OUR PLACE IN THE COSMOS

Presentation by
John Wunderlin
of the Iowa County Astronomers
January 24, 2016

MY BELIEFS AND WHY I'M GLAD I FOUND THE UU CHURCH

- Faith? Belief? in the scientific method and Skepticism
- Realization of our unique place in the universe
  - If the universe is designed for humans, why is 99.999999999+ percent of the universe completely hostile for human life?
  - Lucky accident?
- Do we really need supernatural explanations for the universe when the reality of the natural universe is so amazing?

ASTRONOMY BACKGROUND

- Moon Landing
- 1st Telescope
- 1st Real telescope
- Founding Iowa County Astronomers
- Universe in the Park- Wisconsin State Parks
- Astrophotography

PRESENTATION

- Humanizing space and distance concepts
- My experience with Astrophotography
- Recent NASA space missions results

DISTANCE

HOW FAR AWAY IS THE MOON?

65 mph

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65 mph

153 Days!

HOW FAR AWAY IS THE MOON?

153 Days!
No potty breaks!

HOW FAR AWAY IS THE MOON?

153 Days!
No potty breaks!
238,857 miles

HOW FAR AWAY IS THE SUN?

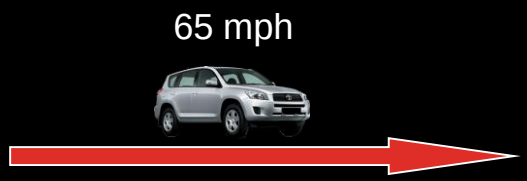
65 mph

HOW FAR AWAY IS THE SUN?

65 mph

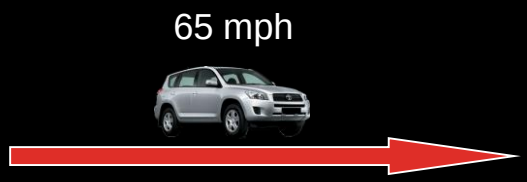
163 Years!

HOW FAR AWAY IS THE SUN?



163 Years!
Still no potty breaks

HOW FAR AWAY IS THE SUN?



163 Years!
Still no potty breaks
92,955,801 miles

ASTRONOMICAL DISTANCES

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- Light is the fastest thing in our Universe.
- Travels at 186,282 miles per second
- Can circle the Earth 7 times in 1 second.

HOW FAR AWAY IS THE MOON?

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Speed of Light

1.3 Seconds

HOW FAR AWAY IS THE SUN?

Speed of Light

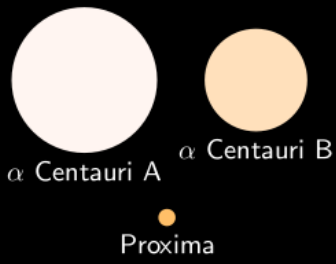
8 minutes

SOLAR SYSTEM DISTANCES

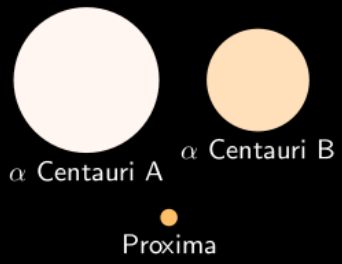
- Moon 1.3 seconds
- Sun 8 minutes
- Mars 12 minutes
- Jupiter 43 minutes
- Saturn 1.3 hours
- Pluto 5.5 hours

ALPHA CENTAURI THE NEAREST STAR

4.4 years



ALPHA CENTAURI THE NEAREST STAR

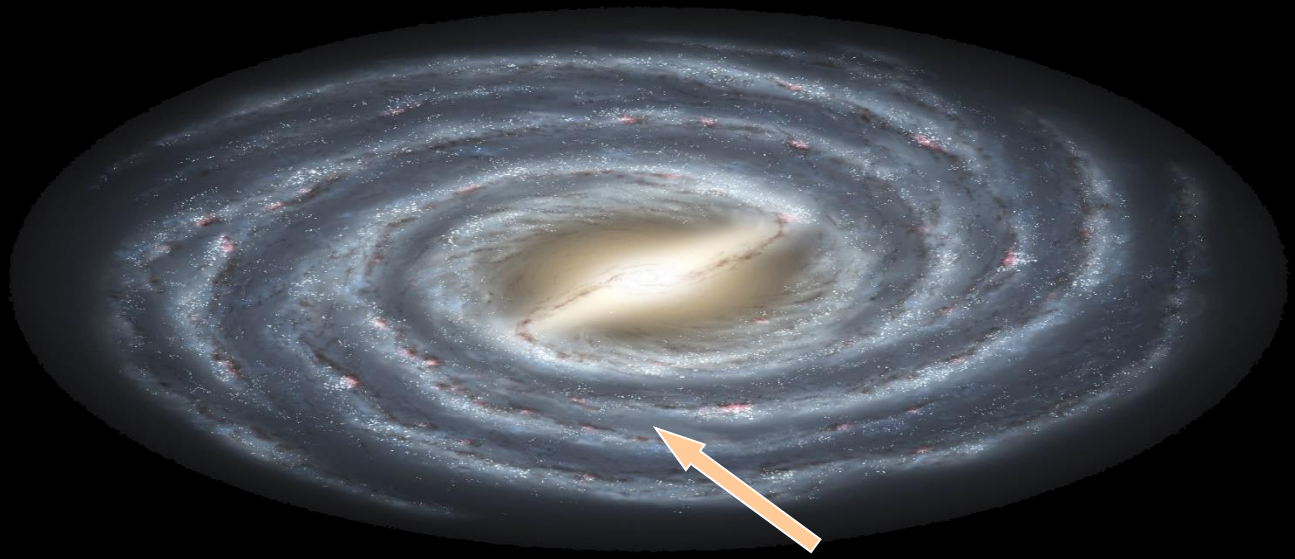


4.4 years

Trinary Star System

MILKY WAY GALAXY

Approximately 100,000
Light Years In diameter

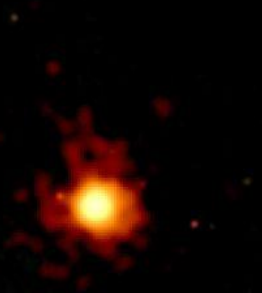


ANDROMEDA GALAXY

- One of the closest galaxies to our own

2.5 million years

MOST DISTANT OBJECT KNOWN



13,000 million years
(13 billion years)

Gamma Ray Burst
GRB 090423

ASTRONOMICAL SCALES SUMMARY

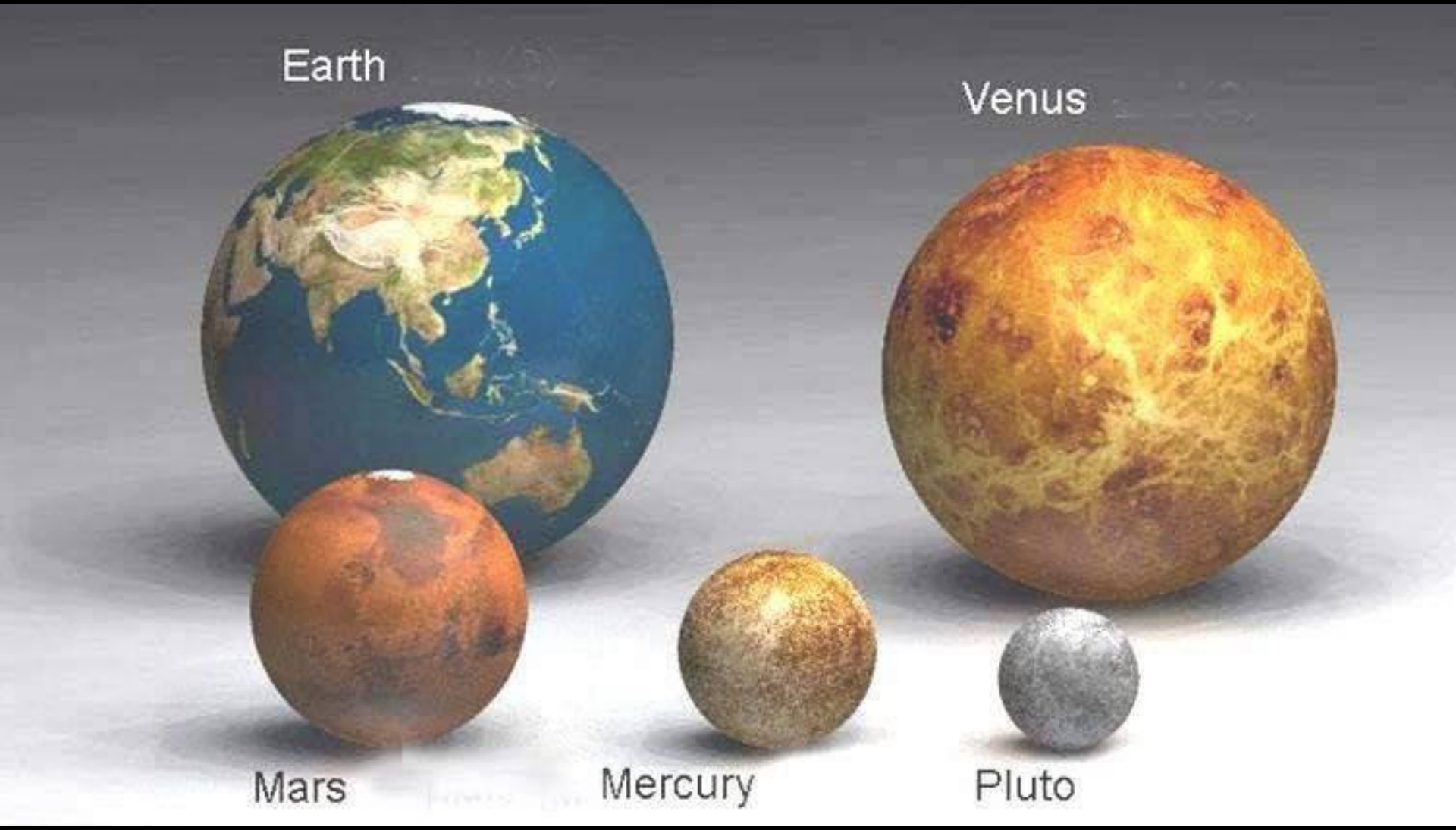
- Light speed is how astronomers measure distance. It is a measurement of how far light travels over time.
- Moon distance of 1.3 seconds is on the same scale of the universe at 13 billion years.

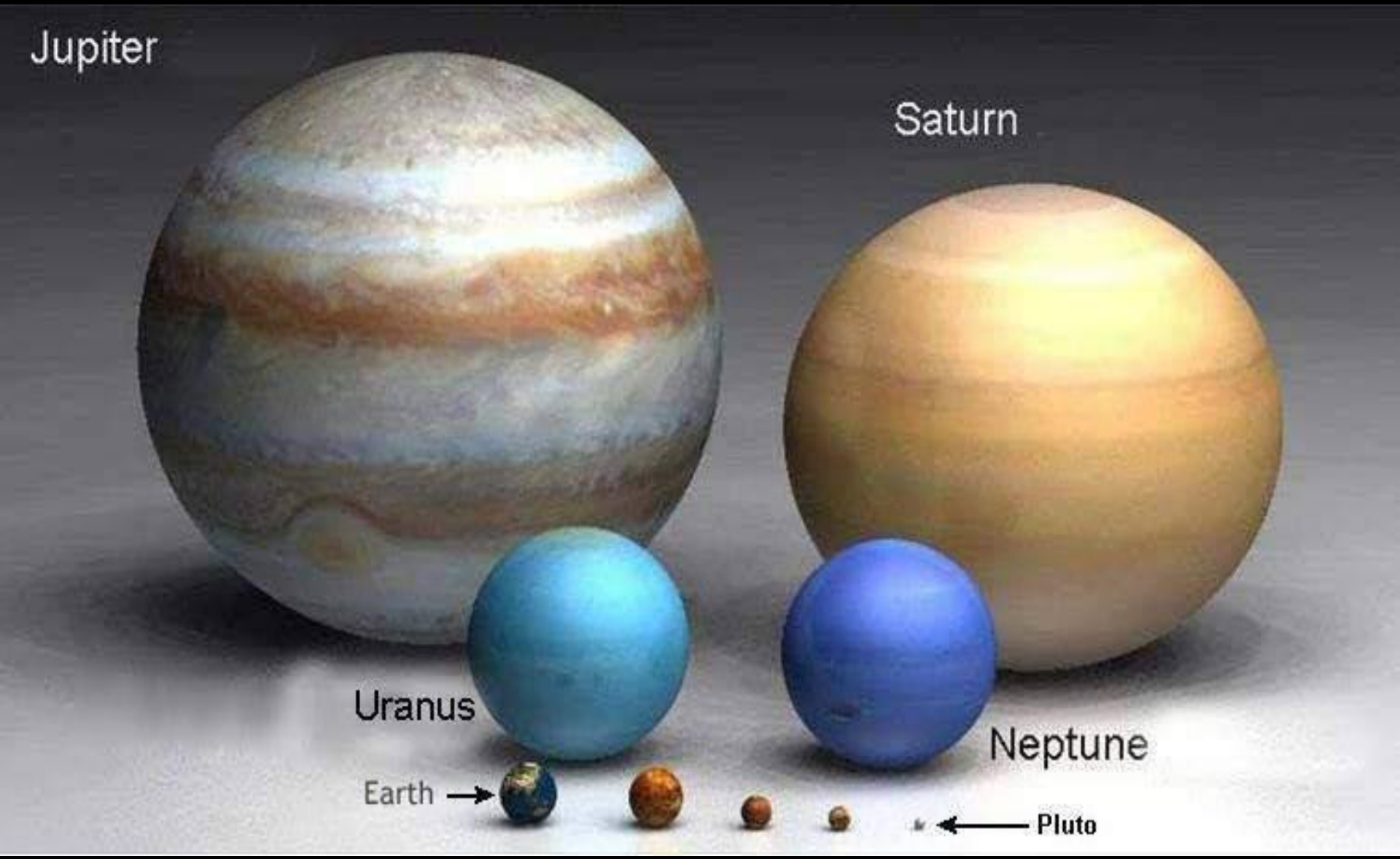
ASTRONOMICAL DISTANCES

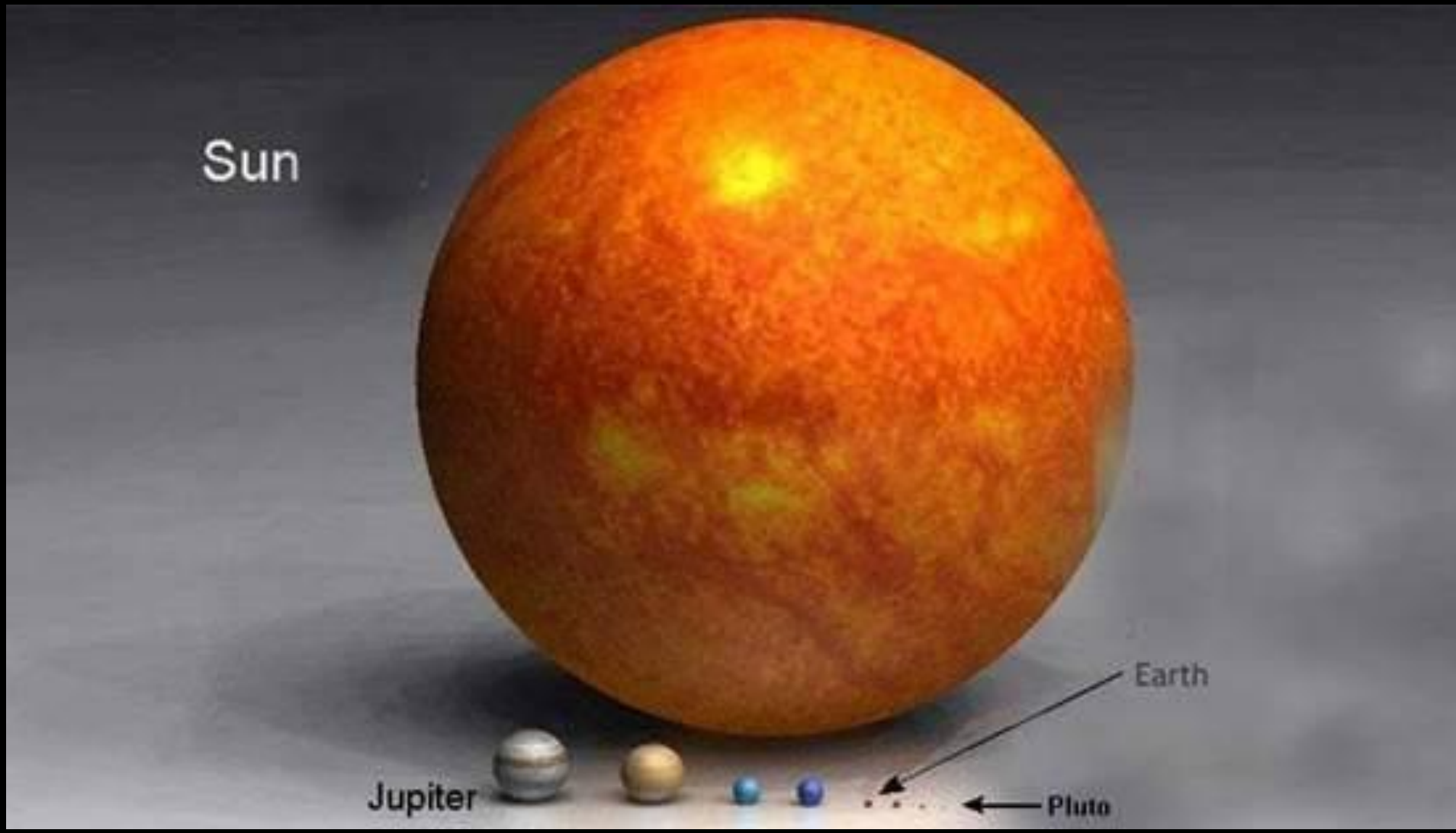
Questions?

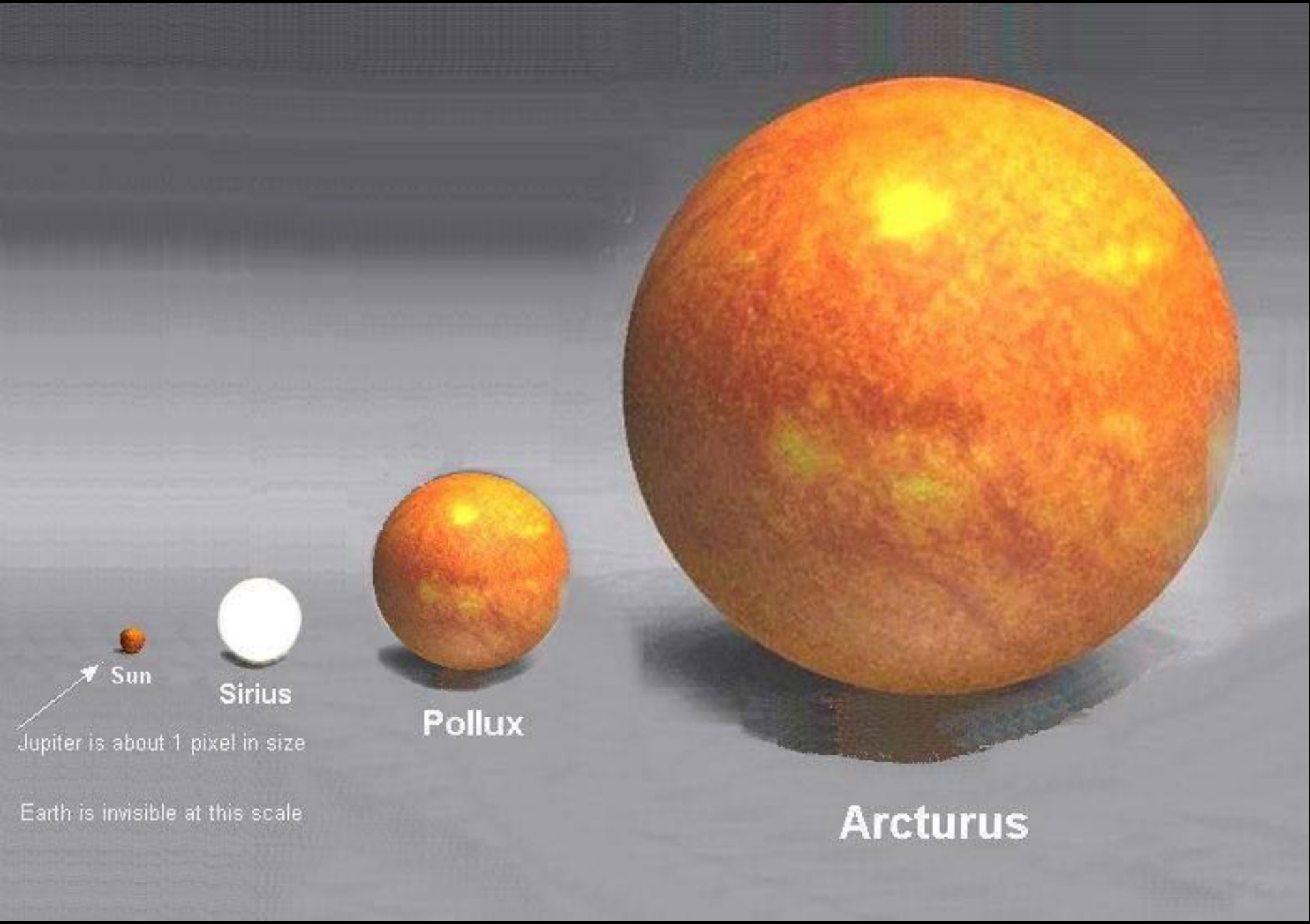
SIZE

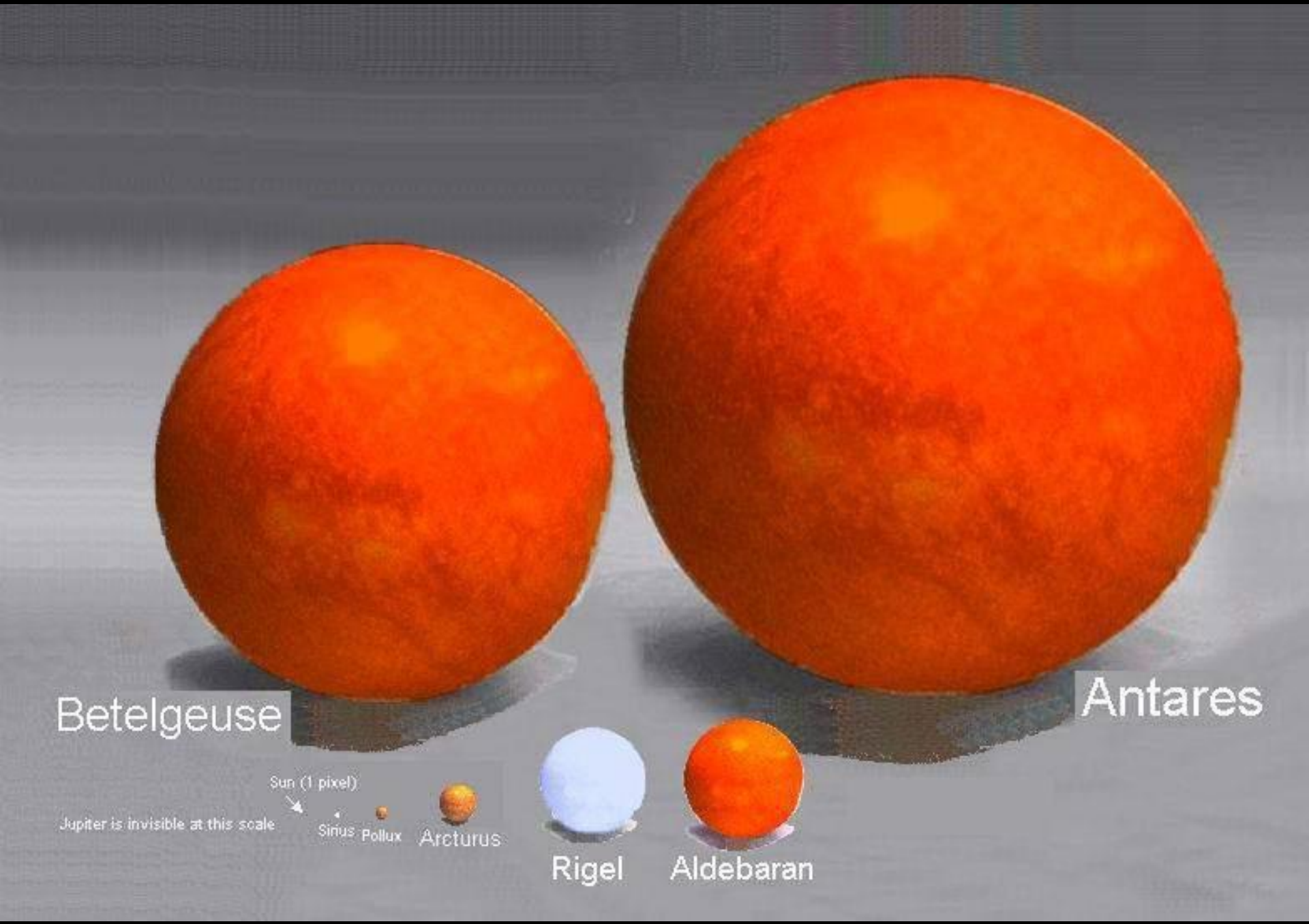
"Planets"
Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune
"Dwarf Planets"
Ceres
Pluto
Haumea
Makemake
Eris


Earth
Venus
Mars
Mercury
Pluto


Jupiter
Saturn
Uranus
Neptune
Earth
Pluto


Sun
Earth
Jupiter
Pluto


Sun
Sirius
Pollux
Arcturus
Jupiter is about 1 pixel in size
Earth is invisible at this scale

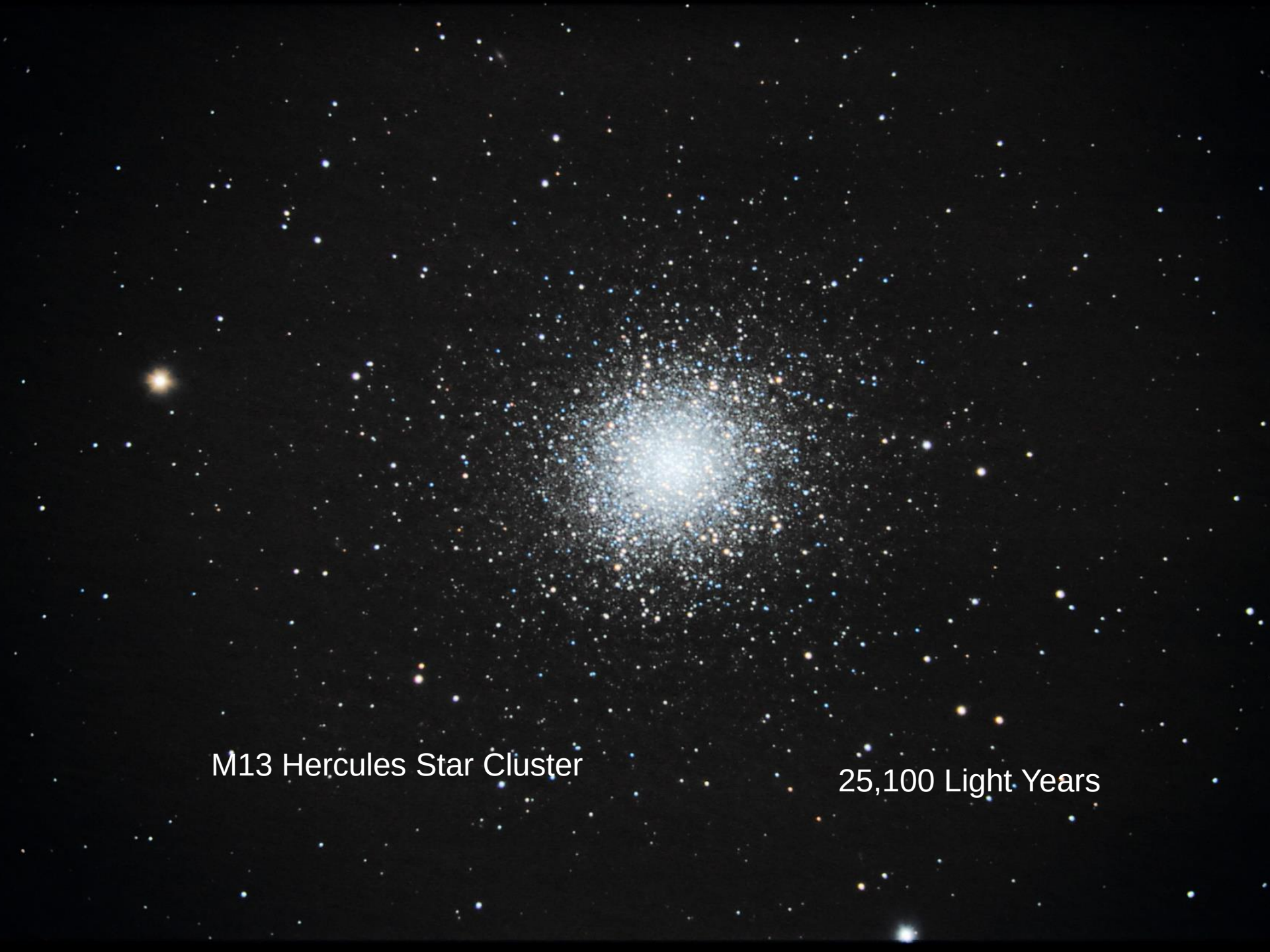

Betelgeuse
Antares
Sun (1 pixel)
Jupiter is invisible at this scale
Sirius
Pollux
Arcturus
Rigel
Aldebaran

ASTRONOMICAL SIZES

Questions?


KOWALSKI - KIELER
INC


MEADE LX50 EMC
ORION
SBIG


M13 Hercules Star Cluster
25,100 Light Years

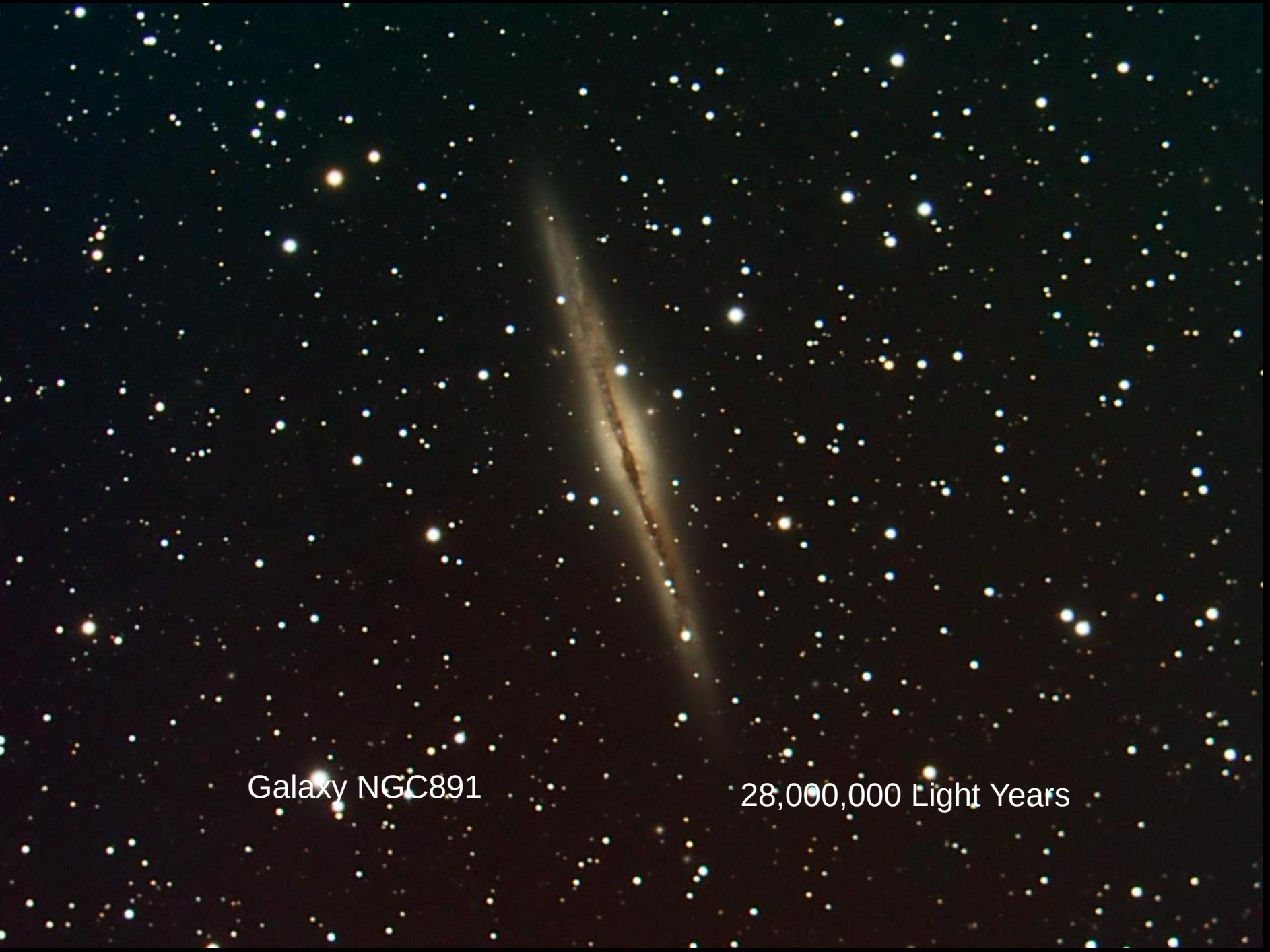

Galaxy M33
2,600,000 Light Years

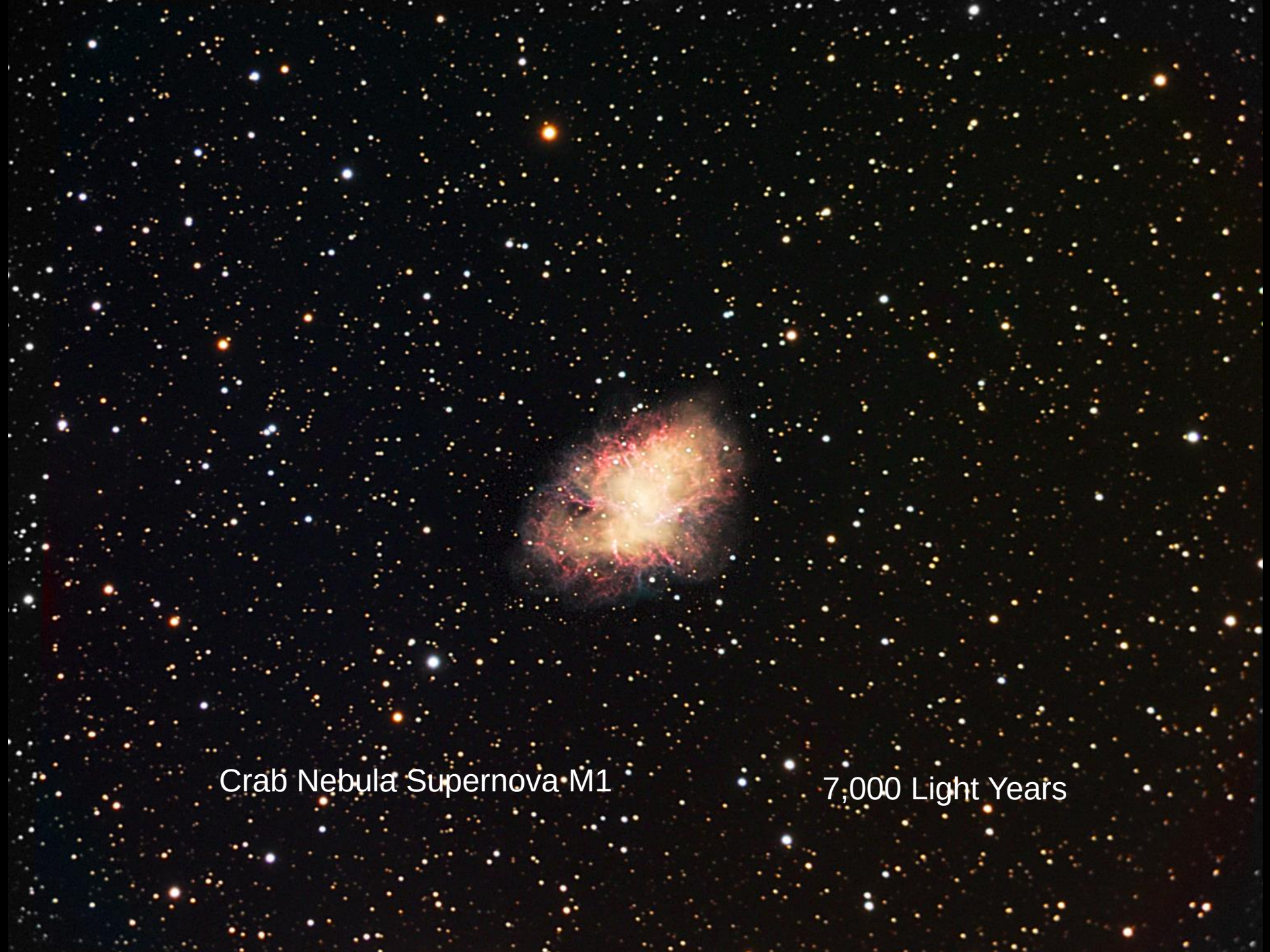

Pleiades Star Cluster
440 Light Years


Cave Nebula
2,400 Light Years

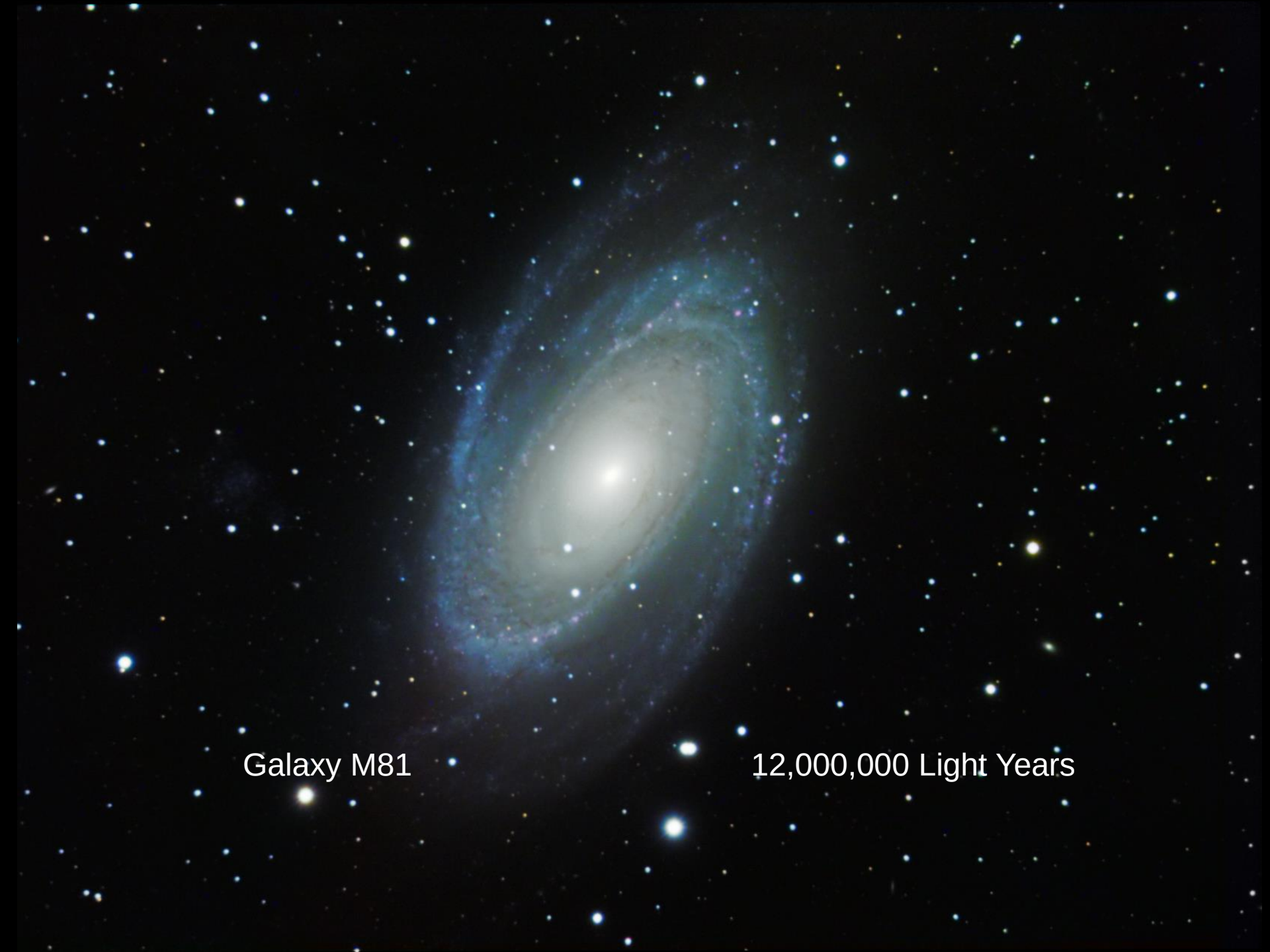

Galaxy M51
25,000,000 Light Years


Bubble Nebula
11,000 Light Years


Galaxy NGC891
28,000,000 Light Years


Crab Nebula Supernova M1
7,000 Light Years


Cocoon Nebula
3,300 Light Years


Galaxy M81
12,000,000 Light Years


Crescent Nebula
5000 Light Years

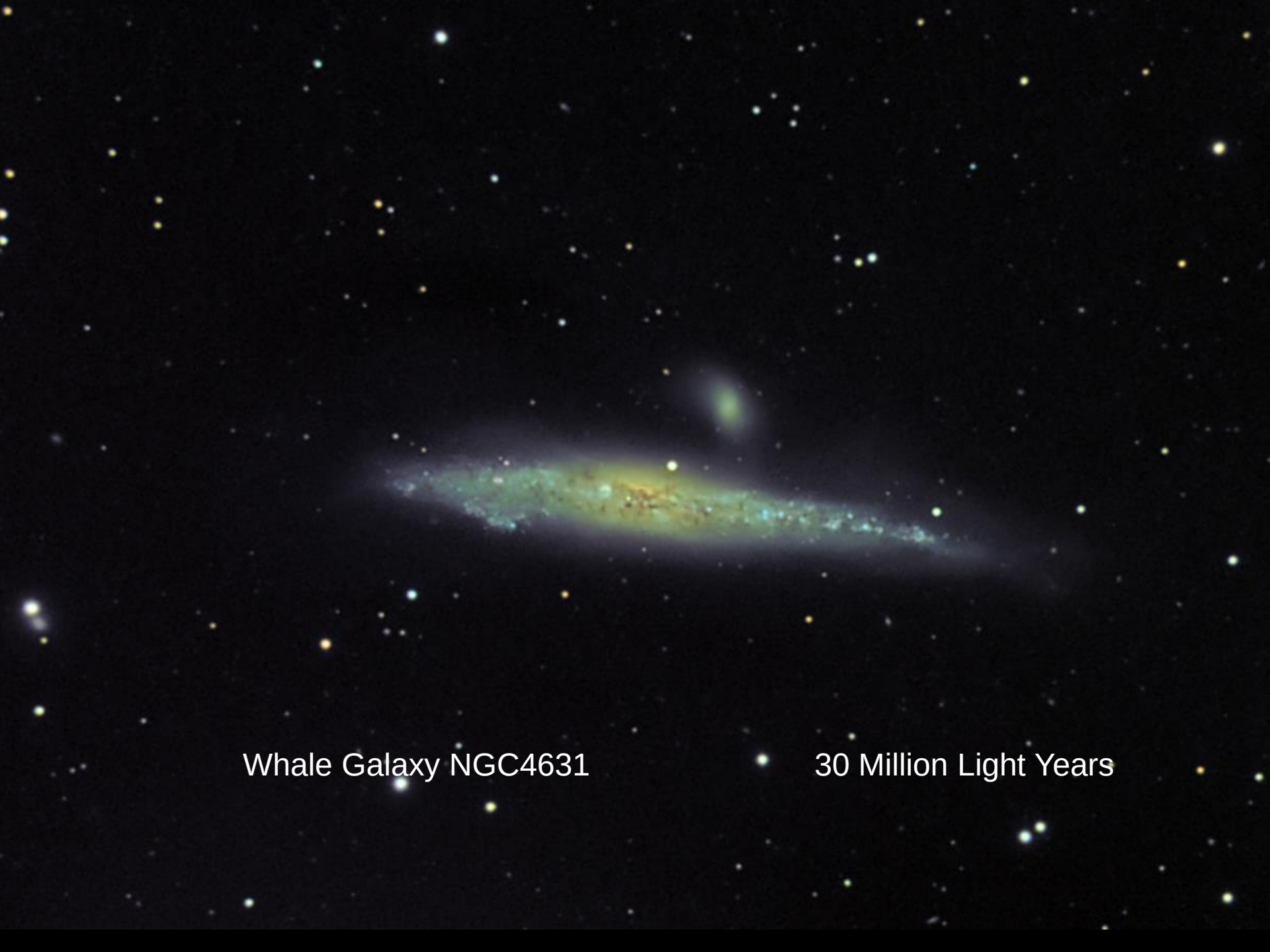

Ghost Nebula vdB 141
1470 Light Years


Horsehead Nebula
1500 Light Years


Orion Nebula
1344 Light Years


Sunflower Galaxy M63
37 Million Light Years


Black Eye Galaxy M64
24 Million Light Years


Whale Galaxy NGC4631
30 Million Light Years

ASTROPHOTOGRAPHY

Questions?

TELESCOPE TIPS

- When viewing objects at night, it take 30 minutes for your eyes to adapt to the dark. Any bright lights and the clock resets!

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TELESCOPE TIPS

- When viewing objects at night, it take 30 minutes for your eyes to adapt to the dark. Any bright lights and the clock resets!
- When looking through a telescope at galaxies and nebulas, you won't see color- astronomers call these objects 'faint fuzzies'.
- Never, never, never, ever view the sun through a telescope without the correct solar filter. You will be instantly blinded!

CURRENT SPACE MISSIONS

- Dawn
- Rosetta
- New Horizons
- Many others

DAWN

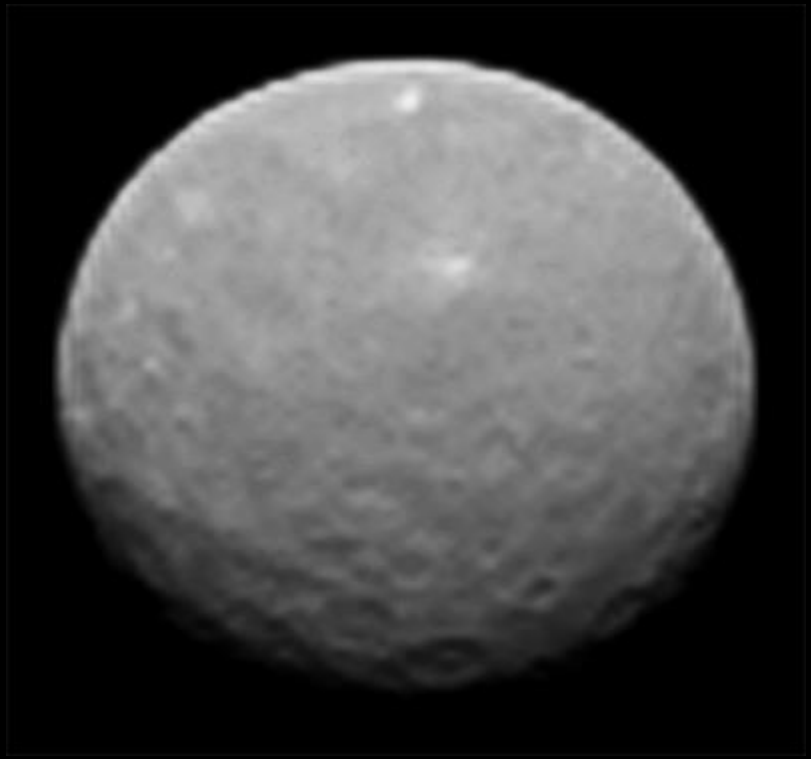
- Launched September 27, 2007
- Visited Vesta and currently nearing Ceres
- Uses ion drive system

DAWN AT VESTA

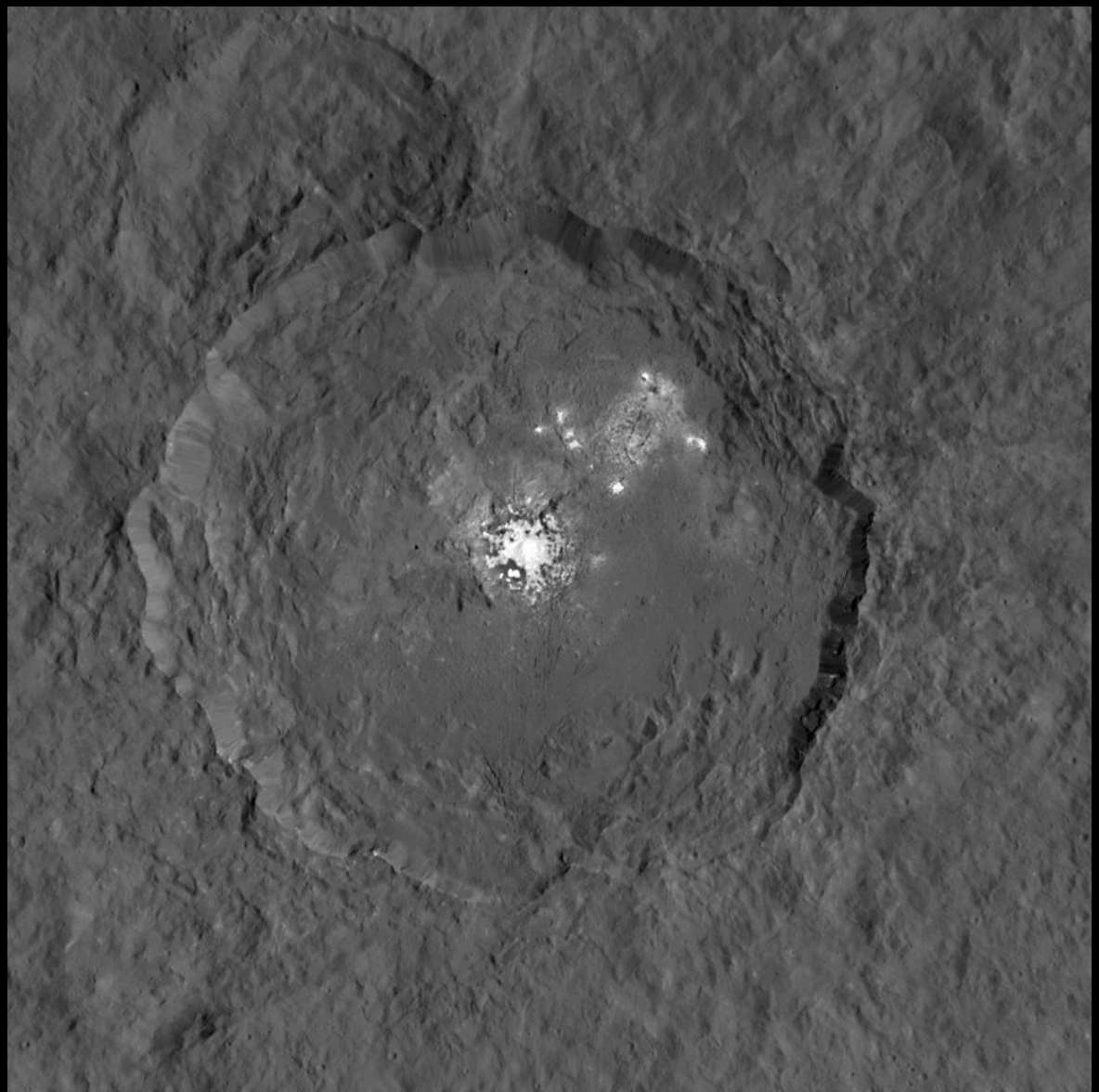
- Vesta diameter 326 miles
- Rotation period: 5 hours
- My weight on Vesta: 3.75 lbs

DAWN APPROACHING CERES

- Ceres diameter: 590 miles
- Rotation period: 9 hours
- My weight on Ceres: 4.3 lbs
- Unknown white spots



DAWN AT CERES

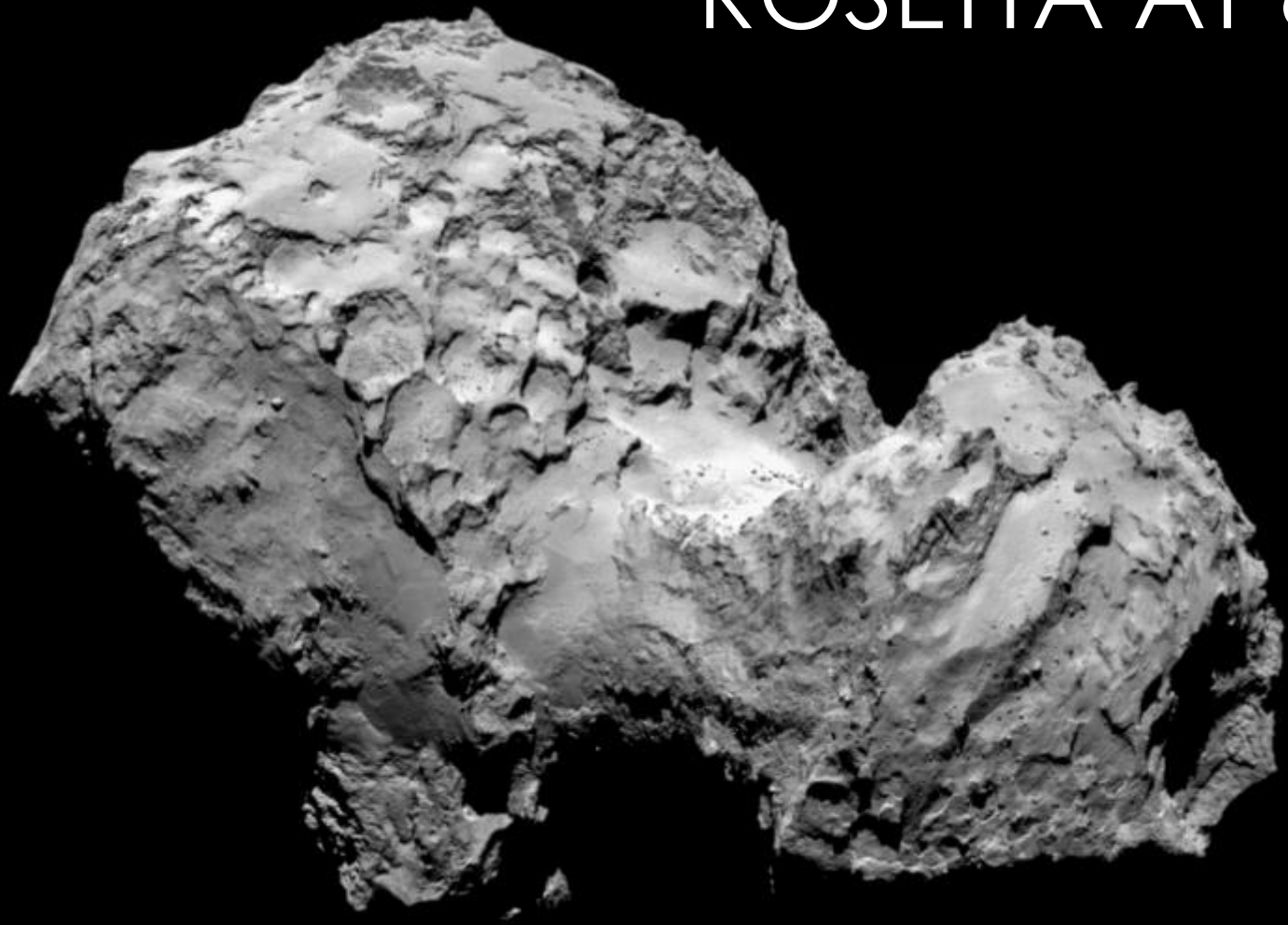


DAWN AT CERES

ROSETTA

- Launched March 4, 2004 by European Space Agency
- Landed spacecraft 'Philae' on the surface of comet 67p/Churyumov-Gerasimenko
- Lander did not attach but provided data before failing.
- Very low surface gravity. You could probably jump from the surface at escape velocity.
- 2.7 miles in diameter
- Philae woke up intermittently but did not provide any additional data
- Mothership will attempt to soft-land in 2016

ROSETTA AT 67P




ROSETTA AT 67P

ROSETTA AT 67P

NEW HORIZONS

- Launched January 19, 2006
- Fastest spacecraft ever: 36,373 mph. 100 times faster than a jetliner
- Will travel 32 times the Earth-Sun distance
- Arrived at Pluto July 14, 2015
- Can't stop- will just be flying by
- Extended mission- flyby of 2014 MU69, January 2019

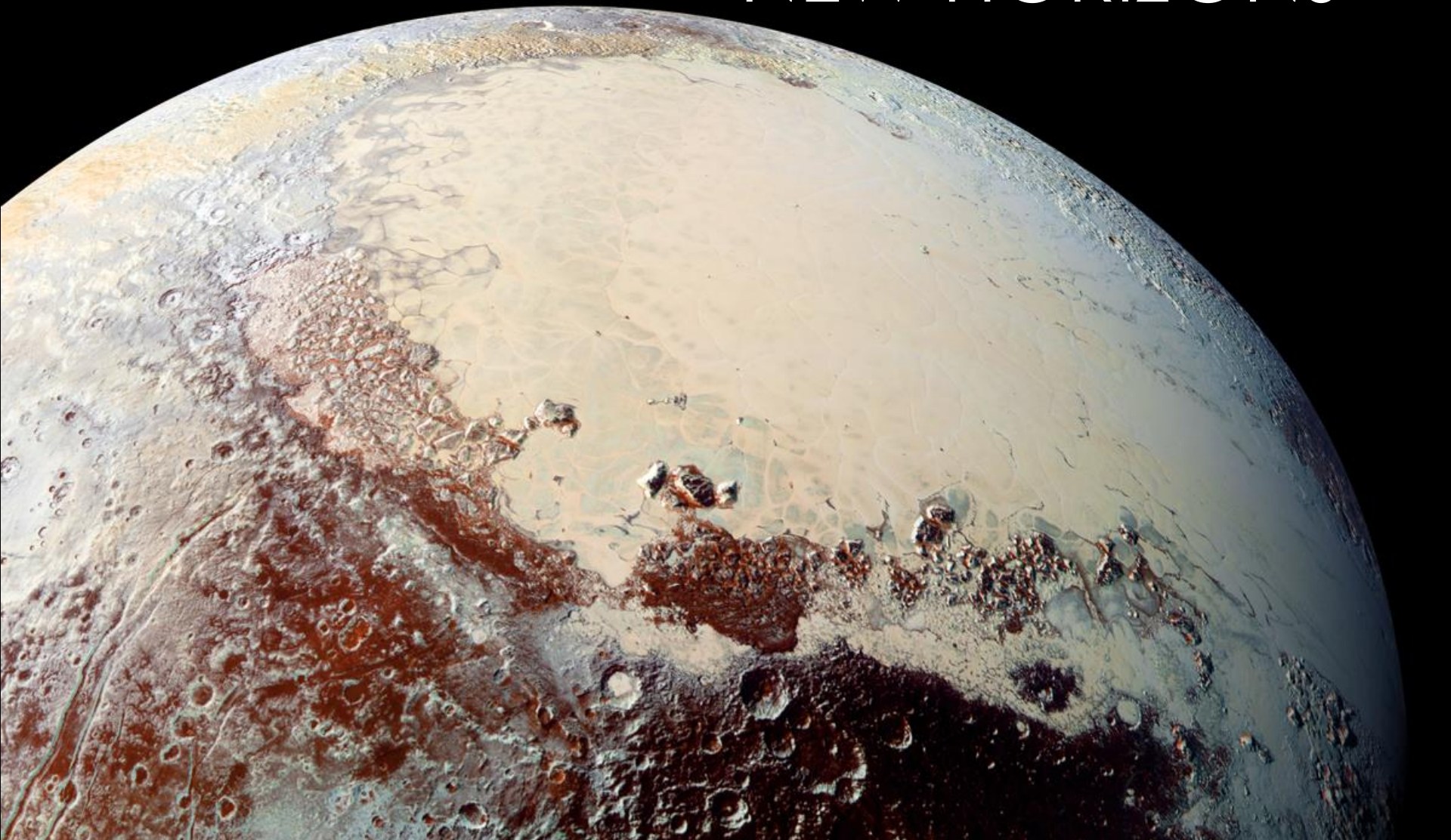
NEW HORIZONS

NH LORRI OPNAV CAMPAIGN 1
2014-07-19 02:30:00 UTC
Distance to Pluto: 429375336 Km
(Proper Motion)

NH LORRI OPNAV CAMPAIGN 2
2015-01-25 02:01:00 UTC
Distance to Pluto: 202976400 Km
(Plutocentric)

NEW HORIZONS

NEW HORIZONS



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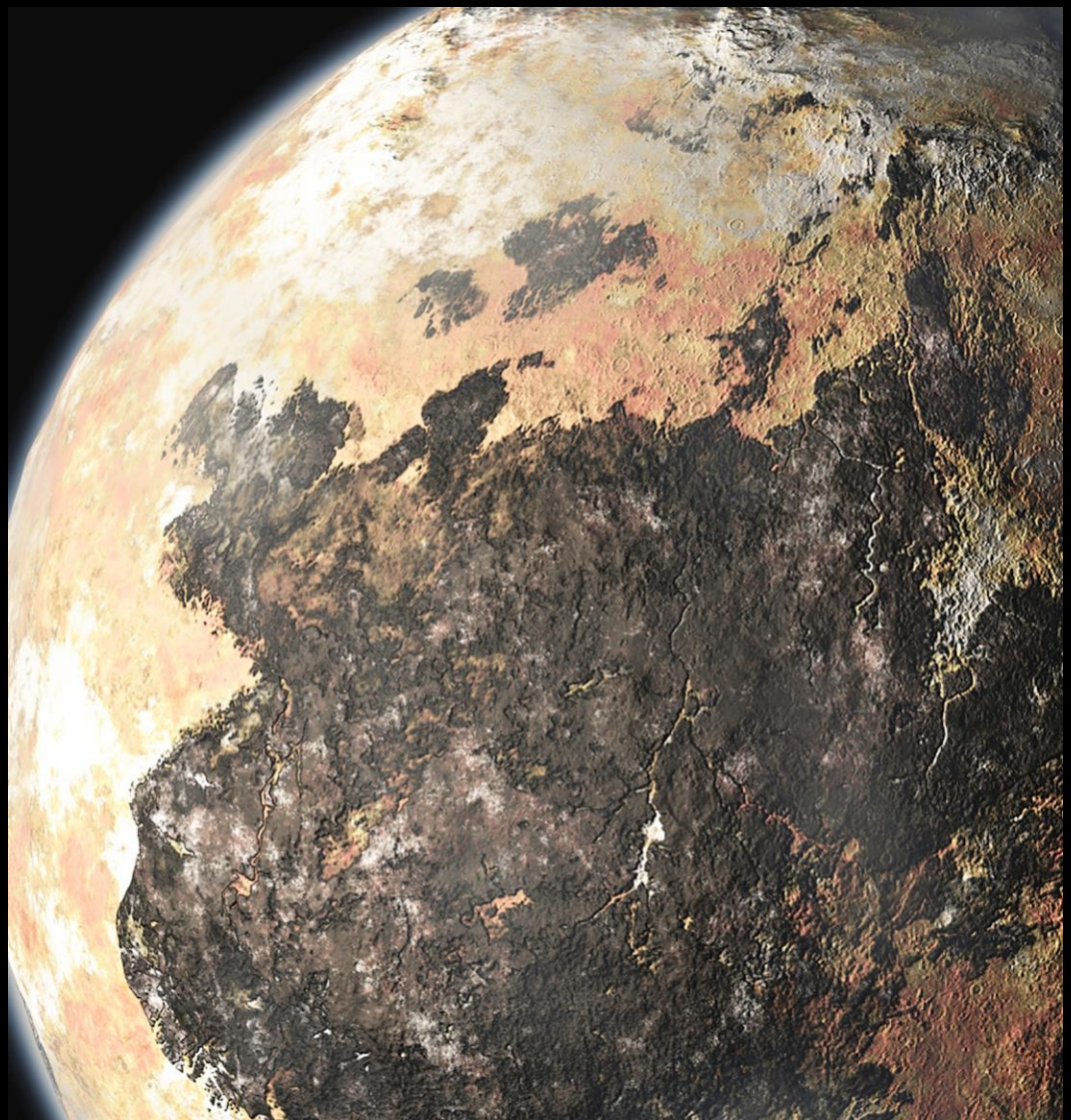

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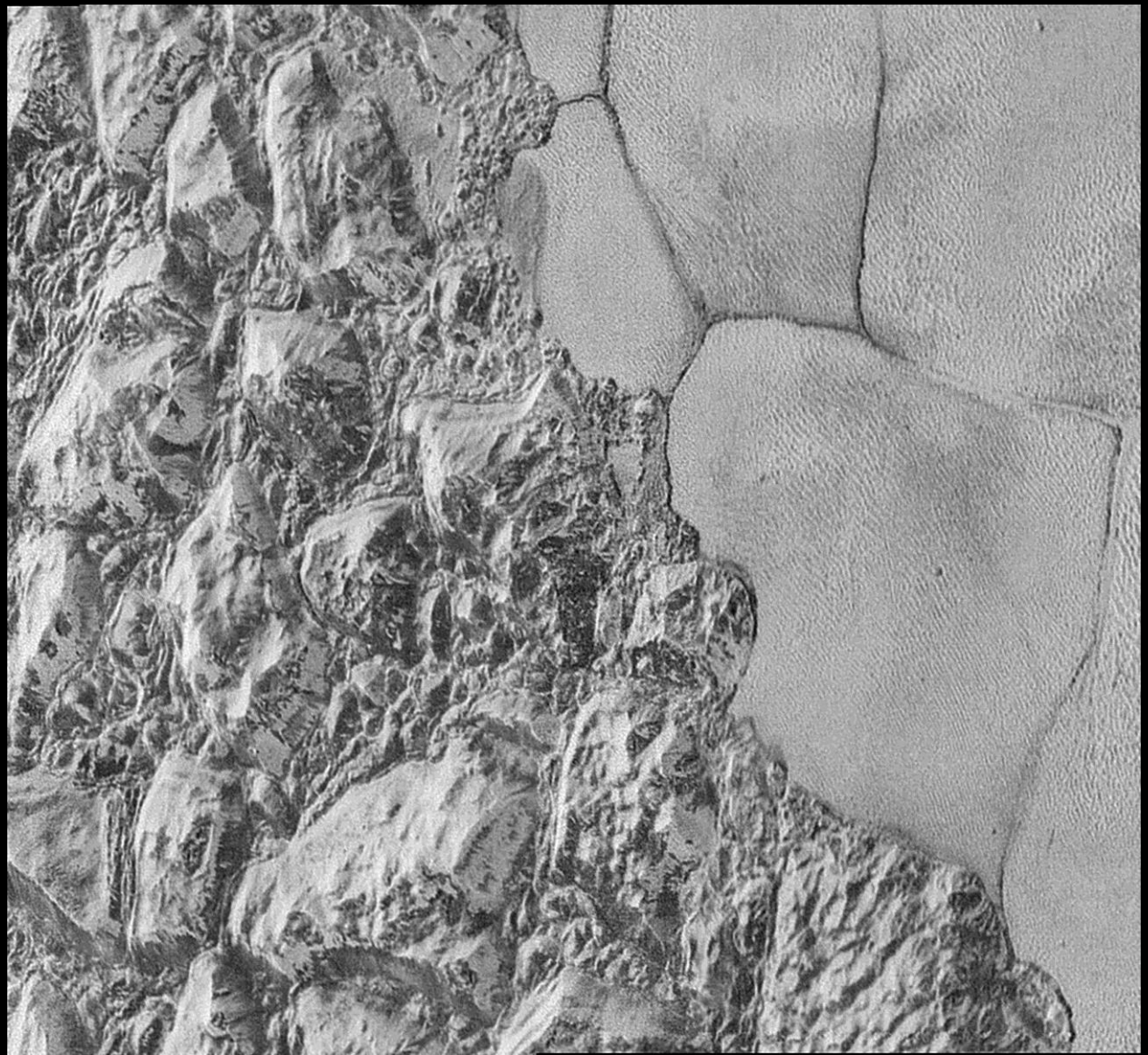

THANKS!

Image credits: Nasa, ESA, Planetary Society, Emily Lakdawalla, YouTube video from ‘Vangelis’