The SOFIA Mid-Infrared Giant H II Region Survey: Galactic Center

Collaborators

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White - 3.5μm, Blue - 25μm, Green - 37μm, Red - 70μm

Image credit: J. De Buizer (SETI) / SOFIA / Spitzer / Herschel

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Illustration of Milky Way (top-down view)
Image credit: NASA/JPL-Caltech/R. Hurt (IPAC)

Main takeaway

- We present the most detailed view to date of on-going massive star formation in the Galactic Center, unlikely to be replicated in the near future.

- However, the characters of the active massive star forming regions in the Galactic Center do not well fit in those of the other parts of the Galaxy.

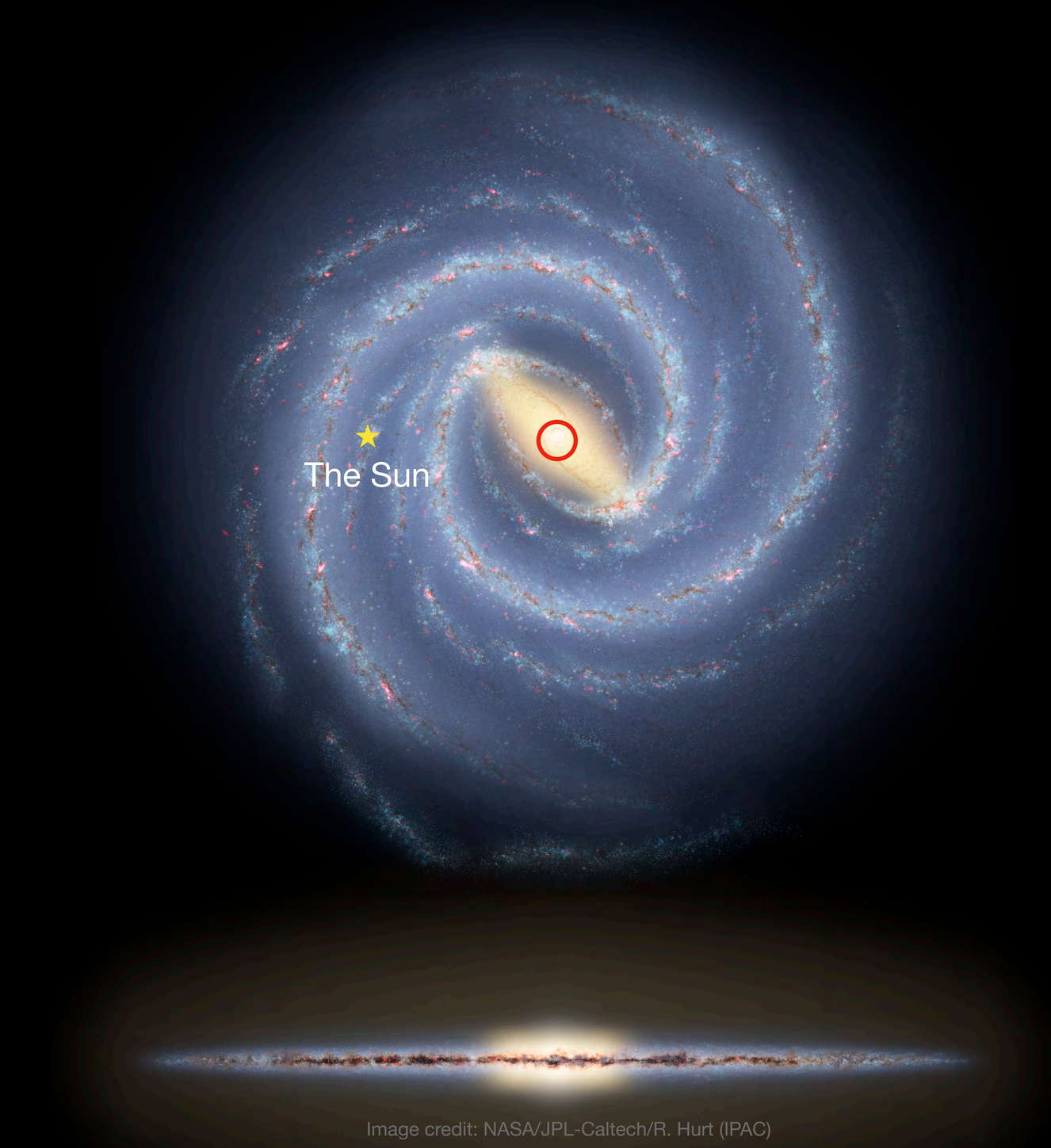


Image credit: NASA/JPL-Caltech/R. Hurt (IPAC)

Galactic Center

- Inner ~1,600 lightyear area near the Galactic Center Black Hole
- Dust and gas density is ~100 times higher than the Galactic plane.
- Star formation rate is ~10 times lower than the Galactic plane.
- The last active star formation activity is assumed to happen >10 Myrs ago.

Giant HII Region

- Large ionized gas clouds powered by massive young stars
- Nearly the only objects we can detect from external galaxies

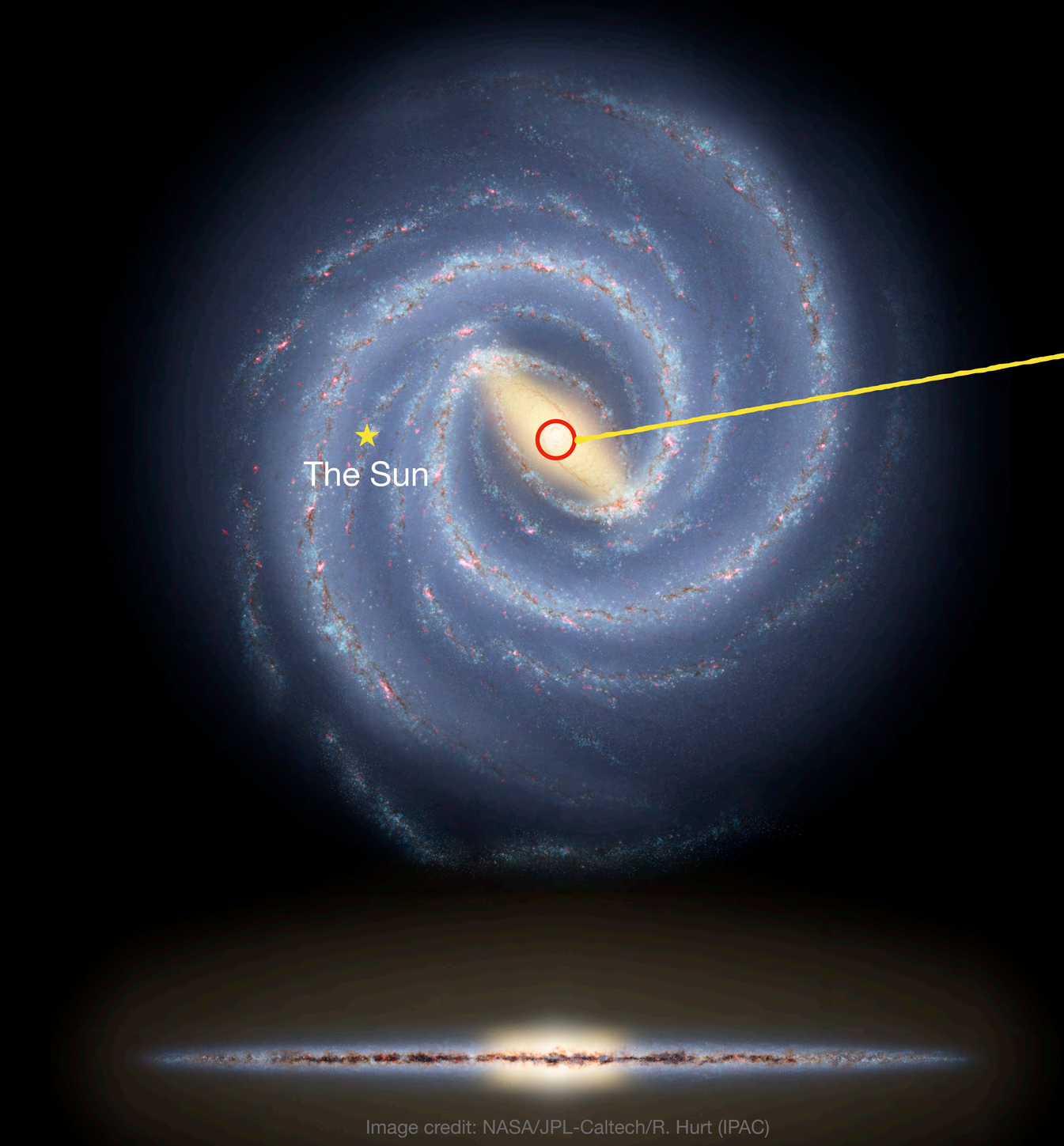
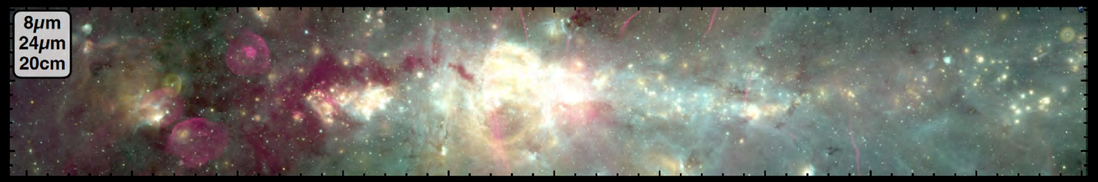


Image credit: NASA/JPL-Caltech/R. Hurt (IPAC)

Galactic Center



Henshaw et al. 2023

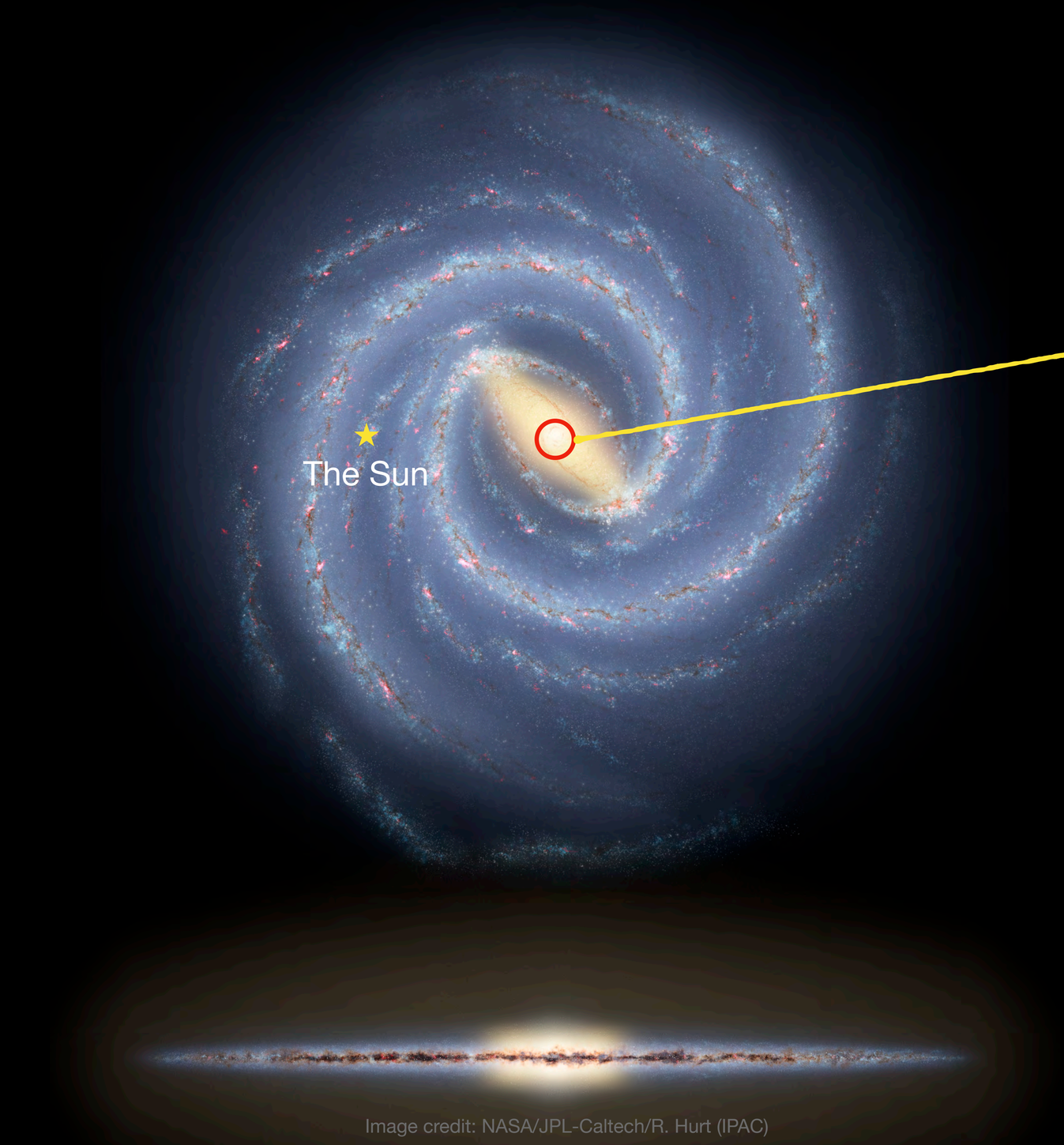
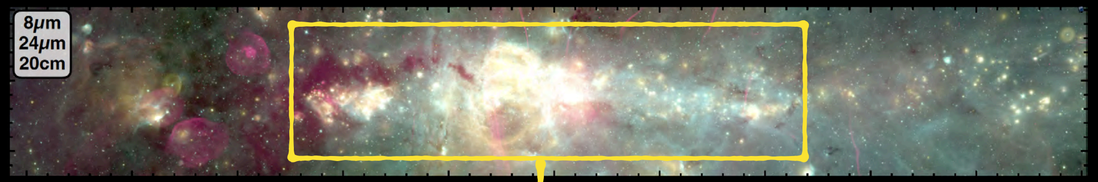


Image credit: NASA/JPL-Caltech/R. Hurt (IPAC)

Galactic Center



Henshaw et al. 2023

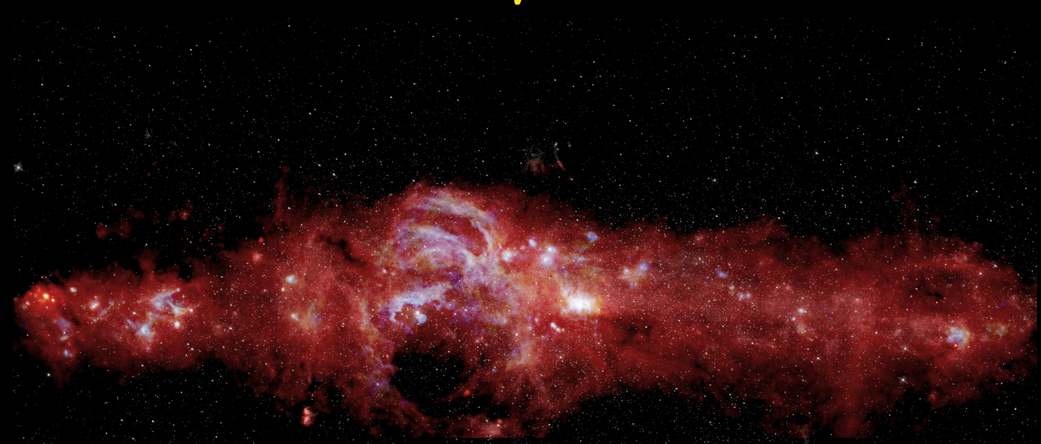
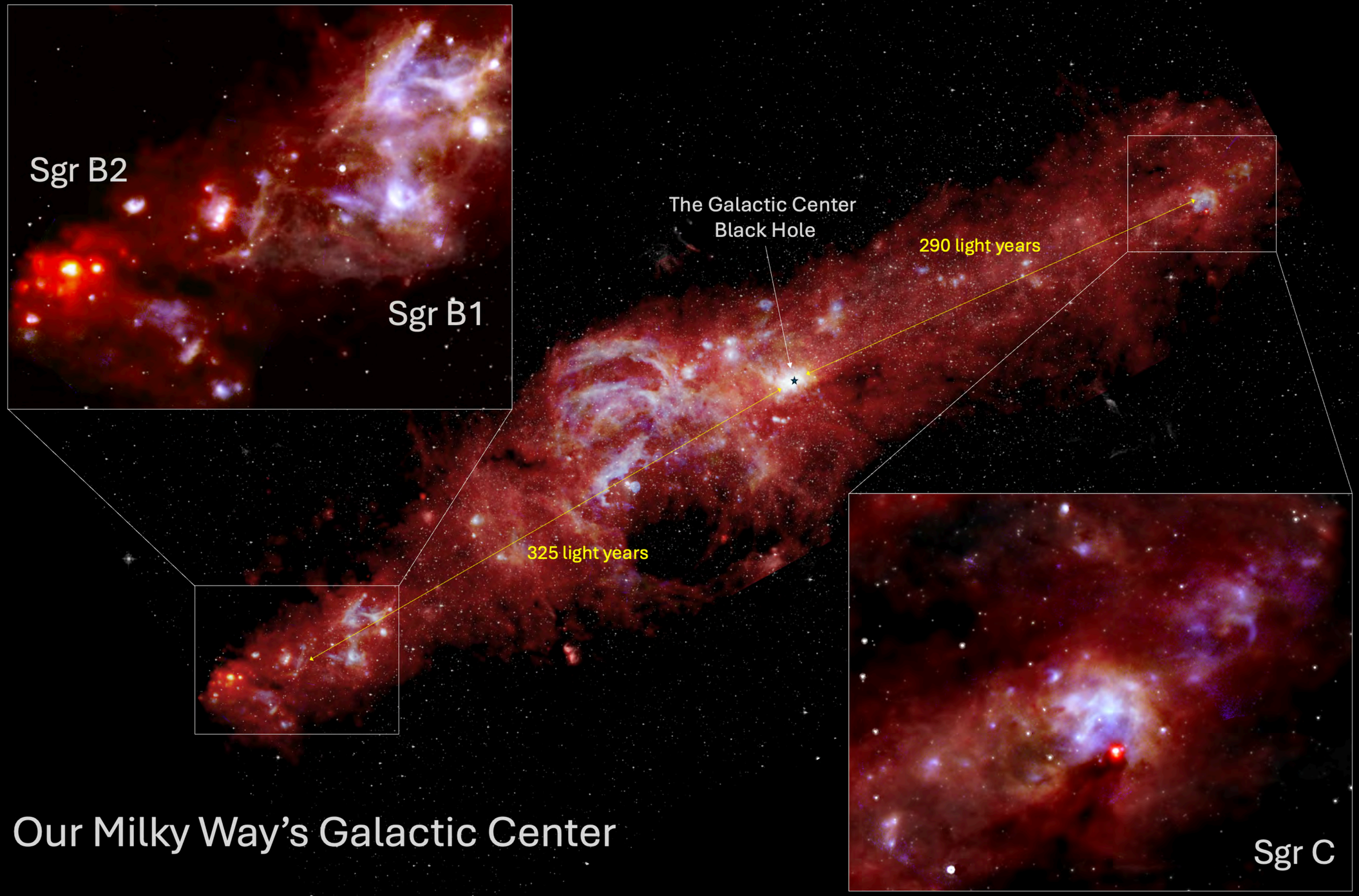


Image credit: J. De Buizer (SETI) / SOFIA / Spitzer / Herschel

MIR Bright Galactic Center

White - 3.5μm, Blue - 25μm, Green - 37μm, Red - 70μm

Image credit: J. De Buizer (SETI) / SOFIA / Spitzer / Herschel



Our Milky Way's Galactic Center

White - 3.5μm, Blue - 25μm, Green - 37μm, Red - 70μm

Image credit: J. De Buizer (SETI) / SOFIA / Spitzer / Herschel

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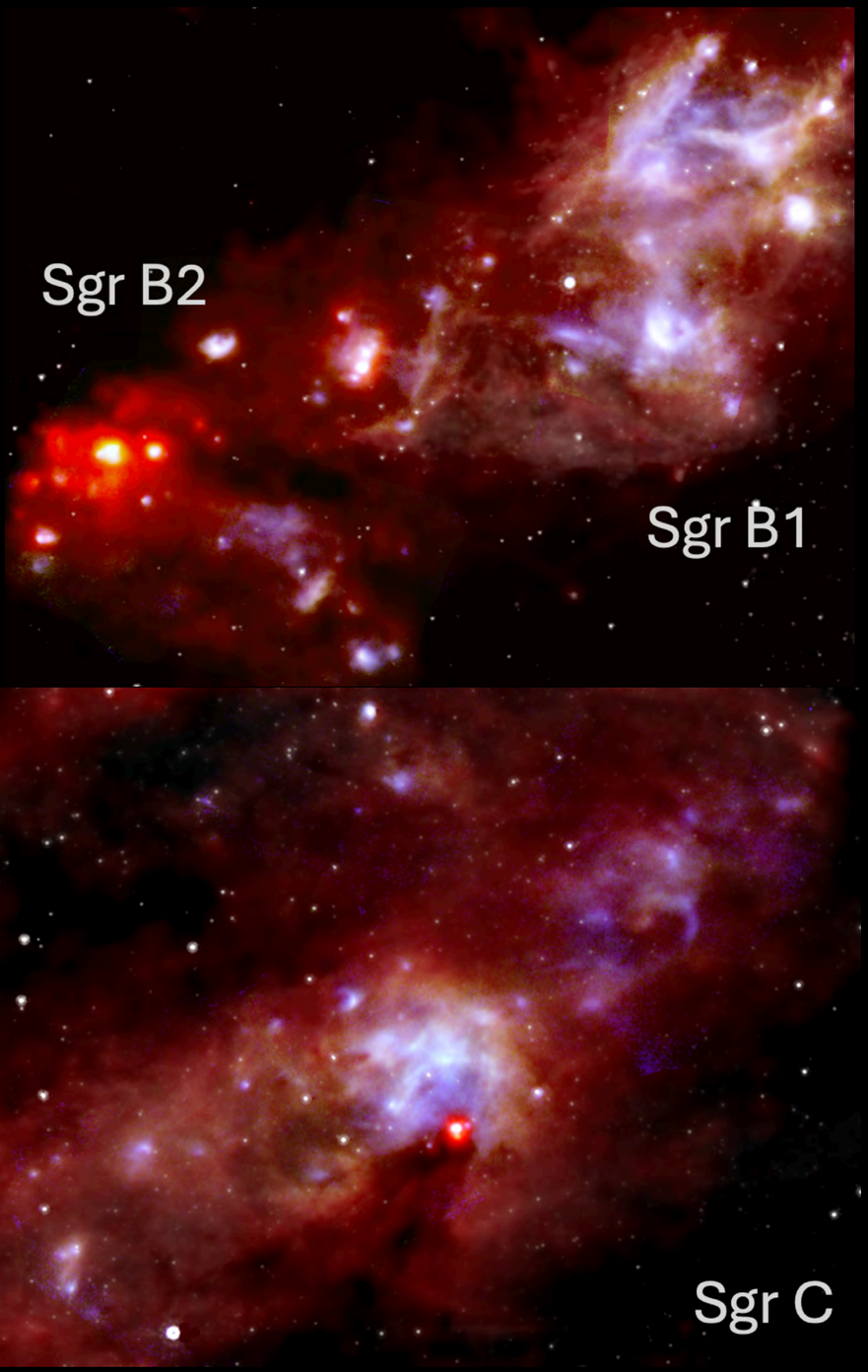
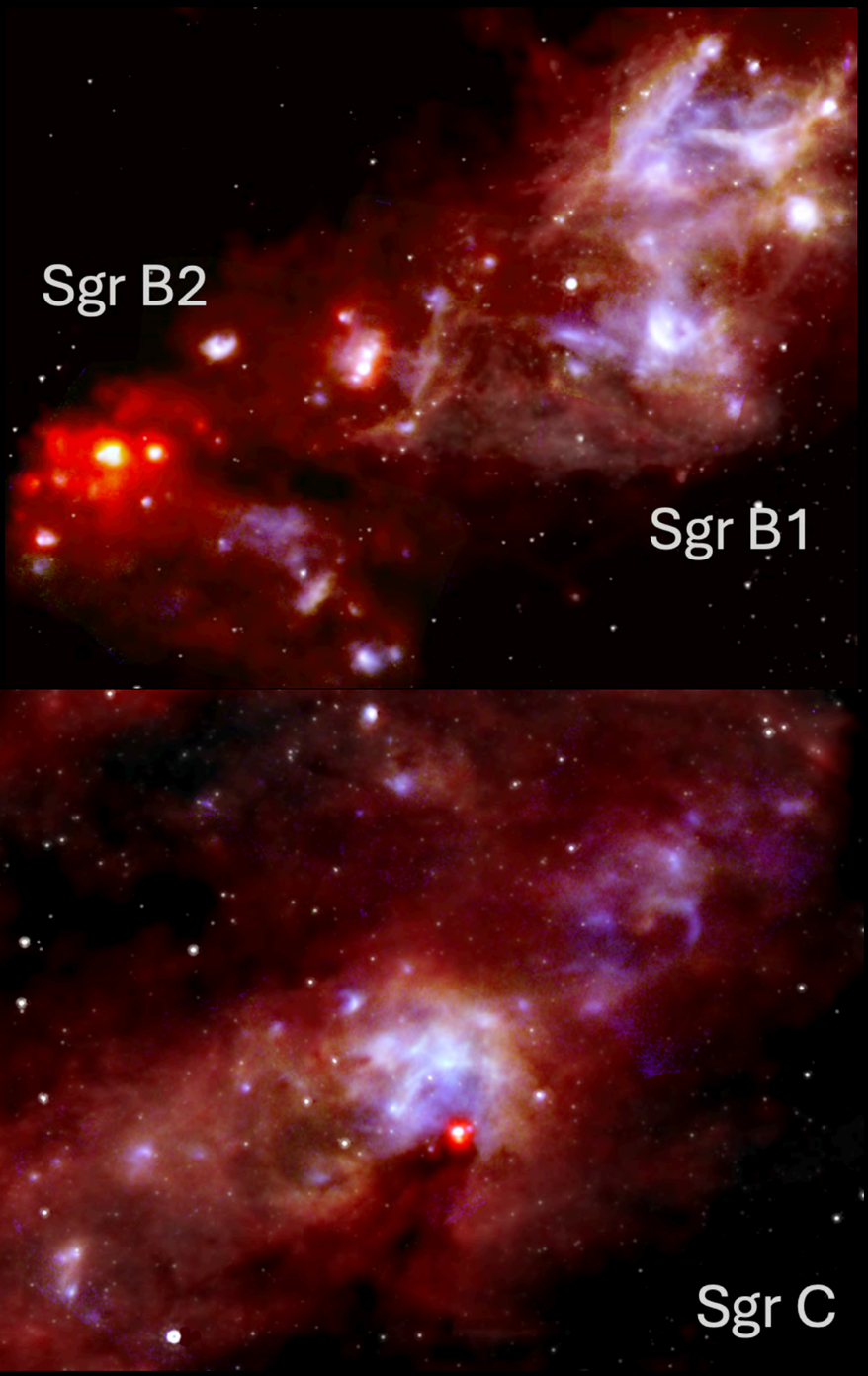


Comparing to the other GHII regions

- **Sgr B2** shows classic GH II features: compact structure, high YSO density, strong MIR/FIR emission, and maser activity.
- **Sgr B1** has weaker emission, lower YSO density, and lacks clear FIR bubble morphology.
- **Sgr C** exhibits diffuse star formation, no masers, and irregular FIR structure with low SFR.
- Sgr B1 and Sgr C have been categorized as GHII regions while Sgr B2 has not.



Main takeaway

- We present the best and the last view of active star formation in the Galactic Center, unlikely to be replicated in the foreseeable future.
- Sgr B1 and Sgr C, traditionally classified as GH II regions, may require reclassification.
- Sgr B2, though not previously considered a GH II region, shows star-forming properties consistent with such regions outside the Galactic plane.
- These results call for a reassessment of the criteria for massive star-forming regions in extreme environments.

Thank you!

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