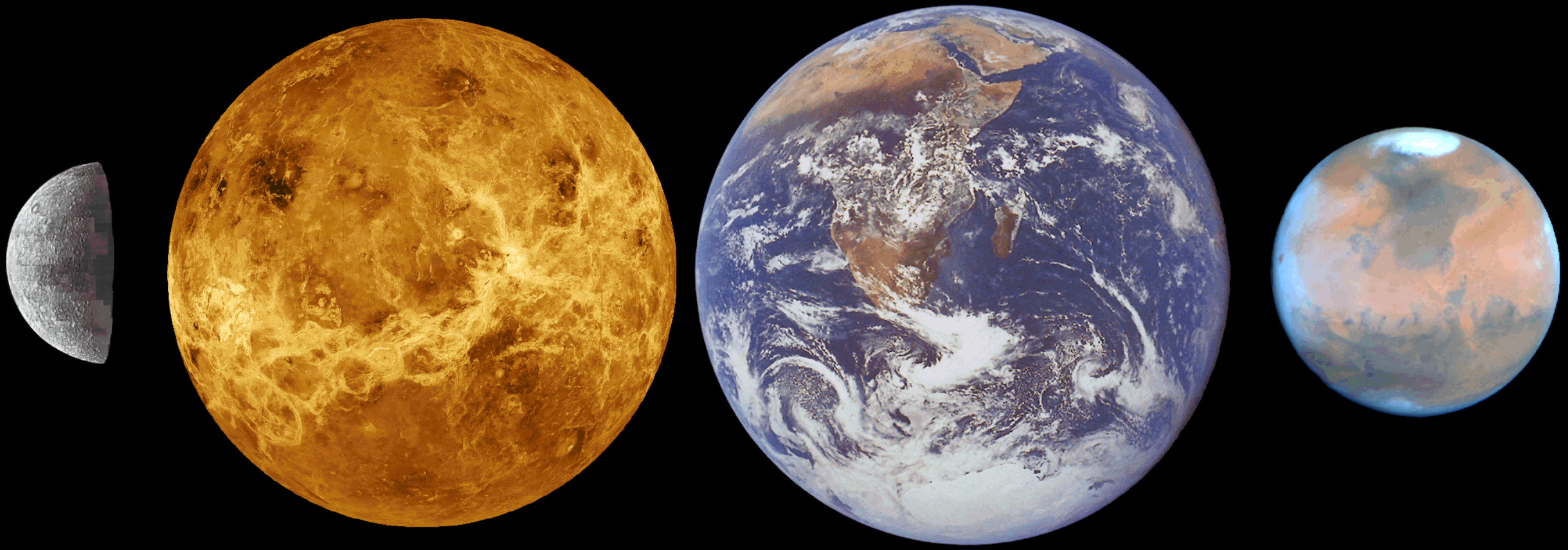
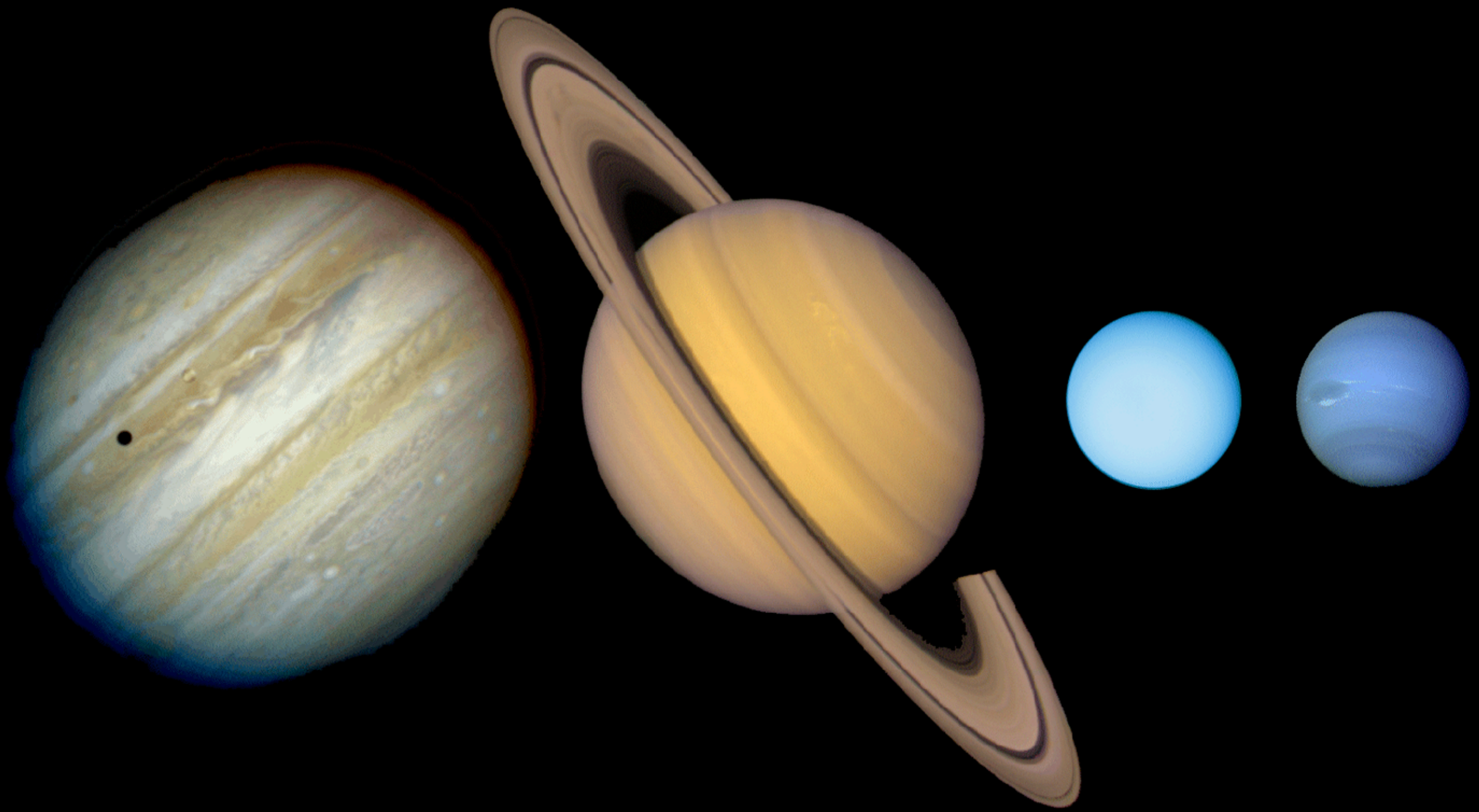


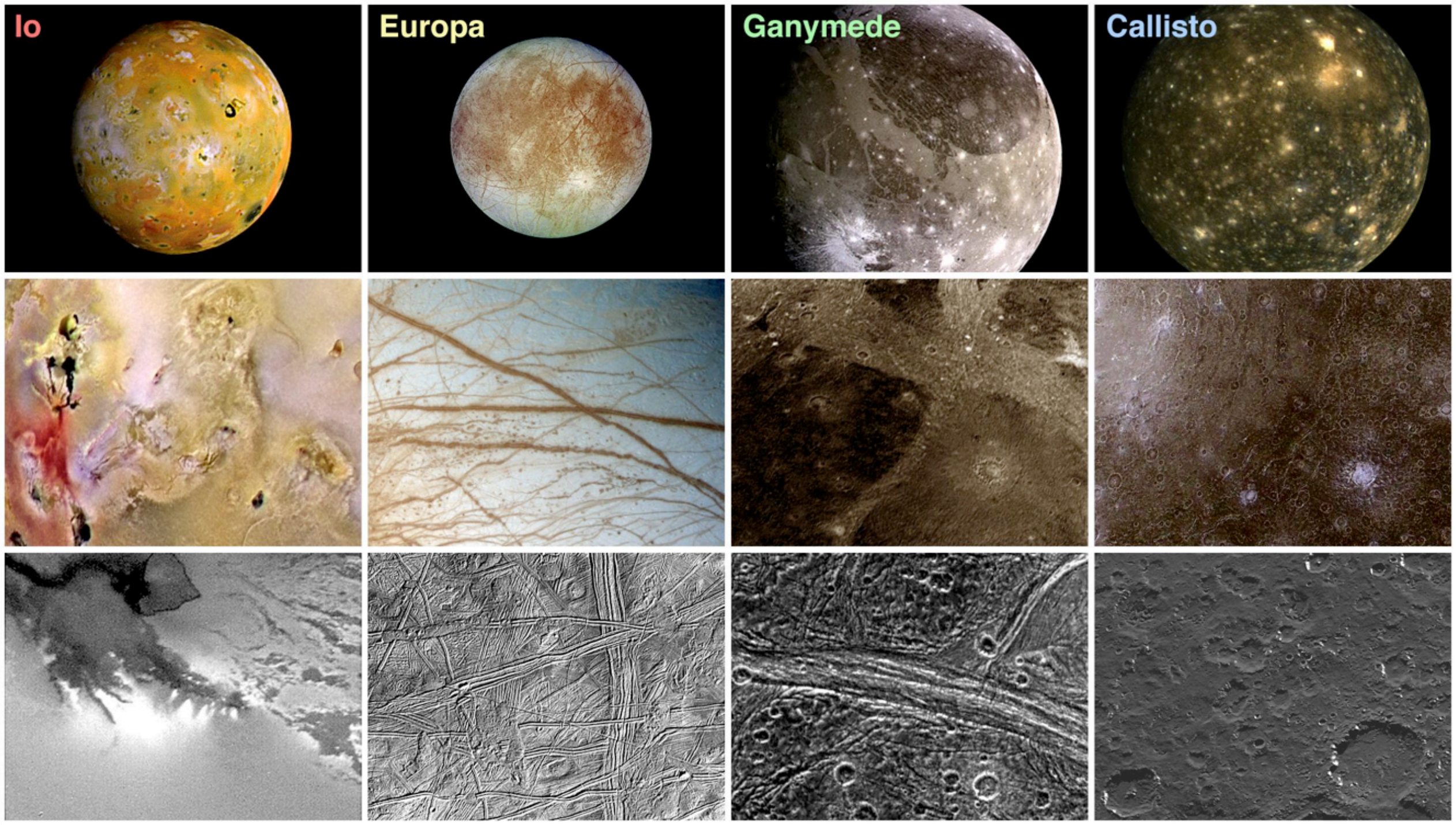
Solar System: terrestrial planets



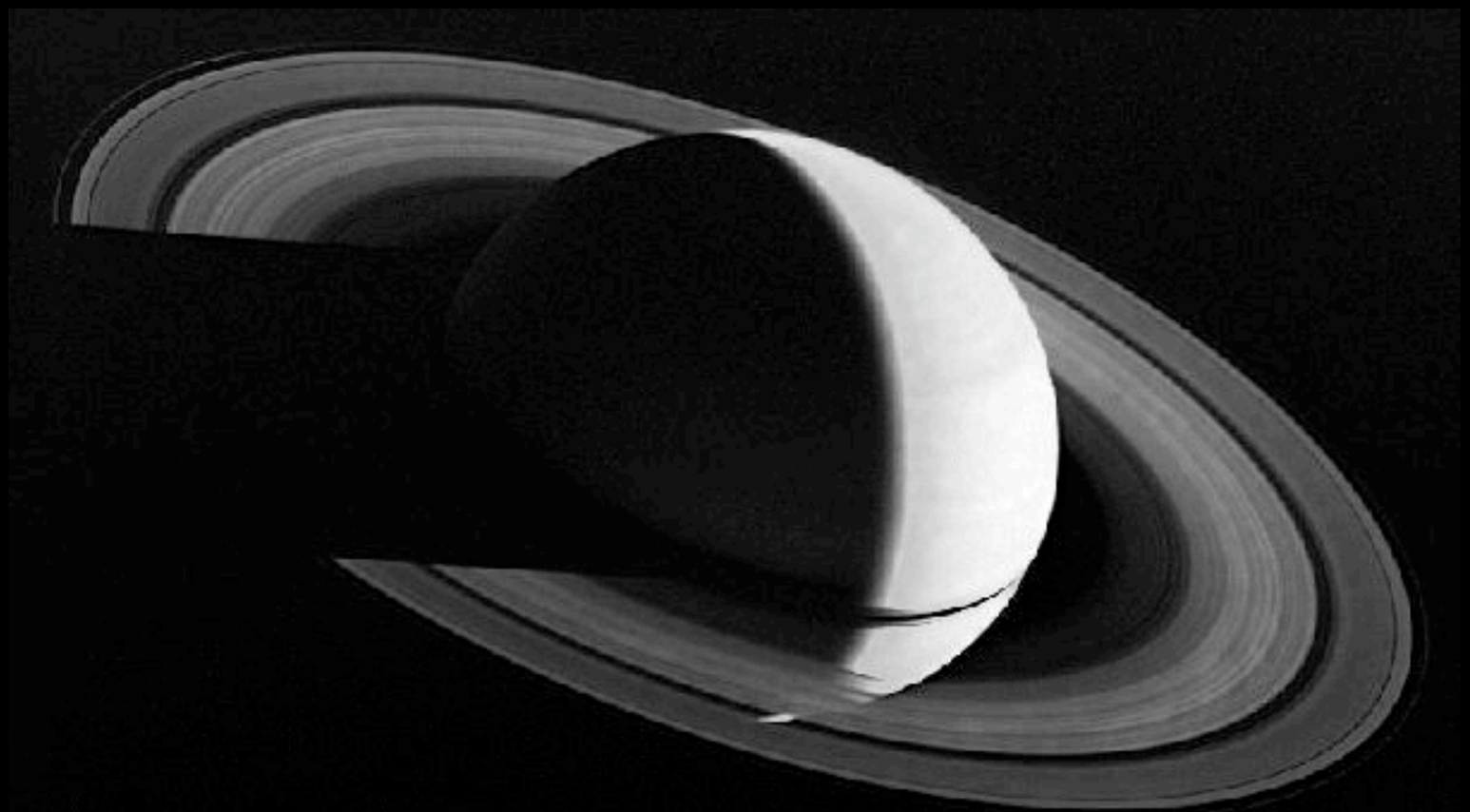
Solar System: Jovian planets



Solar System: large moons of Jupiter



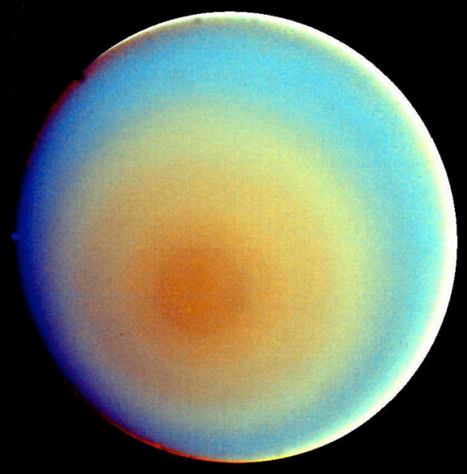
Solar System: Saturn



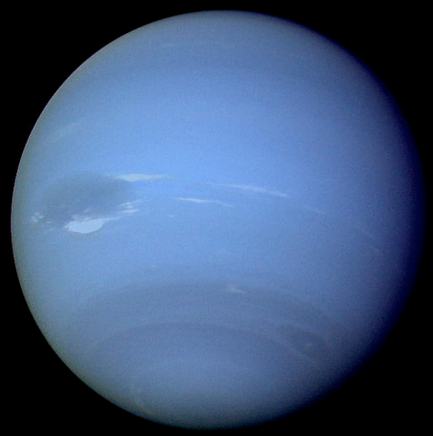
Rings

Titan

Solar System: brief review

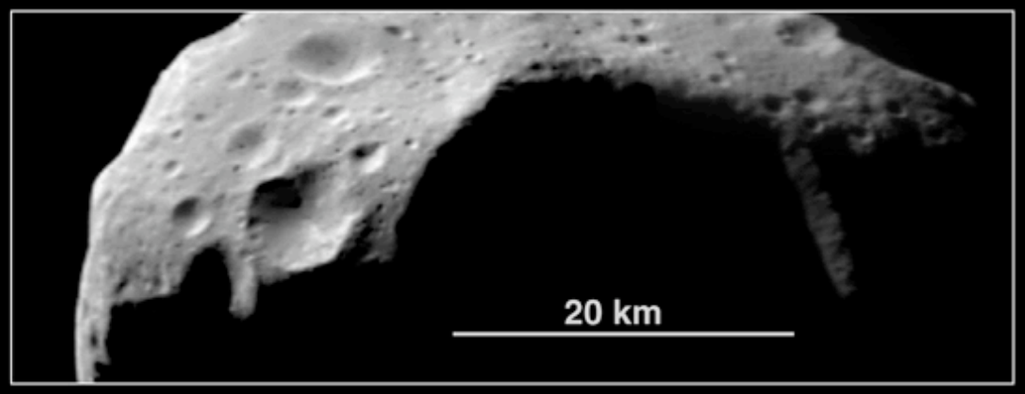


Uranus



Neptune

Solar System: brief review



Asteroids