SHORT CRUISE THROUGH THE UNIVERSE

1cm × 1cm

10cm × 10cm

100cm × 100cm

10m × 10m

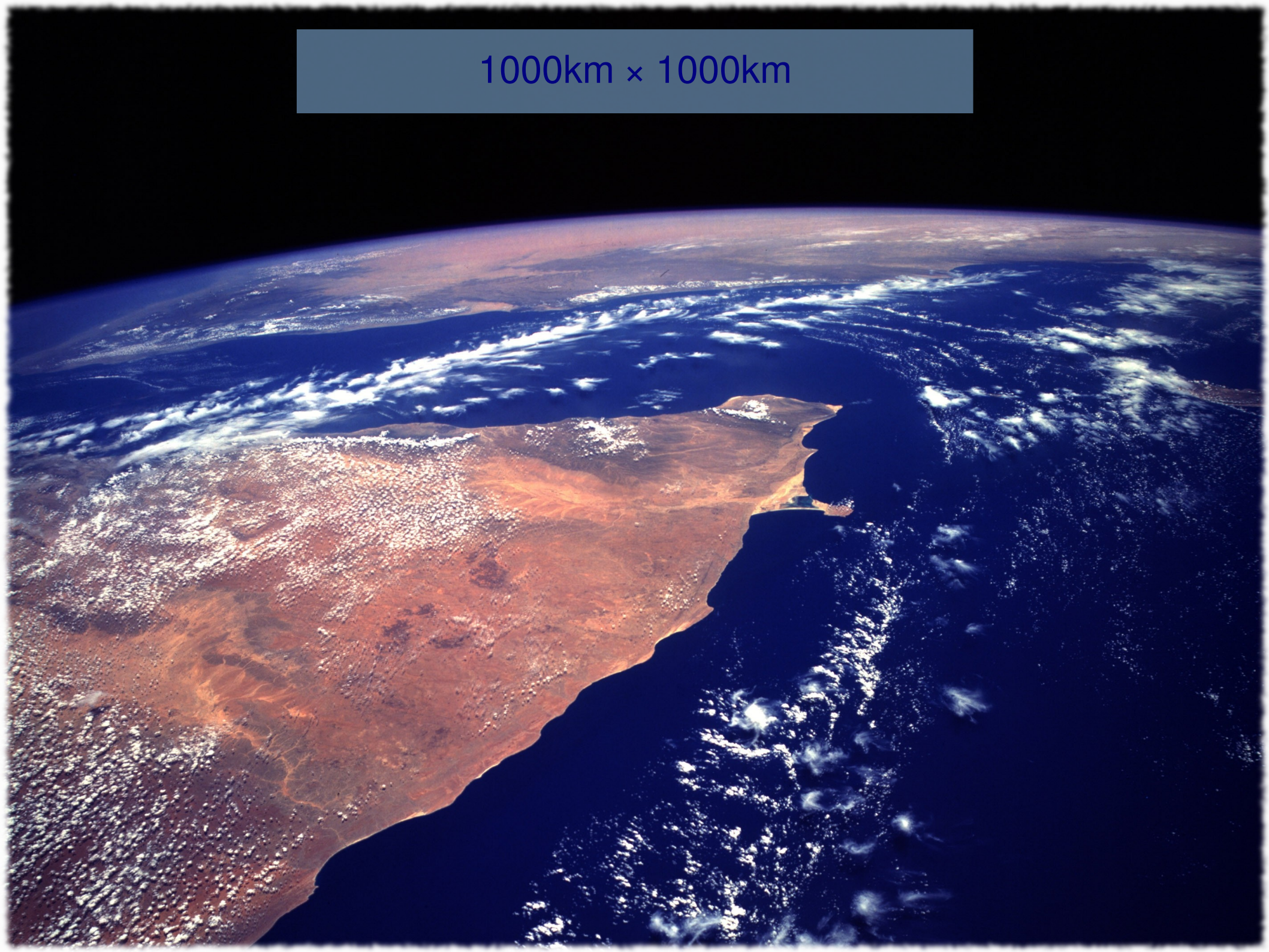
100m × 100m

1km × 1km

1km × 1km

10km × 10km

100km × 100km


1000km × 1000km

10000km × 10000km

100.000km × 100.000km

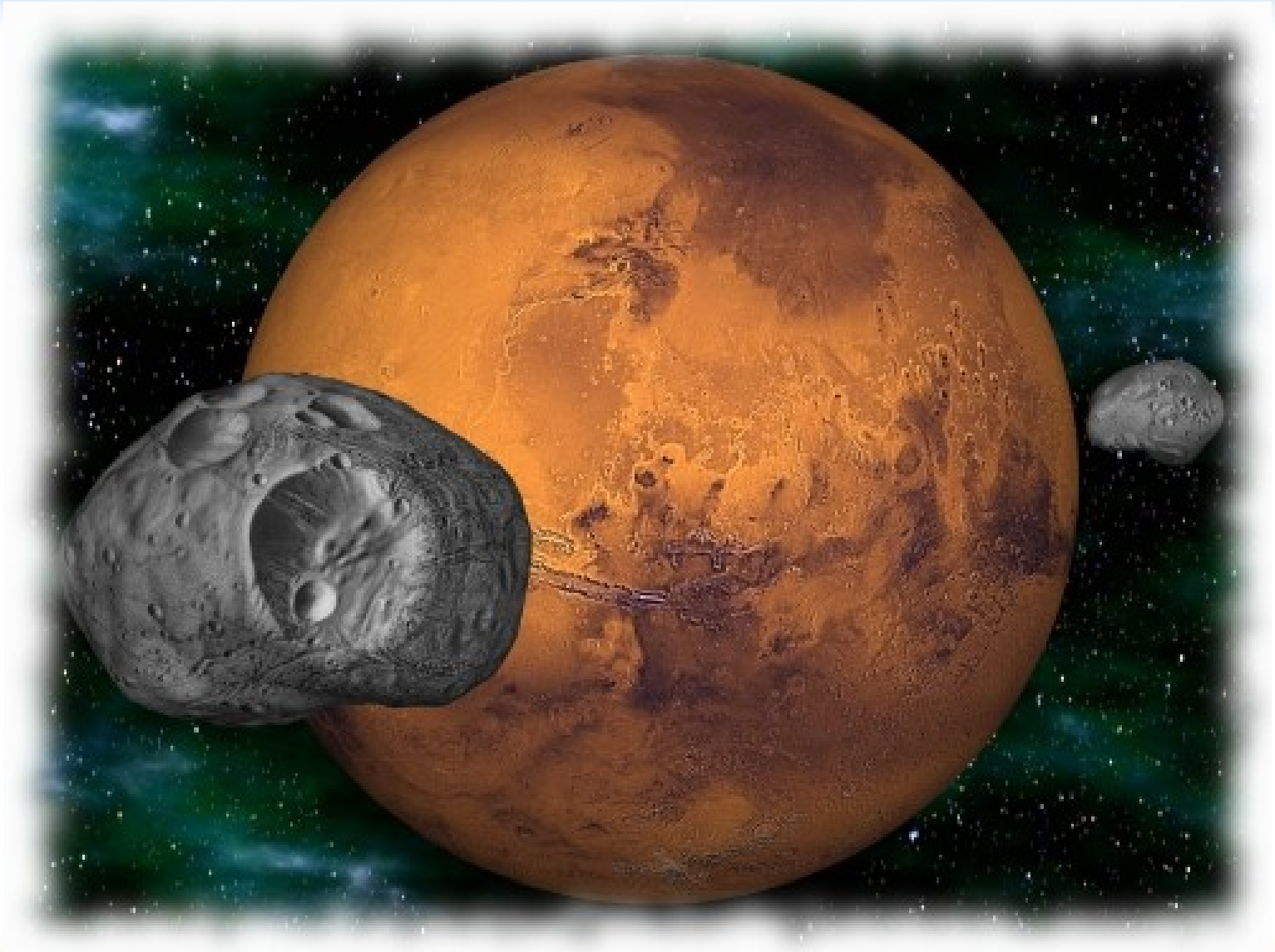
400.000km × 400.000km

1.000.000km × 1.000.000km

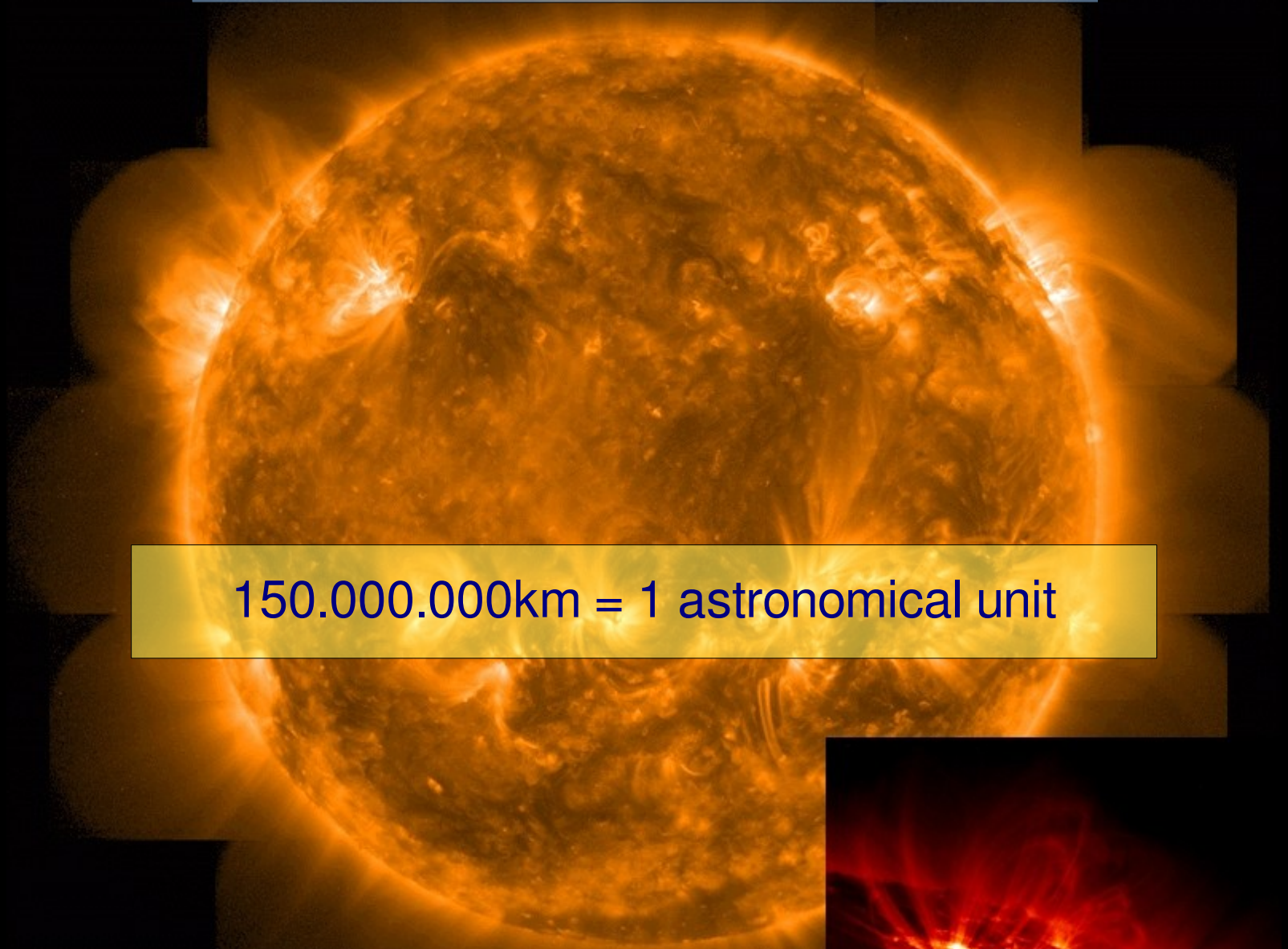
10.000.000km × 10.000.000km

100.000.000km × 100.000.000km

100.000.000km × 100.000.000km

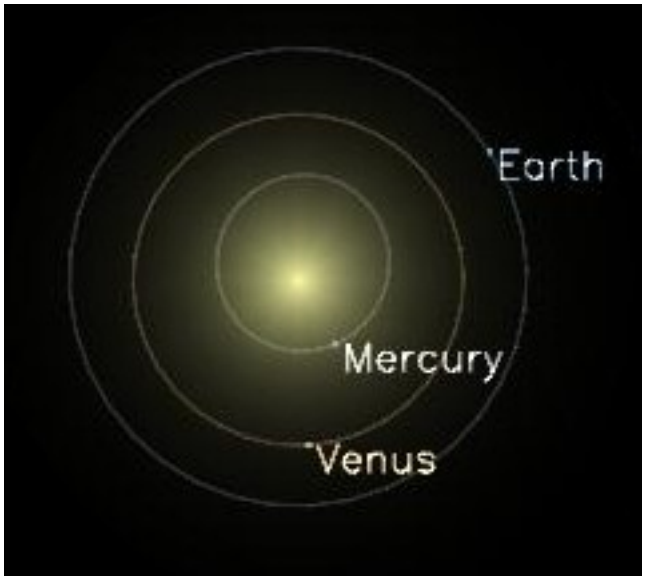


150.000.000km × 150.000.000km



150.000.000km = 1 astronomical unit

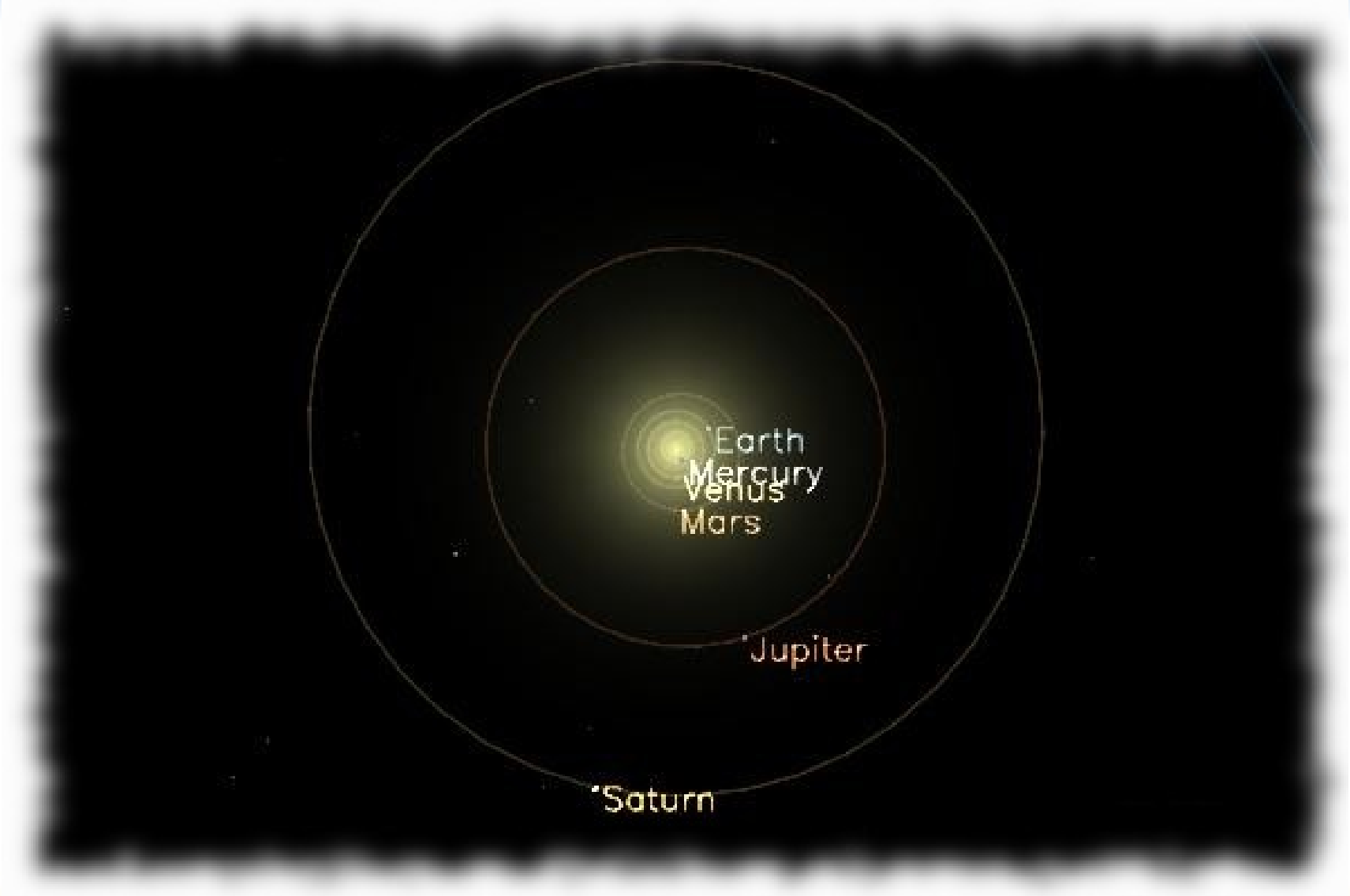
1 au × 1 au

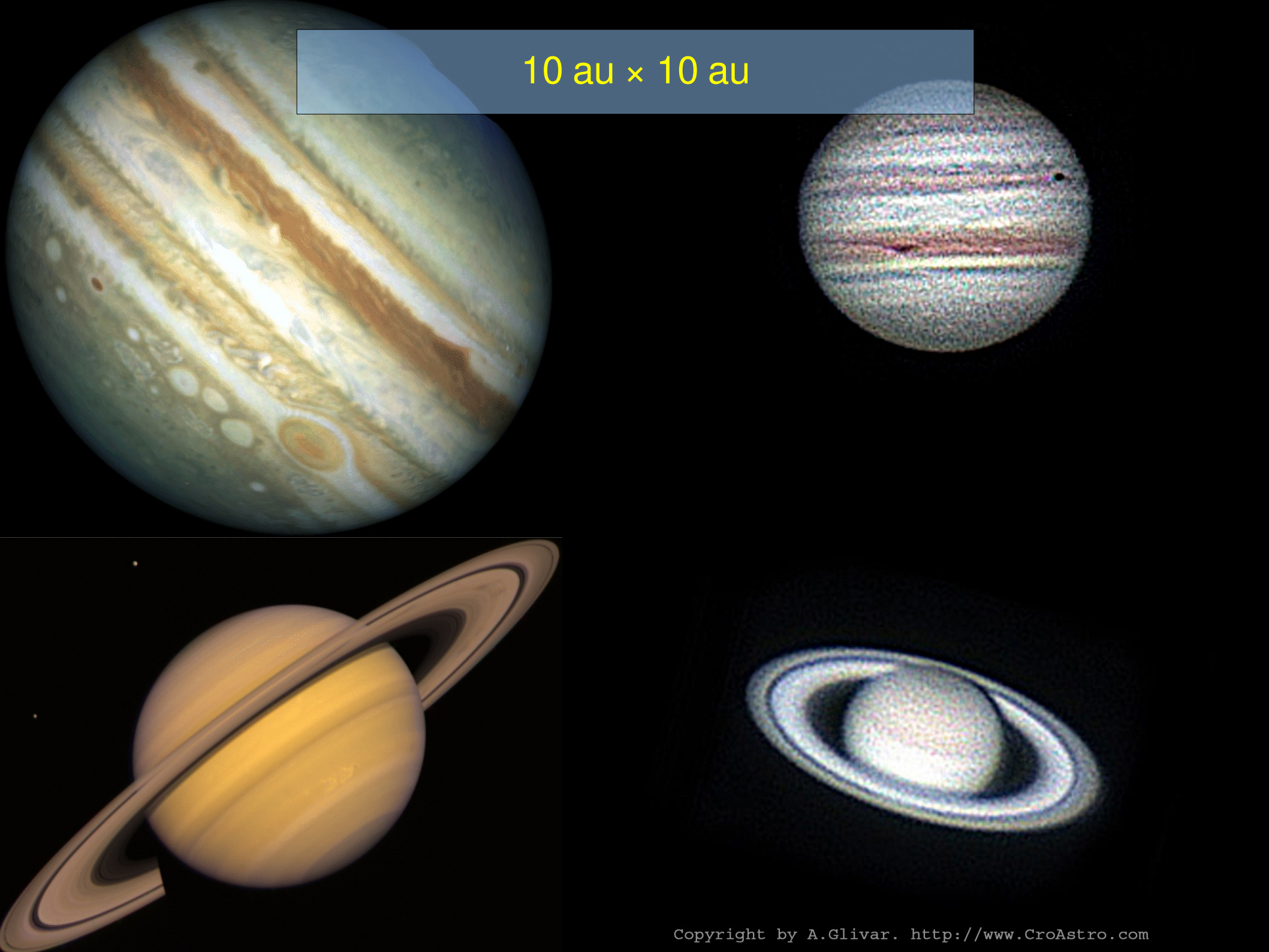


Mercury: 0.4 astronomical units
Venus: 0.7 astronomical units
Earth: 1.0 astronomical units

Reality check: 1 au is 1.500.000.000.000-times larger than the ring

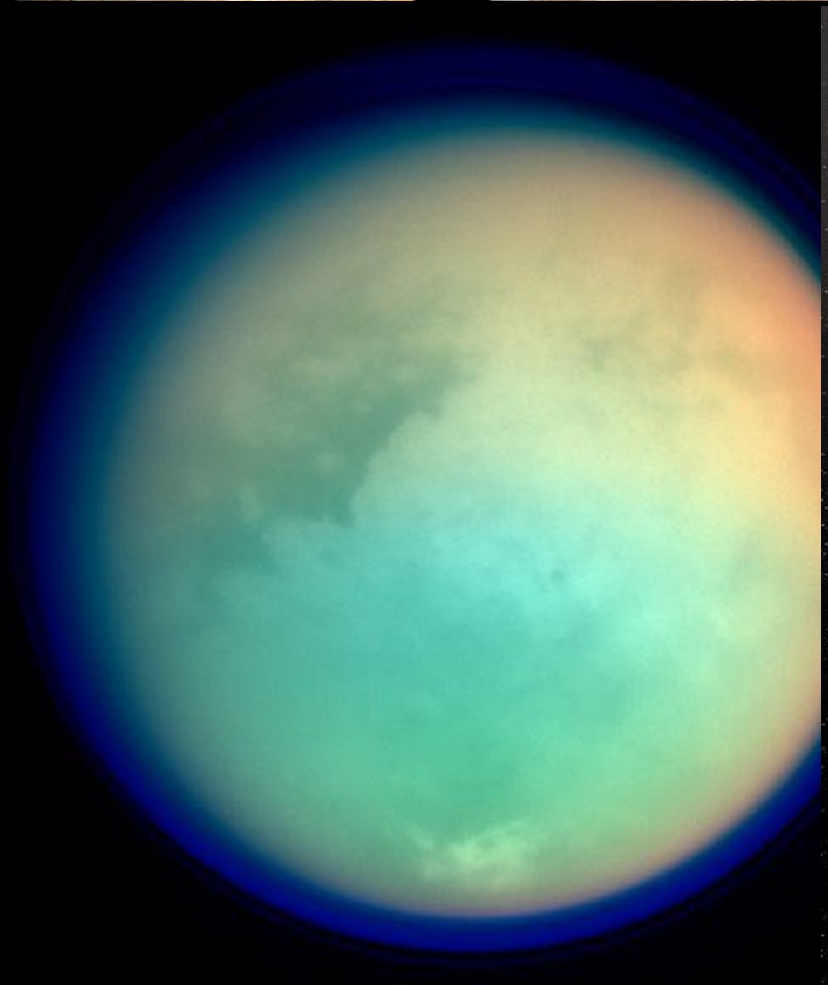
10 au × 10 au

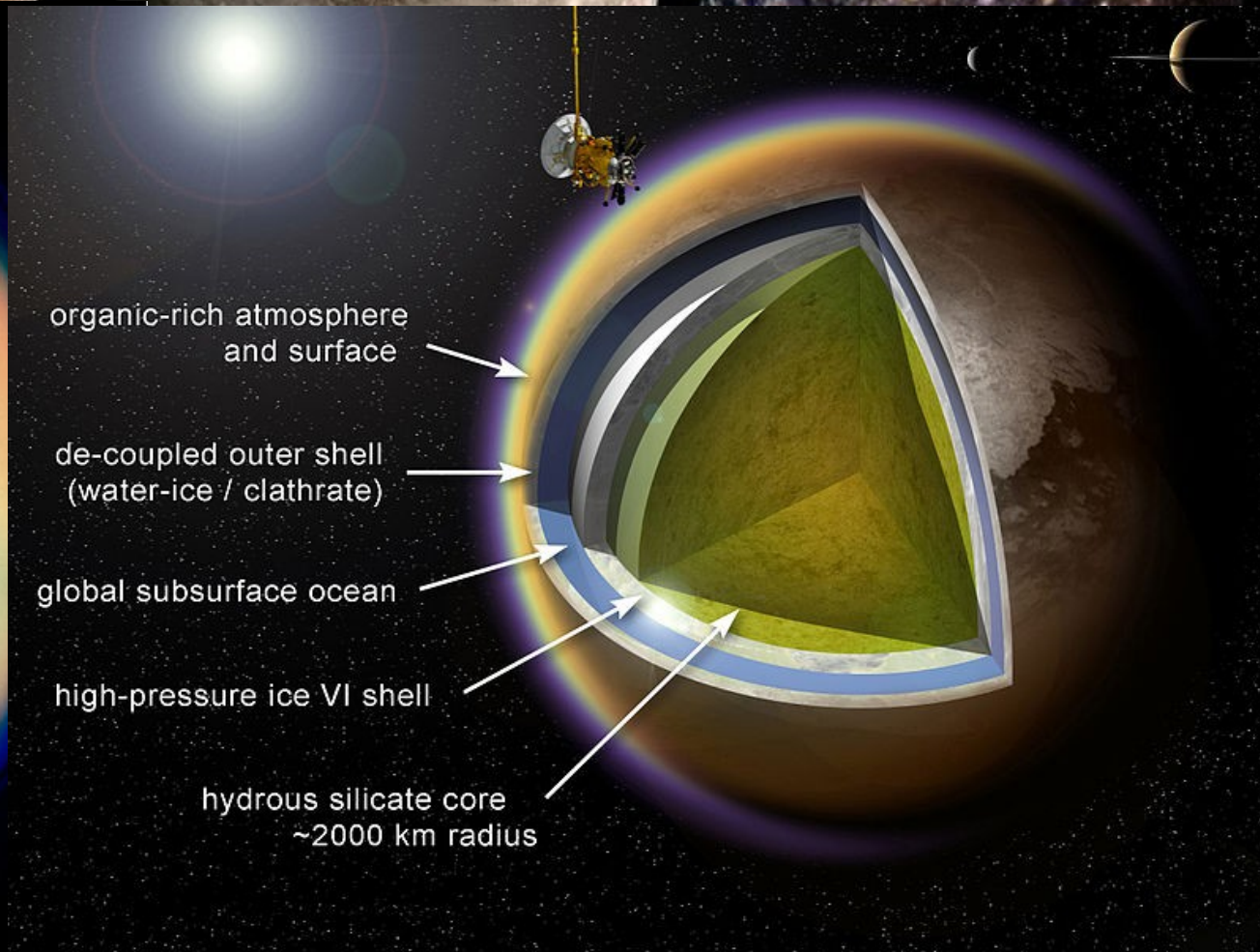




50 au × 50 au

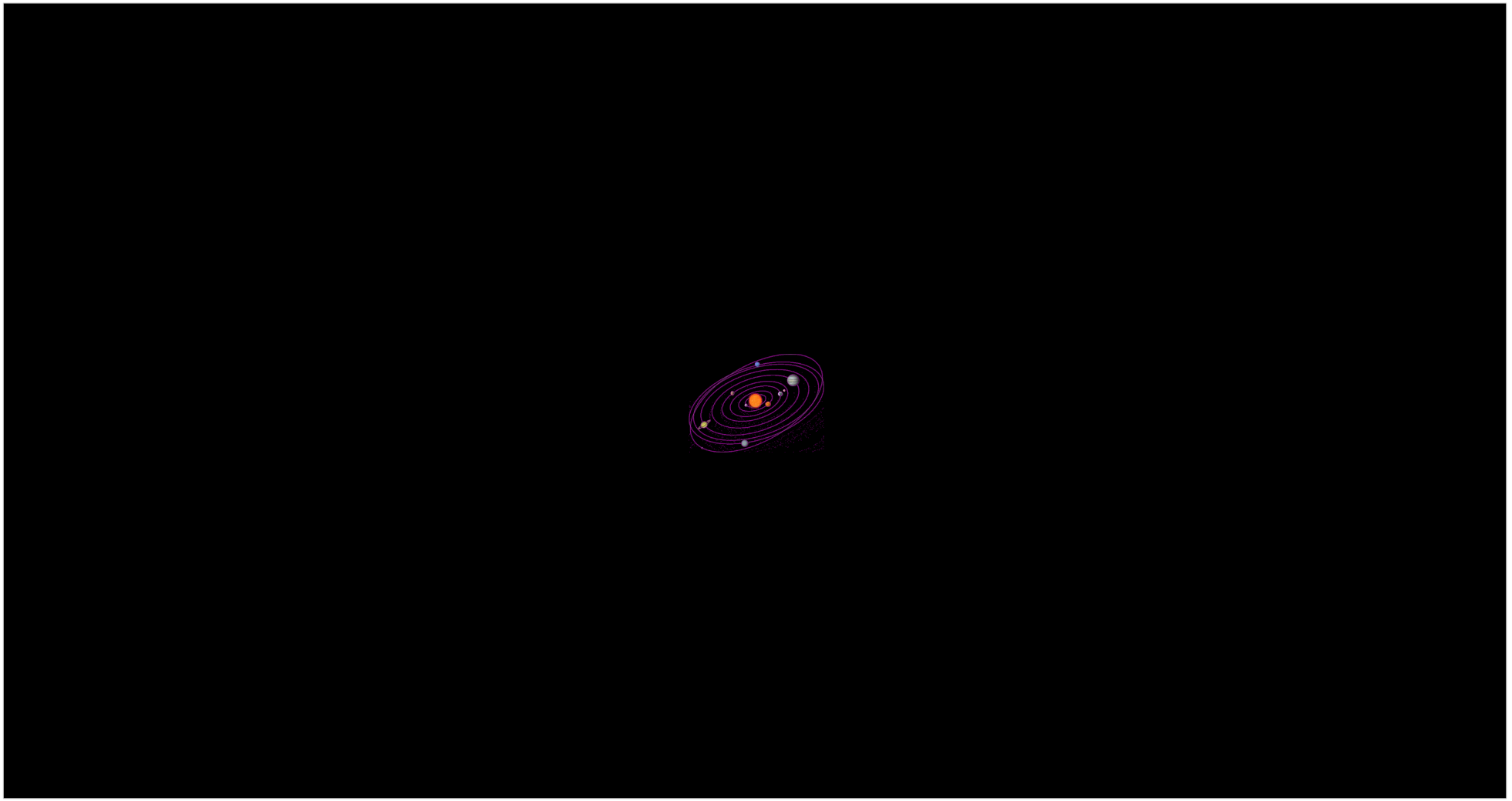
Moons




organic-rich atmosphere
and surface
de-coupled outer shell
(water-ice / clathrate)
global subsurface ocean
high-pressure ice VI shell
hydrous silicate core
~2000 km radius

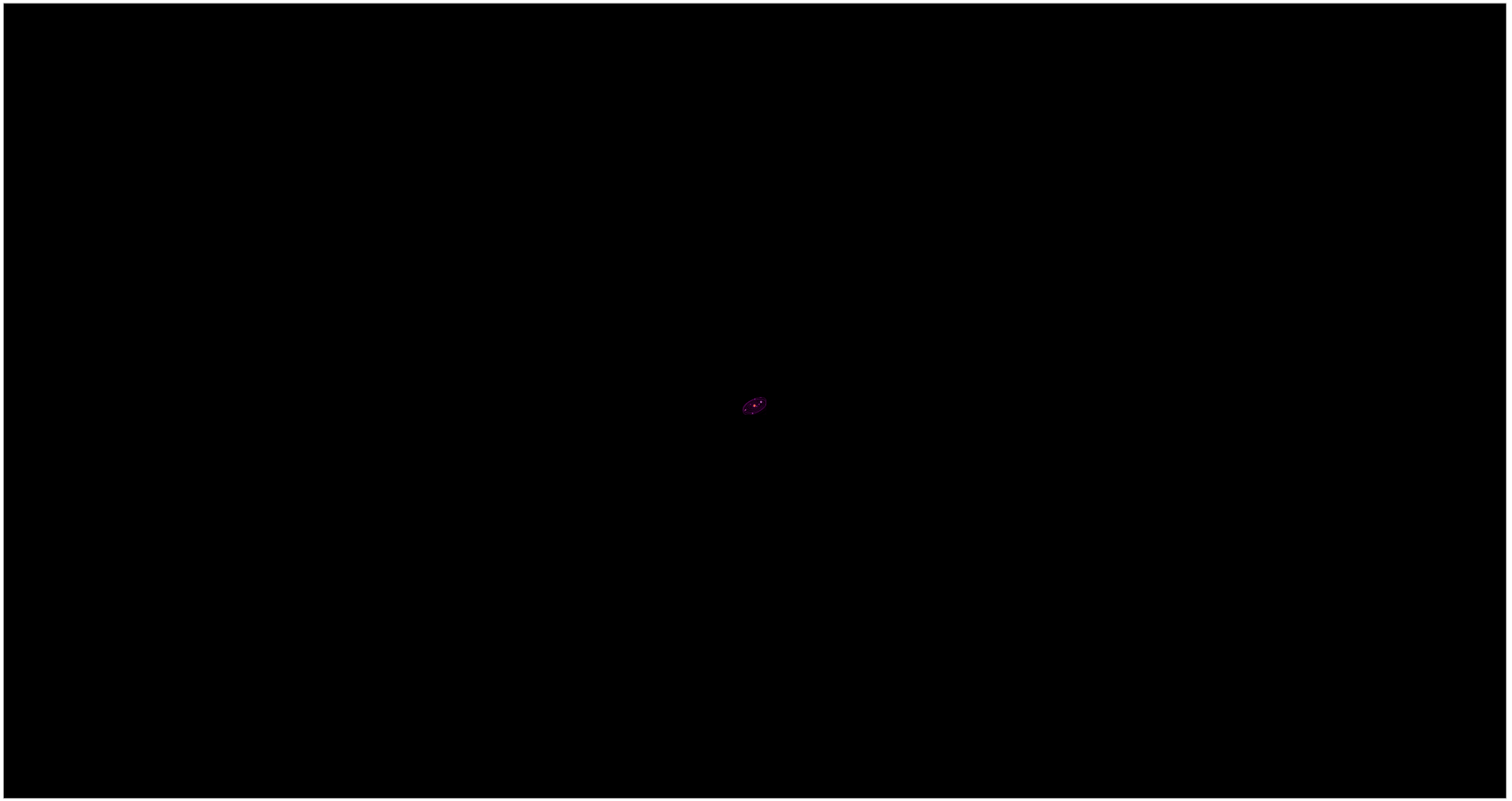
Minor bodies

1000 au × 1000 au



10.000 au × 10.000 au

100.000 au × 100.000 au



5 light years × 5 light years

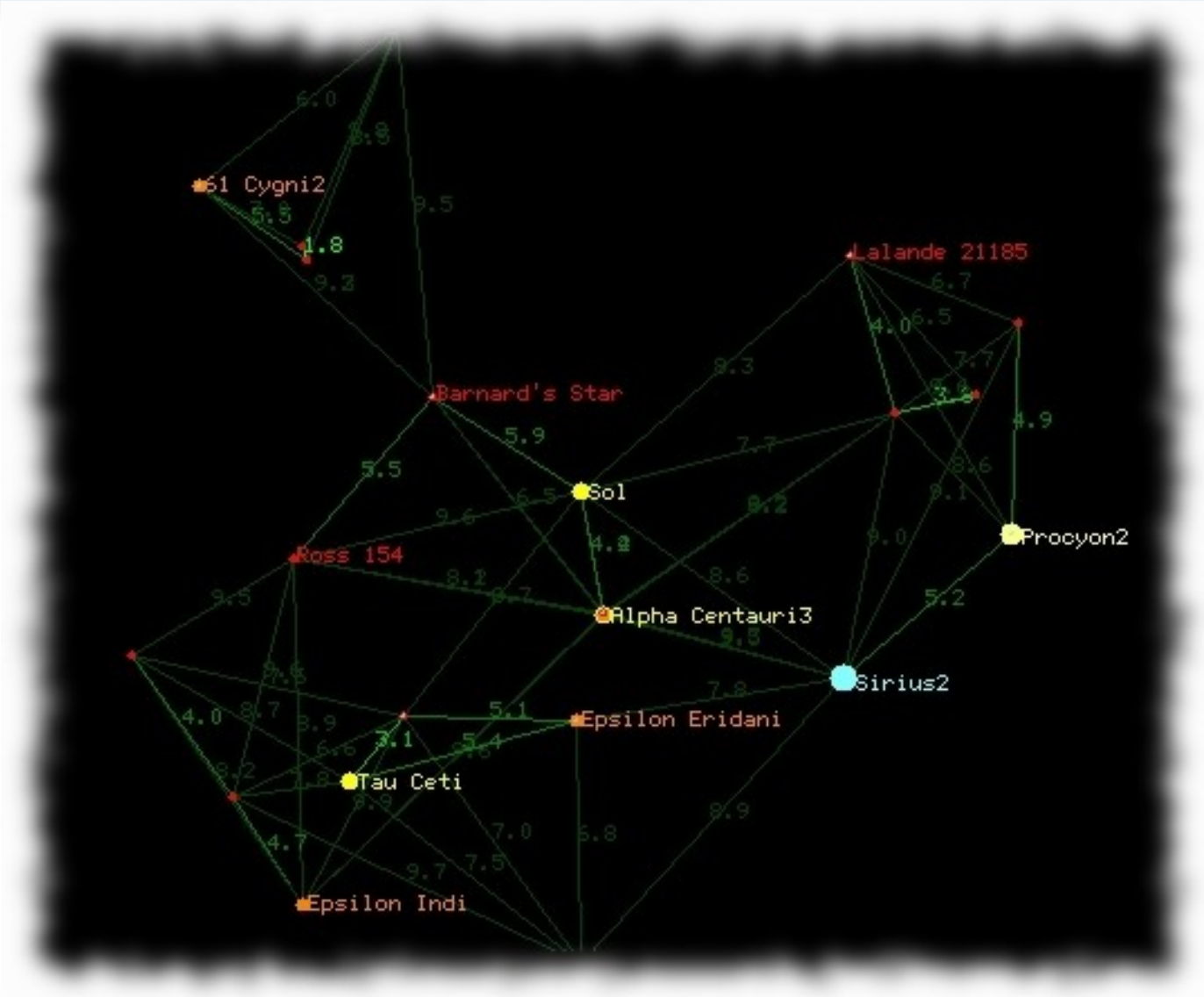
Only now have we reached the closest star, Proxima!

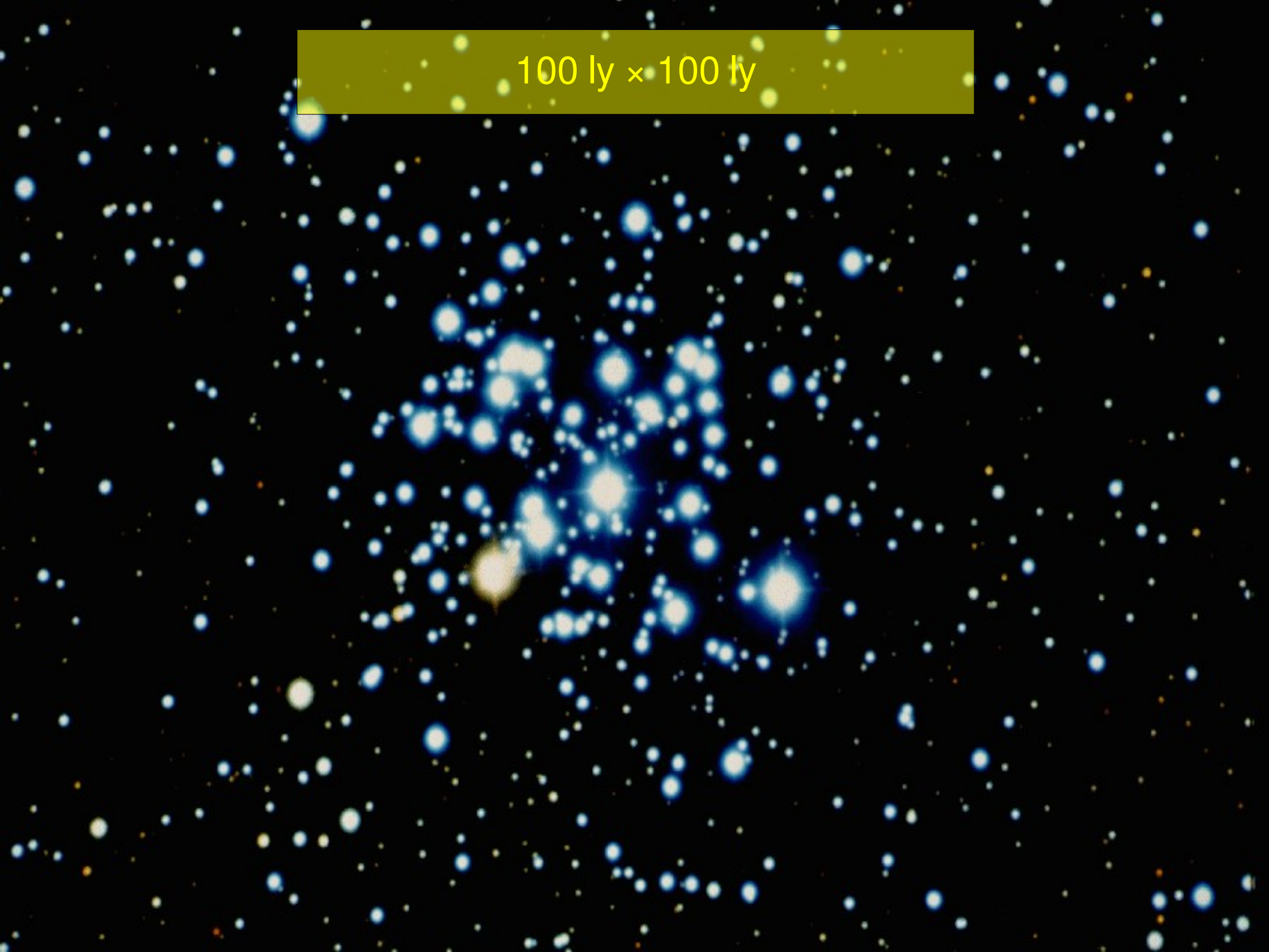
1 light year: distance travelled by light in 1 year

$$1 \text{ ly} = 9.47 \times 10^{12} \text{ km} = 63.115 \text{ au}$$

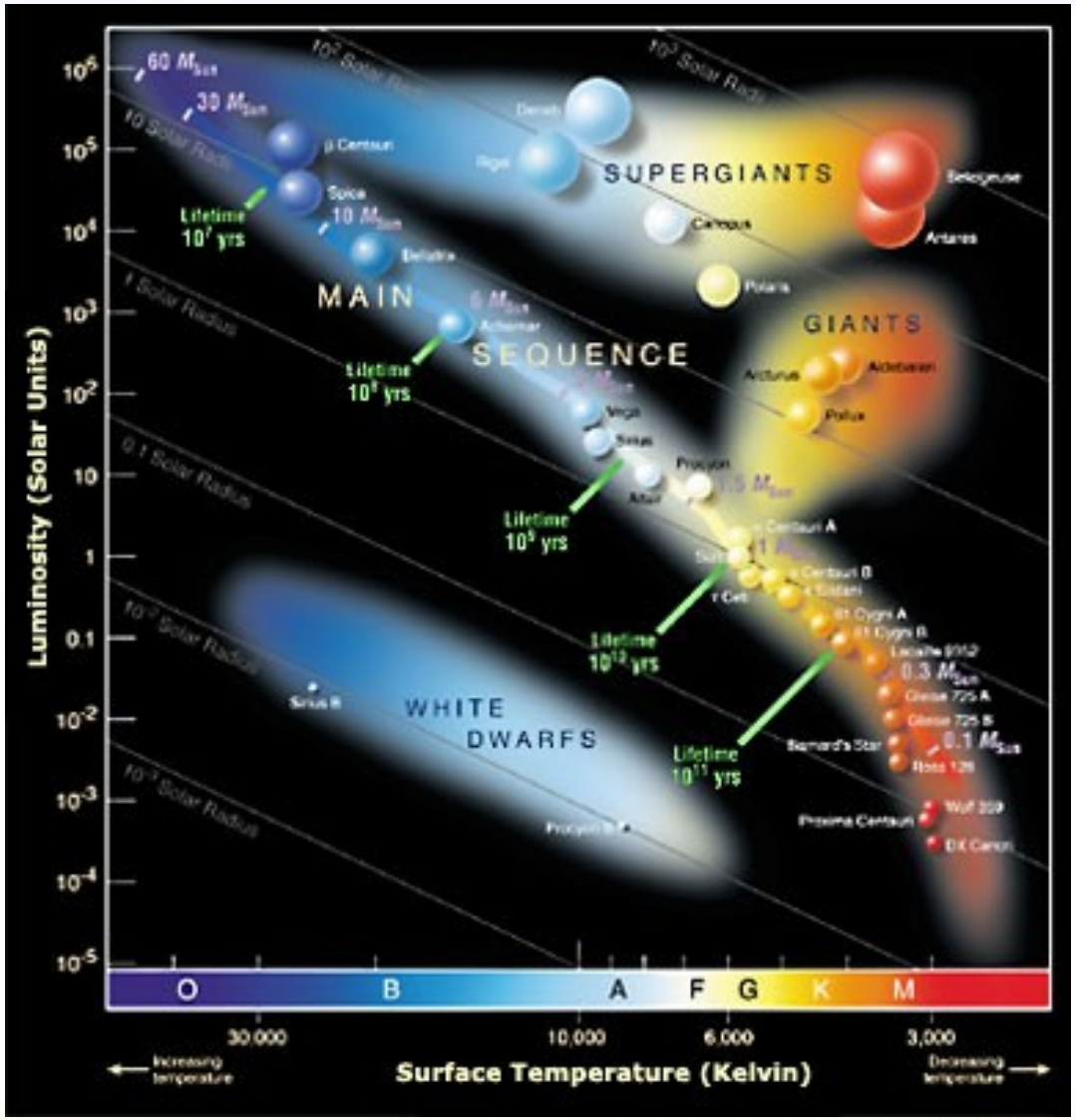
Proxima is the closest star to the Sun; it can be found in the Centaurus constellation, being part of a triple star system. Unfortunately, we can't see Proxima from the northern hemisphere.

10 ly × 10 ly

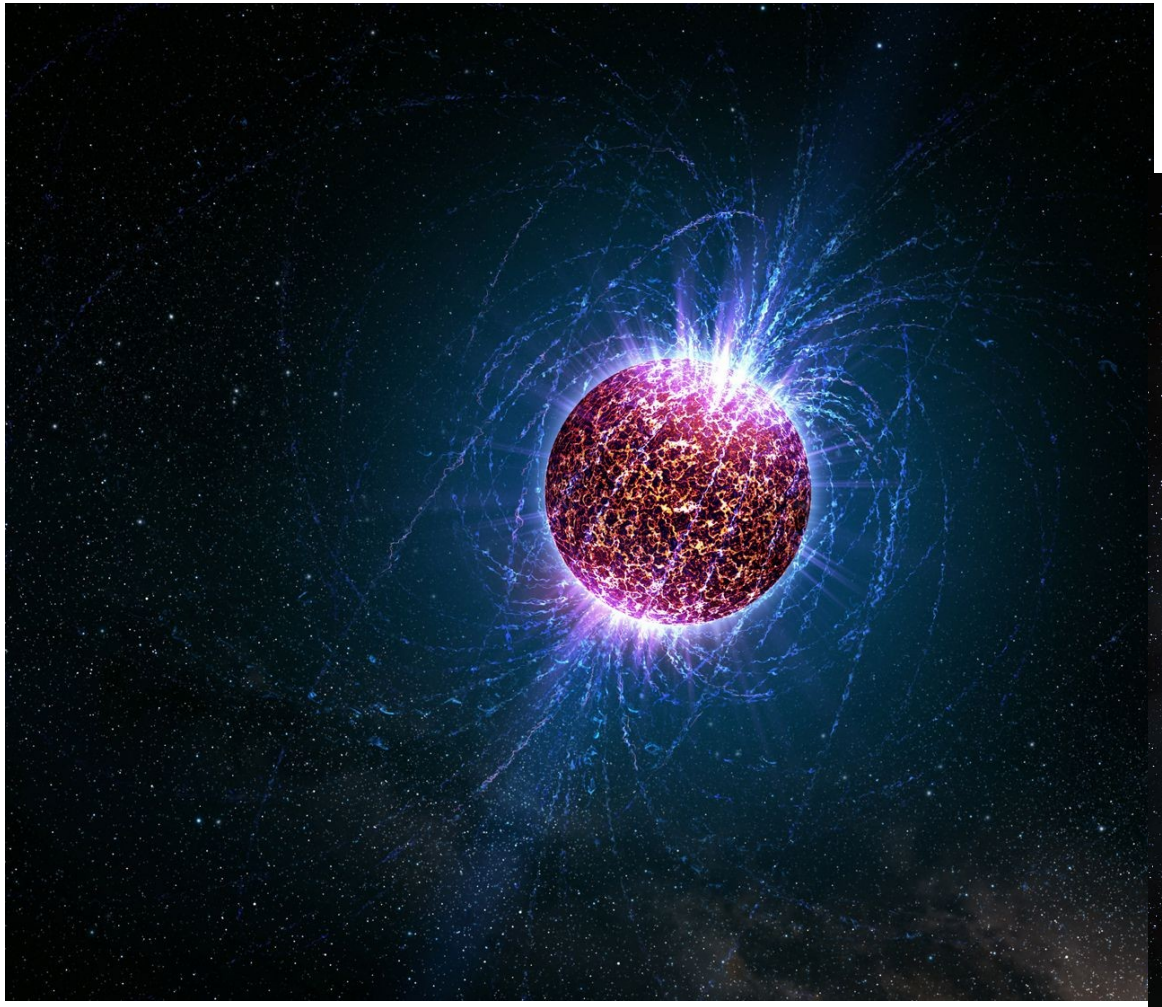

61 Cygni2
1.8
Lalande 21185
Barnard's Star
Sol
Procyon2
Ross 154
Alpha Centauri3
Sirius2
Epsilon Eridani
Tau Ceti
Epsilon Indi


100 ly × 100 ly

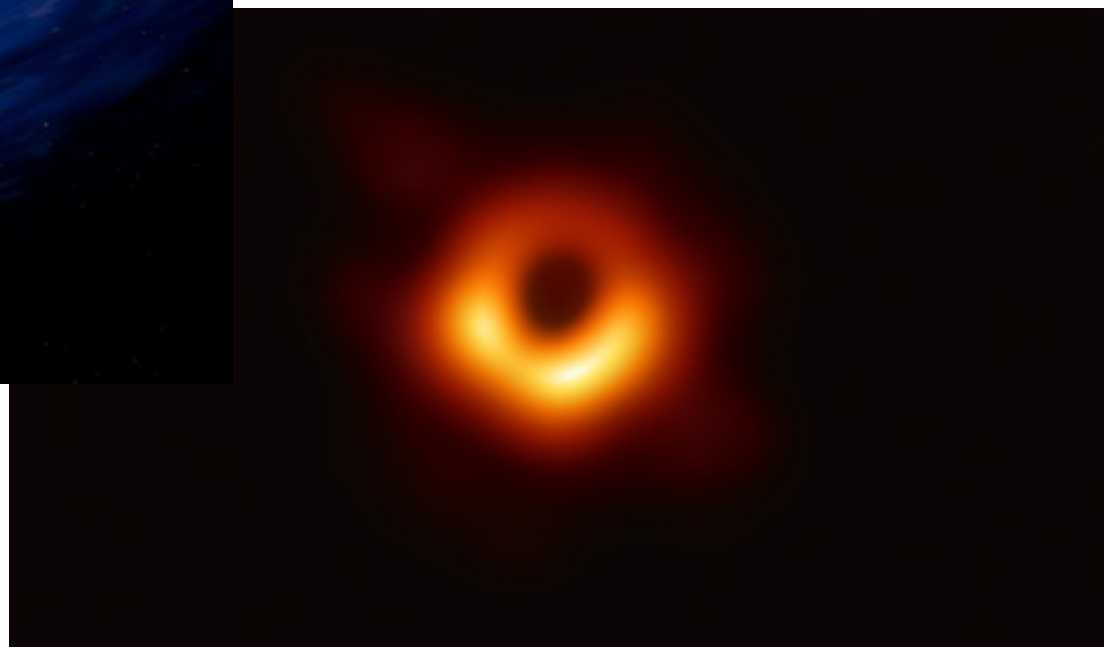
Space is a colorful world!



... and also very strange...



... and also very strange...

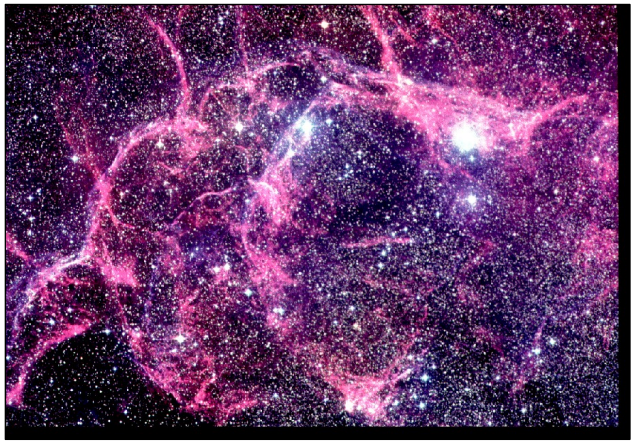


1000 ly × 1000 ly

Nebulae

- reflection
- emission
- absorption

1000 ly × 1000 ly



Nebulae

planetary

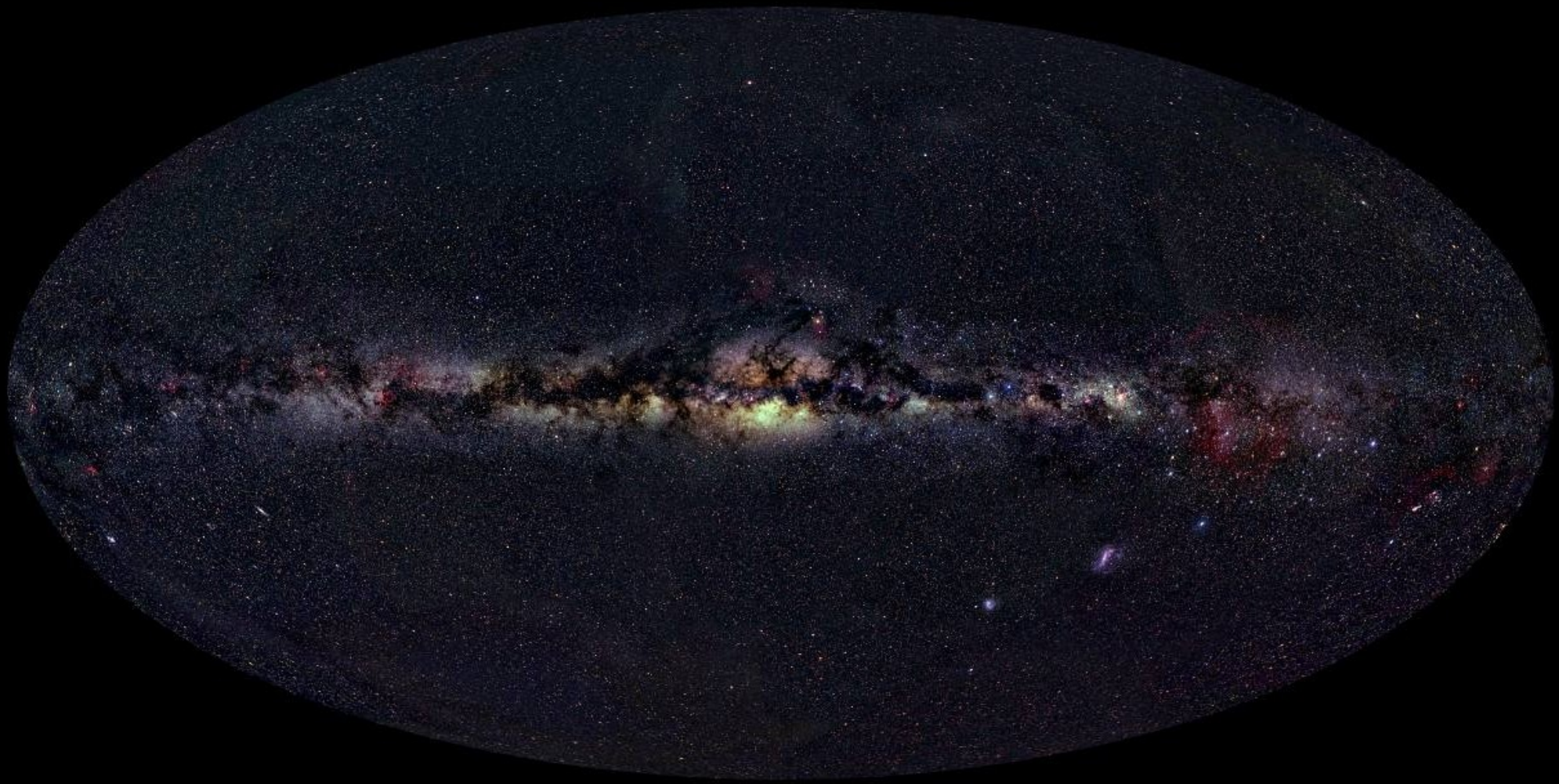
10.000 ly × 10.000 ly

10.000 ly × 10.000 ly

Open clusters in the disk of the Galaxy

100.000 ly × 100.000 ly

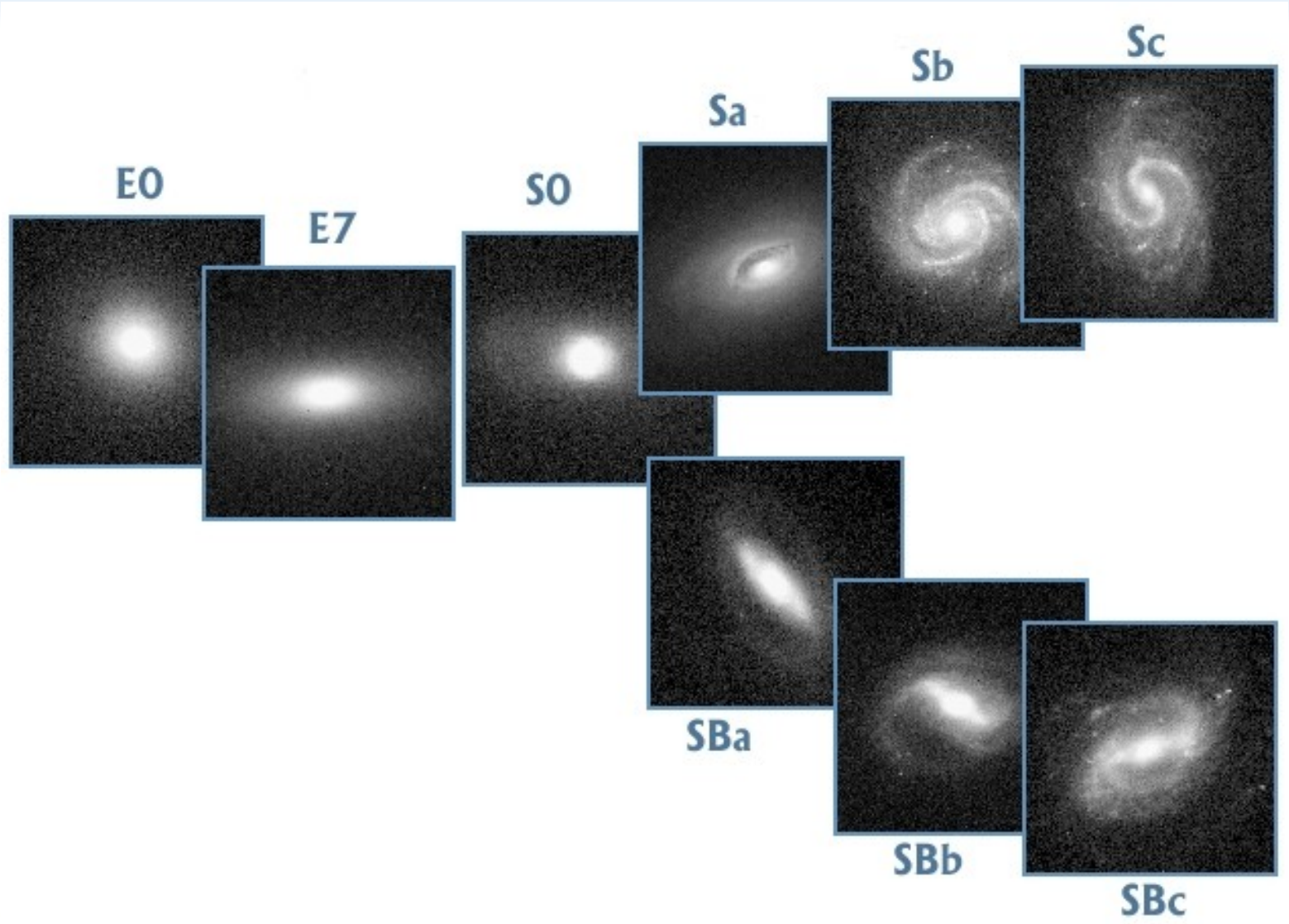
Our Galaxy, the Milky way



100.000 ly × 100.000 ly

Globular clusters in the Galaxy halo

100.000 ly × 100.000 ly



1 Mpc × 1 Mpc

1 parsec: distance at which we would see Earth's orbit at the 1” angle.

1 pc = 3.26 ly = 3.09×10^{13} km = 205.755 au

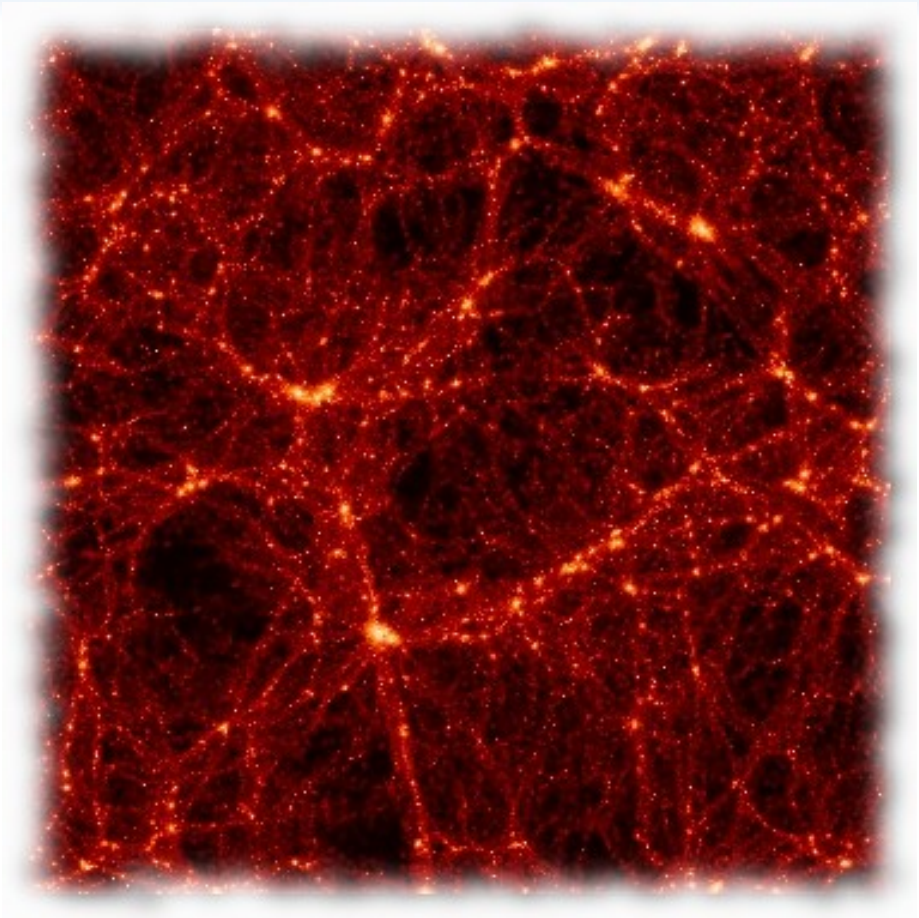
10 Mpc × 10 Mpc

100 Mpc × 100 Mpc

Clusters and hyperclusters of galaxies

Gravitational lensing

4 Gpc × 4 Gpc



Galaxy filaments are thus larger than a ring about 10.000.000.000.000.000.000.000.000.000 (10^{28}) times!

QUESTIONS?