# JWST Stellar Populations of NGC6822

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Dust Life Cycle

- Chemical evolution intrinsically linked to dust evolution

- We need to understand all the mechanisms of dust creation and destruction

- Resolved stellar studies are used to build models in the local group to be applied to earlier universe

- Key moments are bright in IR
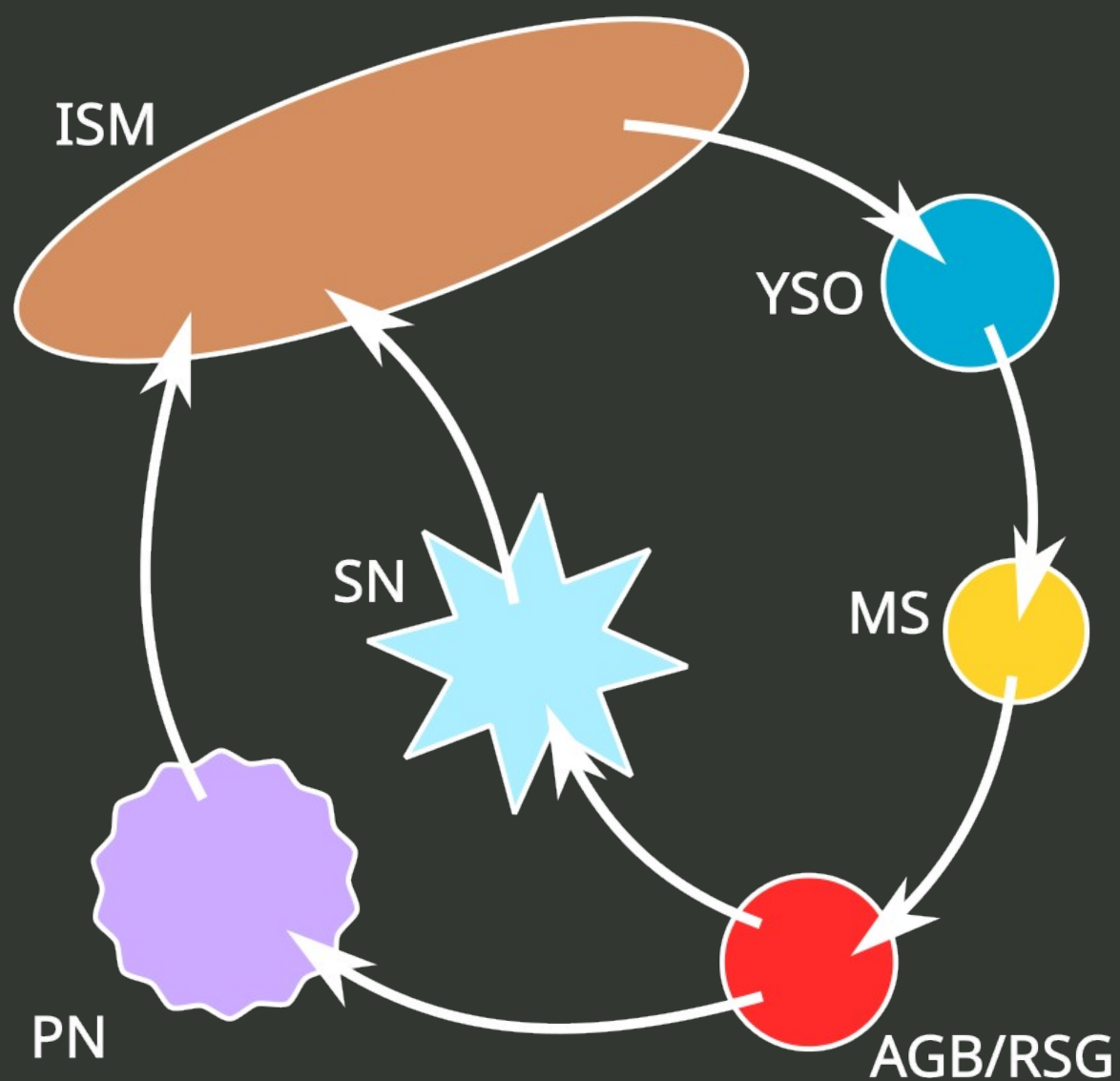
NGC 6822

- Local and tidally isolated barred irregular galaxy

- Nearby d~500kpc

- Metal poor Z~0.25$Z_\odot$

- Analogous to epoch of peak star formation (z=2)
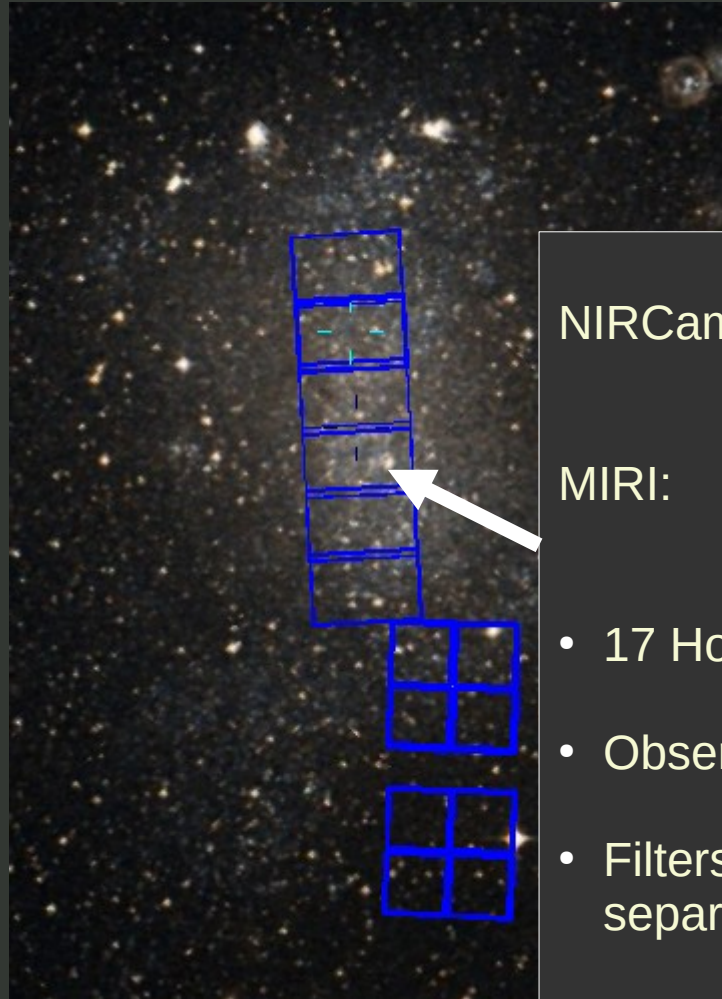
- Peculiar star formation history

Image:ESO

NGC 6822 – Spitzer

- Localised regions of massive star formation

- Diffuse evolved stellar population

- Intermediate age RSGs follow central bar

Hα - **blue**
IRAC 8 μm - **green**
MIPS 24 μm - **red**

Hirschauser et al. (2020)
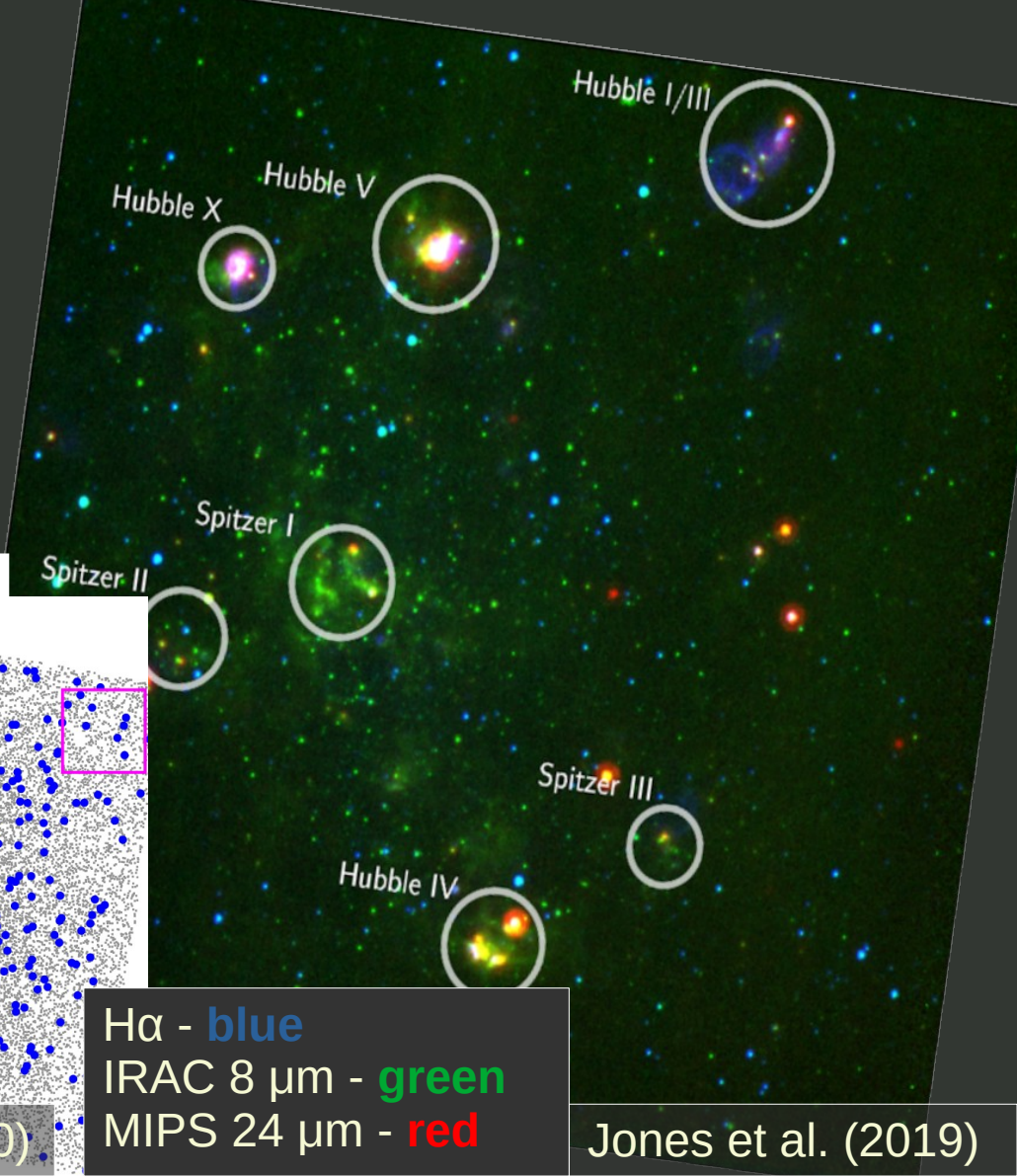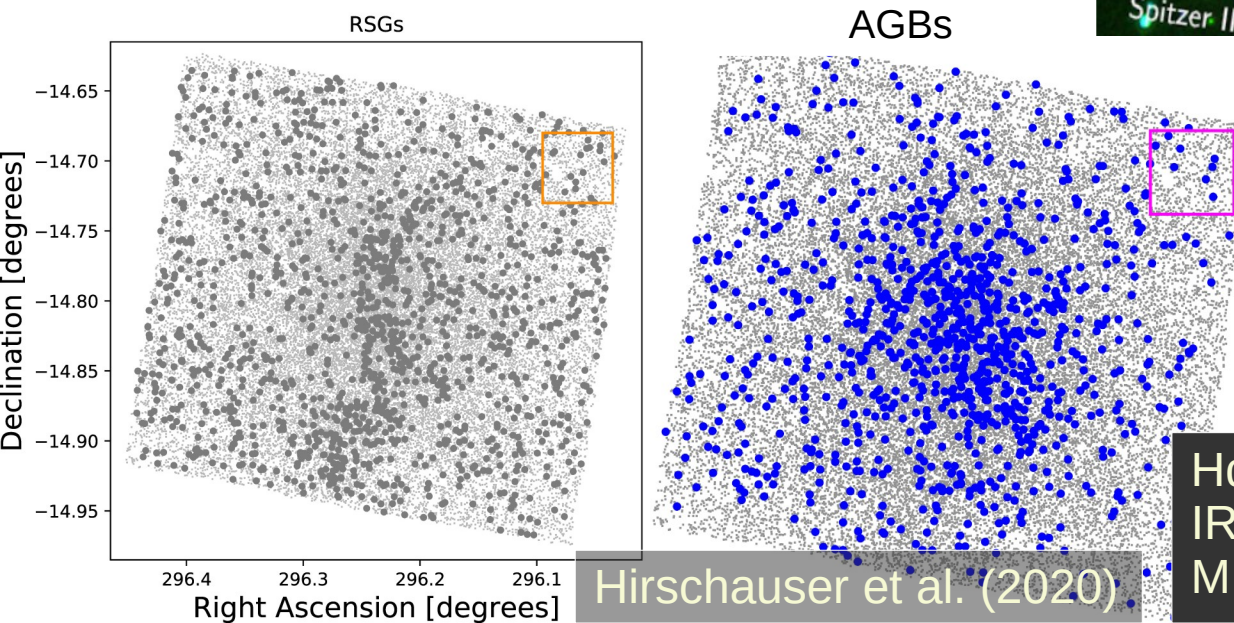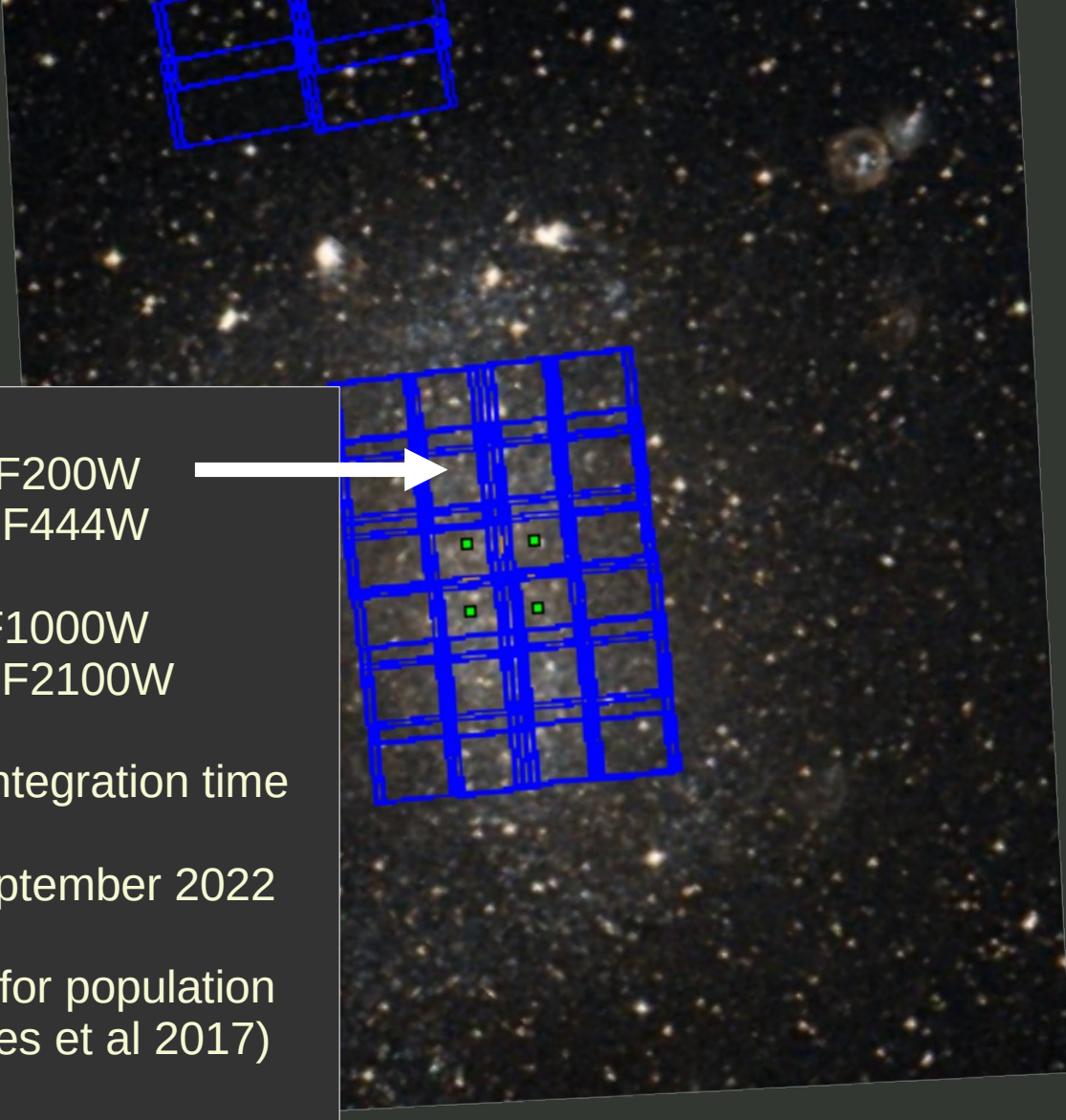
Jones et al. (2019)
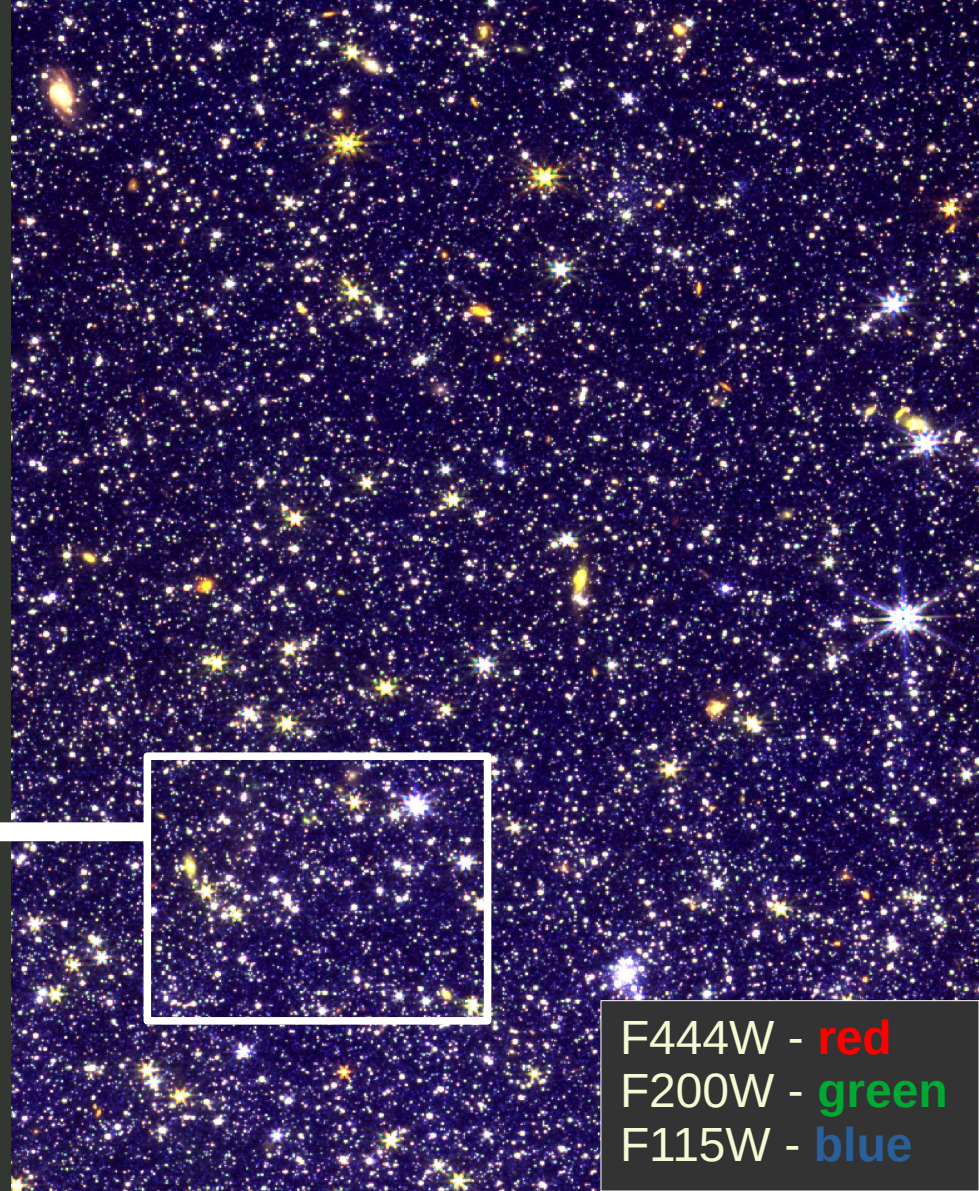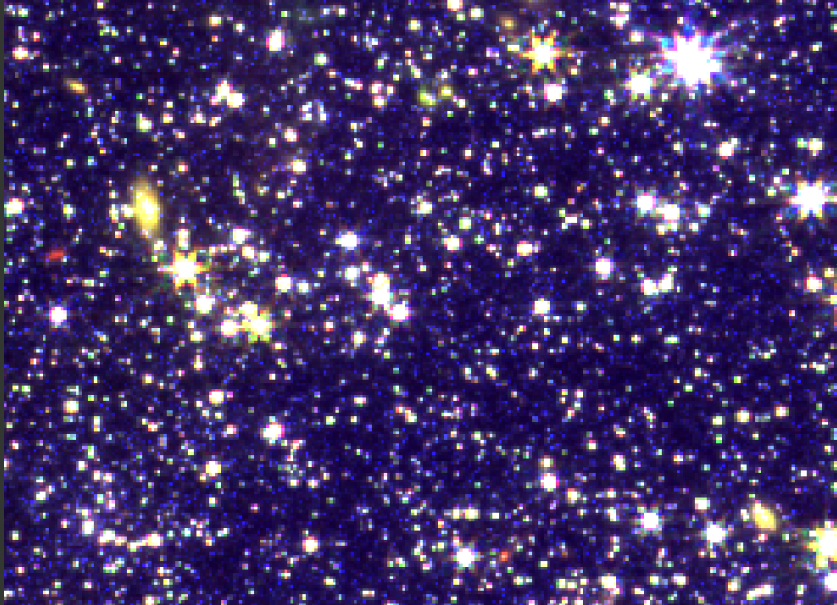
NGC 6822 – JWST

NIRCam: F115W F200W
F356W F444W

MIRI: F770W F1000W
F1500W F2100W

- 17 Hours total integration time

- Observed in September 2022

- Filters selected for population
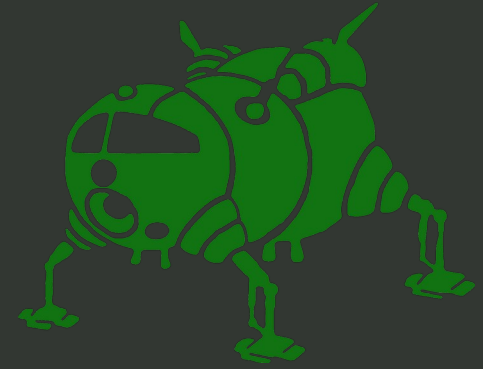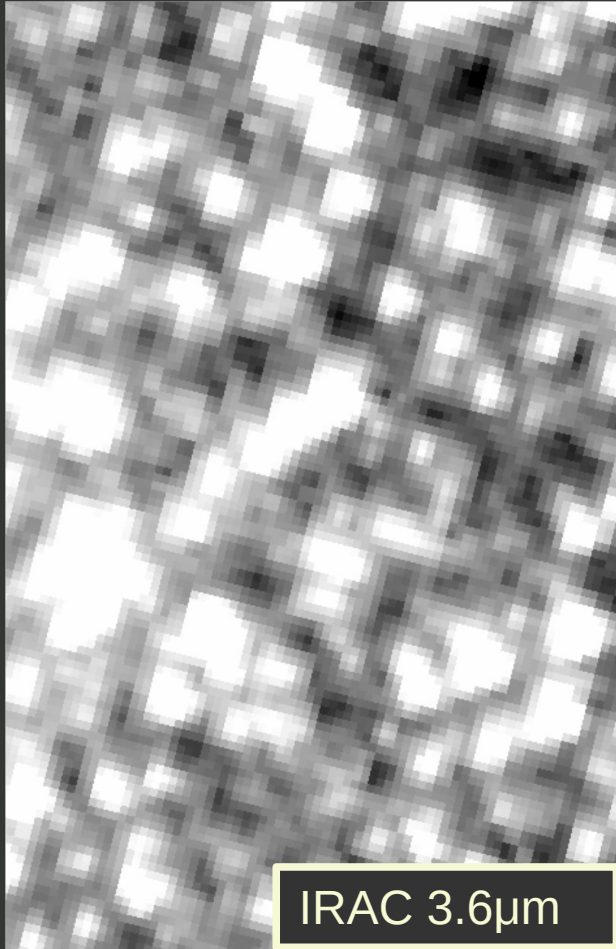separation (Jones et al 2017)

NGC 6822 – JWST

F444W - red
F200W - green
F115W - blue

Photometry - StarbugII

- JWST PSF photometry using python PHOTUTILS[1]

- Optimised for dense stellar fields and complex background emission

- Ensemble of background subtraction techniques to detect more embedded sources

- Removes background galaxy contamination from the image

- Includes catalogue matching, artificial star testing and background estimation

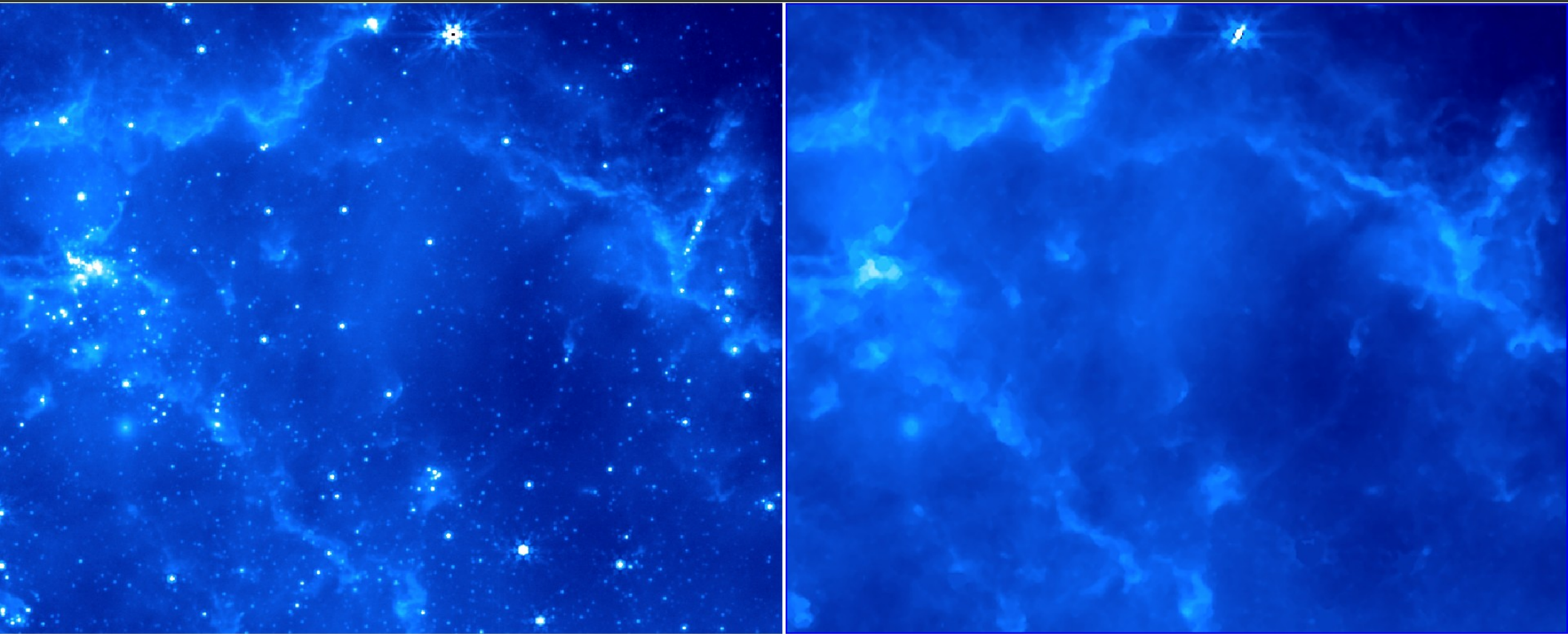- Under constant development: https://github.com/conornally/starbug2

1- https://photutils.readthedocs.io/en/stable

JWST for Stellar Populations

IRAC 3.6μm

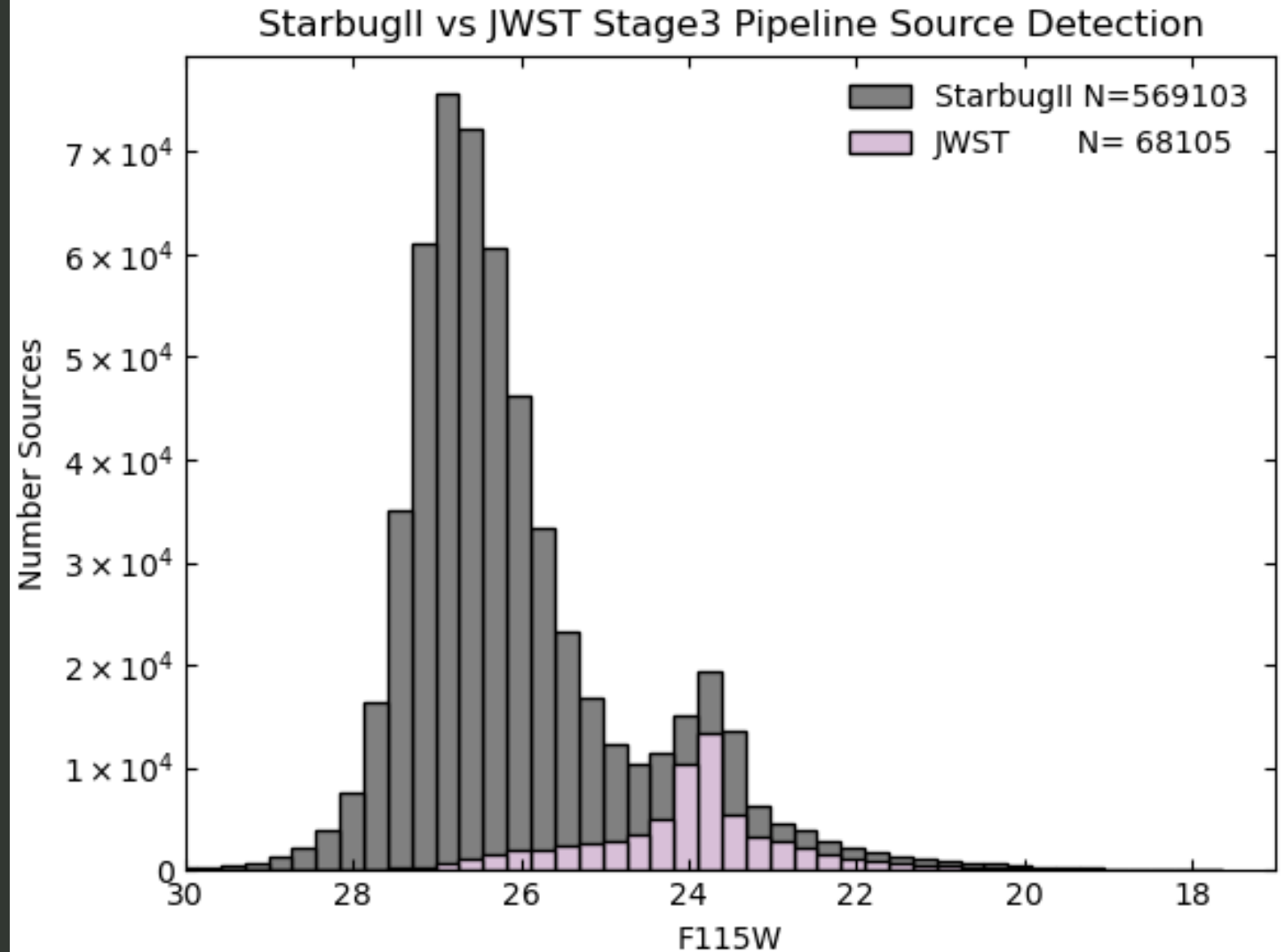JWST imaging has revolutions our view of infra red stellar populations

NIRCam F356W

Diffuse Background Estimation

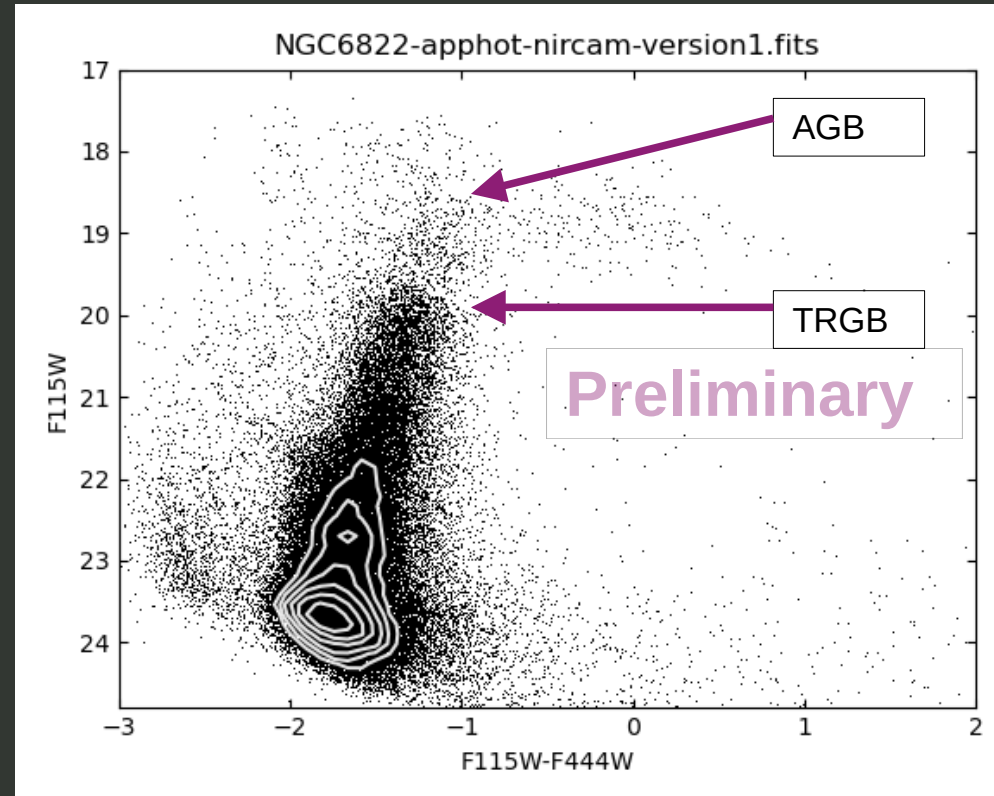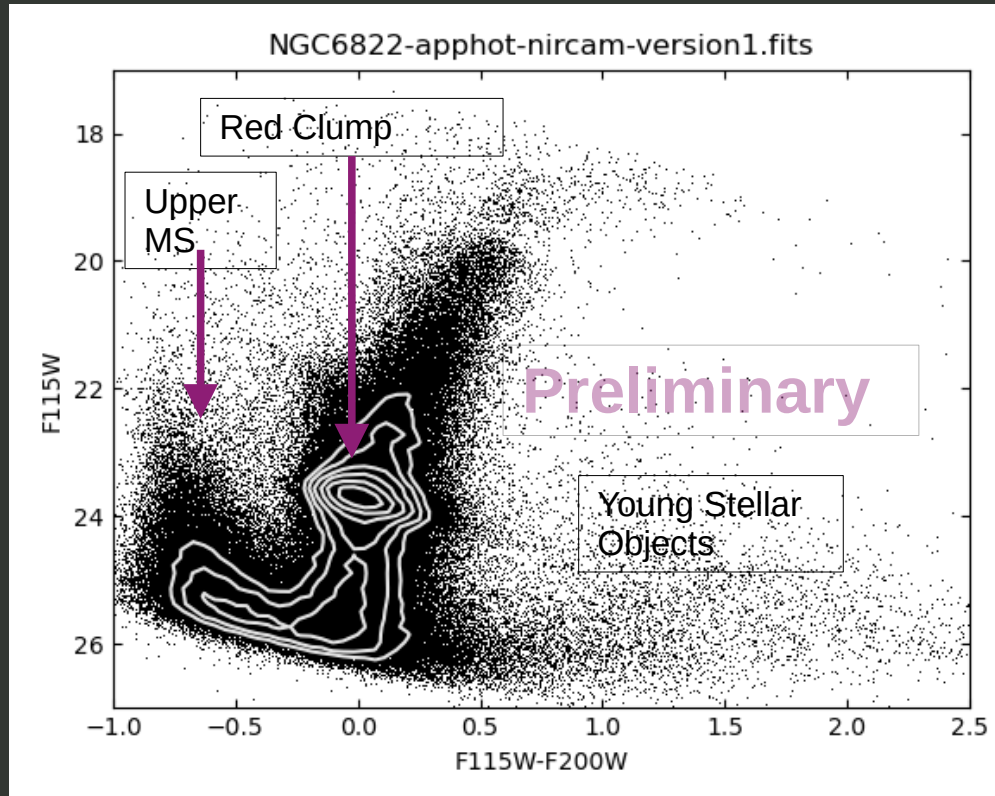# Source Detection

For complex stellar fields, StarbugII out performs the JWST pipeline by an order of magnitude

Starbugll vs JWST Stage3 Pipeline Source Detection

Legend: StarbugII N=569103; JWST N= 68105

X-axis: F115W

Y-axis: Number Sources

NGC 6822 – Colour Magnitude Diagrams

Summary

- JWST has completely revolutionised the field of resolved stellar population studies

- We have NGC6822 NIRCam and MIRI data obtained in September,

- We reach several magnitudes below the Red Clump, detecting the complete IR population, perfect to explore the life cycle of dust through star formation, evolved stars and interstellar medium dust

- StarbugII - a JWST PSF photometry tool for complex and crowded fields is available at: https://github.com/conornally/starbug2

- StarbugII – detects an order of magnitude more stars than the JWST pipeline

Filter Combinations

Jones et al. 2017a