Fragmentation and disk formation in high-mass star formation

Henrik Beuther, MPIA

Francesco's legacy, star formation in space and time, June 2017

Massive star formation conference 2007 in Hd

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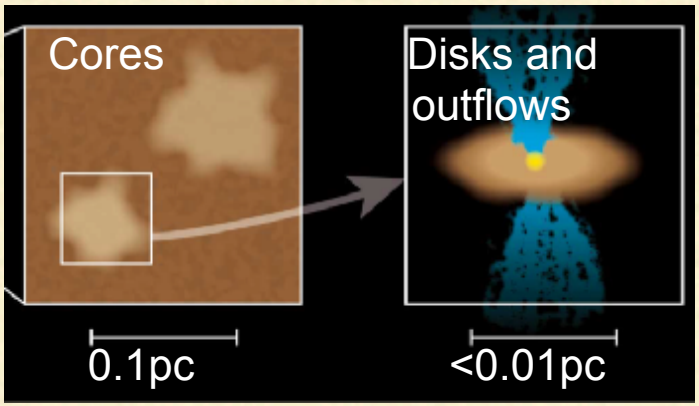
Fragmentation and disk formation during high-mass star formation

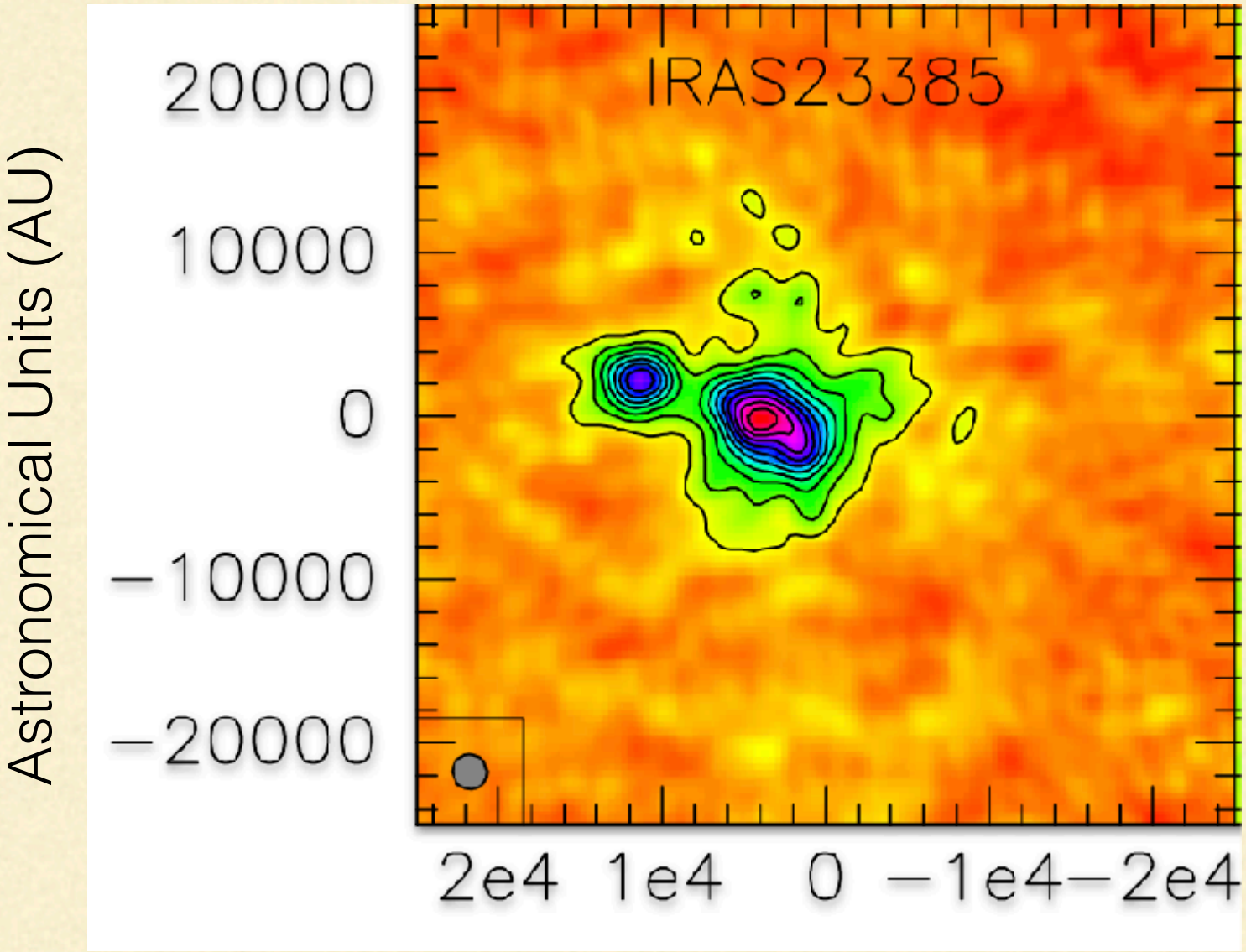
Survey (PI: H. Beuther):

- Large sample of high-mass star-forming regions
- 0.2”-0.3” ~ 500AU
- (sub)mm line and continuum emission

- >300 hours large program at NOEMA/PdBI



Dense cores in 1.3mm continuum



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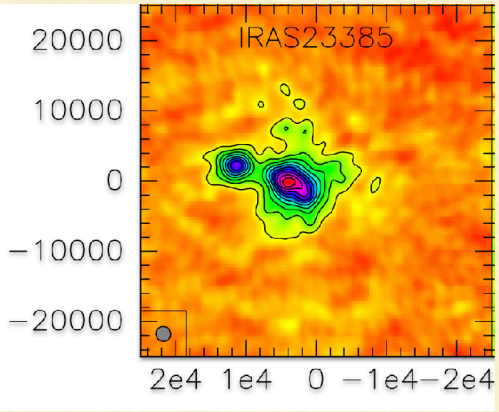
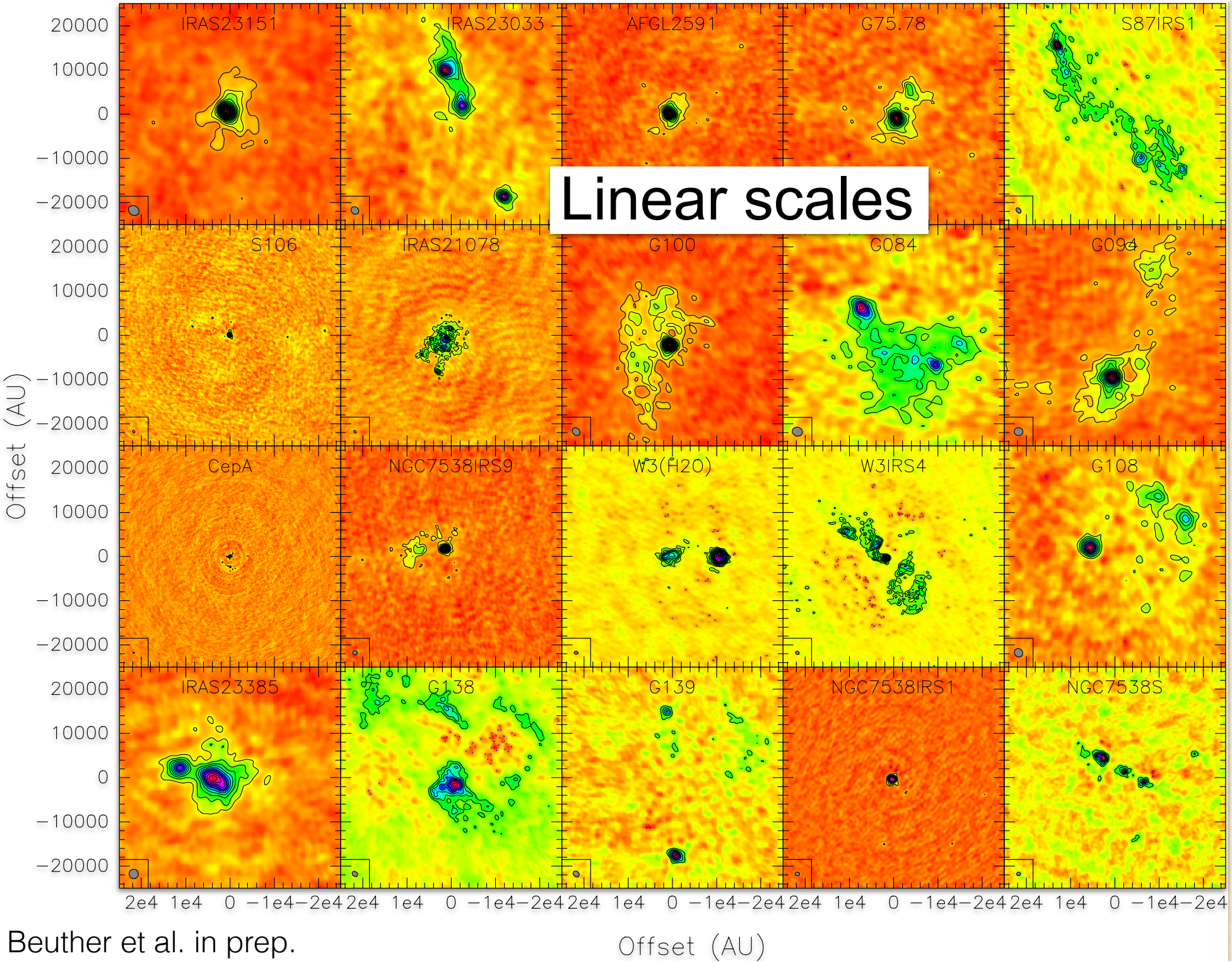
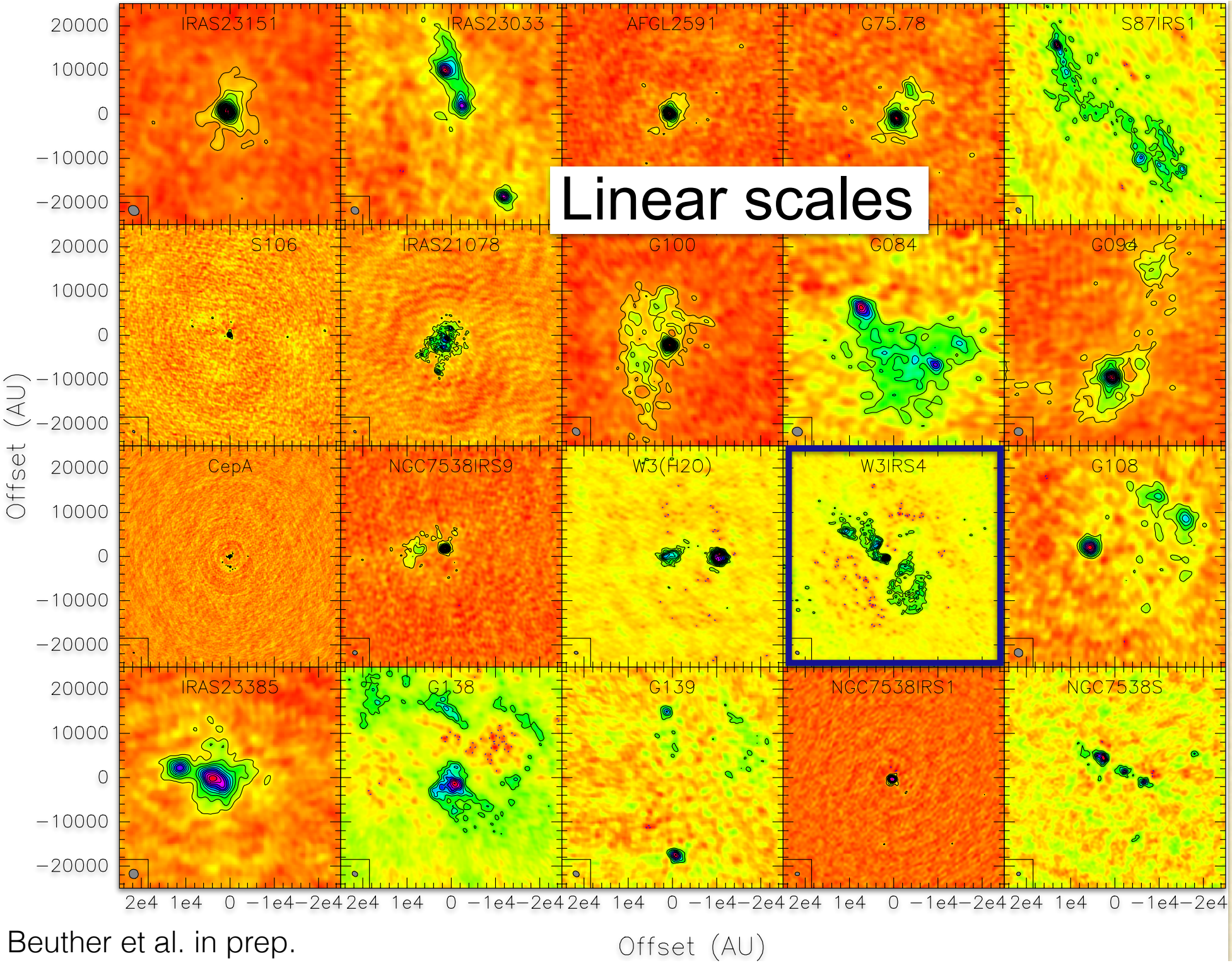




Beuther et al. in prep.



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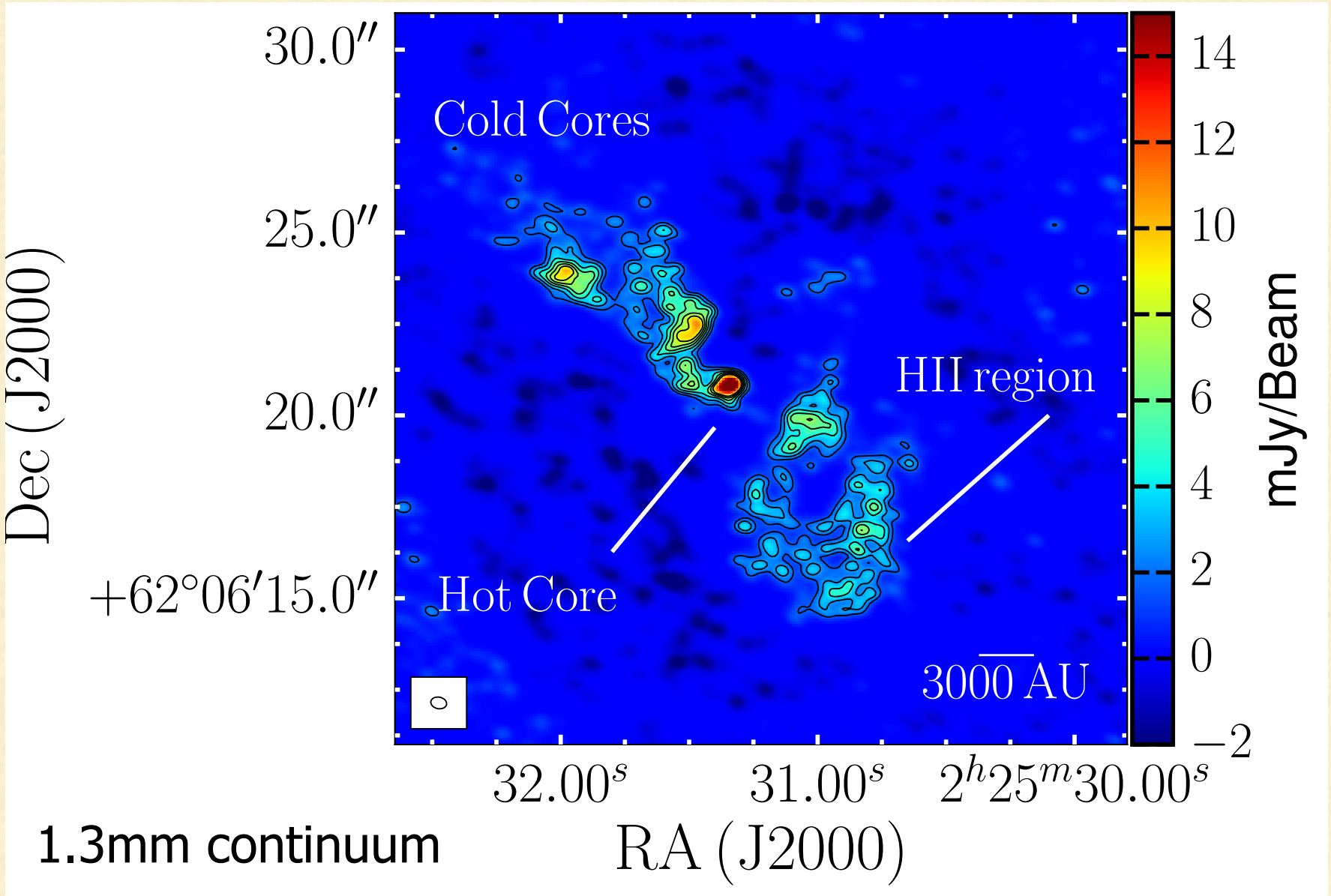
The W3IRS4 region



1.3mm continuum

(Mottram et al. in prep., poster #60)

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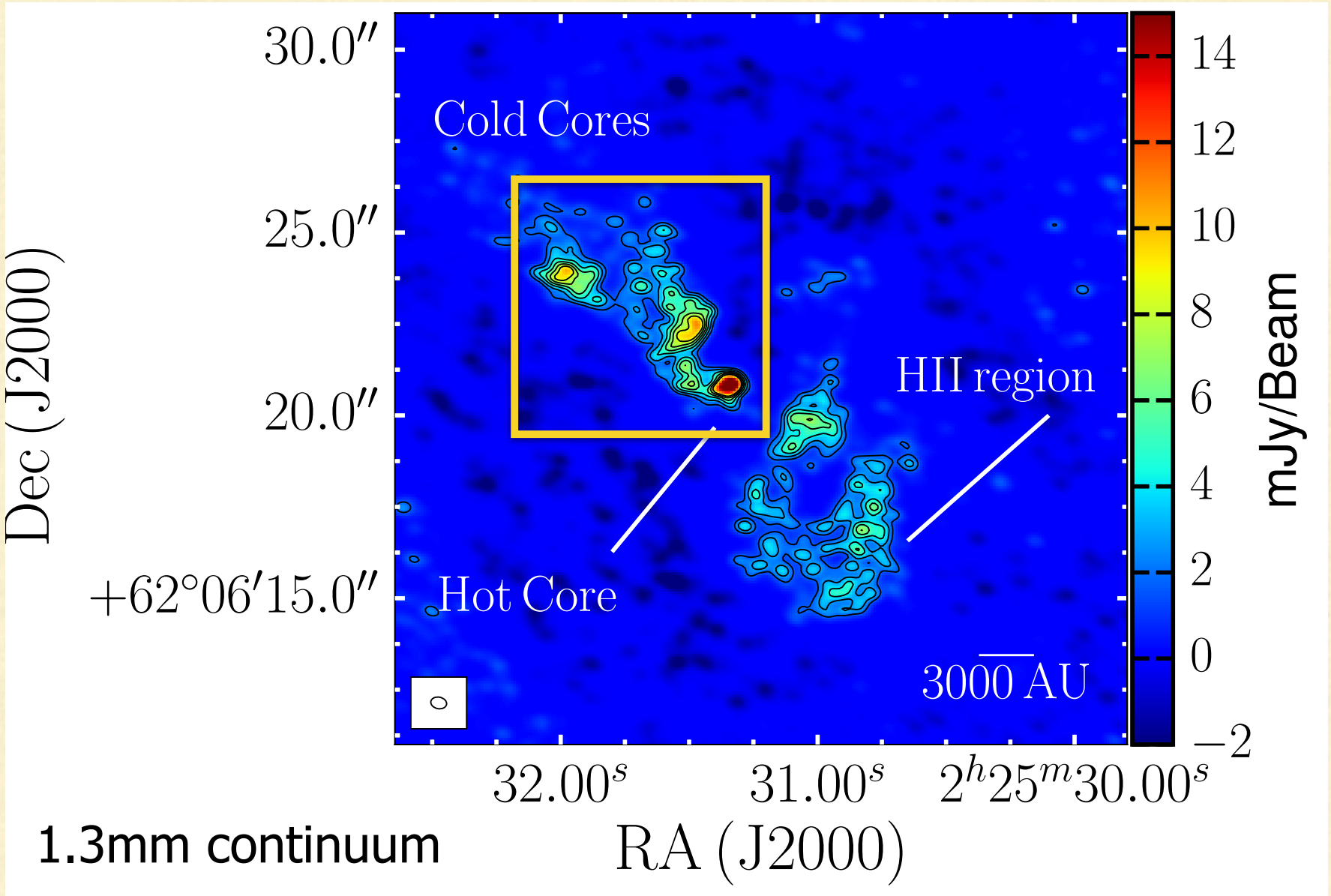
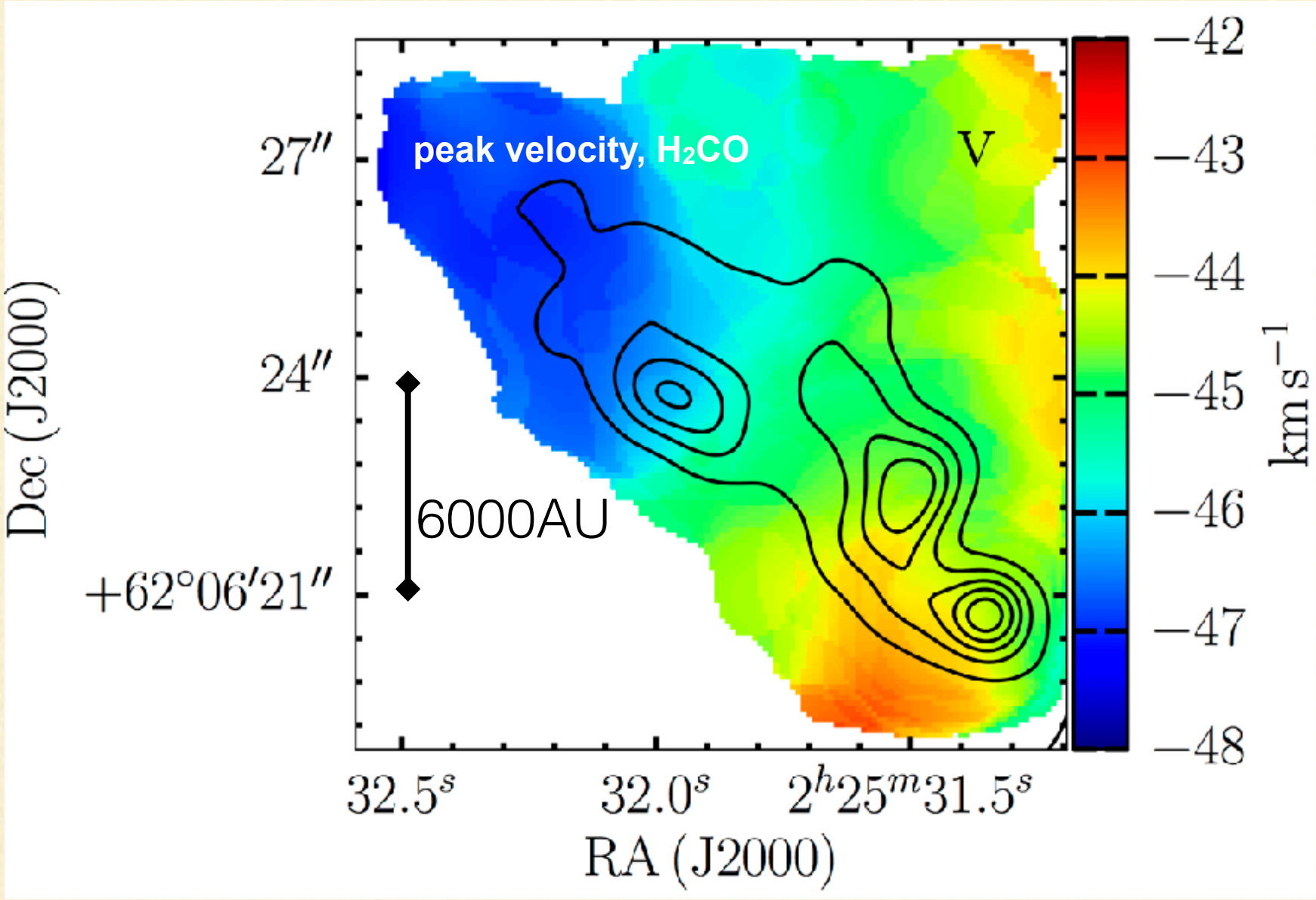


1.3mm continuum

(Mottram et al. in prep., poster #60)

Large-scale flows



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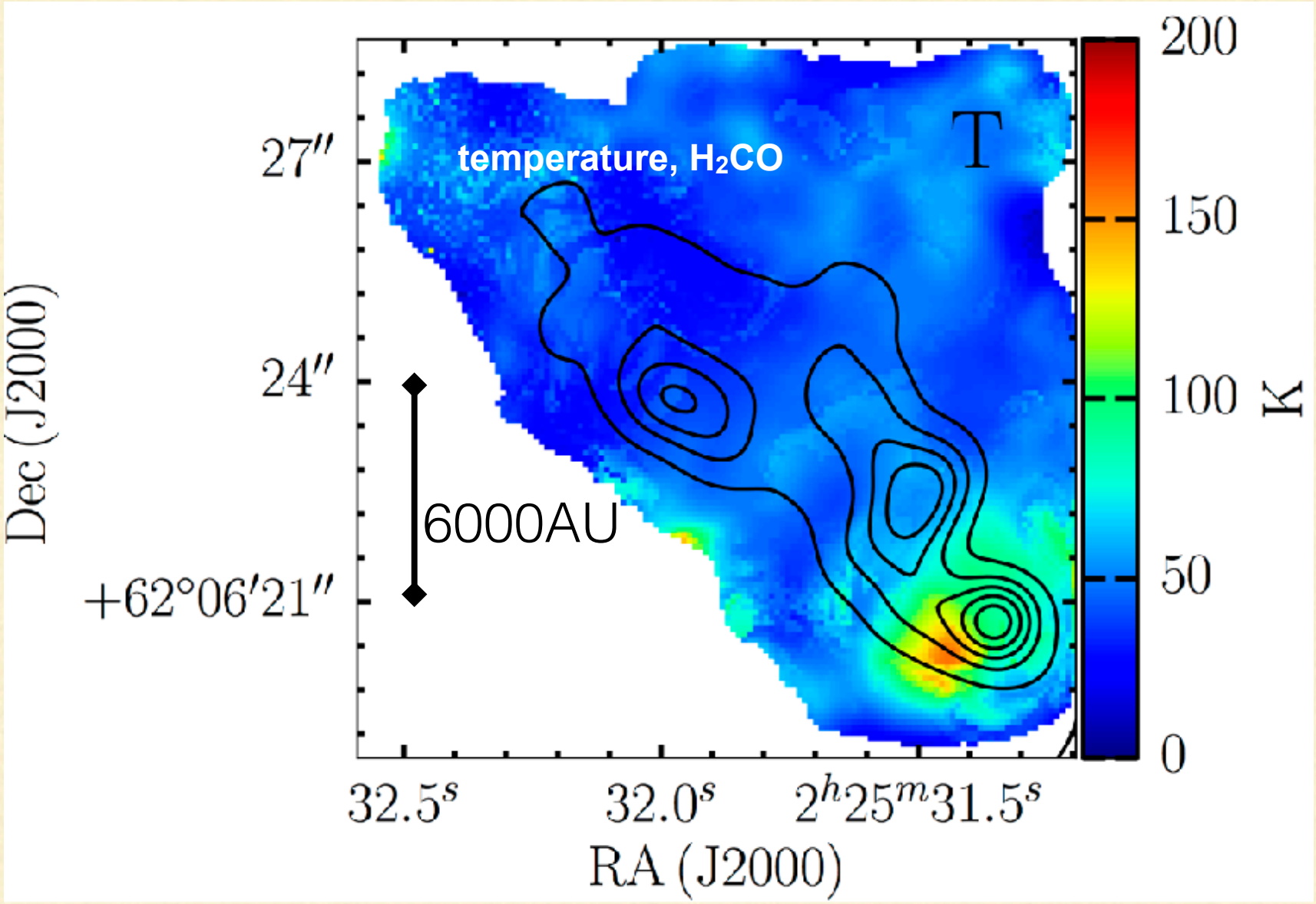
Large-scale temperature distribution



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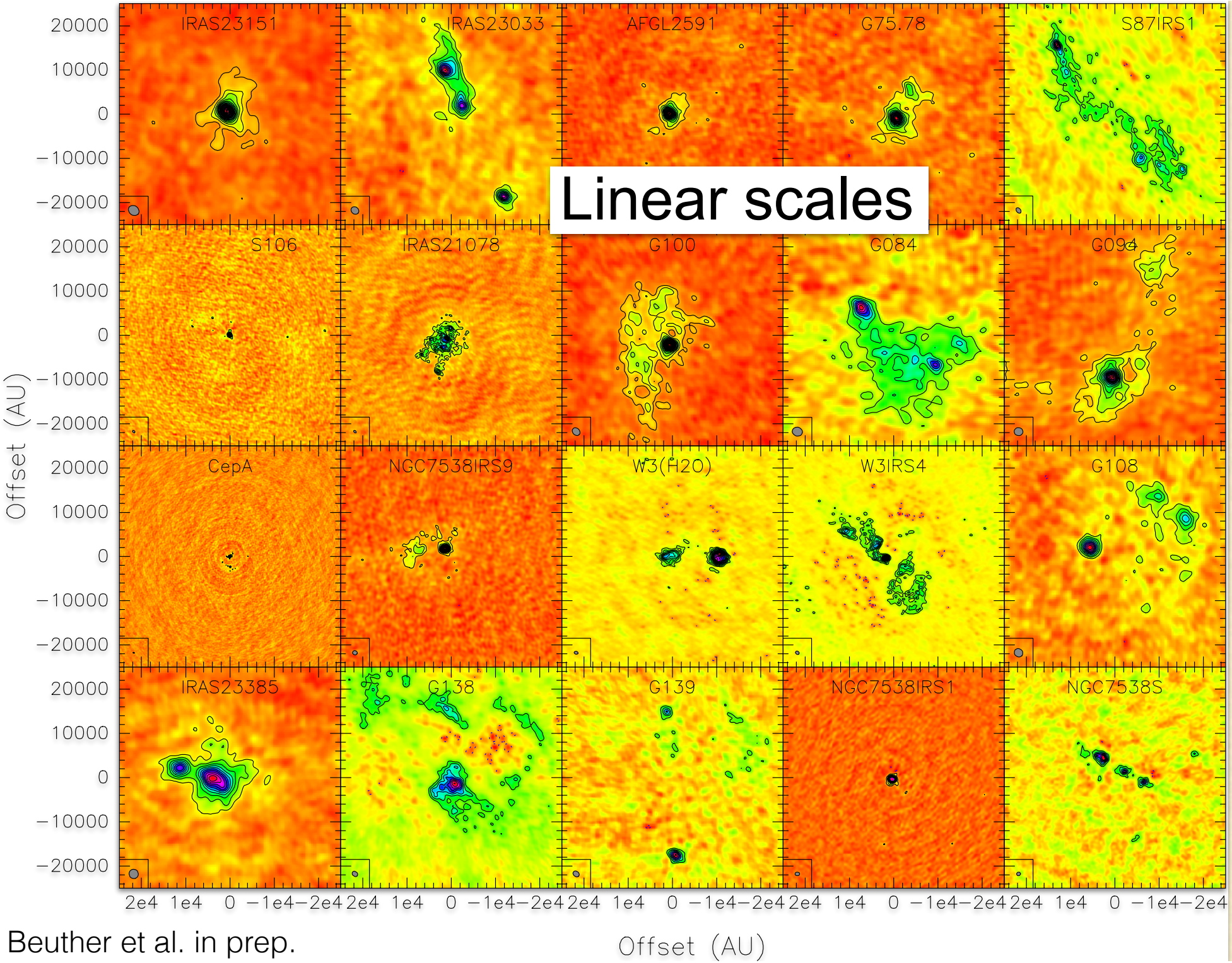

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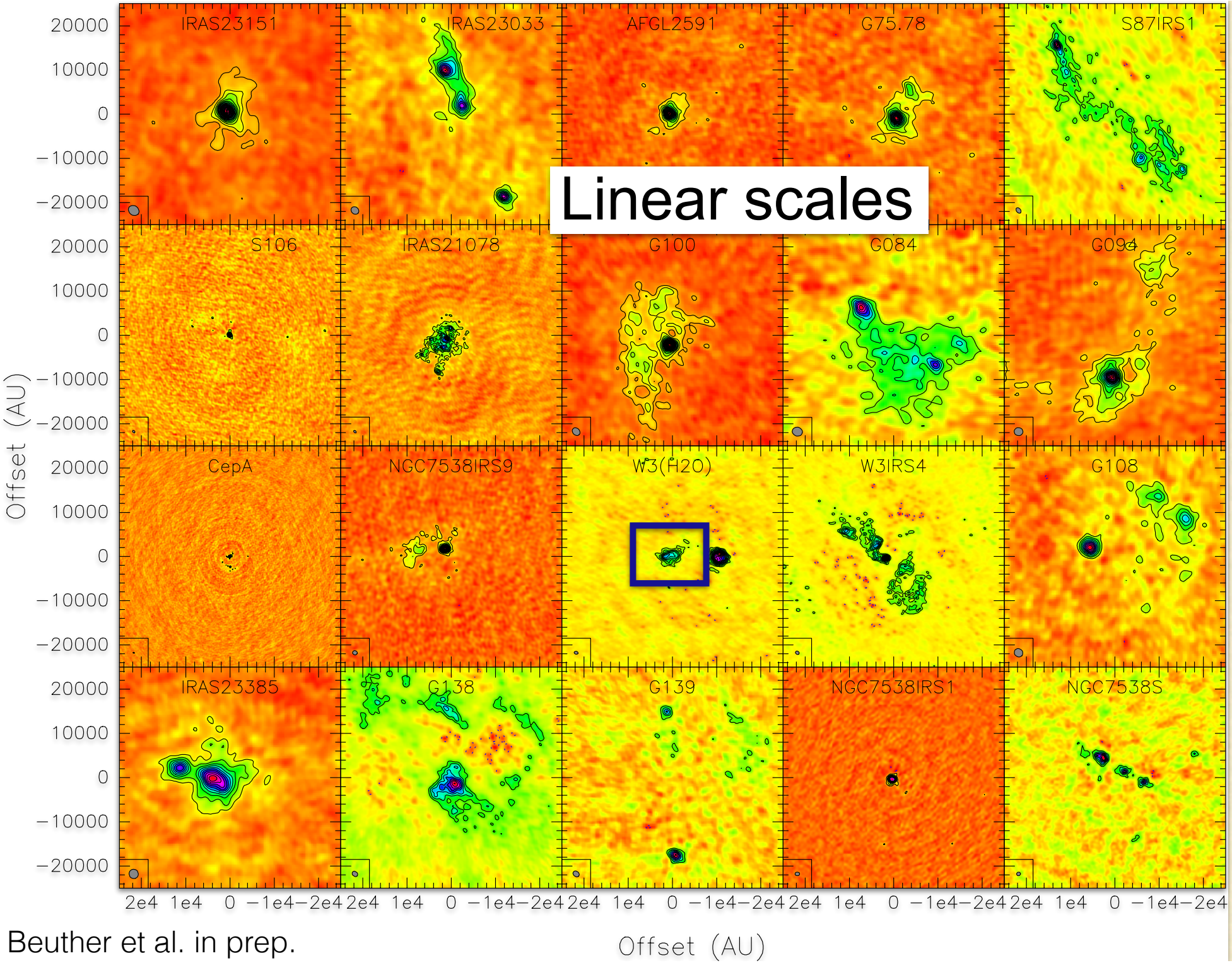
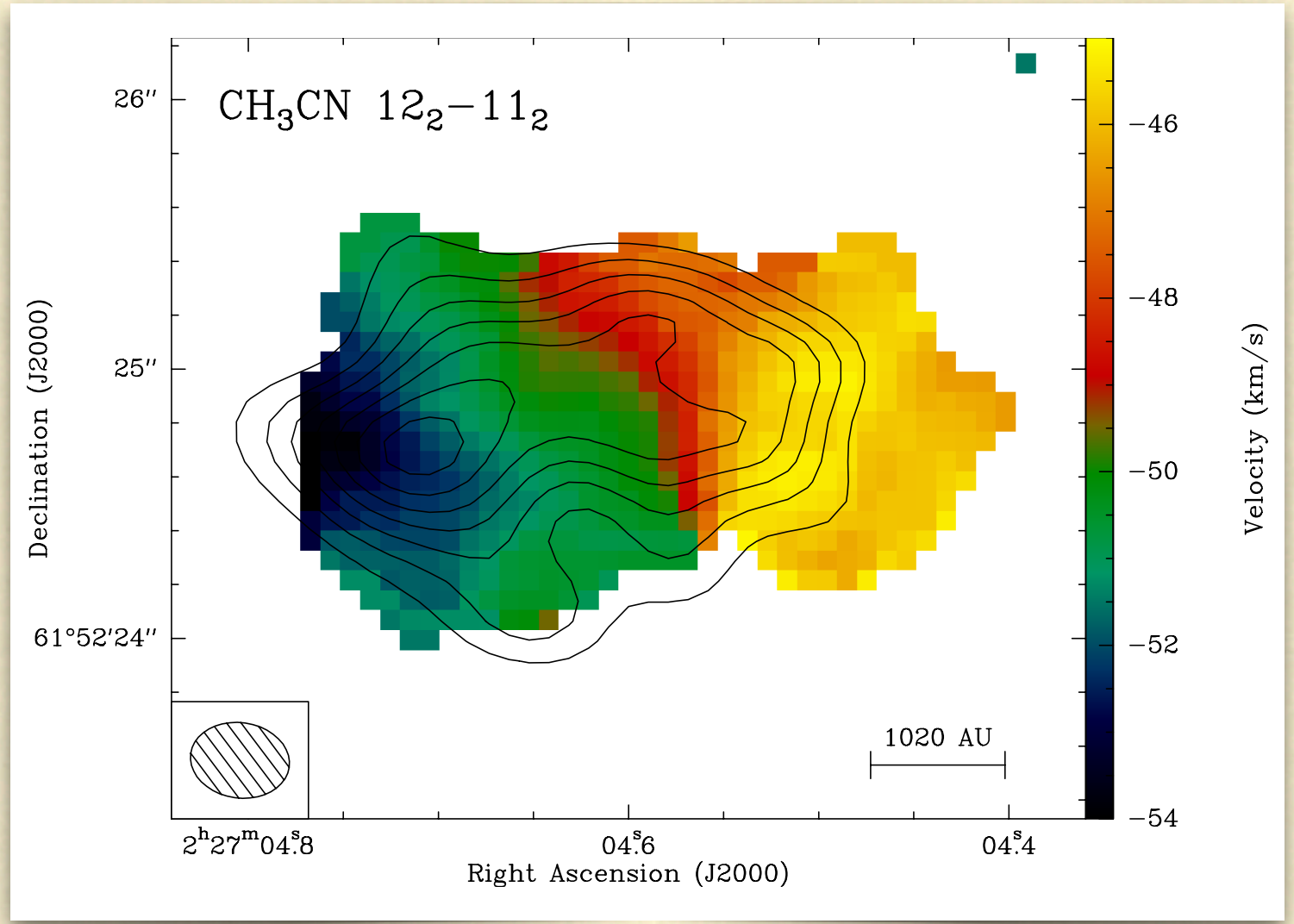


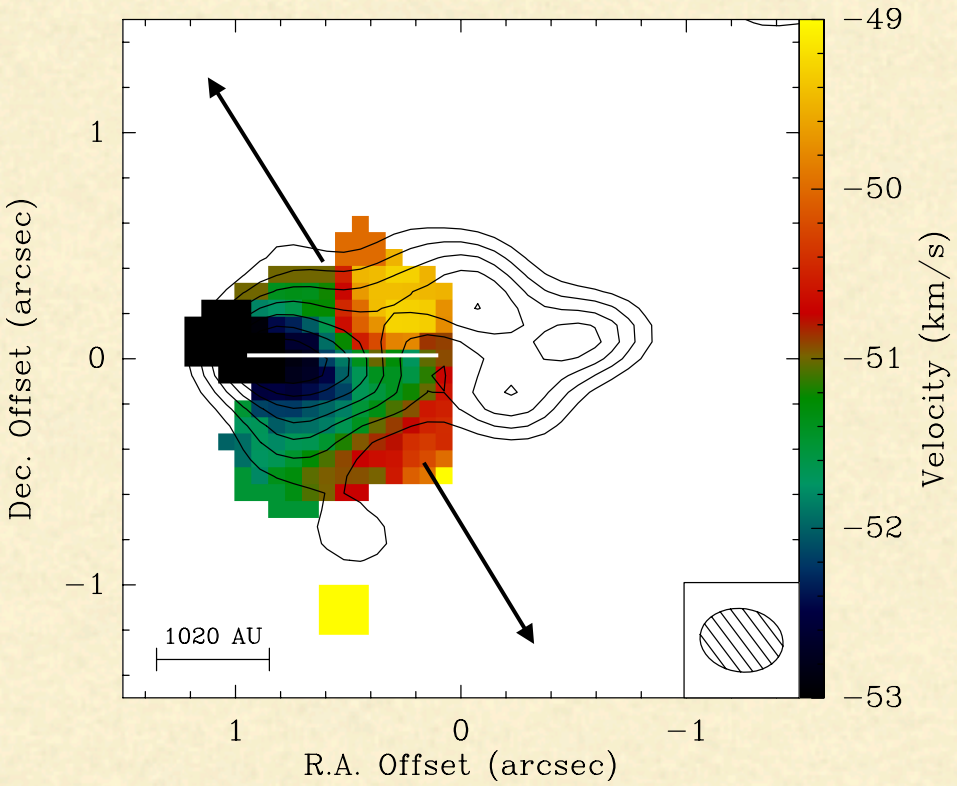
Beuther et al. in prep.

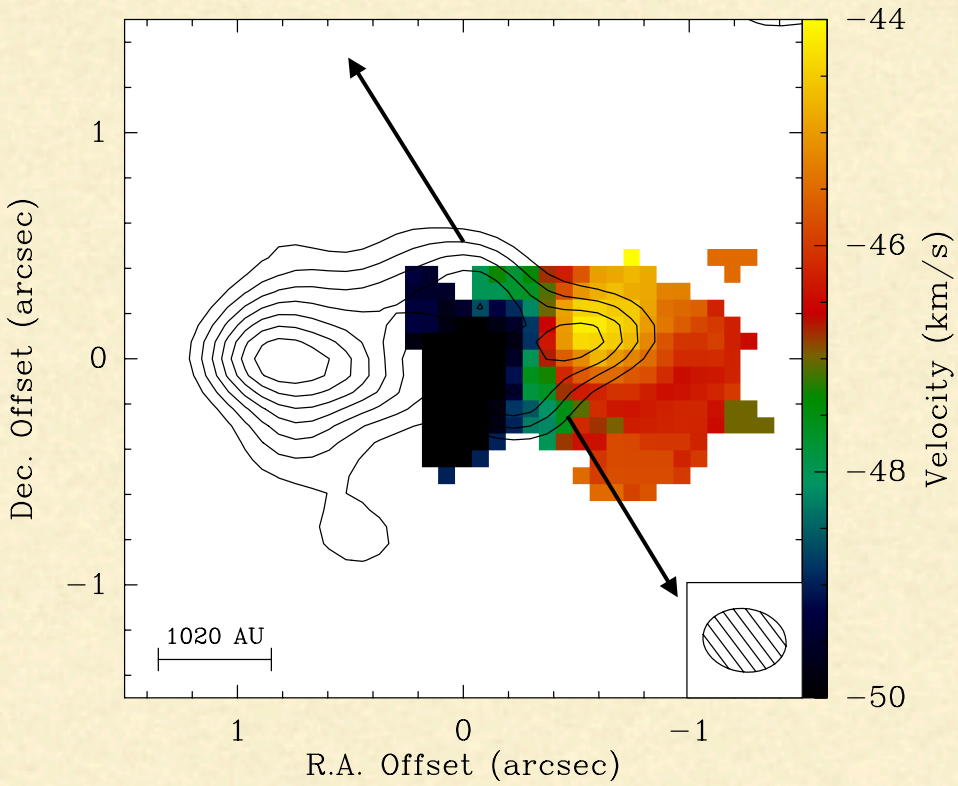
Velocity structure of W3(H2O)



(Ahmadi et al. in prep., poster #29)

Individual fragments





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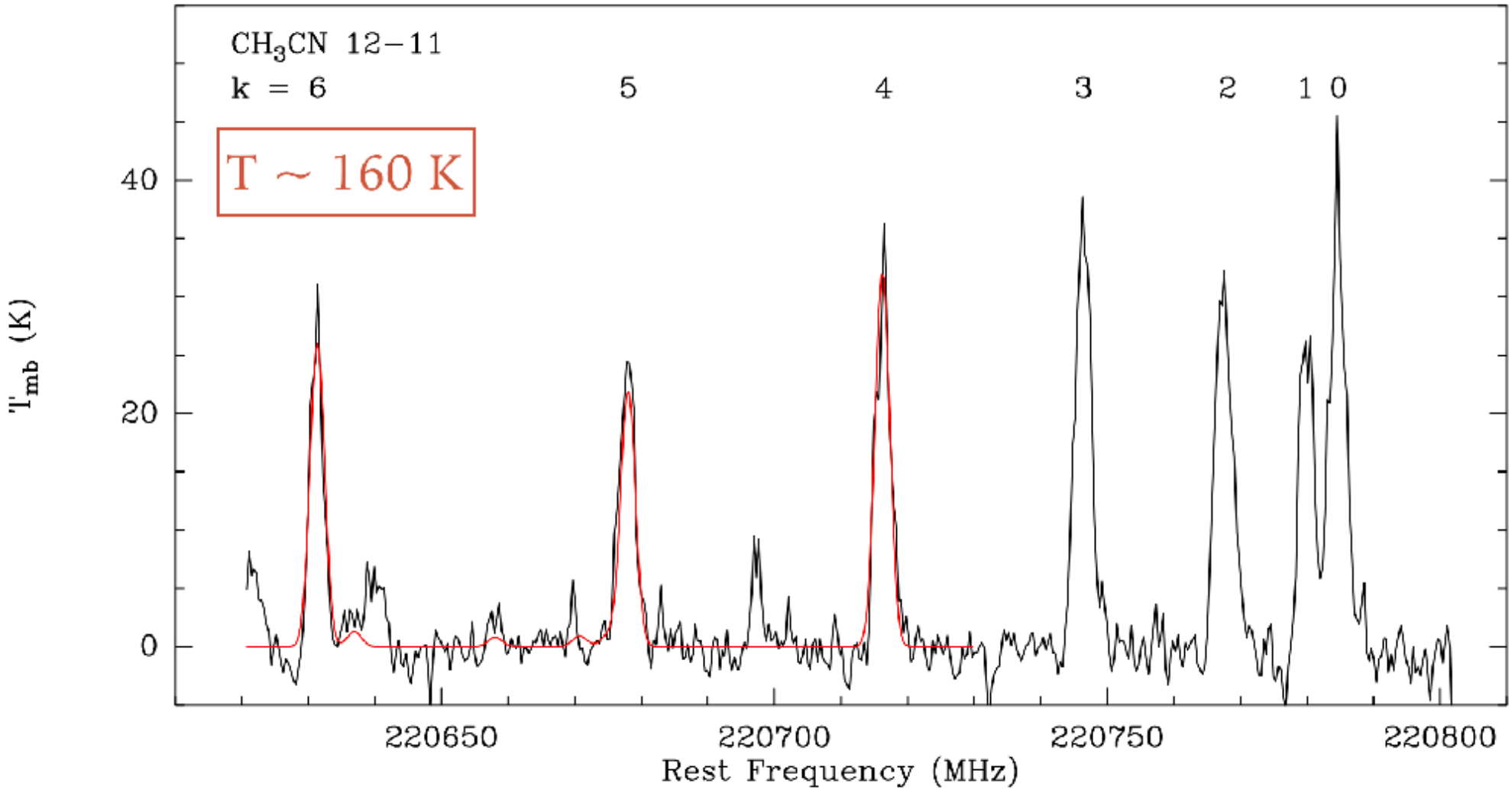
CH3CN spectra



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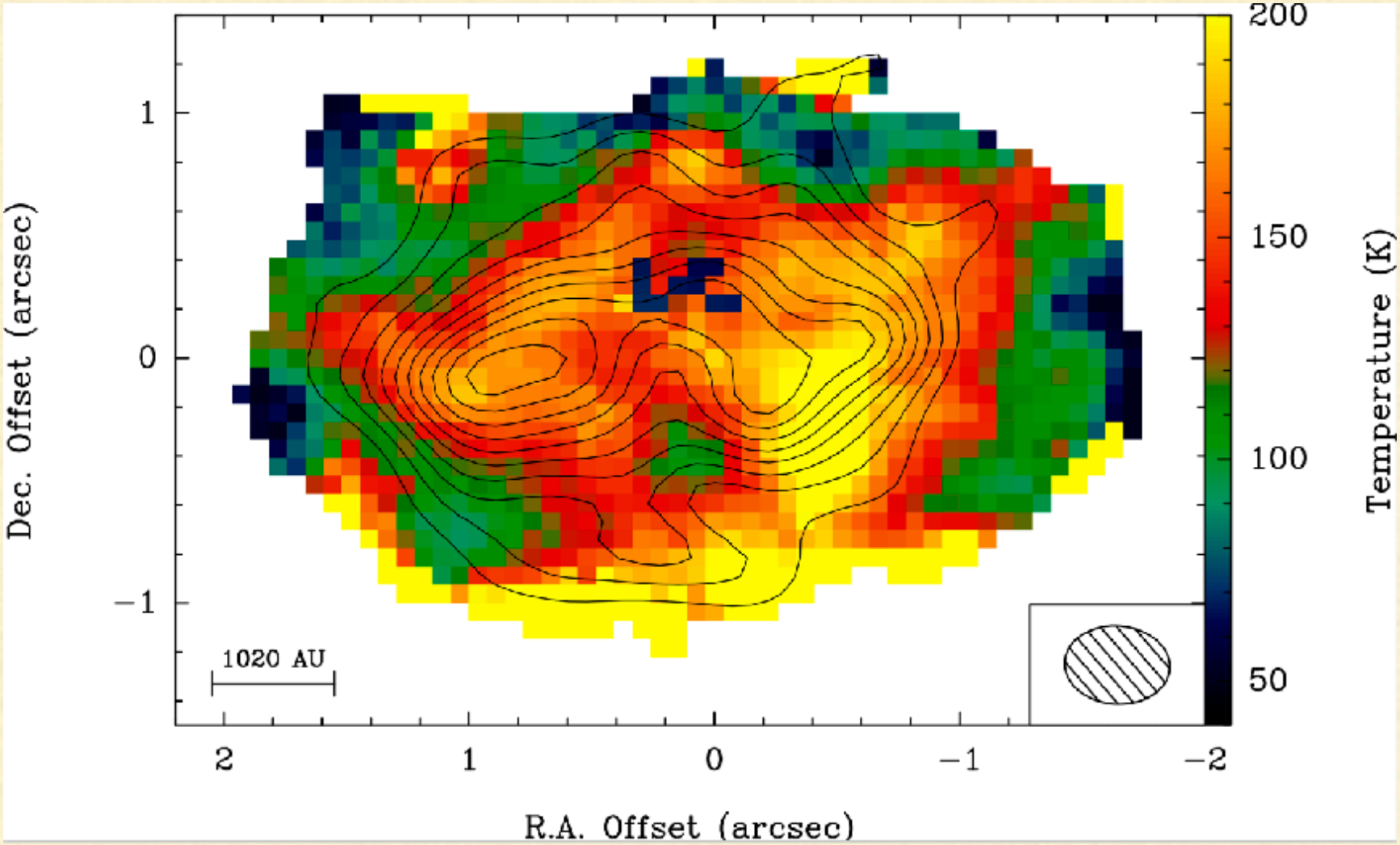
Temperature map



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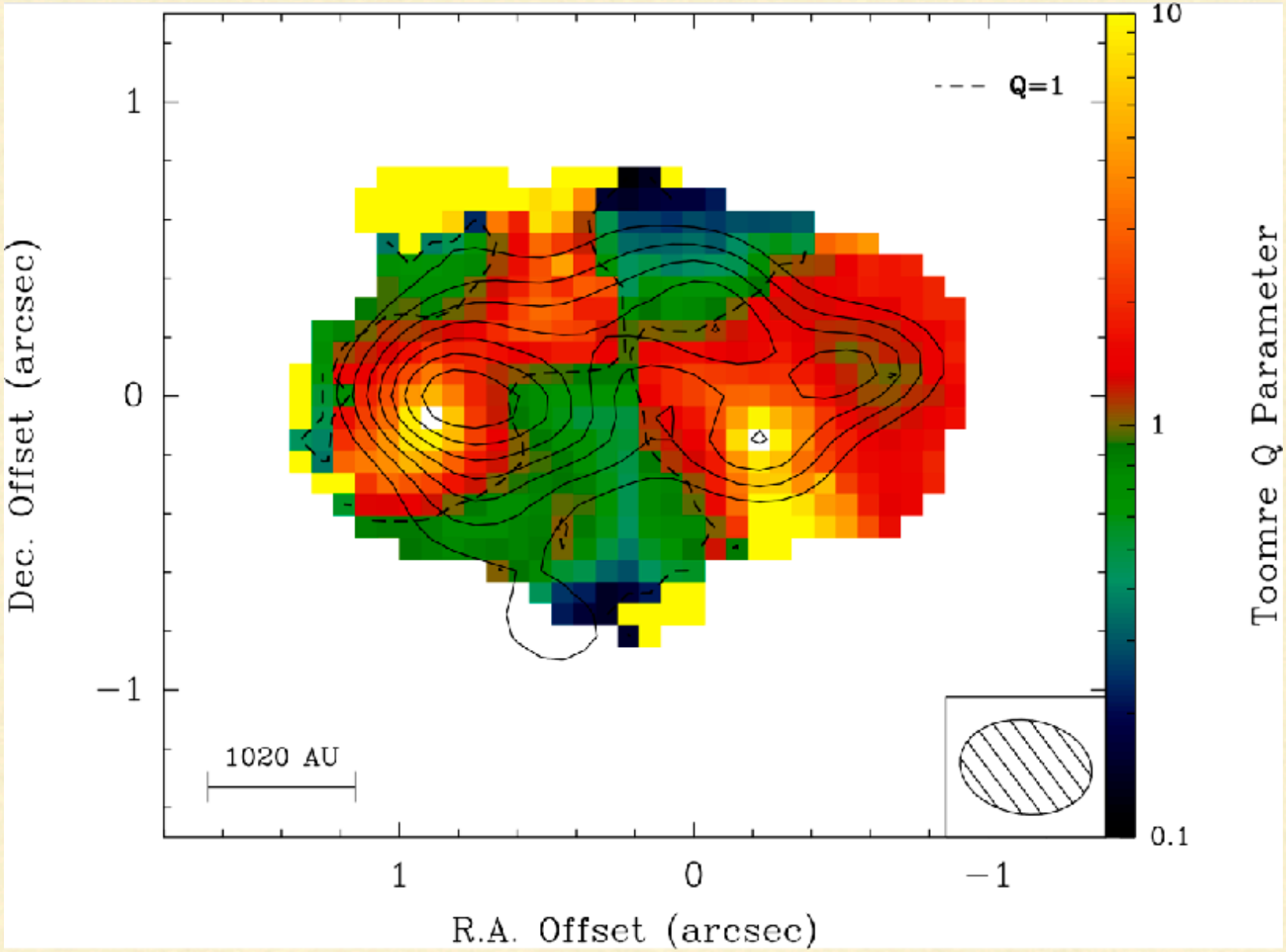
Toomre Q map



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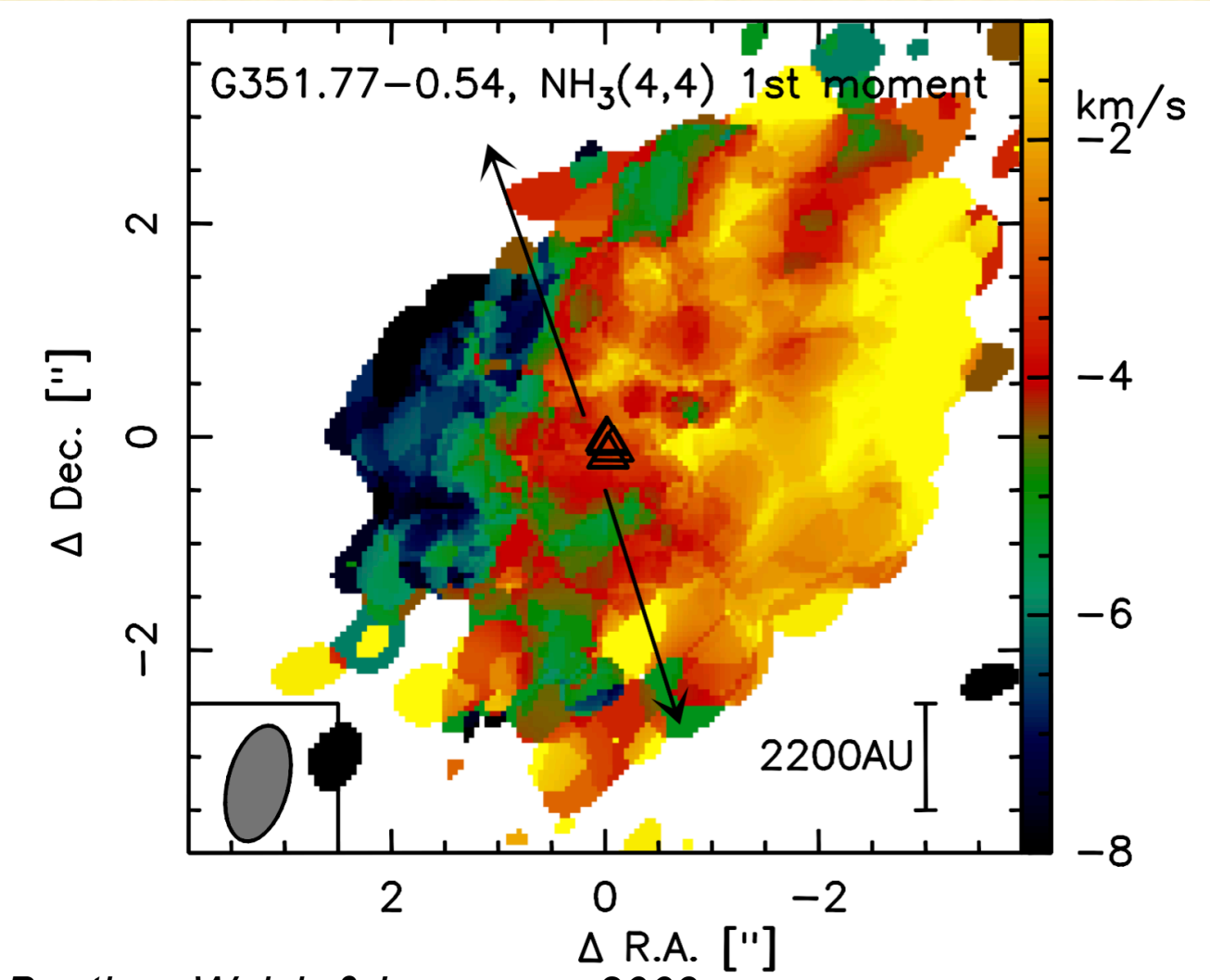
The hot core G351: ALMA@690GHz & 0.06”



Beuther, Walsh & Longmore 2009

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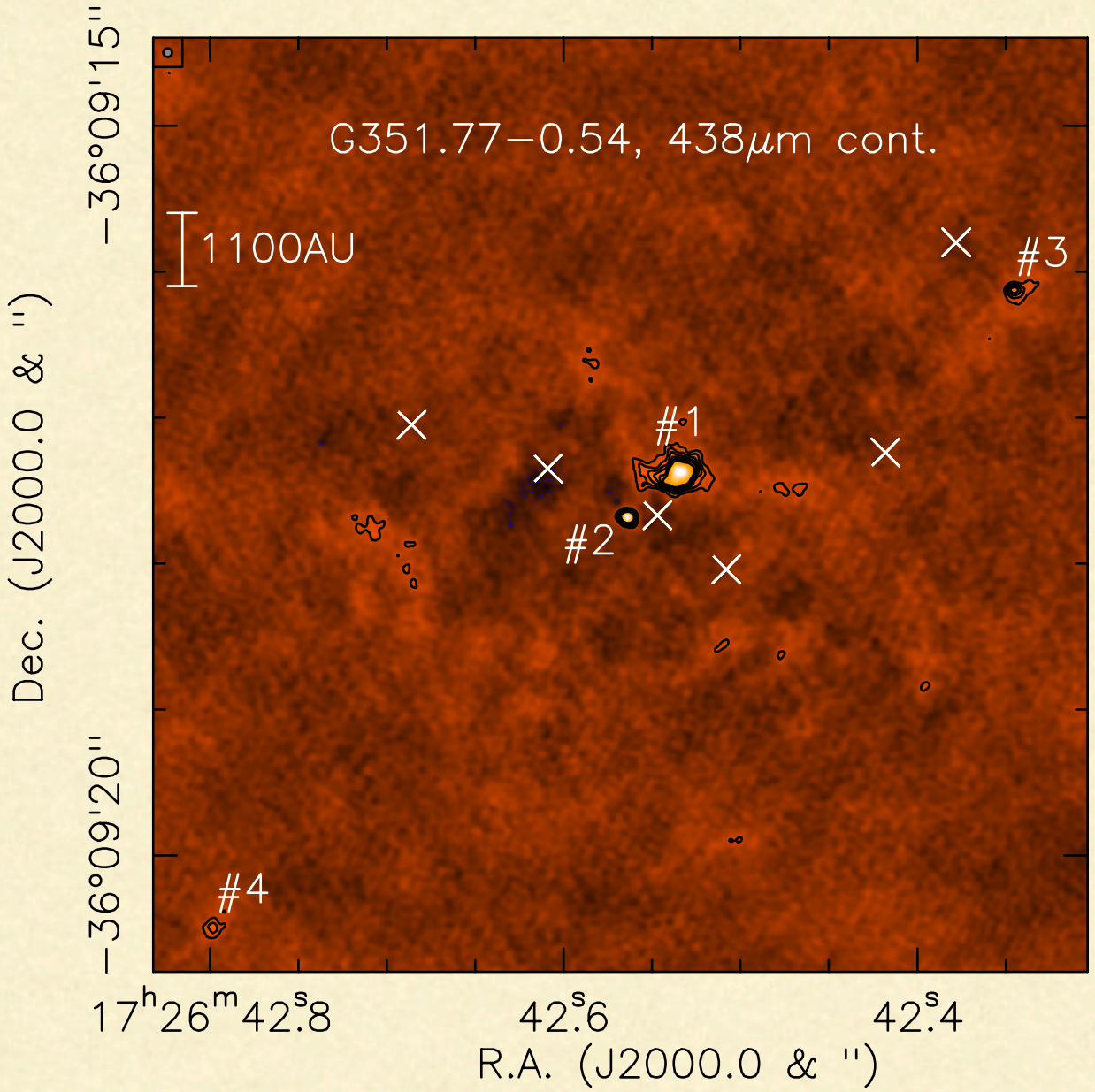

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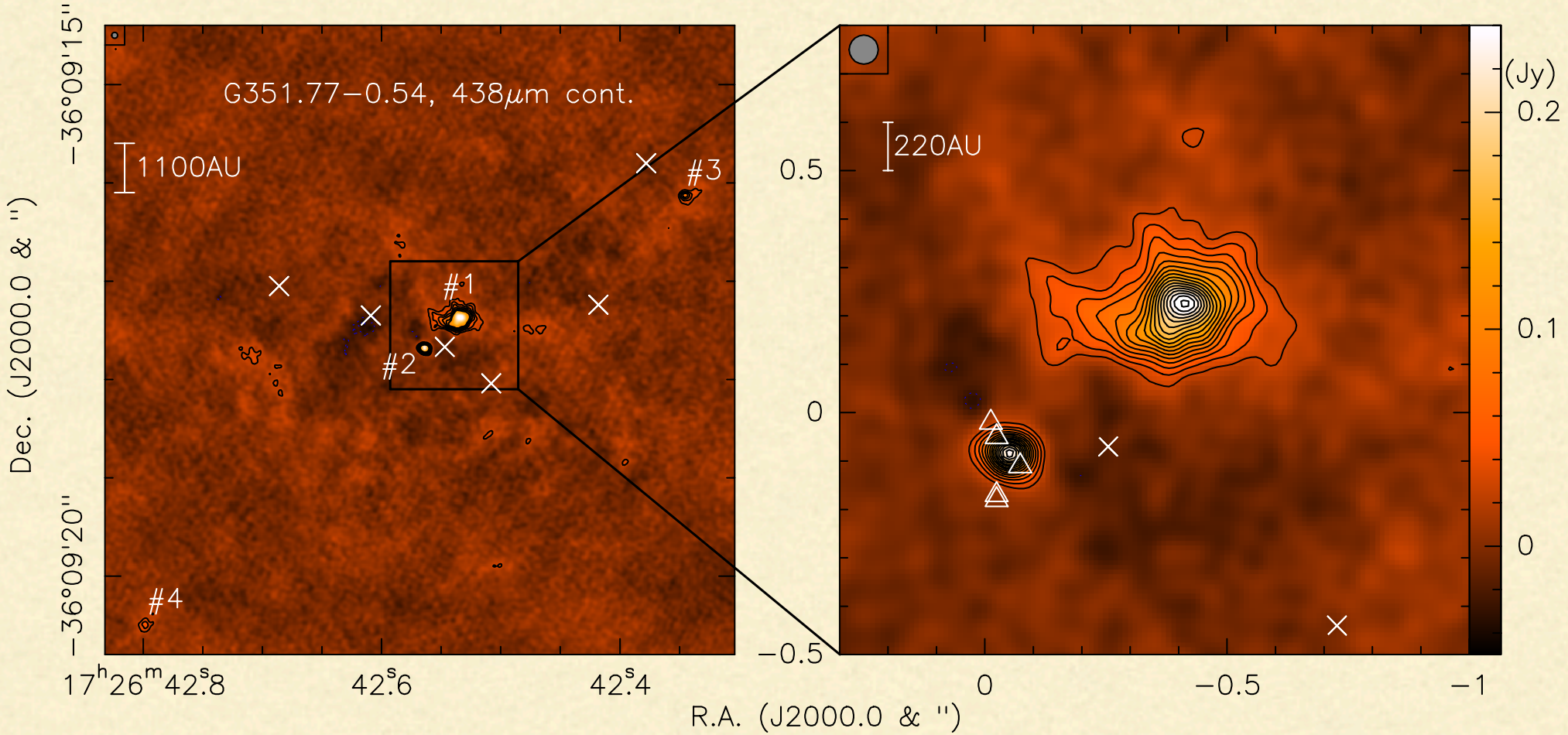

Beuther et al. 2017

Conclusions

- Different modes of fragmentation
    - Isolated cores vs. highly fragmented clumps
    - Core fragmentation on large scales and disk fragmentation on small scales
- Kinematics important on large and small scales
- Temperature structure can be derived on all scales