Star formation in the Galaxy

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Massive stars and feedback ($M > 8M_{\odot}$)

Importance

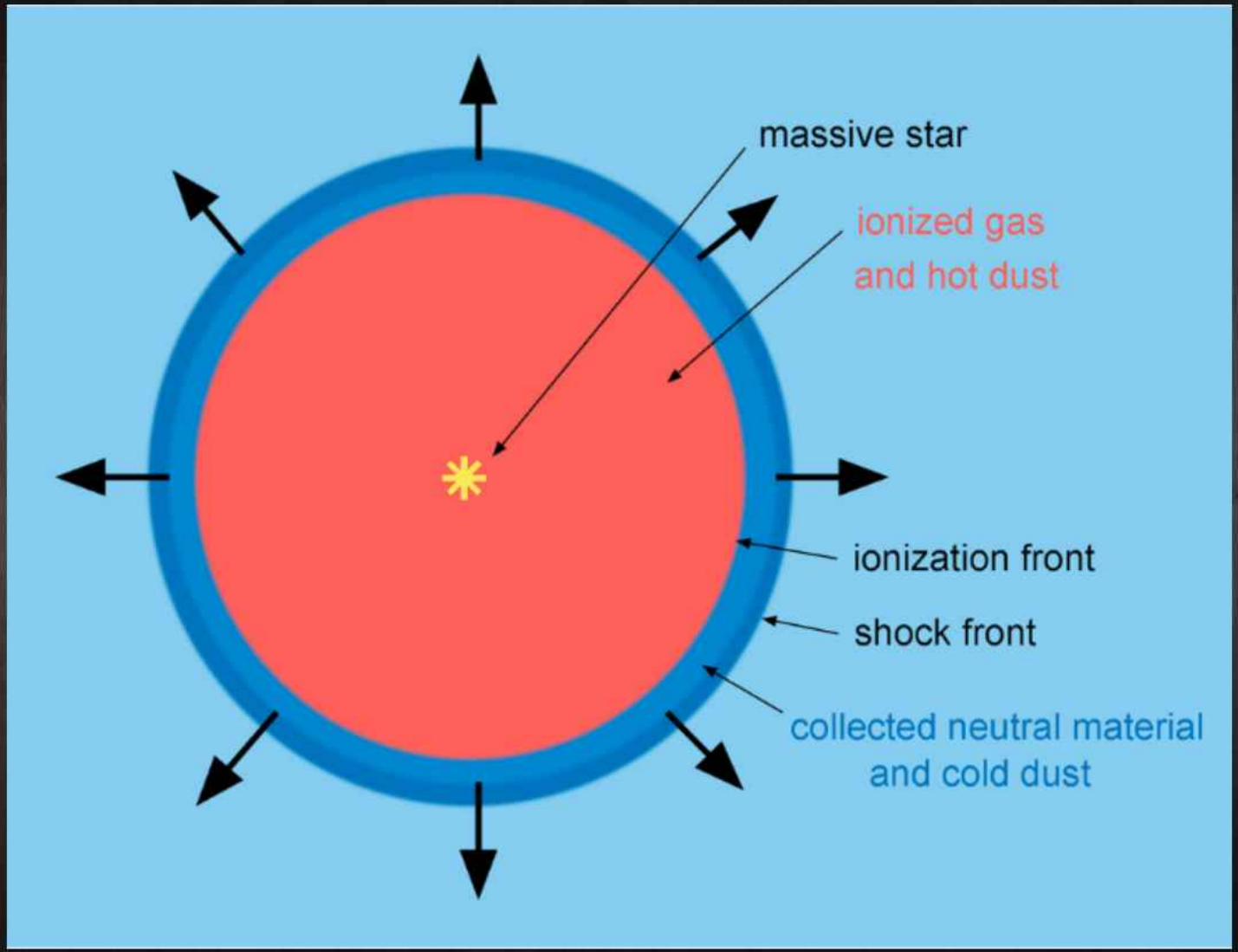
- Galactic evolution and formation
- Enrich ISM with metals

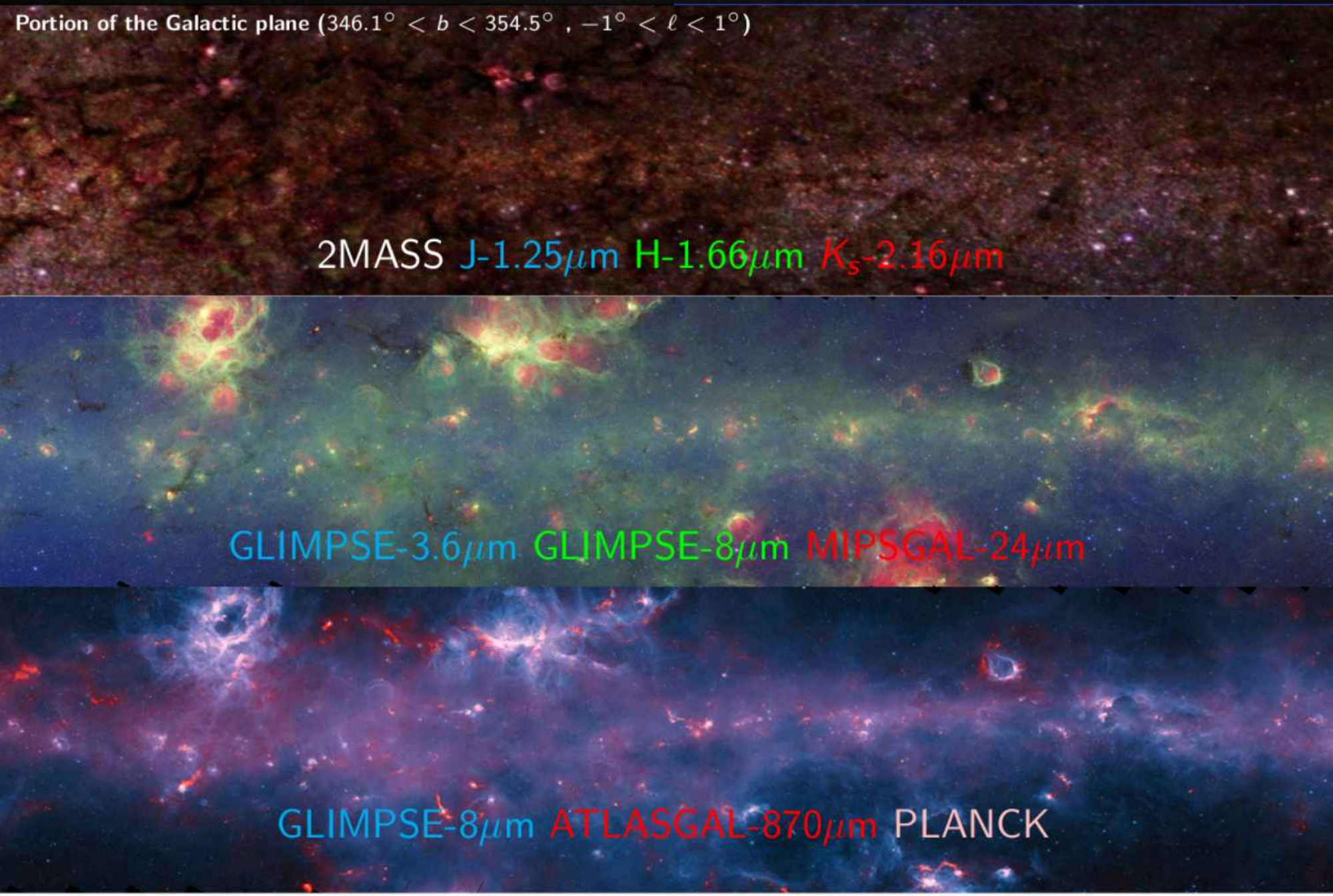
Feedback

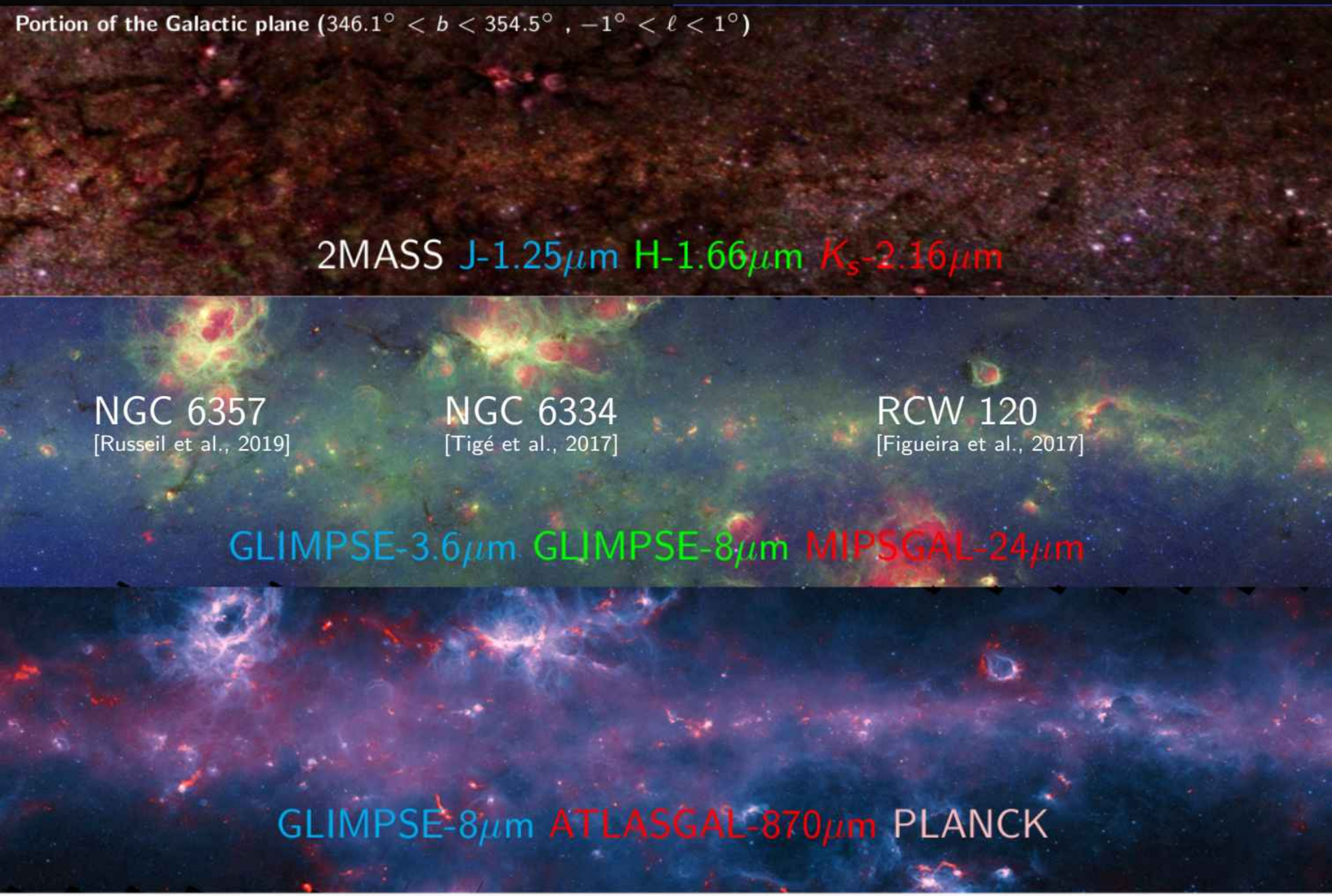
- Stellar winds
- Radiation pressure
- **Photoionization**
- Supernova

Eagle nebula + NGC 6611

Expansion of an H II region [Deharveng et al., 2010]




Portion of the Galactic plane ($346.1^\circ < b < 354.5^\circ$, $-1^\circ < \ell < 1^\circ$)
2MASS J-1.25μm H-1.66μm K_s-2.16μm
GLIMPSE-3.6μm GLIMPSE-8μm MIPSGAL-24μm
GLIMPSE-8μm ATLASGAL-870μm PLANCK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2MASS J-1.25μm H-1.66μm K_s-2.16μm
NGC 6357
[Russeil et al., 2019]
NGC 6334
[Tigé et al., 2017]
RCW 120
[Figueira et al., 2017]
GLIMPSE-3.6μm GLIMPSE-8μm MIPSGAL-24μm
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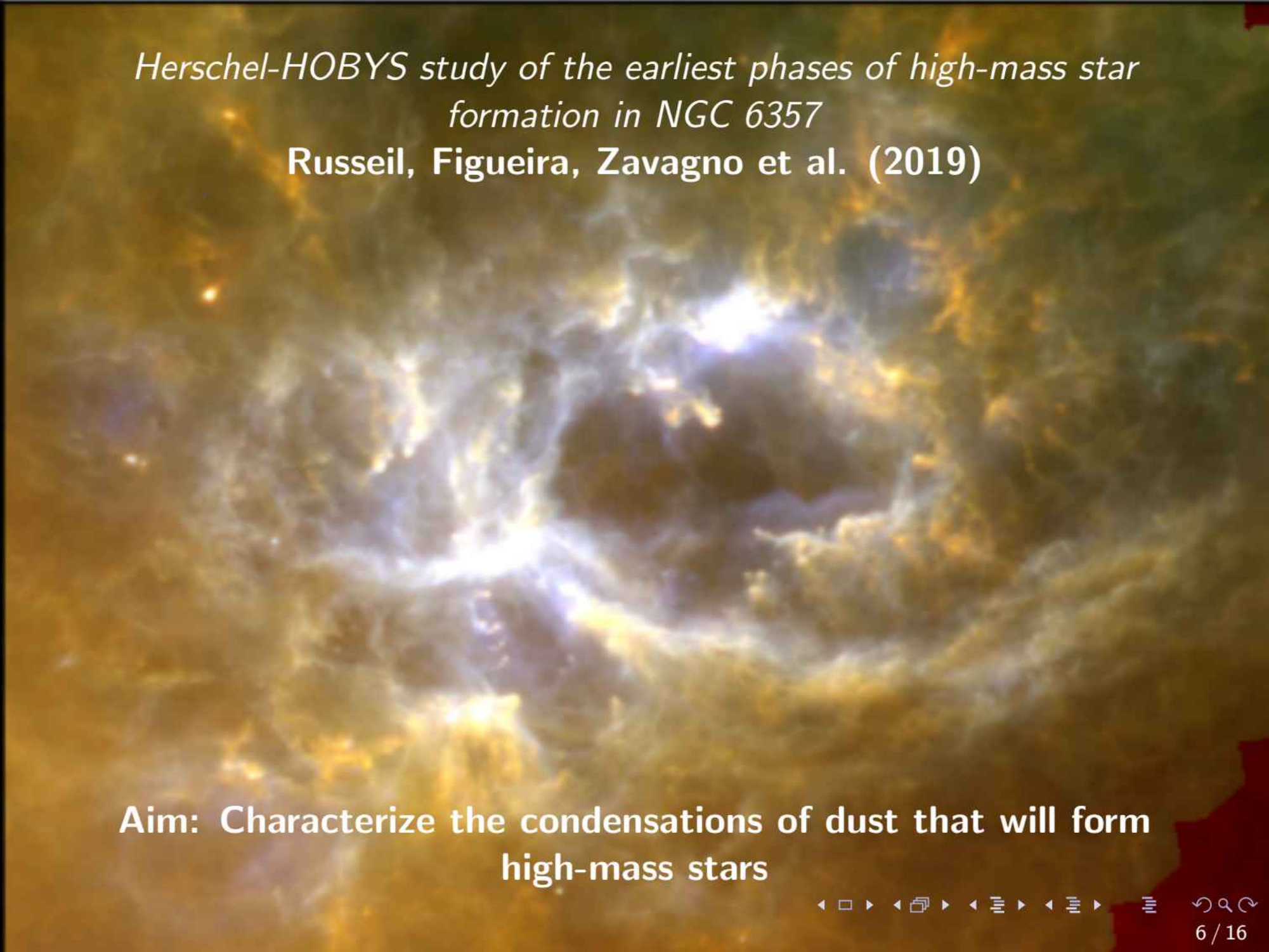


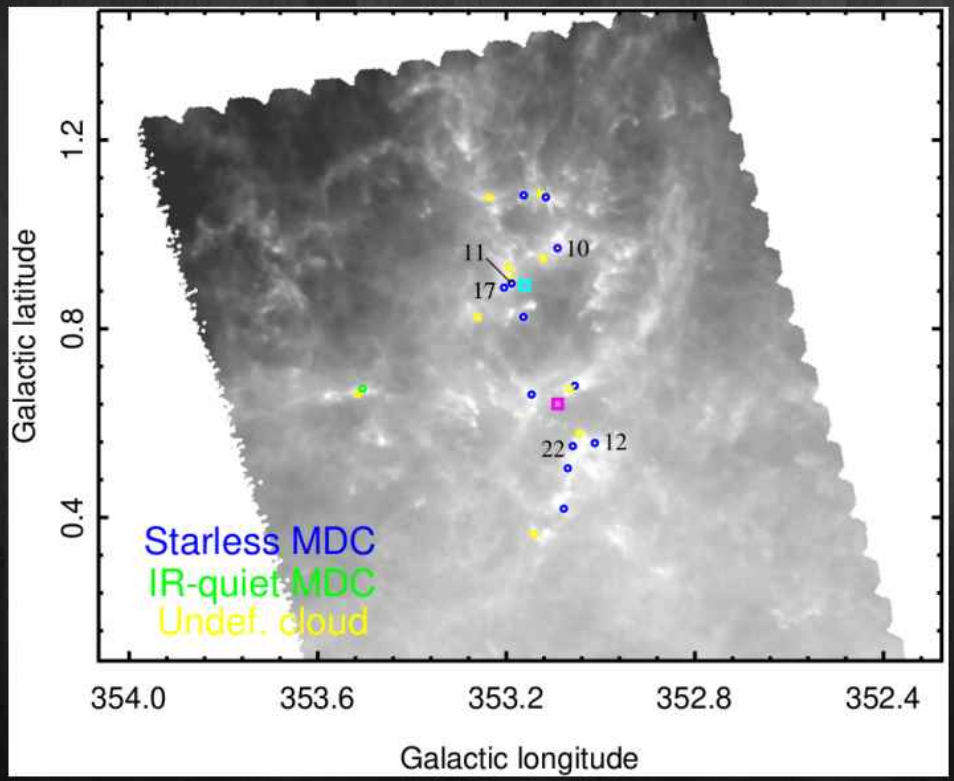
Herschel-HOBYS study of the earliest phases of high-mass star formation in NGC 6357

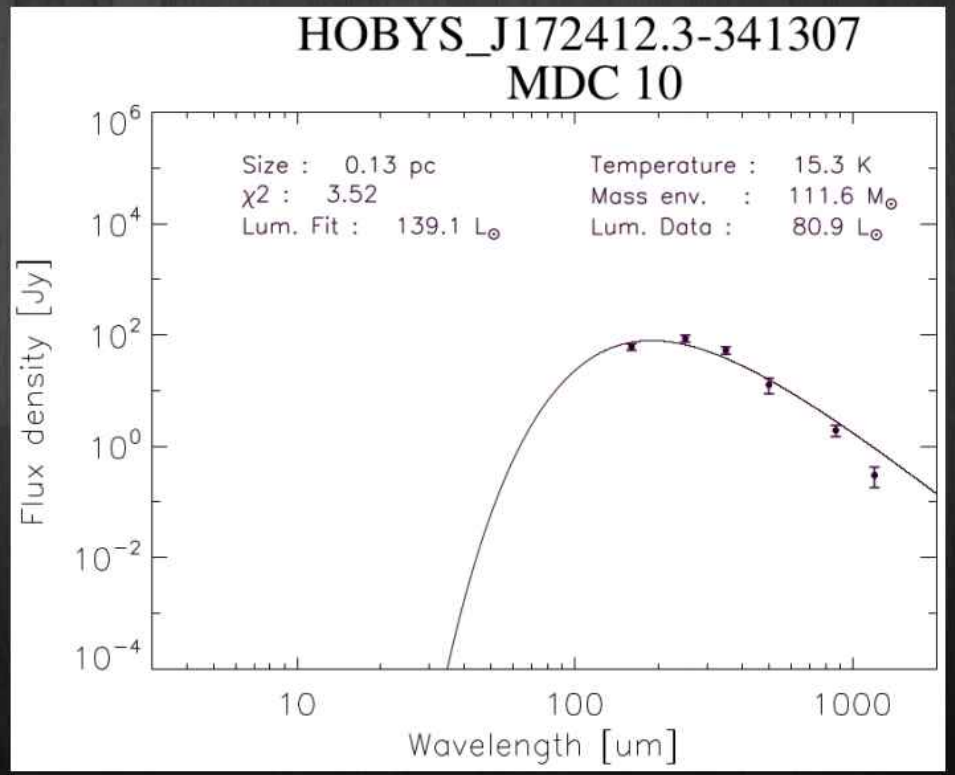
Russeil, Figueira, Zavagno et al. (2019)

Aim: Characterize the condensations of dust that will form high-mass stars

– Extraction performed with the *getsources* algorithm [Men'shchikov et al., 2012, Men'shchikov, 2013]

Spectral Energy Distribution: from 70 to 870 μm (Estimations of mass, temperature, luminosity) $\rightarrow$ catalogue of properties





- **Massive condensations**: $M_{env} > 70\ M_{\odot}$ [Tigé et al., 2017]
- **Starless**: No emission characteristic of protostars (near infrared to 70 μm)
- **Dense**: $n > 10^6$ cm^{-3}
- **Centrally concentrated**: $\rho \propto r^{-2}$

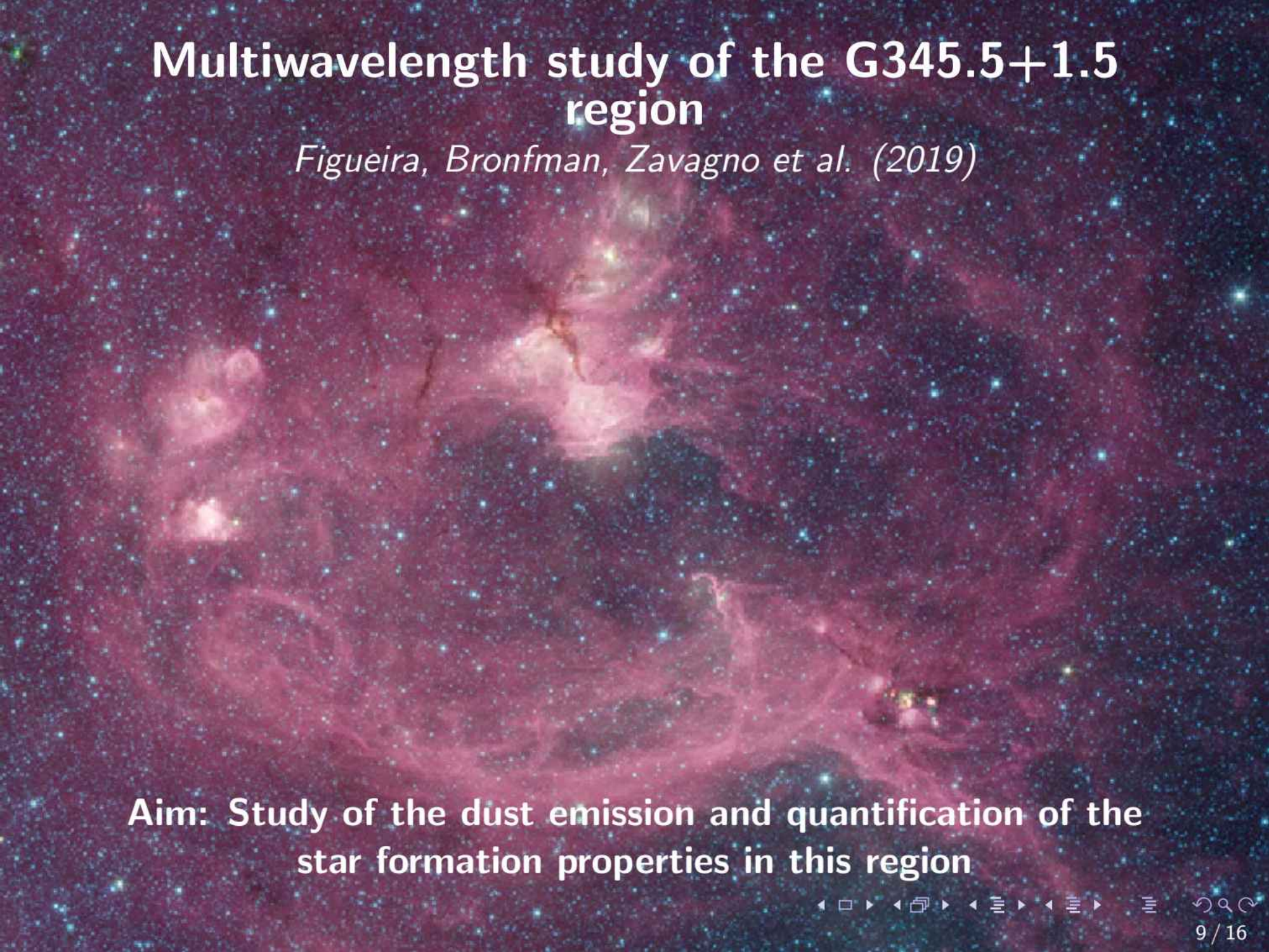
Five condensations are excellent place for high-mass star formation

$\rightarrow$ *Future ALMA proposal in April (study of the fragmentation of these condensations)*

$\rightarrow$ *OB stars and YSO population in NGC 6357-NGC 6334 star-forming complexe as seen with GAIA (Russeil et al. in prep)*

Multiwavelength study of the G345.5+1.5 region

Figueira, Bronfman, Zavagno et al. (2019)



Aim: Study of the dust emission and quantification of the star formation properties in this region

Search for high-mass stars through the bremsstrahlung

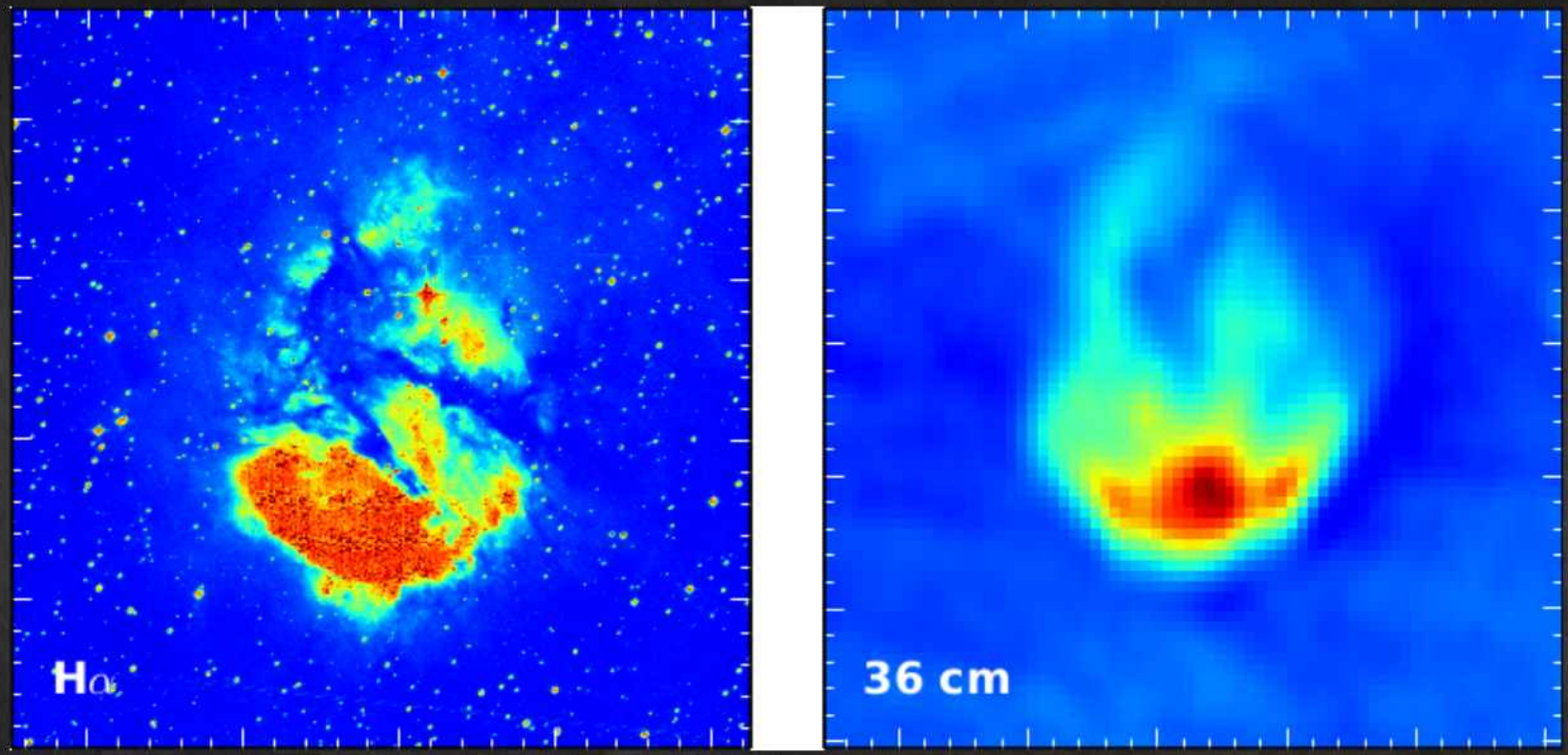


FIGURE: RCW 120 observed through Hα emission (656.3 nm, from SHS) and at 36 cm (from MGPS-2 survey)

Search for high-mass stars through the bremsstrahlung

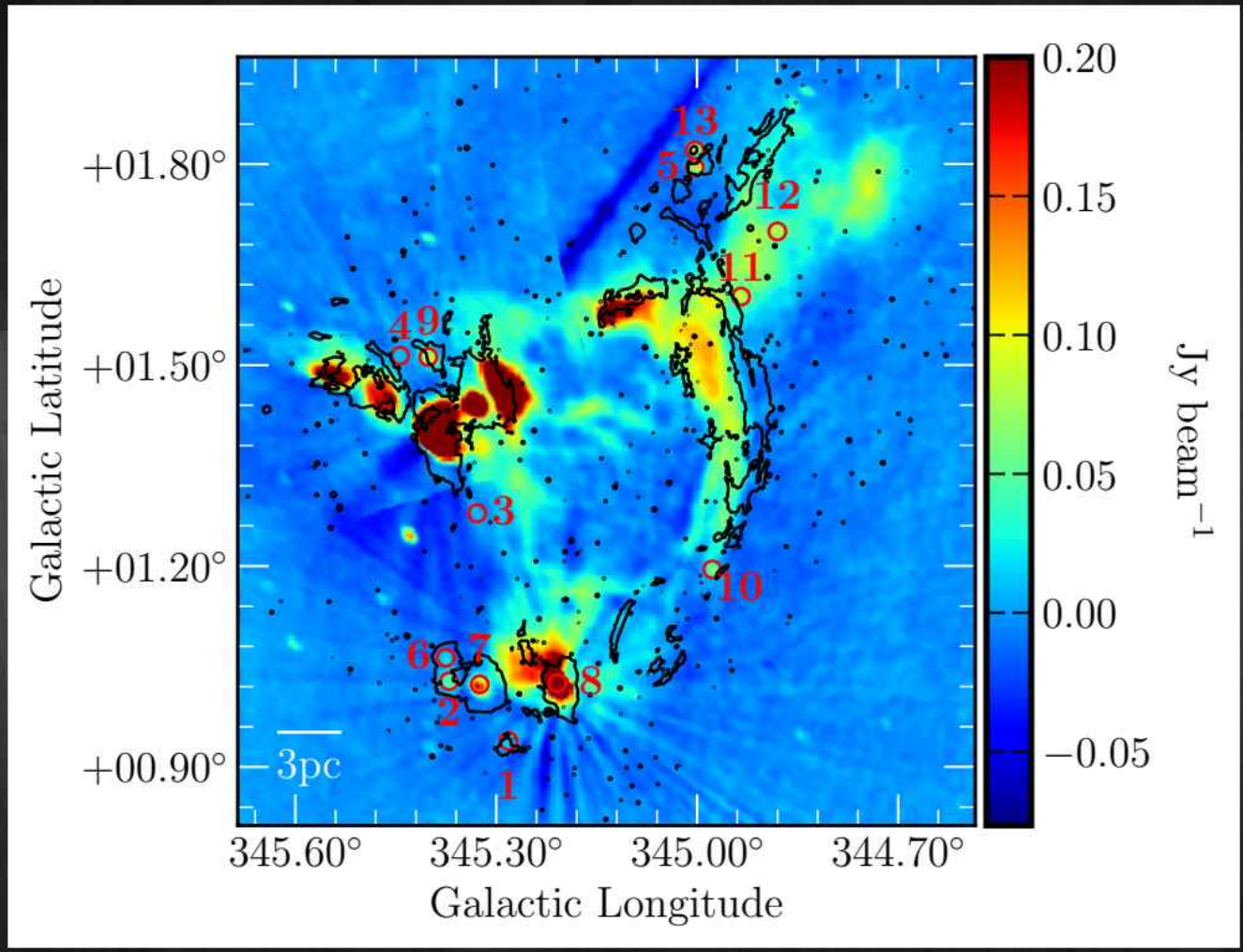
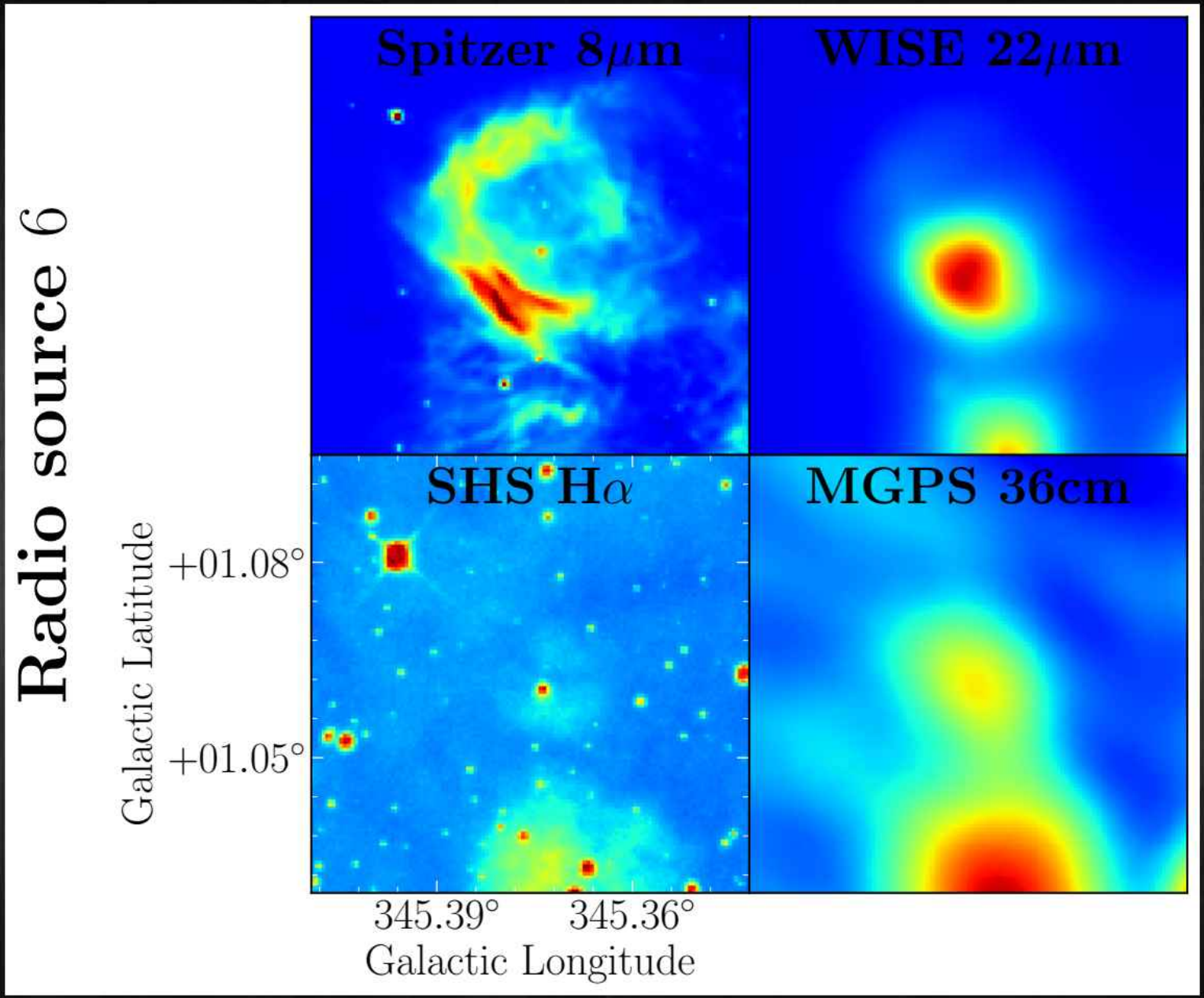


FIGURE: G345.5+1.5 at 36 cm (from MGPS-2 survey)


Radio source 6
Spitzer 8μm
WISE 22μm
SHS Hα
MGPS 36cm
Galactic Latitude
+01.08°
+01.05°
345.39°
345.36°
Galactic Longitude

- We estimate the number of high-mass stars from 7 to 12 in this region

Using this estimation, the Star Formation Rate can be computed:

$$SFR \sim 10^{-3} M_{\odot}\ yr^{-1}$$

$$\Sigma_{SFR} \sim 1.3 M_{\odot}\ yr^{-1}\ kpc^{-2}$$

- Σ_{SFR} equivalent to other high-mass star forming regions
- More than half of the dusty clumps in the region are emitting in near infrared wavelength (tracer of protostars)

G345.5+1.5 is a region actively forming (high-mass) stars and deserve follow-up studies

Publications in prep / submitted:

$\longrightarrow$ **H II regions and High Mass Starless Clumps: Catalogs and properties**
(Zhang et al. submitted to A&A)

$\longrightarrow$ **OB stars and YSO population in NGC 6357-NGC 6334 star-forming complexe as seen with GAIA**
(Russeil et al. in prep)

$\longrightarrow$ **APEX-Artémis study of the filamentary structure of RCW 120**
(Zavagno et al. in prep)

$\longrightarrow$ **CO observations towards two sub-regions of RCW 120**
(Figueira et al. in prep)

Thank you for your attention