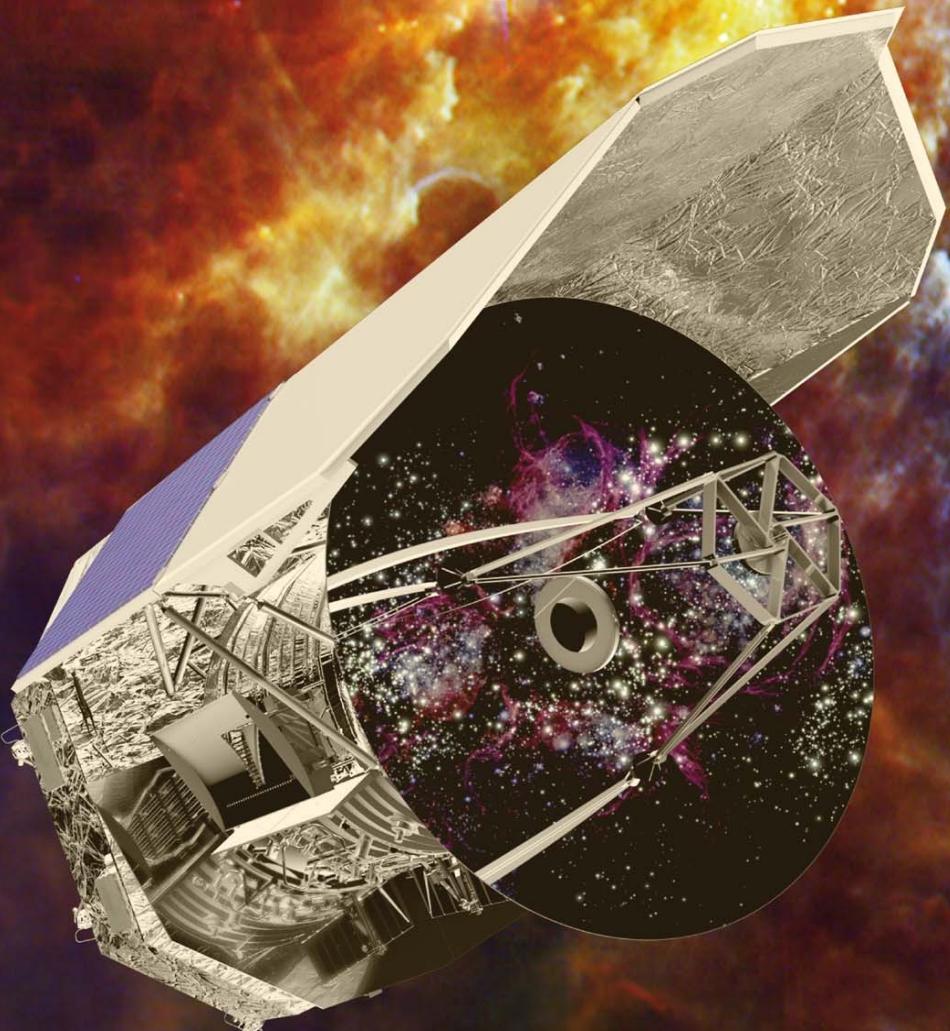


Herschel Space Observatory

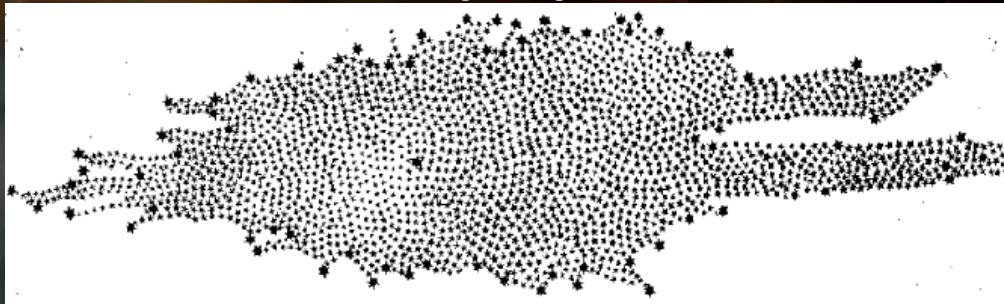


Chris North
Cardiff University

chris.north@astro.cf.ac.uk
<http://herescheltelescope.org.uk>

The size of the Universe

The Milky Way (1785)



William Herschel

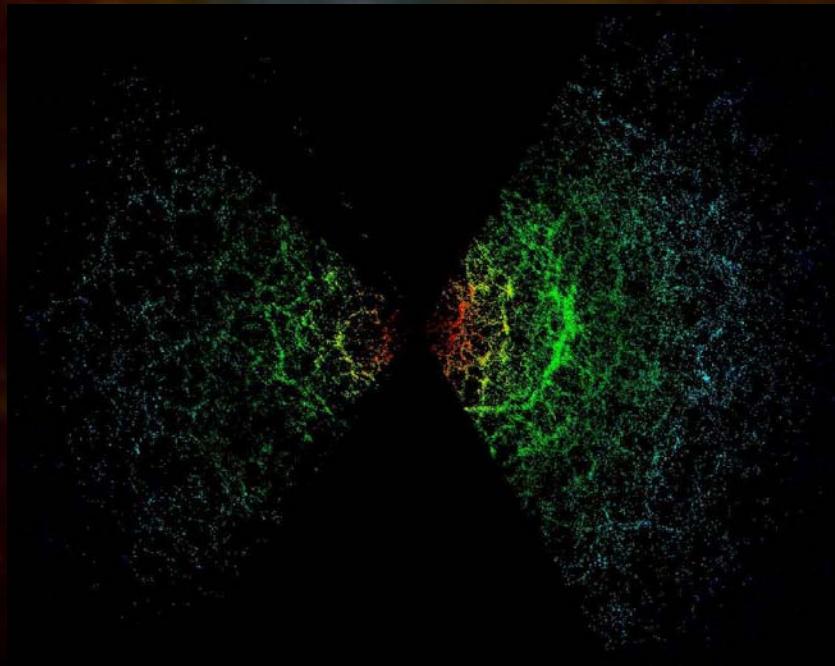
The Great Andromeda Nebula (1887)



Isaac Roberts

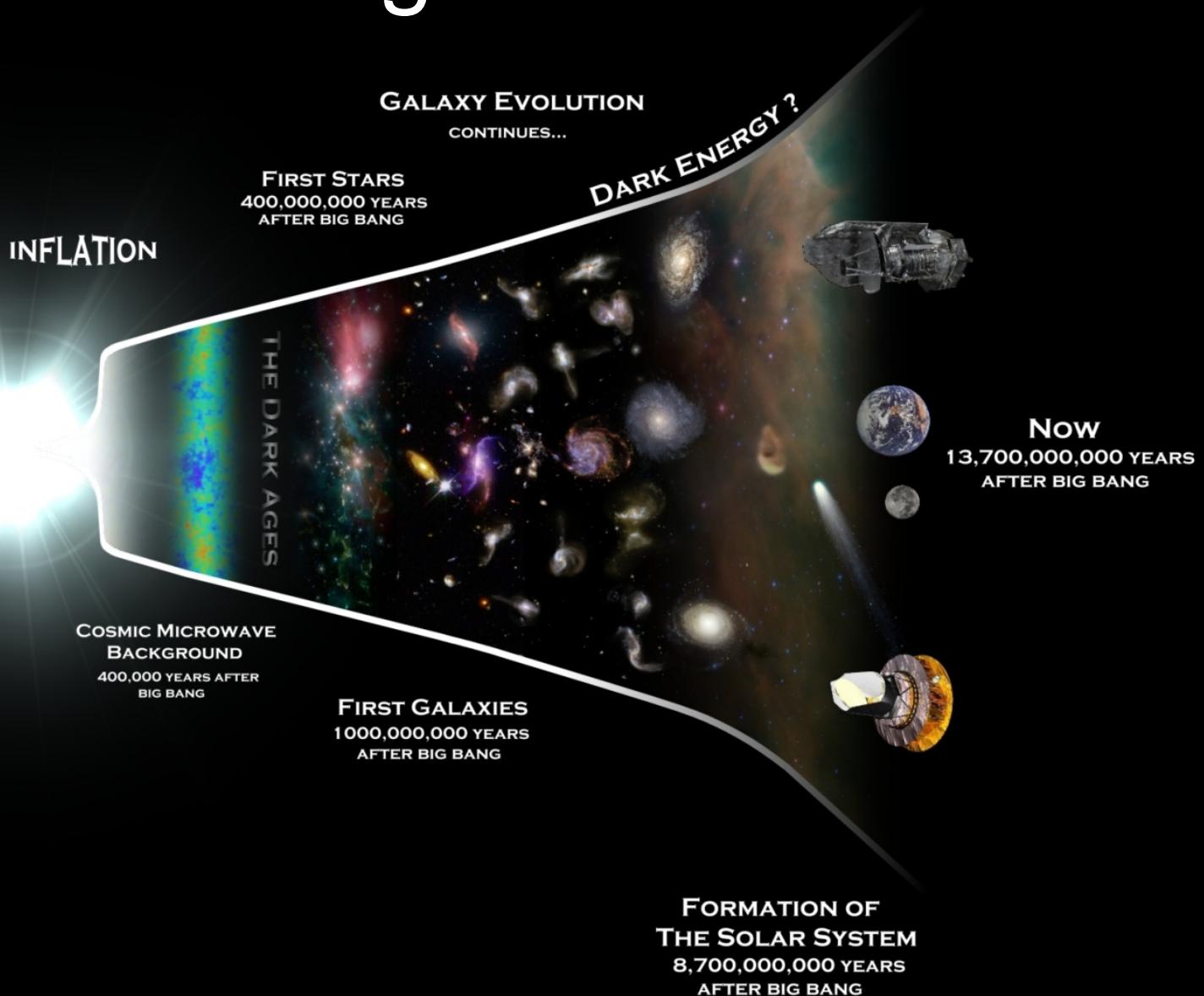


The Distant Universe



The Big Picture

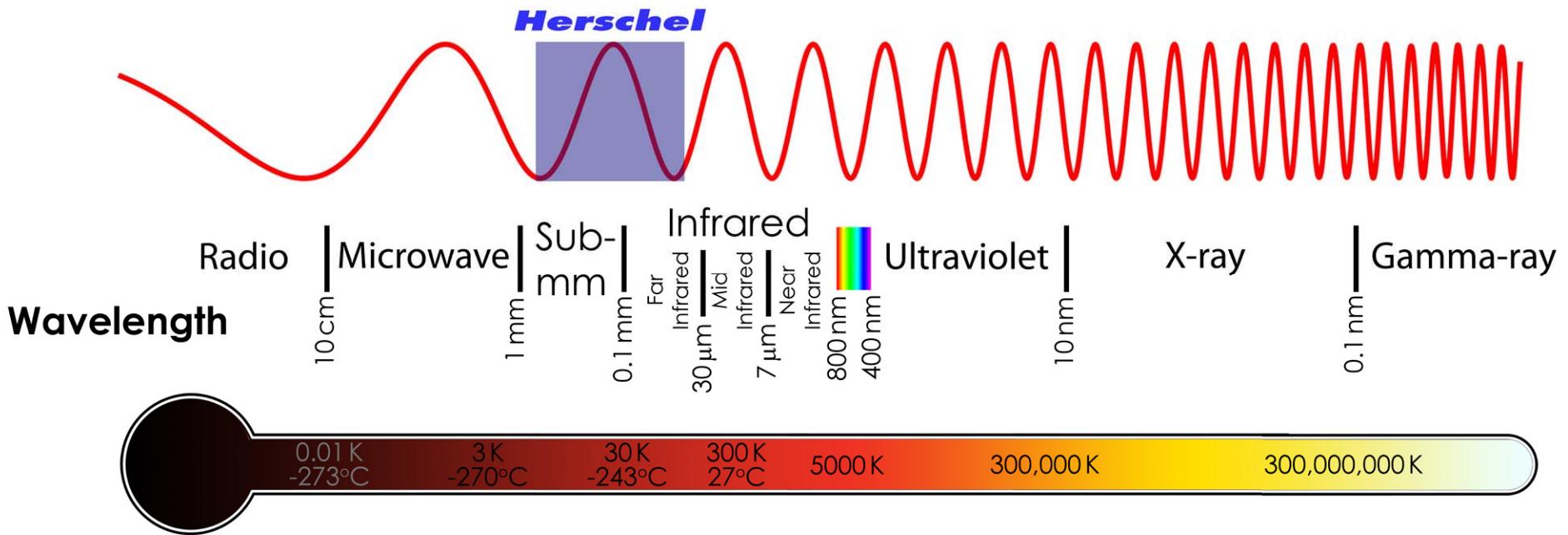
THE
BIG
BANG



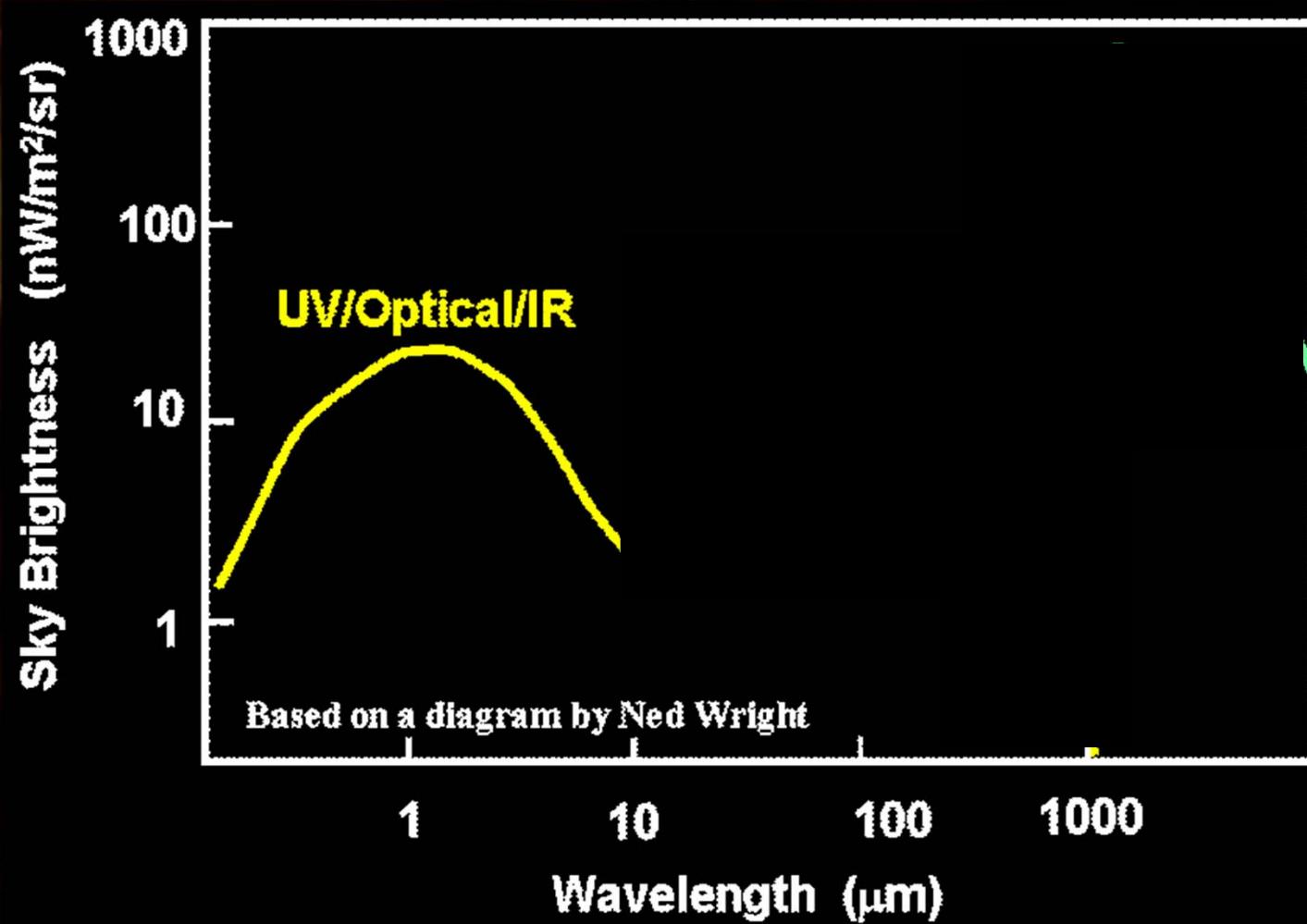
William Herschel



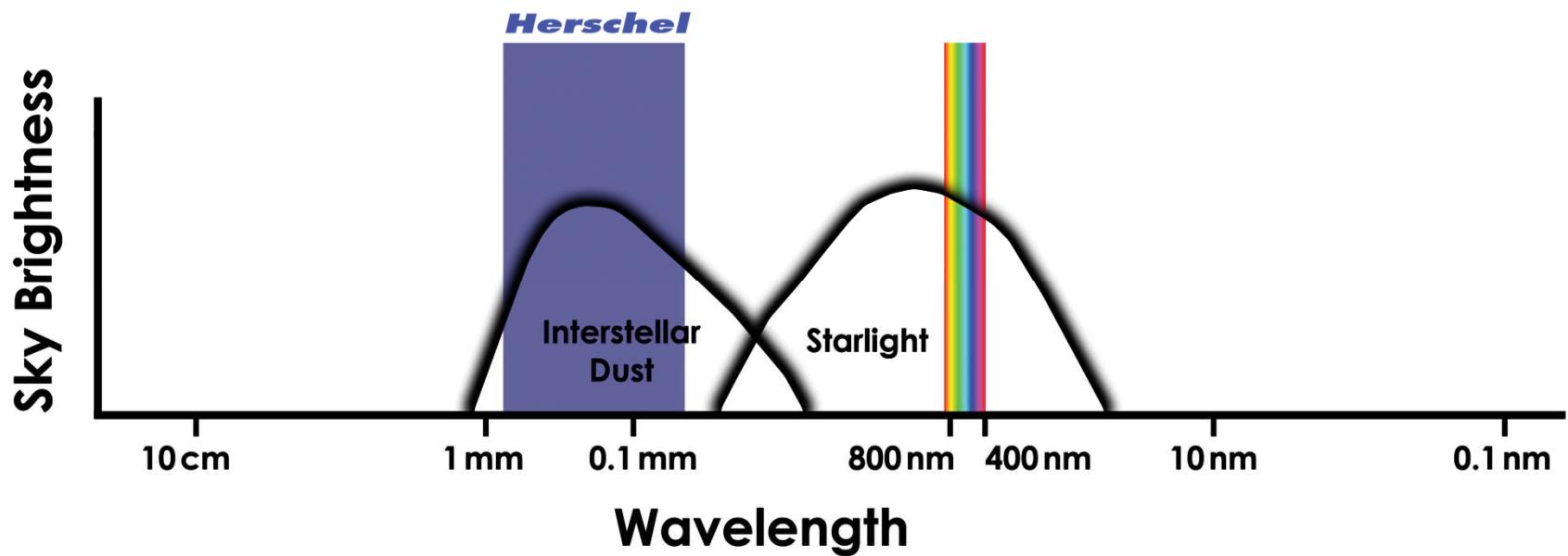
The EM Spectrum



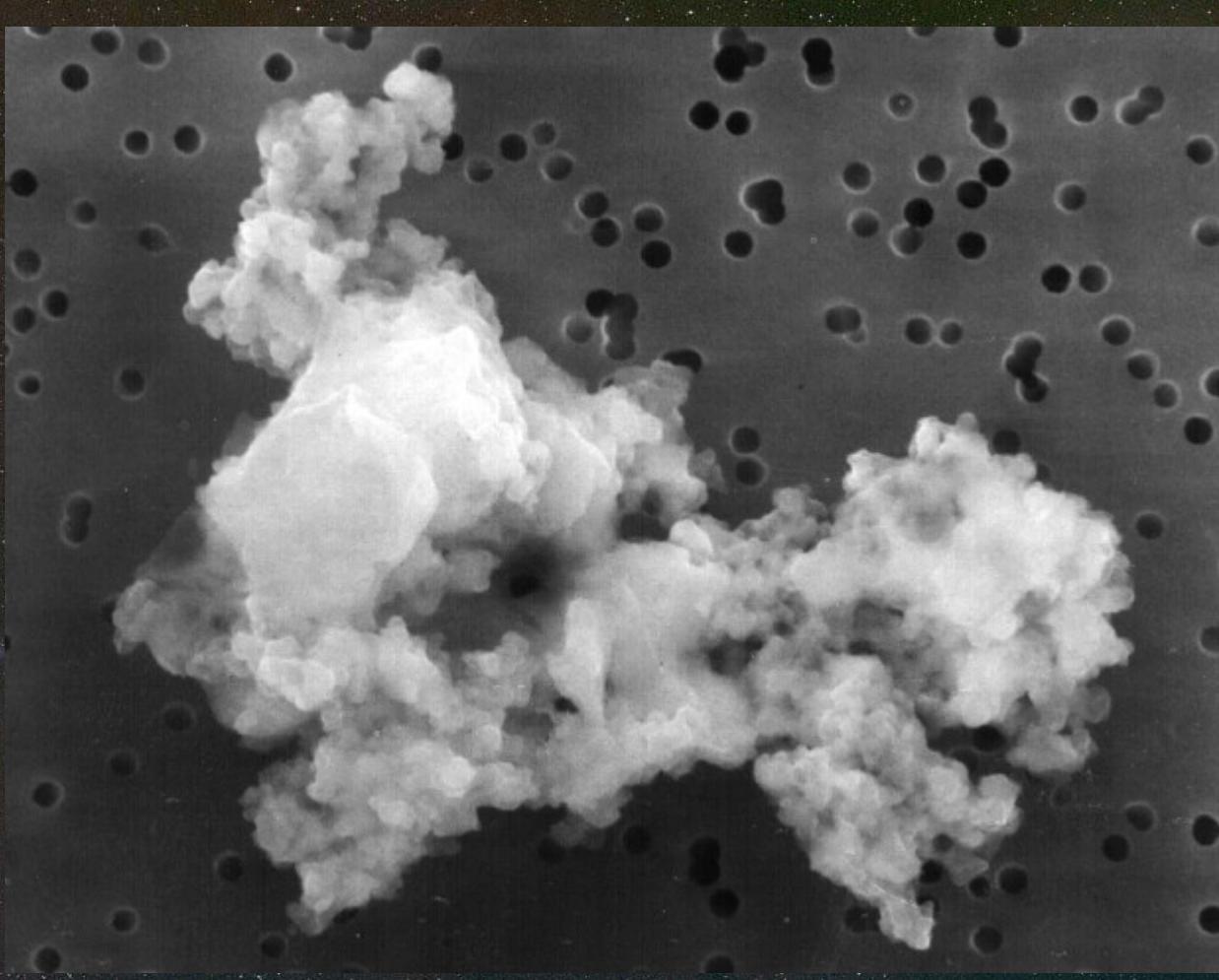
Infrared radiation



Infrared radiation



Visible light



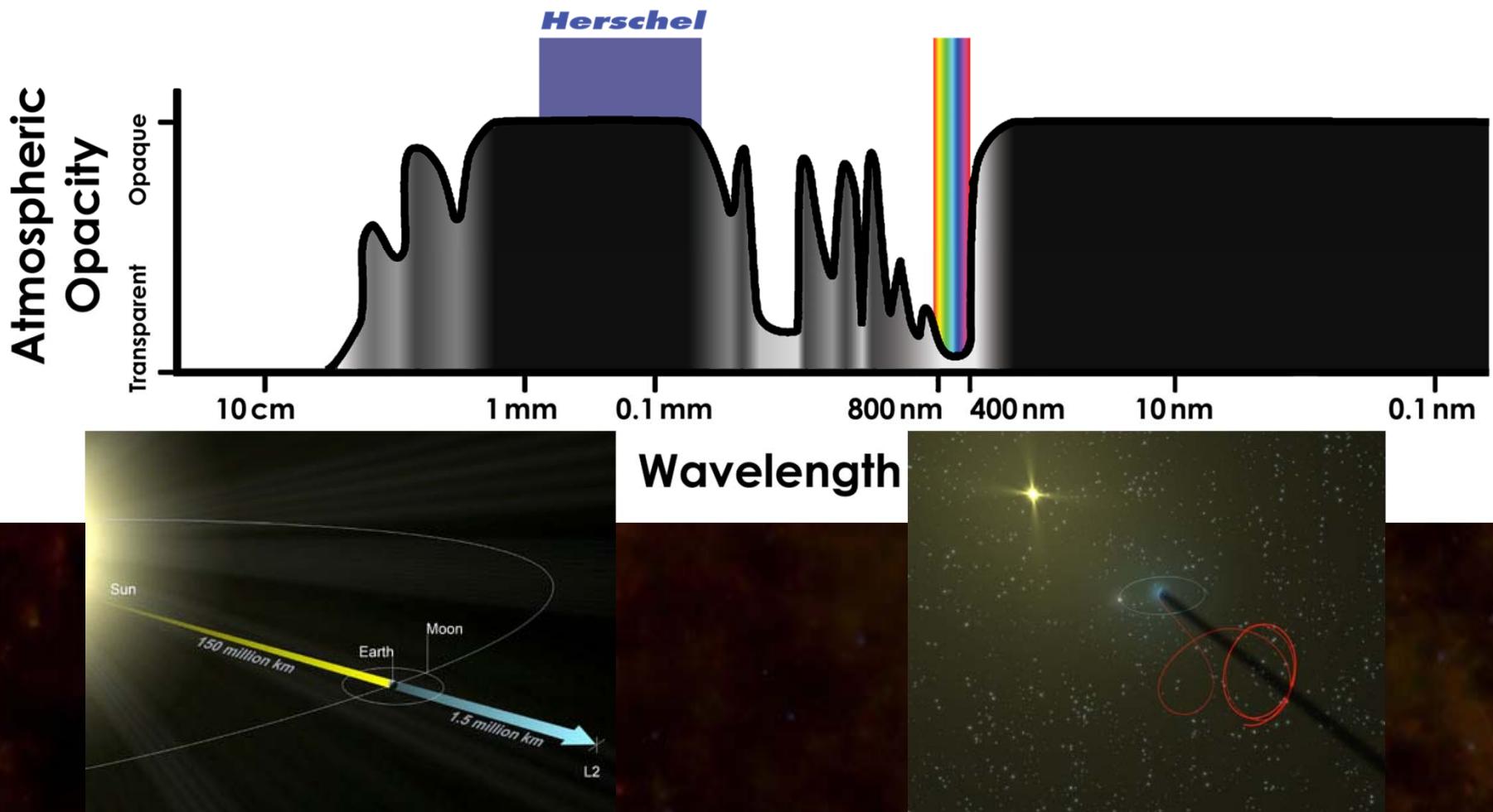
Far Infrared



Visible + Far-infrared



The Sky's The Limit



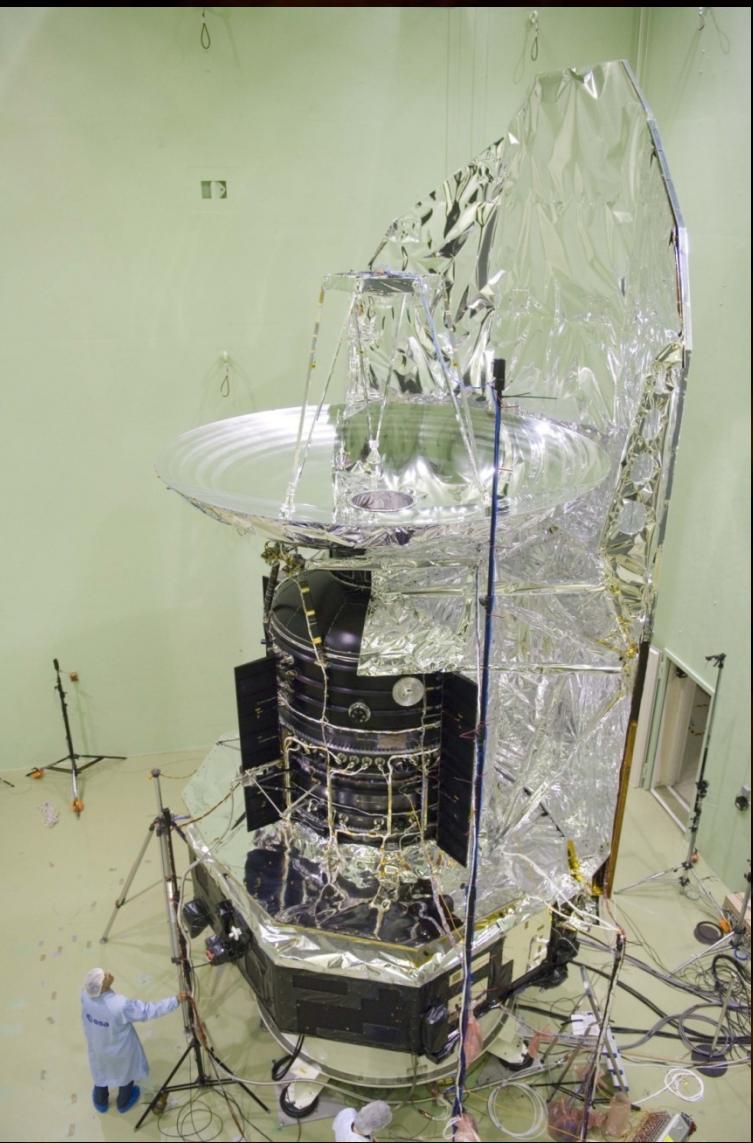
The Herschel Satellite



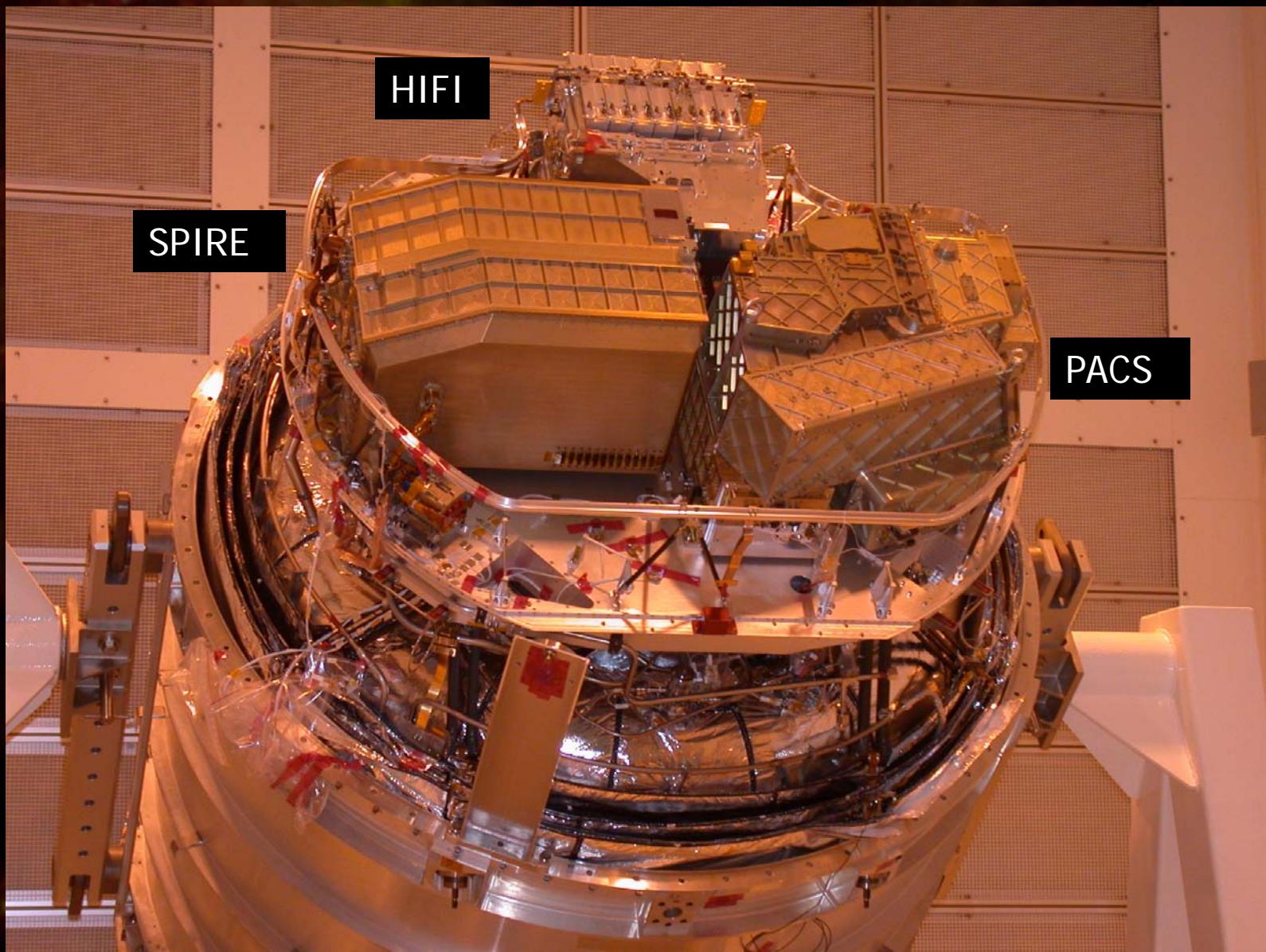
- 8x4x4m
- 4 tonnes on launch
- 3.5m mirror
- 2200 litres of He
- Cooled to 0.3K
- 3 instruments
- 70-700 microns

The Herschel Team

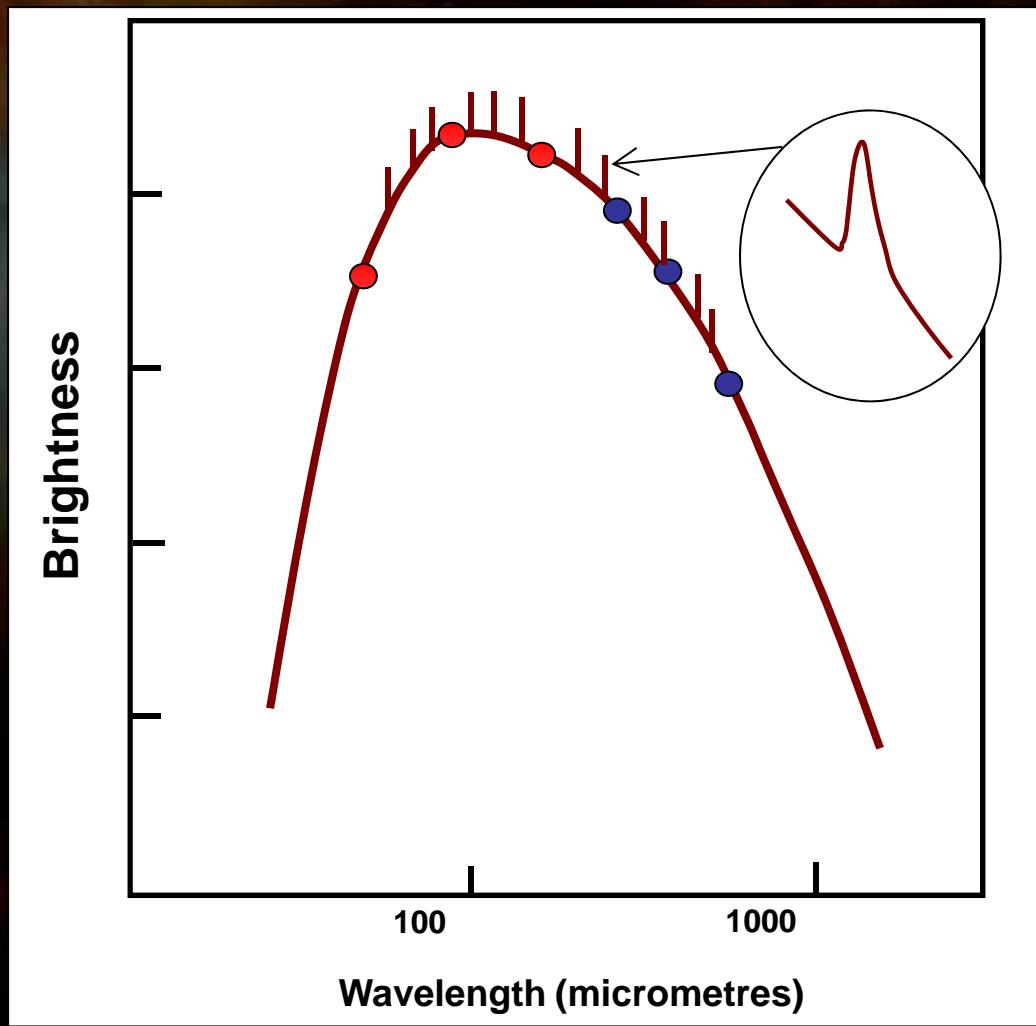




Herschel's Instruments



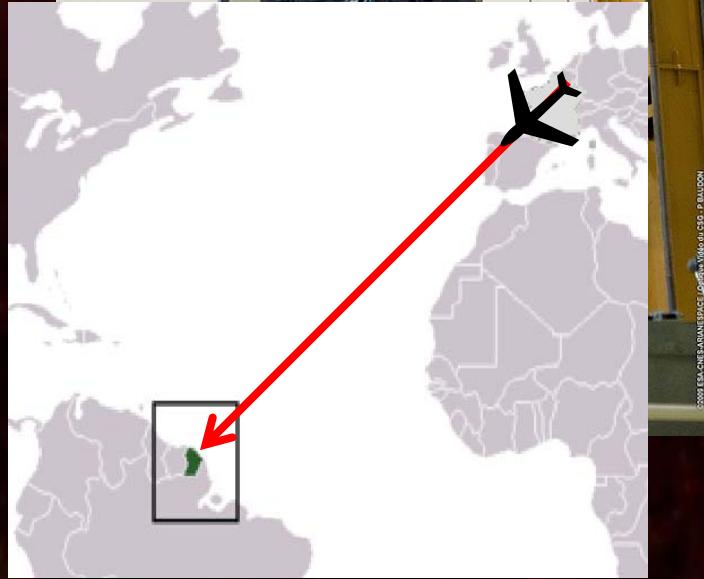
Herschel's Instruments



Multicolour Images



The



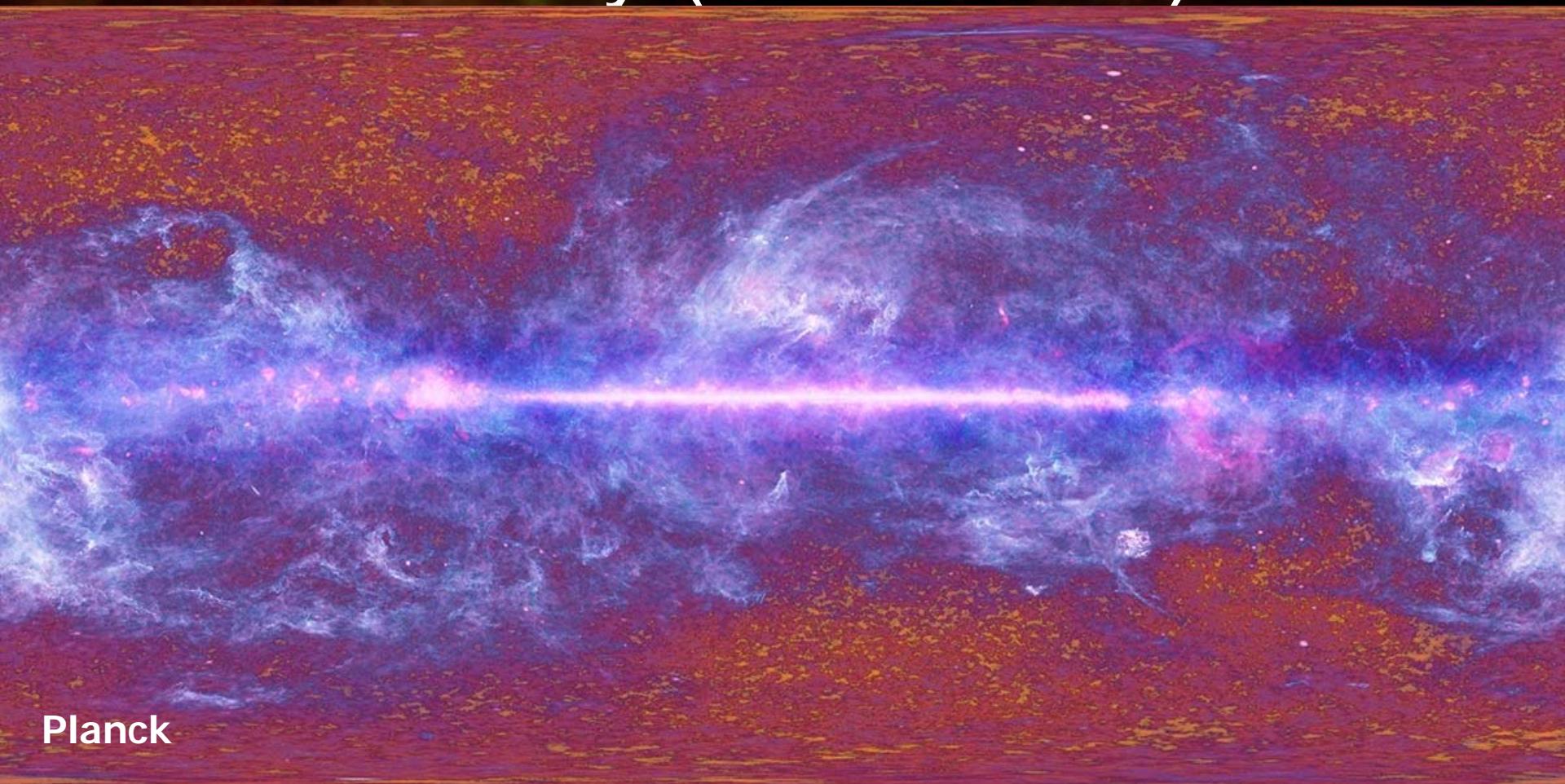
All sky (visible)

A wide-field view of the visible sky, showing a dense distribution of stars, galaxies, and nebulae. The image is dominated by a dark, reddish-brown glow from interstellar dust and gas, with numerous small blue and white stars of various sizes scattered across the field.

DSS

www.chromoscope.net

All-sky (microwave)



Planck

www.chromoscope.net

Whirlpool Galaxy (M51)

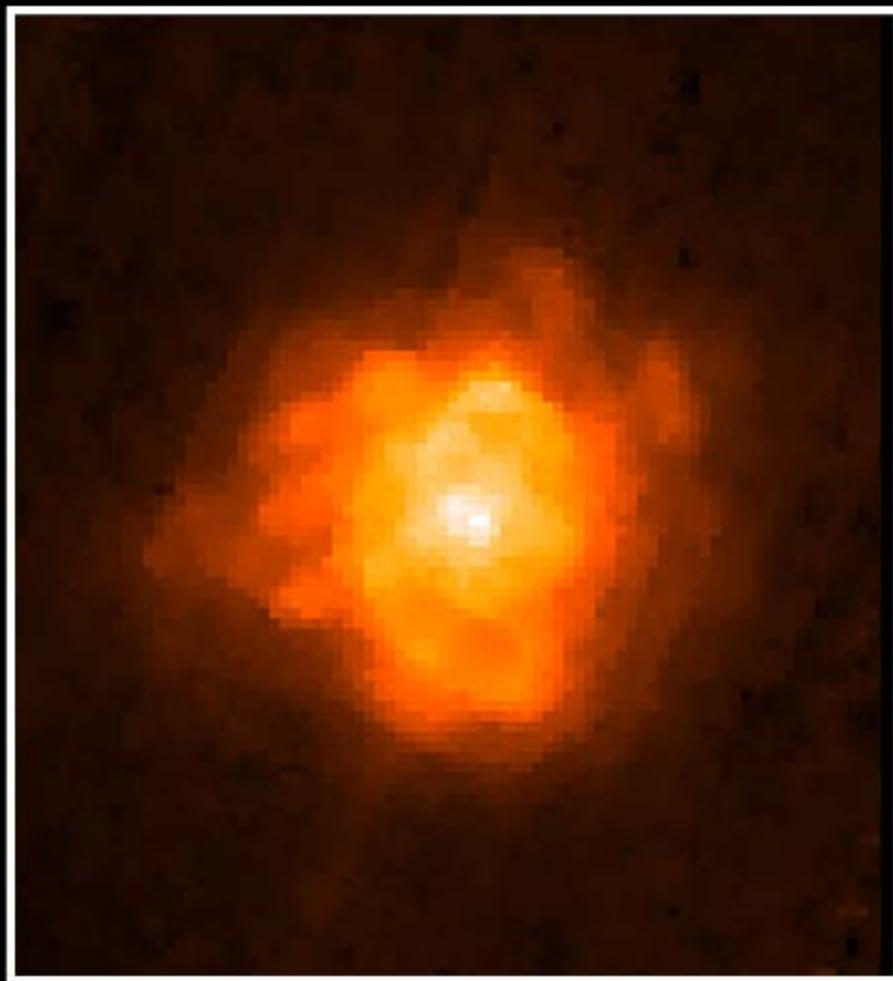


Herschel-PACS



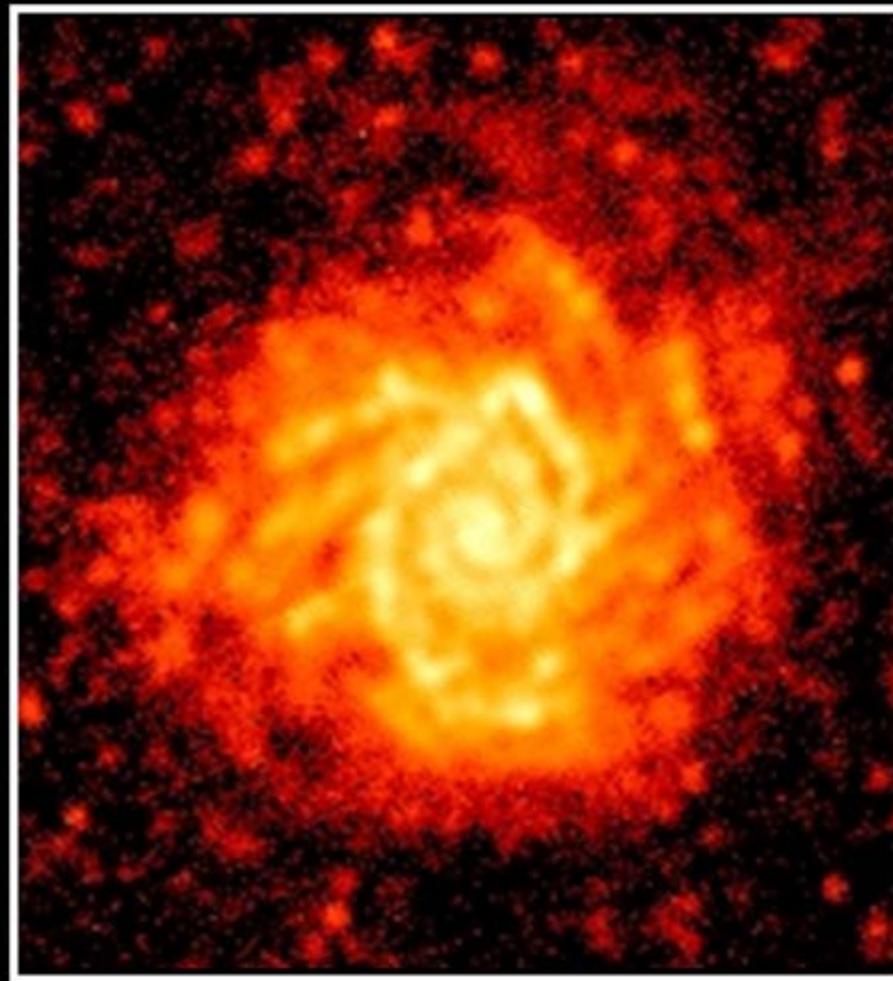
Visible

M74 *Spitzer* 160 μm



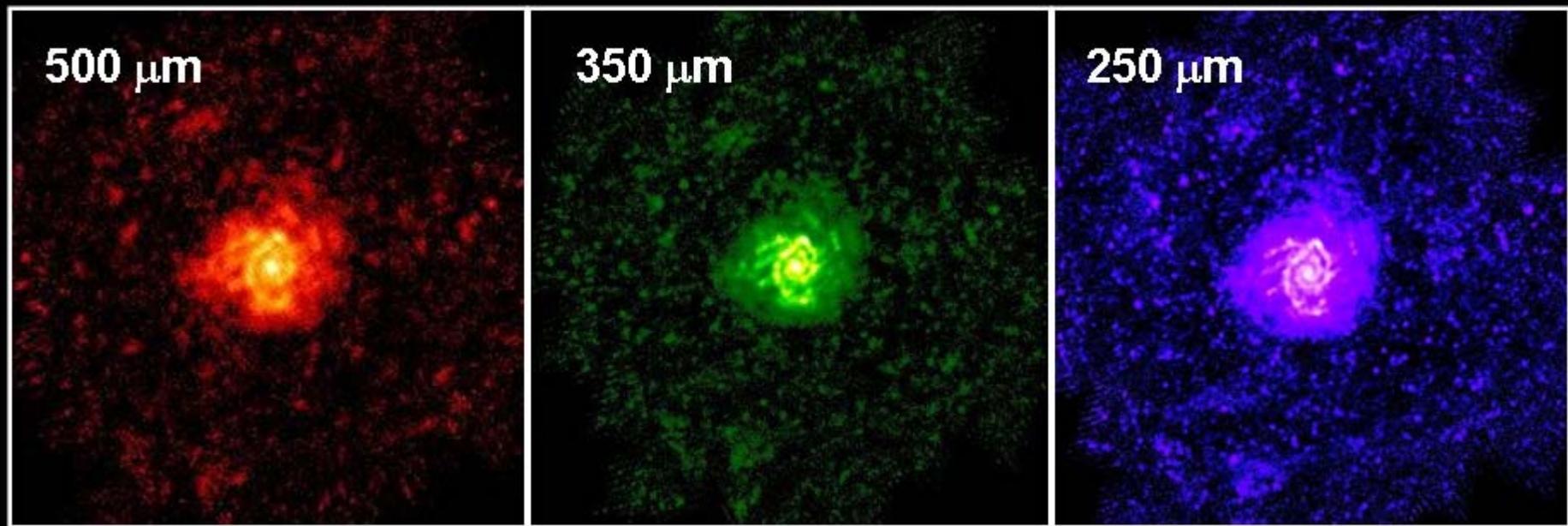
NASA / *Spitzer* SINGS

M74 SPIRE 250 μm



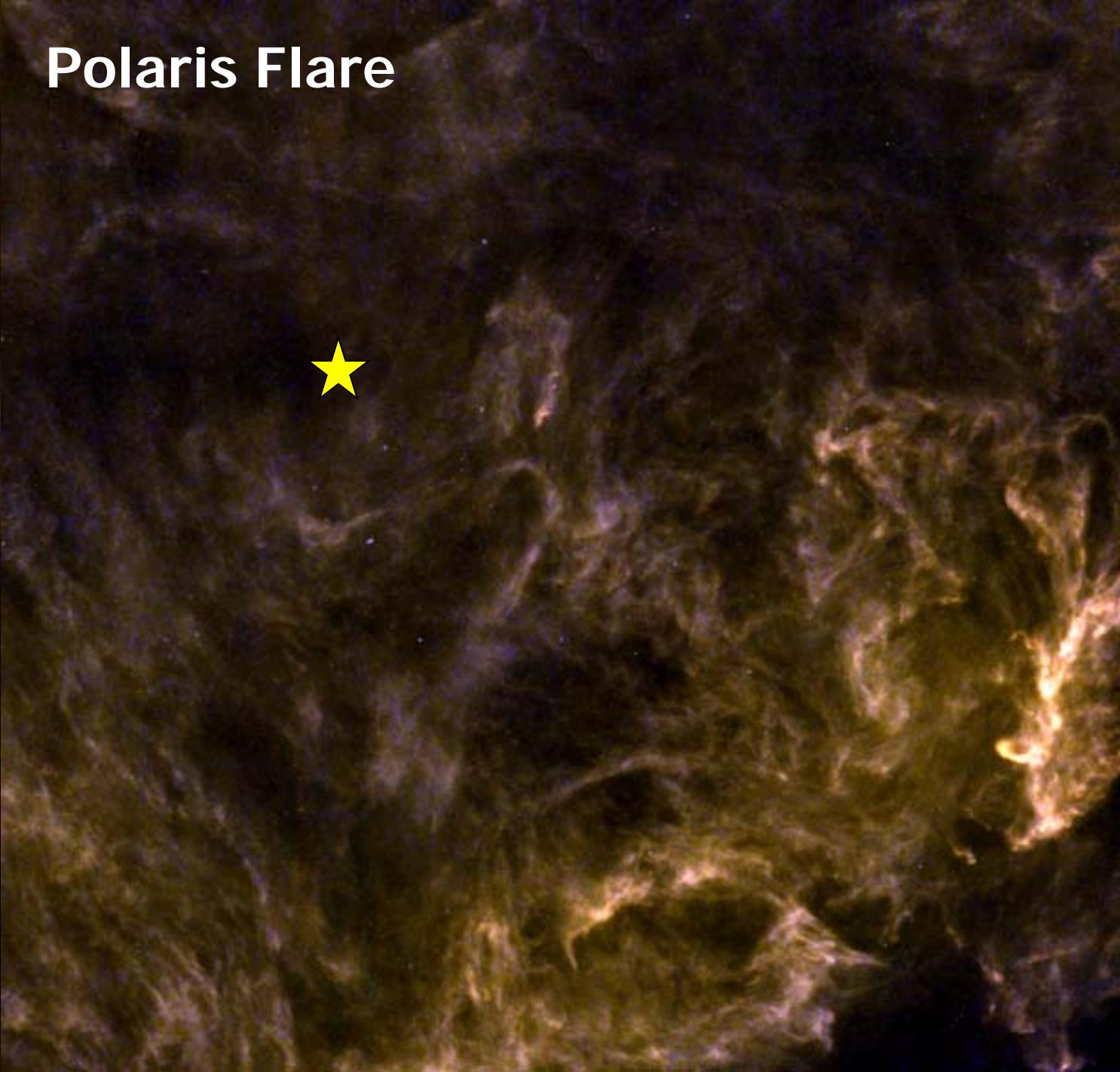
ESA and the SPIRE Consortium

SPIRE Images of M74

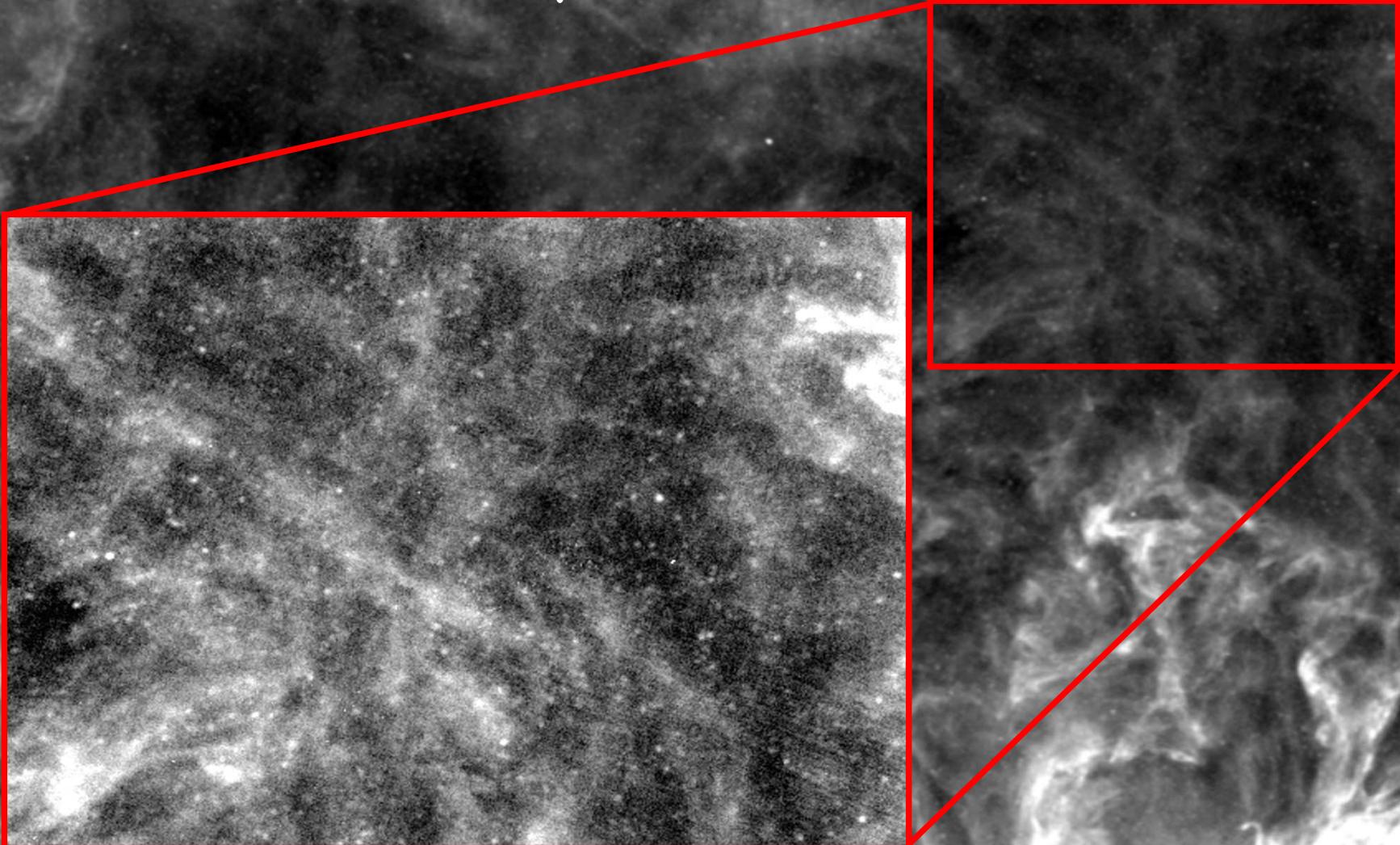


© ESA and the SPIRE Consortium

Polaris Flare



Polaris Flare (250 μ m)

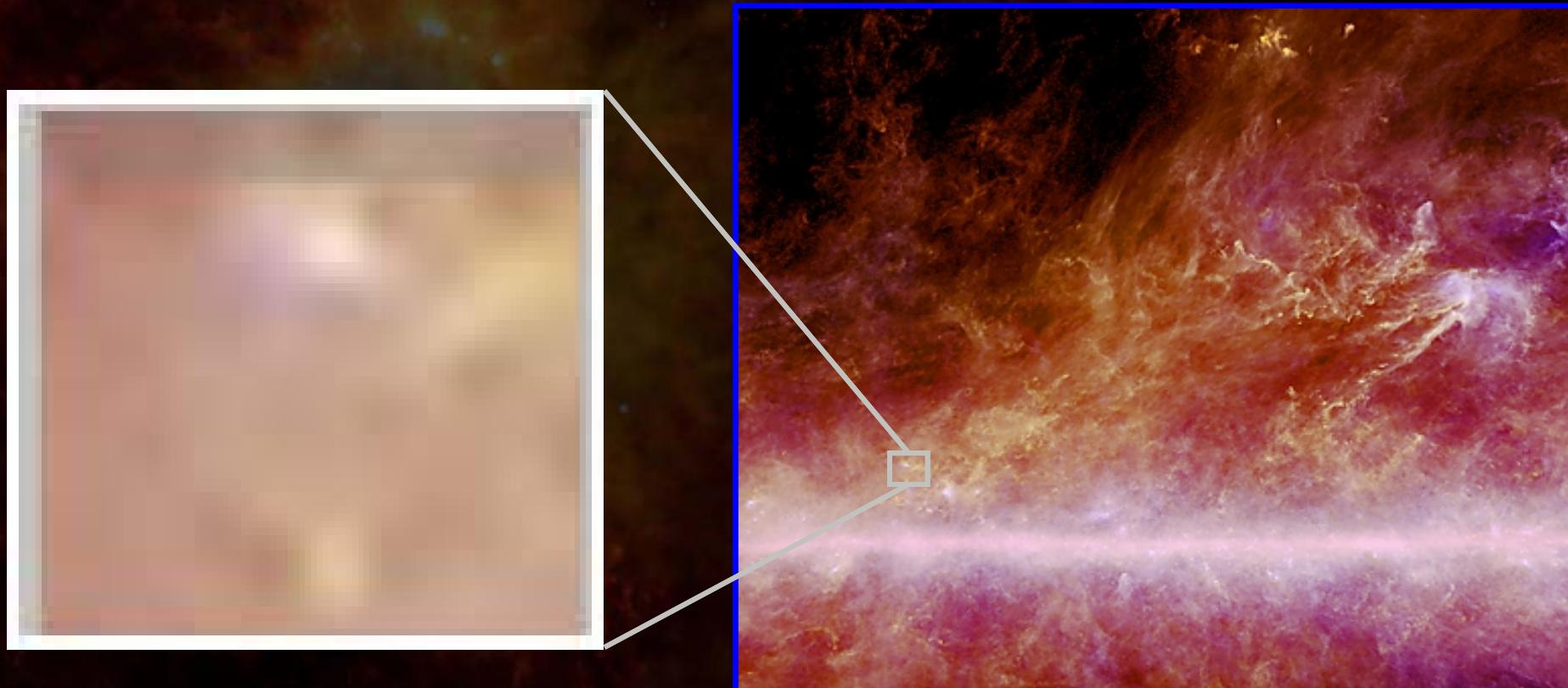


The Southern Cross



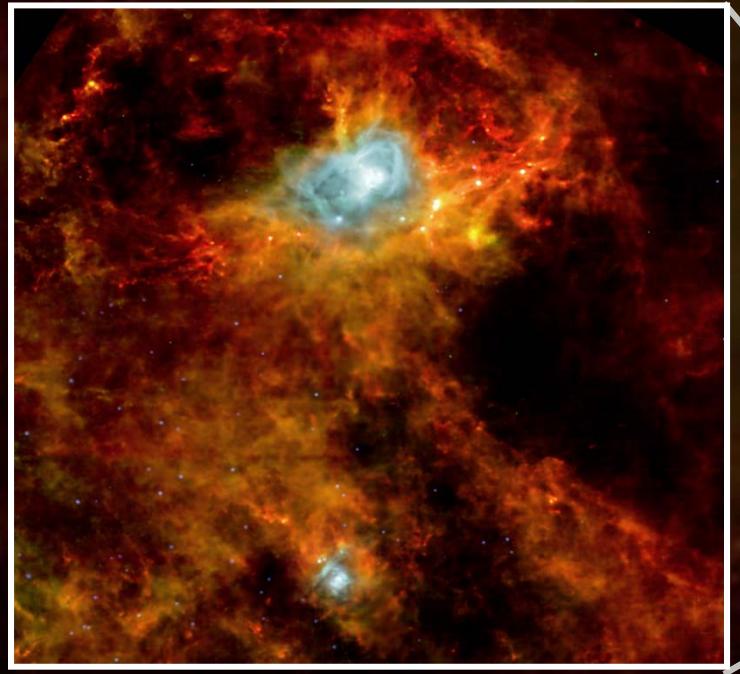
©ESA and the SPIRE & PACS consortia

Star formation in Aquila

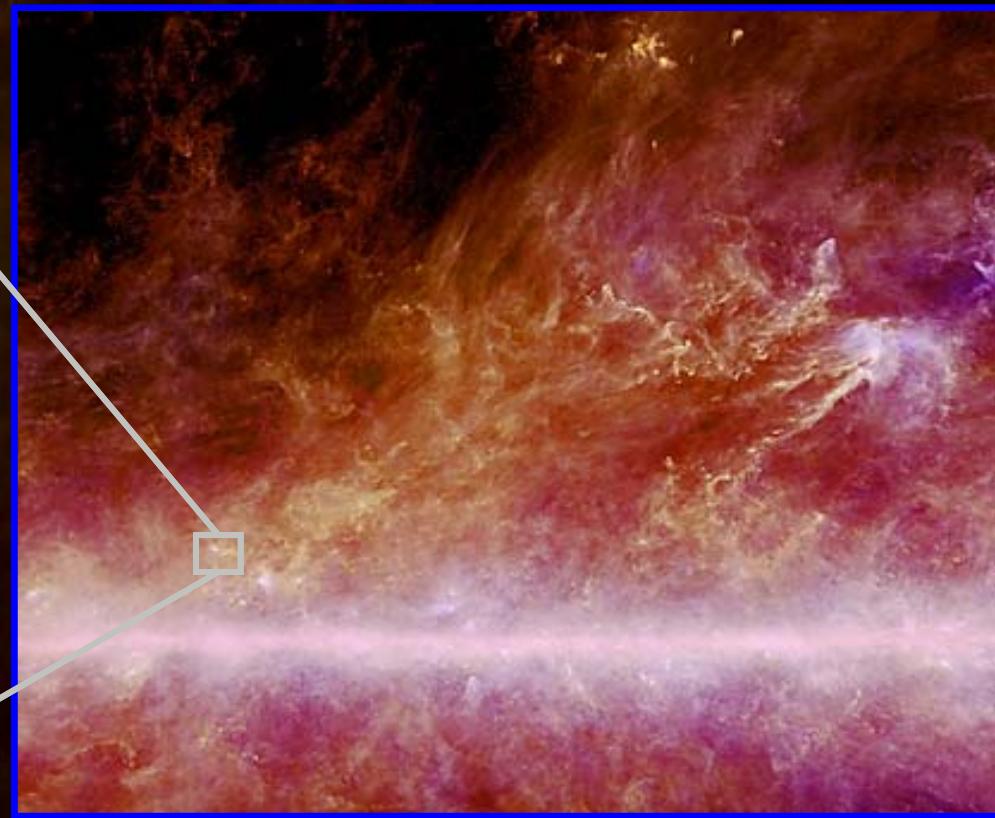


Planck + IRAS
100/350/540 μm

Star formation in Aquila

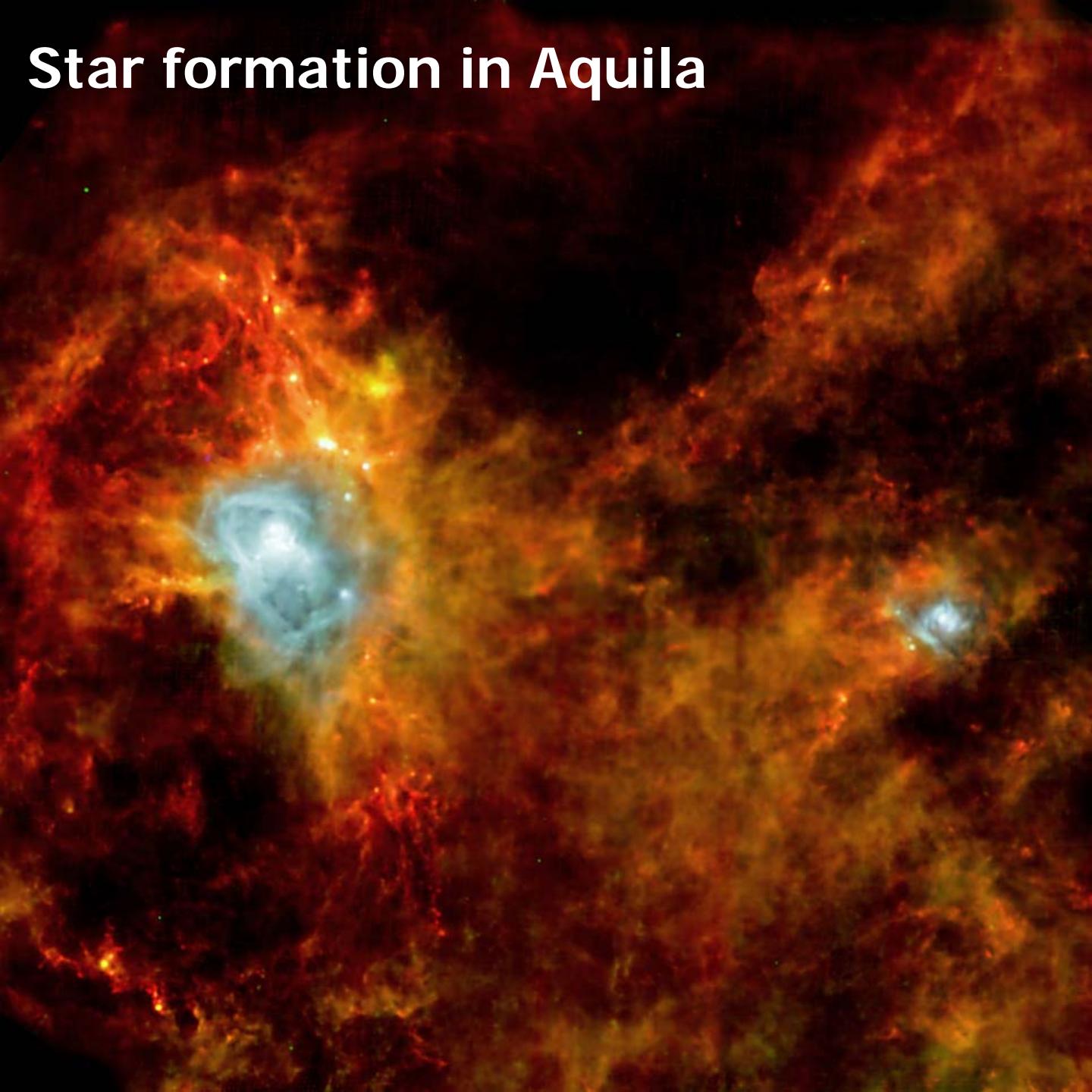


Herschel
70/160/500 μm



Planck + IRAS
100/350/540 μm

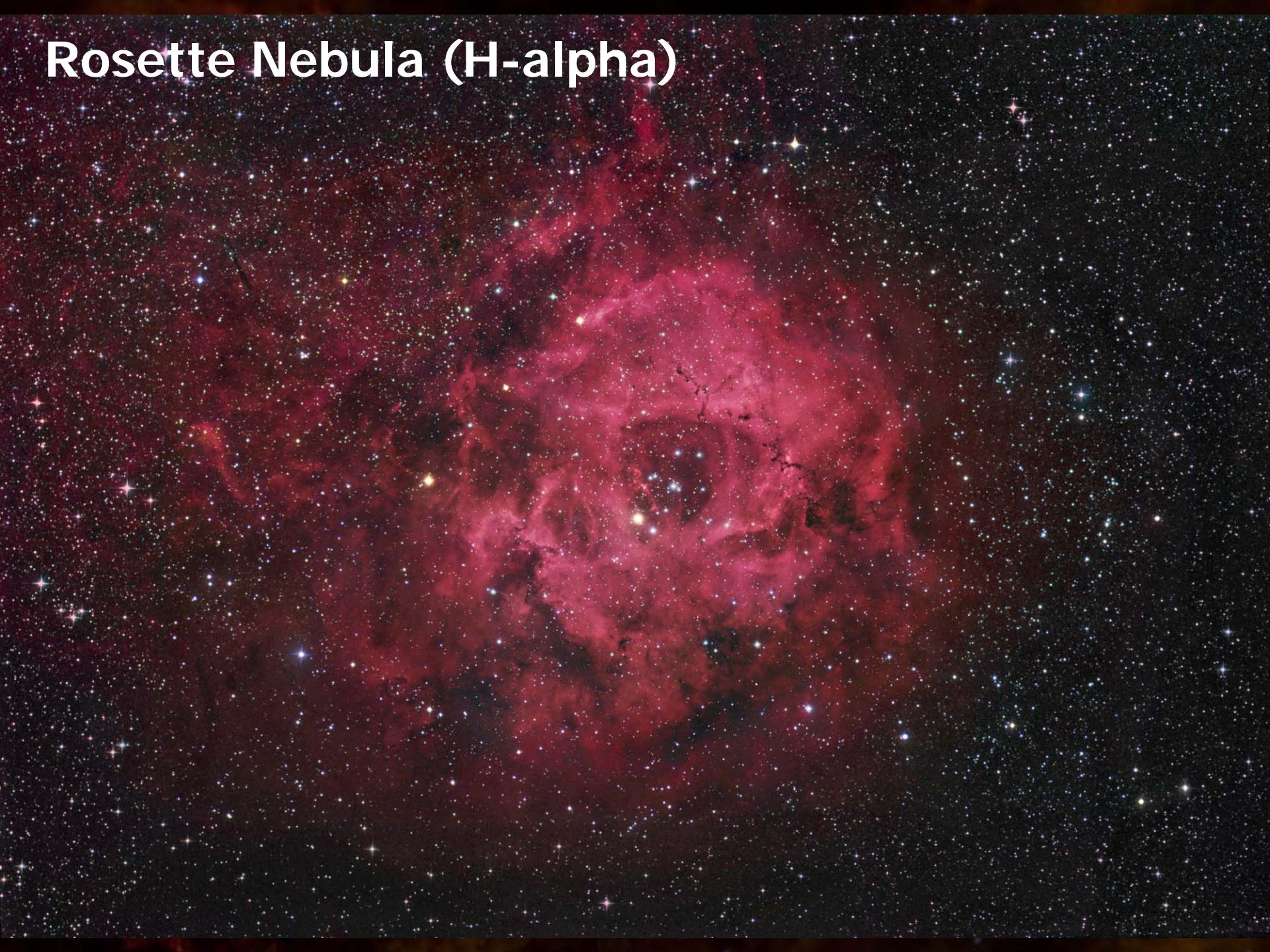
Star formation in Aquila



RCW 120



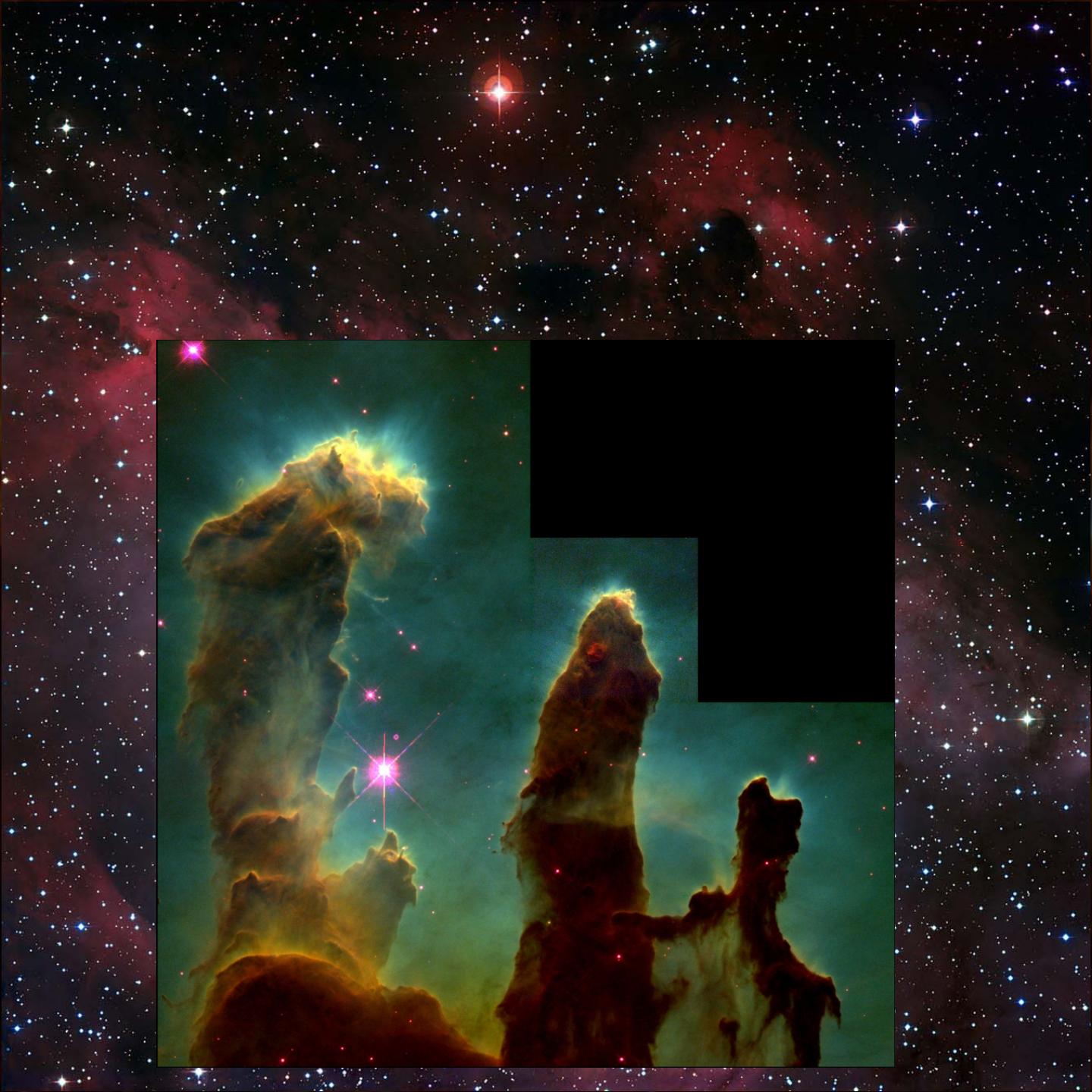
Rosette Nebula (H-alpha)



Rosette Nebula (H-alpha + Herschel)







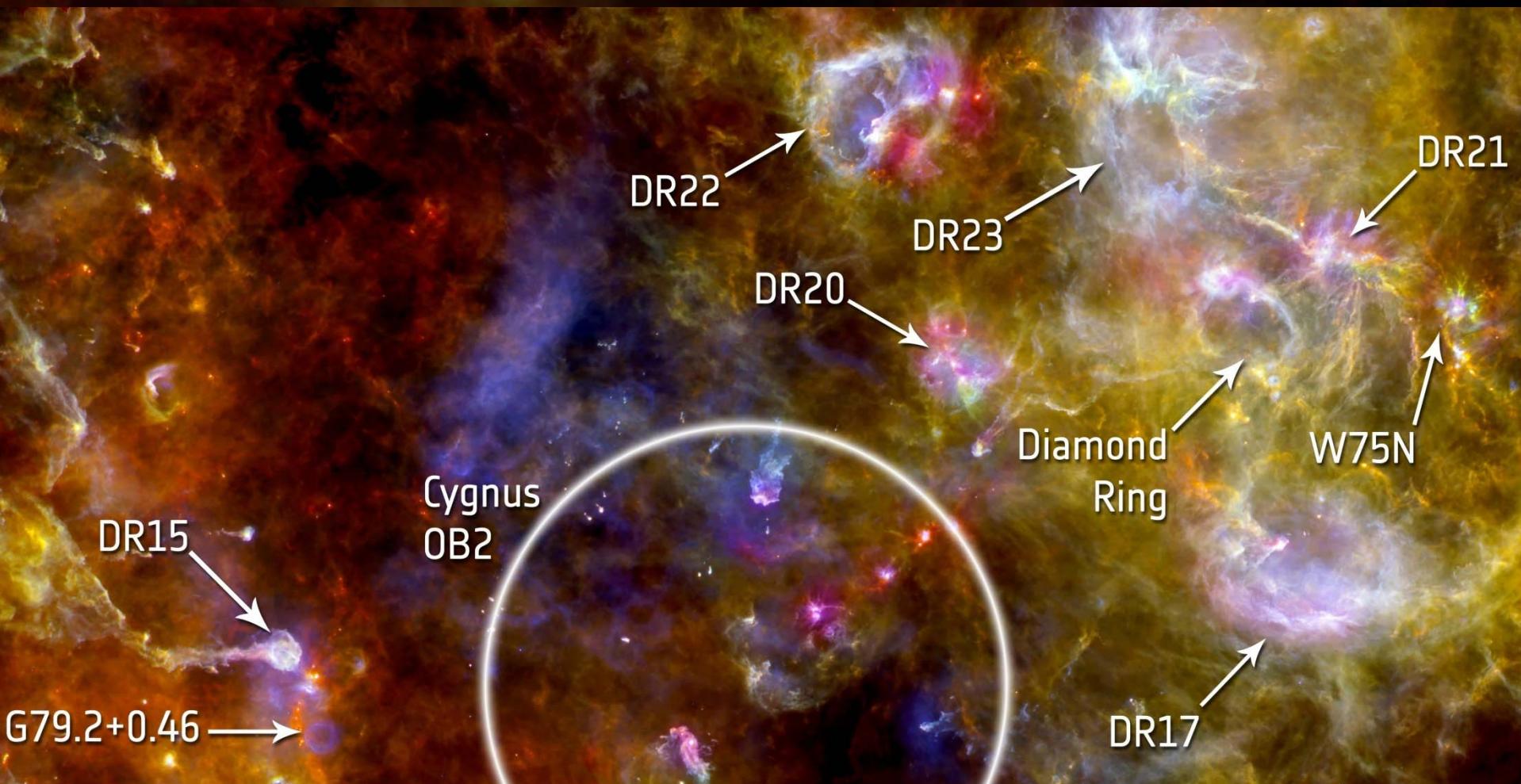


Orion Nebula



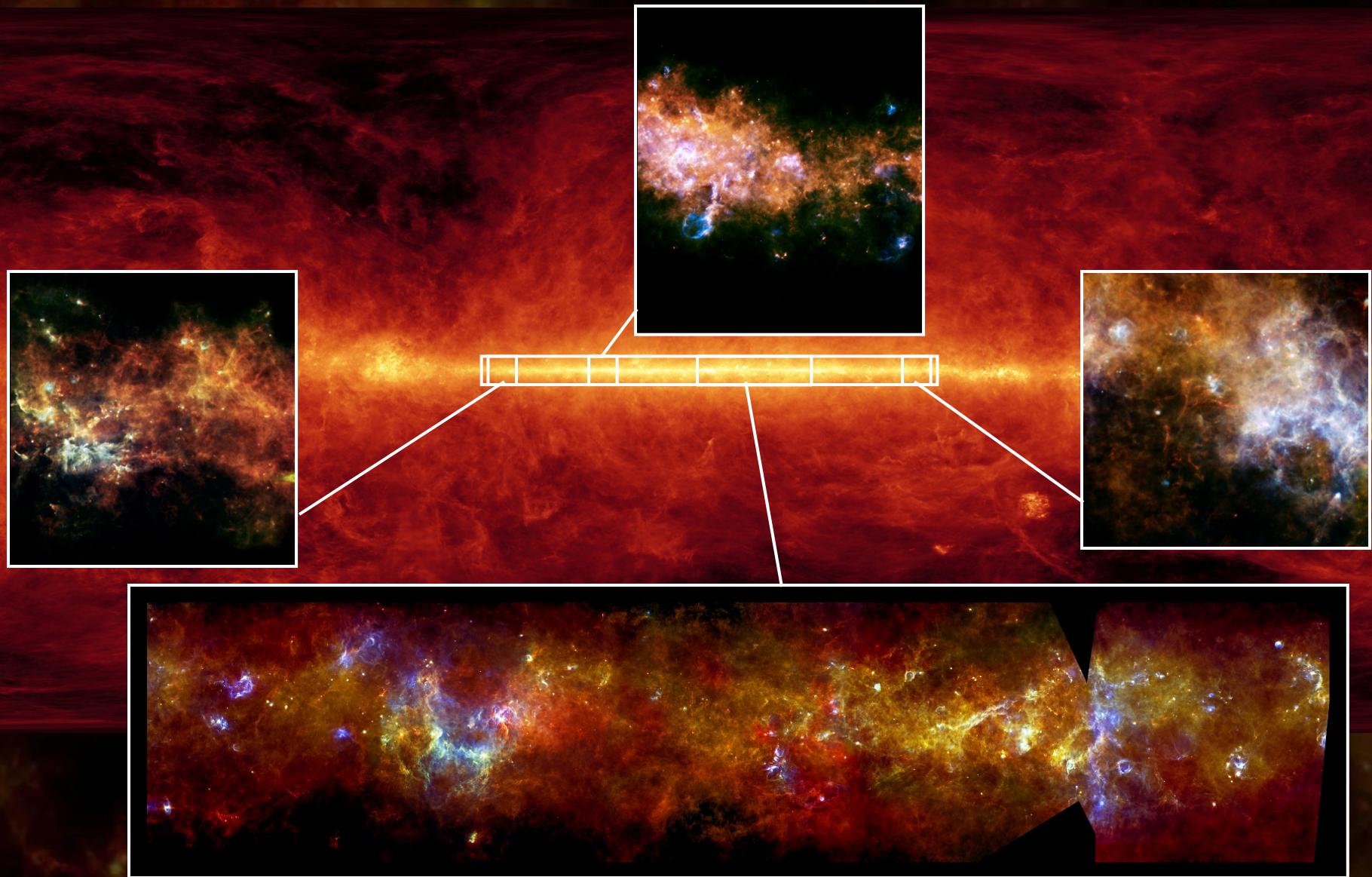


Cygnus X





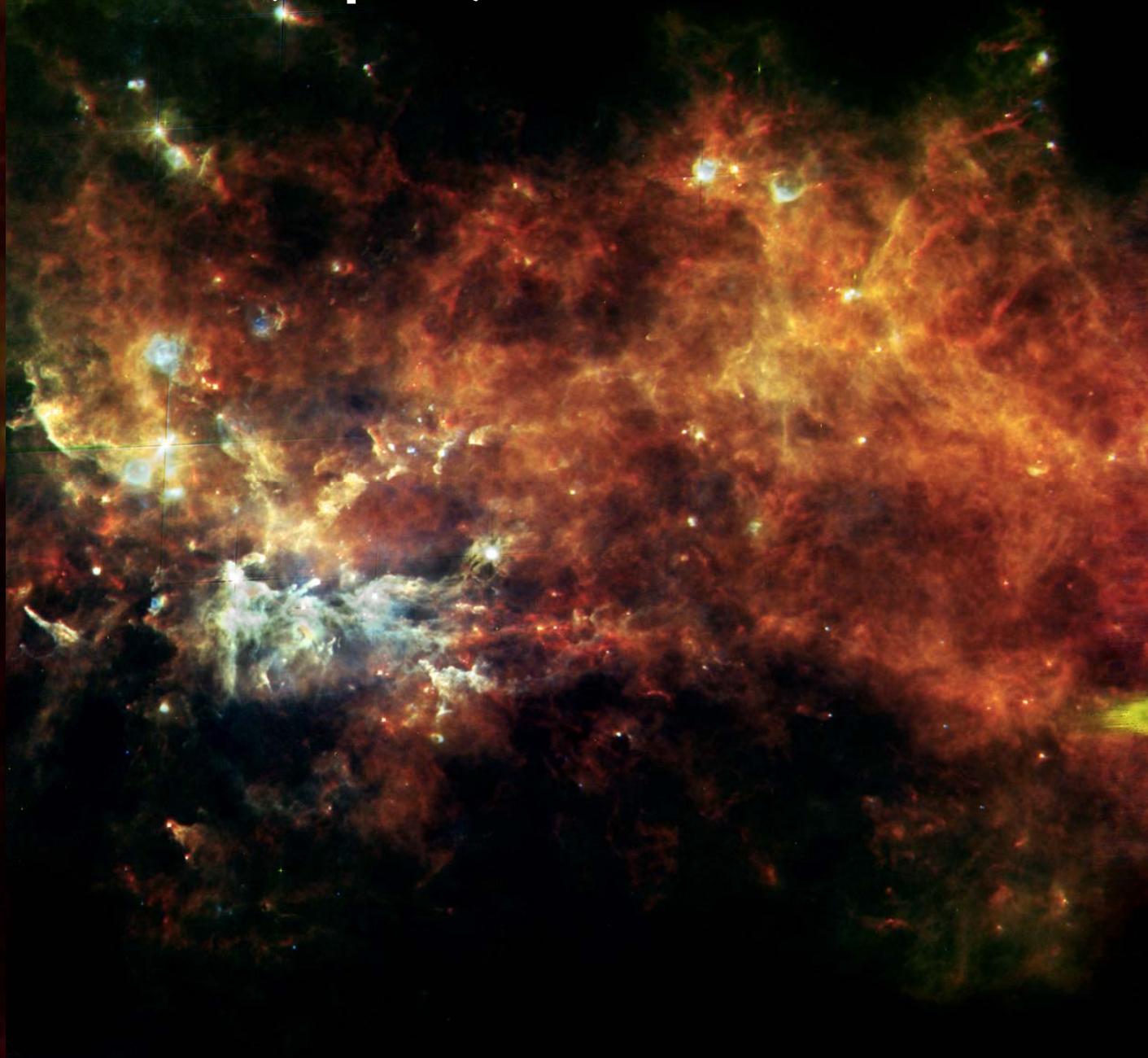
Hi-GAL



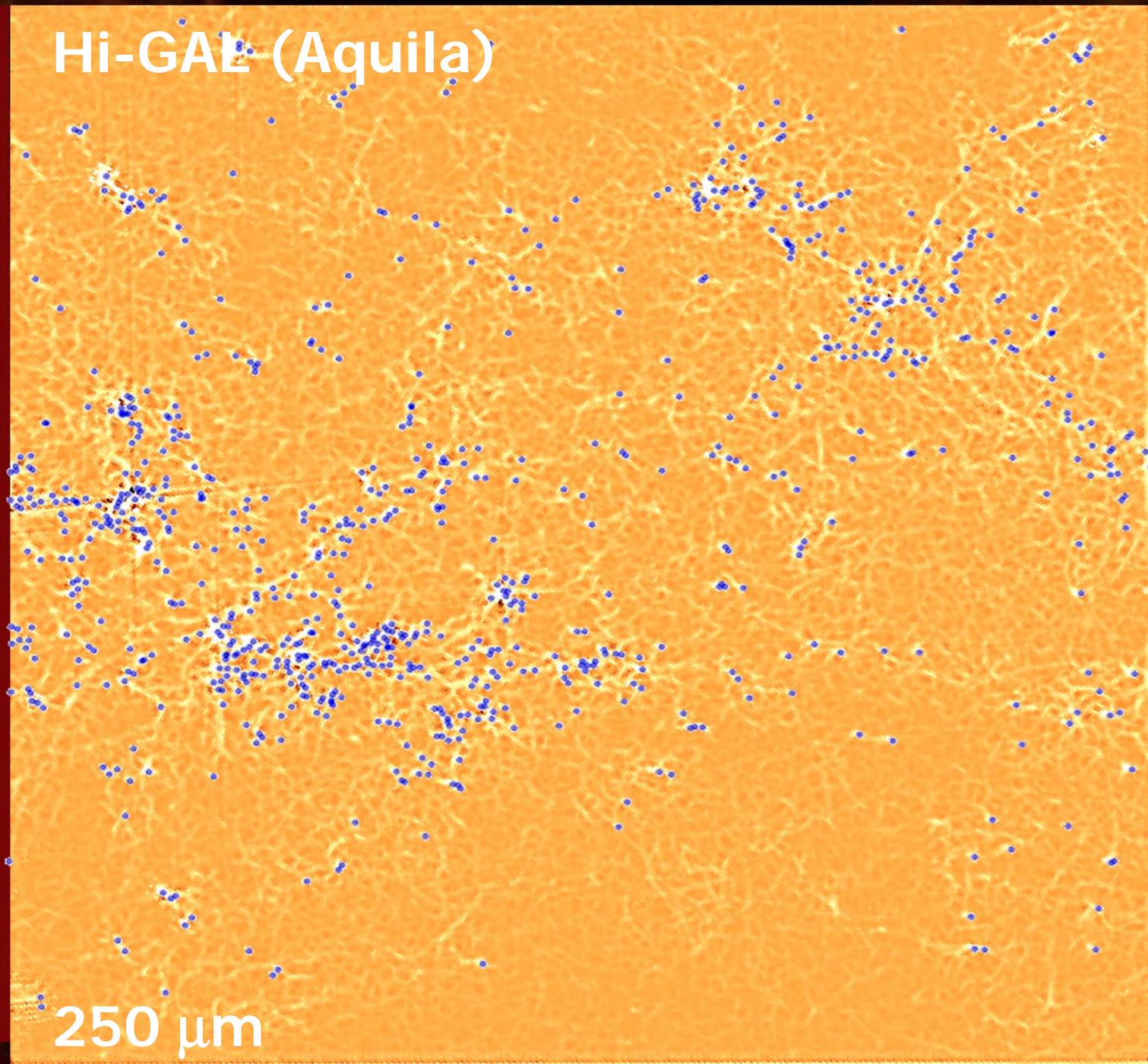
The Galactic Plane



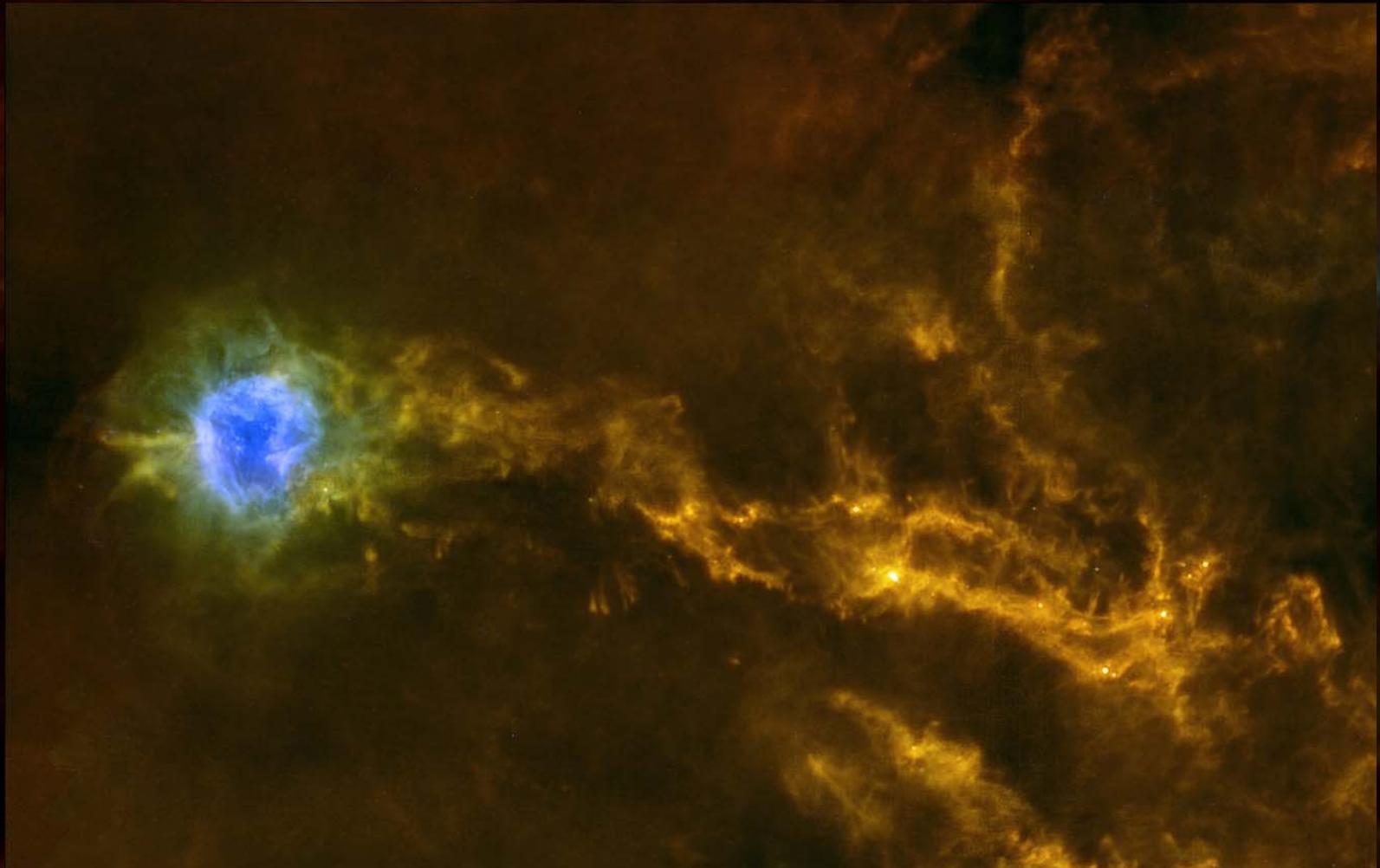
Hi-GAL (Aquila)



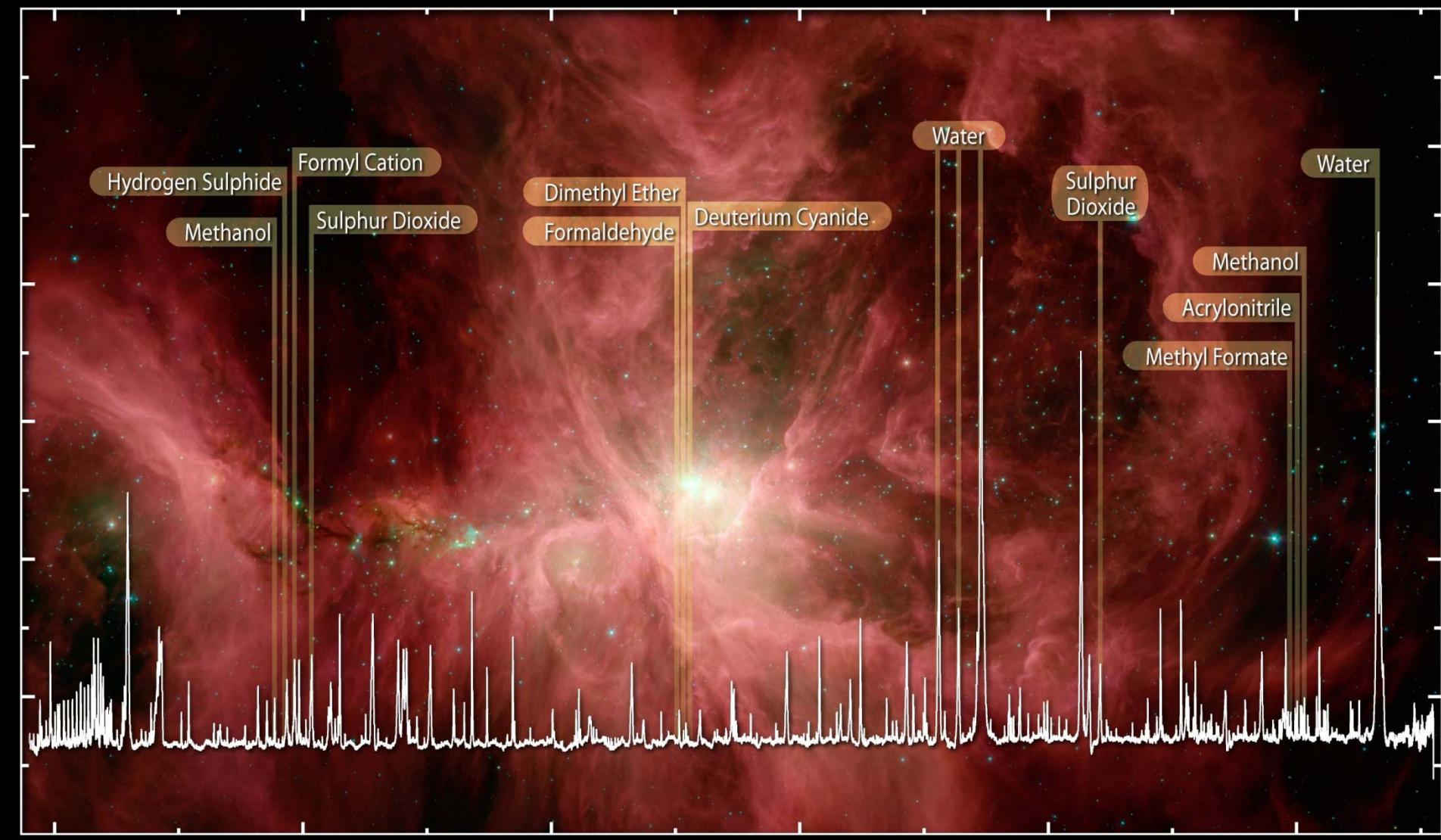
Hi-GAL (Aquila)



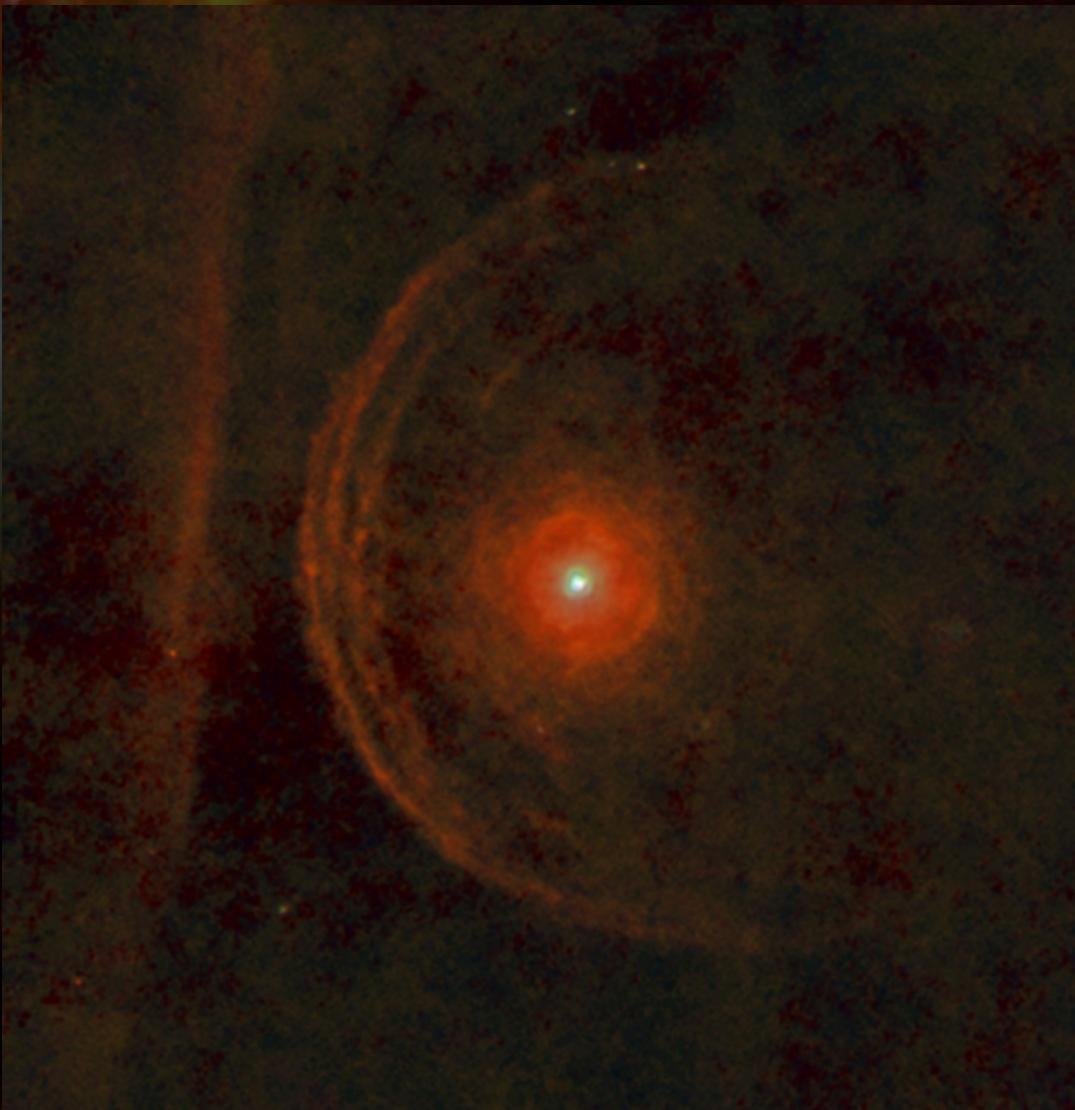
Cocoon Nebula



Orion Nebula



Betelgeuse



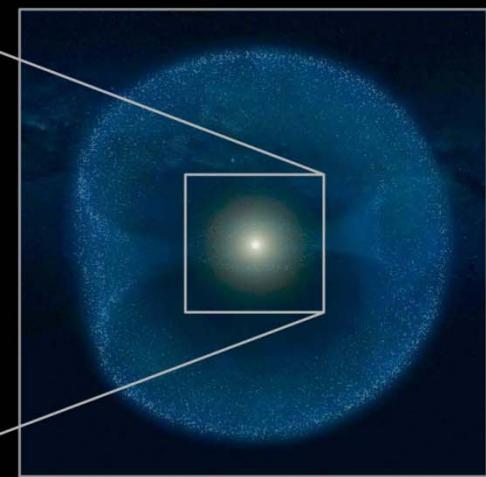
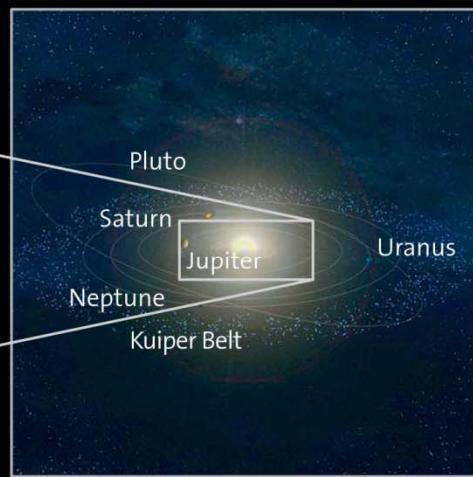
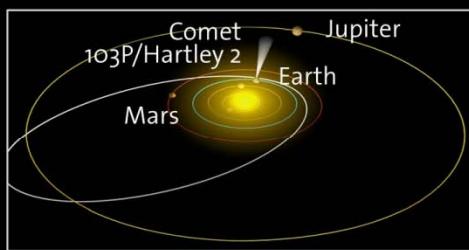
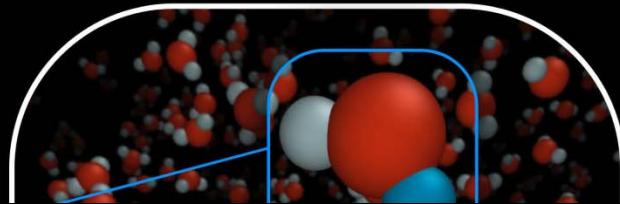
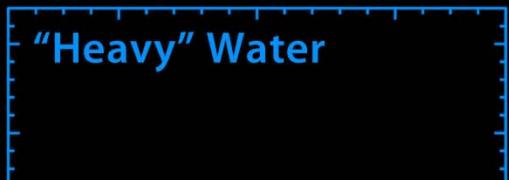
CW Leonis



Crab Nebula



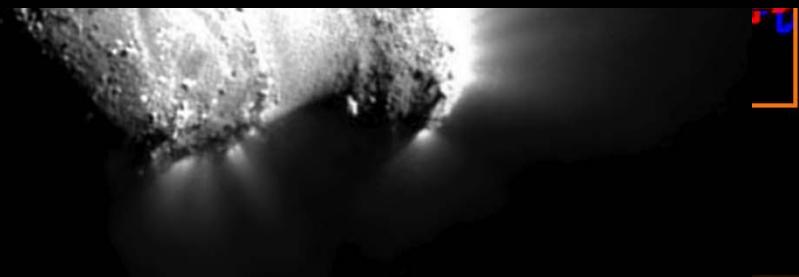
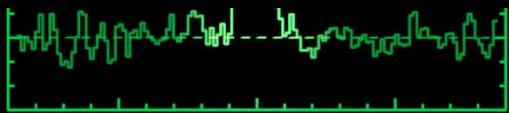
Comet Hartley 2



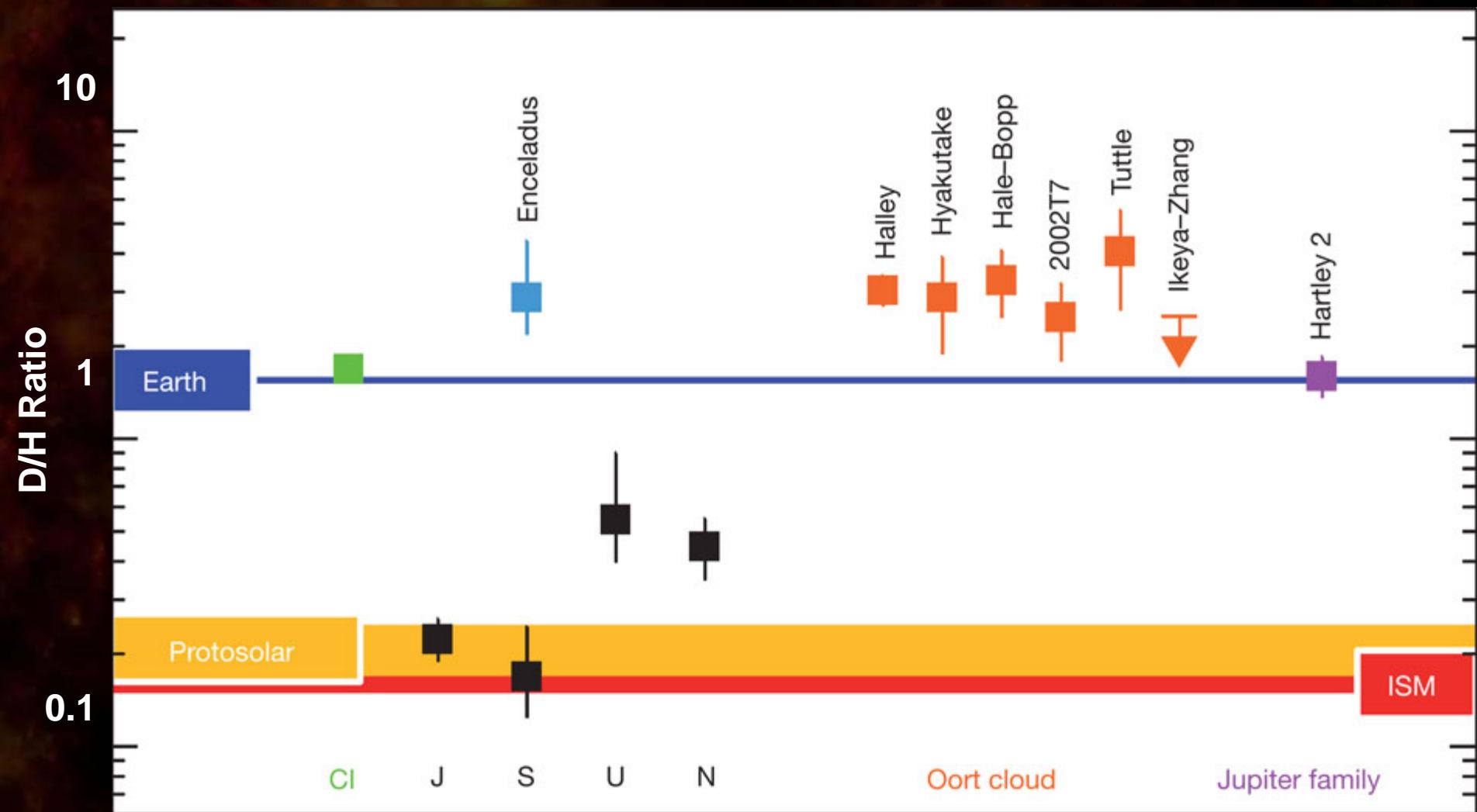
Inner Solar System

Outer Solar System

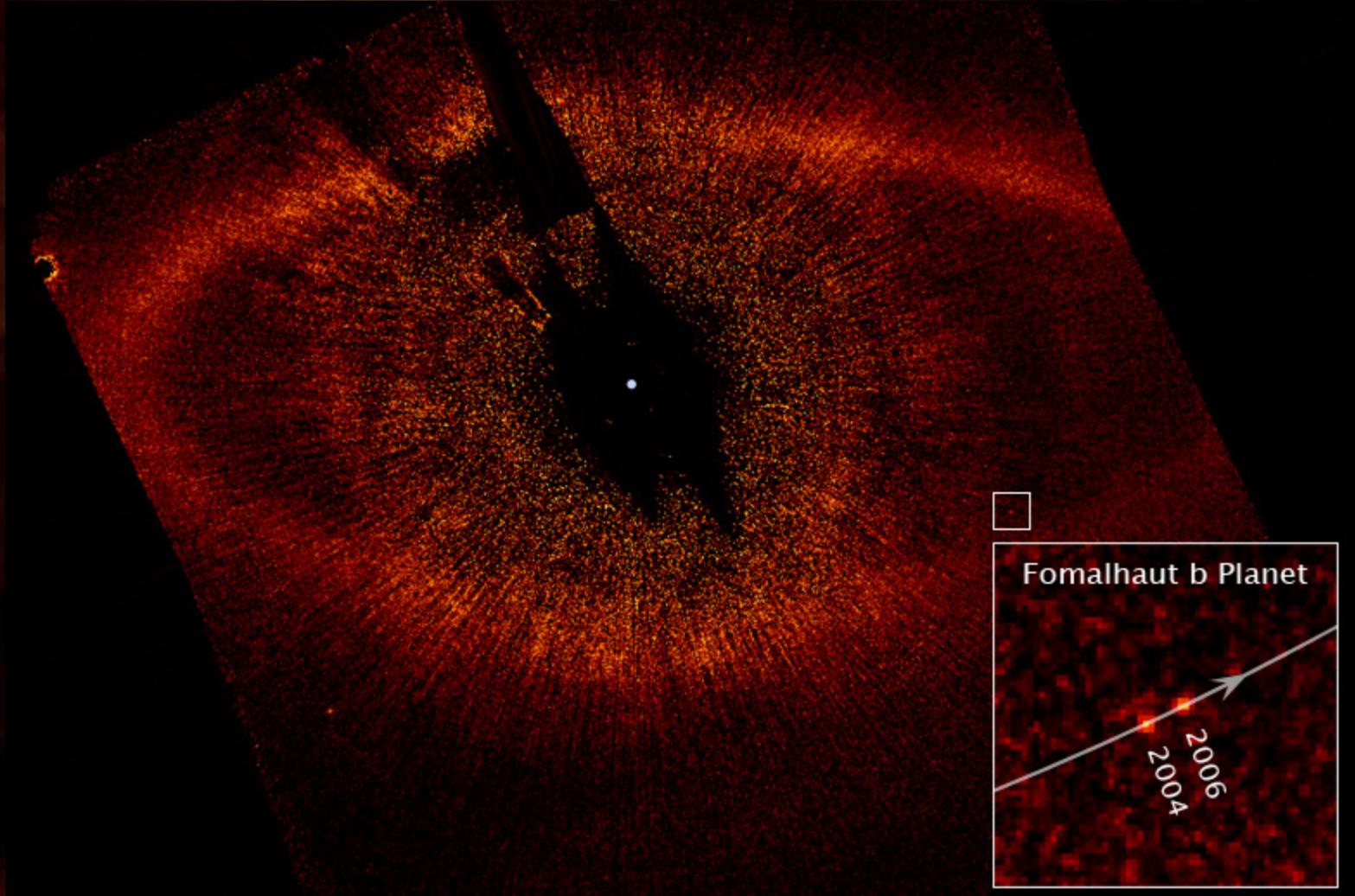
Oort Cloud



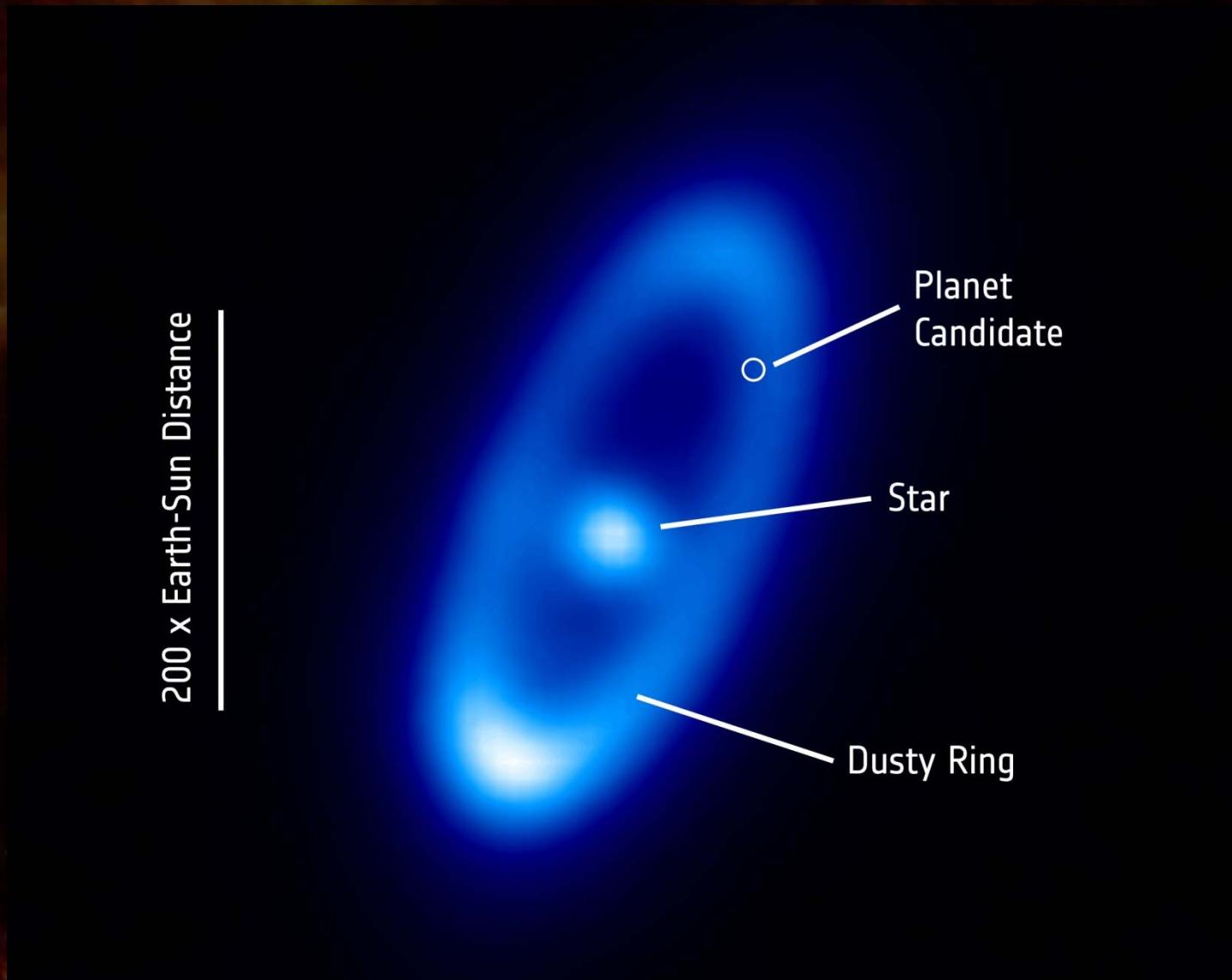
Water composition



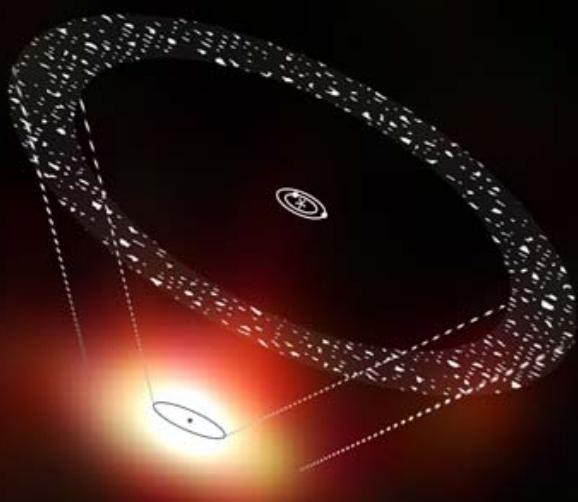
Fomalhaut



Fomalhaut



More Debris Disks



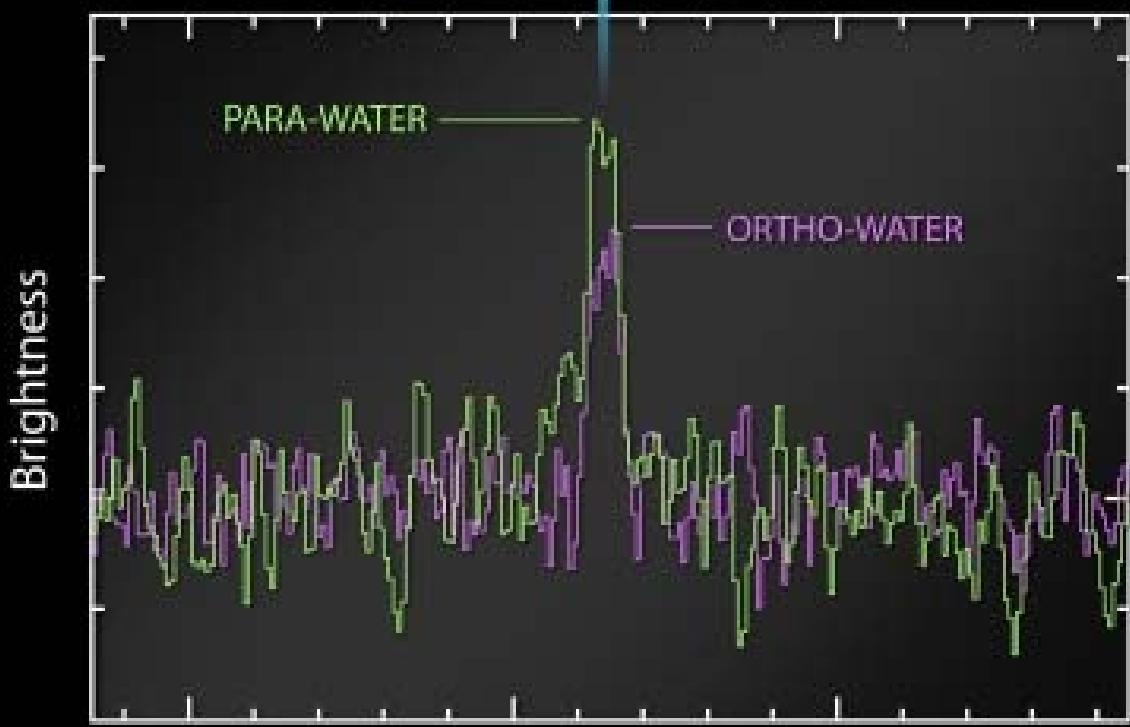
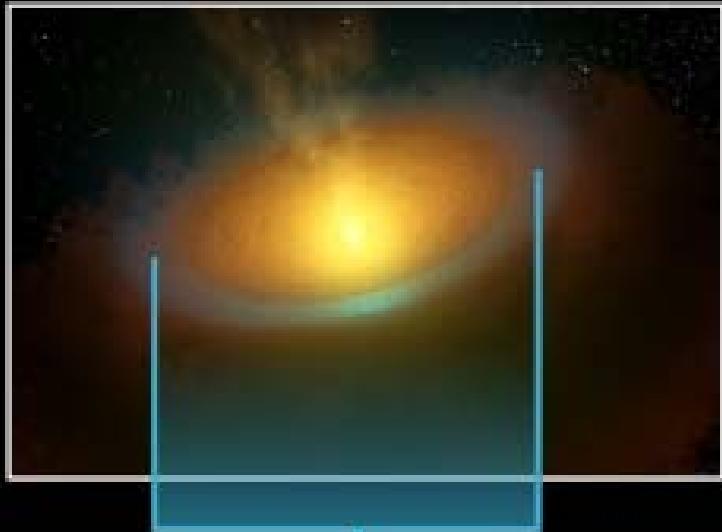
61 Virginis



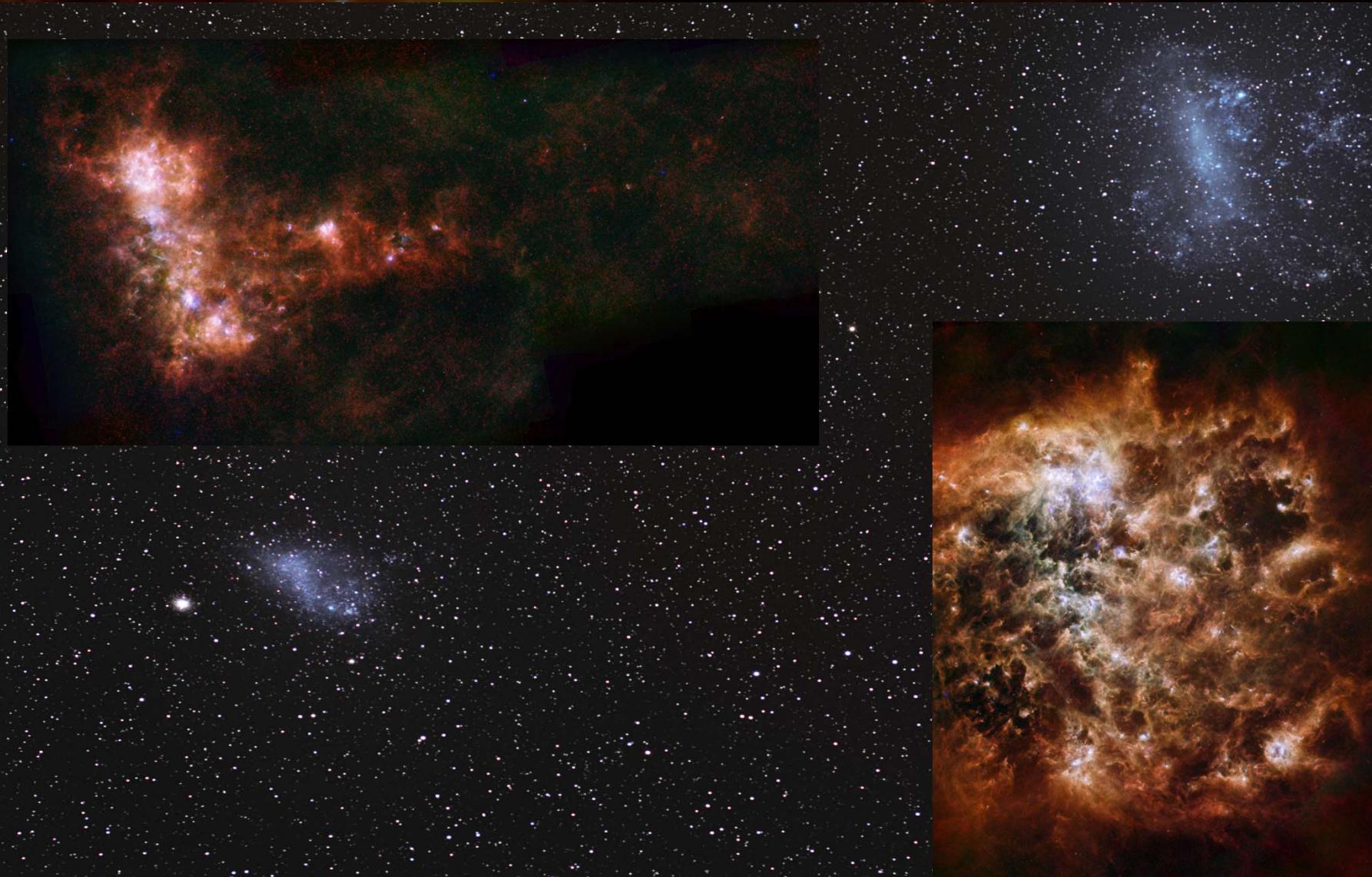
Gleise 581

TW Hydrae

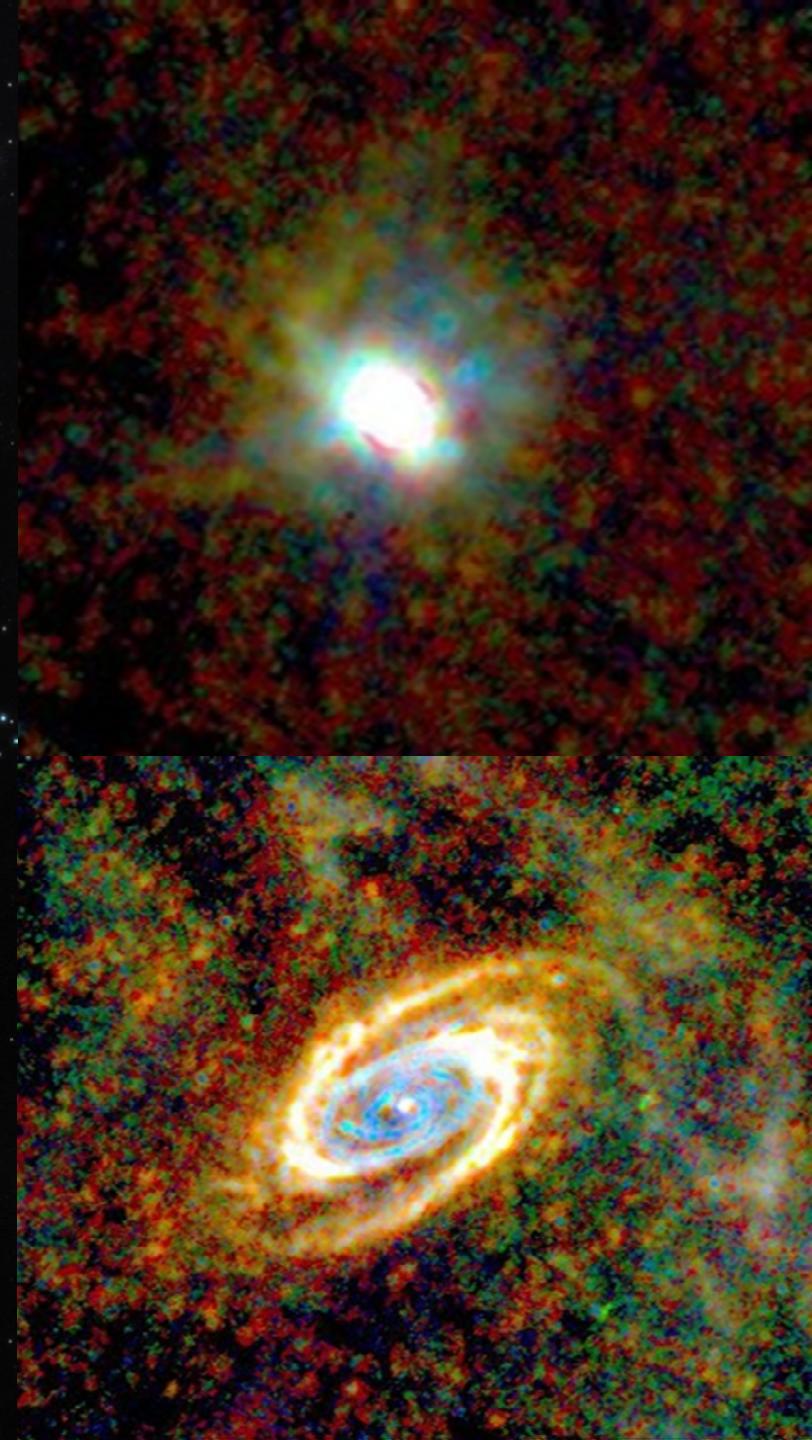




Magellanic Clouds



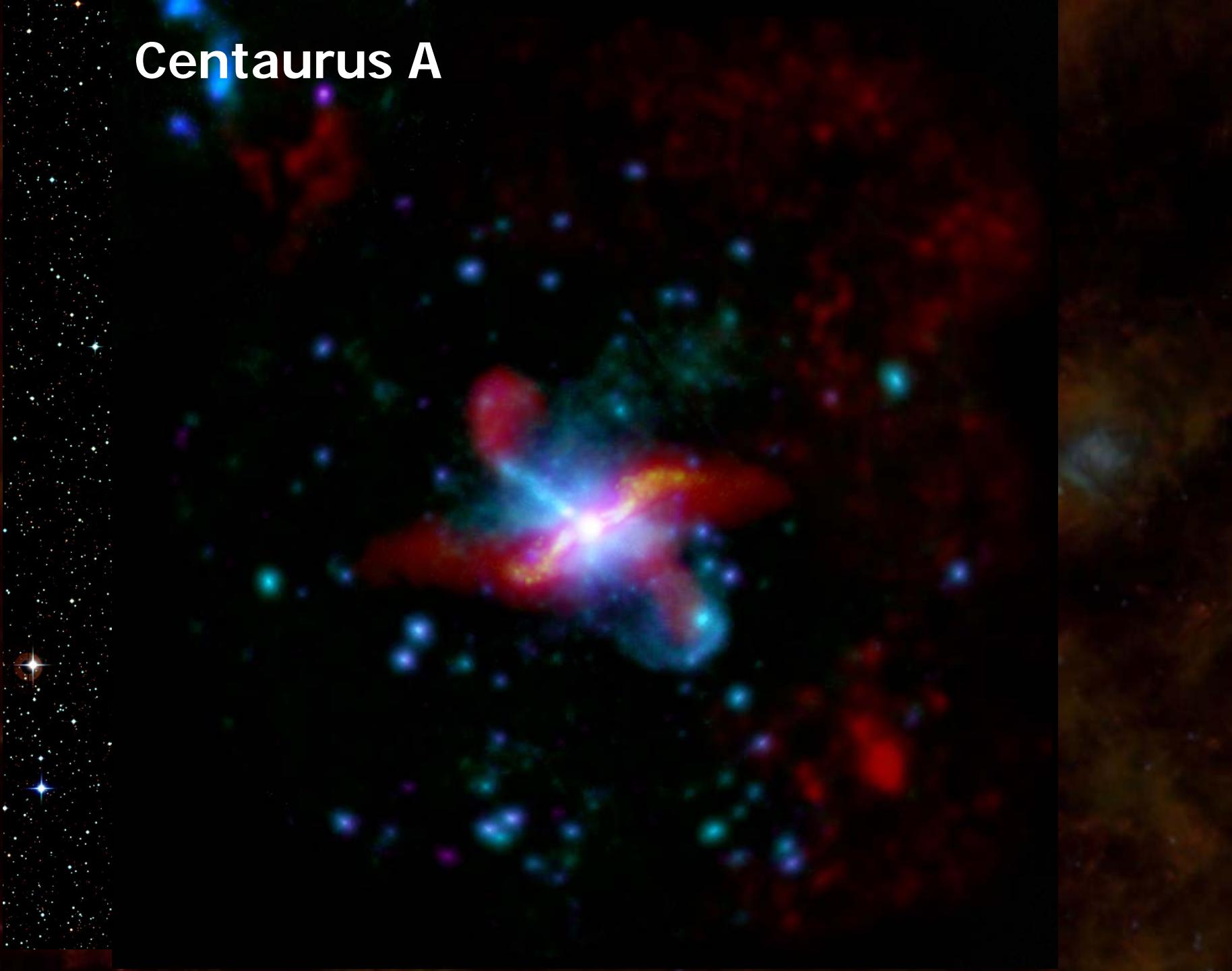
M81 & M82



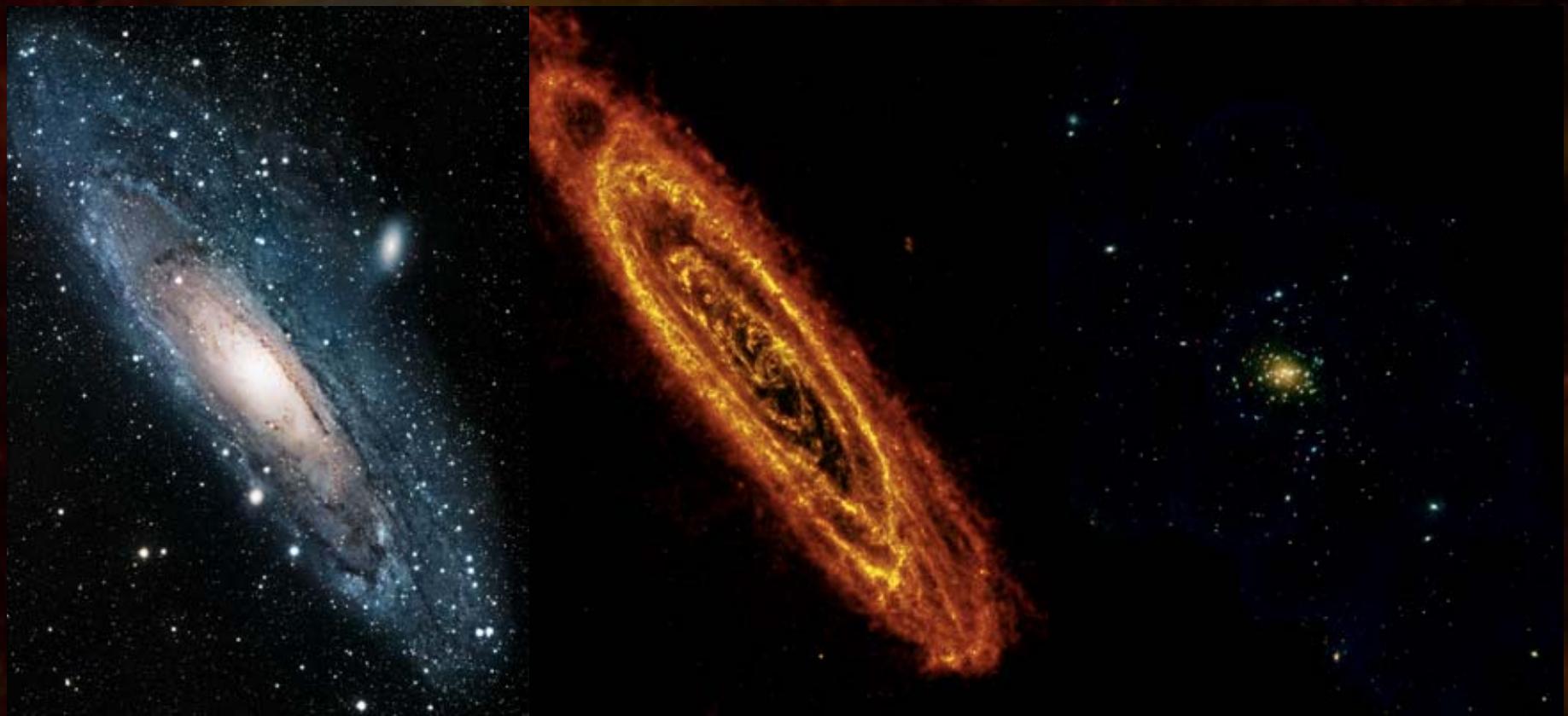
Andromeda Galaxy

A detailed image of the Andromeda Galaxy's spiral arms, showing a dense concentration of stars and interstellar gas and dust. The arms are primarily composed of blue and white stars, indicating younger stellar populations, and are set against a dark, reddish-brown background of older stars and intergalactic space.

Centaurus A



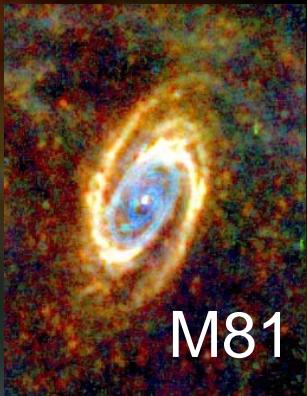
Andromeda Galaxy



Nearby Galaxies



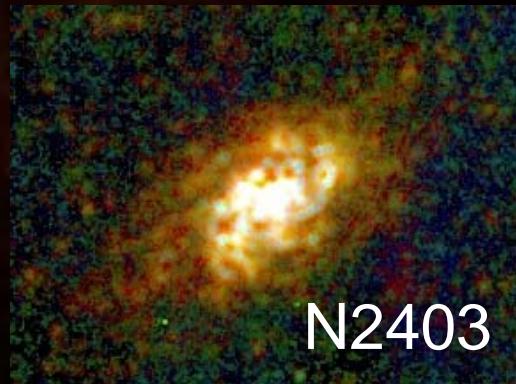
M51



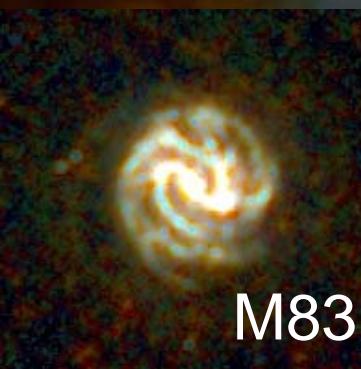
M81



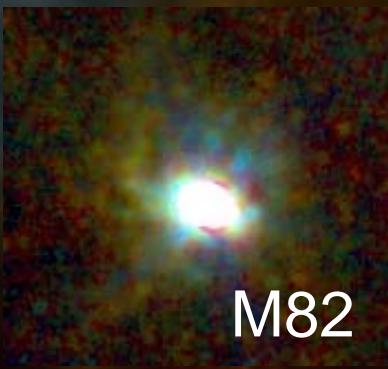
N891



N2403



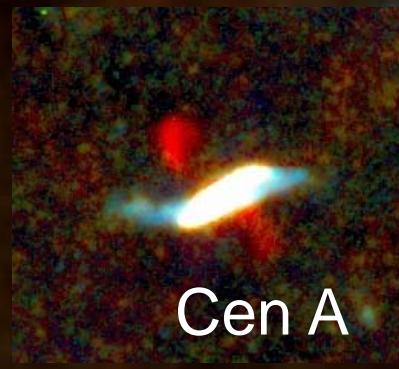
M83



M82



N4038/9



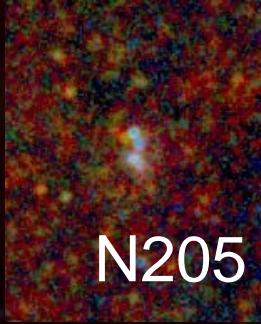
Cen A



N1068



N4151



N205

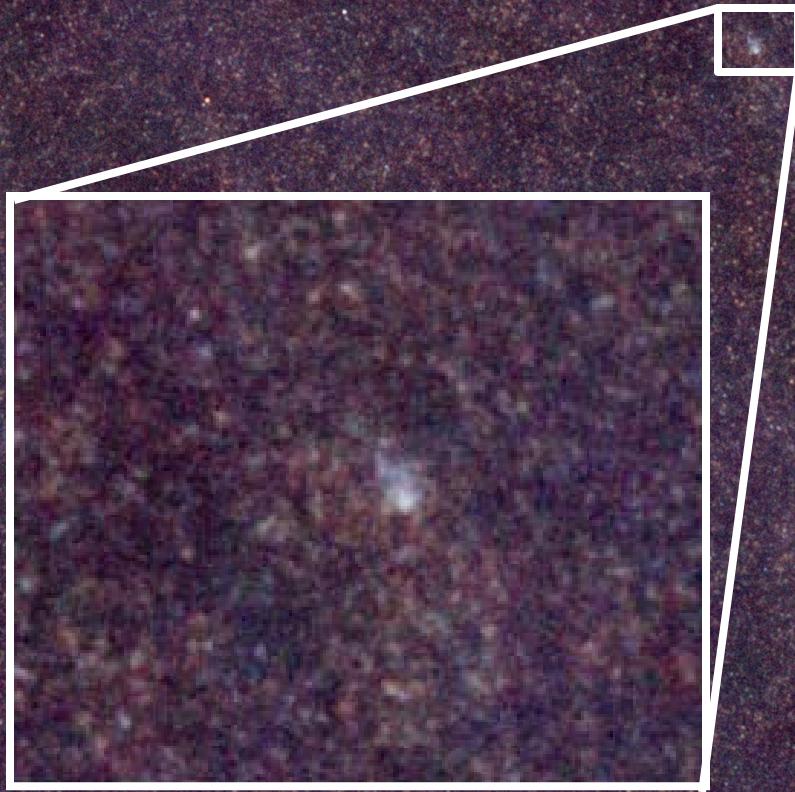


N4125

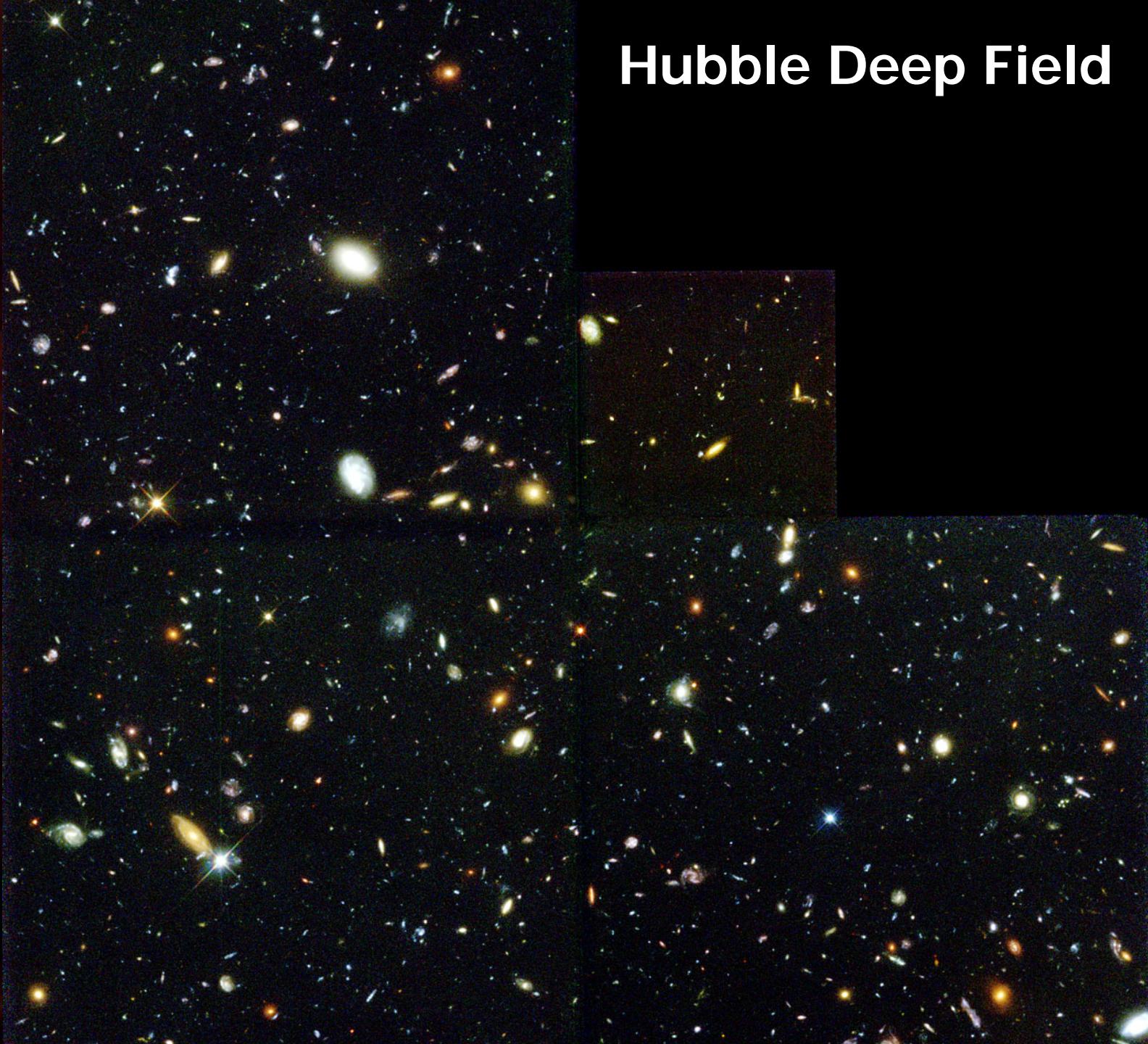


Arp220

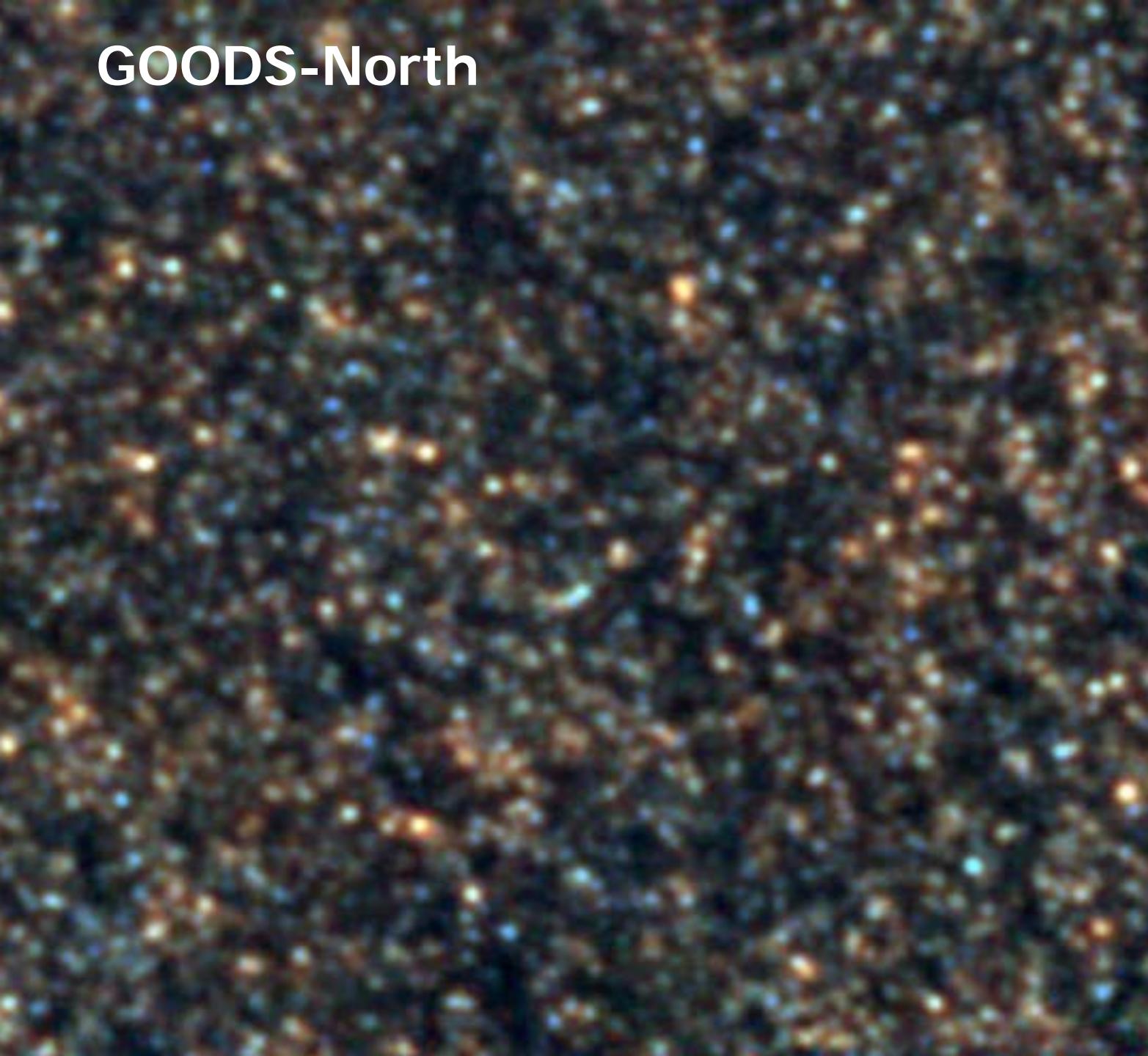
Herschel-ATLAS



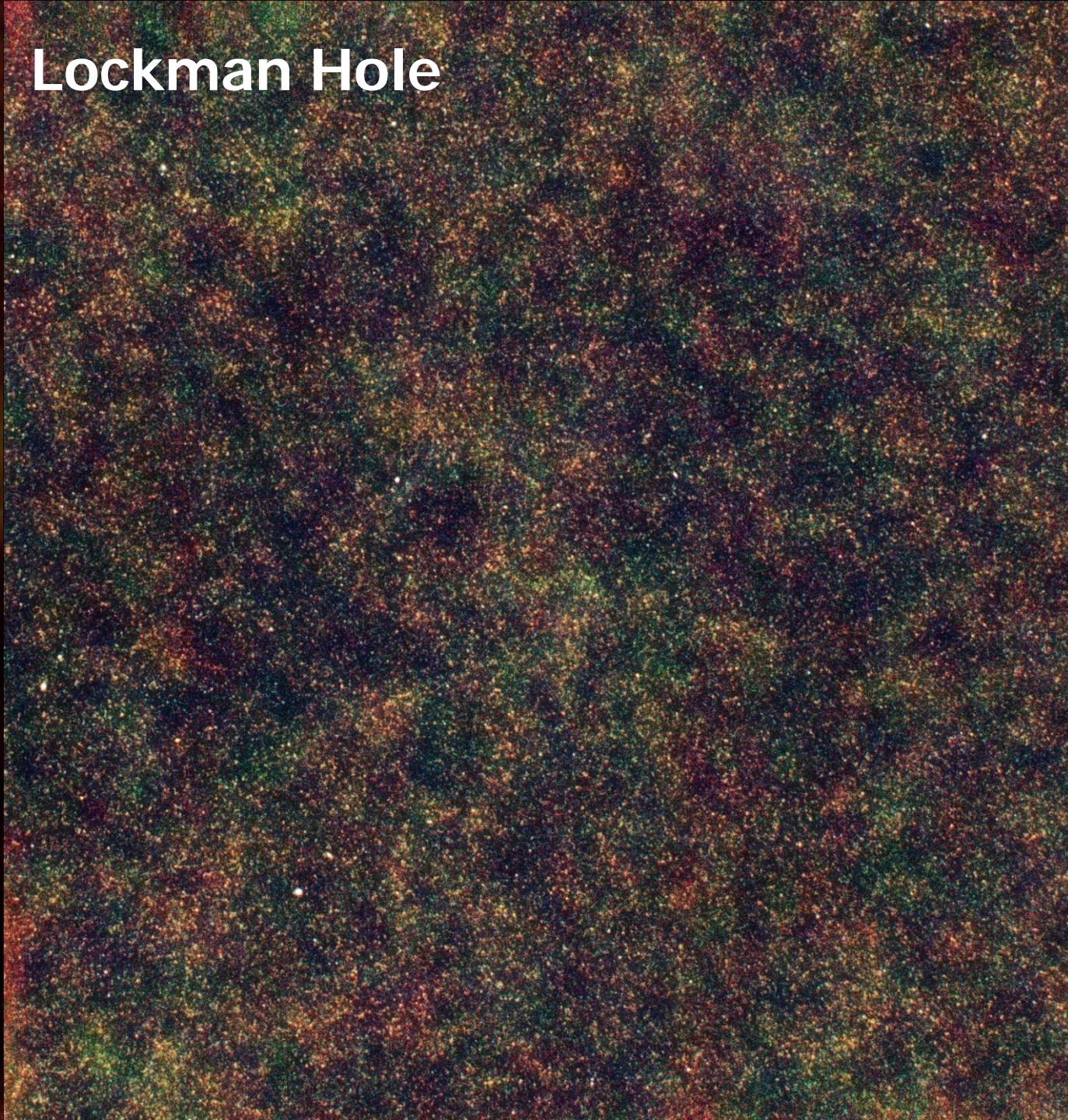
Hubble Deep Field



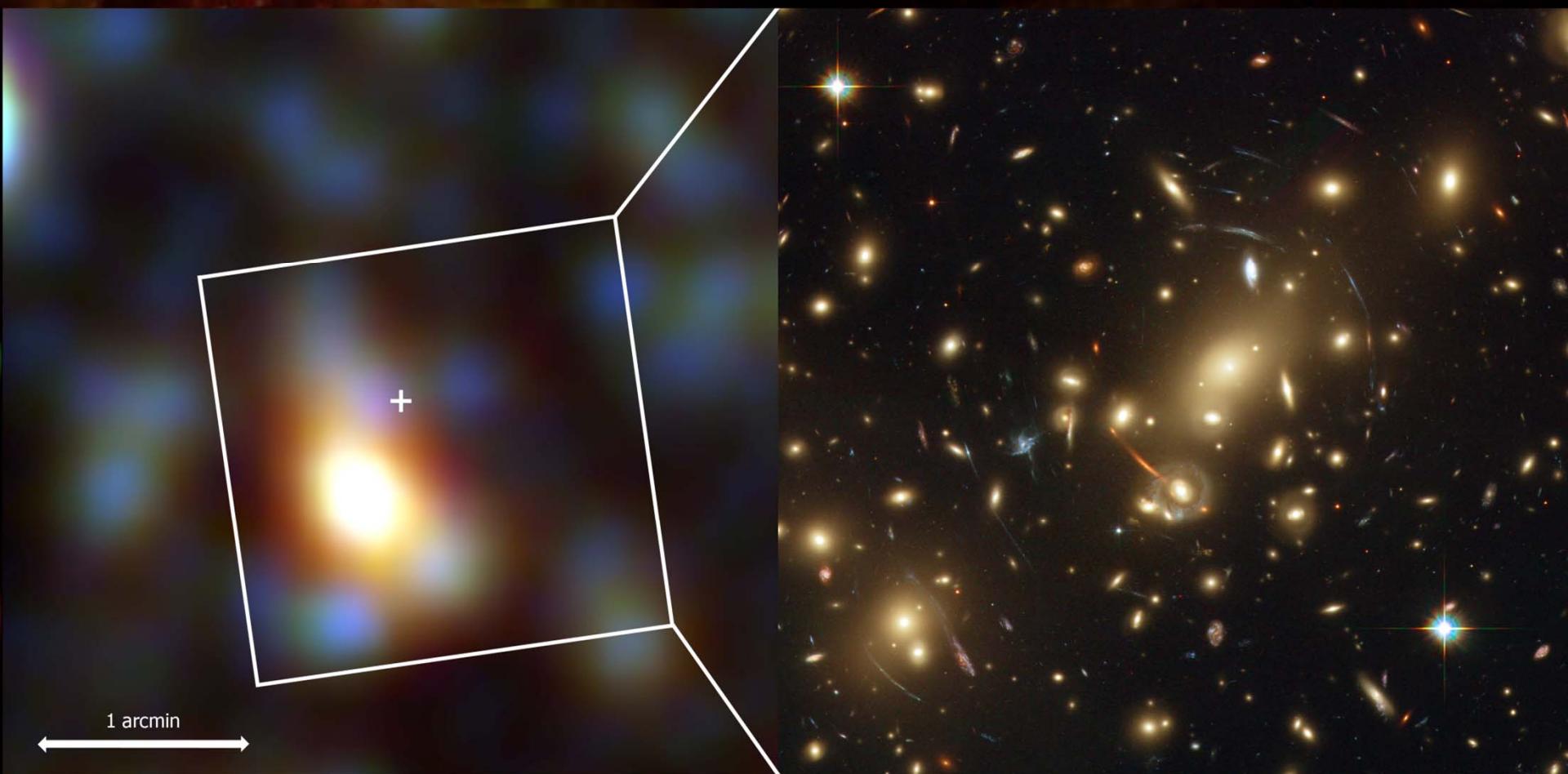
GOODS-North

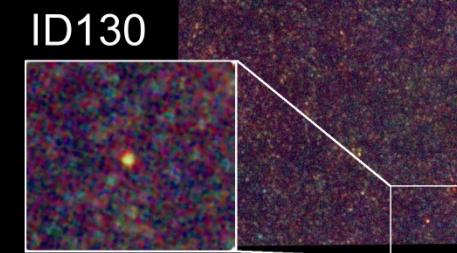
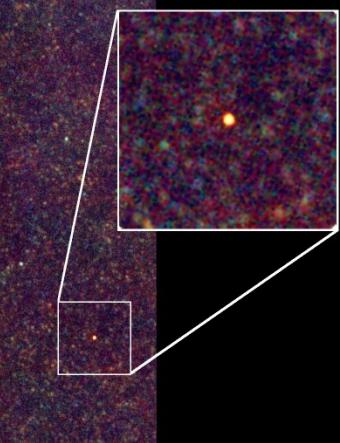
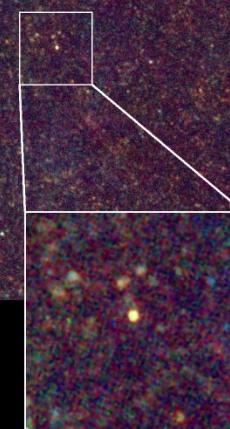
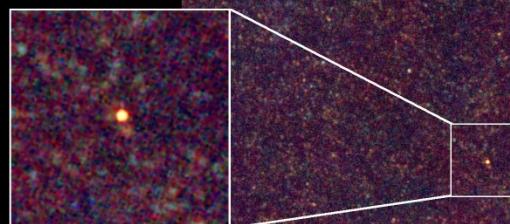


Lockman Hole



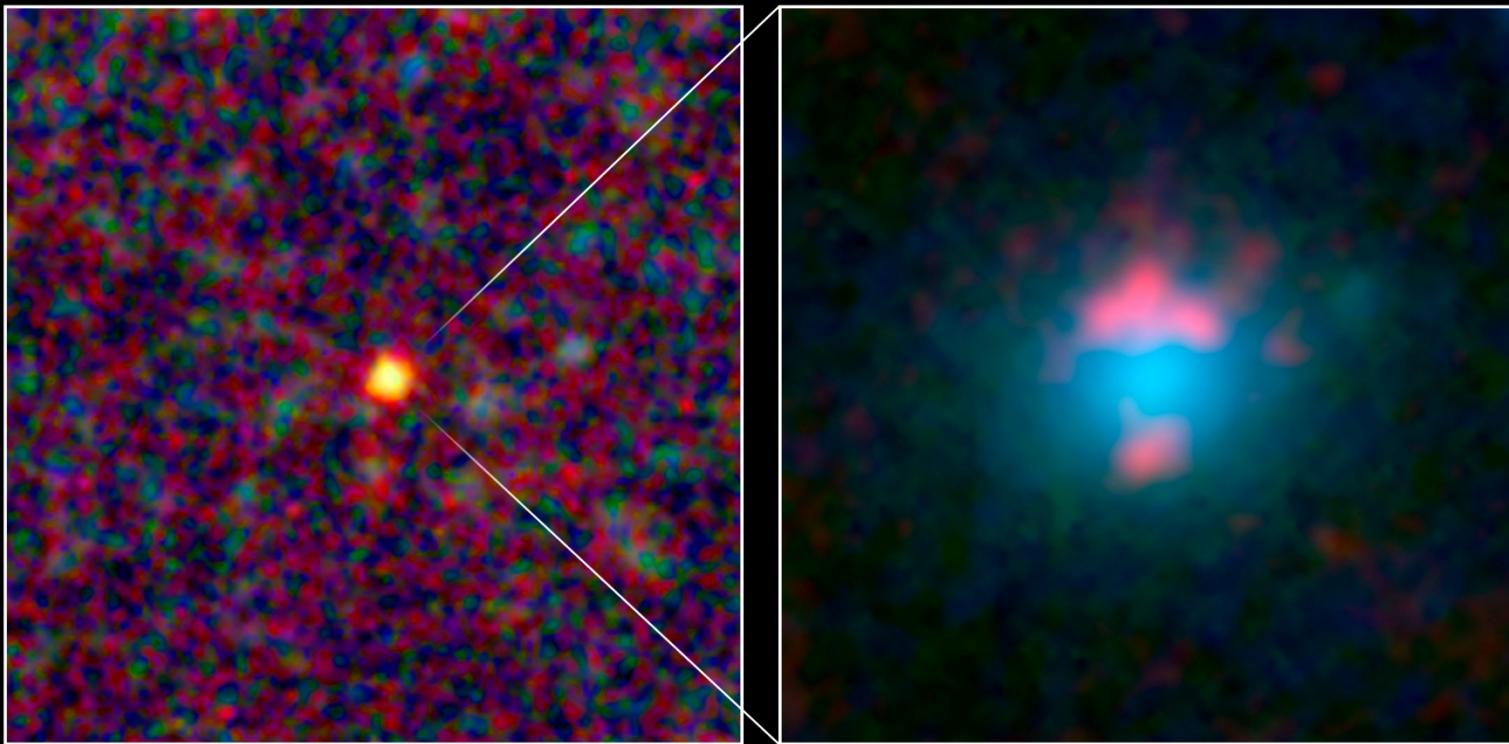
Abell 2218





Gravitational Lensing

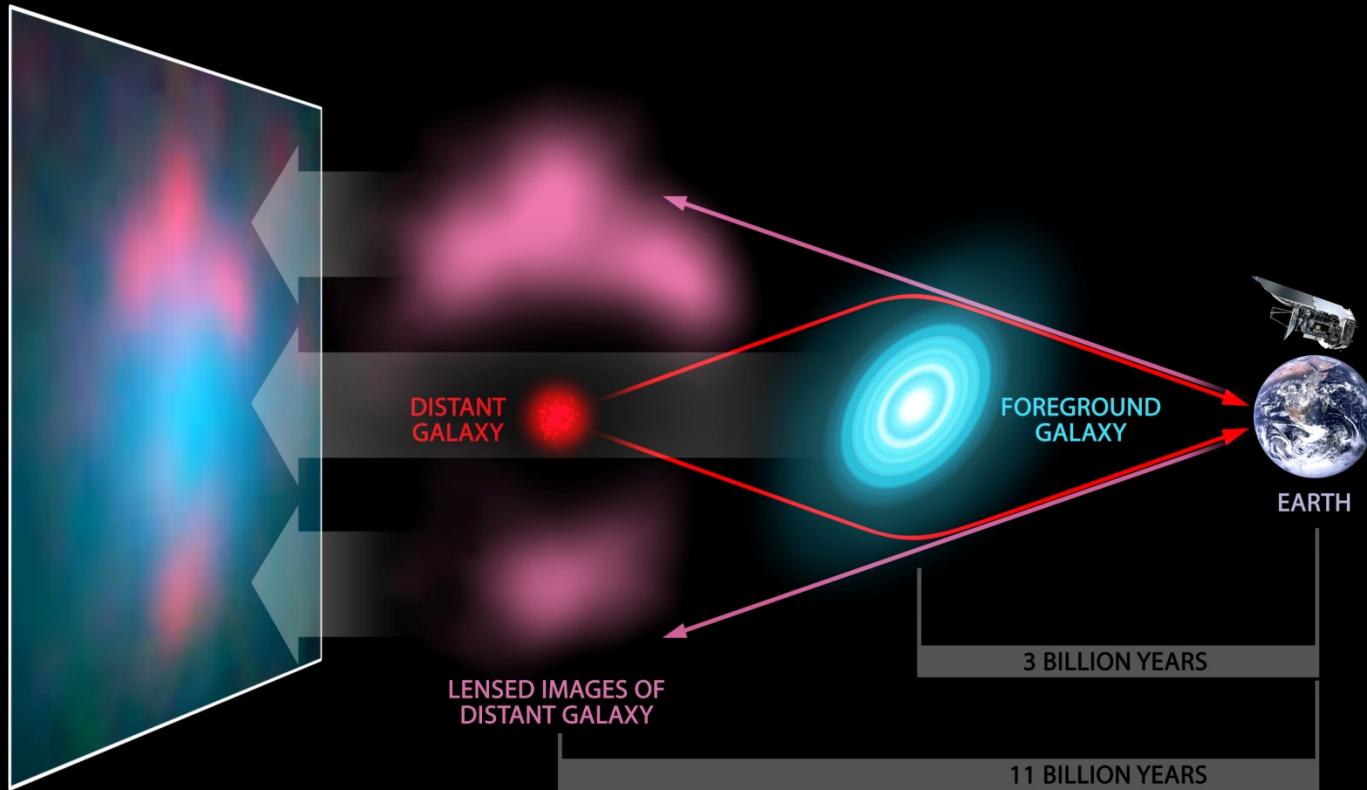
SDP 81

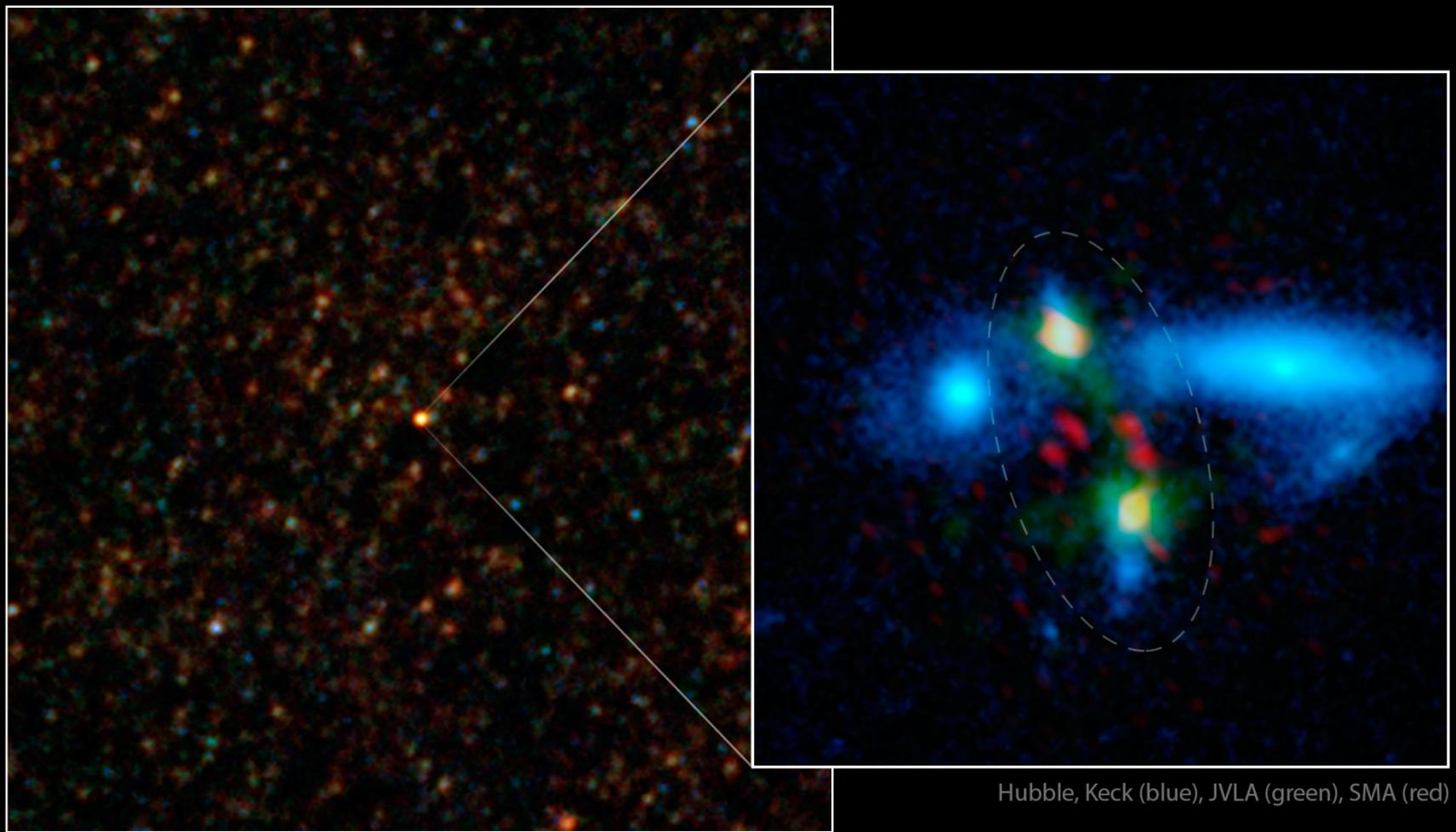


Herschel

Keck & SMA

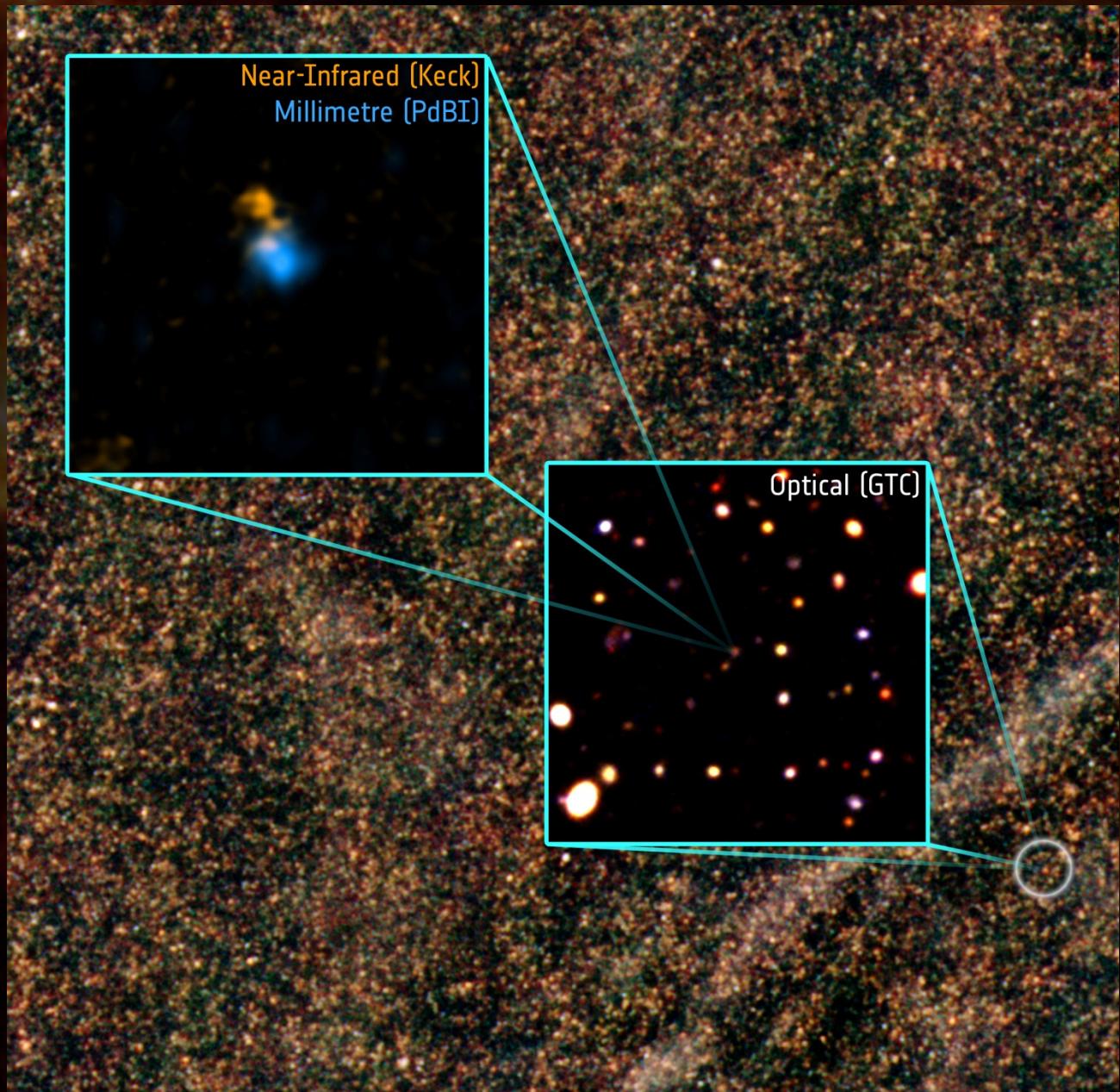
Gravitational Lensing





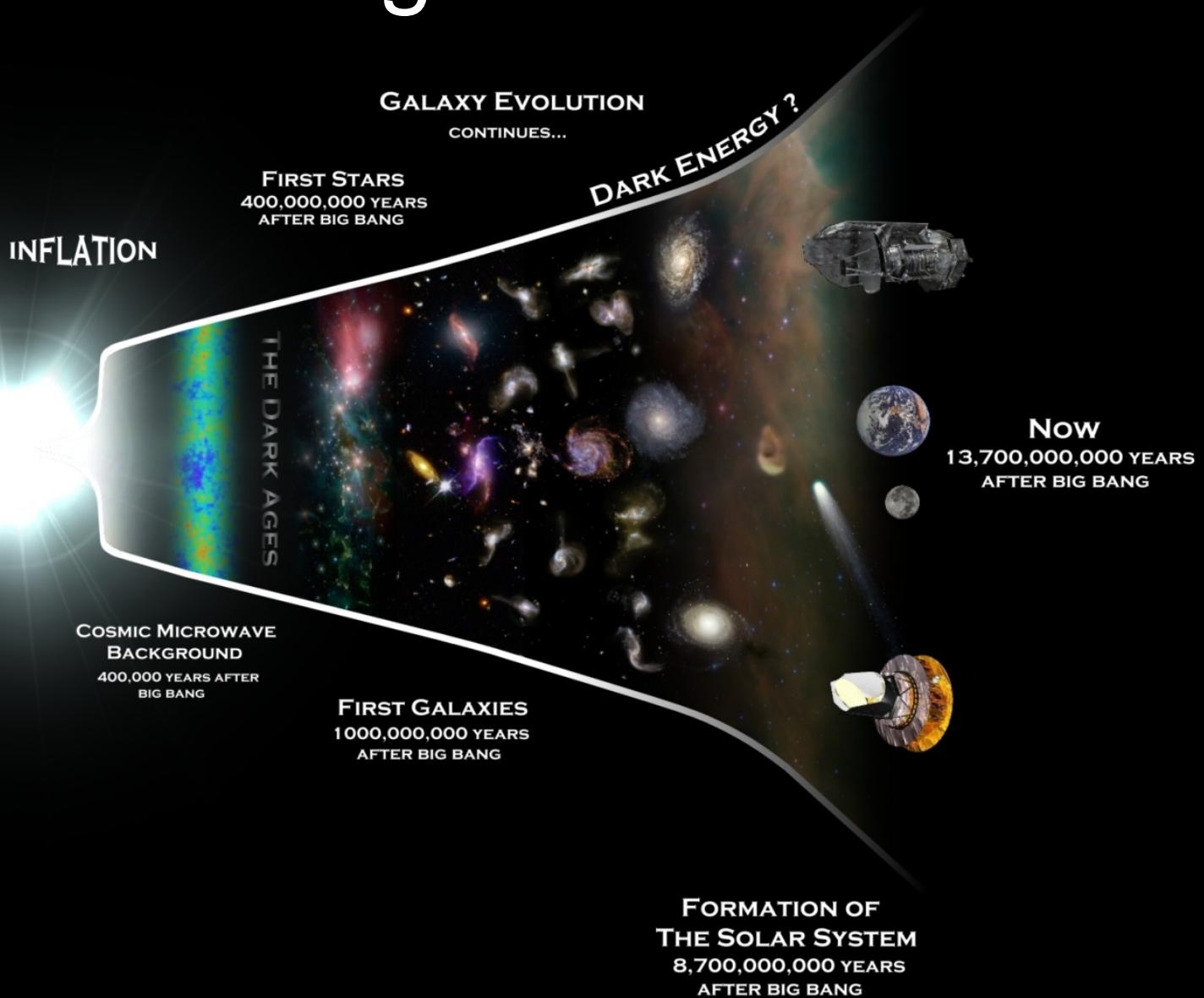
Hubble, Keck (blue), JVLA (green), SMA (red)

Herschel Space Observatory

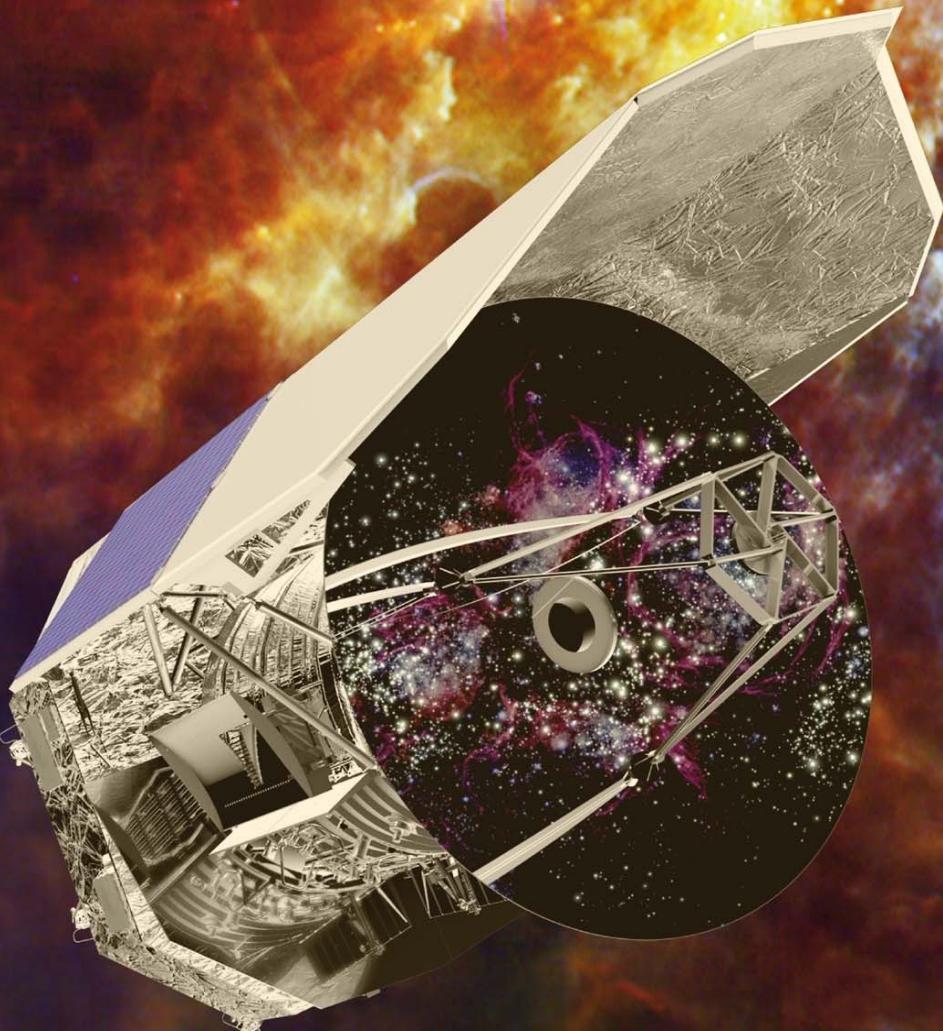


The Big Picture

THE
BIG
BANG



**With thanks to
the Herschel Team!**



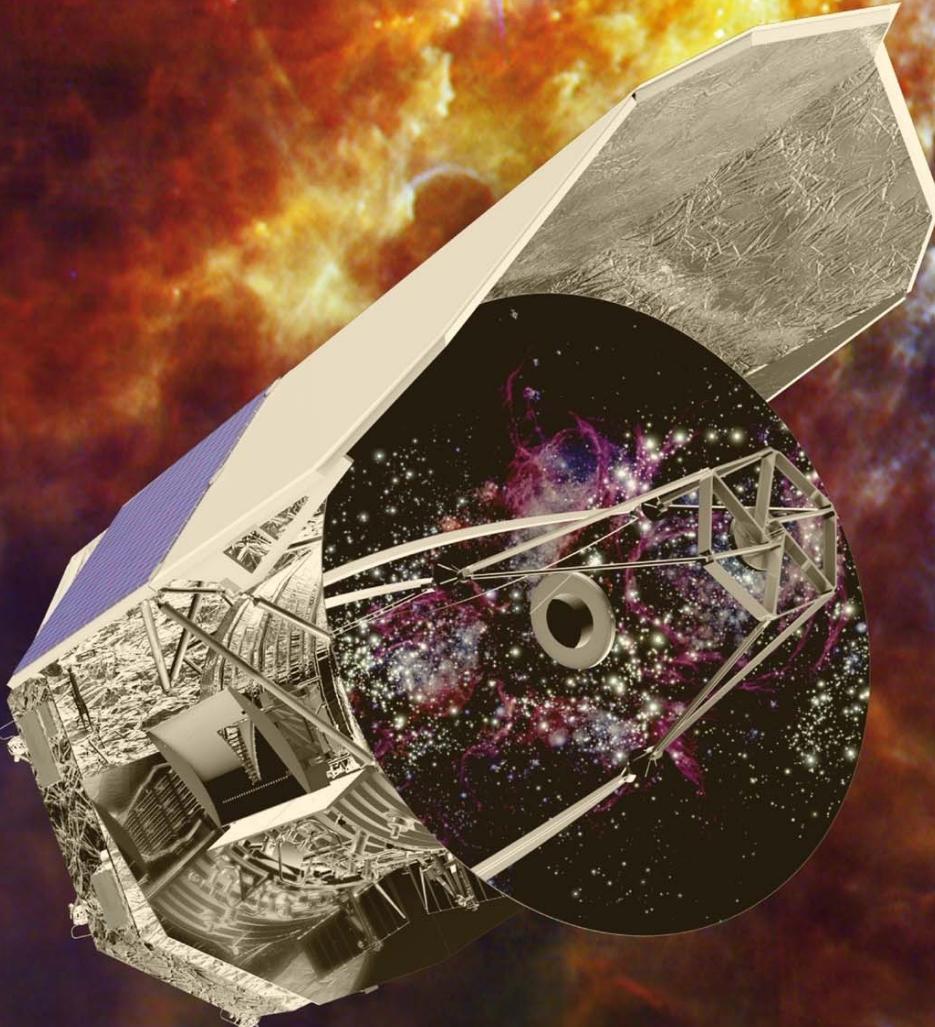
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Thank You!



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