Cometary Science with the NEOCam mission

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What we anticipate learning with NEOCam

- Discover and characterize thousands of comets larger than 1 km
  - Thermal flux gives nucleus size
  - Flux excess at ~4.6 μm gives $CO+CO_2$ production
  - Dust production ($\varepsilon f \rho$)
  - Morphology gives particle sizes and ages, particularly in longer wavelength data
- New viewing geometry of comet trails

What we know about comets now, a rough cut

- As of 18 March 2019

JPL Small-Body Database Search Engine

[Refine Search] **Results:** 3564 matching objects

Constraints: comets

- Many are sungrazers discovered by SOHO

JPL Small-Body Database Search Engine

[Refine Search] **Results:** 1991 matching objects

Constraints: comets **and** IAU name != SOHO

What we know about comets now, a rough cut

- What is left, periodic comets

JPL Small-Body Database Search Engine

[Refine Search] **Results:** 827 matching objects

Constraints: comets **and** orbital class (ETc **or** CTc **or** JFC **or** JFc **or** HTC) **and** IAU name != SOHO

- What is left, other comets

JPL Small-Body Database Search Engine

[Refine Search] **Results:** 623 matching objects

Constraints: comets **and** orbital class (HYP **or** PAR) **and** IAU name != SOHO

JPL Small-Body Database Search Engine

[Refine Search] **Results:** 541 matching objects

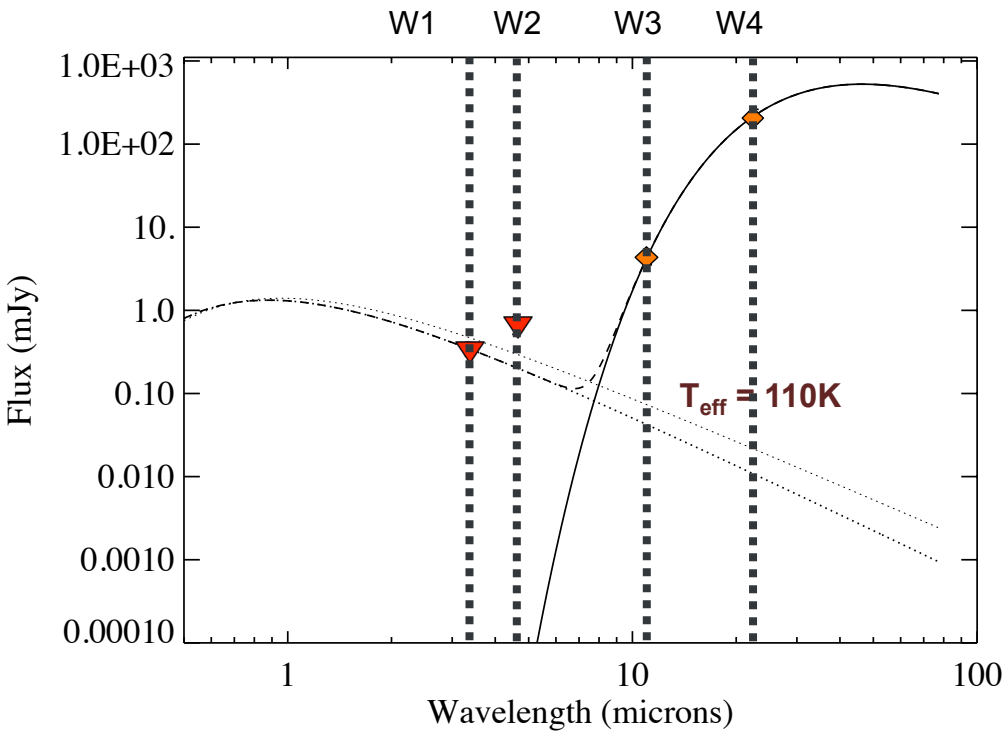
Constraints: comets **and** orbital class (COM) **and** IAU name != SOHO

Comets in the infrared so far

- *IRAS* 24
- *Spitzer* ~100
- *WISE/NEOWISE* ~300

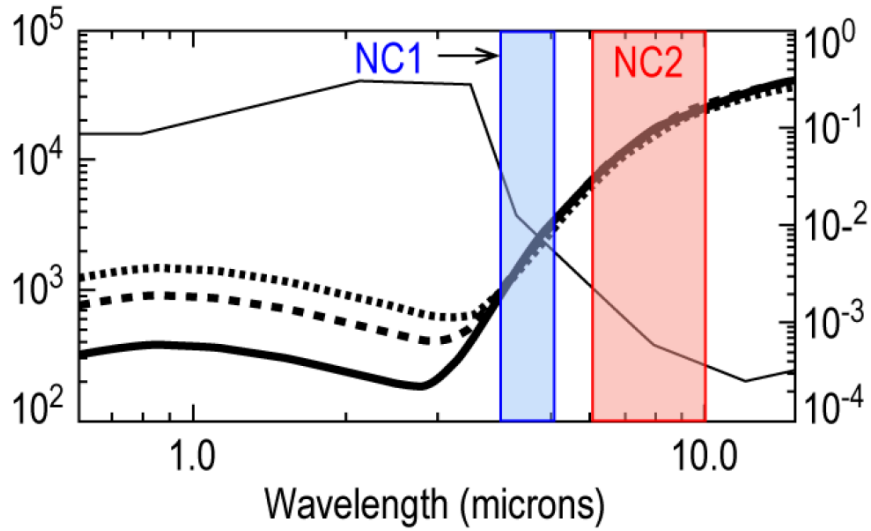
NEOWISE as an analog for NEOCam

NEOWISE



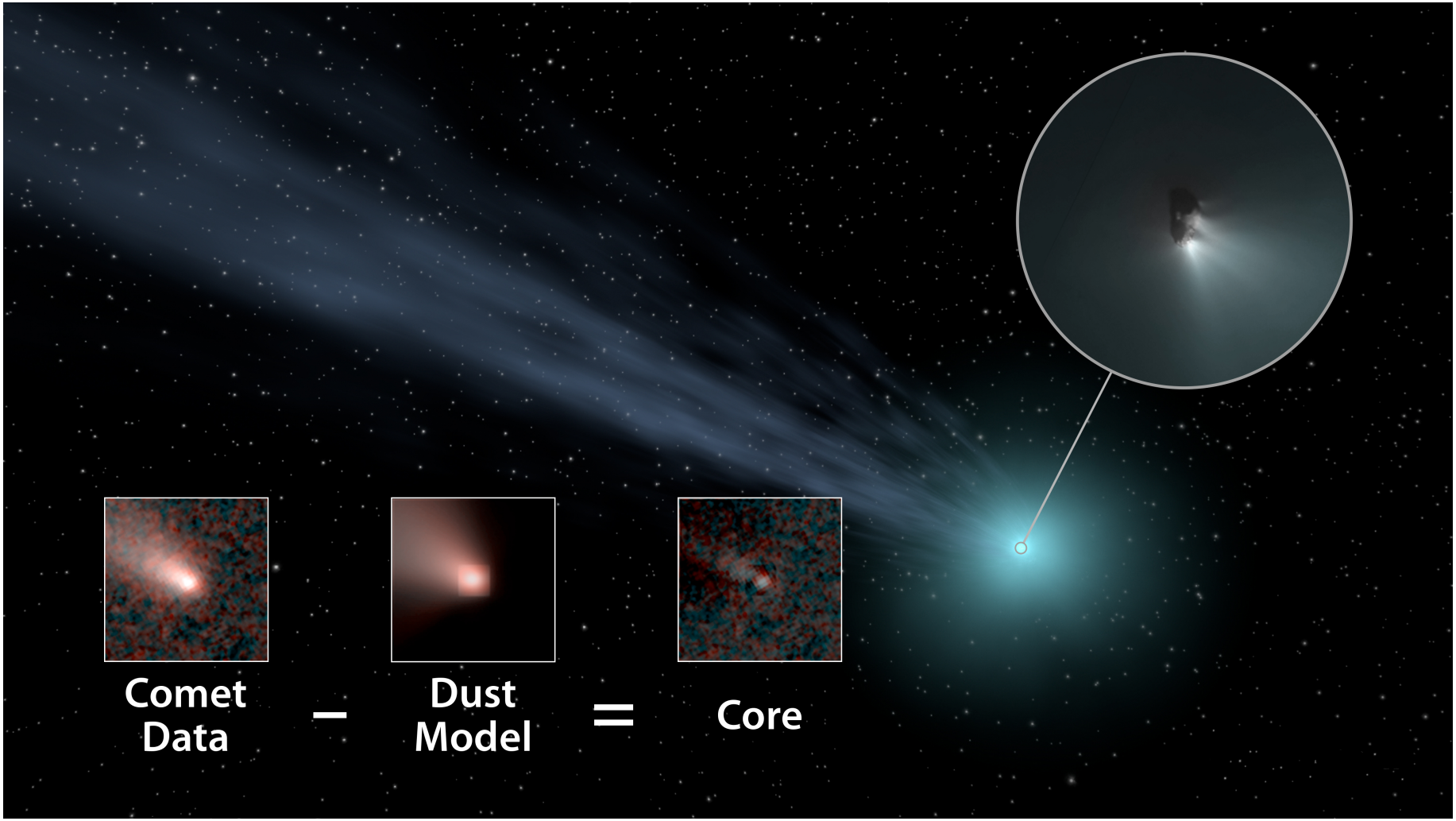
C/2009 P1 (Garradd), Bauer et al. 2015

NEOCam



SED for NEAs, but similar to comets

Physical Parameters: Nucleus Size



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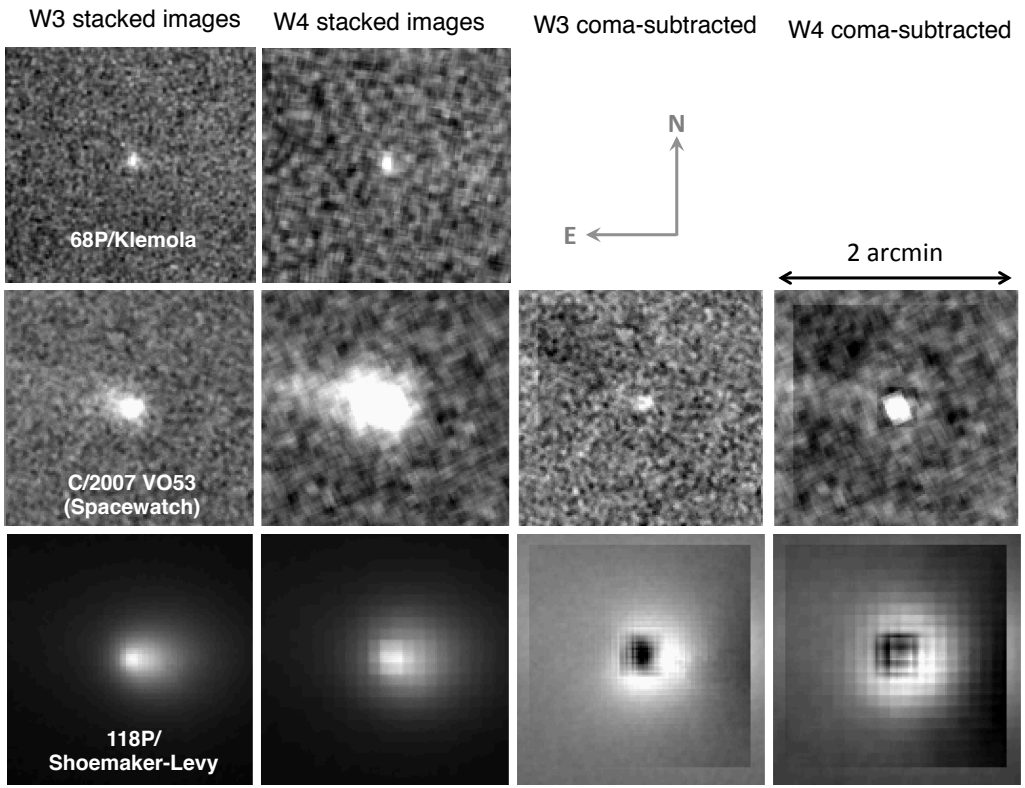
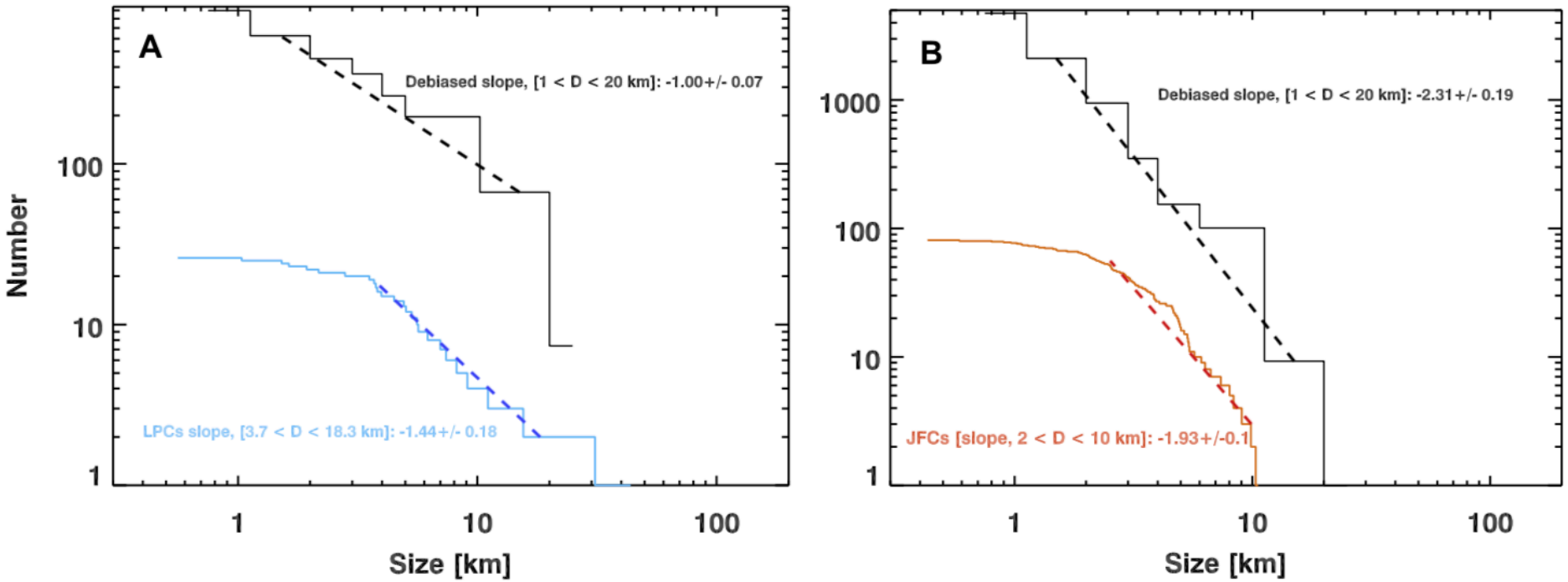


Bauer et al., 2017, AJ

Physical Parameters: Nucleus Size

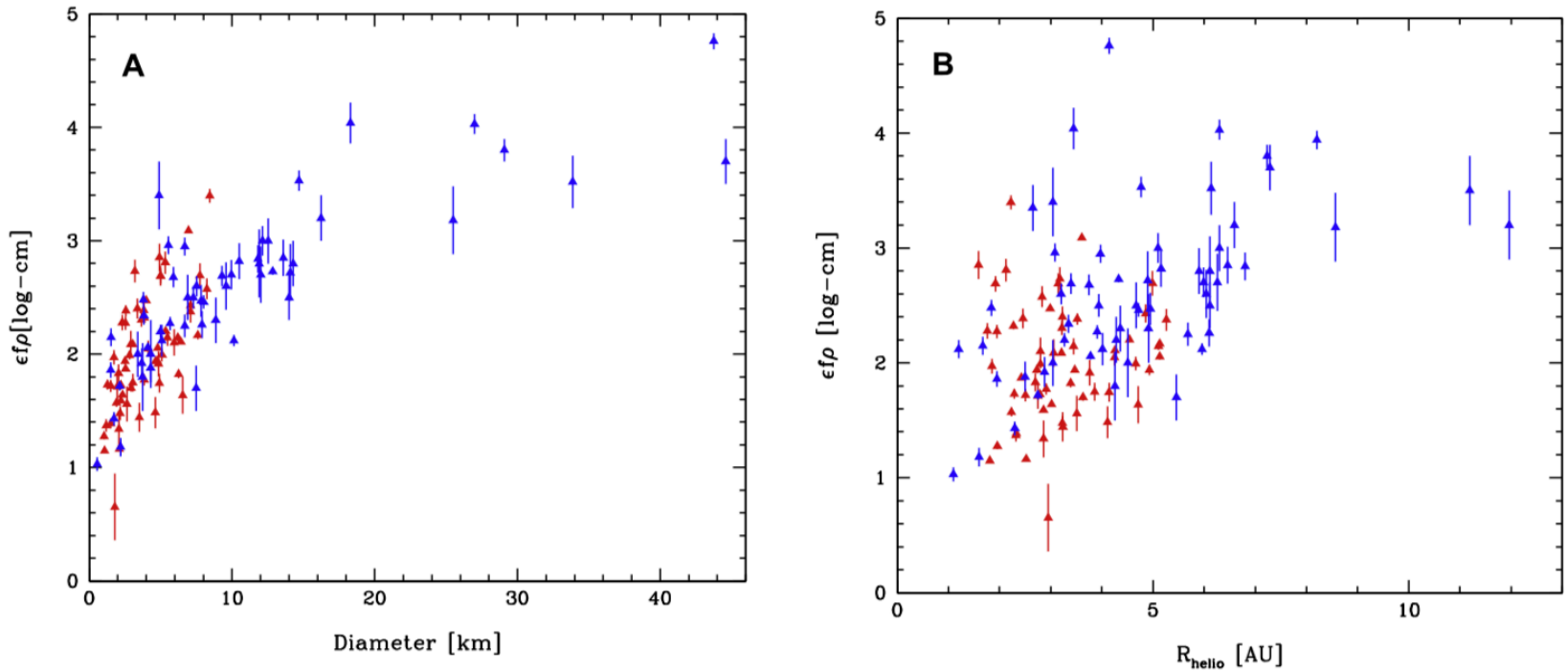
- Extracted nucleus flux fit to NEATM model



Bauer et al., 2017, AJ

Dust Production

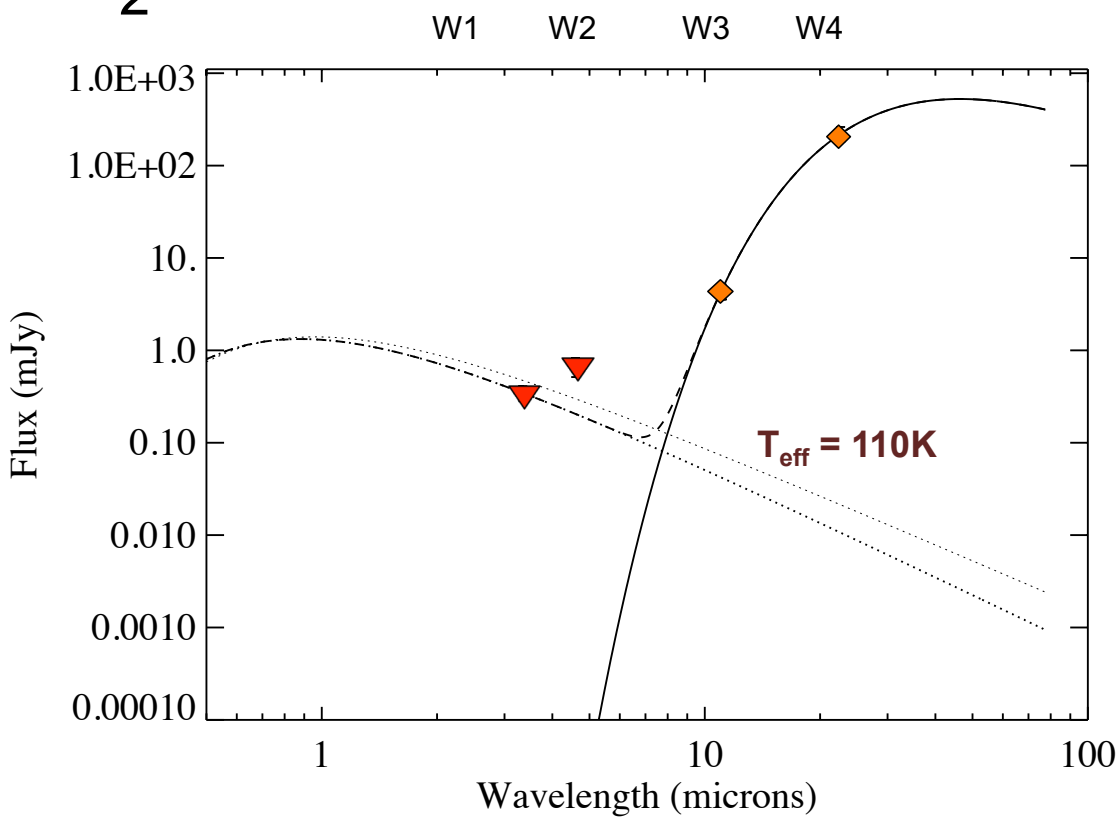
- $\varepsilon f\rho$ can be used as a proxy for the quantity of dust produced by a comet



Bauer et al., 2017, AJ

CO/CO_2 Detection

- Flux excess in W2 is due to presence of CO/CO_2



Bauer et al. 2015

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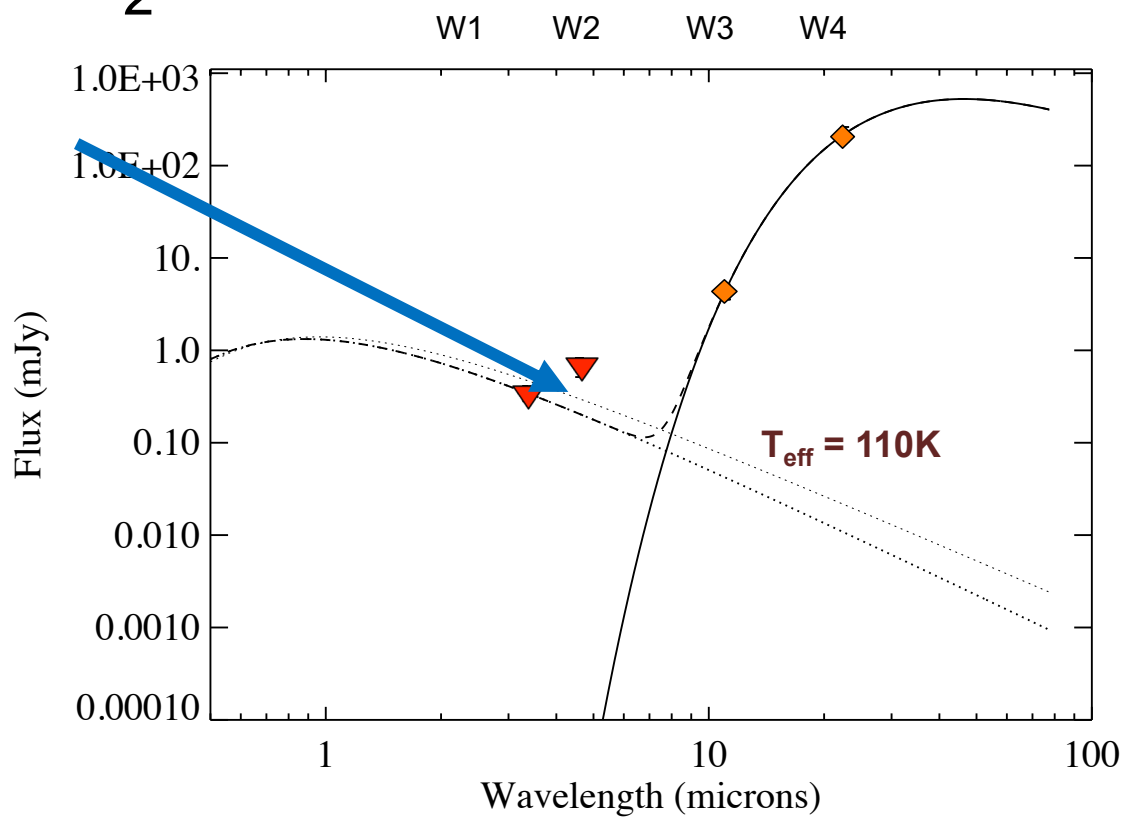
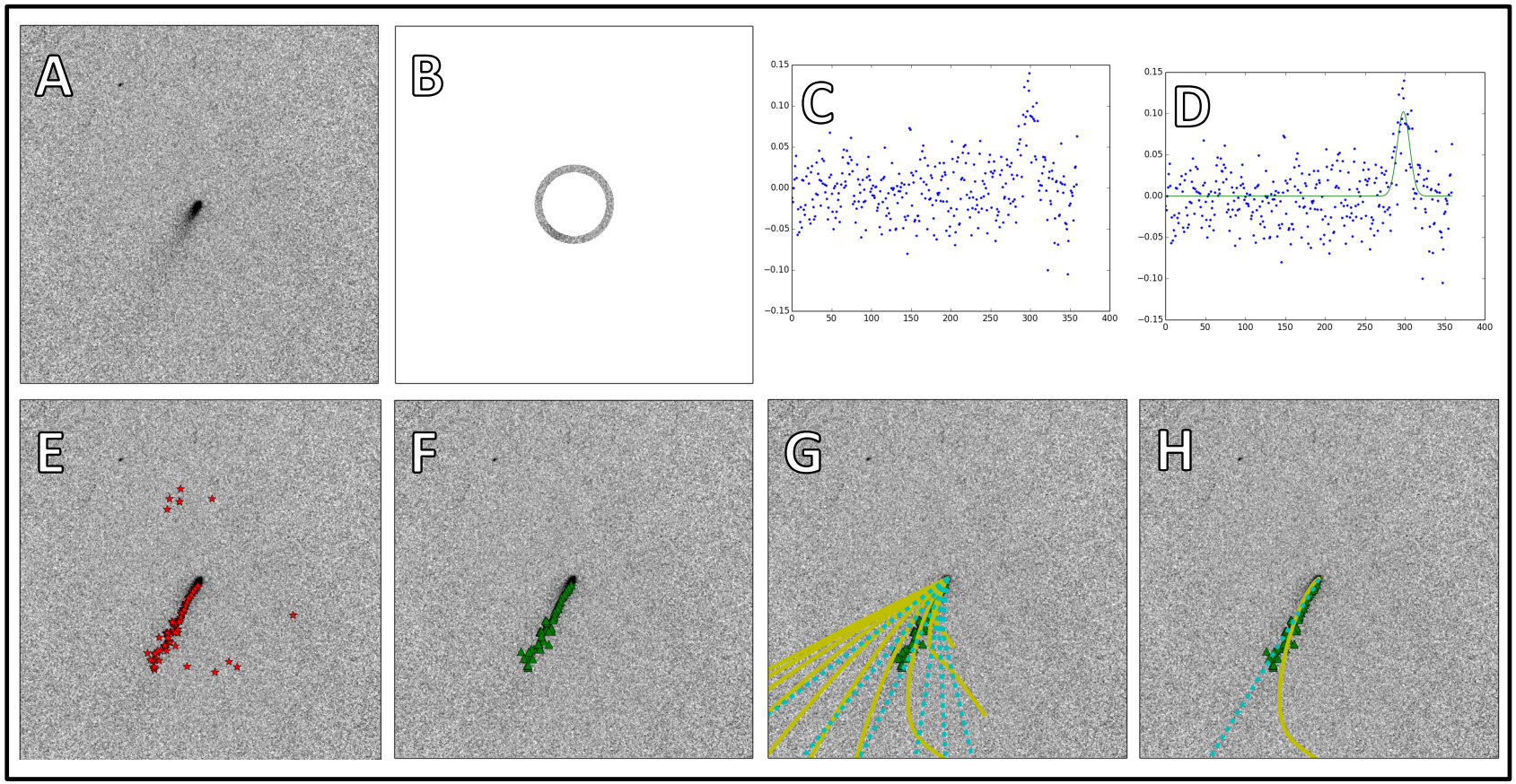


Bauer et al. 2015

Dust Morphology

- Shape of comet's tail can be used to constrain ejection time and particle size



Kramer et al., 2017, *Icarus*

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