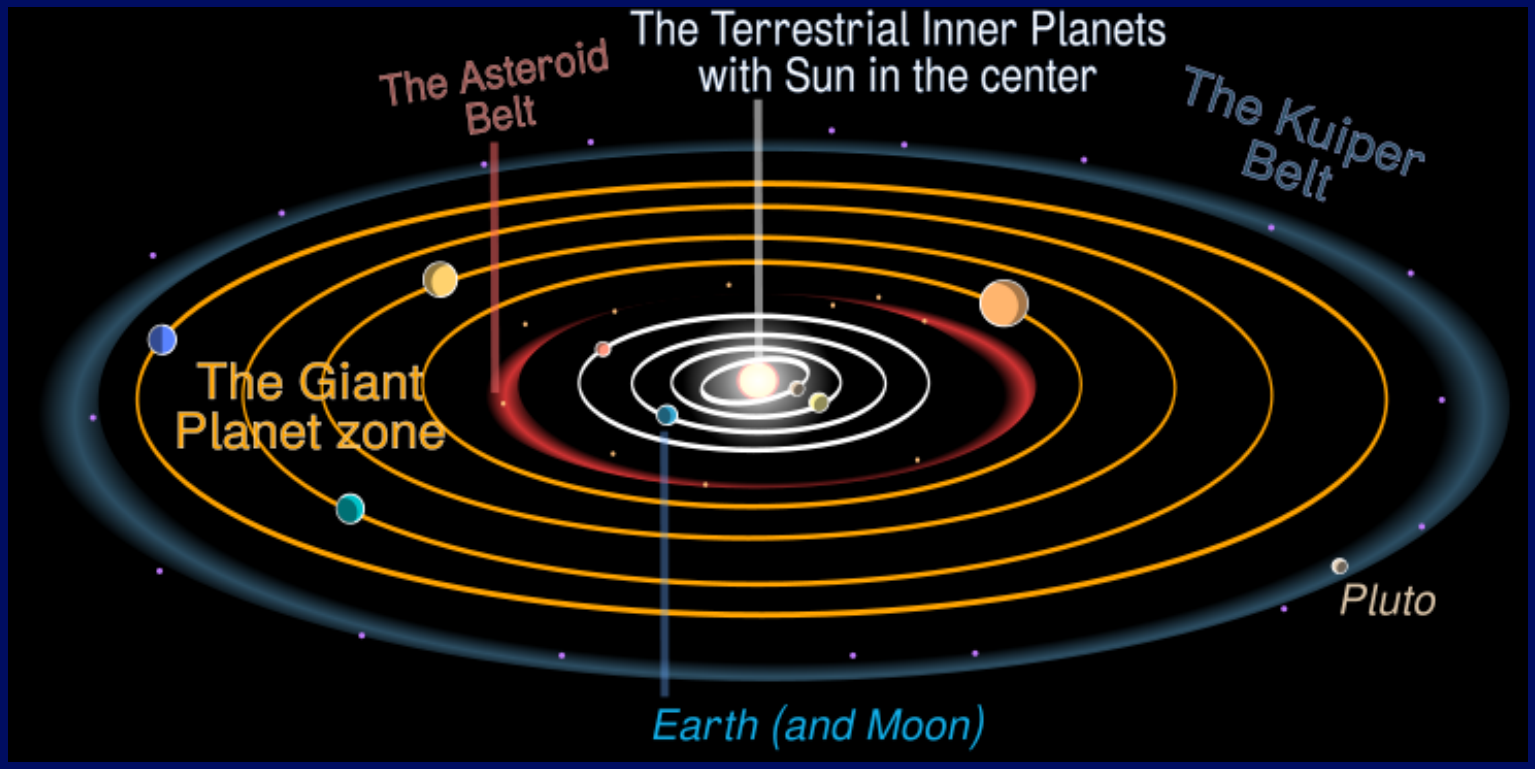
Astronomy 405
Solar System and ISM*

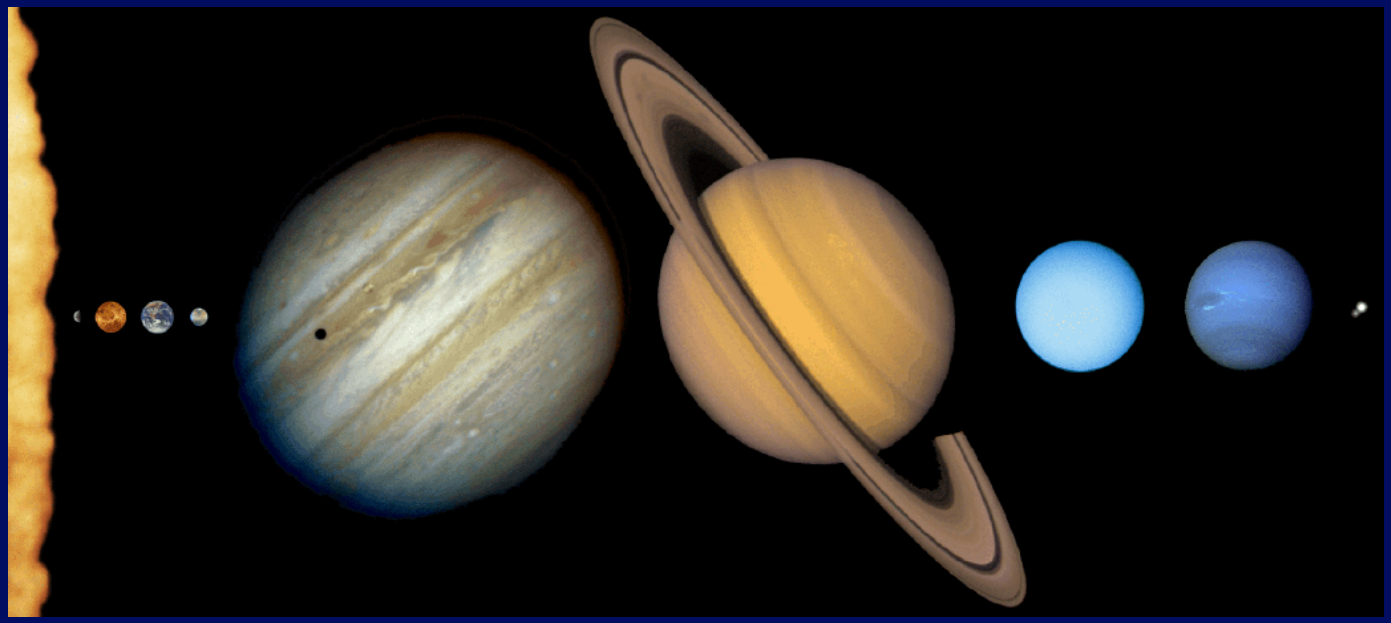
Lecture 1: Overview

January 14, 2013

* ISM = interstellar medium

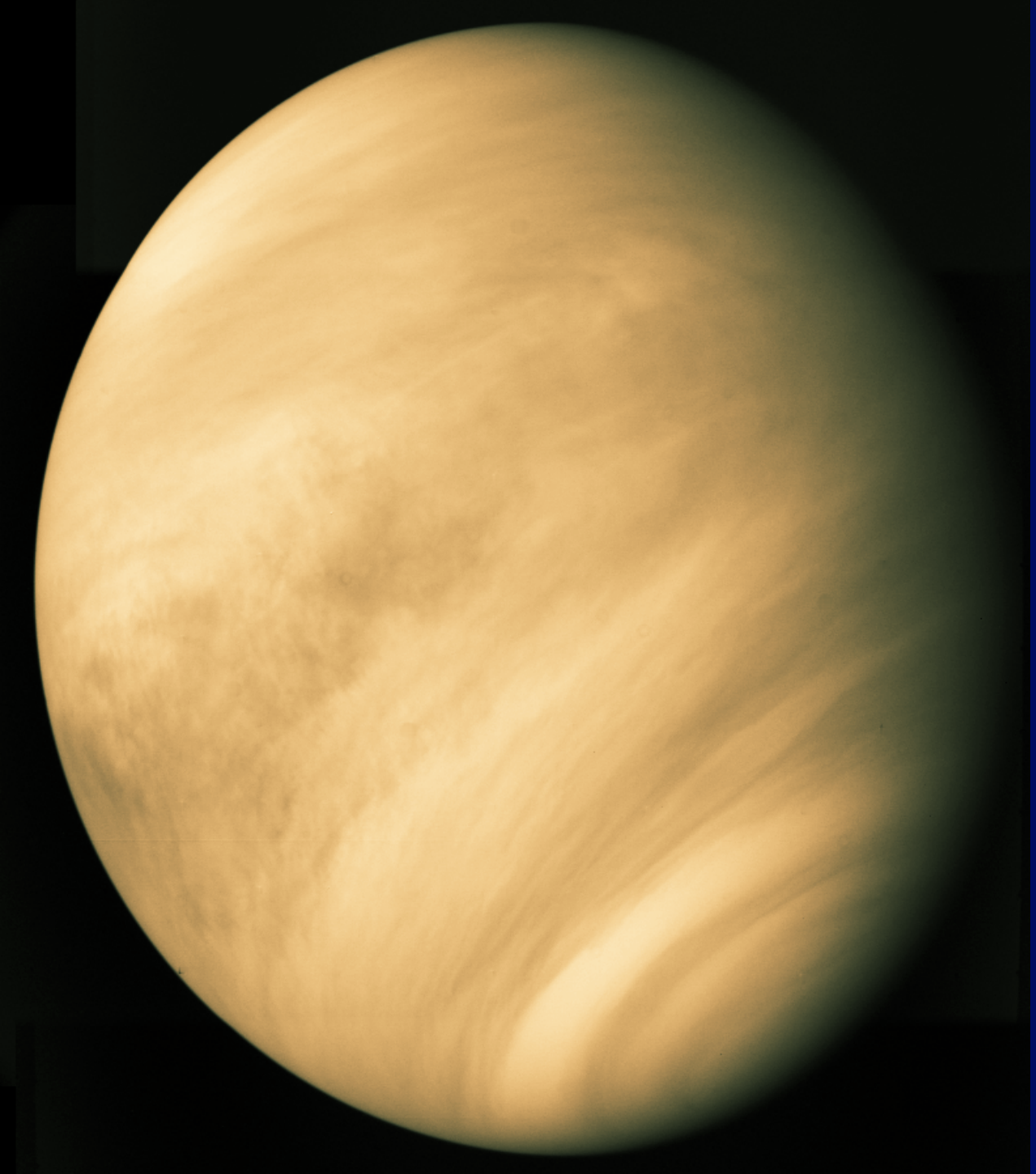

Saturn
Venus
Mercury


The Asteroid Belt
The Terrestrial Inner Planets with Sun in the center
The Kuiper Belt
The Giant Planet zone
Pluto
Earth (and Moon)



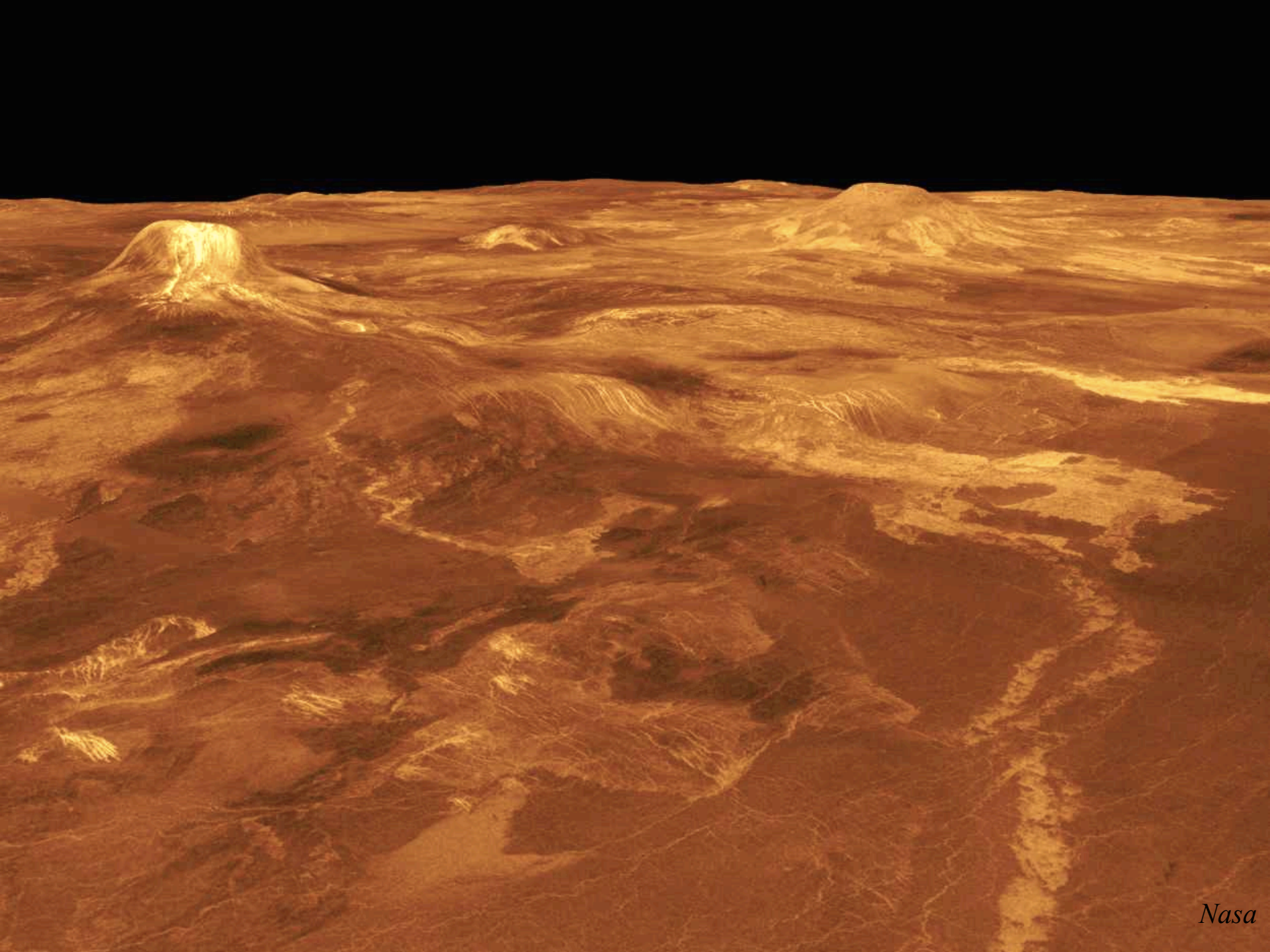
Mercury

Mariner 10

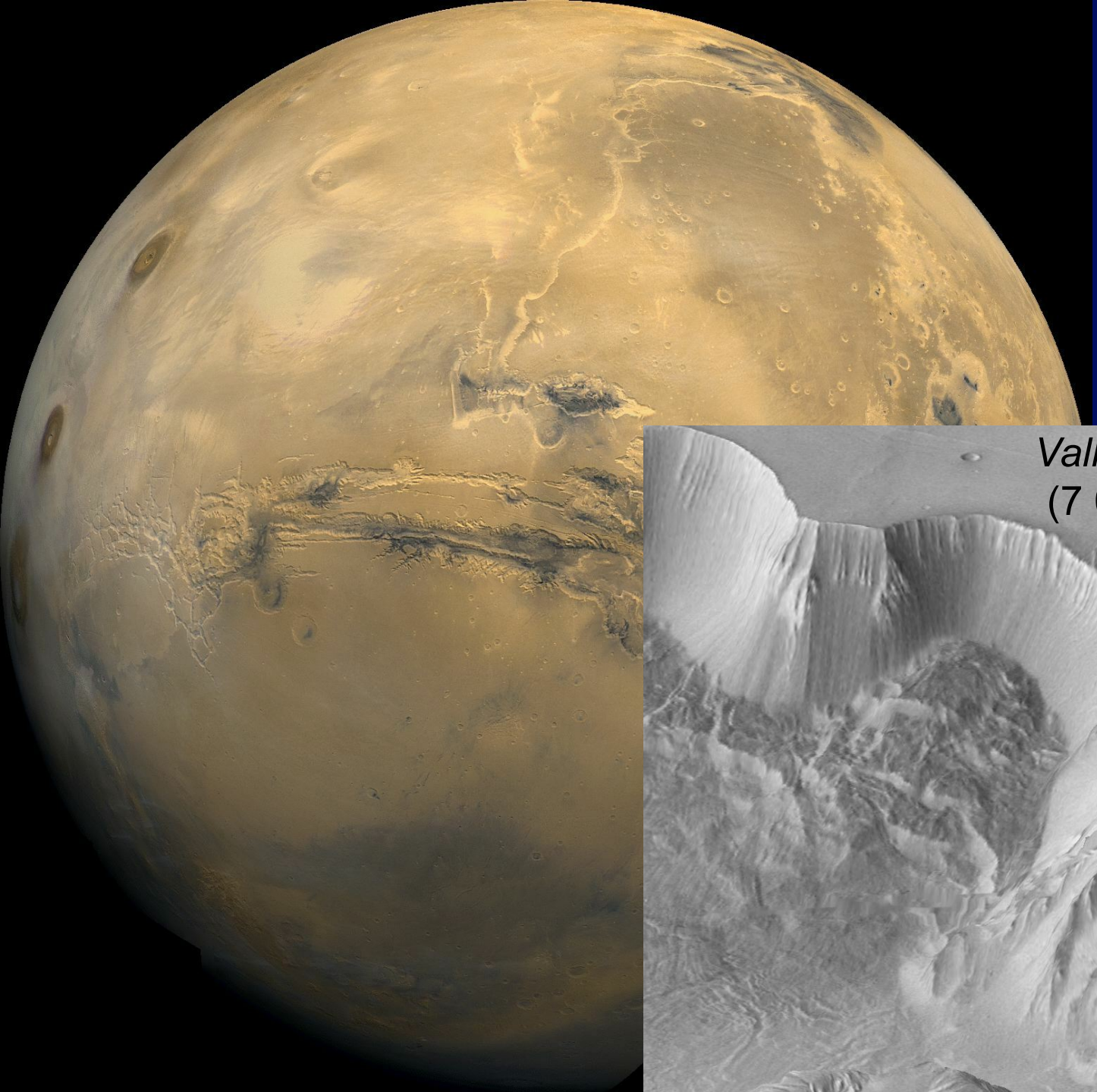


Venus

Mariner10

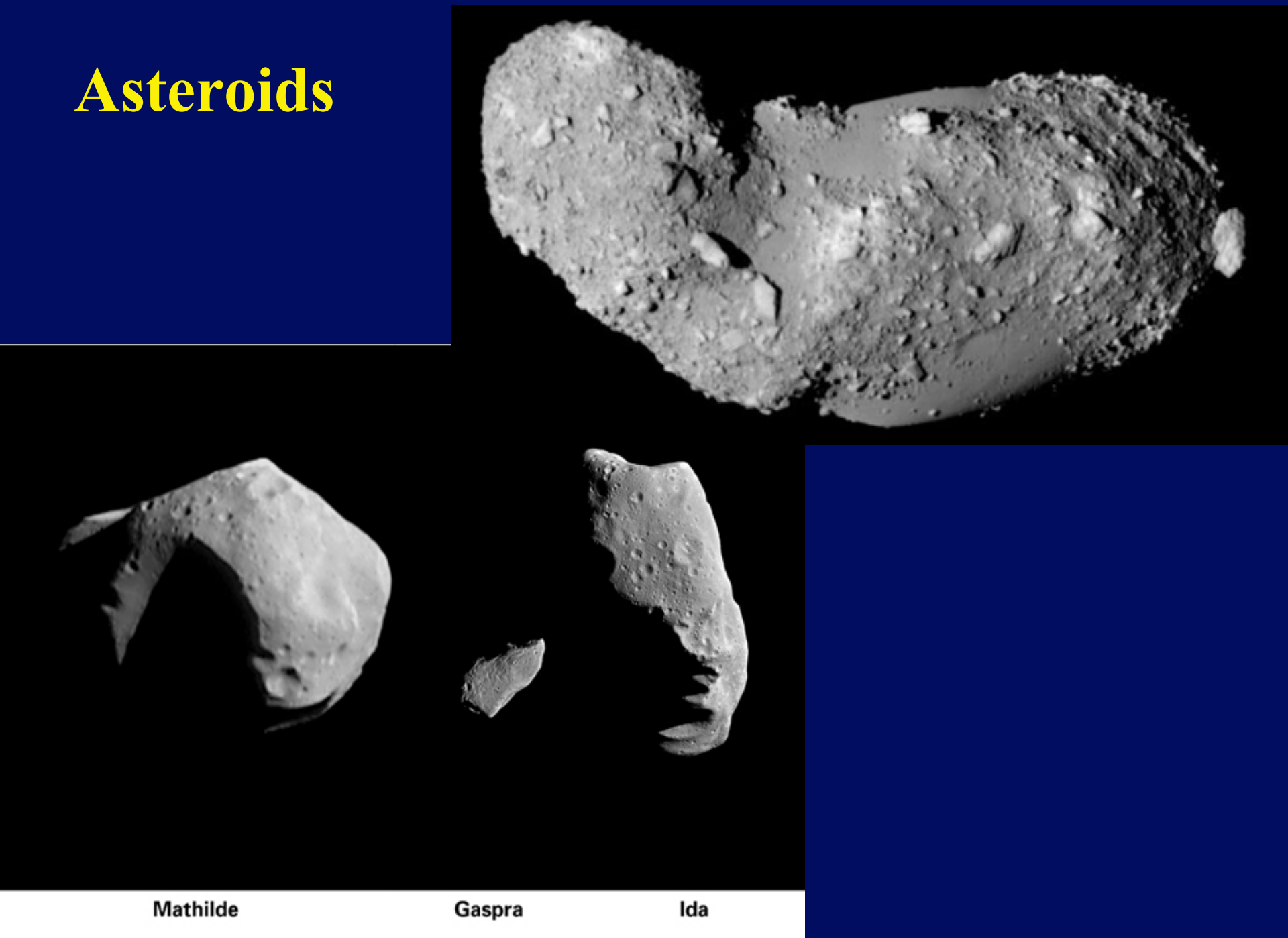

Nasa

Mars

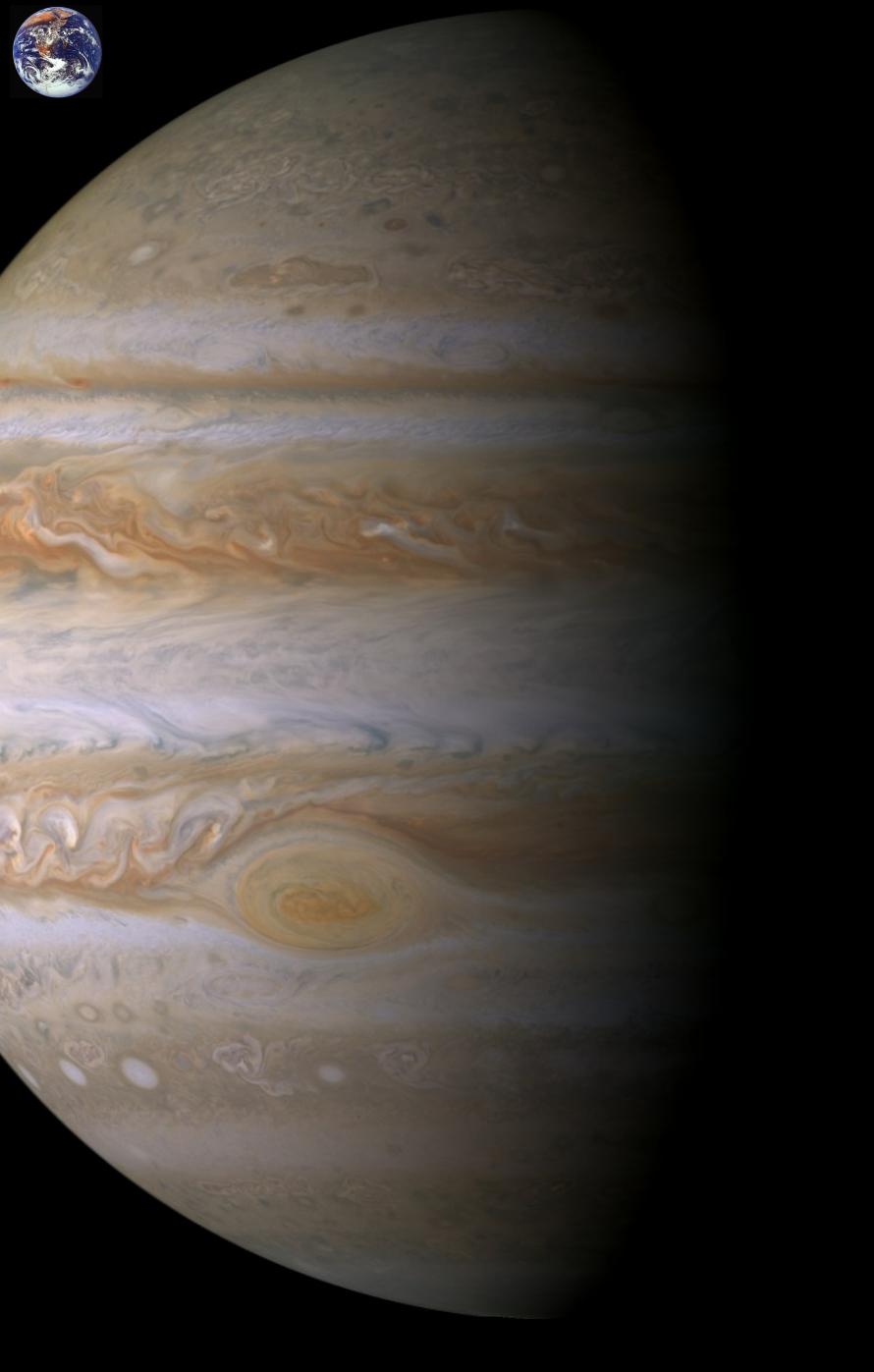


Valles Marineris
(7 000 m high)

Asteroids

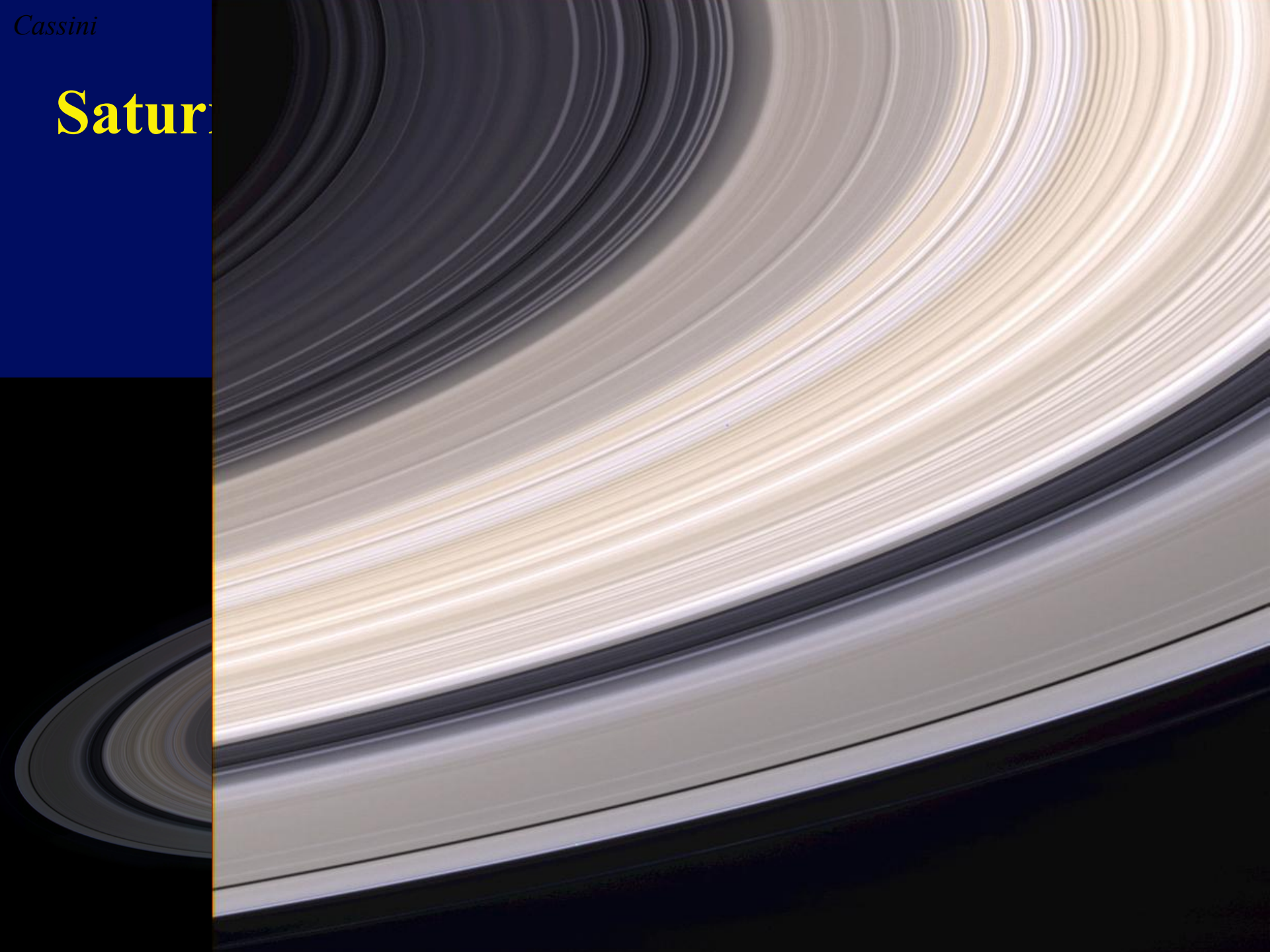


Jupiter



Cassini

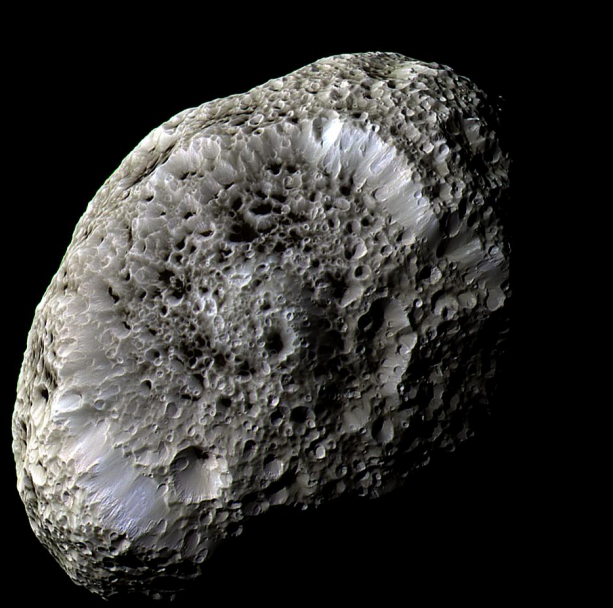
Satur

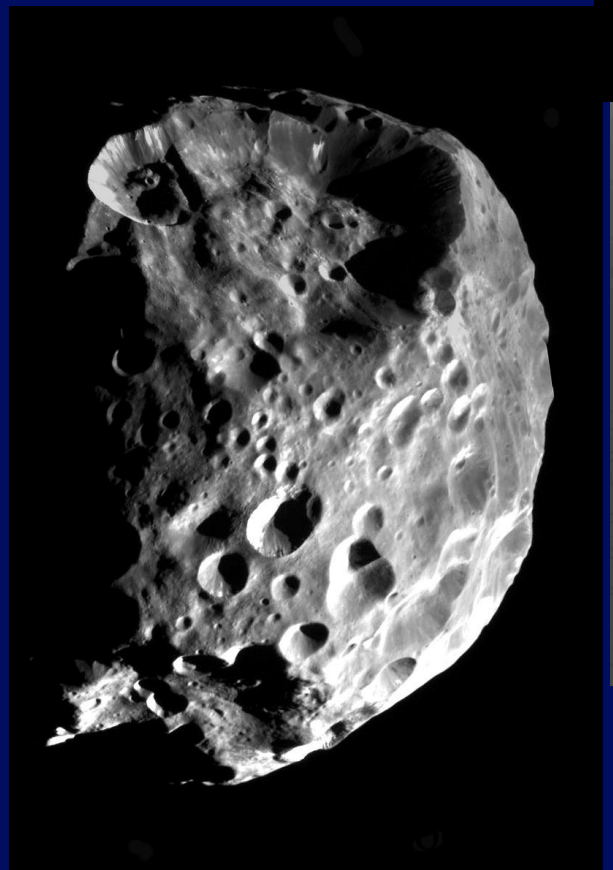


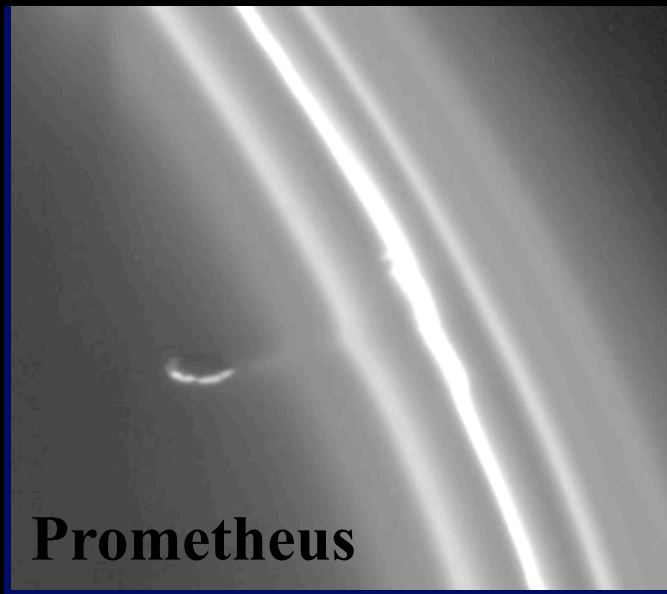
Moons…

Titan

Mimas



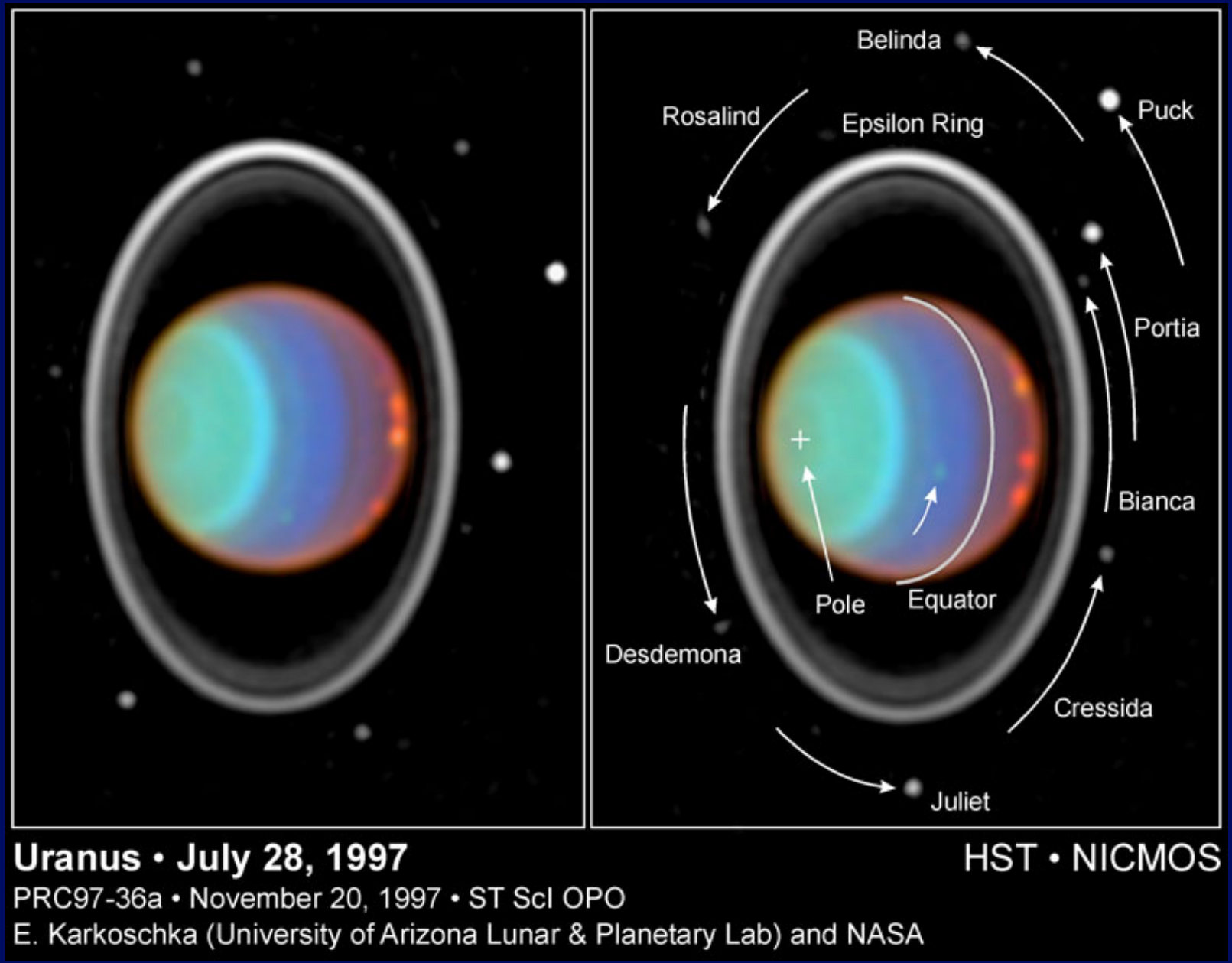




Prometheus

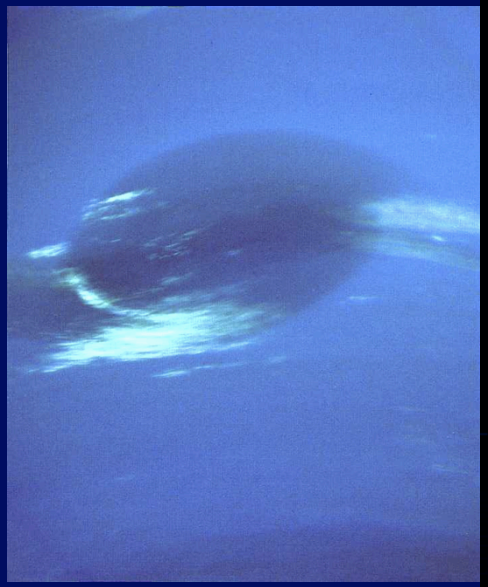
Voyager, Huygens & Cassini

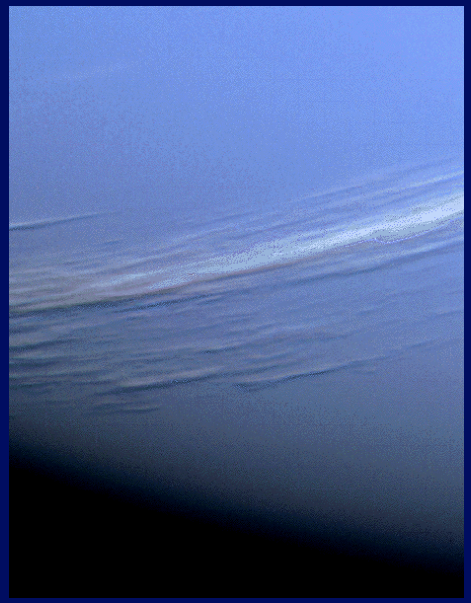
Hubble Watches Uranus

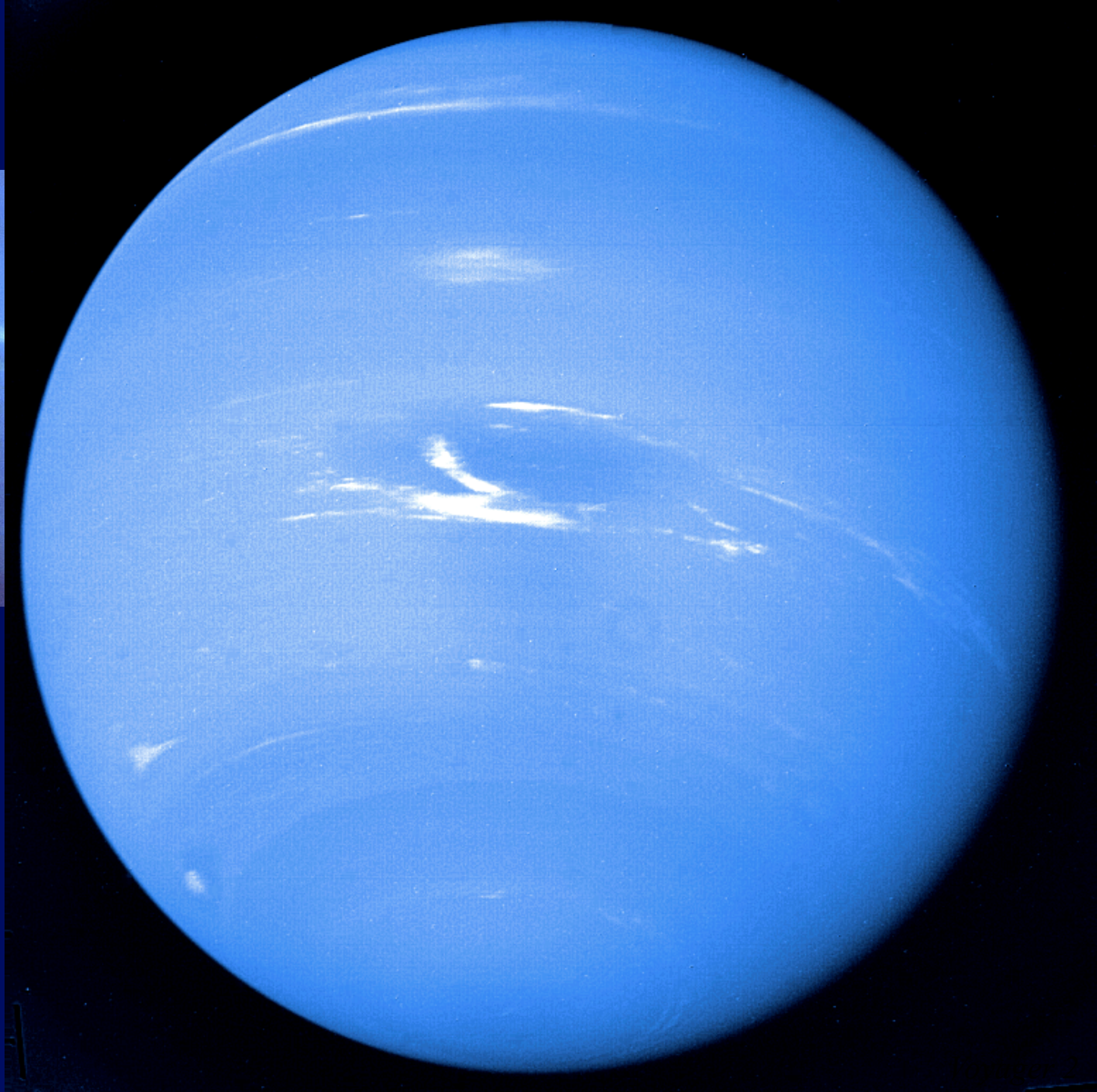


Voyager

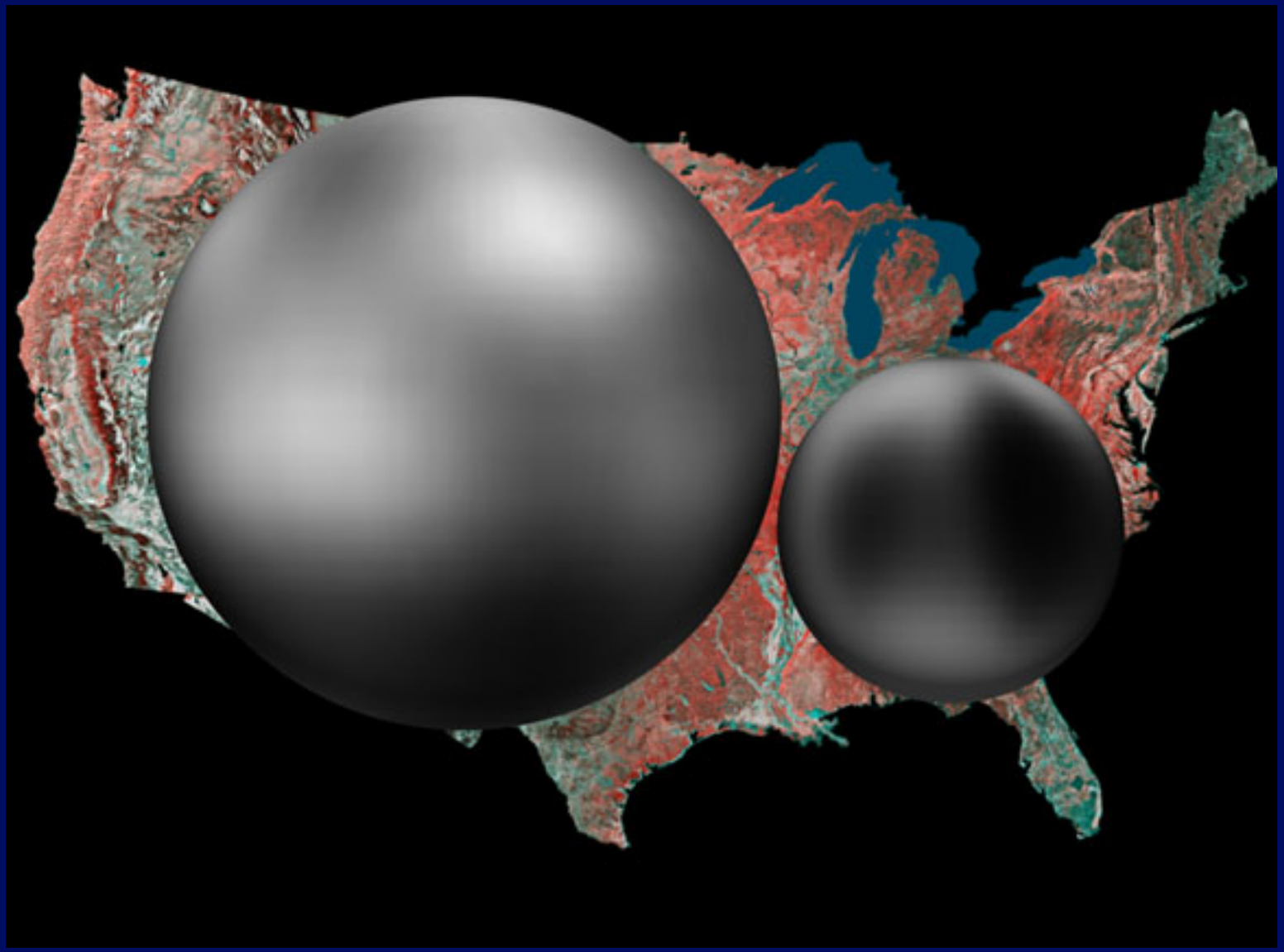
Neptune







Pluto & Charon



Pluto was voted out as a planet in the General Assembly meeting of the International Astronomical Union at Prague in Aug 2006

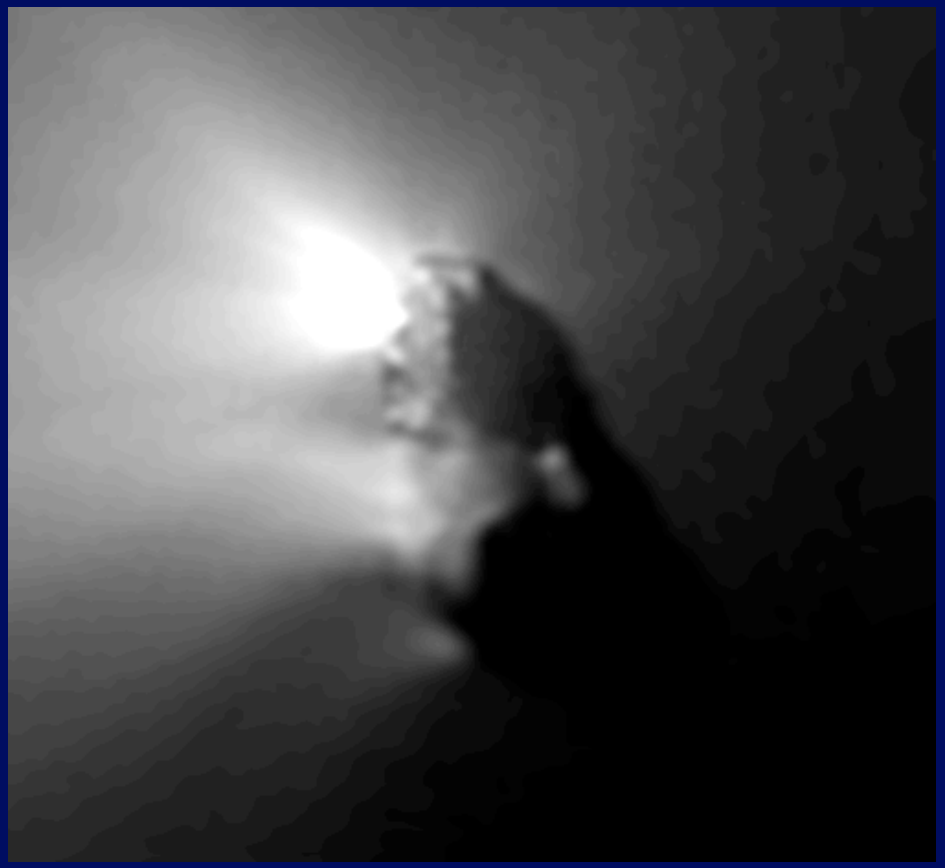
RESOLVED, BY THE SENATE OF THE NINETY-SIXTH GENERAL ASSEMBLY OF THE STATE OF ILLINOIS,

that as Pluto passes overhead through Illinois' night skies, that it be reestablished with full planetary status, and that March 13, 2009 be declared "Pluto Day" in the State of Illinois in honor of the date its discovery was announced in 1930.

(SR0046 was adopted on 2/26/2009.)

Comets

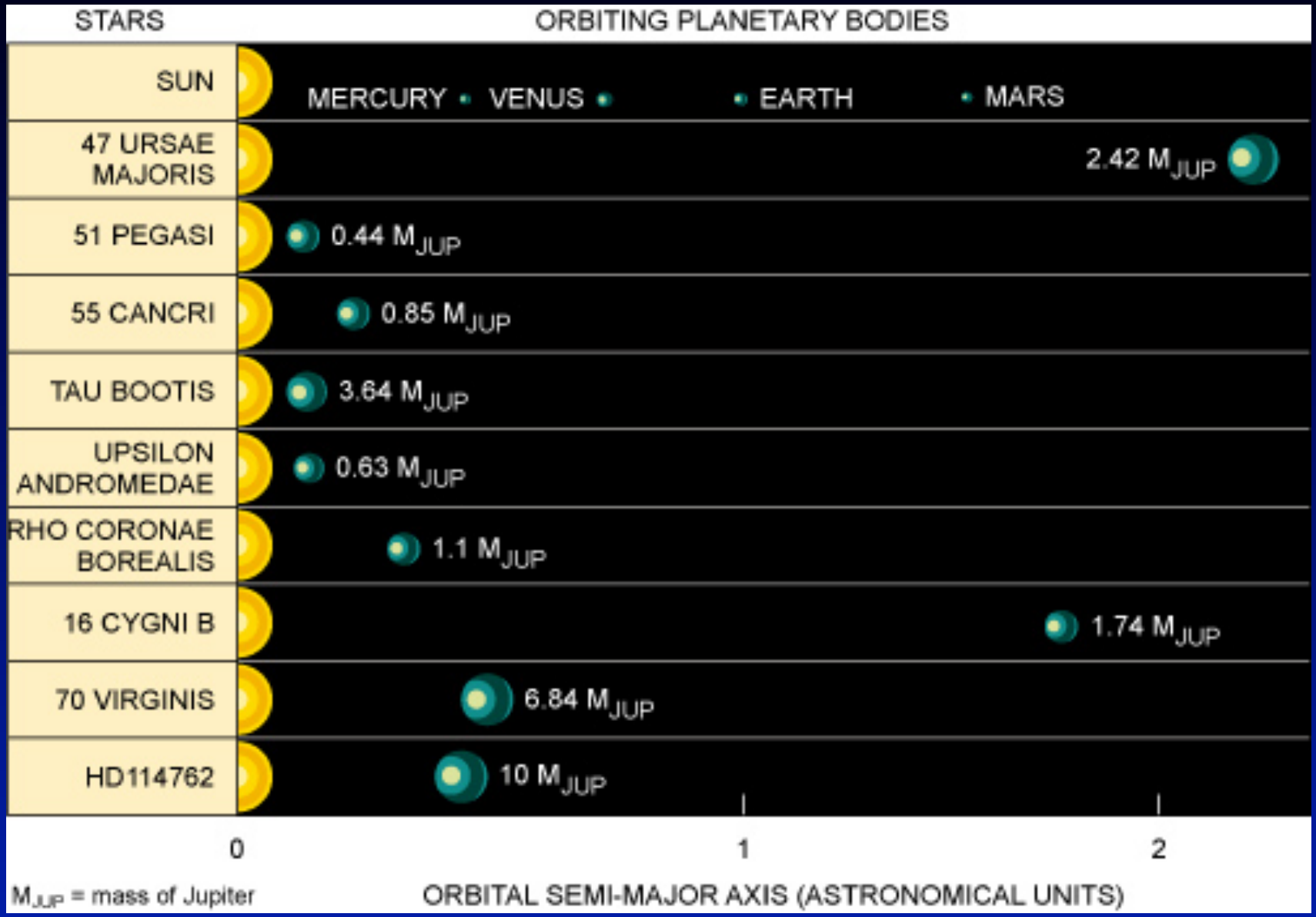
Hale-Bopp



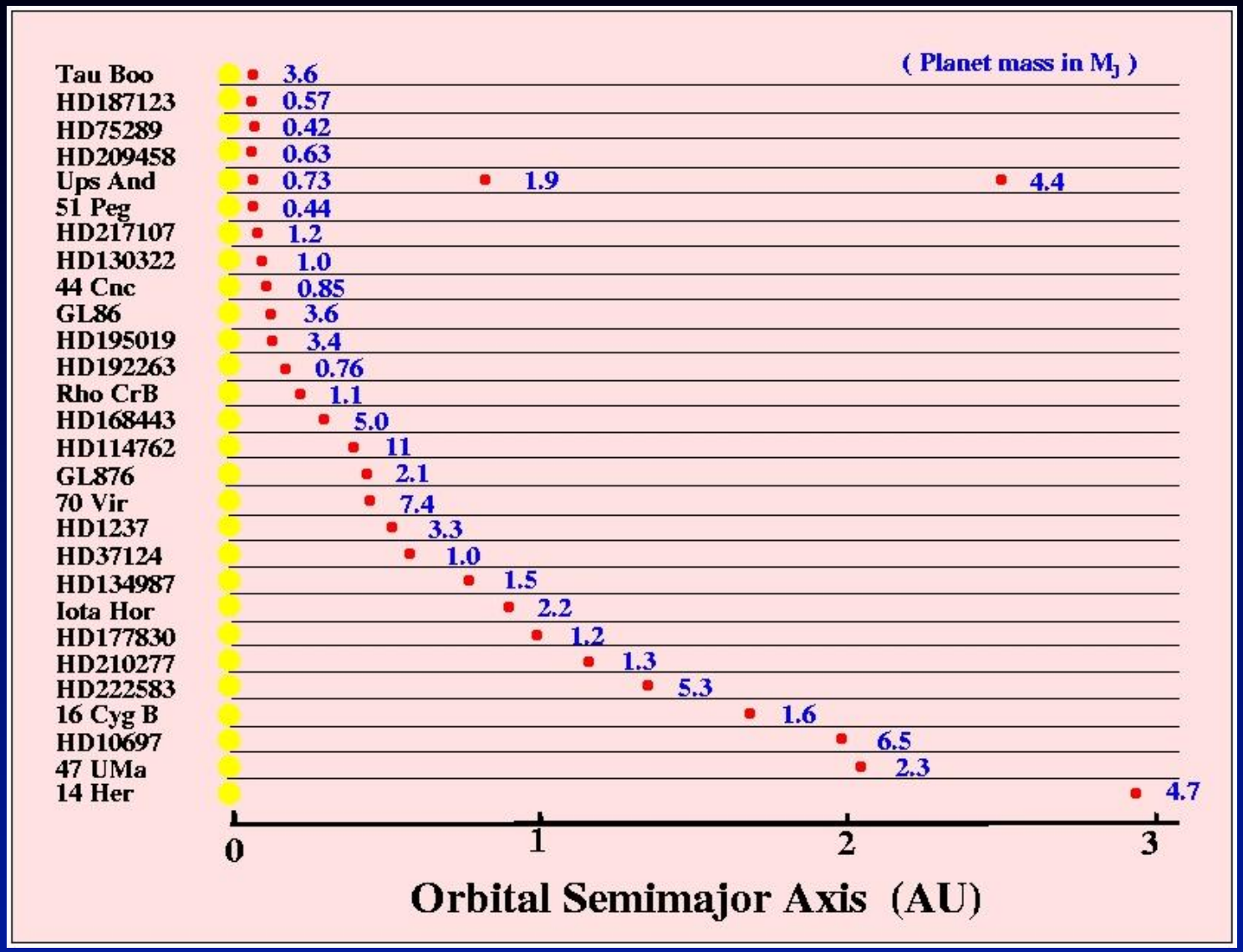
Halley comet nuclei
(*Giotto, ESA*)


Meteor Shower

Stars and Planets



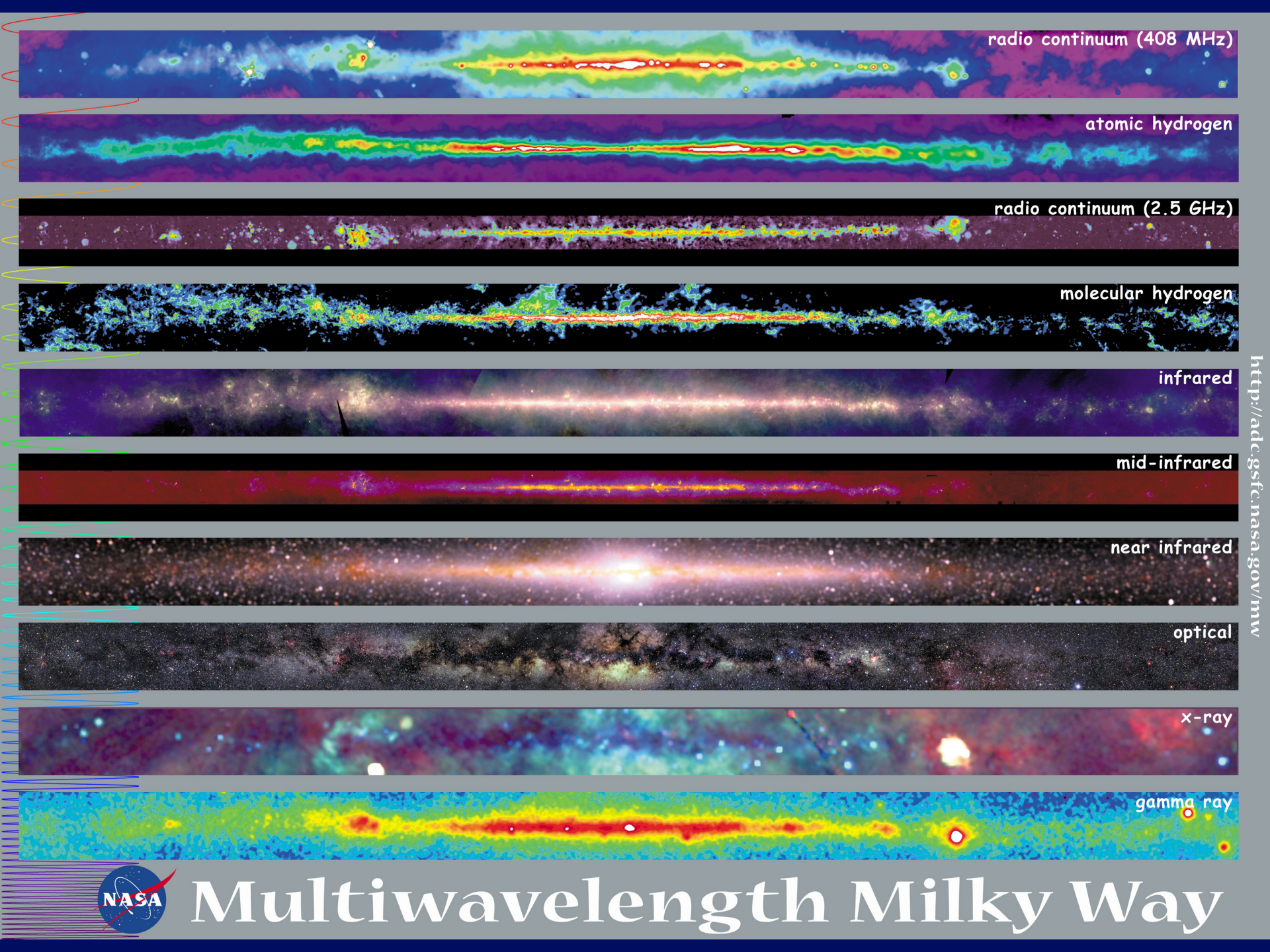
Masses and Orbital Radii of the Planets



152 planets in 134 planetary systems; 14 multiple planet systems

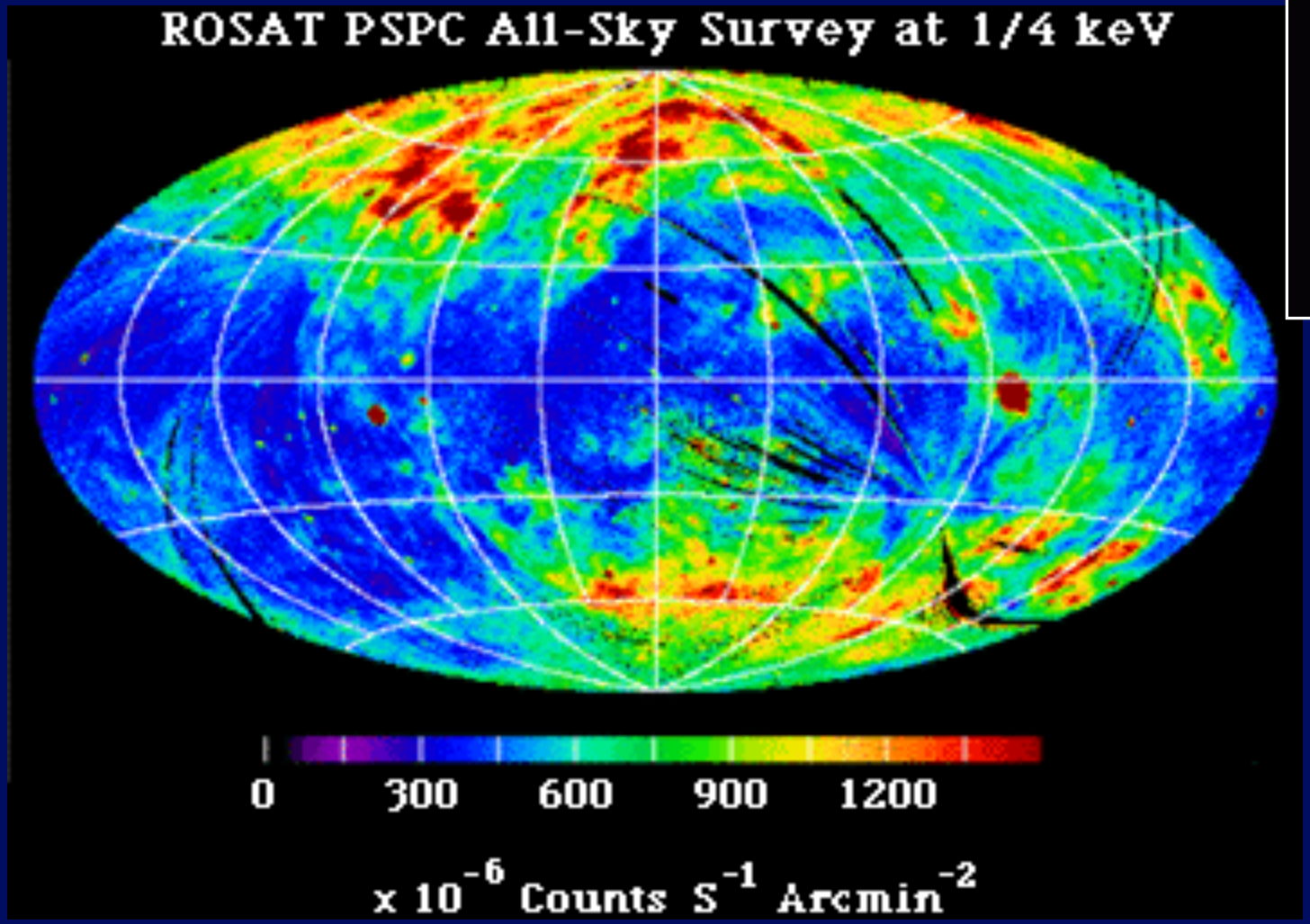
Some Topics to Be Covered:

- **Tidal force**
- **Planetary atmospheres**
  temperature and composition
- **Radioactive dating**
- **Dust**
  production and evolution
- **Formation and Evolution of Planetary system**


radio continuum (408 MHz)
atomic hydrogen
radio continuum (2.5 GHz)
molecular hydrogen
infrared
mid-infrared
near infrared
optical
x-ray
gamma ray
http://adc.gsfc.nasa.gov/mw
NASA
Multiwavelength Milky Way

ROSAT All-Sky Survey

1990 Jun - 1991 Jan; 0.1 keV - 2 keV
Detected 150,000 sources!



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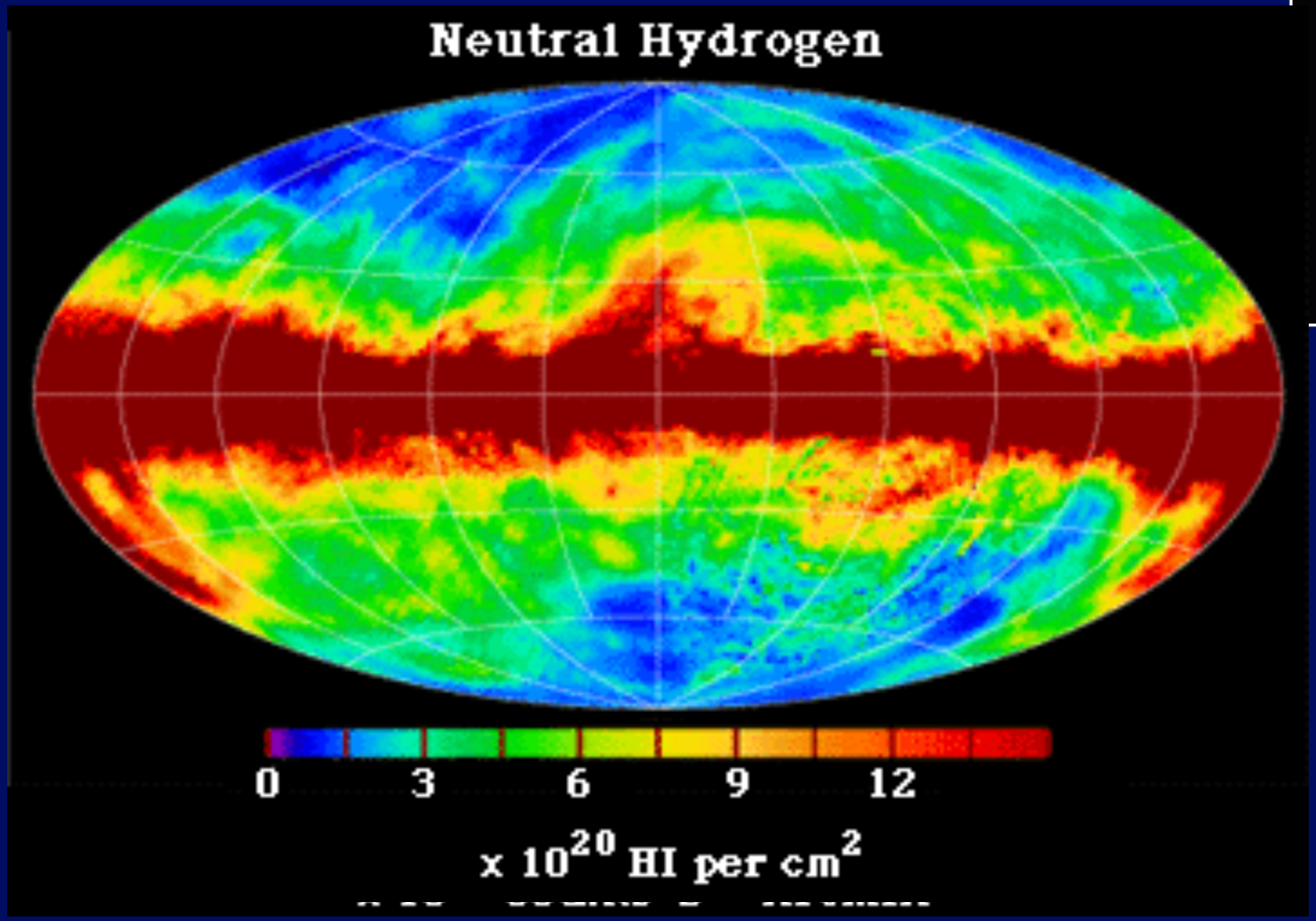

1

2

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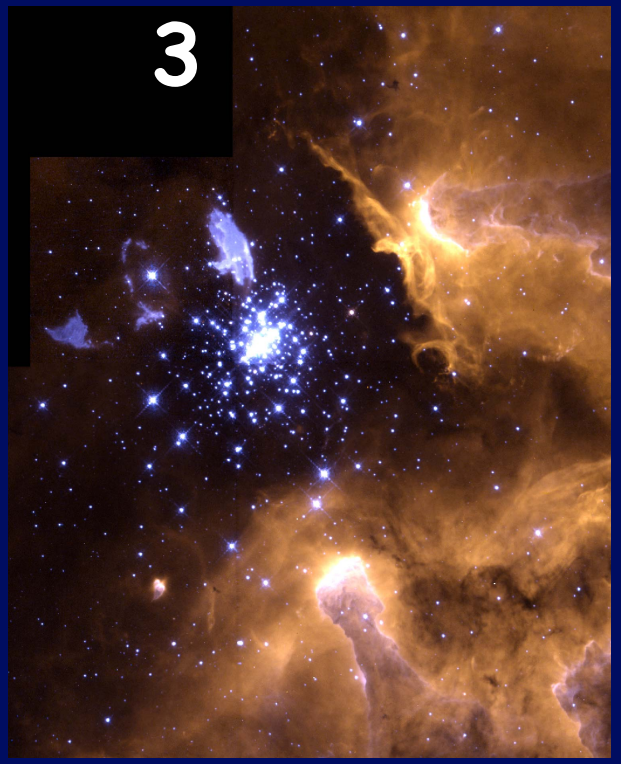
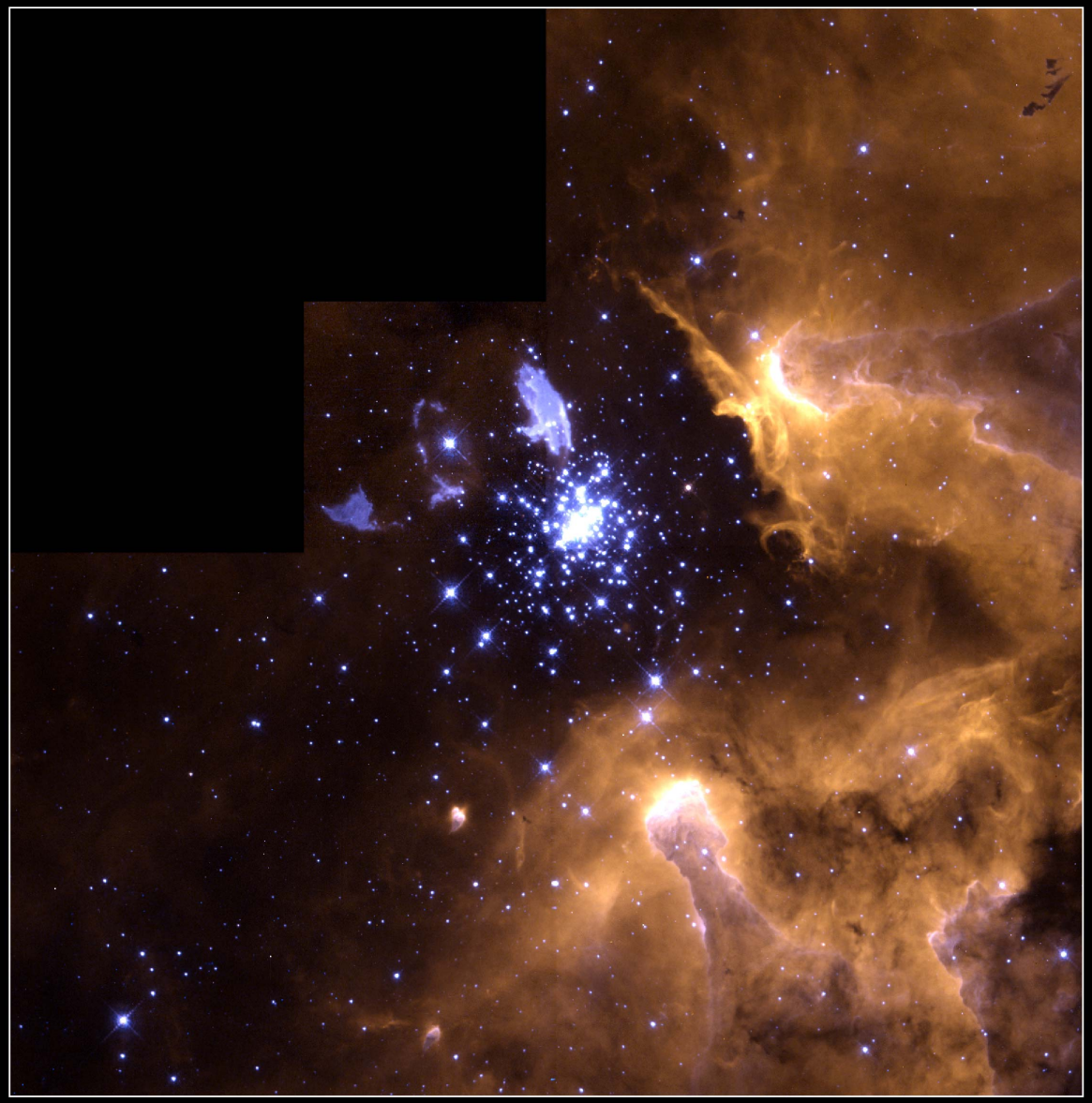


4

5



NGC 3603

Hubble Space Telescope • WFPC2

PRC99-20 • STScI OPO

Wolfgang Brandner (JPL/IPAC), Eva K. Grebel (University of Washington),
You-Hua Chu (University of Illinois, Urbana-Champaign) and NASA

Multi-λ View of Planetary Nebulae

Cat's Eye Nebula
X-ray in blue

Helix Nebula
24 μm in red

Some Topics to Be Covered:

- Physical state of the ISM
- ionization, heating, cooling
- Theory vs observations
- Gas dynamics
- Interaction between stars and ISM
- Multi-phase ISM
- Interstellar dust