Eagle Nebula: A new view of an icon

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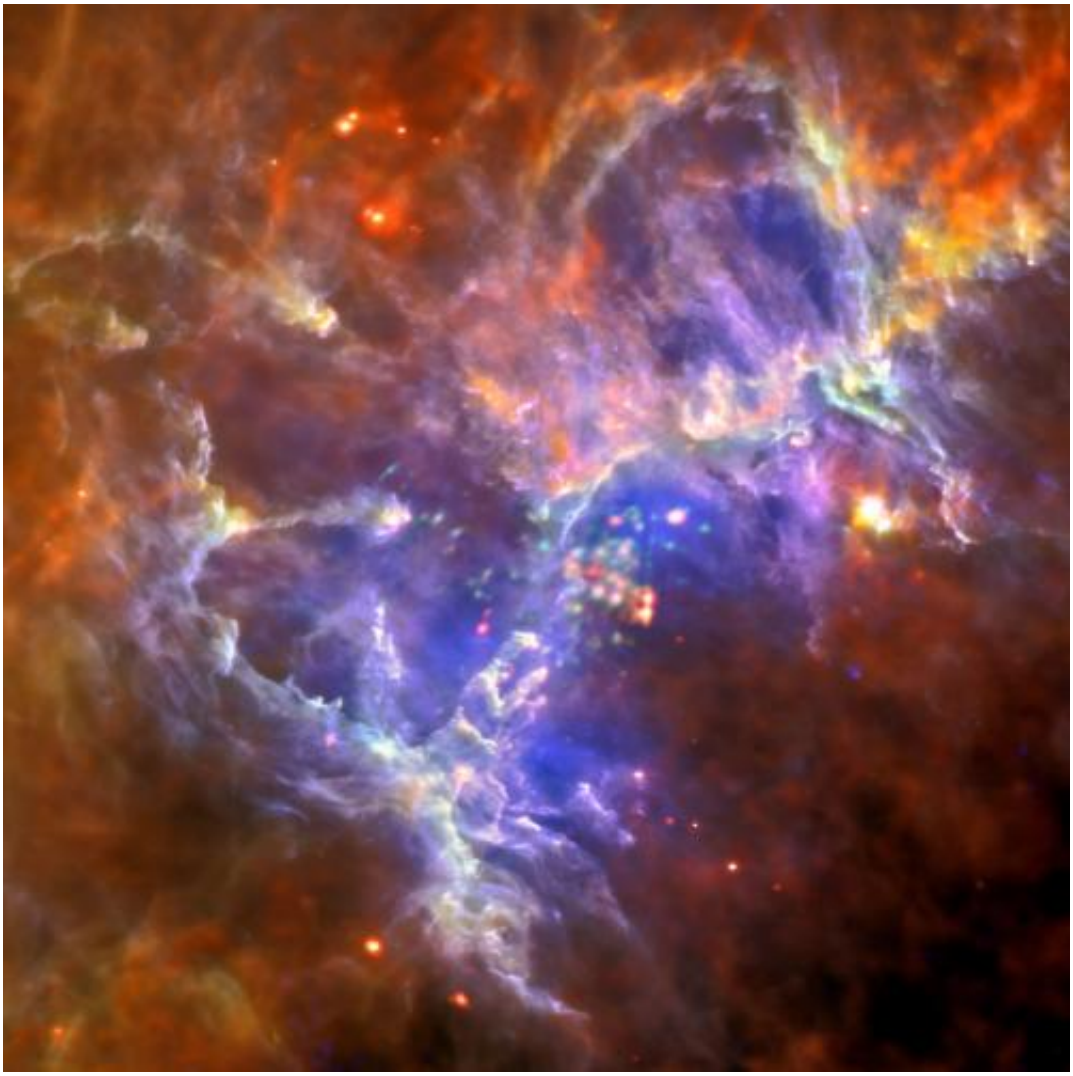
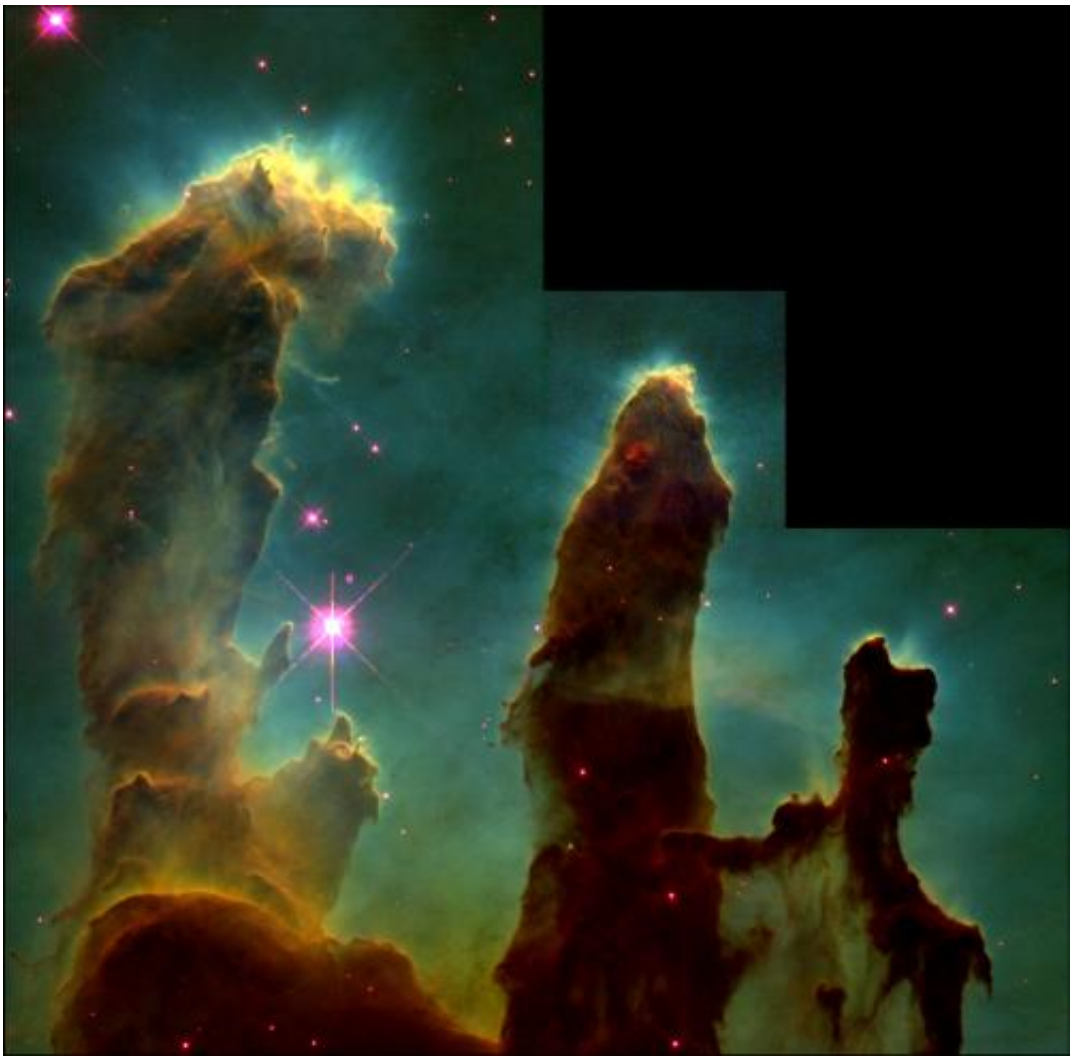


Combining almost opposite ends of the electromagnetic spectrum, this composite of the Herschel in far-infrared and XMM-Newton's X-ray images shows how the hot young stars detected by the X-ray observations are sculpting and interacting with the surrounding ultra-cool gas and dust, which, at only a few degrees above absolute zero, is the critical material for star formation itself. Both wavelengths would be blocked by Earth's atmosphere, so are critical to our

understanding of the lifecycle of stars. Credits: far-infrared: ESA/Herschel/PACS/SPIRE/Hill, Motte, HOBYS Key Programme Consortium; X-ray: ESA/XMM-Newton/EPIC/XMM-Newton-SOC/Boulanger

(PhysOrg.com) -- The Eagle Nebula as never seen before. In 1995, the Hubble Space Telescope's 'Pillars of Creation' image of the Eagle Nebula became one of the most iconic images of the 20th century. Now, two of ESA's orbiting observatories have shed new light on this enigmatic star-forming region.

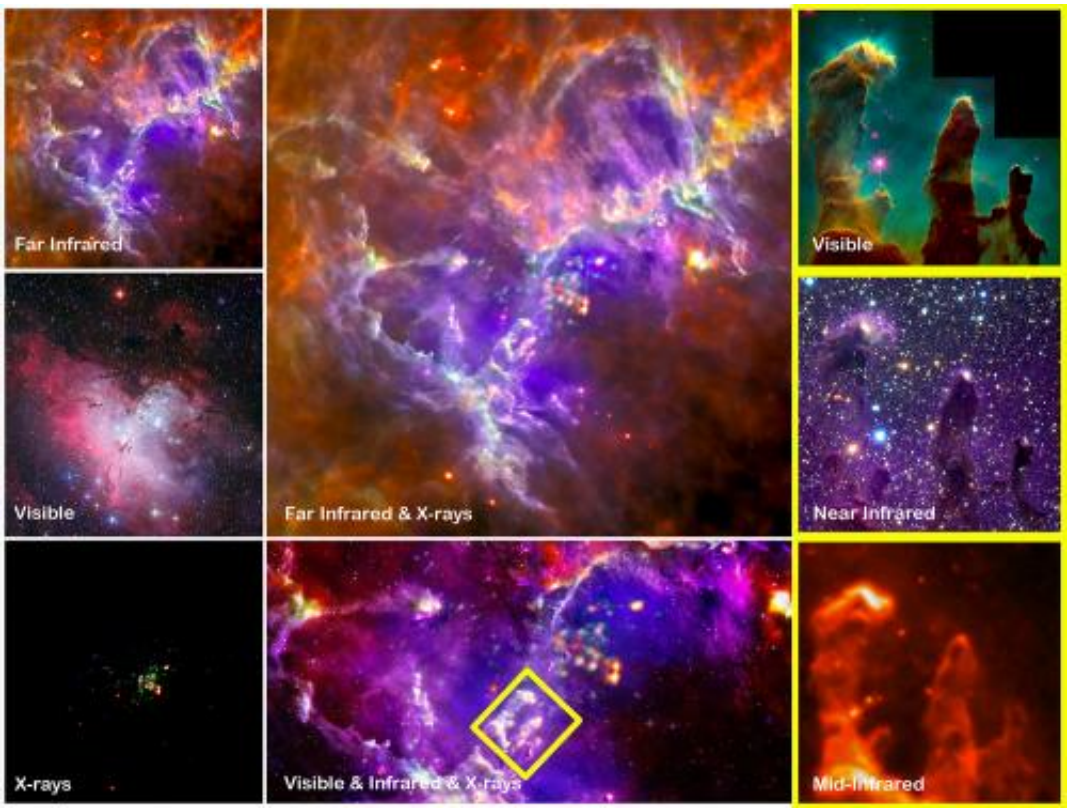
The Eagle Nebula is 6500 light-years away in the constellation of Serpens. It contains a young hot star cluster, NGC6611, visible with modest back-garden telescopes, that is sculpting and illuminating the surrounding gas and dust, resulting in a huge hollowed-out cavity and pillars, each several light-years long.



This 1995 Hubble Space Telescope image of the 'Pillars of Creation' is probably the most famous astronomical image of the 20th Century. Taken in visible light using a combination of SII/H-alpha and OIII filters, it shows a part of the Eagle Nebula where new stars are forming. The tallest pillar is around 4 light-years high. Credits: NASA/ESA/STScI, Hester & Scowen (Arizona State University)

The Hubble image hinted at new stars being born within the pillars, deeply inside small clumps known as 'evaporating gaseous globules' or EGGs. Owing to obscuring dust, Hubble's visible light picture was unable to see inside and prove that young stars were indeed forming.

The ESA Herschel Space Observatory's new image shows the pillars and the wide field of gas and dust around them. Captured in far-infrared wavelengths, the image allows astronomers to see inside the pillars and structures in the region.



Messier 16 is a diffuse emission nebula that contains the young open cluster NGC6611. The iconic 'Pillars of Creation' image taken with the Hubble Space Telescope in 1995 is captured in near-infrared by the VLT, which penetrates straight through the obscuring gas and dust, rendering them almost invisible. The pillars are only a small portion of the extensive nebulous region imaged in far-infrared by ESA's Herschel Space Observatory, which shows cool dust and gas tendrils being carved away by the hot stars seen in the X-ray image from XMM-Newton. The wide-field optical image from the ESO MPG telescope puts the pillars into context against the full scale of the nebula, which is over 75 light-years across. Credits: far-infrared: ESA/Herschel/PACS/SPIRE/Hill, Motte, HOBYS Key Programme Consortium; ESA/XMM-Newton/EPIC/XMM-Newton-SOC/Boulanger; optical: MPG/ESO; near-infrared:

VLT/ISAAC/McCaughrean & Andersen/AIP/ESO

In parallel, a new multi-energy X-ray image from ESA's XMM-Newton telescope shows those hot young stars responsible for carving the pillars.

Combining the new space data with near-infrared images from the European Southern Observatory's (ESO's) Very Large Telescope at Paranal, Chile, and visible-light data from its Max Planck Gesellschaft 2.2m diameter telescope at La Silla, Chile, we see this iconic region of the sky in a uniquely beautiful and revealing way.

In visible wavelengths, the nebula shines mainly due to reflected starlight and hot gas filling the giant cavity, covering the surfaces of the pillars and other dusty structures.

At near-infrared wavelengths, the dust becomes almost transparent and the pillars practically vanish.

In far-infrared, Herschel detects this cold dust and the pillars reappear, this time glowing in their own light.

Intricate tendrils of dust and gas are seen to shine, giving astronomers clues about how it interacts with strong ultraviolet light from the hot stars seen by XMM-Newton.

In 2001, Very Large Telescope near-infrared images had shown only a small minority of the EGGs were likely to contain stars being born.

However, Herschel's image makes it possible to search for young stars over a much wider region and thus come to a much fuller understanding of the creative and destructive forces inside the Eagle Nebula.

Earlier mid-infrared images from ESA's Infrared Space Observatory and NASA's Spitzer, and the new XMM-Newton data, have led astronomers to suspect that one of the massive, hot stars in NGC6611 may have exploded in a supernova 6000 years ago, emitting a shockwave that destroyed the pillars.

However, because of the distance of the Eagle Nebula, we won't see this happen for several hundred years yet.

Powerful ground-based telescopes continue to provide astonishing views of our Universe, but images in far-infrared, mid-infrared and X-ray wavelengths are impossible to obtain owing to the absorbing effects of Earth's atmosphere.

Space-based observatories such as ESA's Herschel and XMM-Newton help to peel back that veil and see the full beauty of the Universe across the electromagnetic spectrum.

With regions like the Eagle Nebula, combining all of these observations helps astronomers to understand the complex yet amazing lifecycle of stars.

Provided by European Space Agency