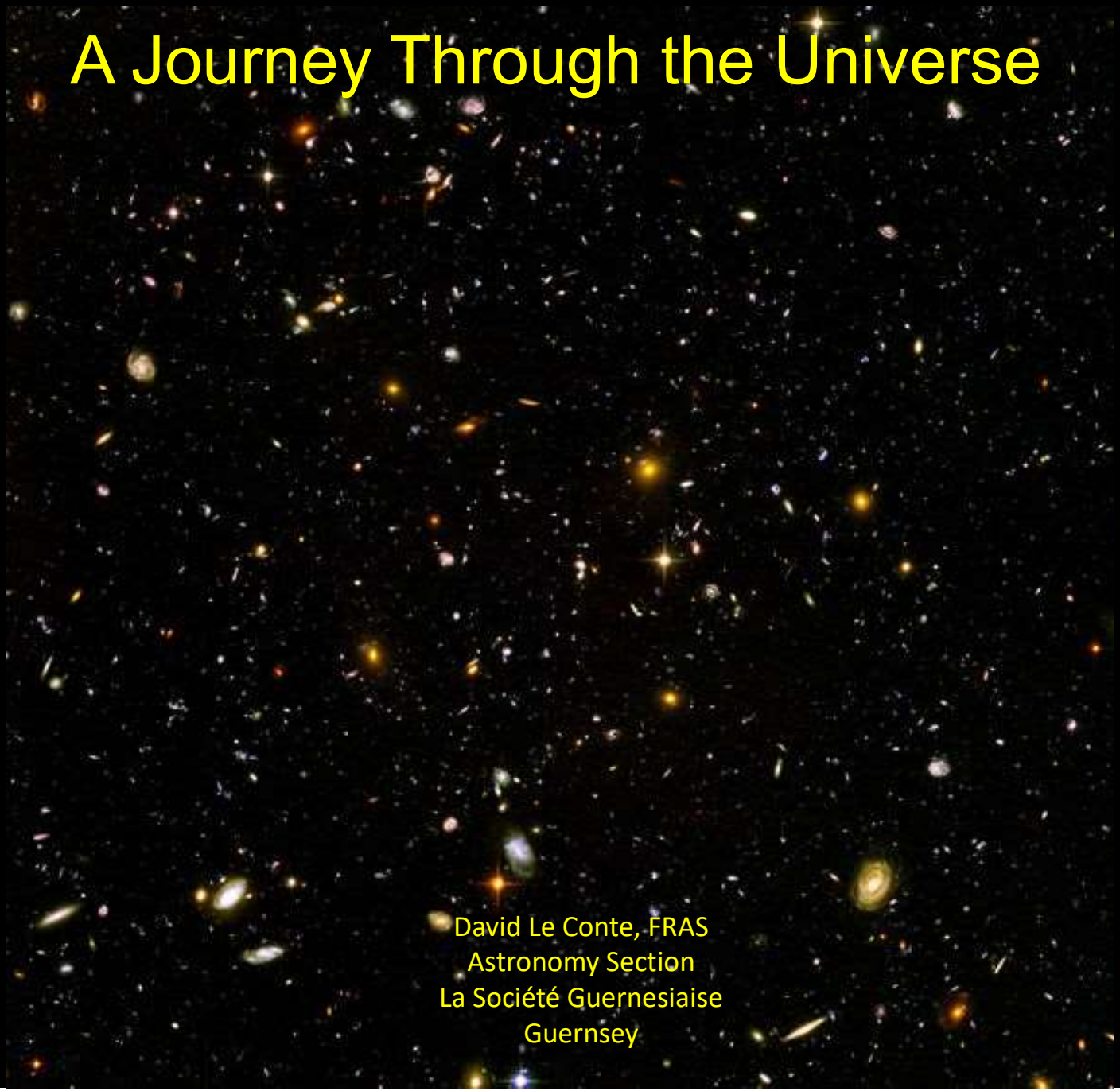
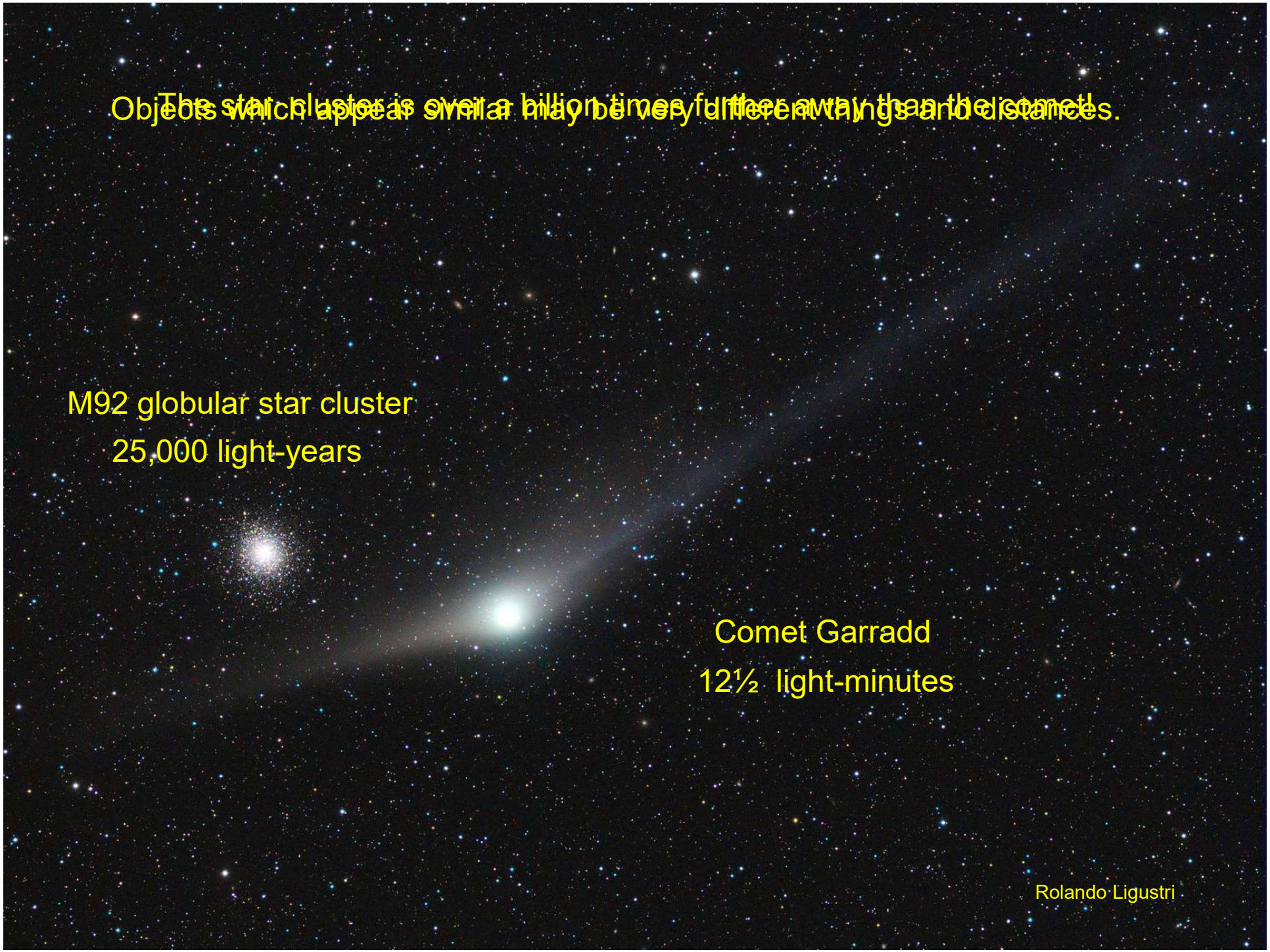
A Journey Through the Universe



David Le Conte, FRAS
Astronomy Section
La Société Guernesiaise
Guernsey


Objects which appear similar may be very different things and distances.
This star cluster is over a billion times further away than the comet!
M92 globular star cluster
25,000 light-years
Comet Garradd
12½ light-minutes
Rolando Ligustri

Light-years

The speed of light is 186,000 miles (300,000 km) per second

In one minute light travels over 11 million miles

That distance is a '*light-minute*'

In one hour light travels 670 million miles (over 1 trillion km)

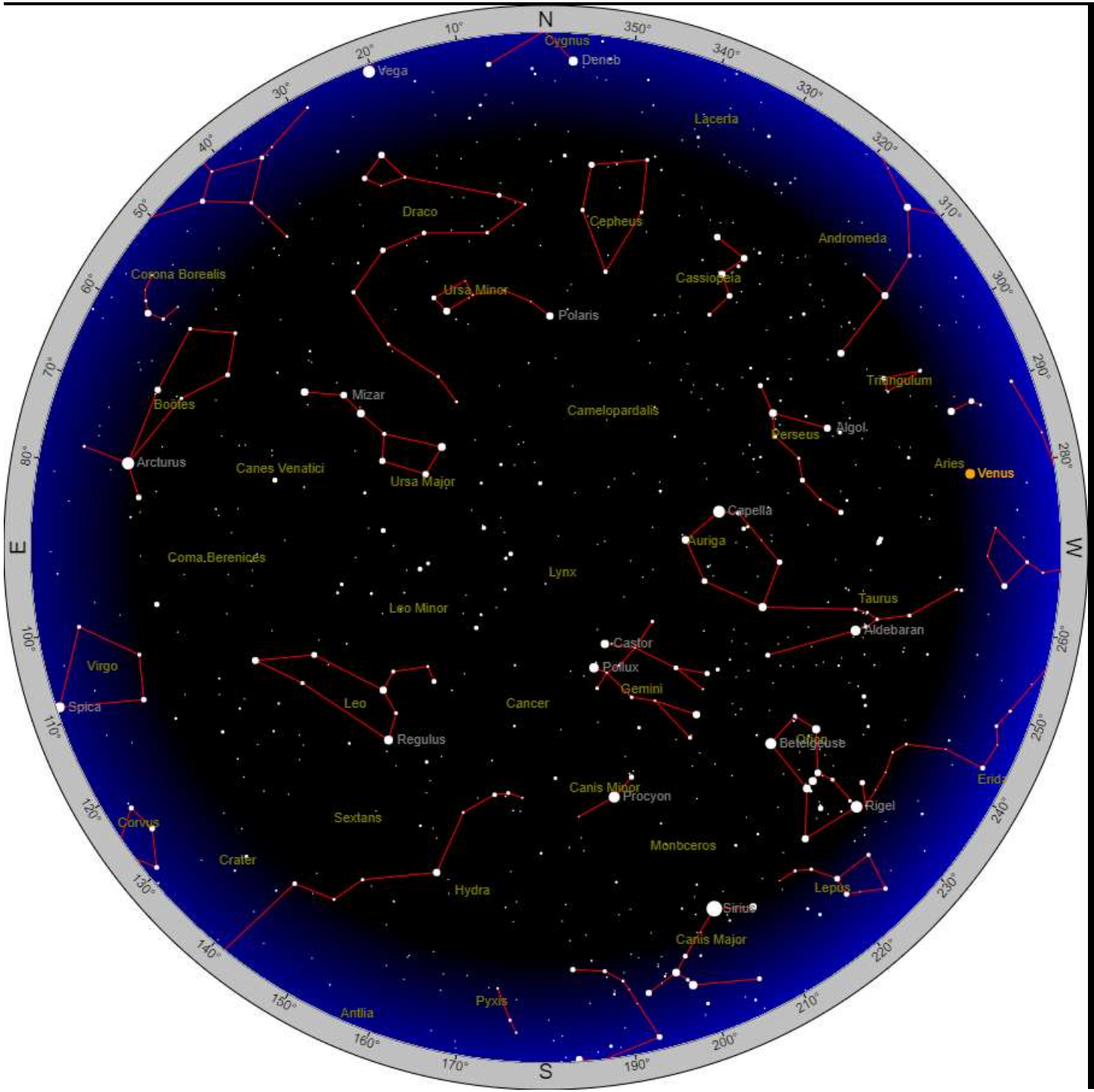
In one year light travels 6 trillion miles (9.5 trillion km)

That distance is a '*light-year*'


Outer space
About 100 km

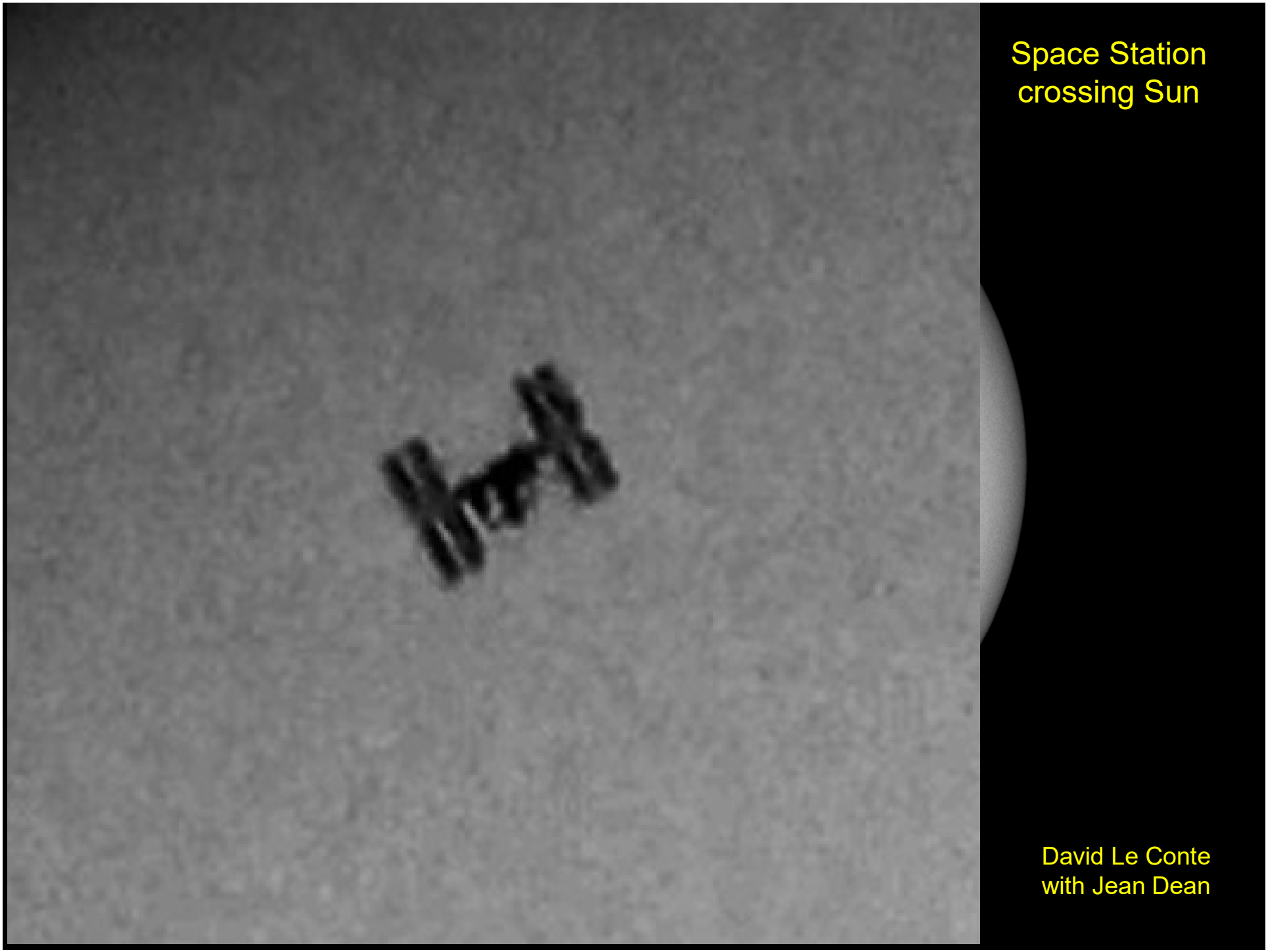

The International Space Station
400 km

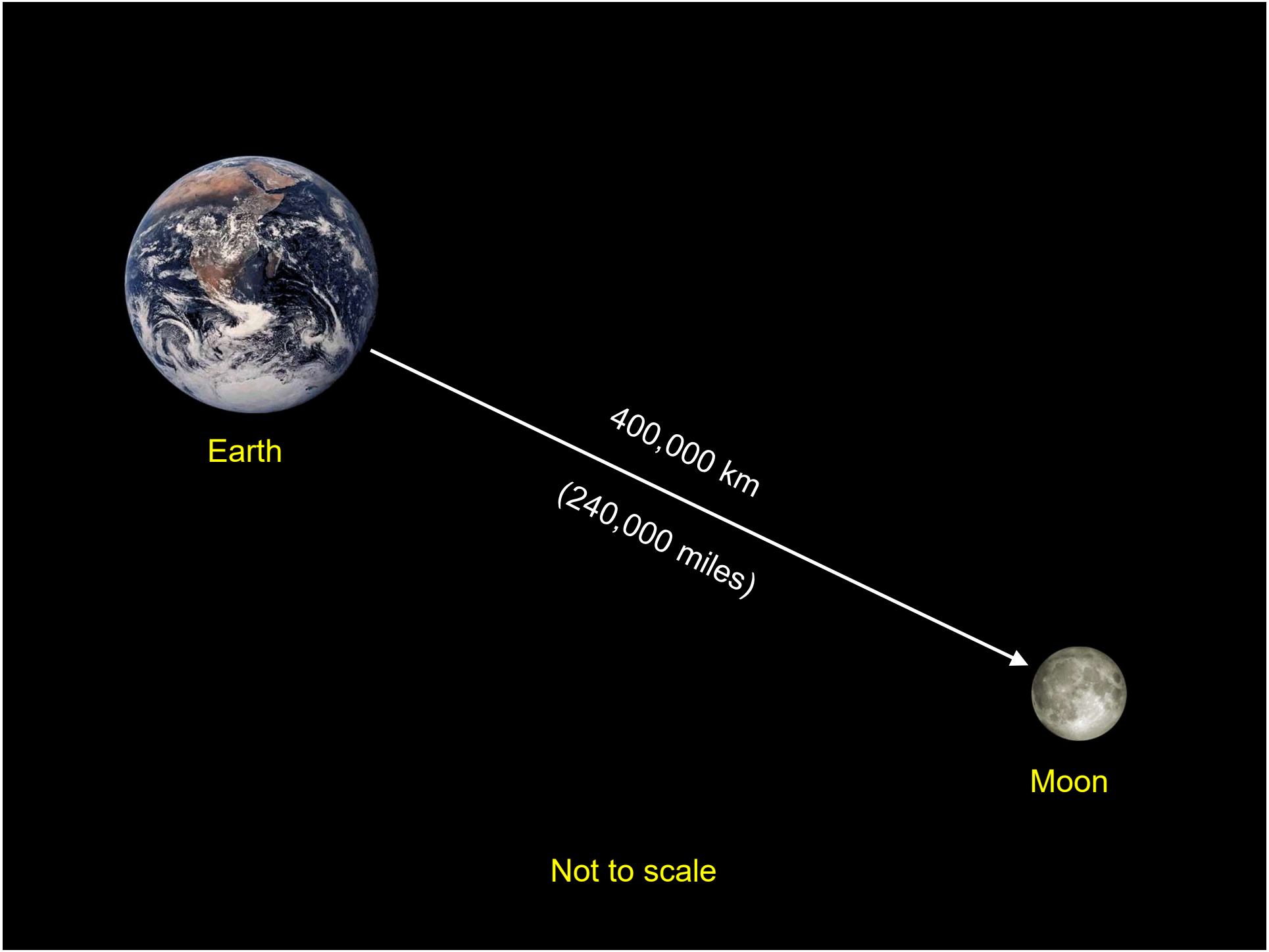

International Space Station and Space Shuttle Endeavour
(Three minutes after the Space Station)
David Le Conte



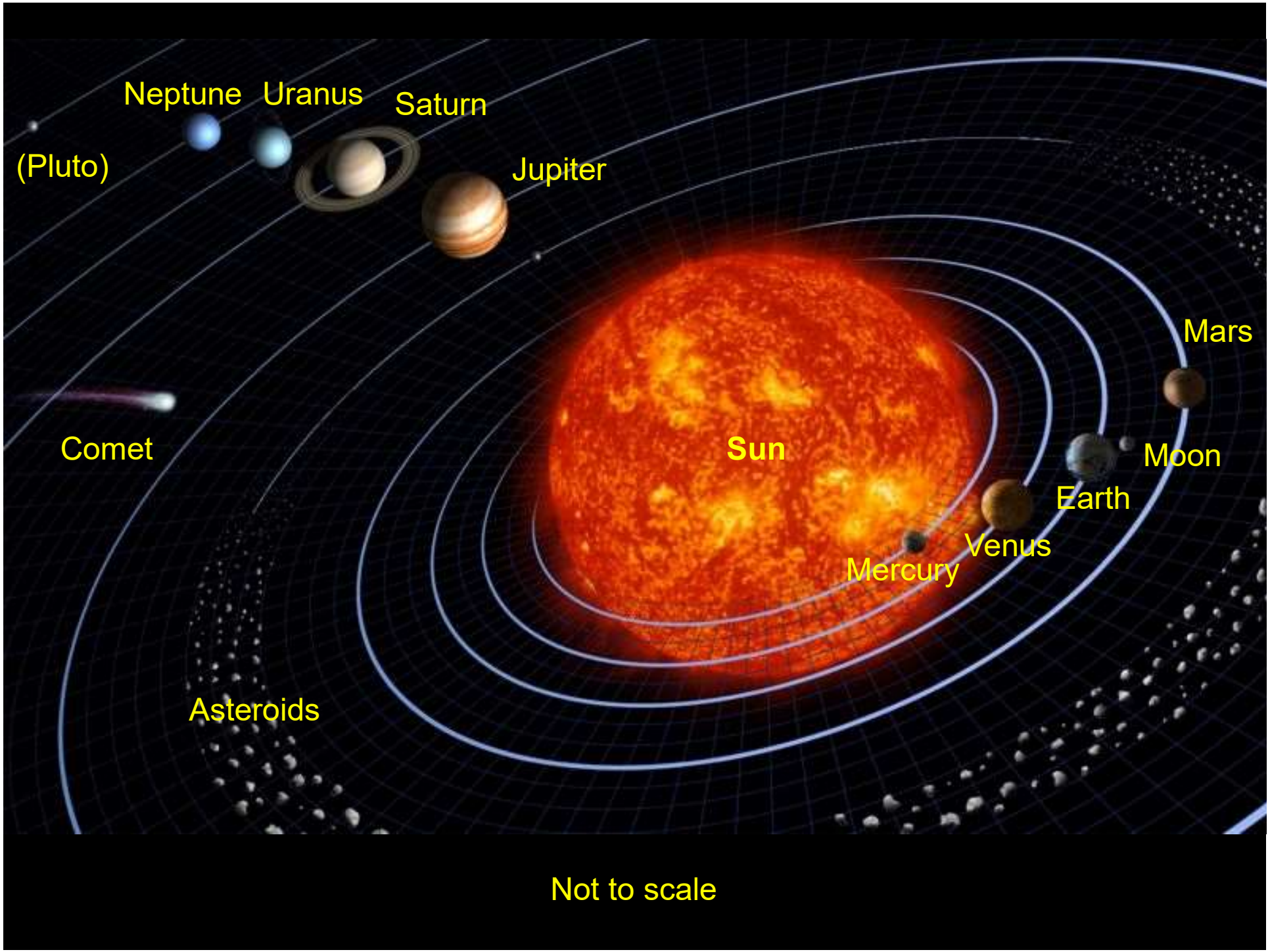
www.
heavens-above.com

The night sky
from Guernsey
9 pm, April 2020

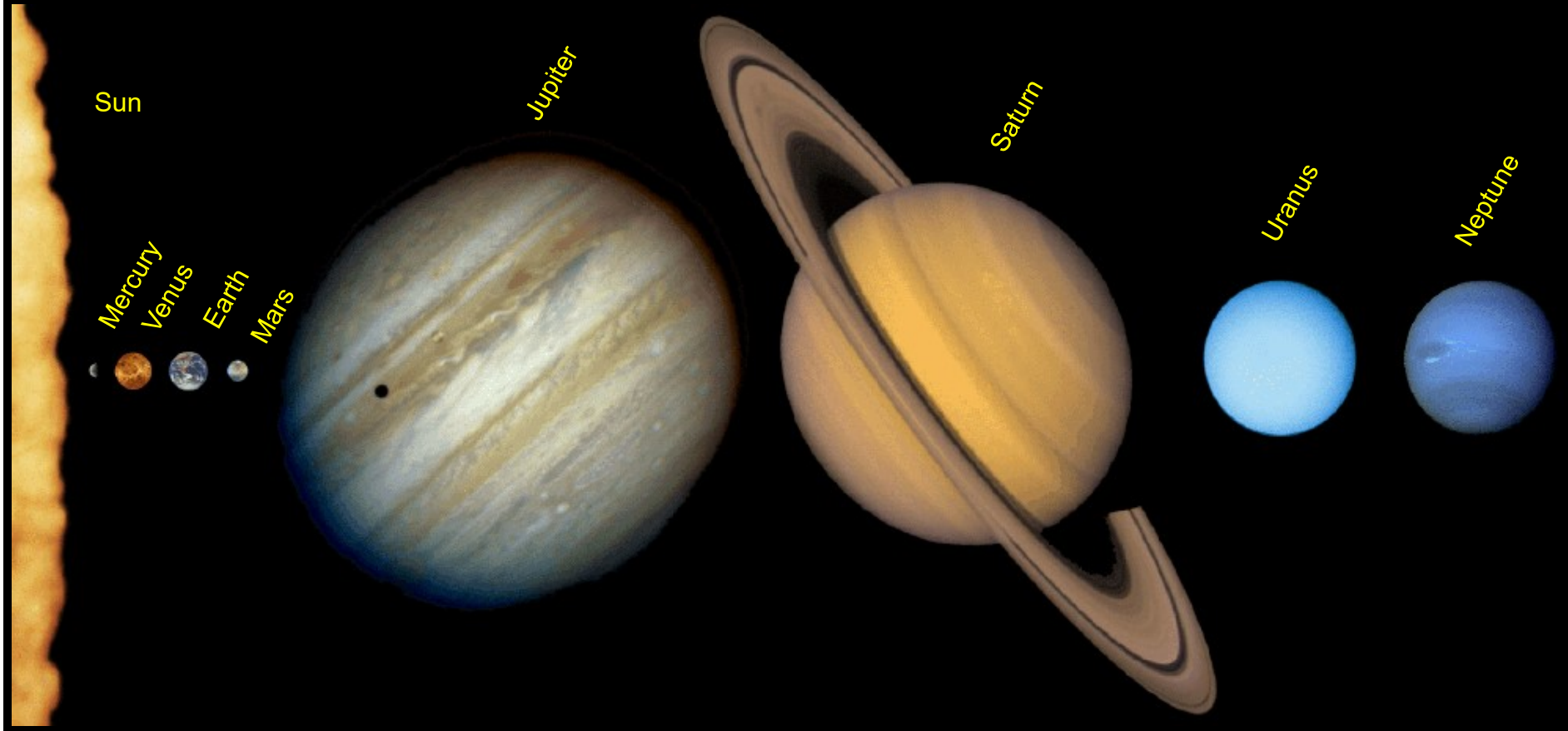

Space Station
crossing Sun
David Le Conte
with Jean Dean


Earth
400,000 km
(240,000 miles)
Moon
Not to scale

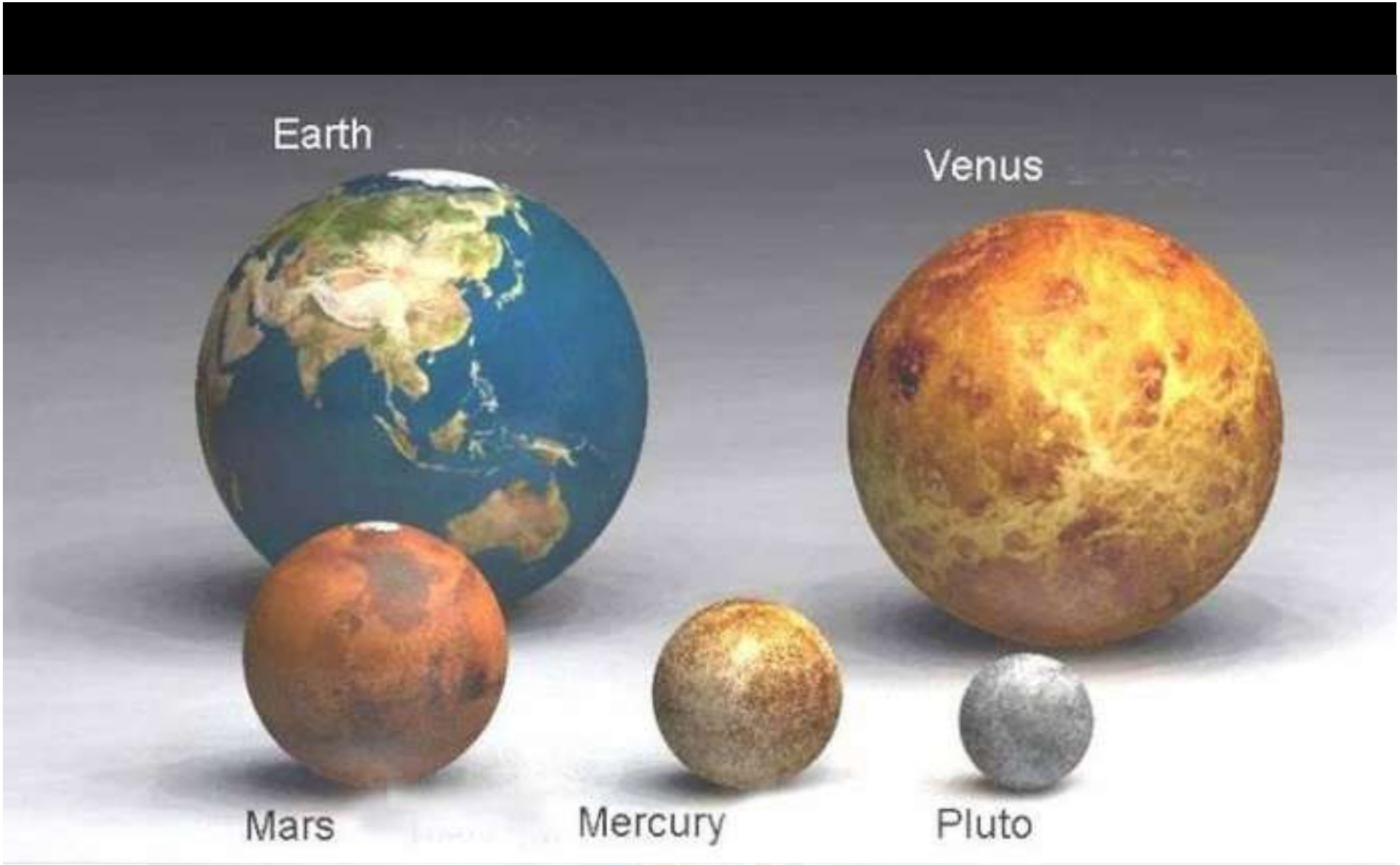

The Moon. 400,000 km (240,000 miles, 1.3 light-seconds)


Neptune
Uranus
Saturn
(Pluto)
Jupiter
Mars
Comet
Sun
Moon
Earth
Venus
Mercury
Asteroids
Not to scale

The solar system of the Sun and eight planets
(Sizes are to scale, but distances from the Sun are not to scale.)

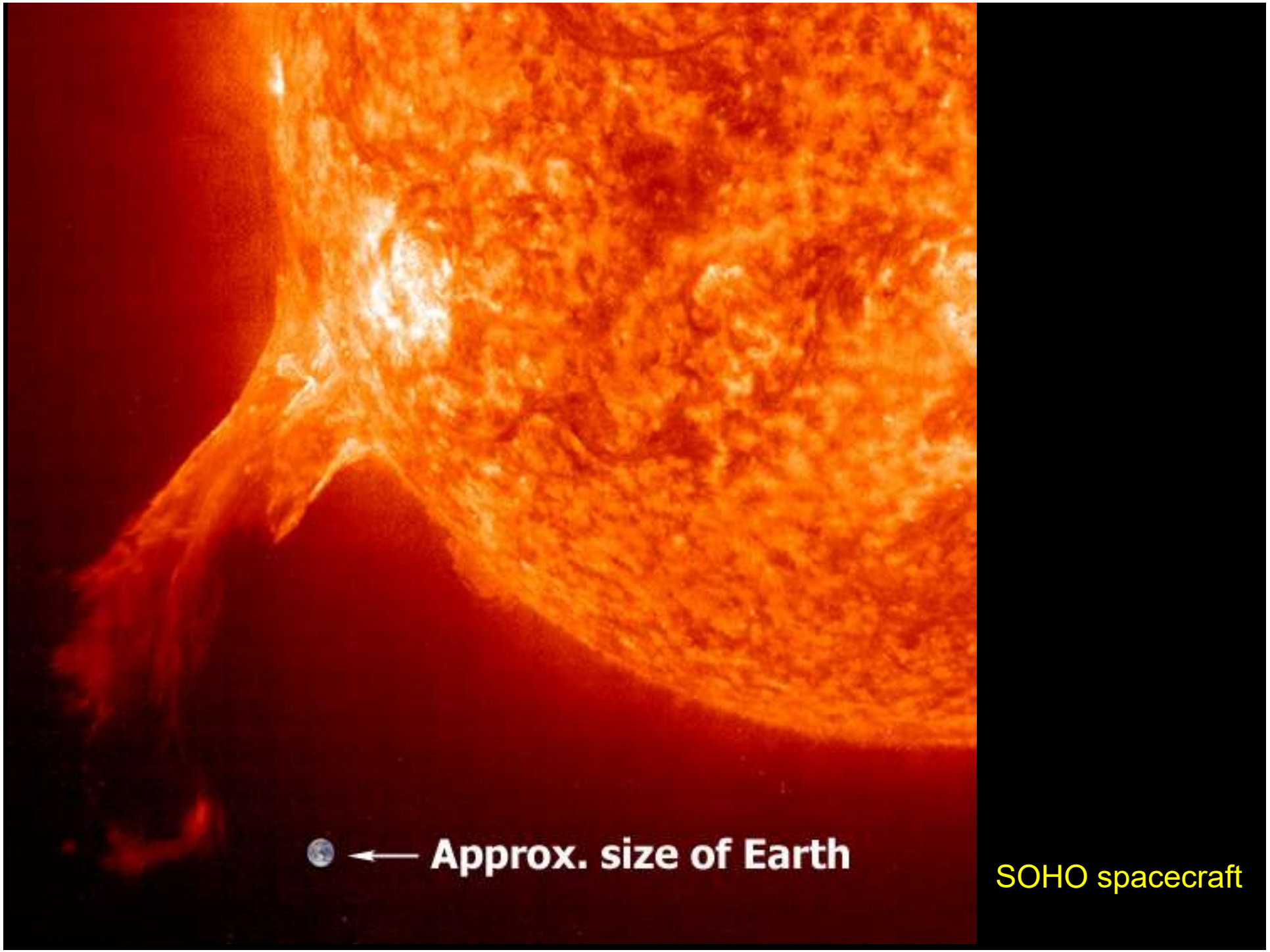


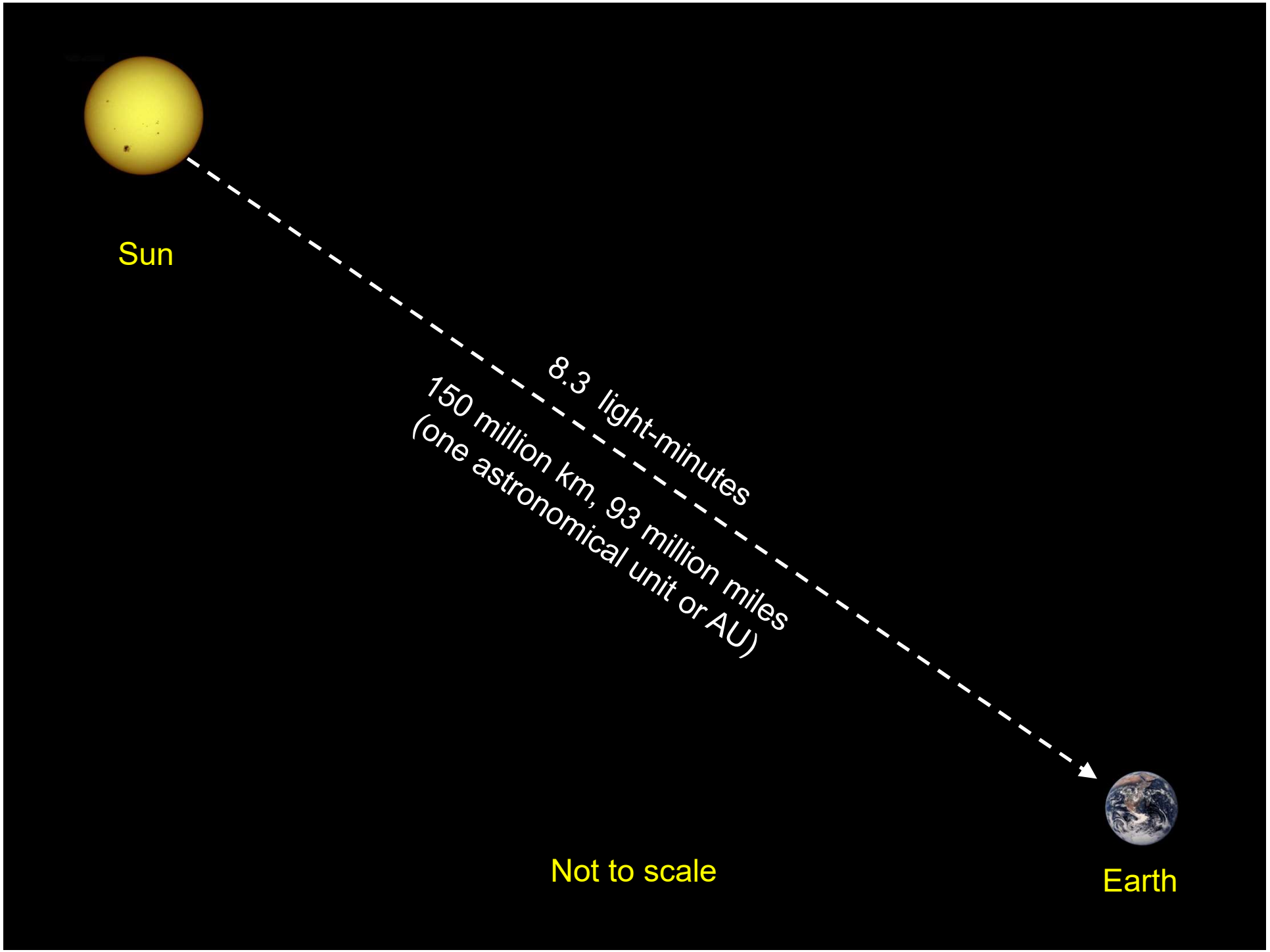
My Very Easy Method : Just Stay Up Nights !



The rocky planets


The Sun is 100 times the size of the Earth,
and 400 times the size of the Moon.
Earth
Moon
Sizes to scale

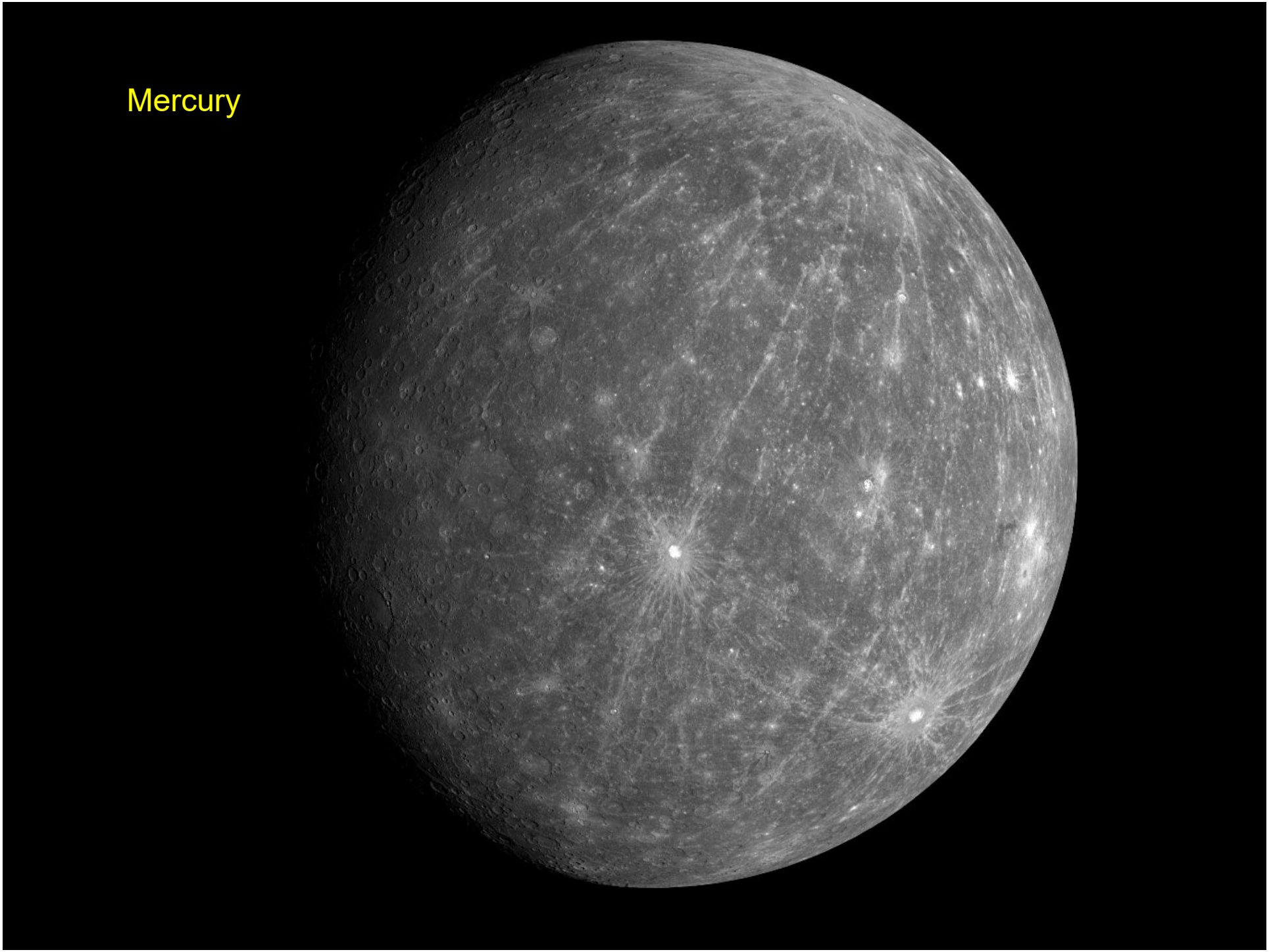

← Approx. size of Earth
SOHO spacecraft


Sun
8.3 light-minutes
150 million km, 93 million miles
(one astronomical unit or AU)
Not to scale
Earth

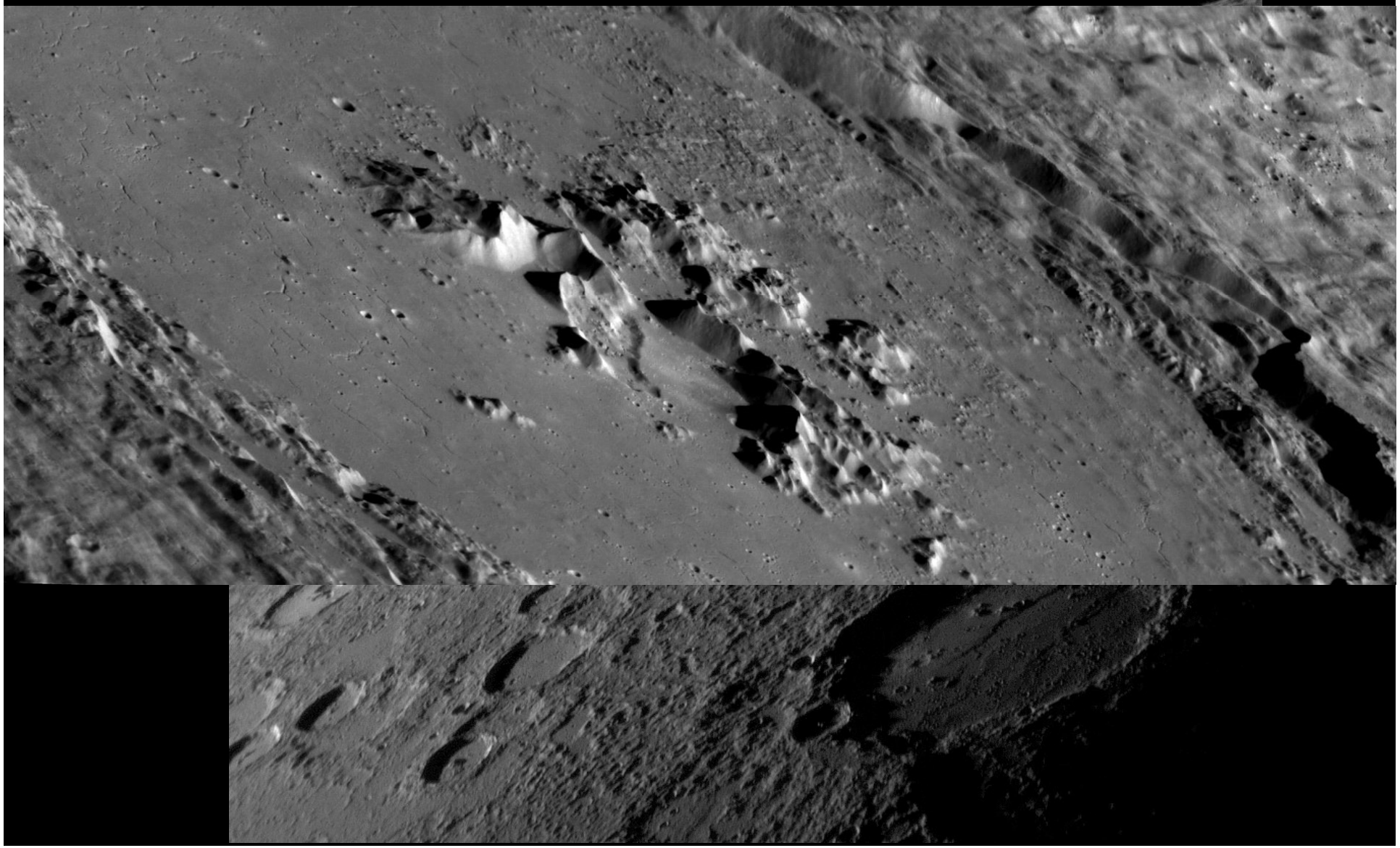

David Le Conte
Wyoming 2017

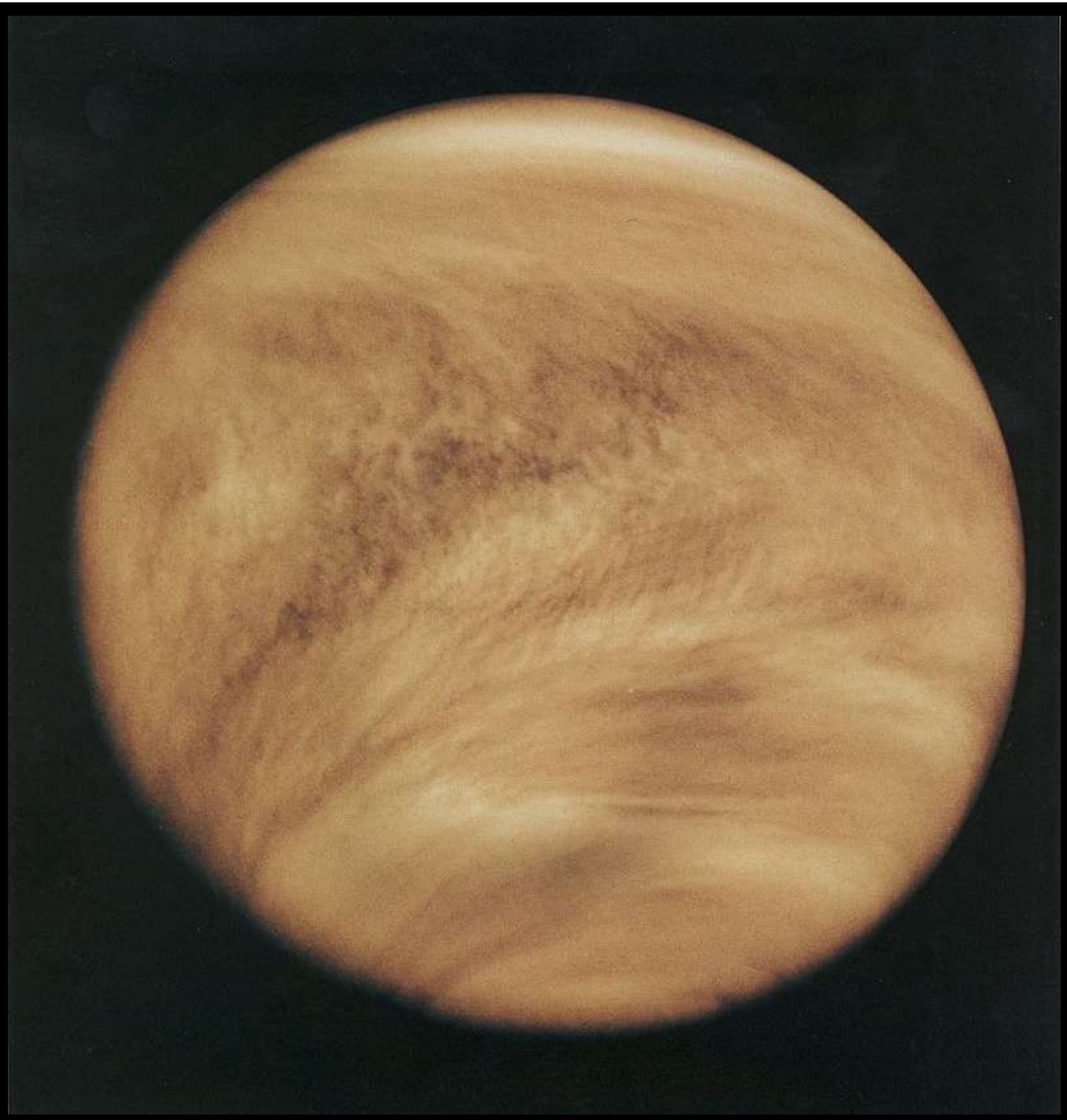
David Le Conte
Norway 2018

Mercury



Mercury, Messenger spacecraft, 2008





Venus
108 million km
(67 million miles)
from Sun

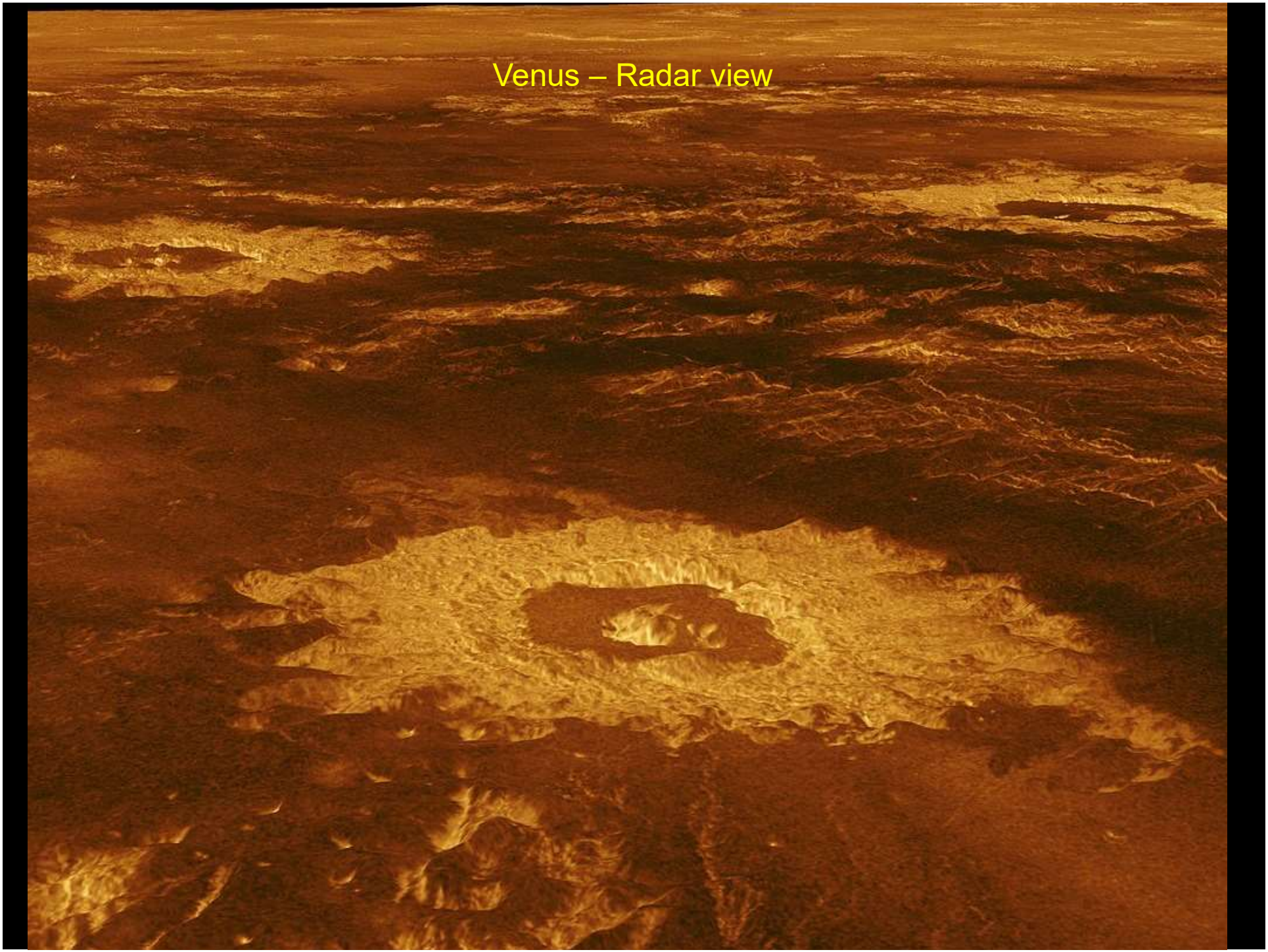
Pioneer Venus Orbiter
1979

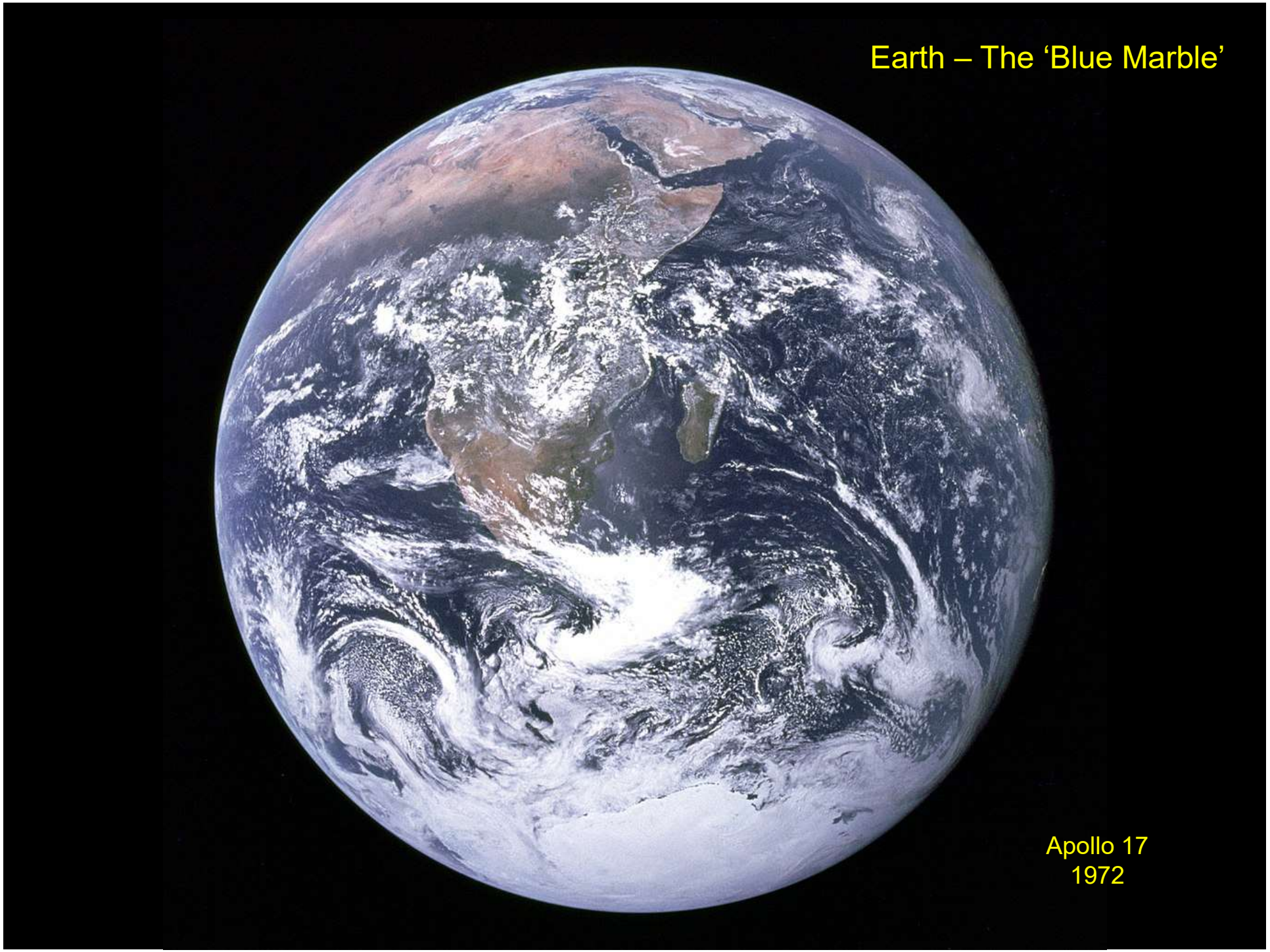
Venus – Radar view

Venus

Earth

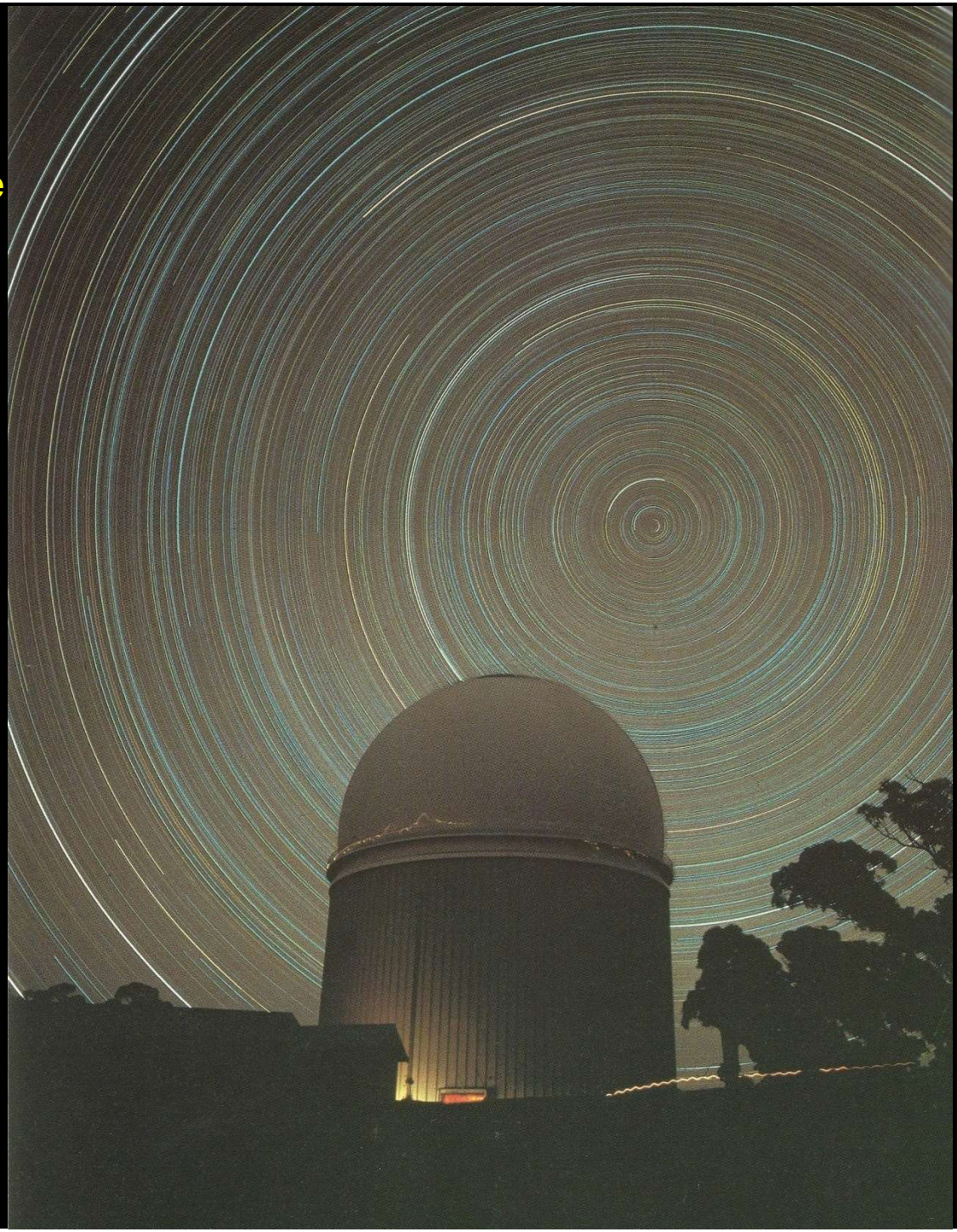
Magellan spacecraft image

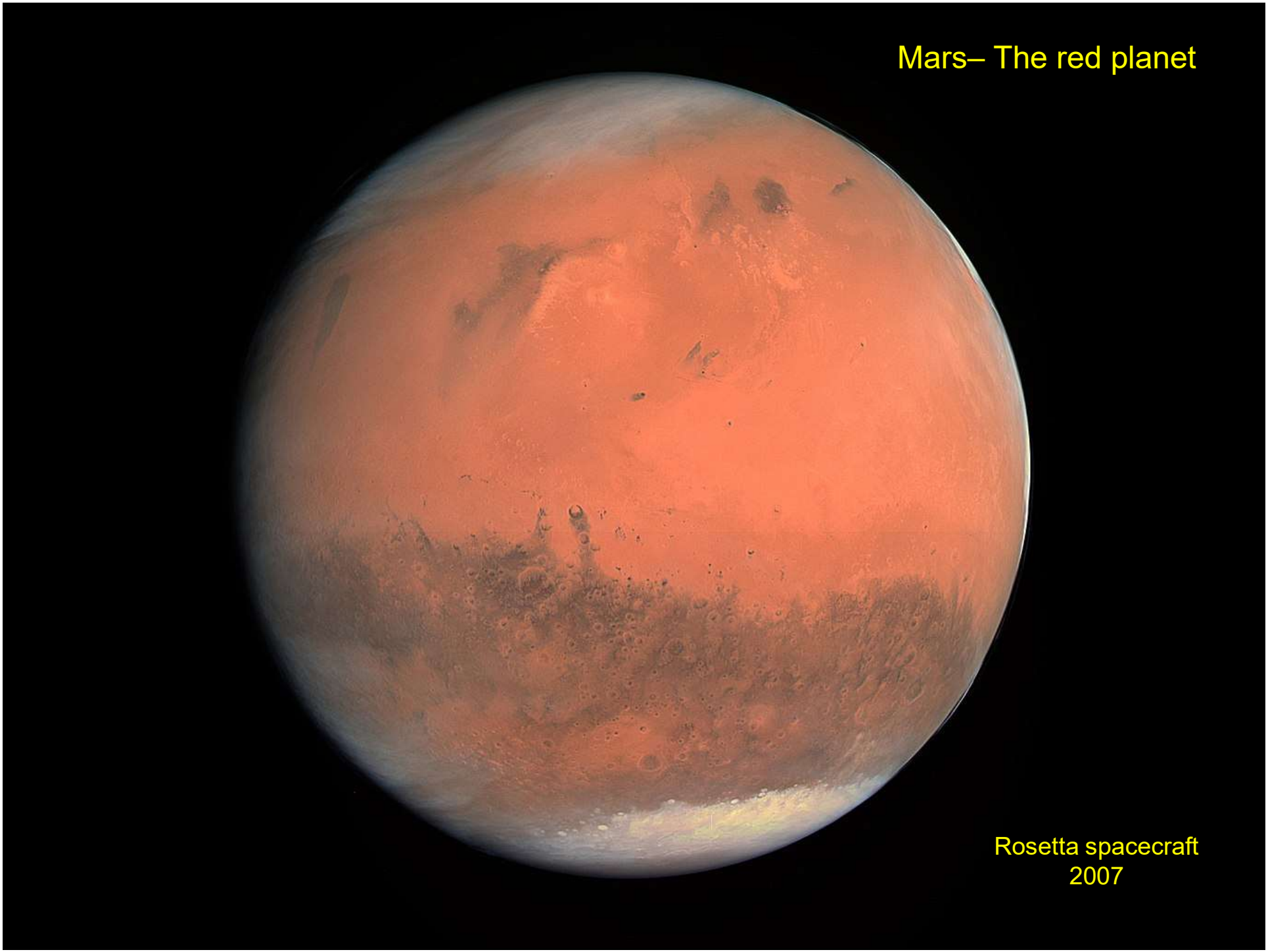

Venus – Radar view

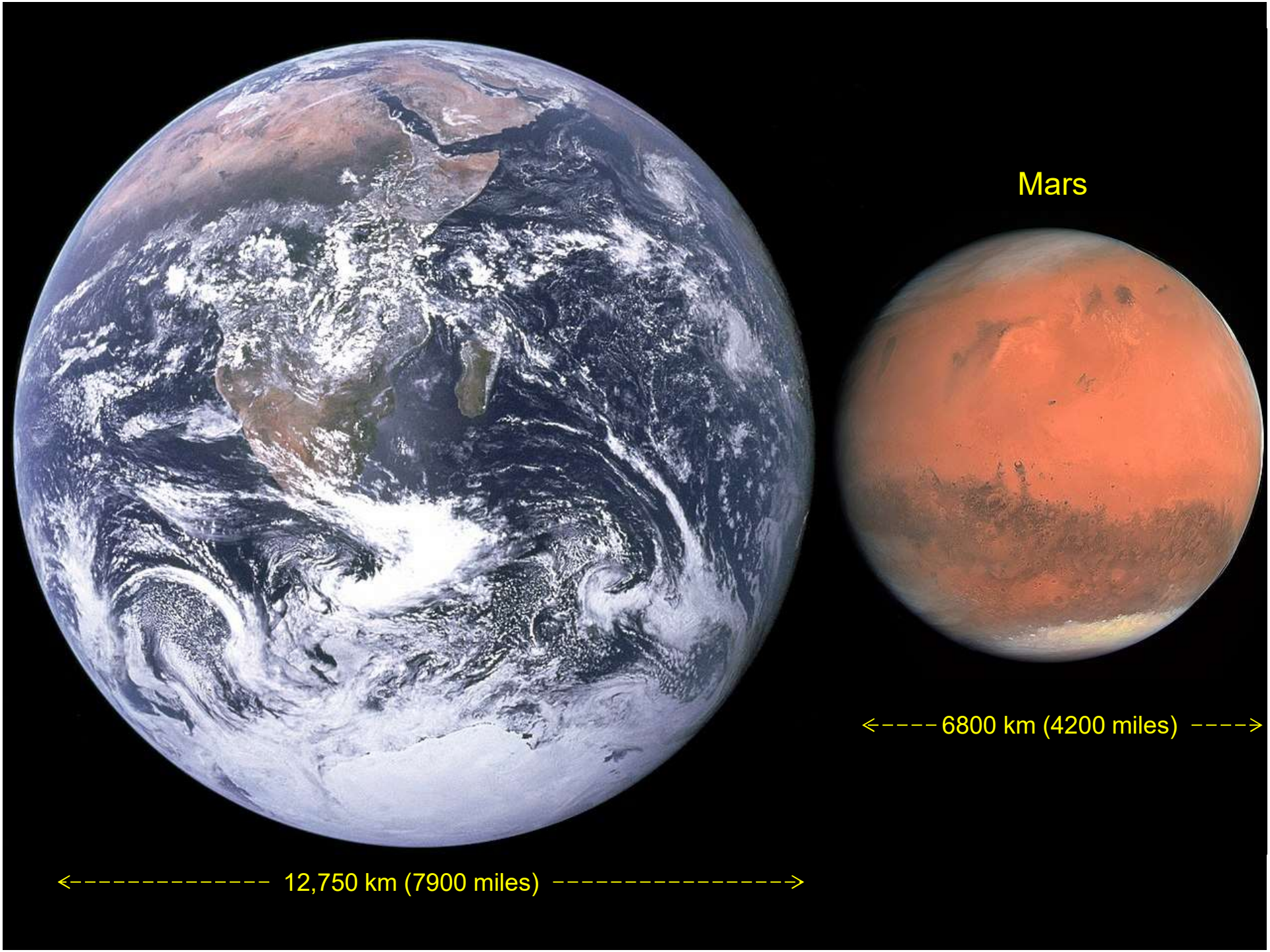

Earth – The ‘Blue Marble’
Apollo 17
1972

The spin of the Earth not only
Makes the Sun and Moon rise
and set, but also makes
the stars appear to rotate.

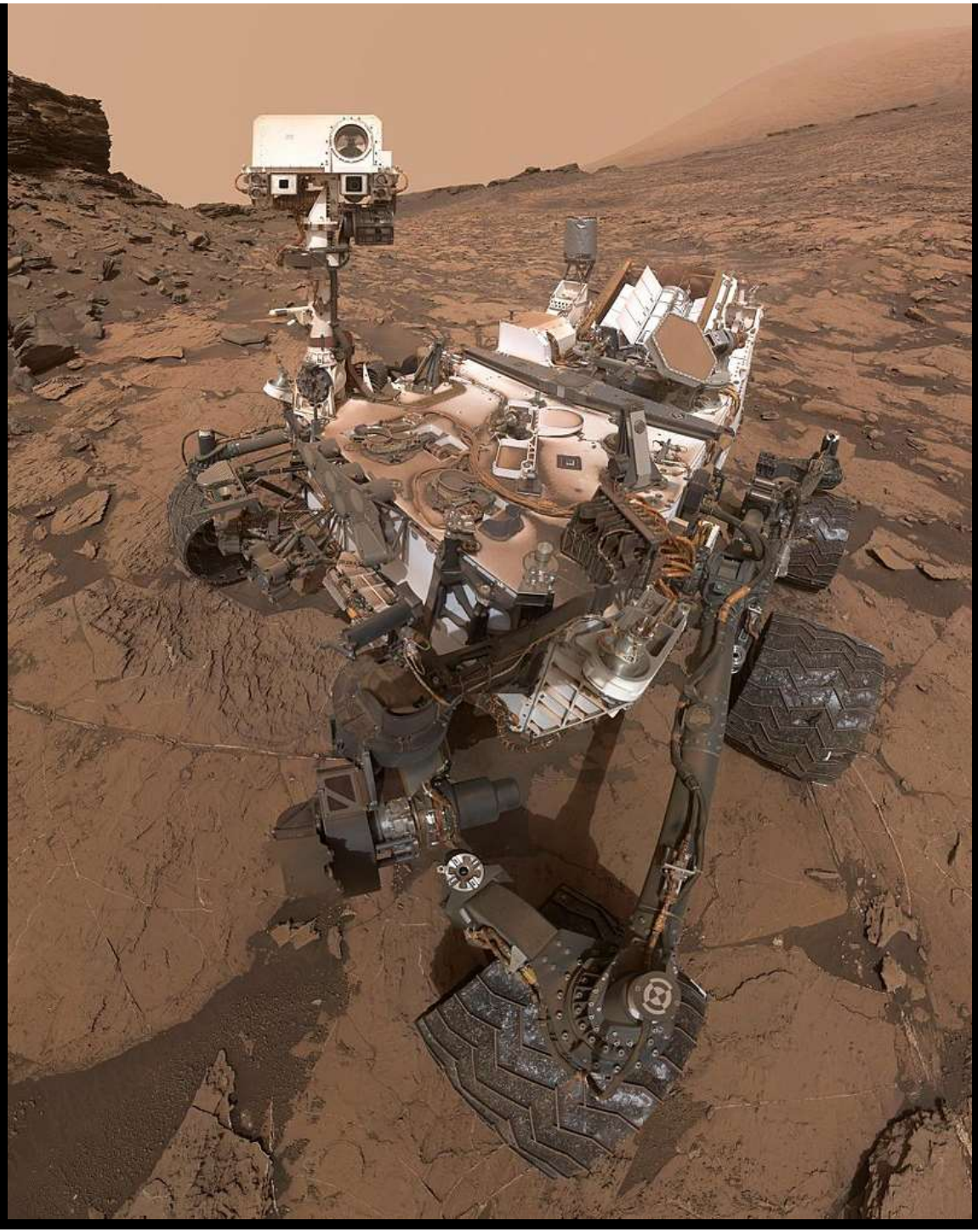
Note the different colours
of the stars.




Mars– The red planet
Rosetta spacecraft
2007


Mars
6800 km (4200 miles)
12,750 km (7900 miles)


Mars South Polar cap

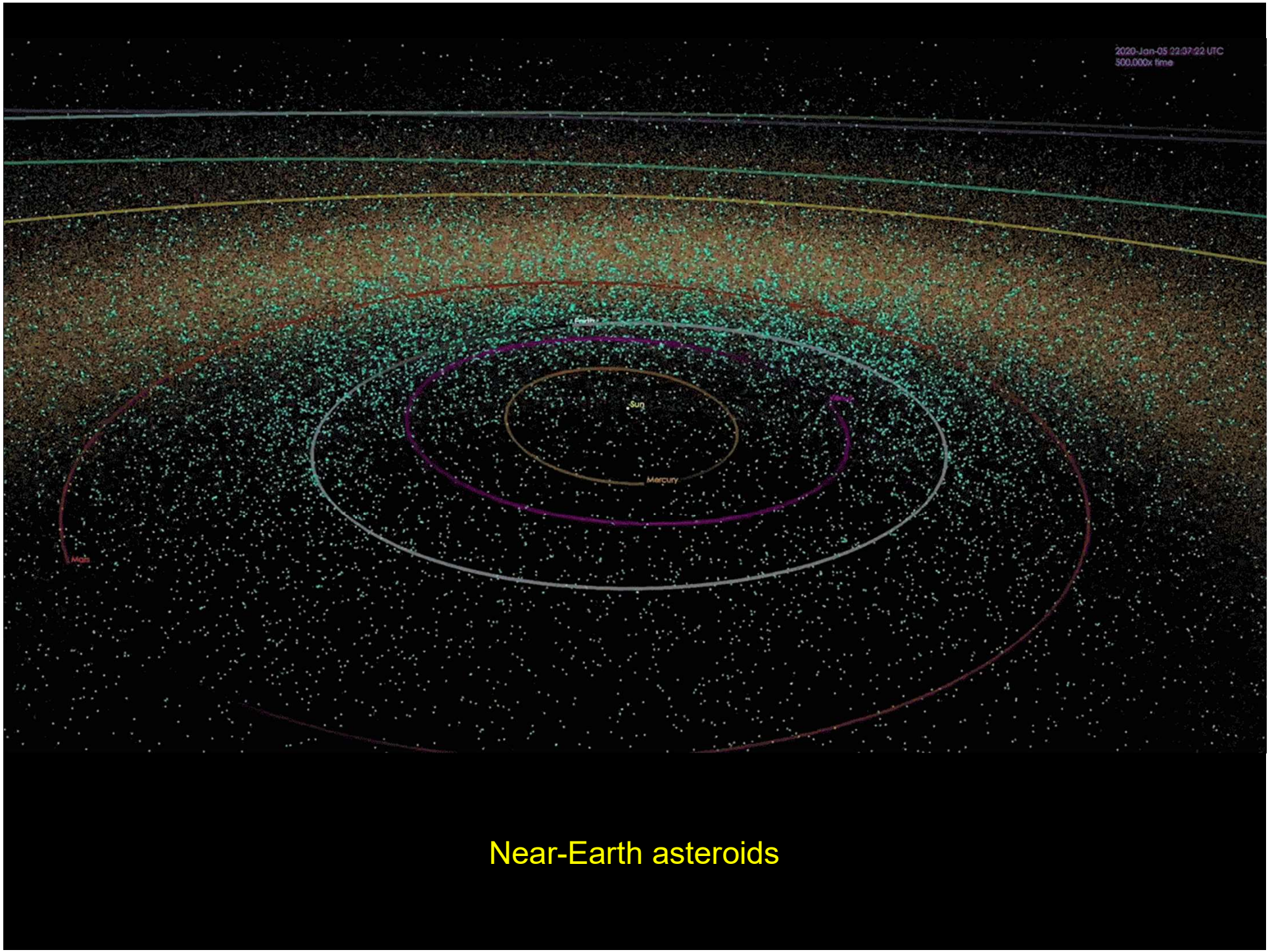


Mars Curiosity Rover (selfie)

Mars Curiosity Rover image, 2012

Mars Curiosity Rover image of Mount Sharp, 2015

Asteroid Ida and its moon Dactyl



Near-Earth asteroids

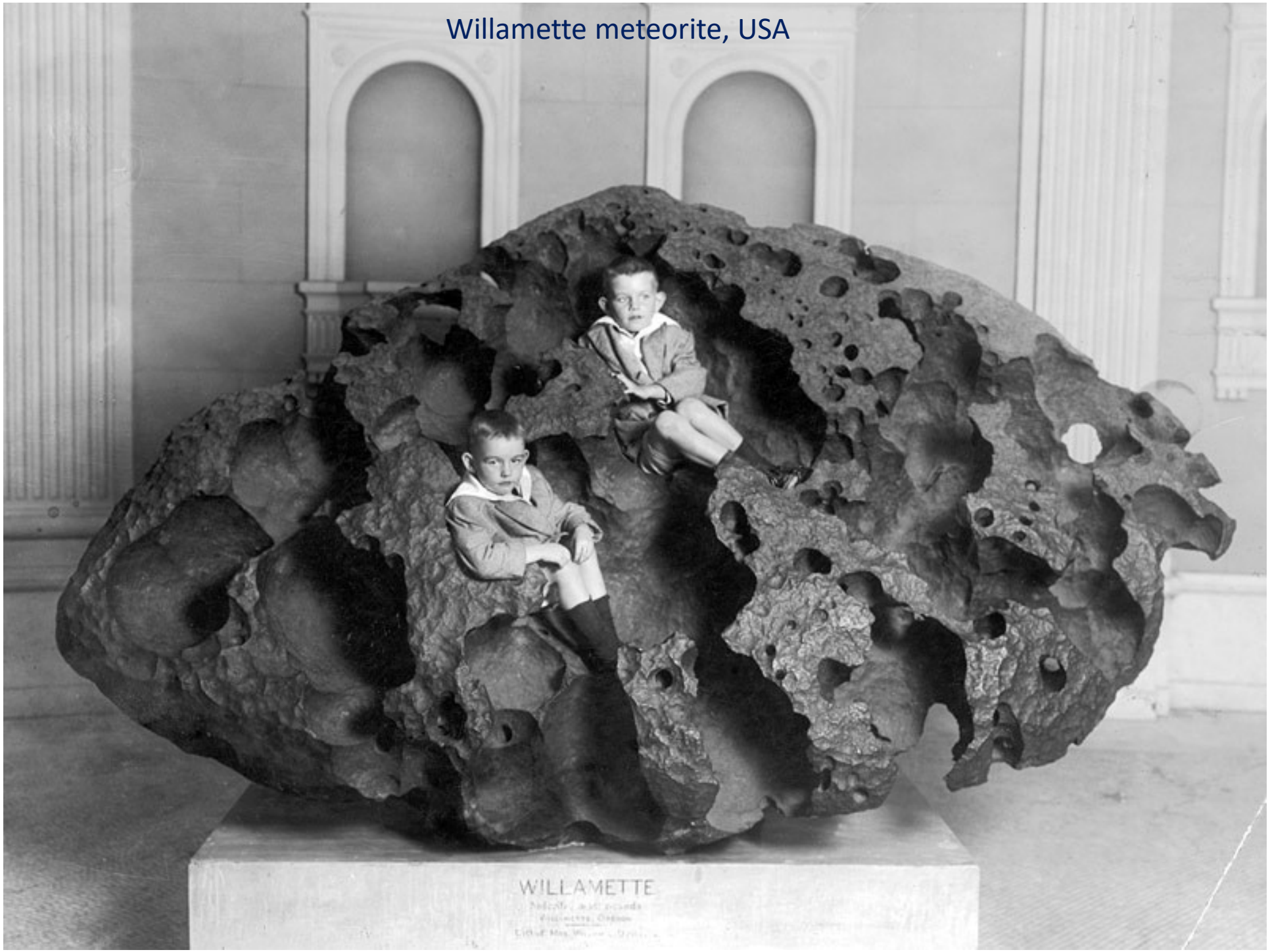
Comet Hale-Bopp

David Le Conte, Guernsey, 1997

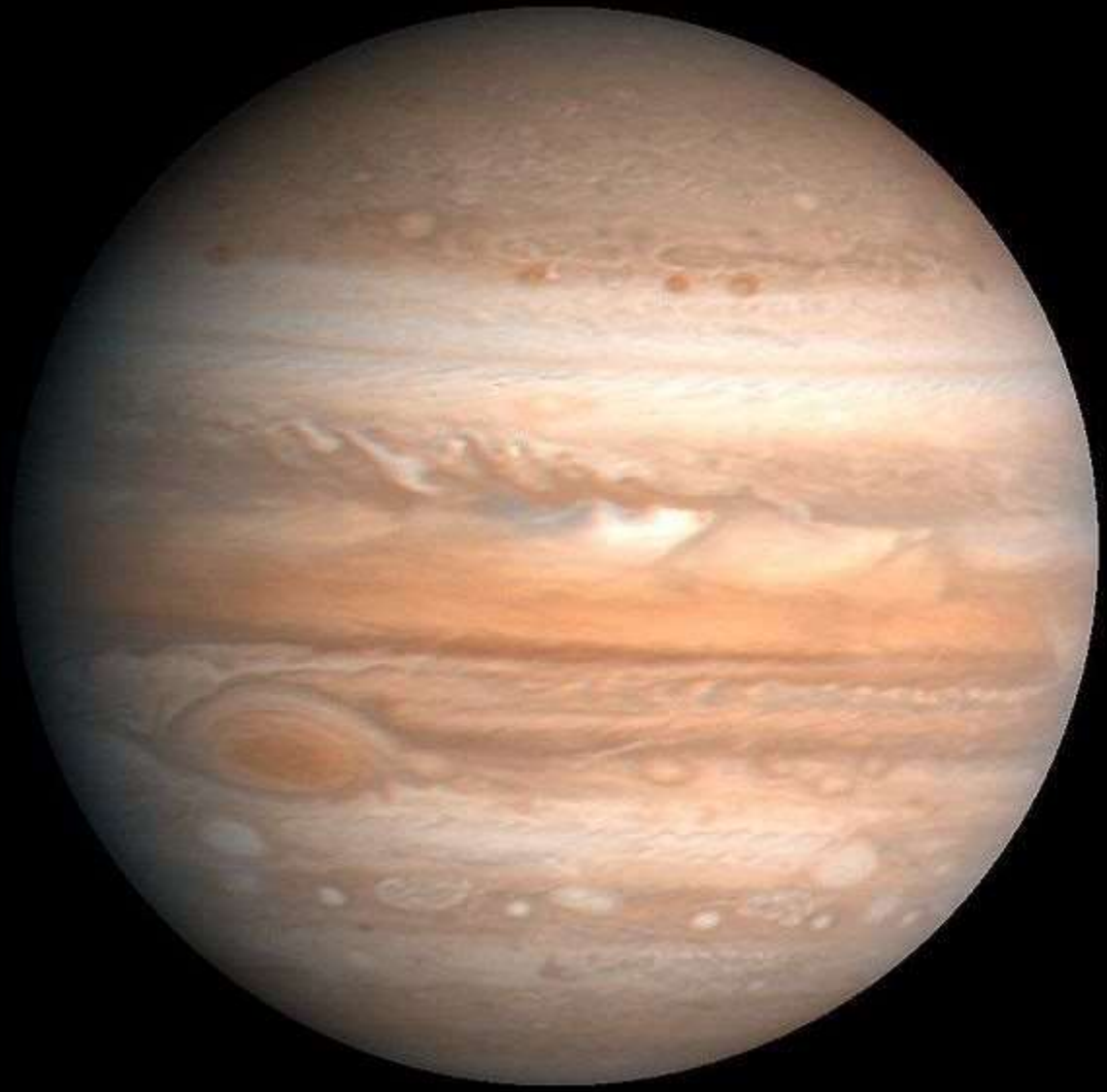
Perseid meteor shower, 2008

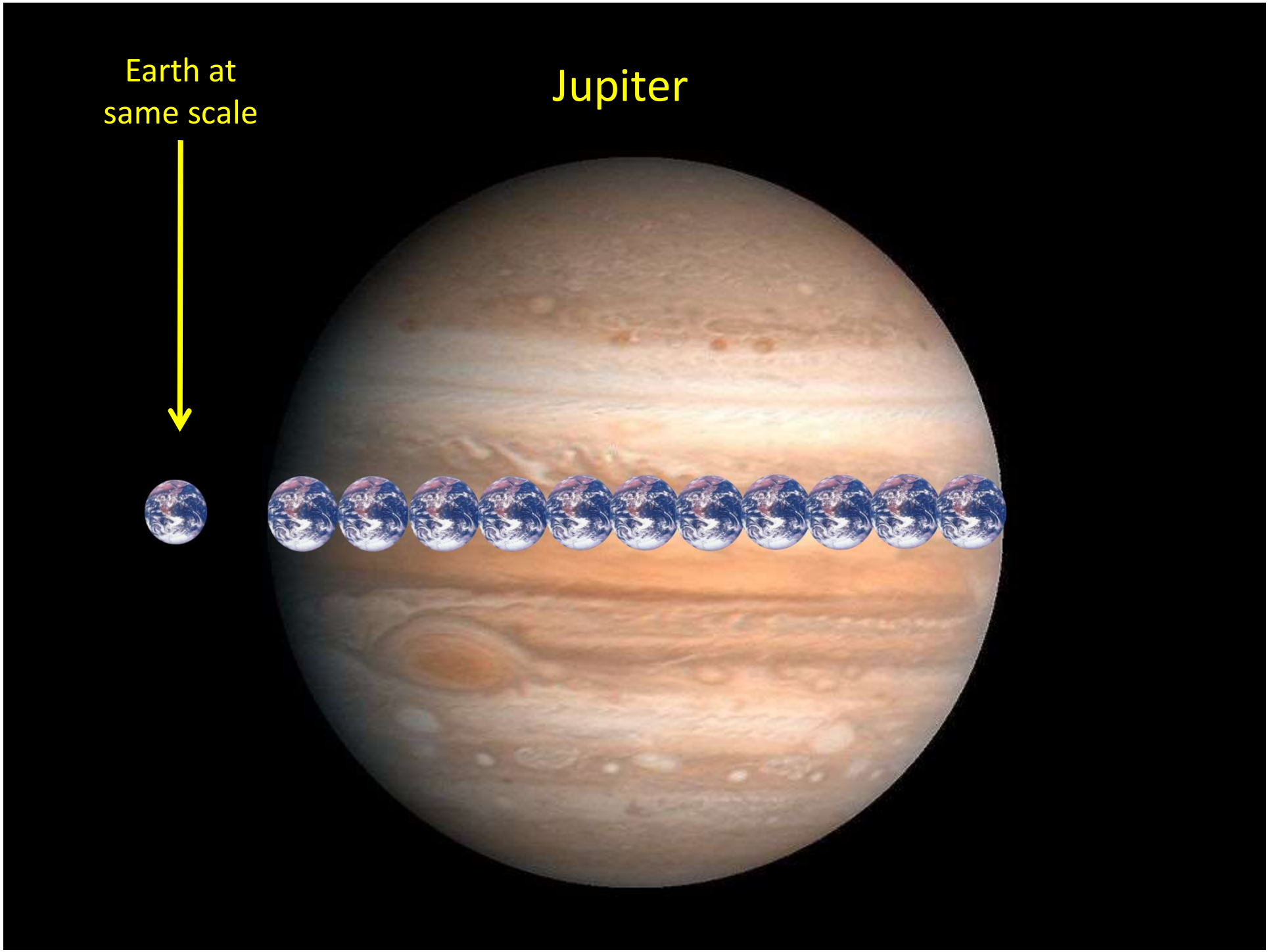
Alex Tudorica

Willamette meteorite, USA



Jupiter
780 million km (500 million miles) from the Sun (5 AU, 43 light-minutes)

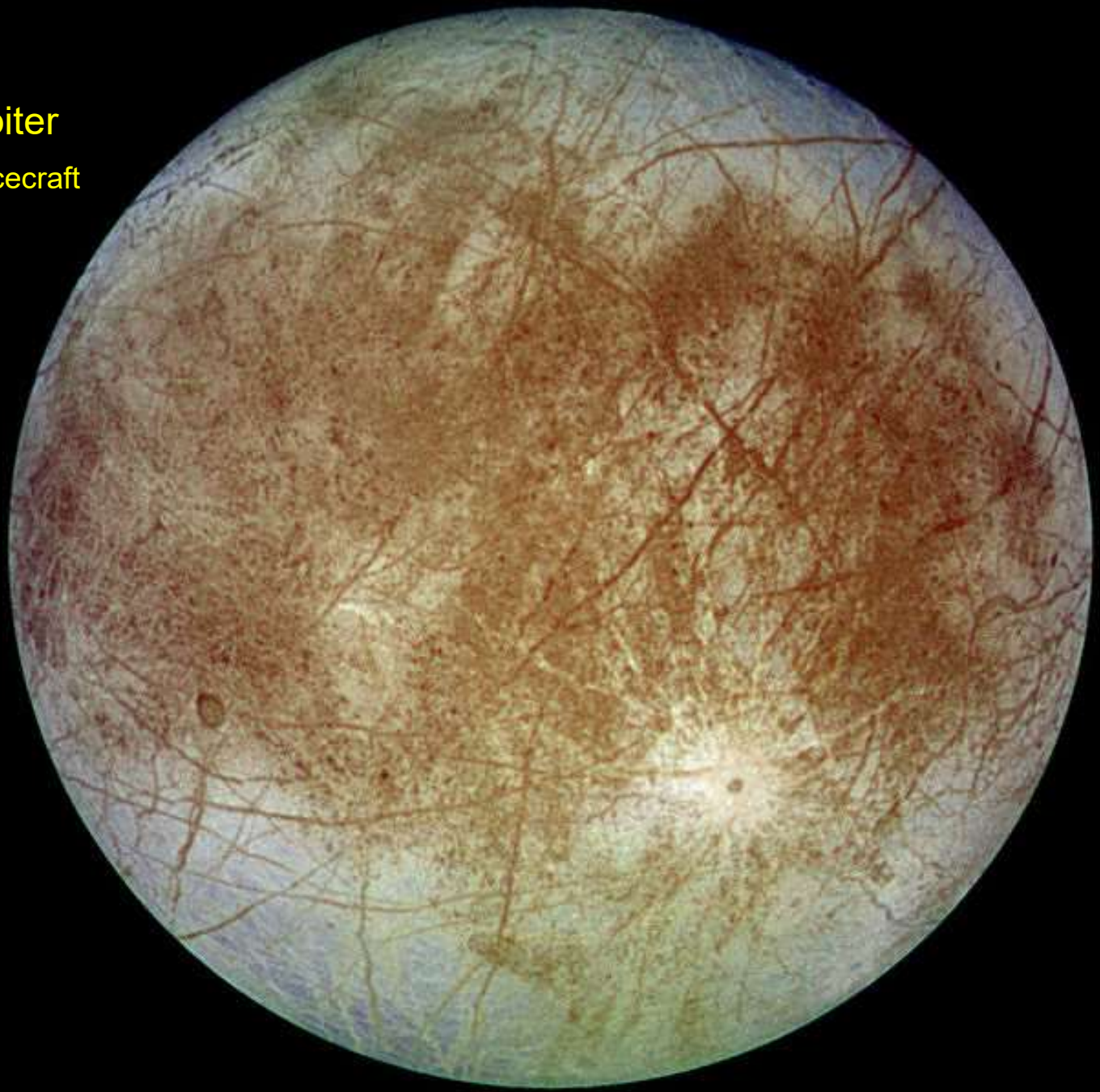



Earth at
same scale
Jupiter

Jupiter and its four ‘Galilean’ moons

Europa
Moon of Jupiter

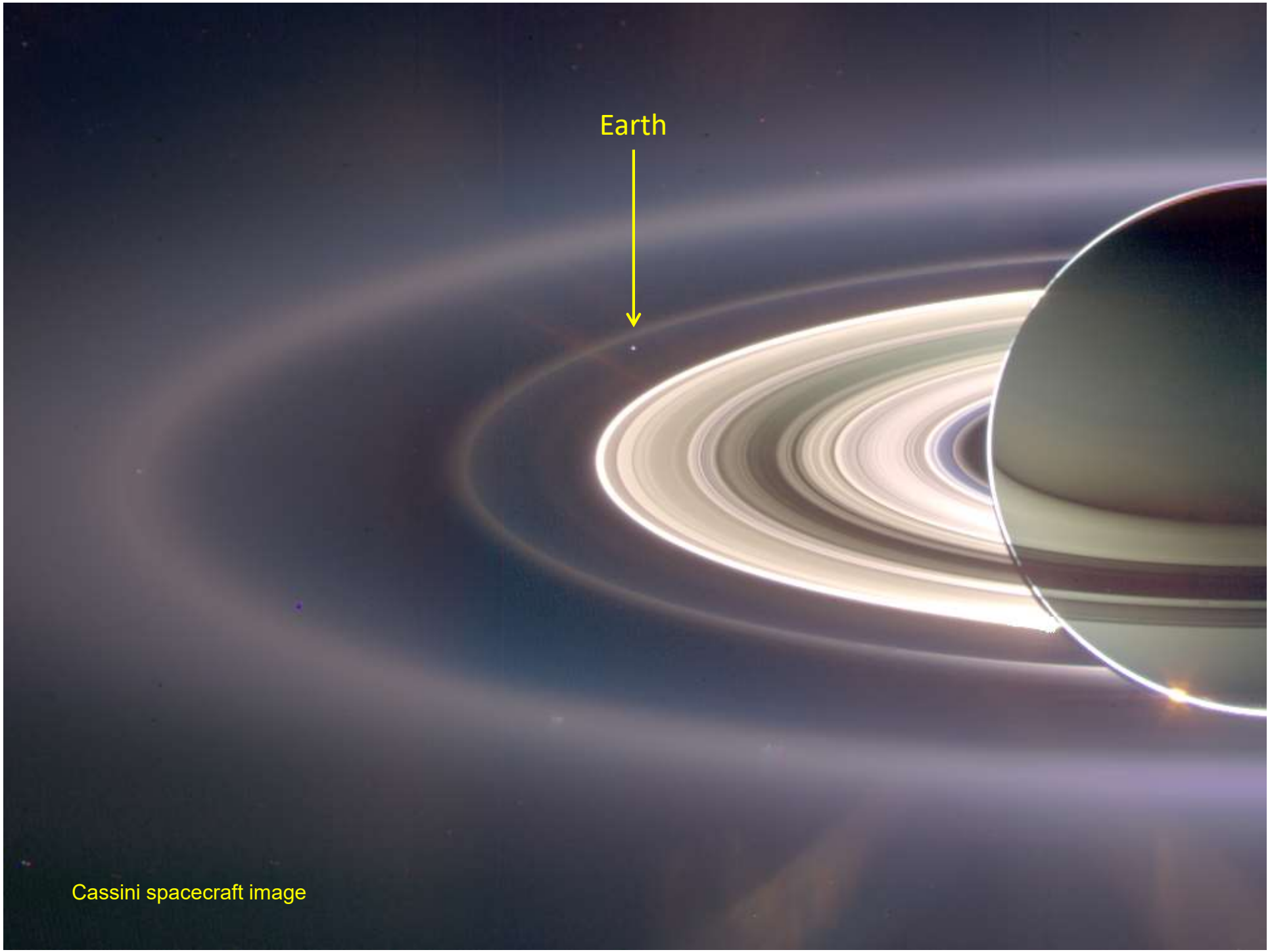
NASA Galileo spacecraft

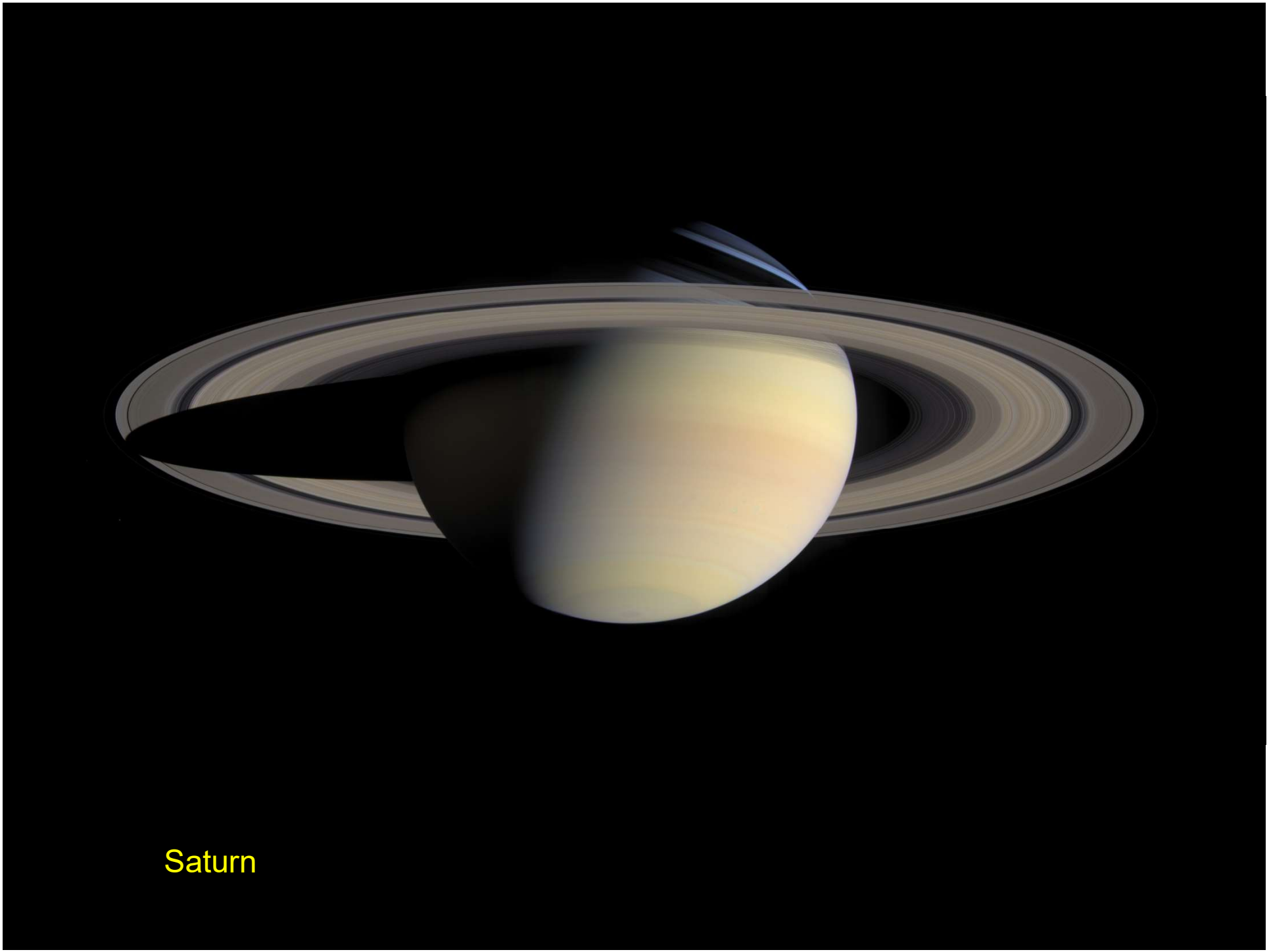


Saturn

1400 million km (900 million miles) from the Sun (9.5 AU, 80 light-minutes)

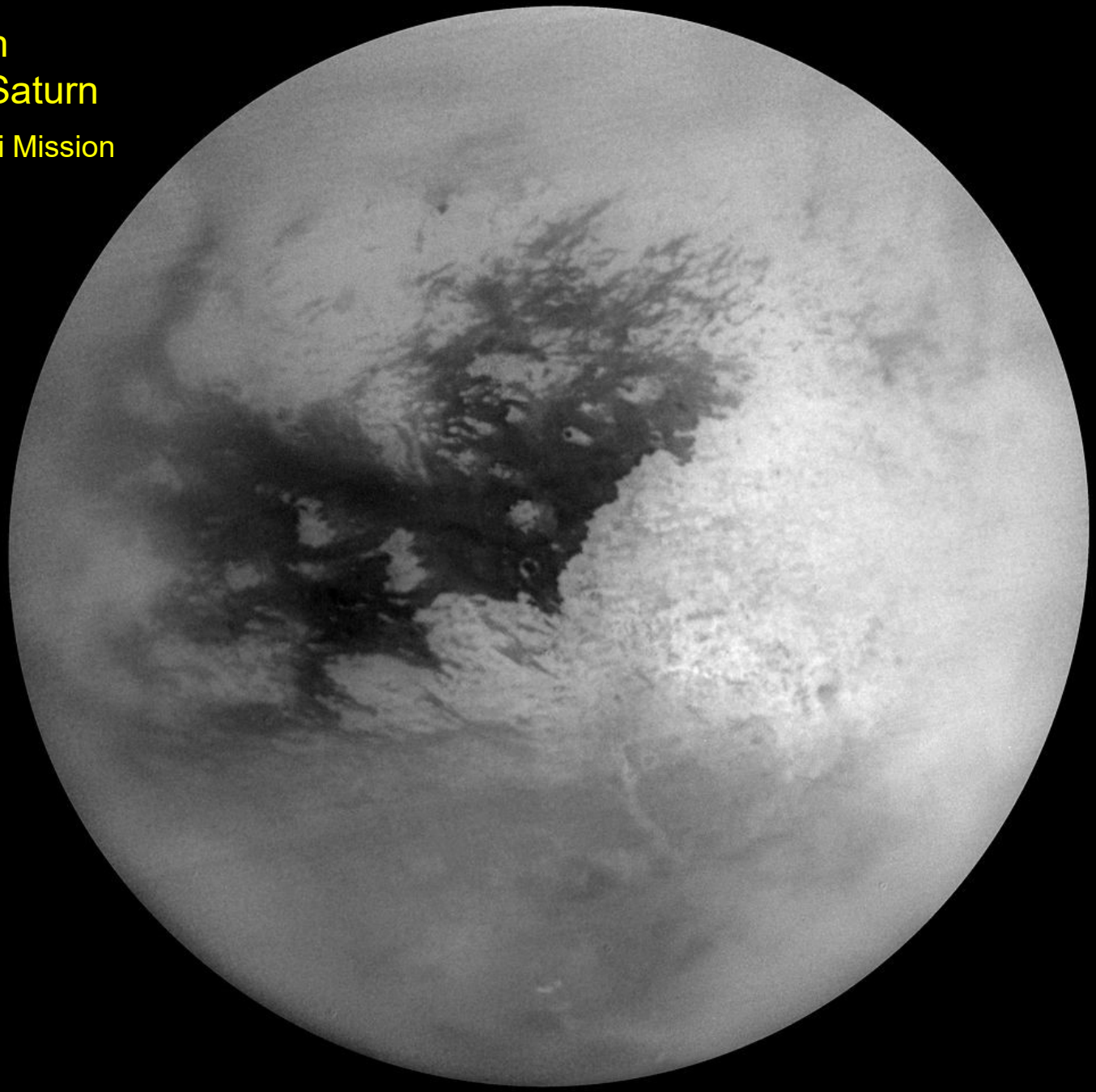
Hubble Space Telescope image


Earth
Cassini spacecraft image


Saturn

Titan
Moon of Saturn

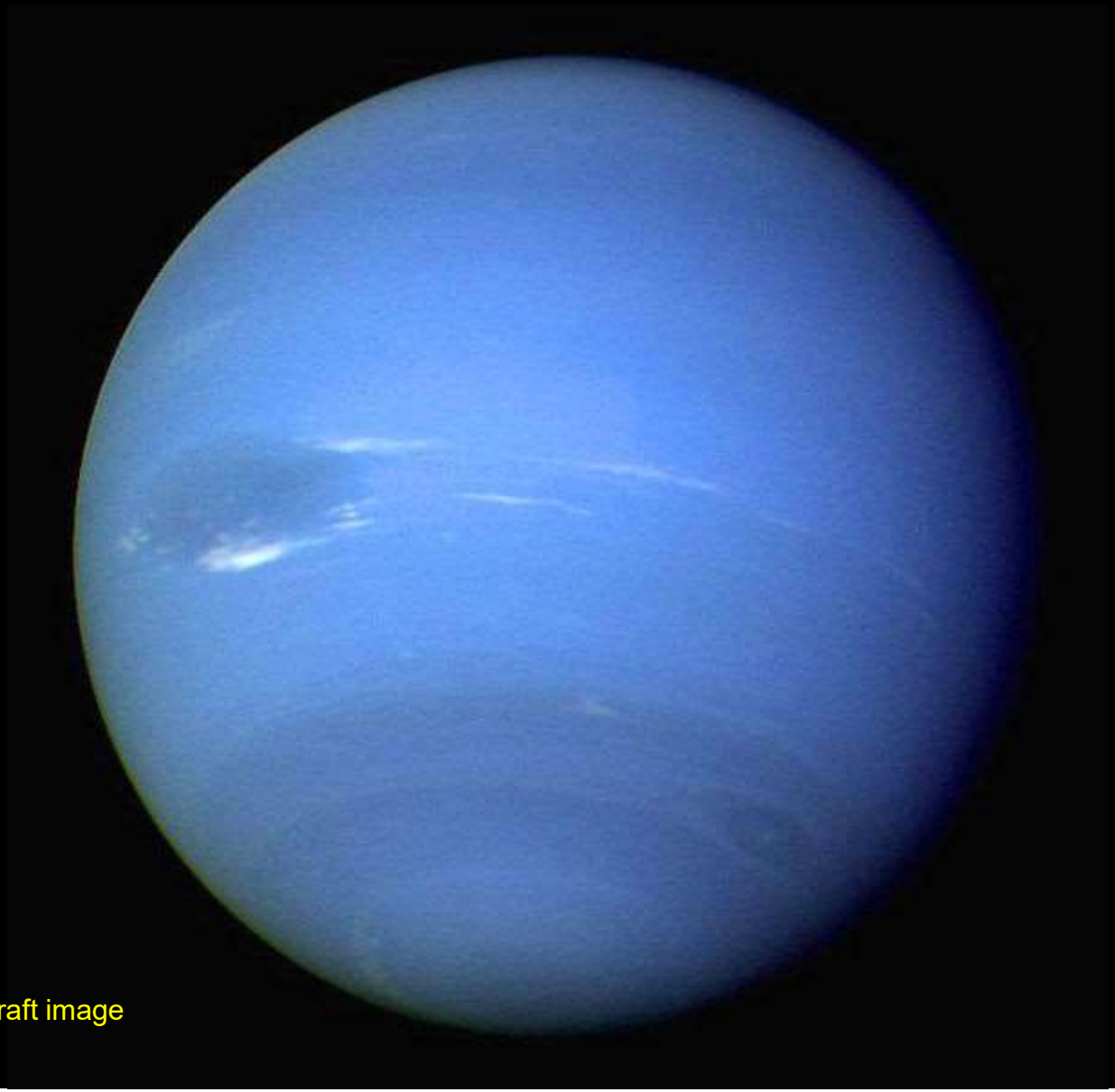
NASA Cassini Mission



Uranus
3 billion km (1.8 billion miles) from the Sun (19 AU, 2.7 light-hours)

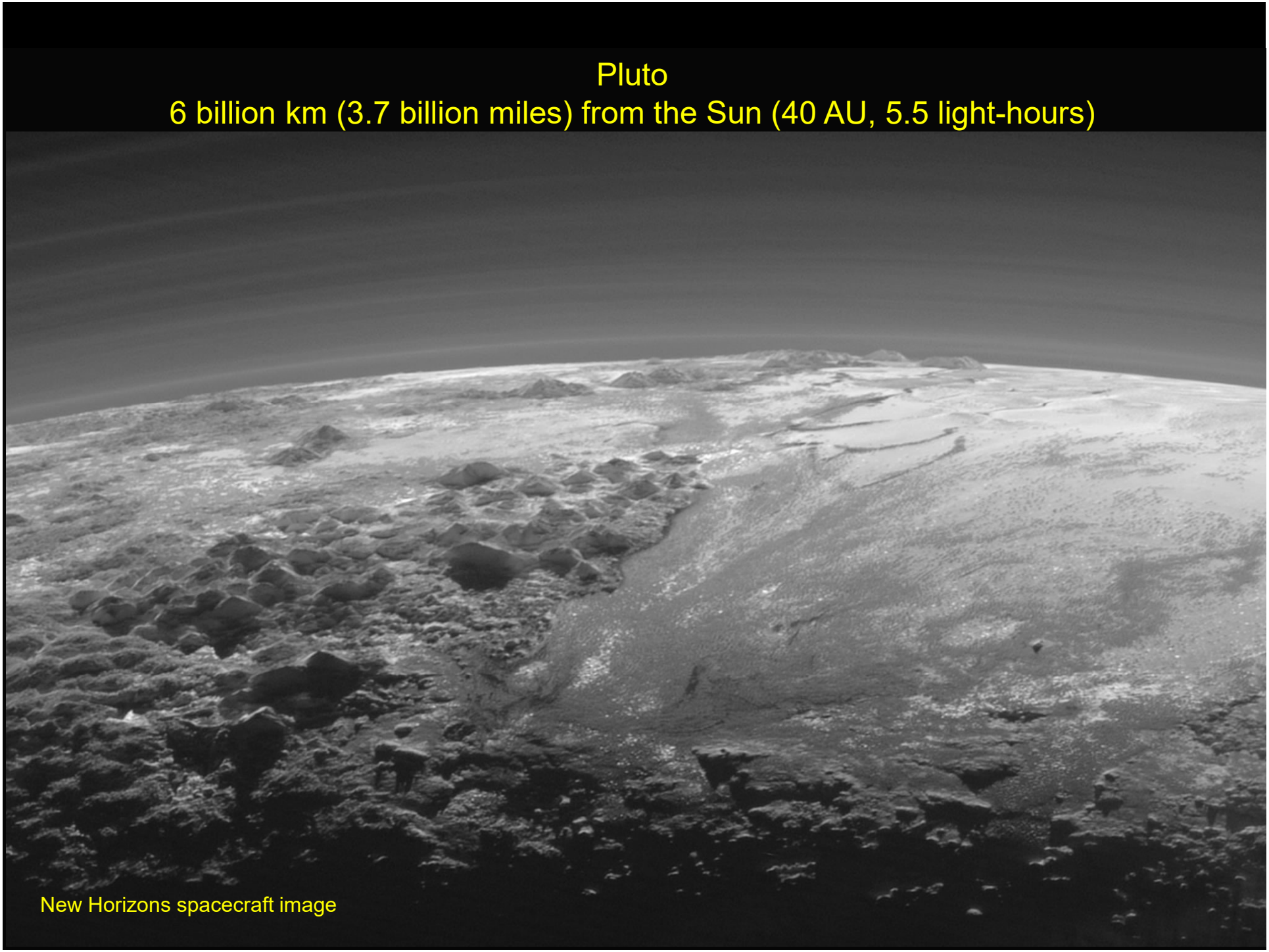
Voyager 2 spacecraft image

Neptune
4.5 billion km (3 billion miles) from the Sun (30 AU, 4 light-hours)



Voyager 1 spacecraft image

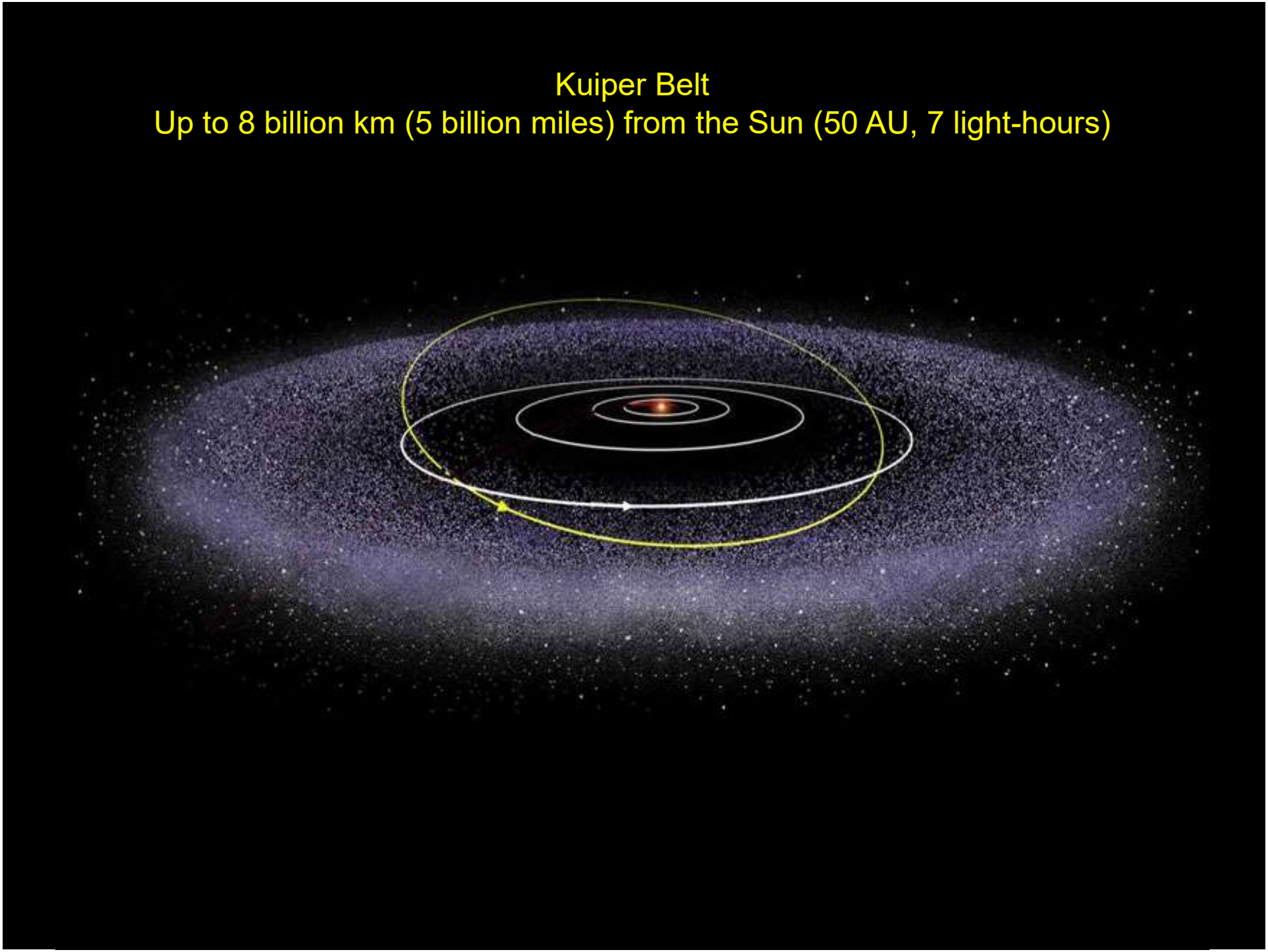
Pluto
6 billion km (3.7 billion miles) from the Sun (40 AU, 5.5 light-hours)

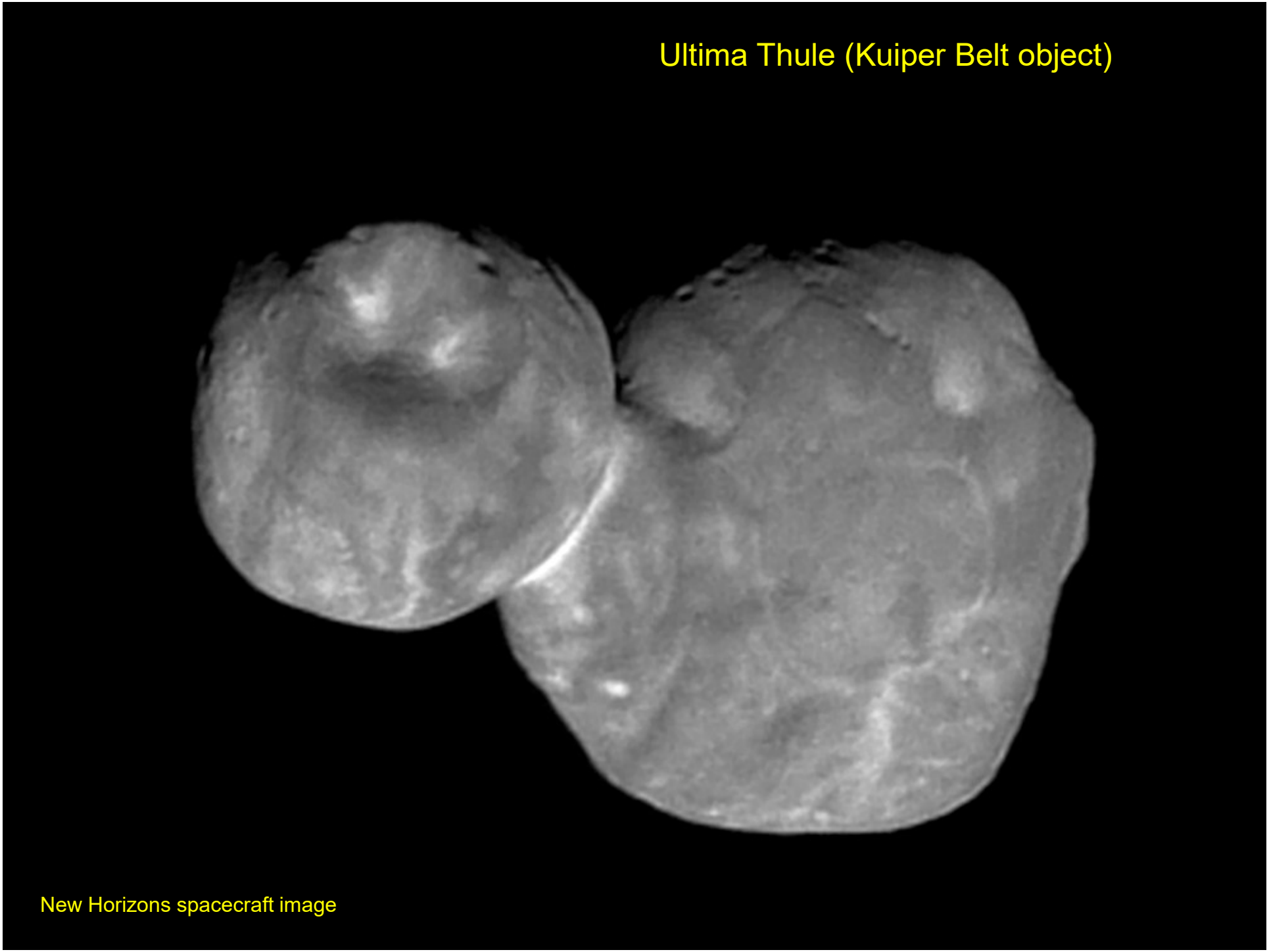


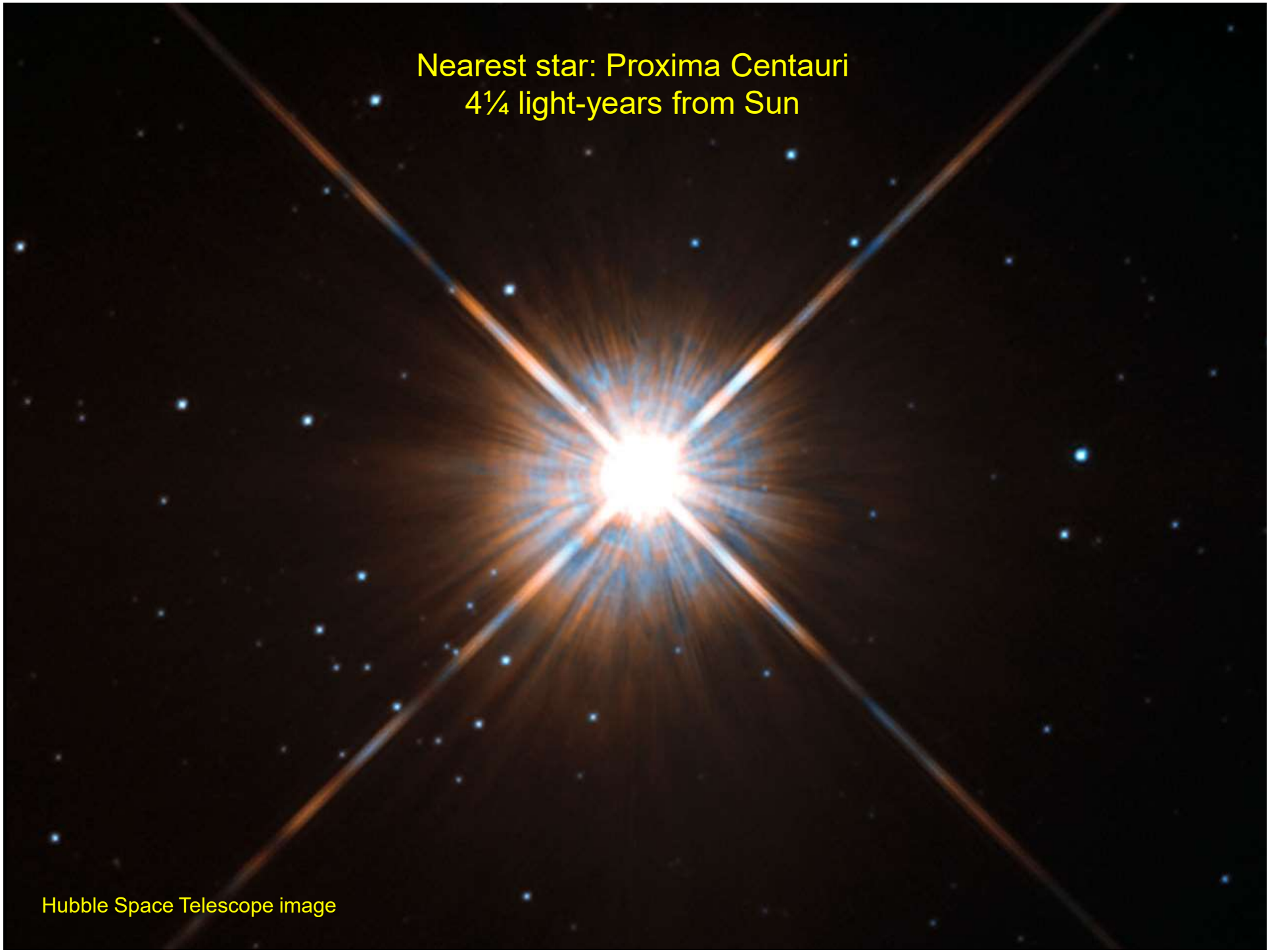
New Horizons spacecraft image

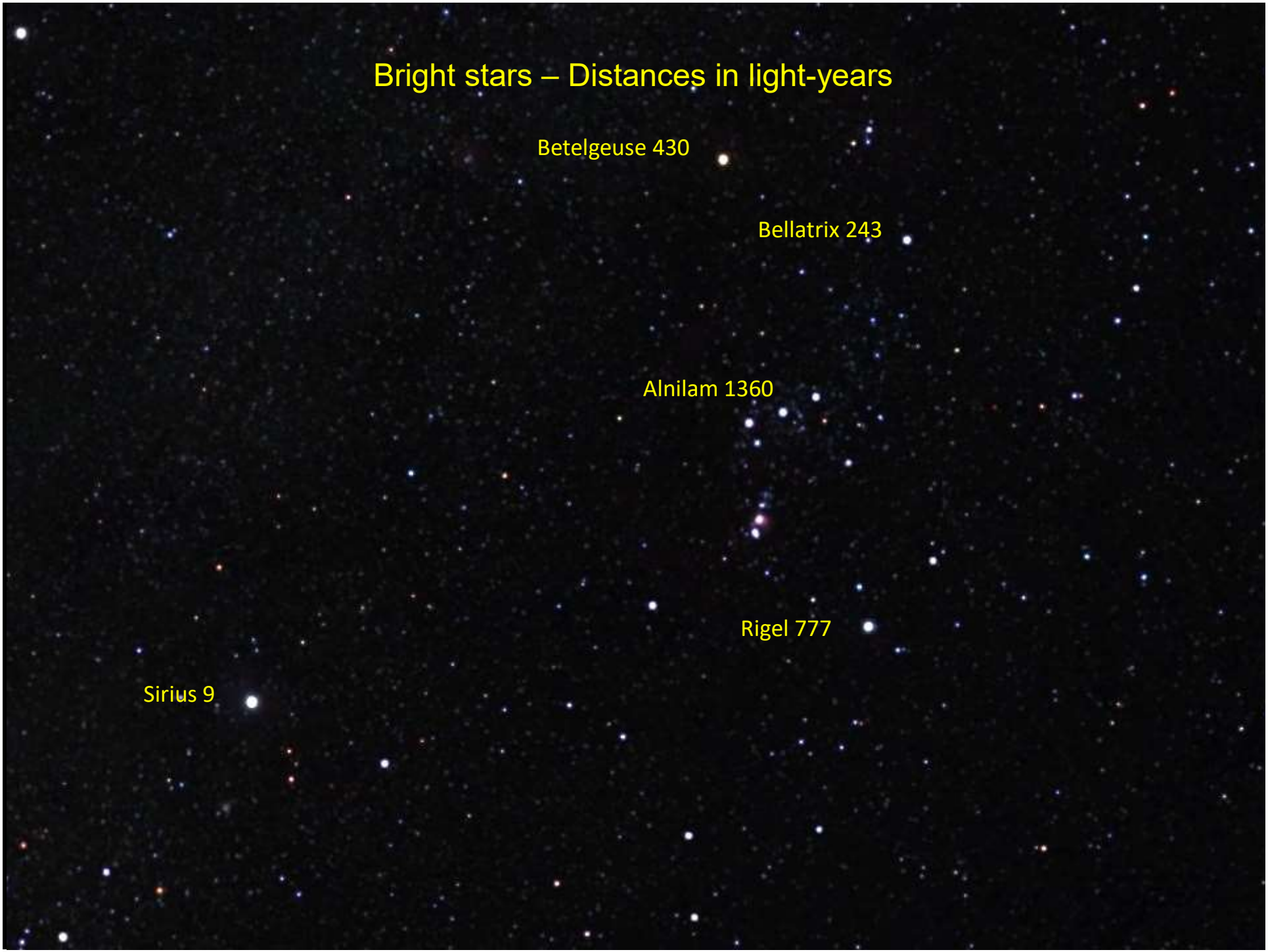
Kuiper Belt

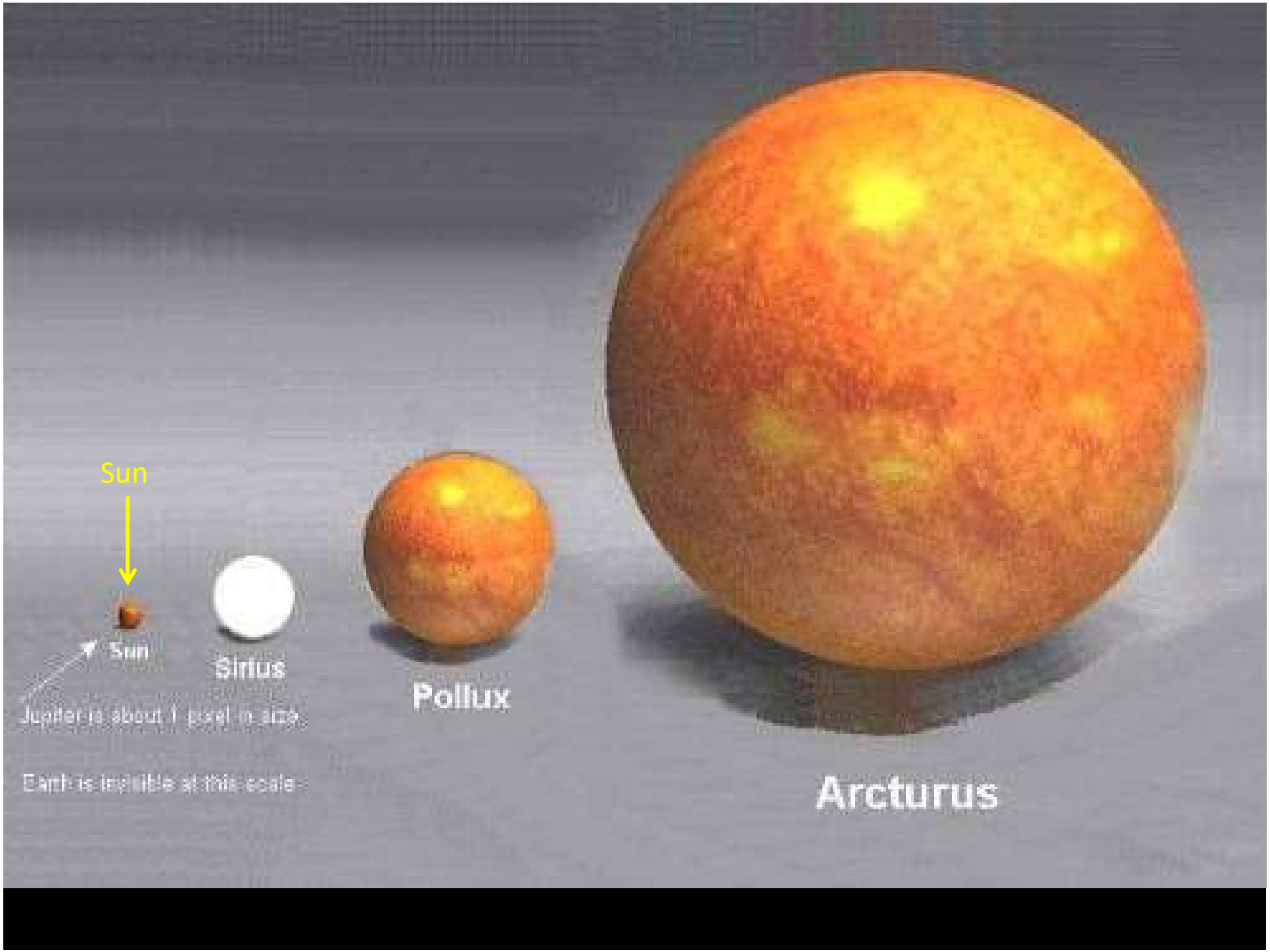
Up to 8 billion km (5 billion miles) from the Sun (50 AU, 7 light-hours)

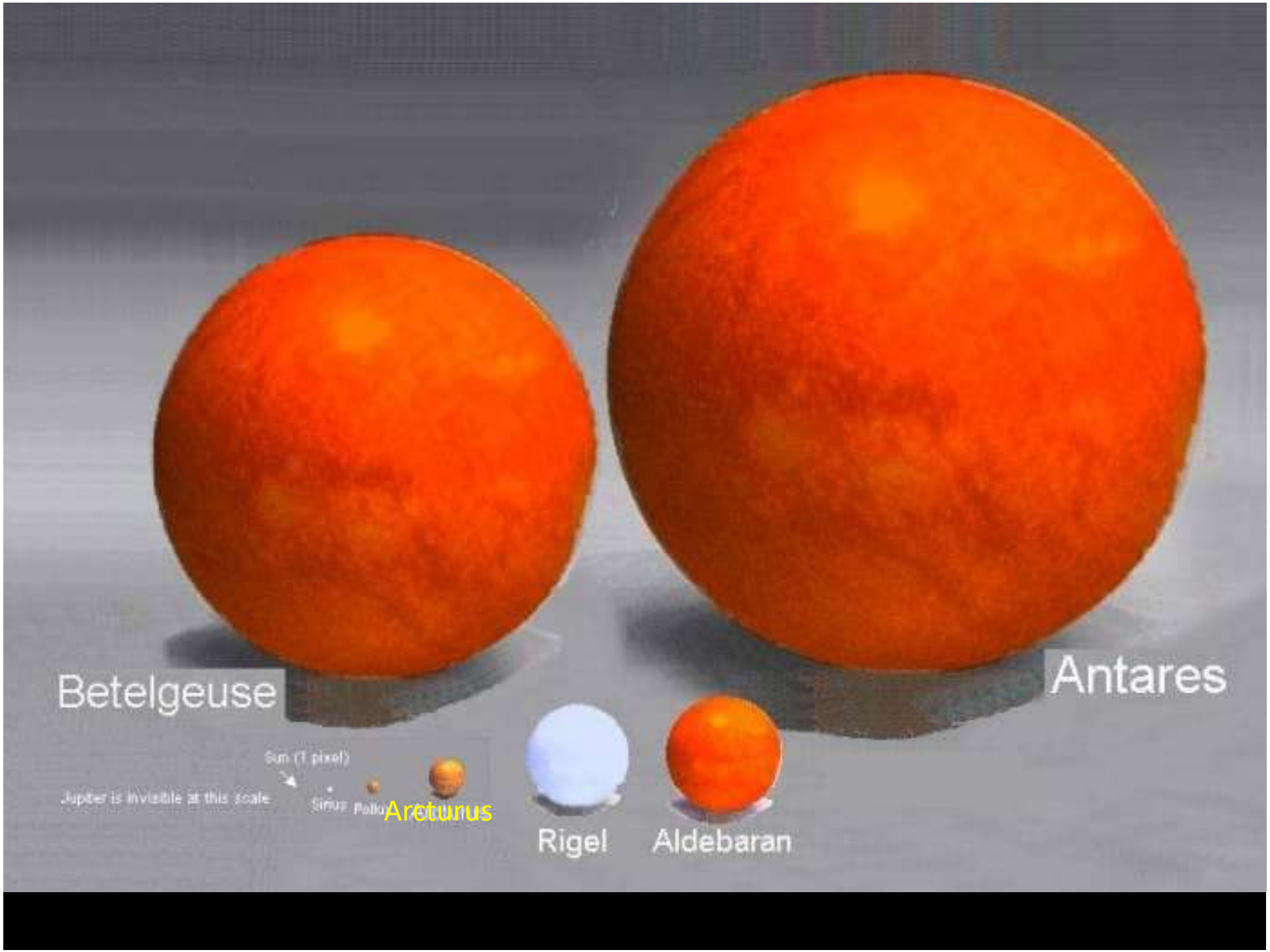


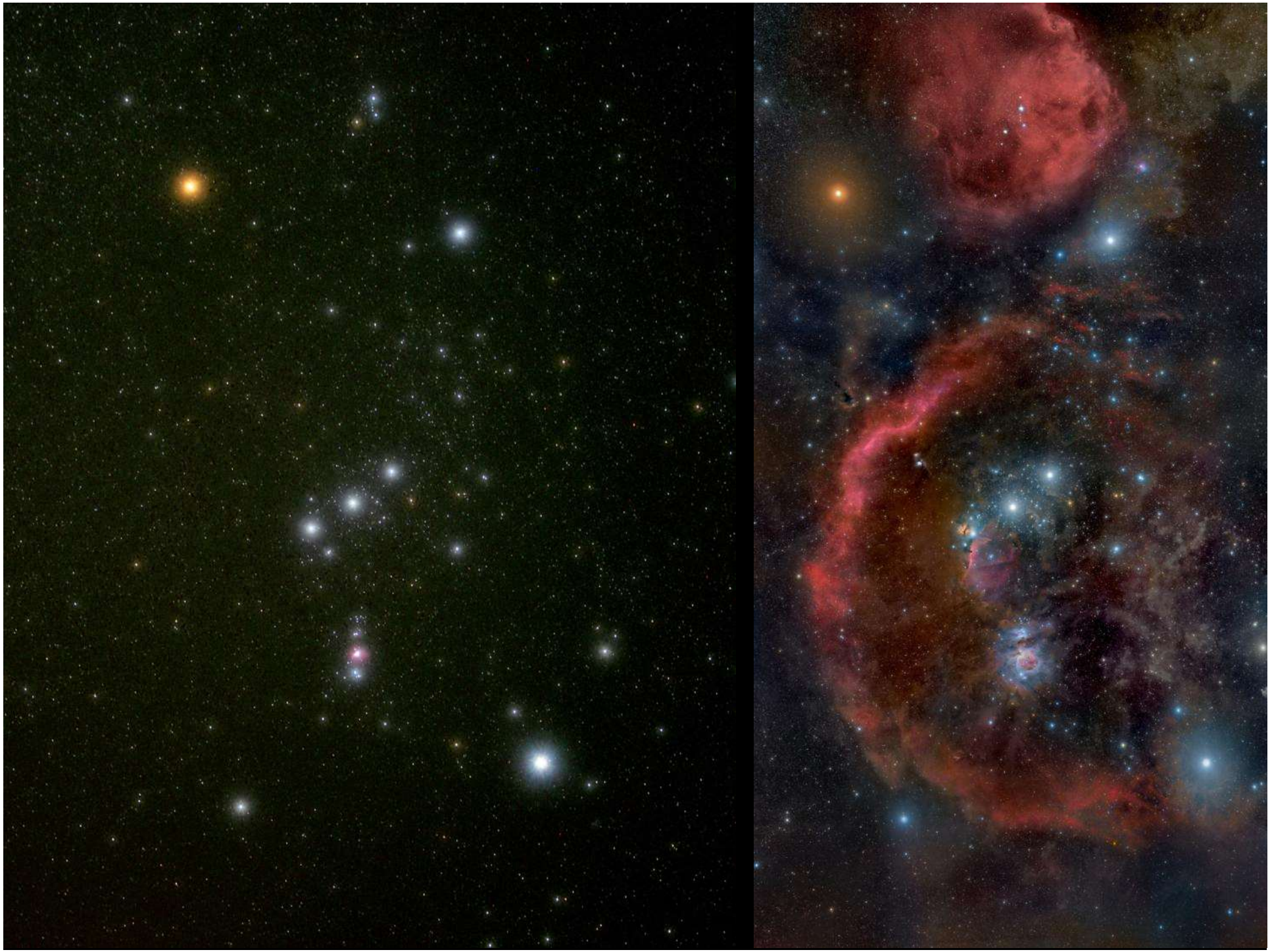

Ultima Thule (Kuiper Belt object)
New Horizons spacecraft image


Nearest star: Proxima Centauri
4¼ light-years from Sun
Hubble Space Telescope image

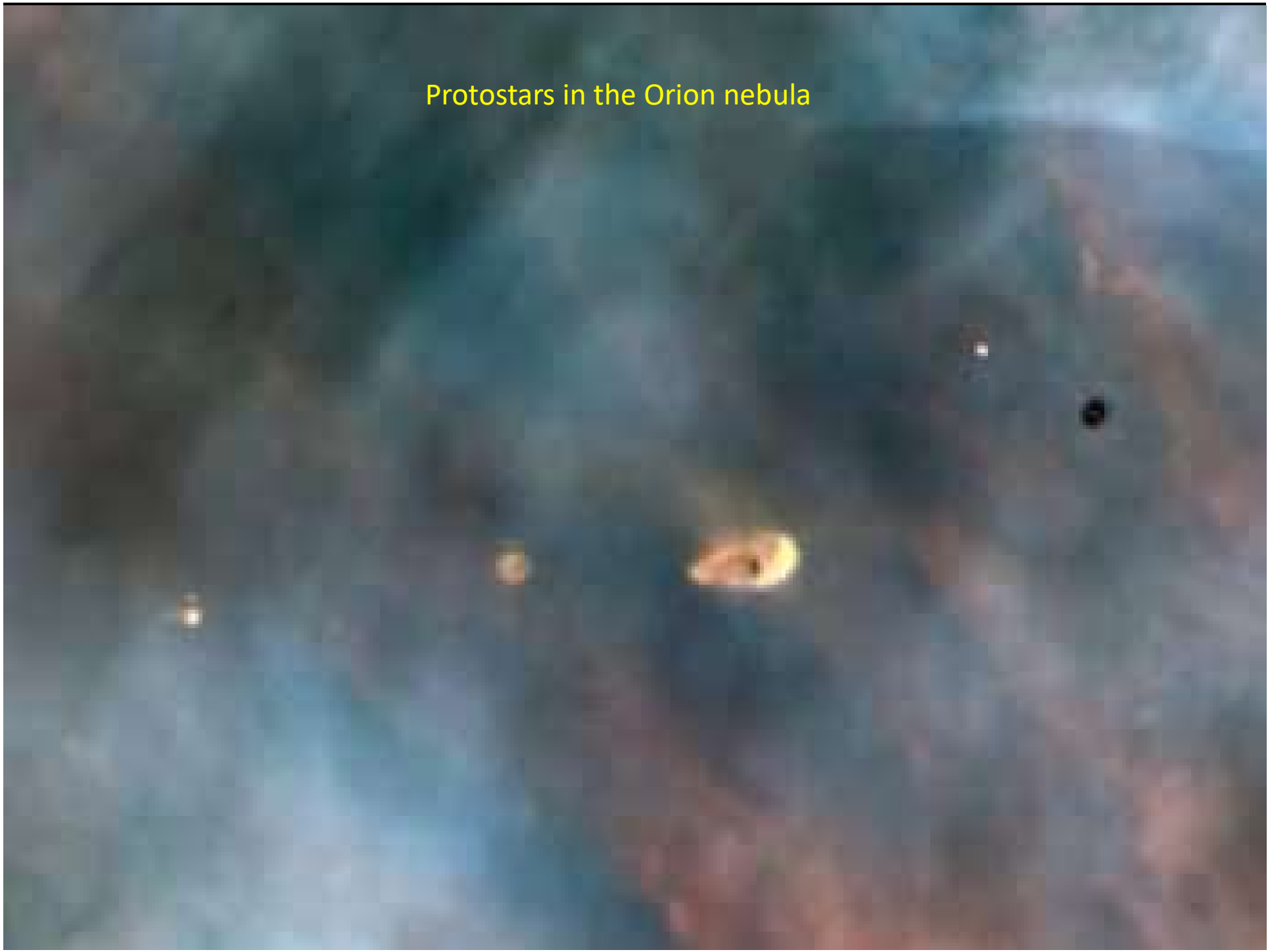

Bright stars – Distances in light-years
Betelgeuse 430
Bellatrix 243
Alnilam 1360
Rigel 777
Sirius 9


Sun
Sun
Sirius
Pollux
Arcturus


Betelgeuse
Antares
Sun (1 pixel)
Jupiter is invisible at this scale
Arcturus
Rigel
Aldebaran



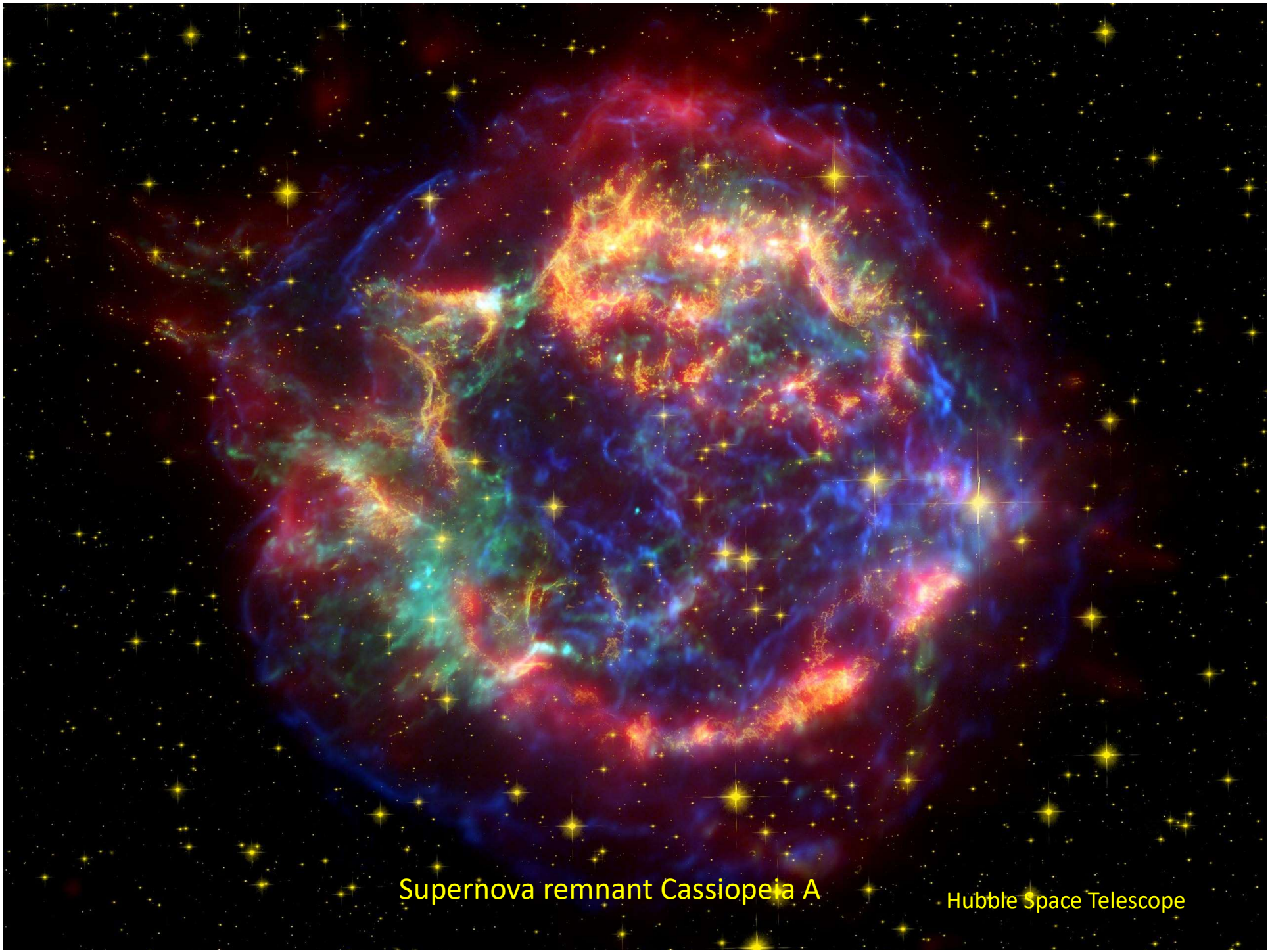
Stars are born in gaseous nebulae, like the Orion Nebula, M42

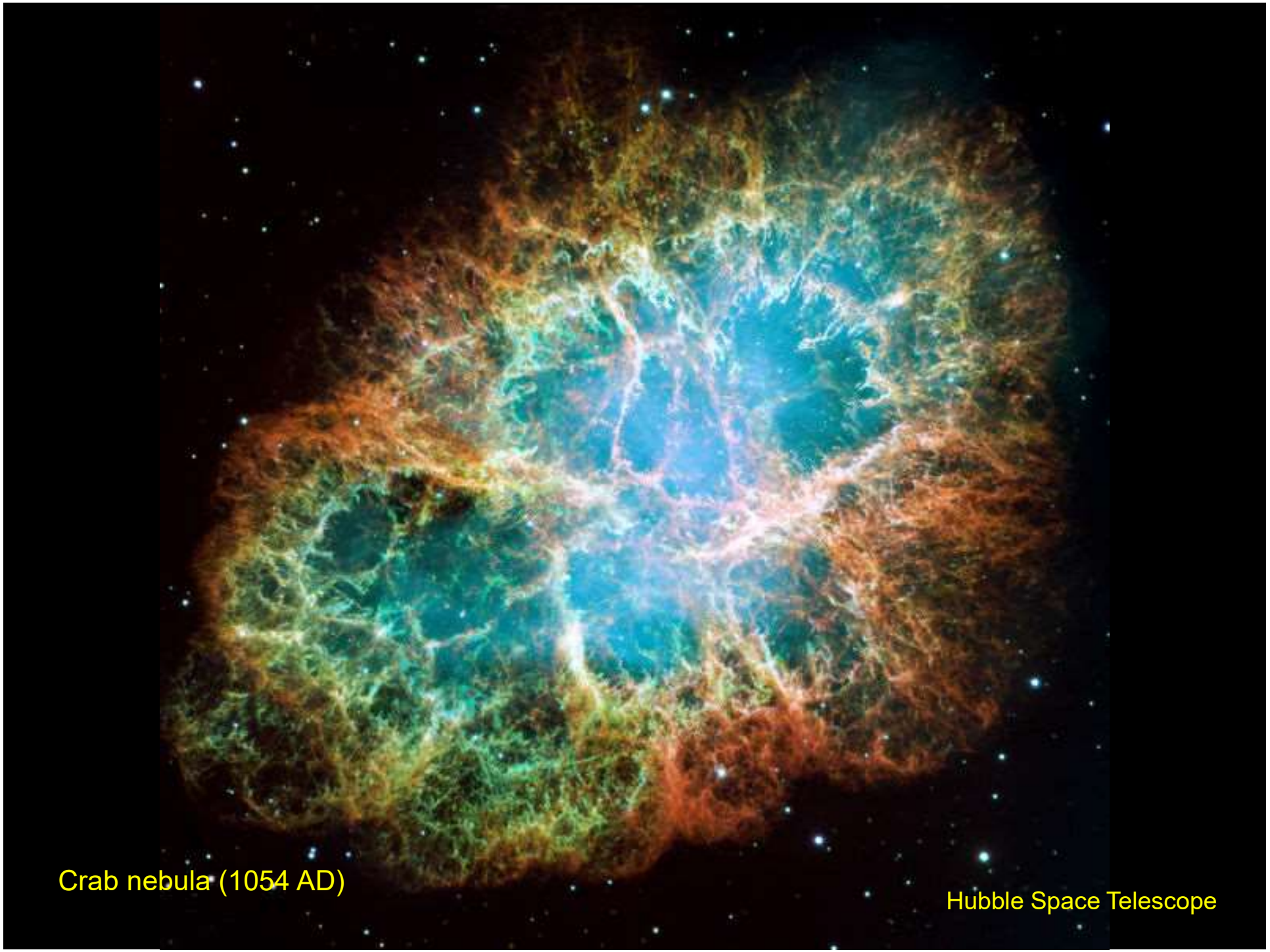

Protostars in the Orion nebula

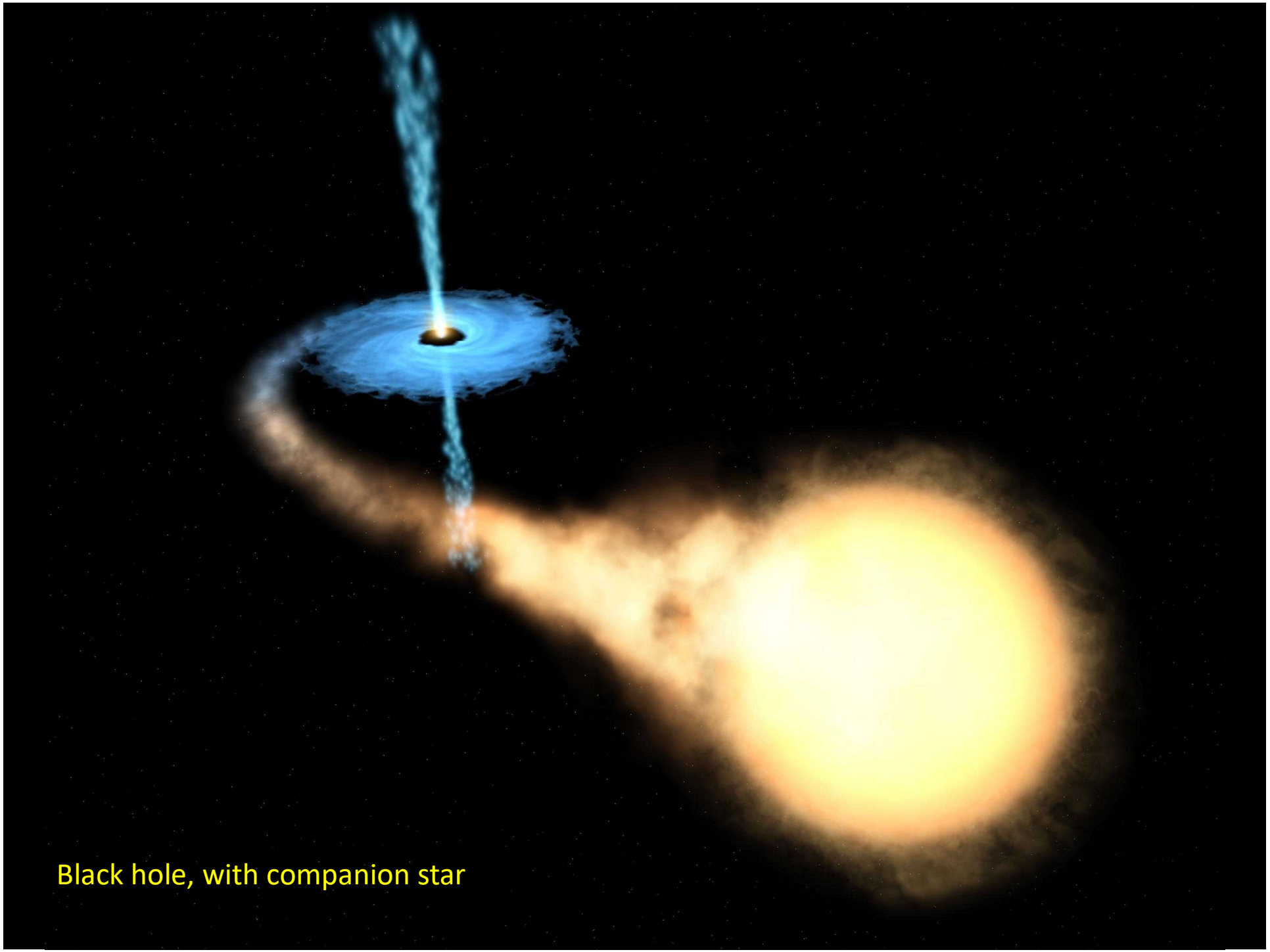
The Ring nebula in Lyra

Supernova
1987A

Anglo-Australian
Observatory


Supernova remnant Cassiopeia A
Hubble Space Telescope


Crab nebula (1054 AD)
Hubble Space Telescope

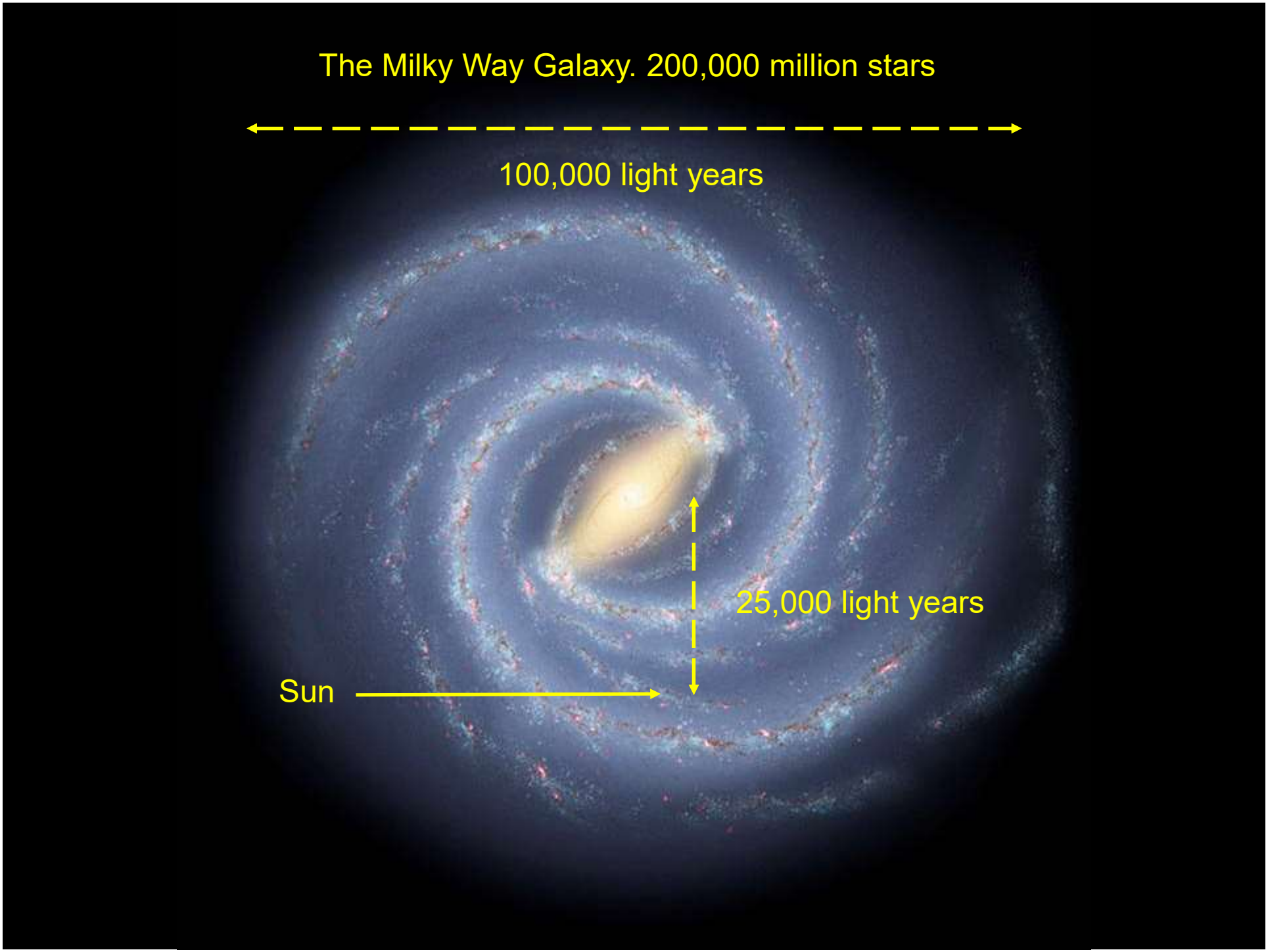

Black hole, with companion star


Globular cluster NGC 6093
Hubble Space Telescope

The Milky Way Galaxy

Jean Dean, Guernsey

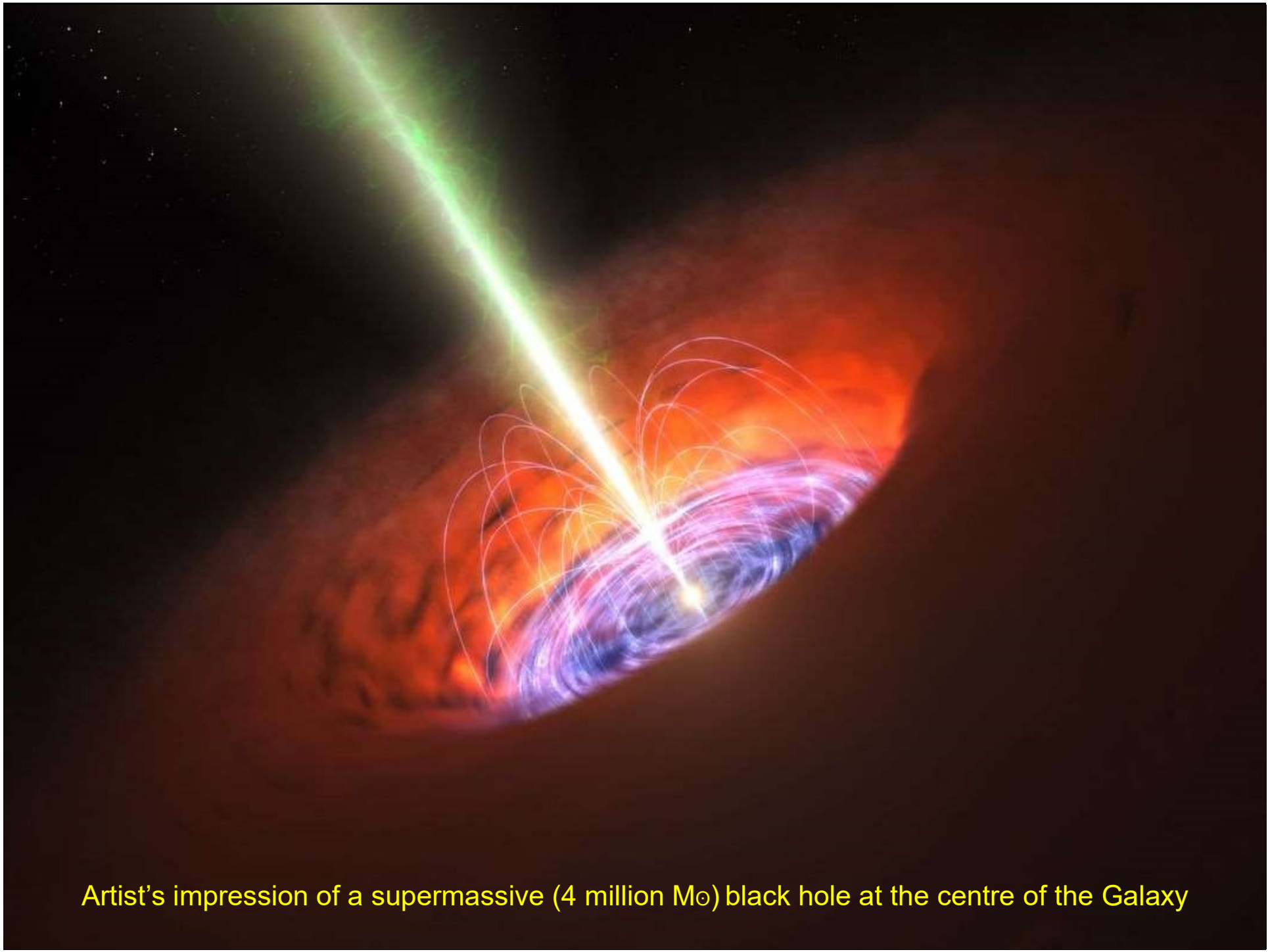
The Milky Way Galaxy


The Milky Way Galaxy. 200,000 million stars
100,000 light years
25,000 light years
Sun


Central 900 light-years of the Milky Way Galaxy (Infrared image by Spitzer Space Telescope)

Central 300 light-years of the Milky Way Galaxy

Composite infrared image by Hubble and Spitzer Space Telescopes



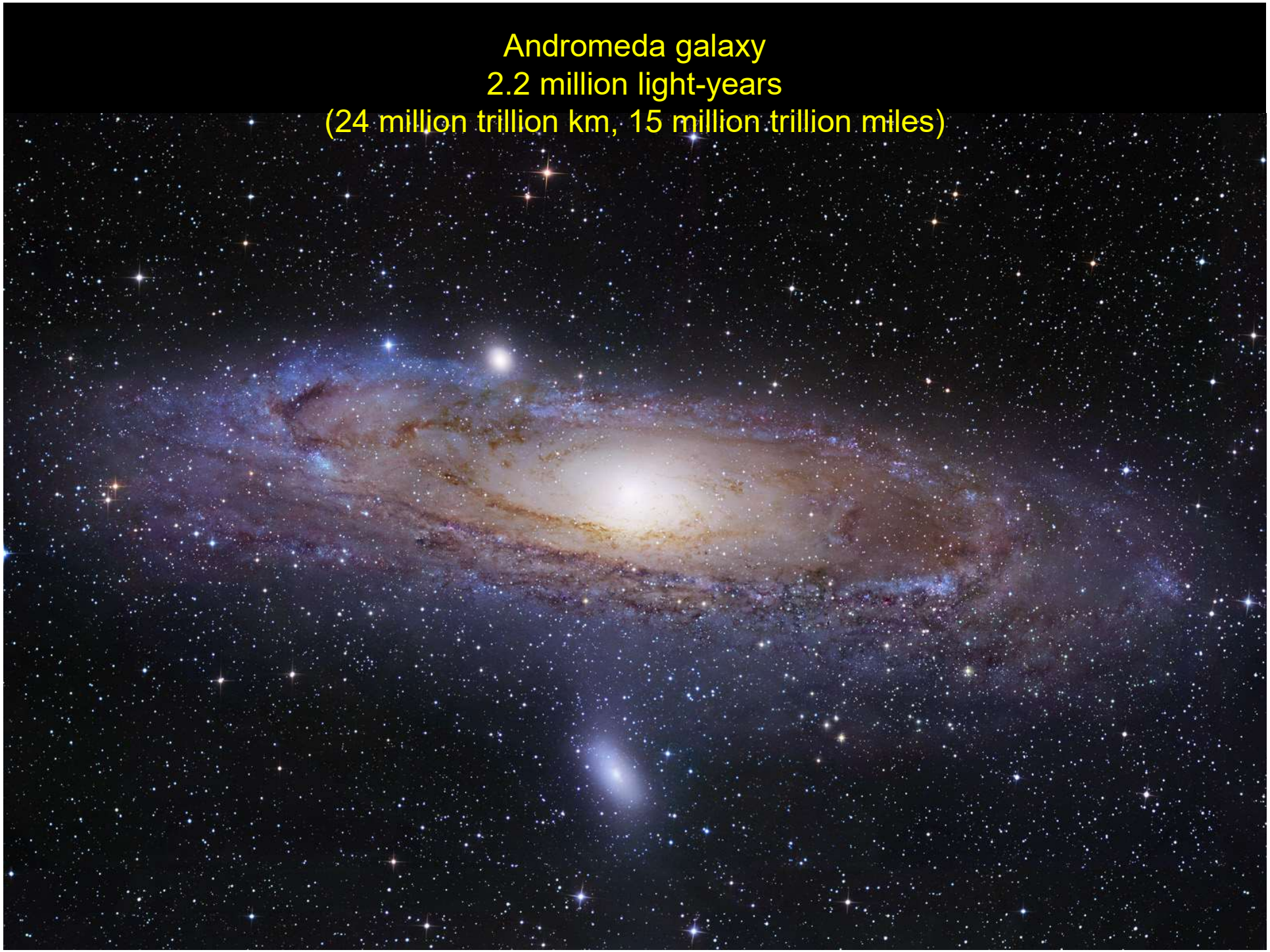
Artist's impression of a supermassive (4 million $M_\odot$) black hole at the centre of the Galaxy

Large Magellanic Cloud
160,000 light-years distant

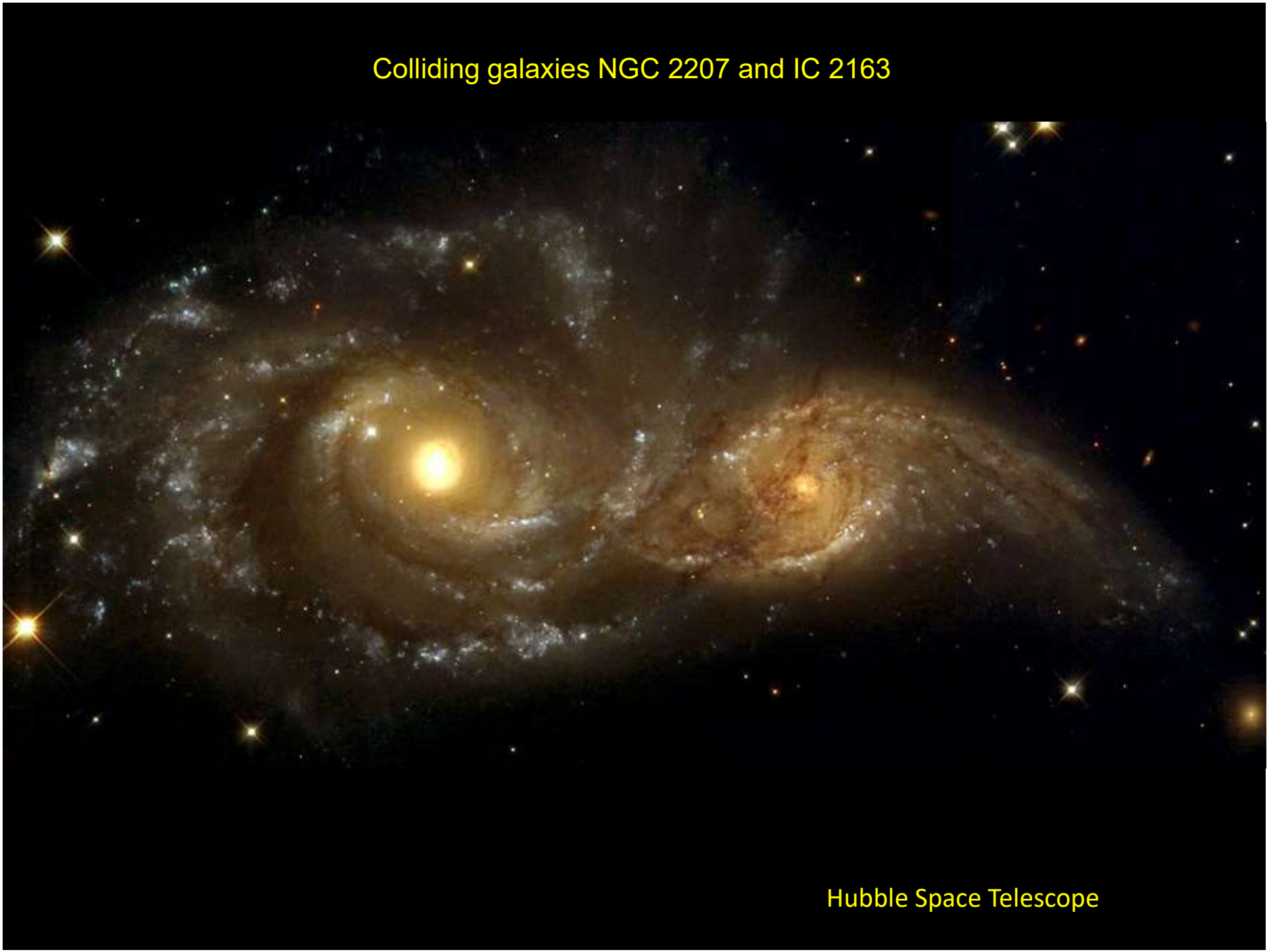
Large Magellanic Cloud
160,000 light-years distant

M51 Whirlpool galaxy

The Needle Galaxy

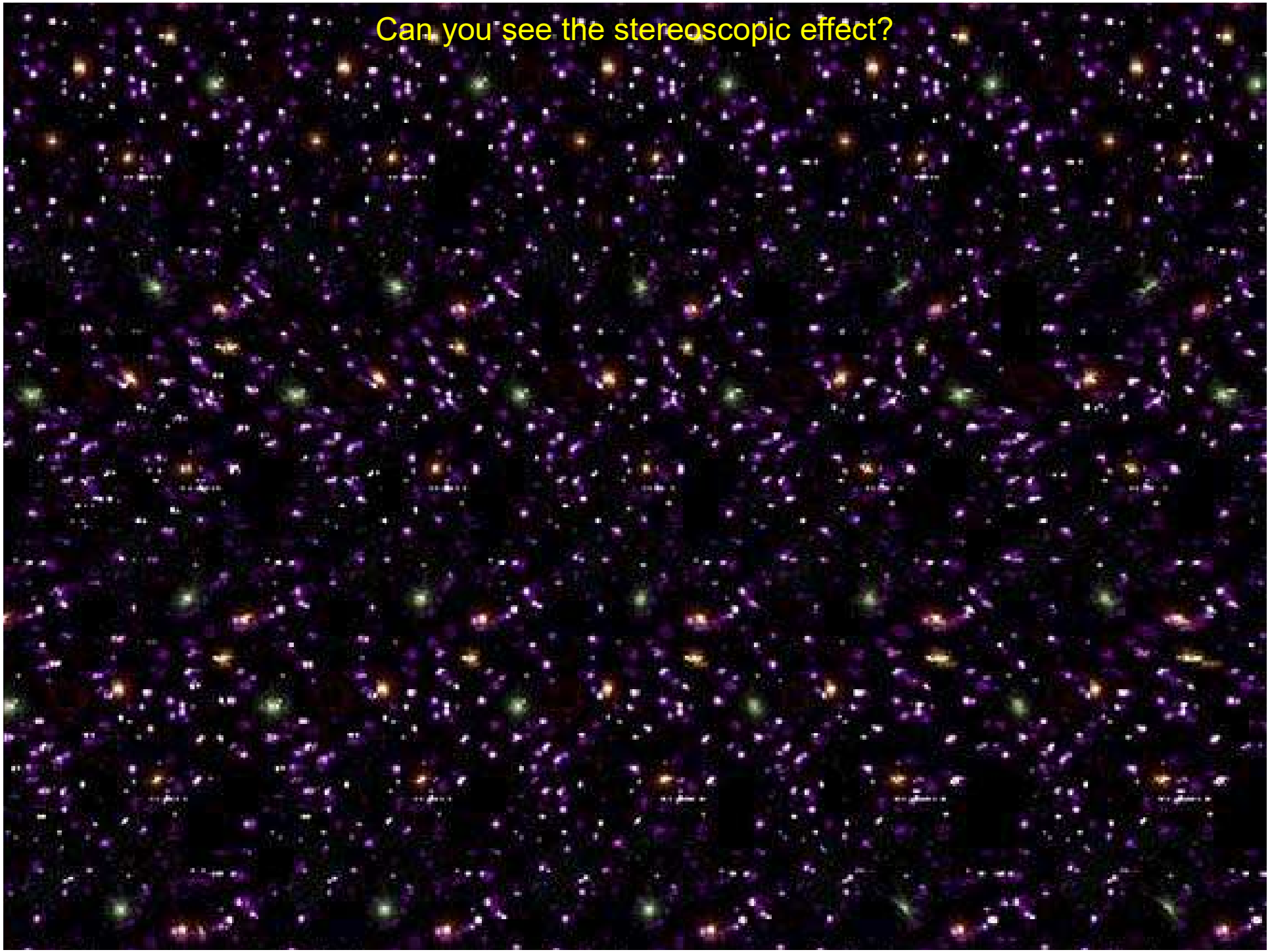

Andromeda galaxy
2.2 million light-years
(24 million trillion km, 15 million trillion miles)


M101 galaxy


Colliding galaxies NGC 2207 and IC 2163
Hubble Space Telescope


M87 galaxy in the Virgo galactic cluster.
55 million light-years


Hubble Ultra Deep Field
13 billion light-years.


Can you see the stereoscopic effect?

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Guernsey, in the British Channel Islands.

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http://www.astronomy.org.gg/more/resources/education