

SOFIA Observations of Orion BN/KL with FORCAST

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SOFIA-USRA

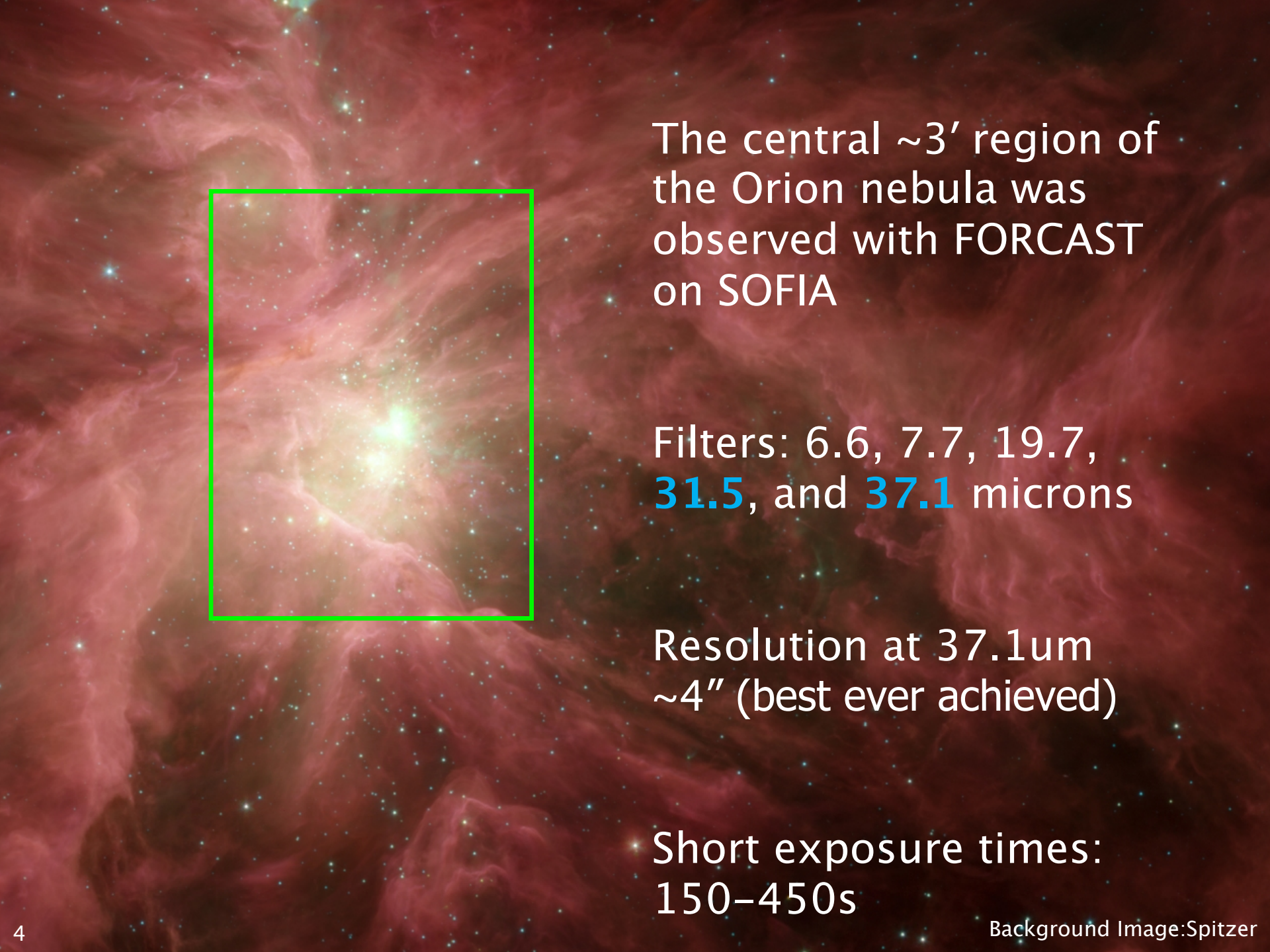


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R. Y. Shuping, W. D. Vacca, H. Zinnecker

Why observe Orion?

- “Obligation”
- To determine which sources are internally heated and contribute to the luminosity of BN/KL

The long wavelengths of FORCAST offer more dust penetrating power

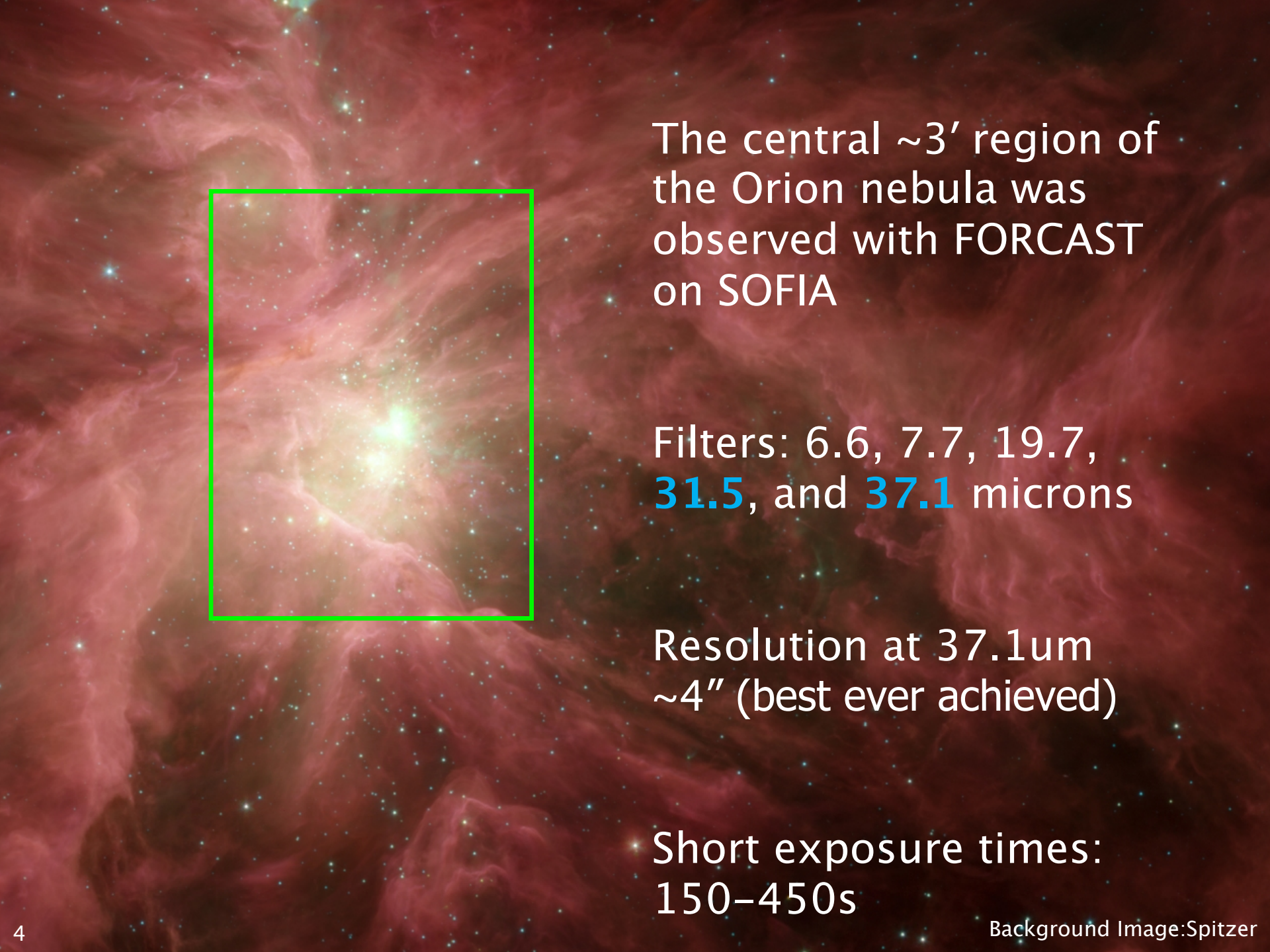


The central $\sim 3'$ region of
the Orion nebula was
observed with FORCAST
on SOFIA

Filters: 6.6, 7.7, 19.7,
31.5, and **37.1** microns

Resolution at 37.1 μm
 $\sim 4''$ (best ever achieved)

Short exposure times:
150–450s

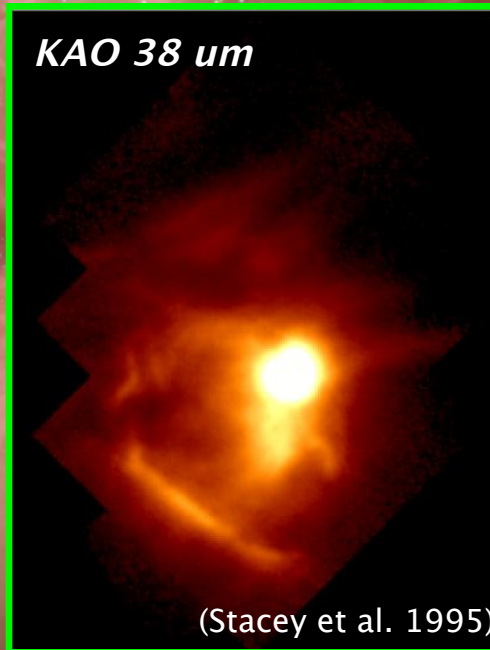
The background image is a wide-field view of the Orion Nebula, showing its characteristic reddish-pink and blue colors. A green rectangular box is overlaid on the left side of the image, highlighting the central region where the observation was conducted. The nebula's structure is complex, with various filaments and knots of gas and dust.

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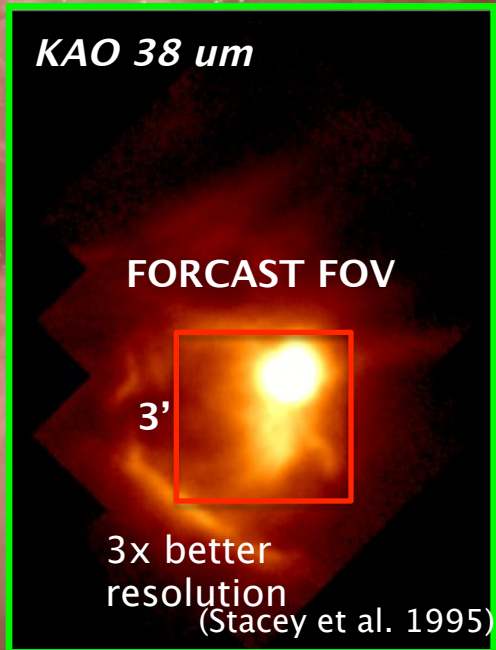


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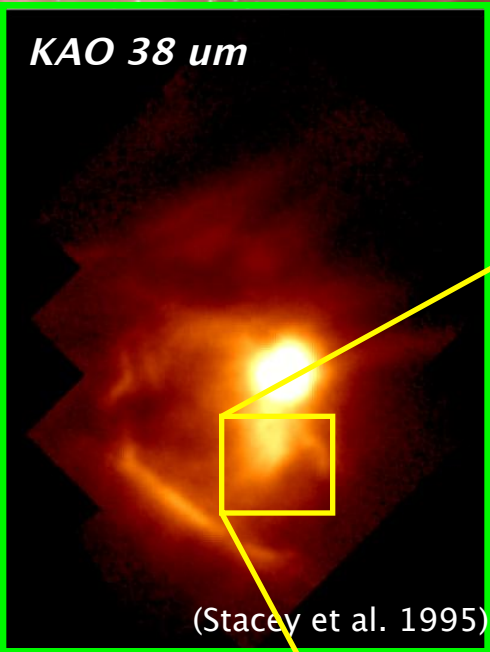


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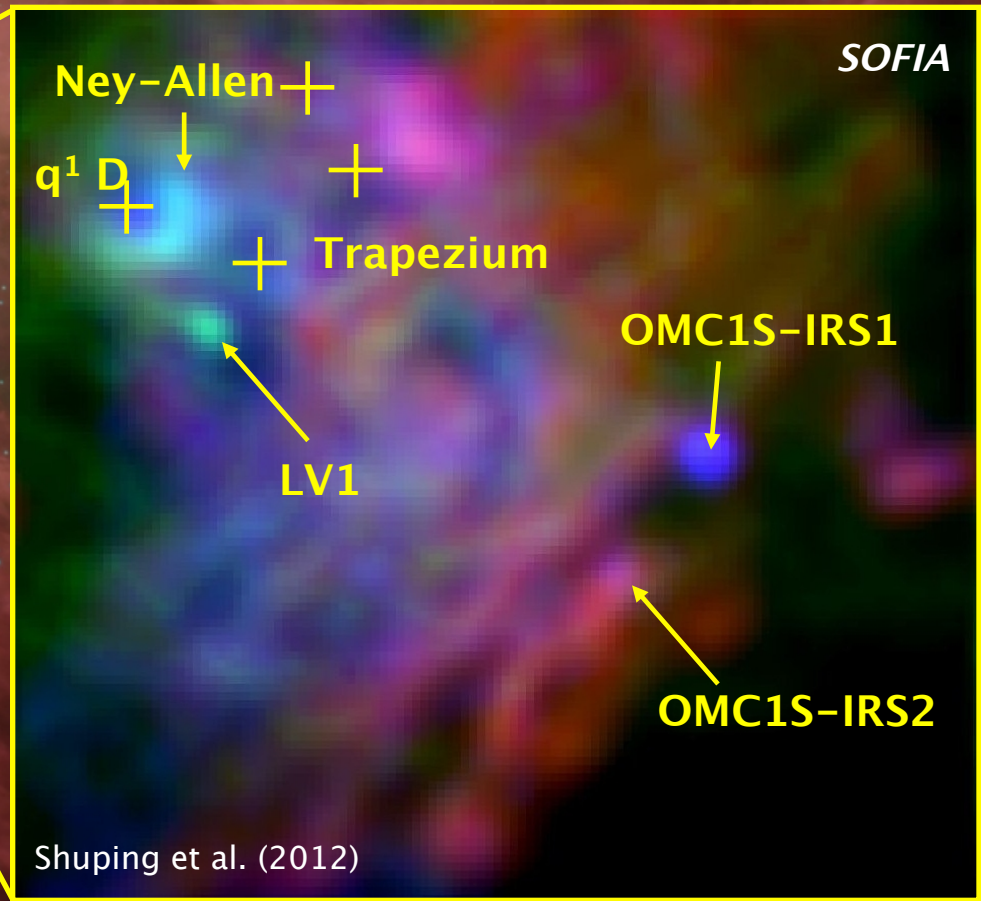
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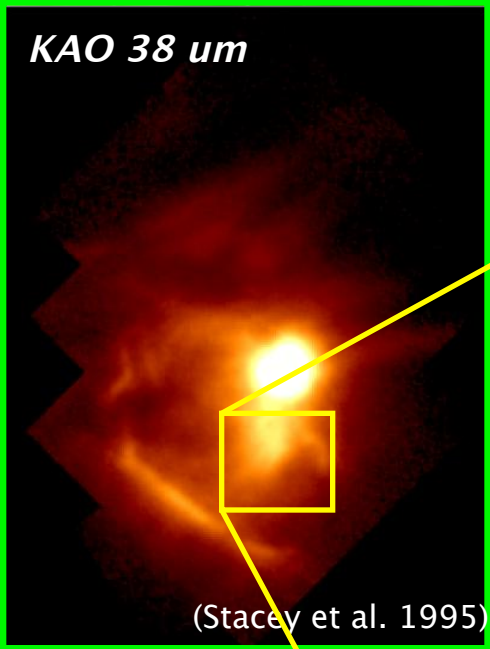
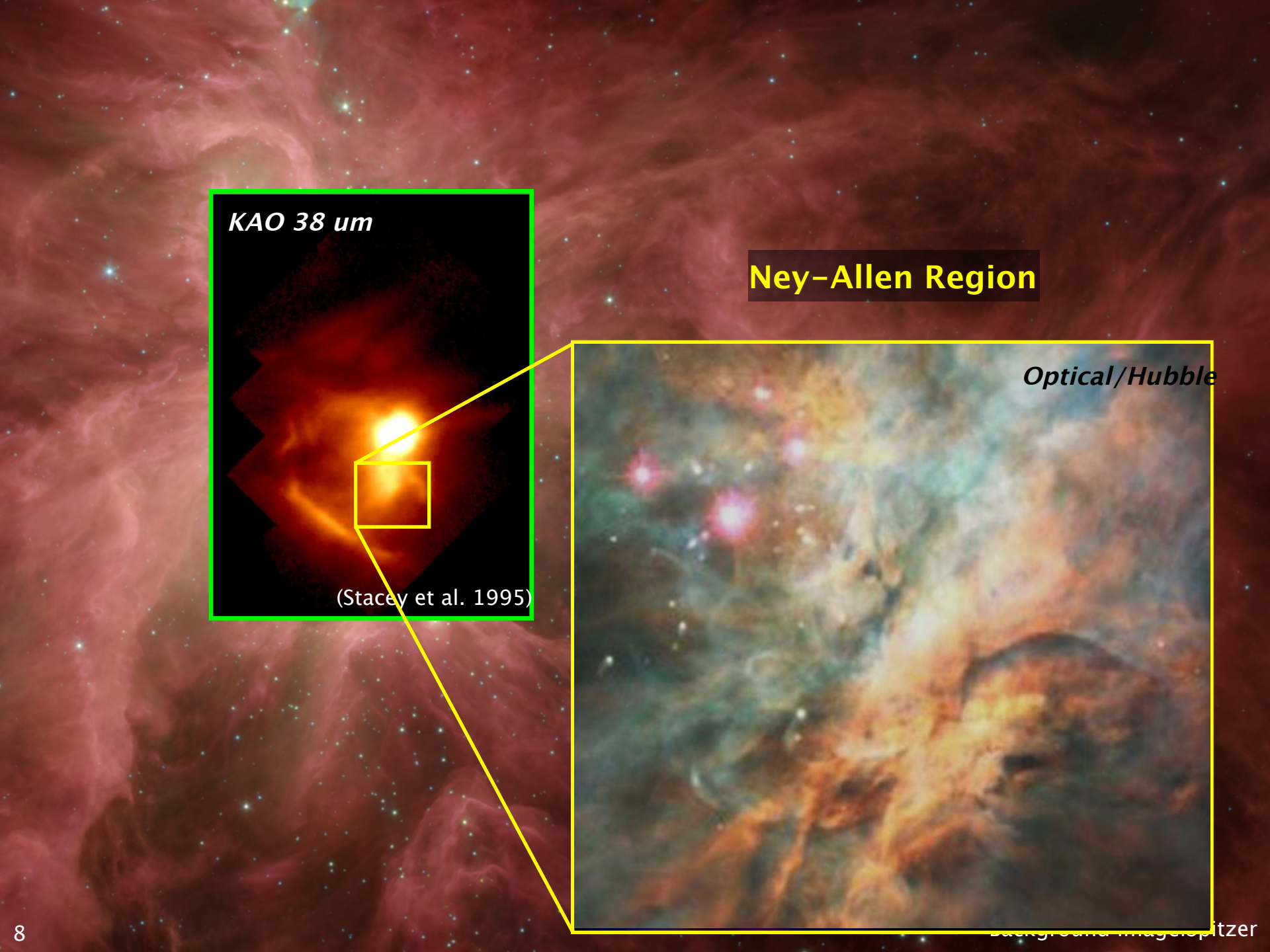
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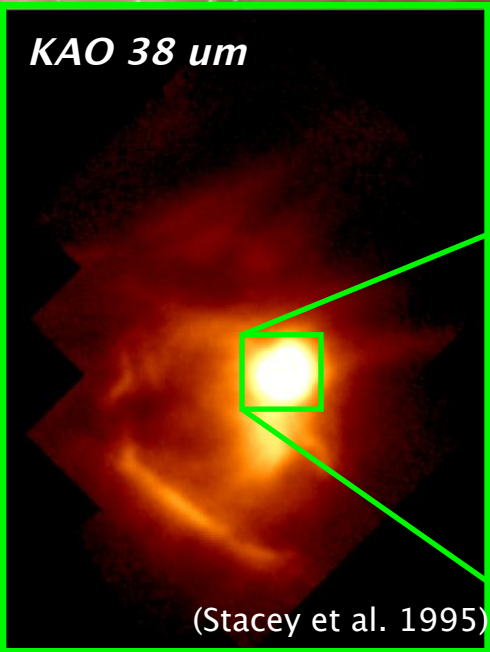
Ney-Allen Region
Blue=7 μ m Green=19 μ m Red=37 μ m



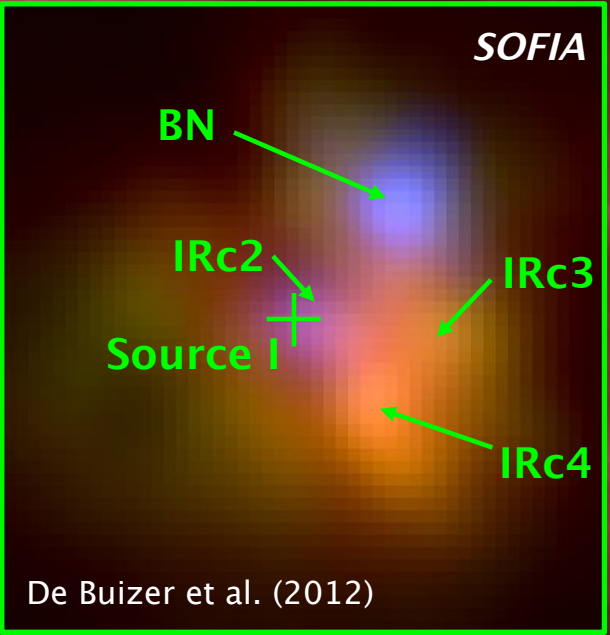


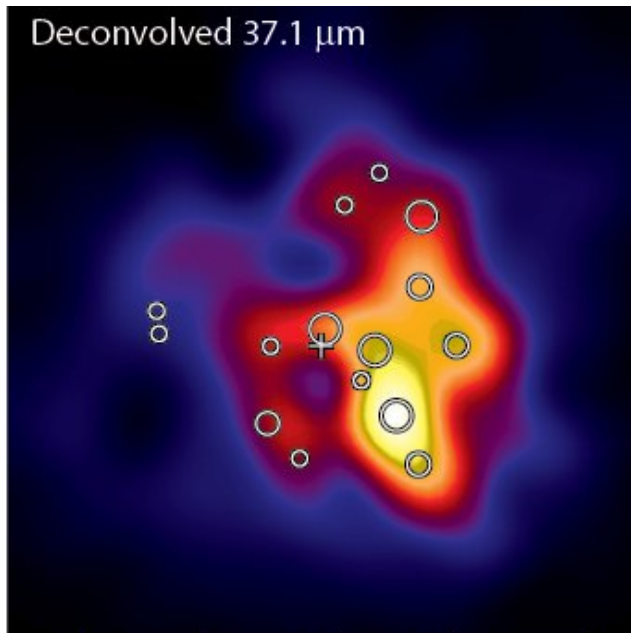
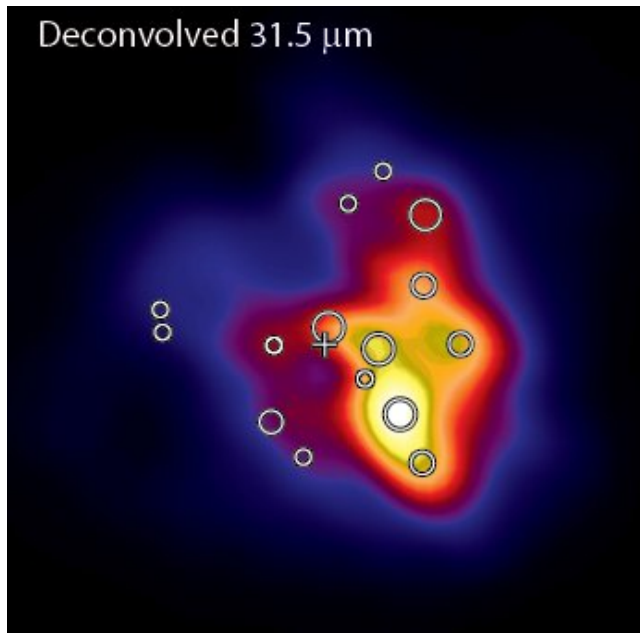
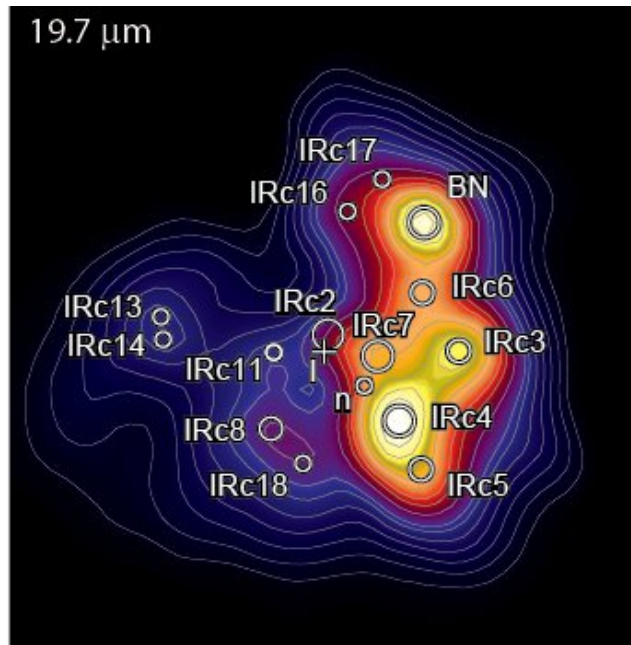
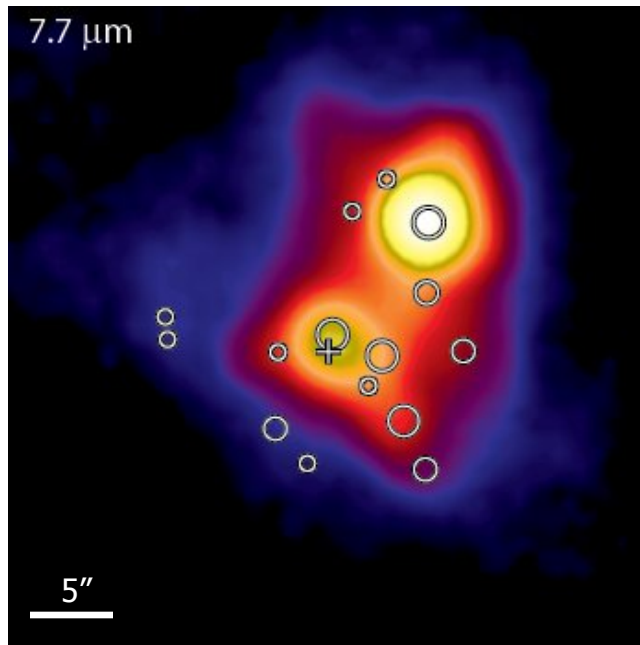
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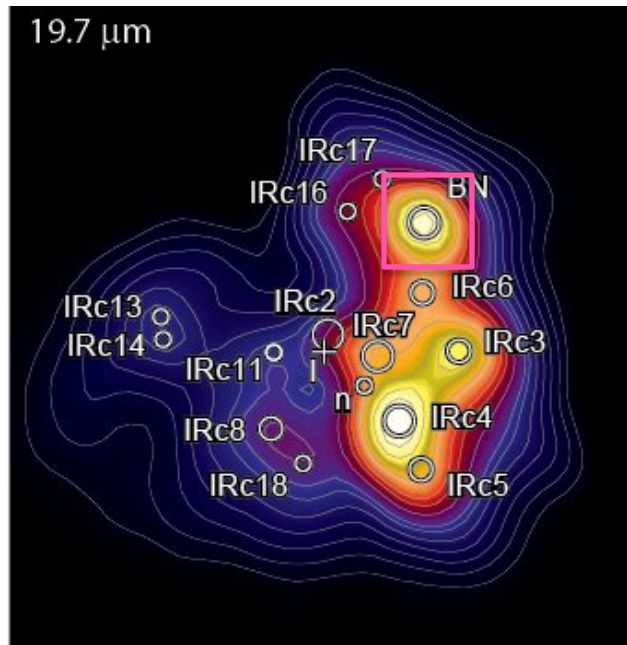
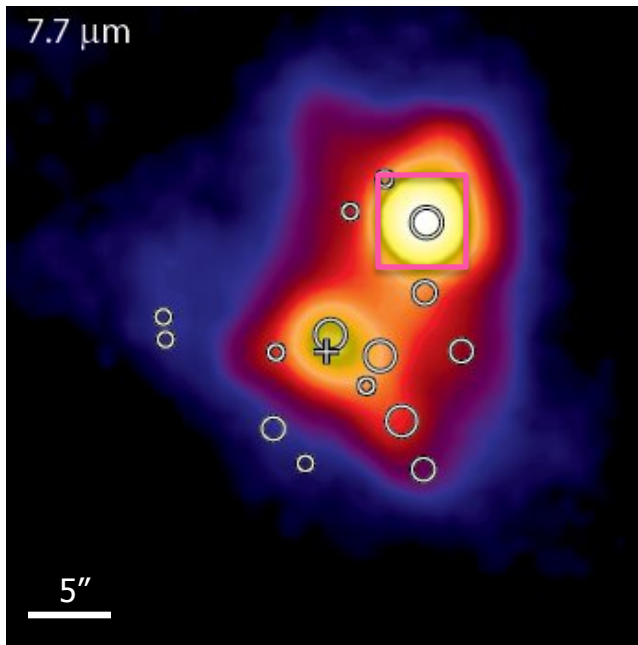




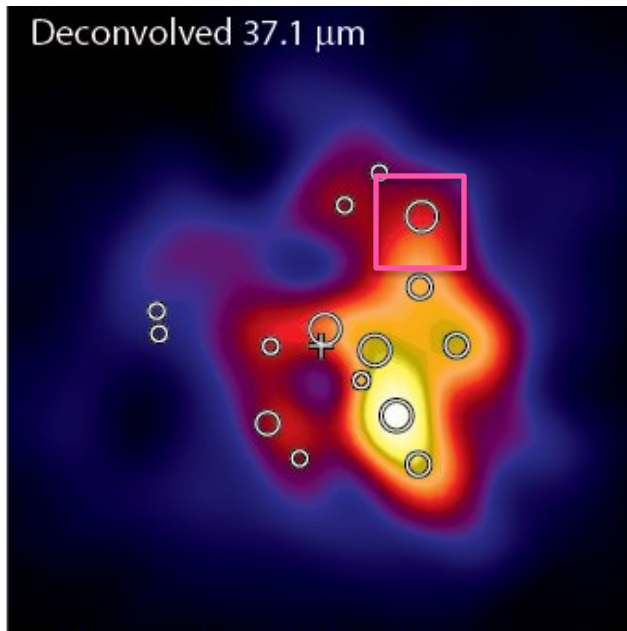
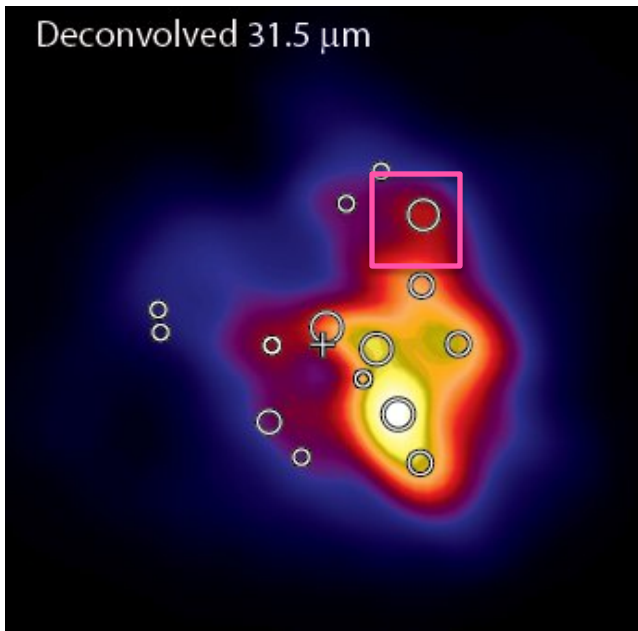
BN/KL Region
Blue=19 μ m Green=31 μ m Red=37 μ m

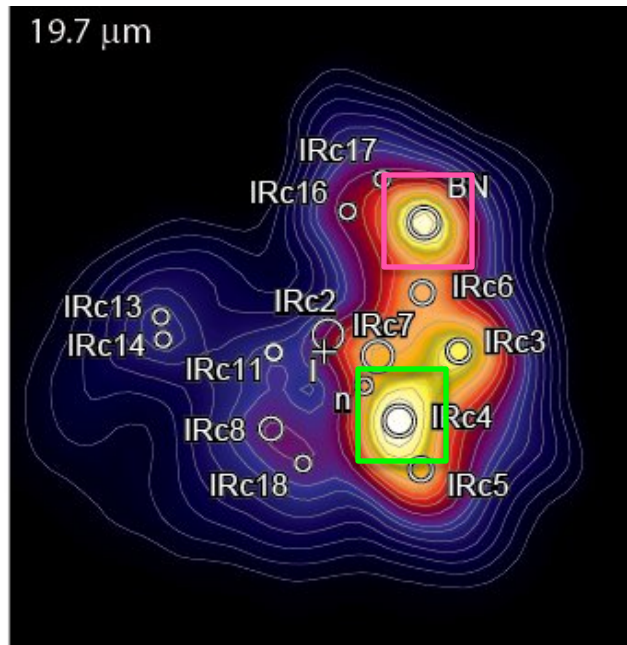
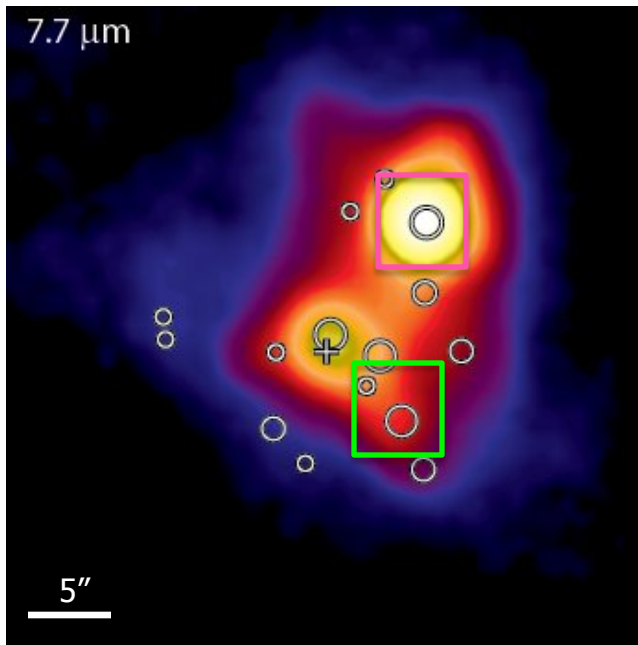






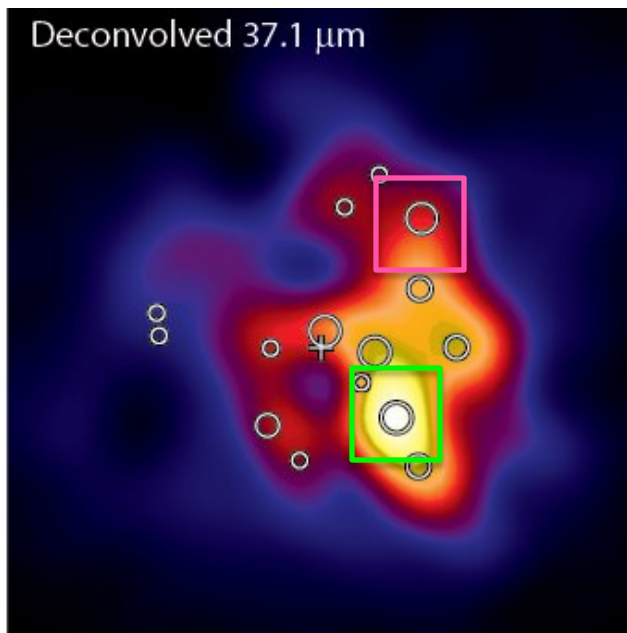
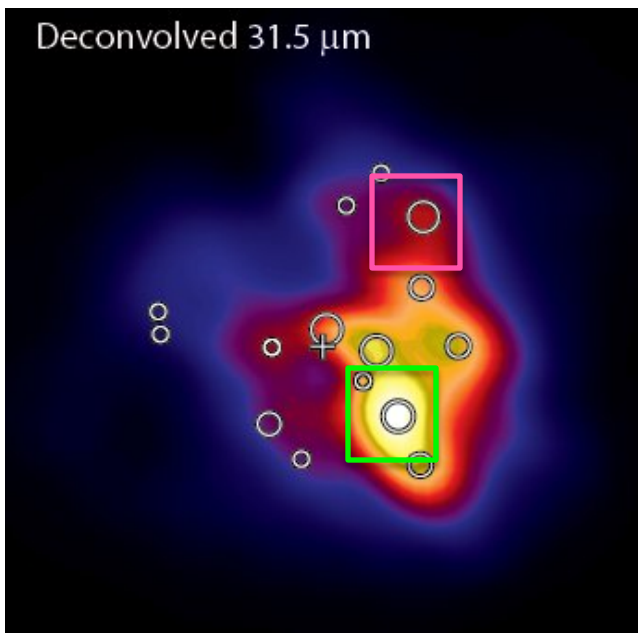
**BN declines in
prominence at
longer λ 's**

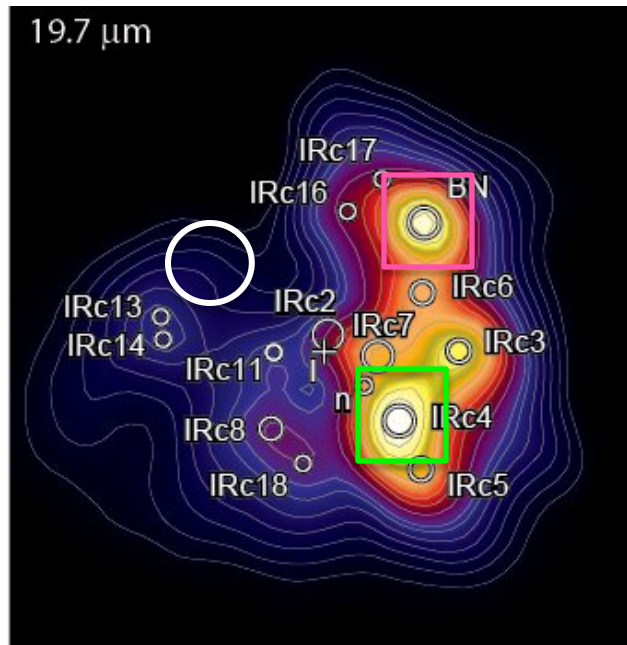
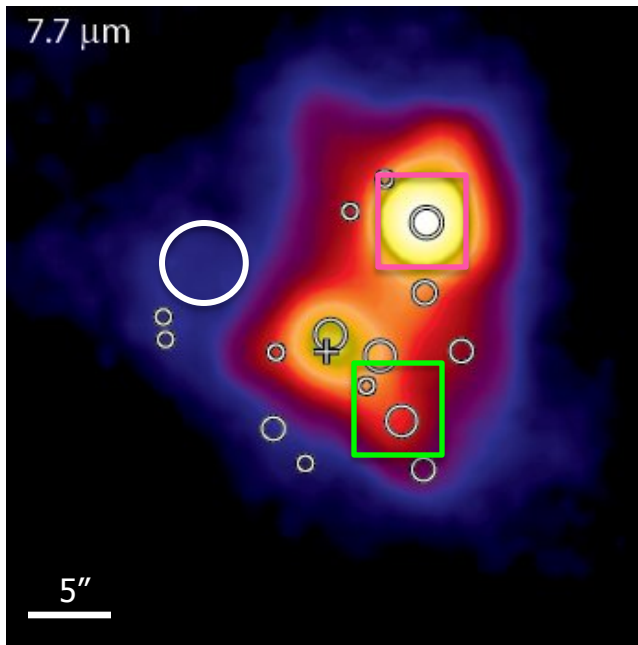




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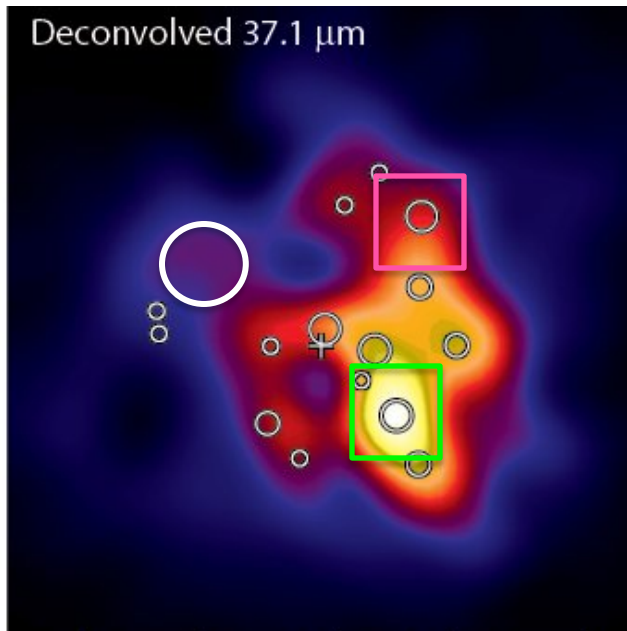
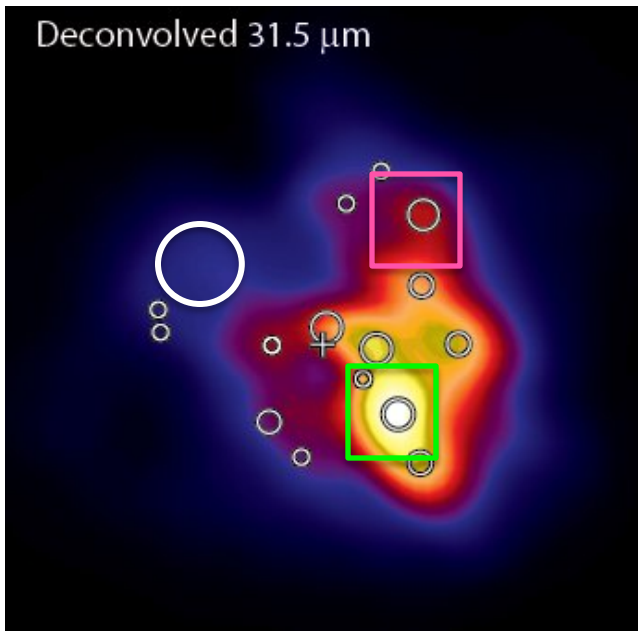
IRc4 dominates at $\lambda > 31\mu\text{m}$





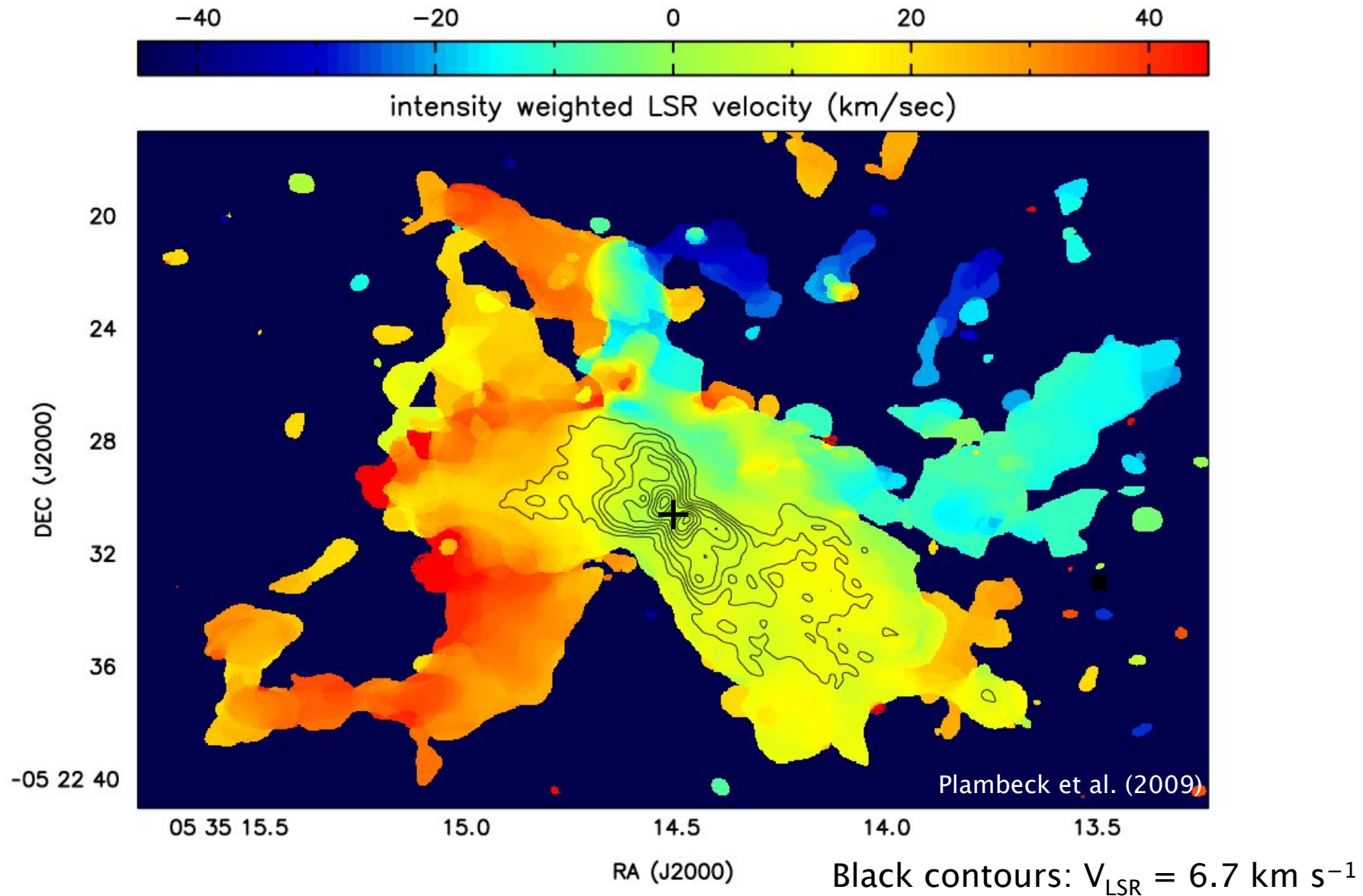
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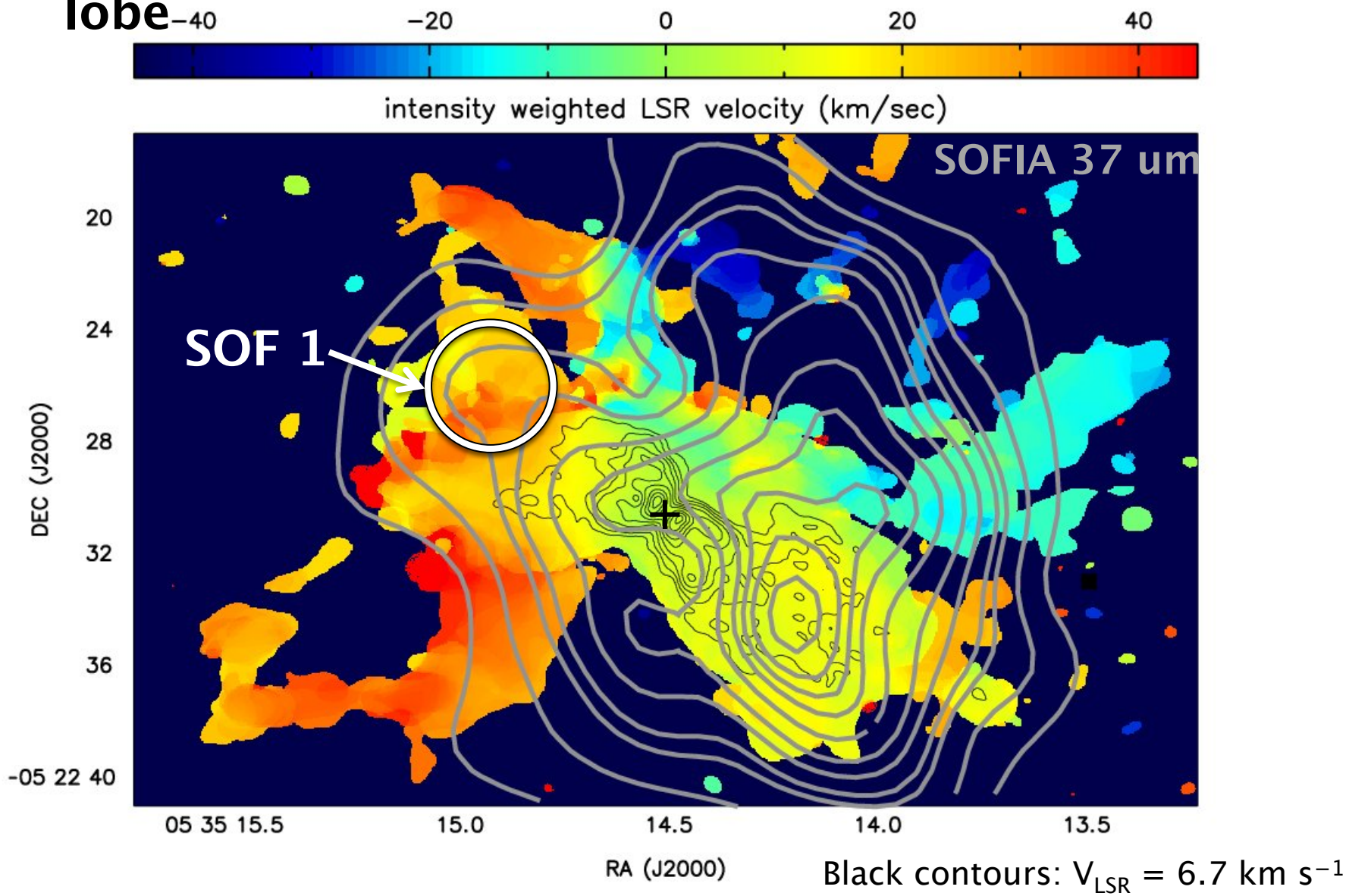


A previously unidentified area of emission is apparent at $\lambda > 31\mu\text{m}$ (SOF1)

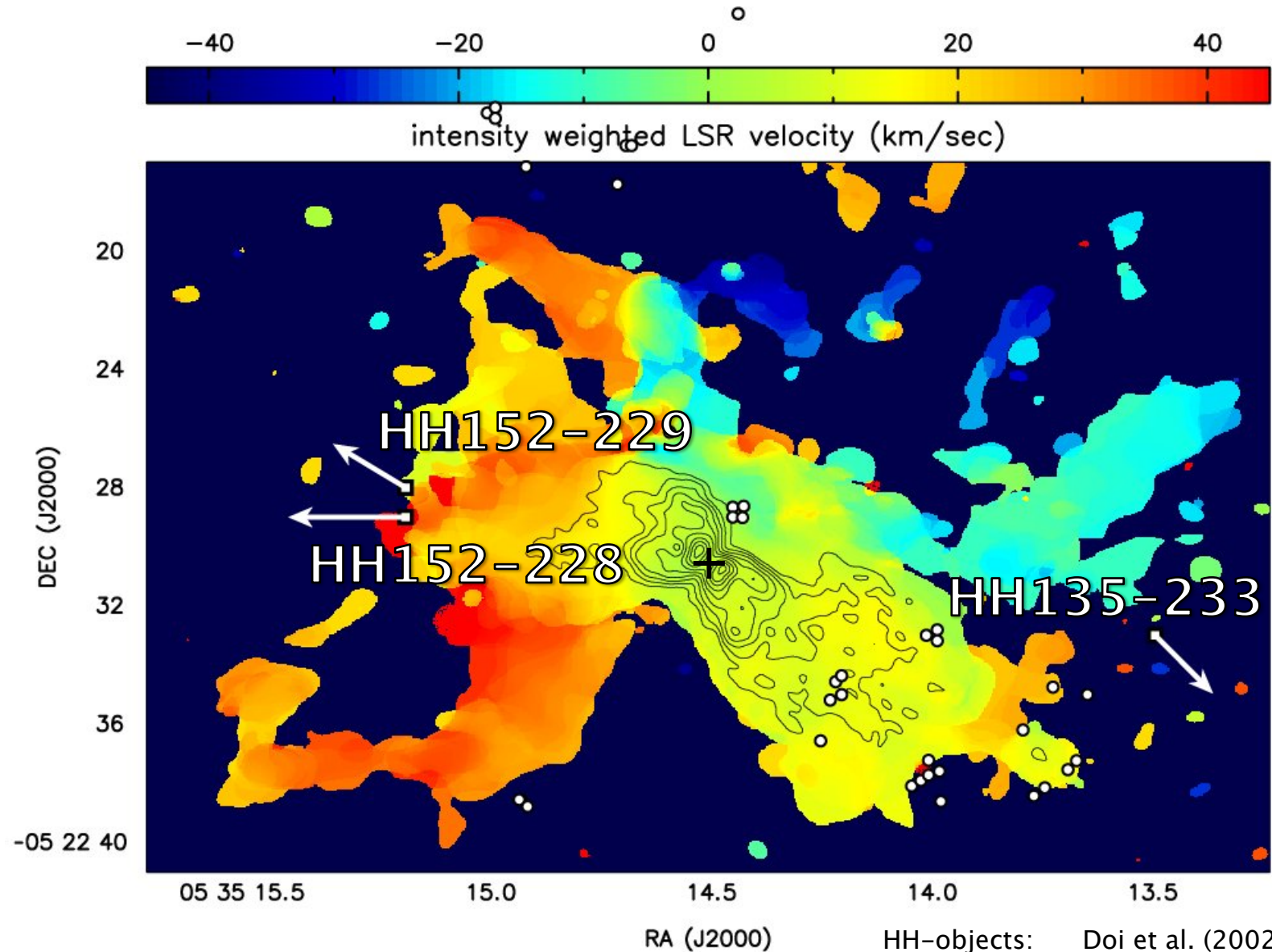
There is an SiO outflow centered near Source I



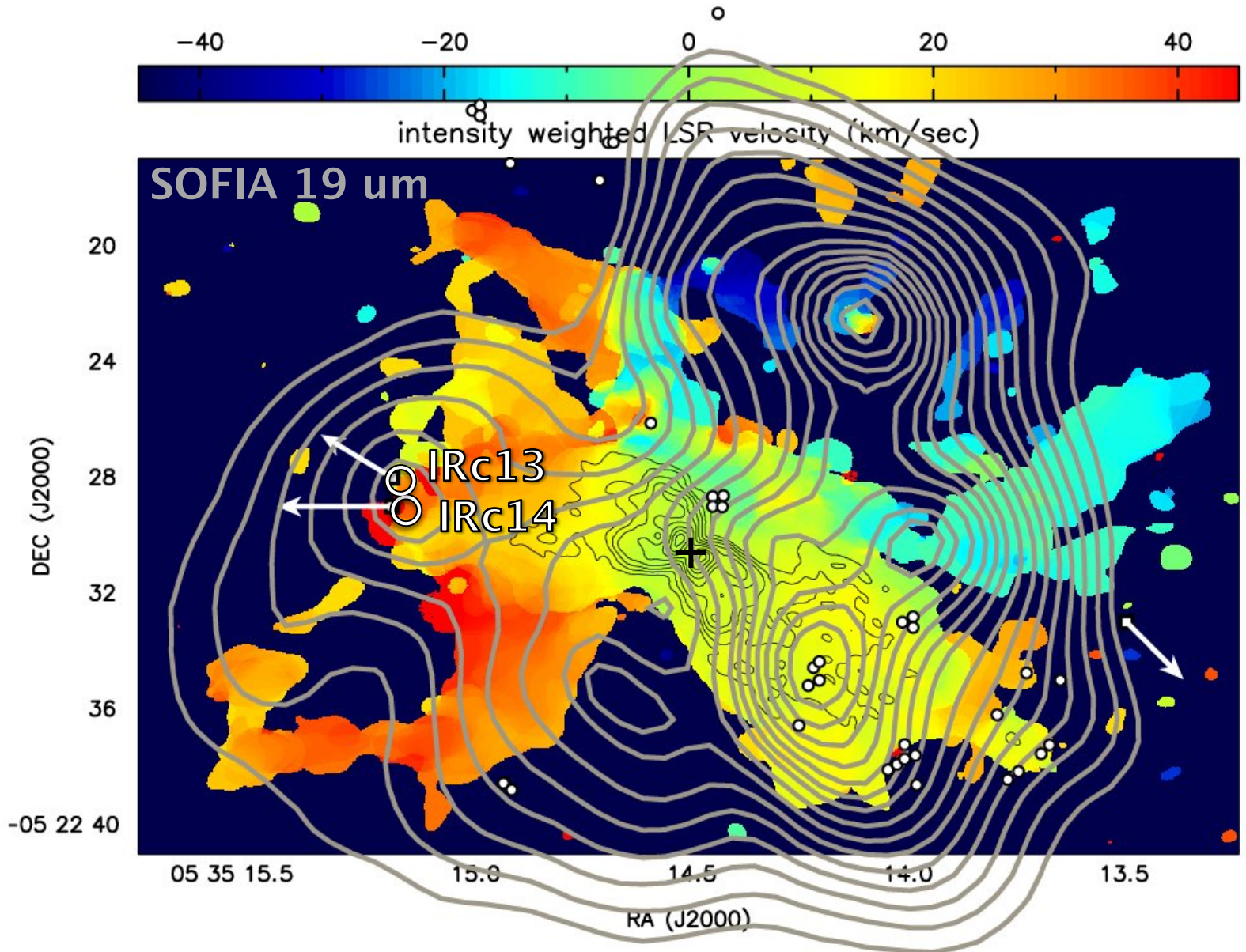
SOF 1 is coincident with the outflow lobe

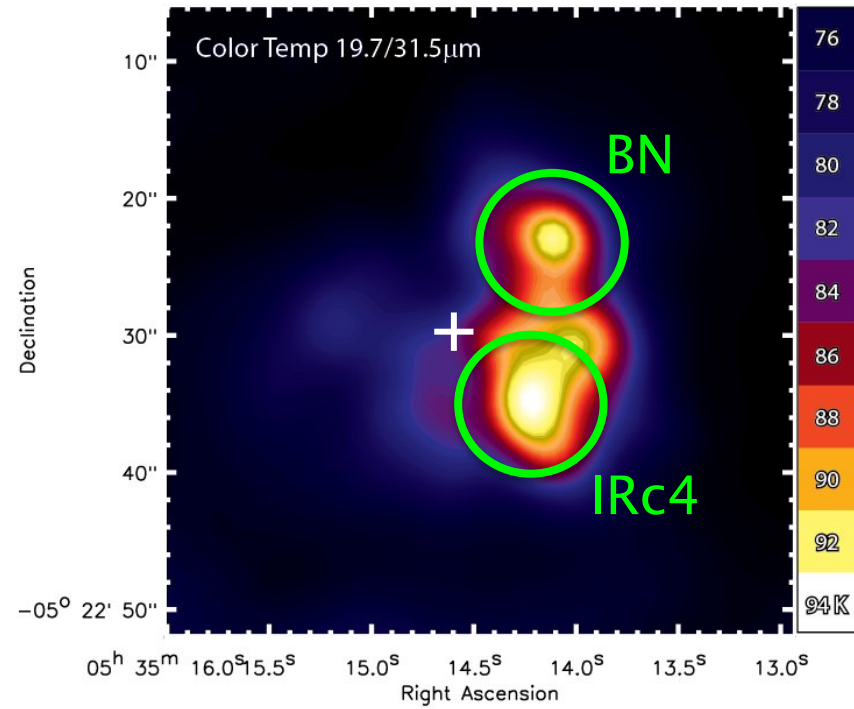


Outflow indicators, water masers and HH objects, present

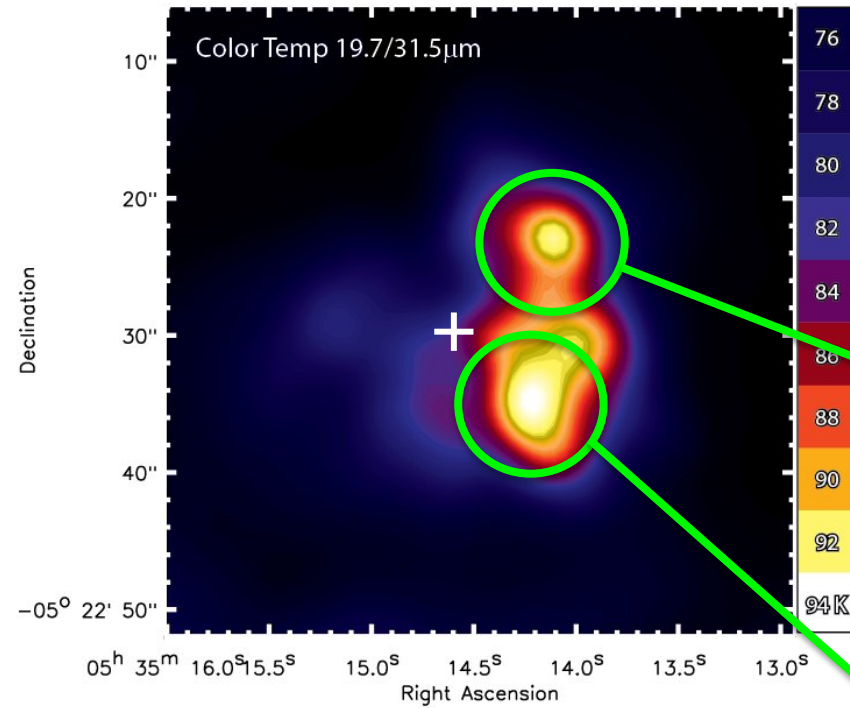


IRc13 and IRc14 appear to be HH objects

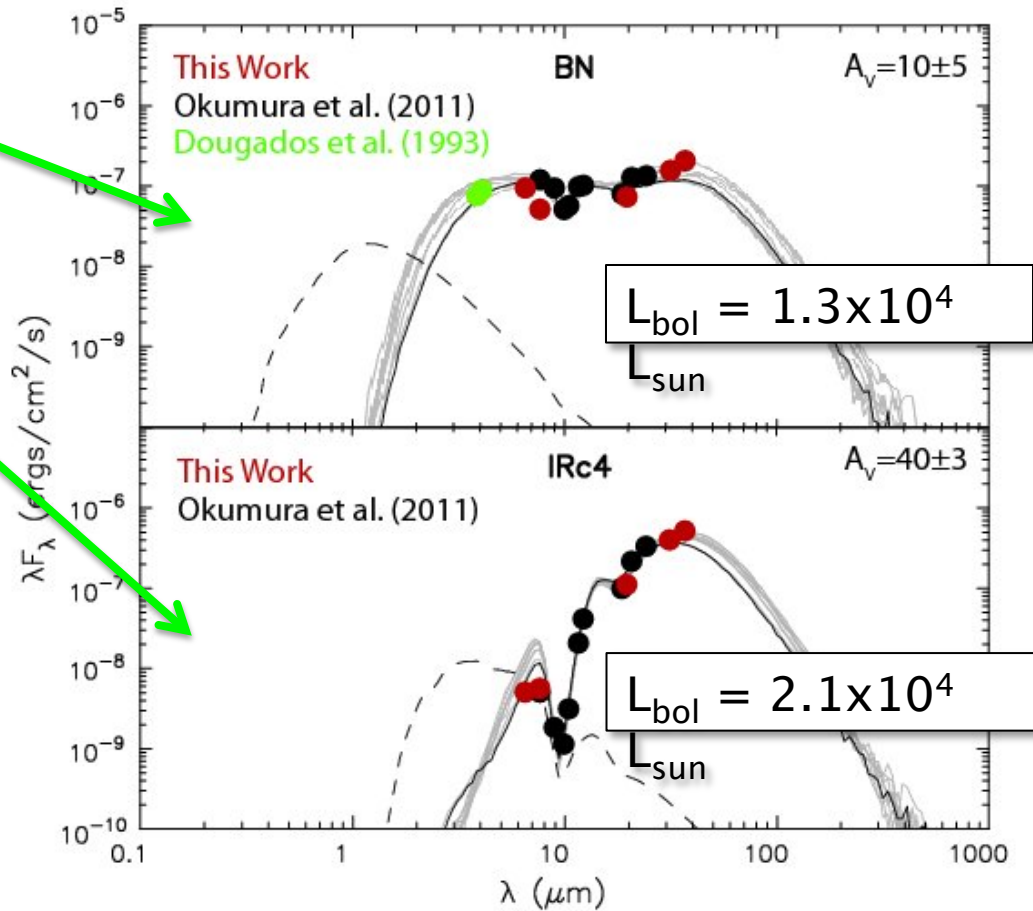


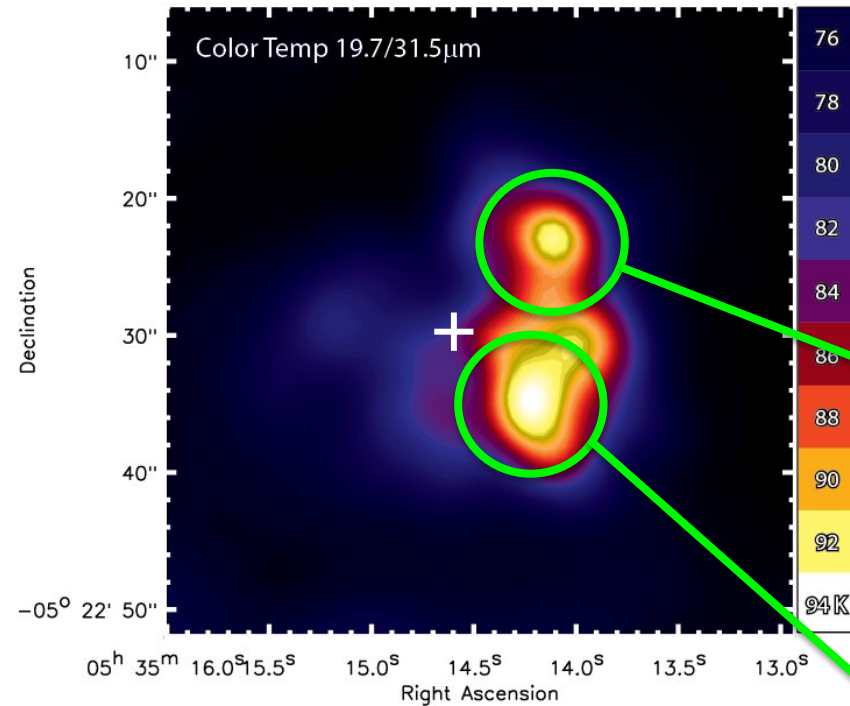


Like BN, IRC4 is a self-luminous source

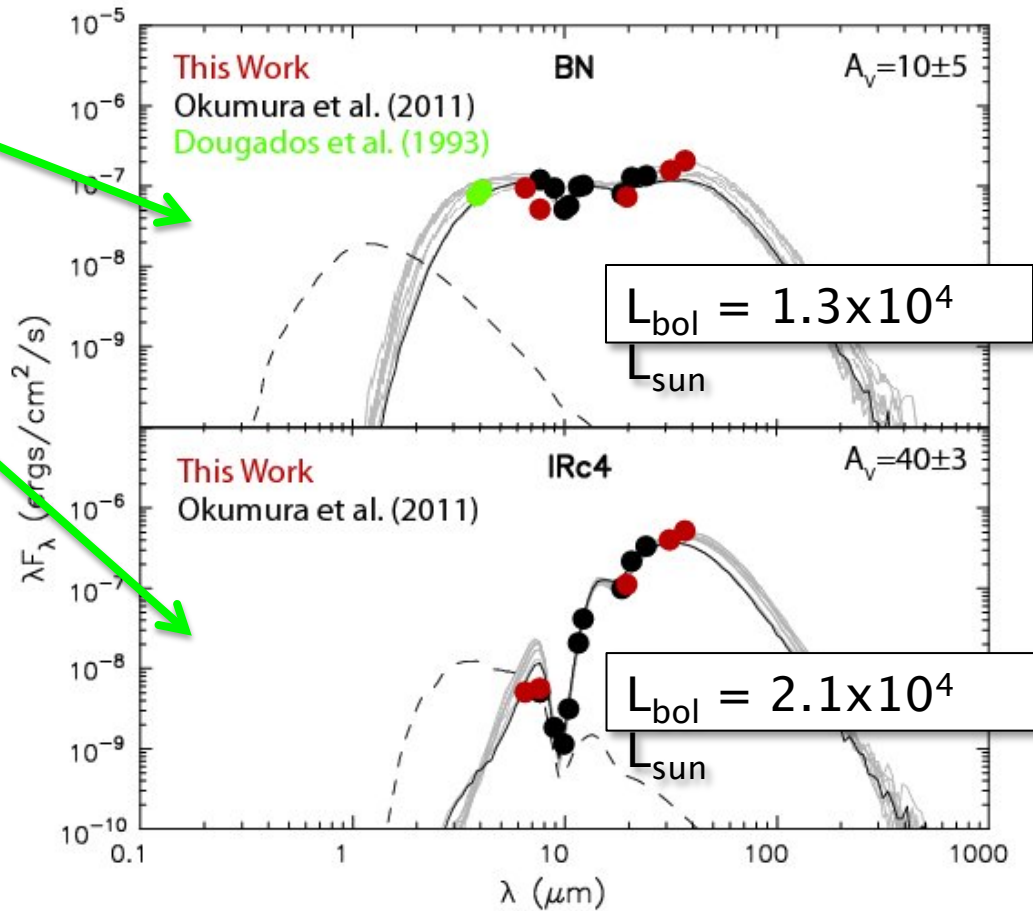


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Like BN, IRC4 is a self-luminous source



IRC4 luminosity is too high to be caused by externally heating

BN+IRC4 account for $\sim 40\%$ of the $\sim 10^5 L_{\text{sun}}$ of the BN/KL region

Conclusions

- SOFIA/FORCAST observed the central 3' of the Orion Nebula with the highest resolution ever at 31 and 37 microns
- BN is not prominent at wavelengths 31 microns or longer
- IRc4 is likely a self-luminous source with a luminosity of about 1/4 the entire KL Nebula
- A previously unidentified area of emission, prevalent at wavelengths >31 microns appears to be associated with the outflow cavity
- We detect likely MIR emission from HH objects in the Orion outflow