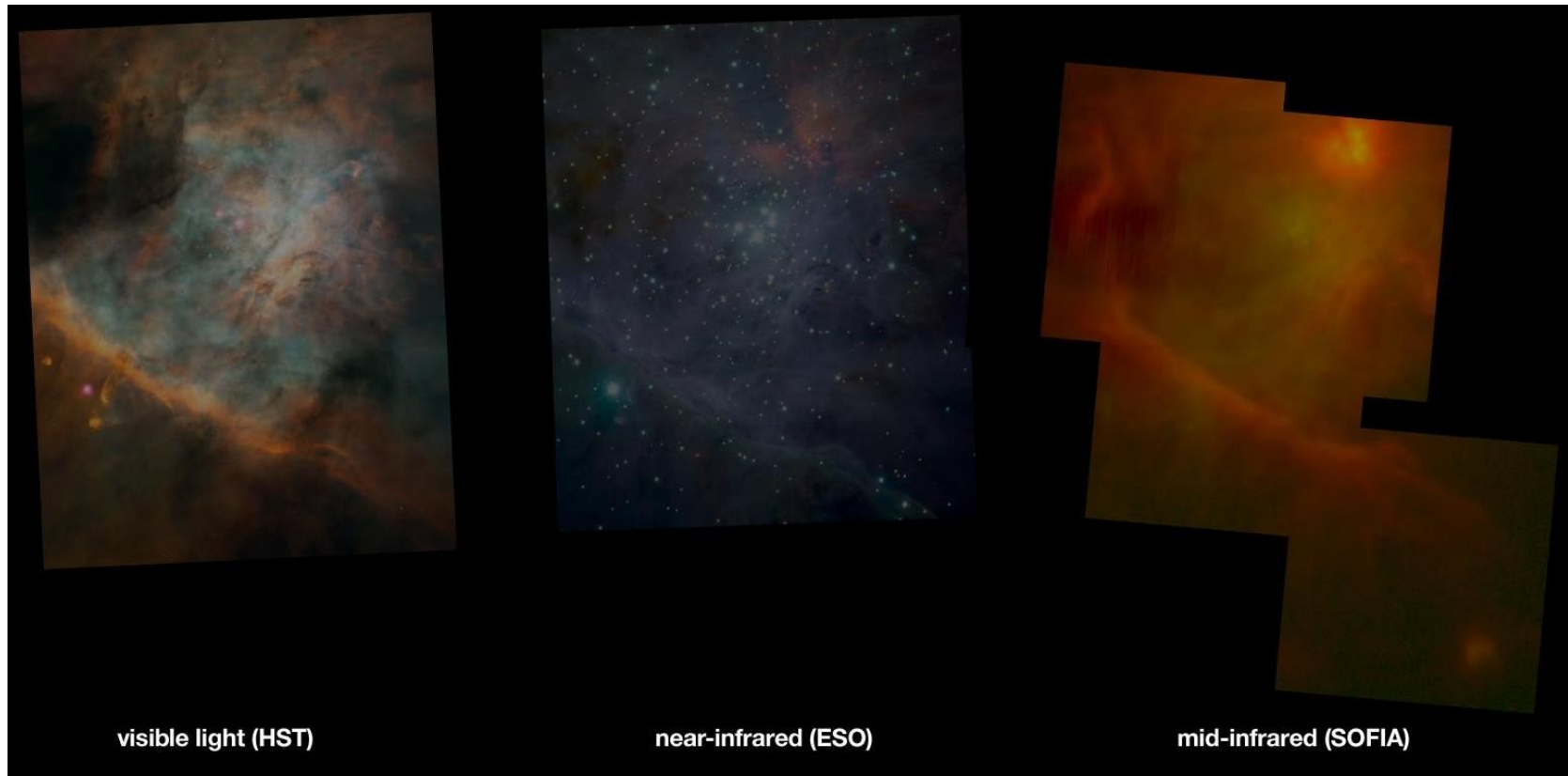
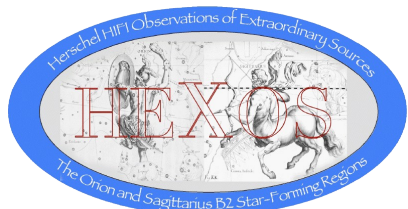


CII in the Orion Bar

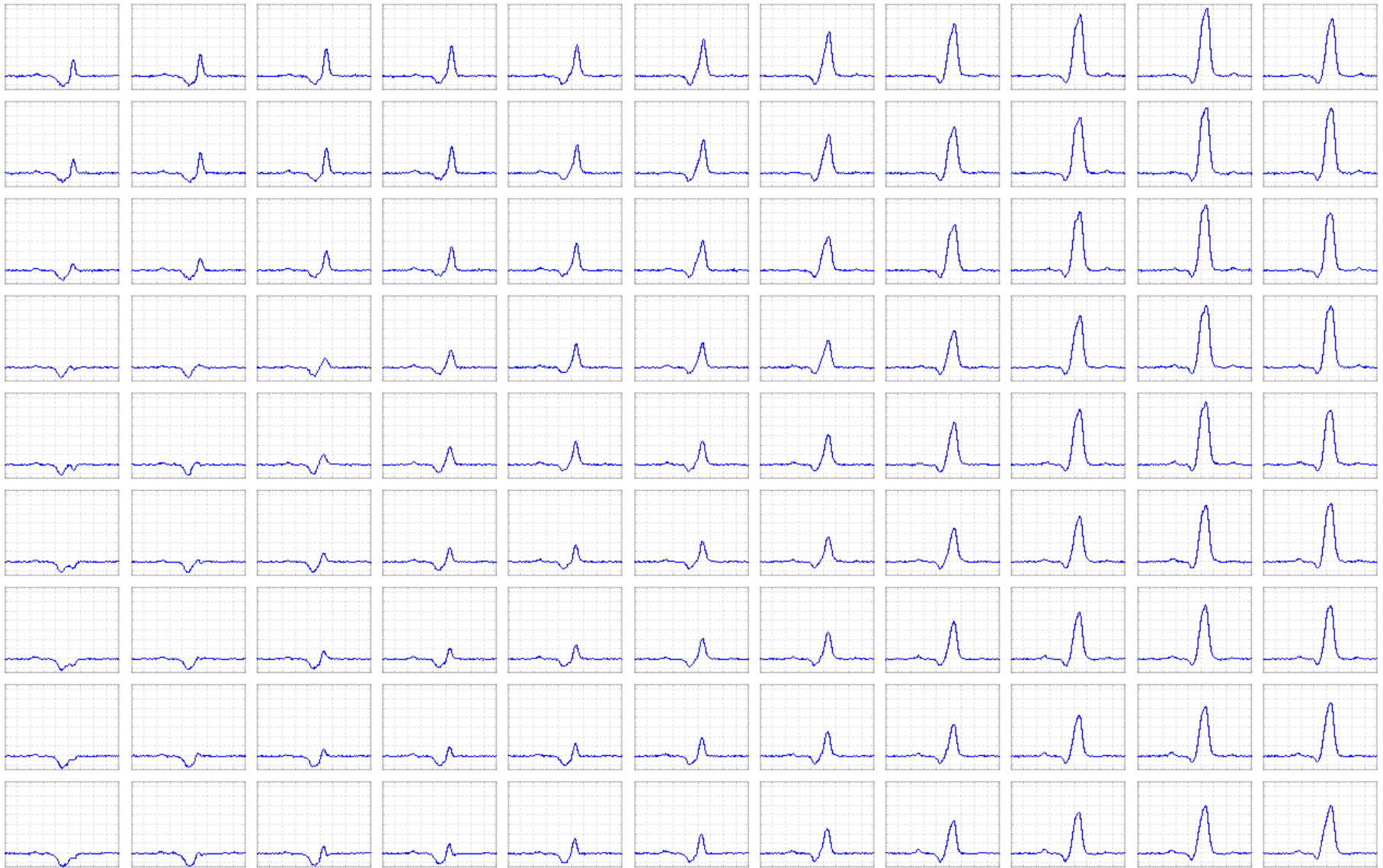
V. Ossenkopf, M. Röllig

- Analysis of 2 ObsIds: 1342203243 & 1342218522





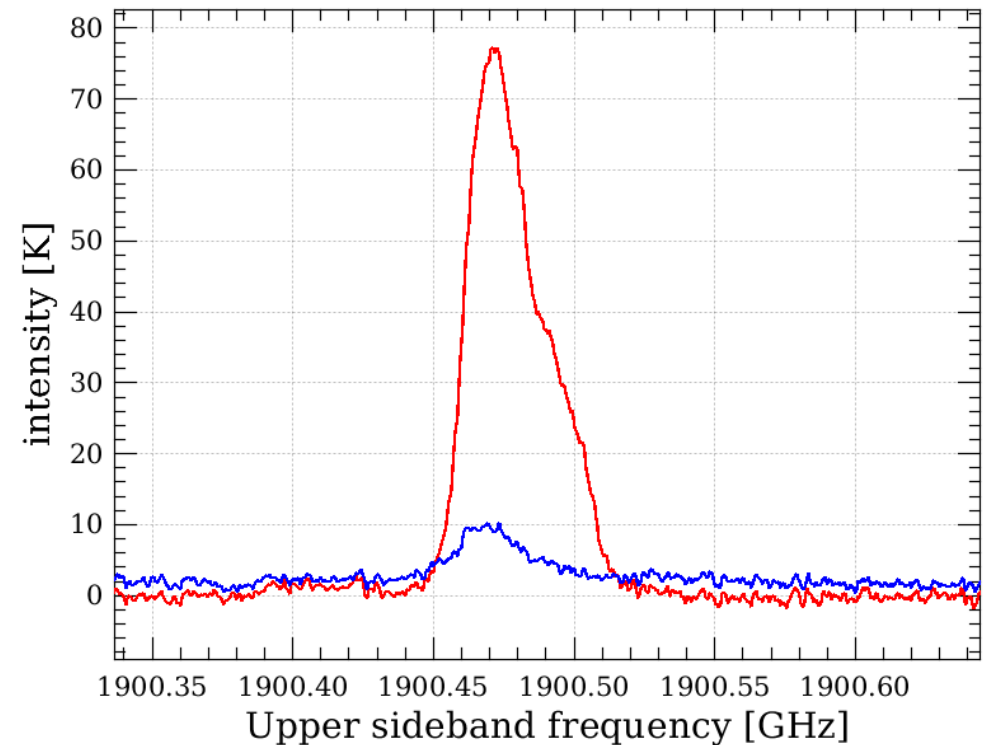
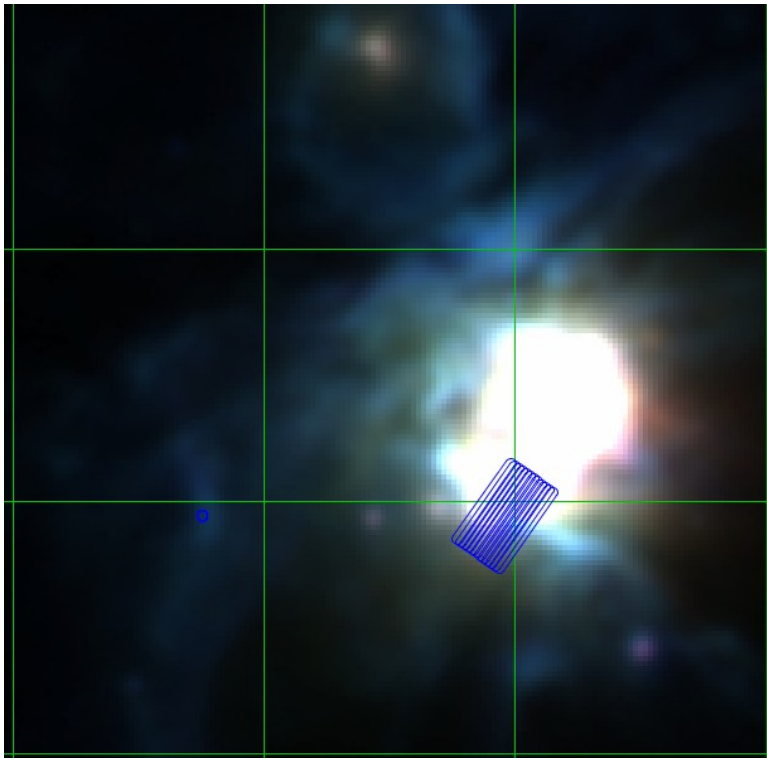
Original map



- Strong OFF contamination

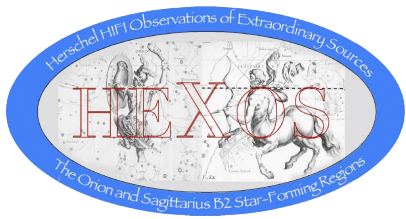
Corrected with separate OFF

- Original OFF had very bright [CII] contamination
- Even tertiary OFF >15' away still shows 10K emission



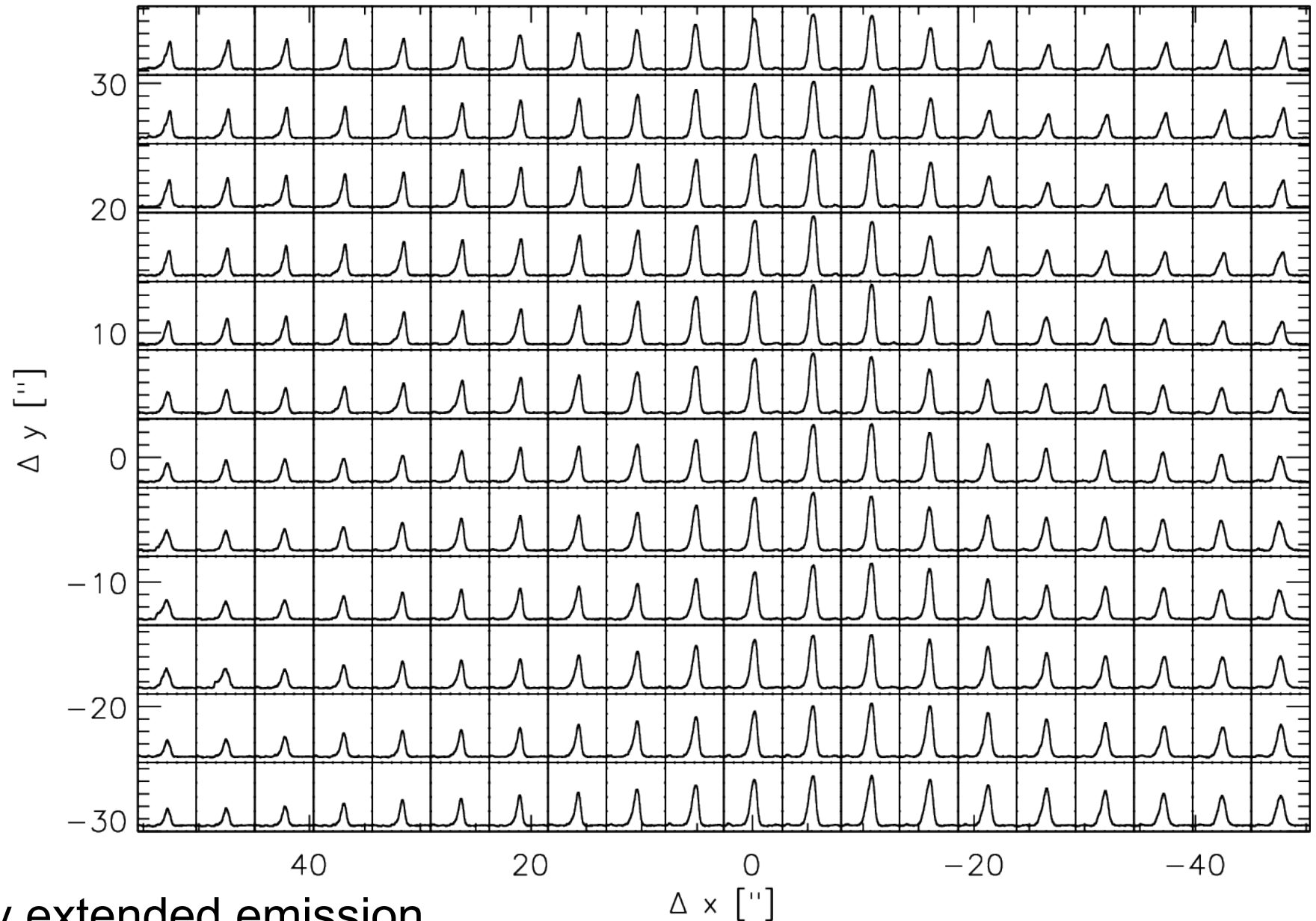
— HIFI spectrum WBS, ObsID: 218522, HIFILoadChopOnIntegration at ON
 — HIFI spectrum WBS, ObsID: 218522, HIFILoadChopOffIntegration at OFF

→ Very extended [CII] emission



Corrected with separate OFF

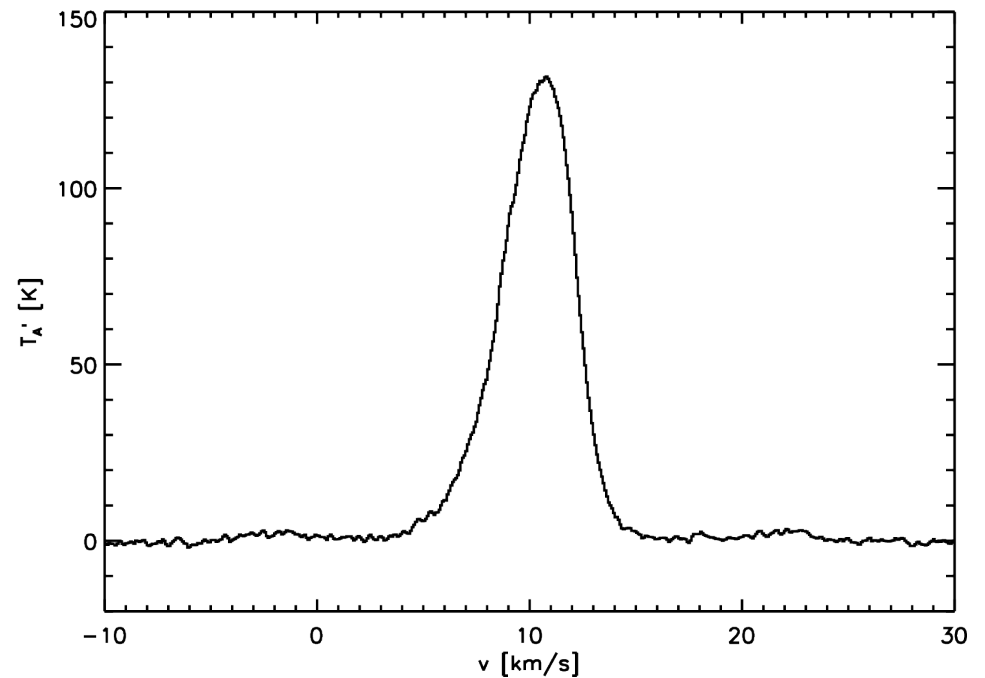
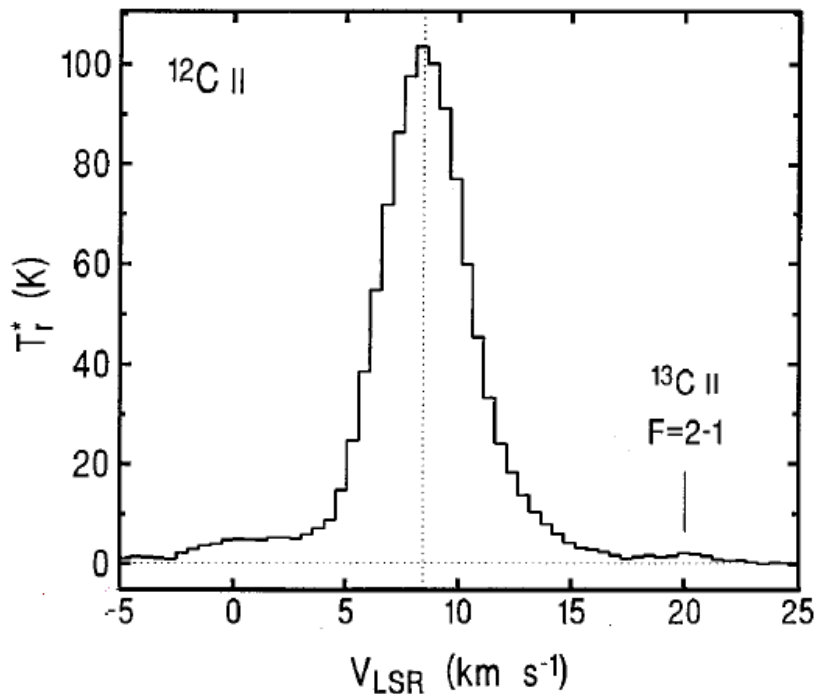
CII, $v = -5 \dots 25 \text{ km/s}$, $T_A^* = -20.0 \dots 220.0 \text{ K}$



- Very extended emission

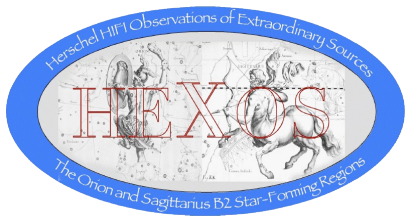
Calibration

Comparison with existing KAO observations (Boreiko & Betz 1996)



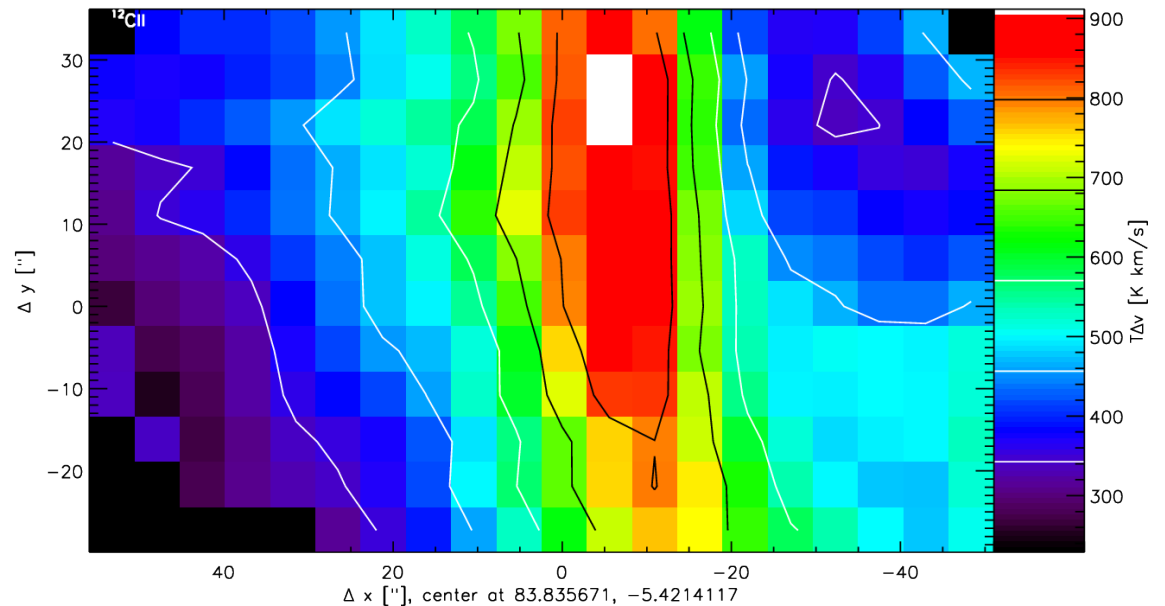
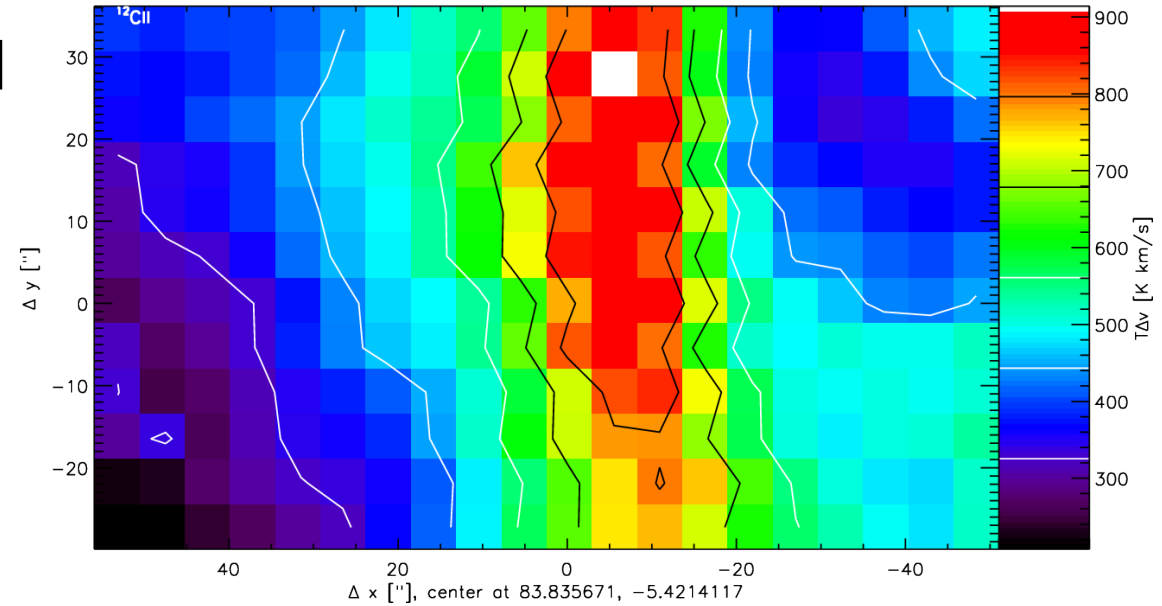
Intensity higher by 60K on T_{mb} scale

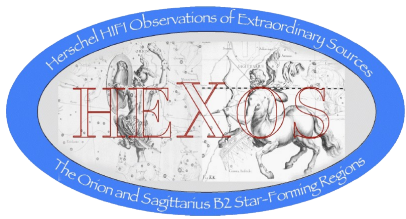
- Error beam pickup unclear
- Self-chopping in KAO observations?



Pointing problems

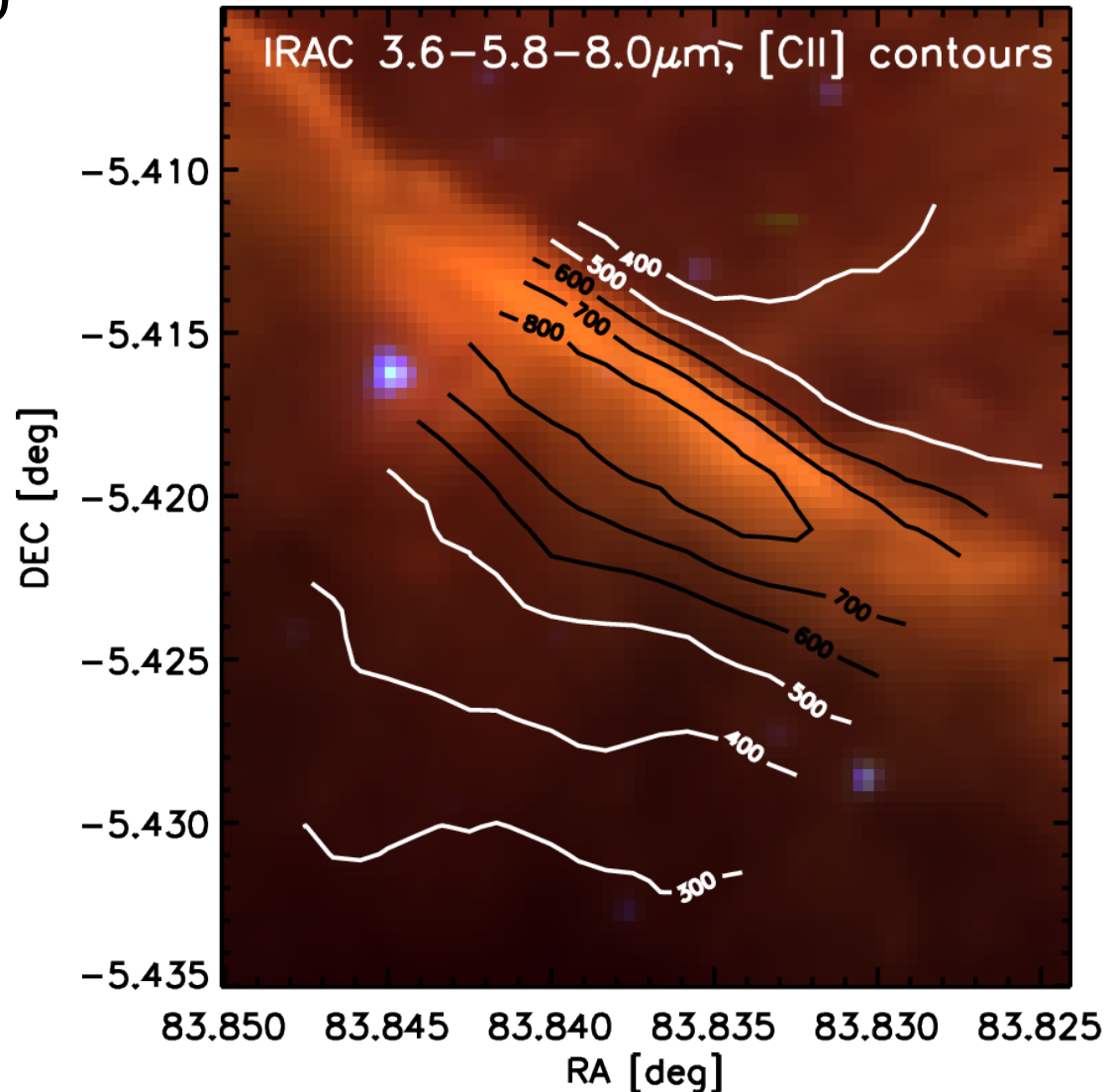
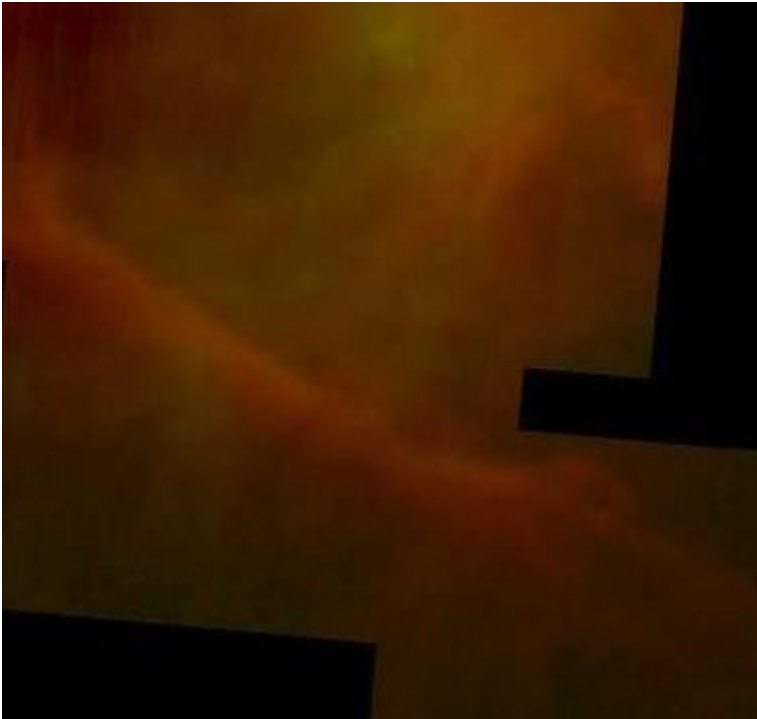
- Integrated map reflected zig-zag measurement sequence
- Corrected assuming a straight structure of the Bar
- Corresponds to fixed pointing shift by 1.4" or fixed time delay of 0.3s



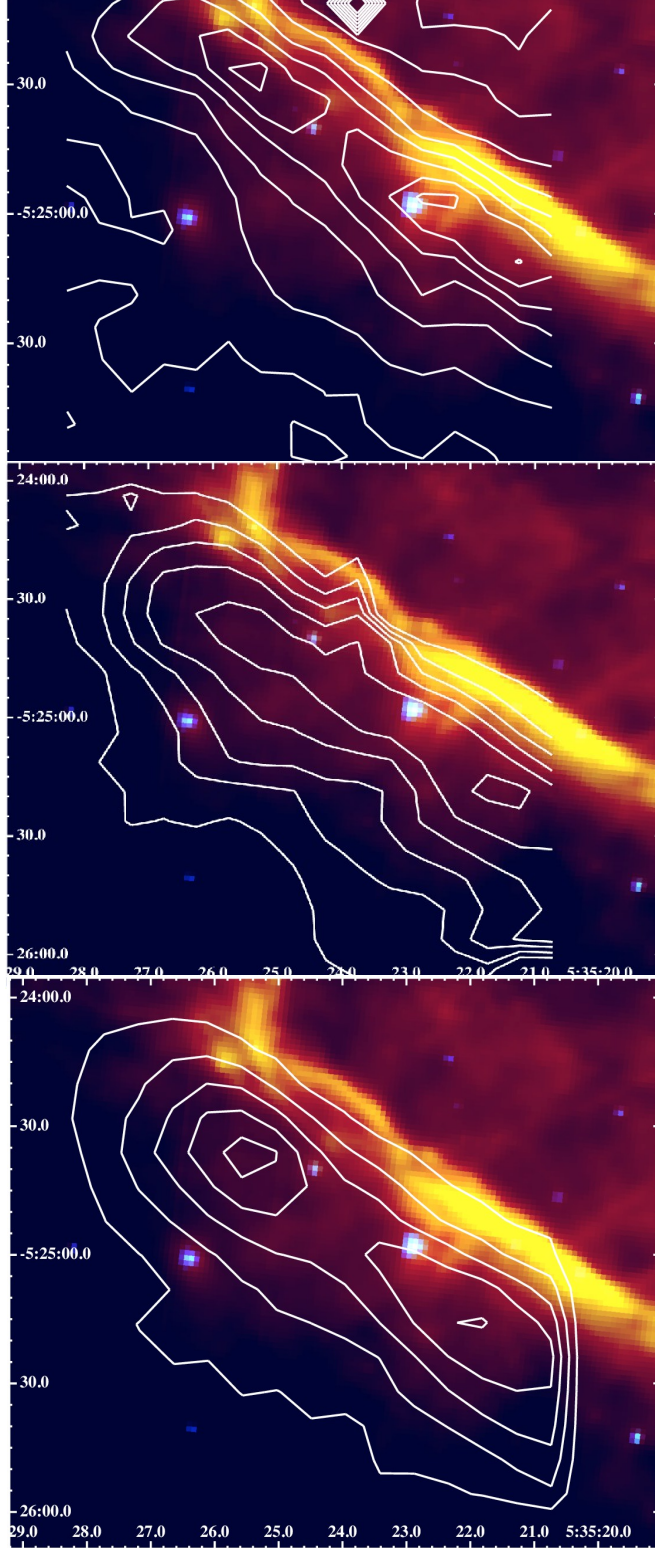


Spatial structure

- Extremely high S/N (> 100 for individual channels)
- Very smooth structure
 - No clumpiness in [CII]
 - Similar to MIR FORCAST map



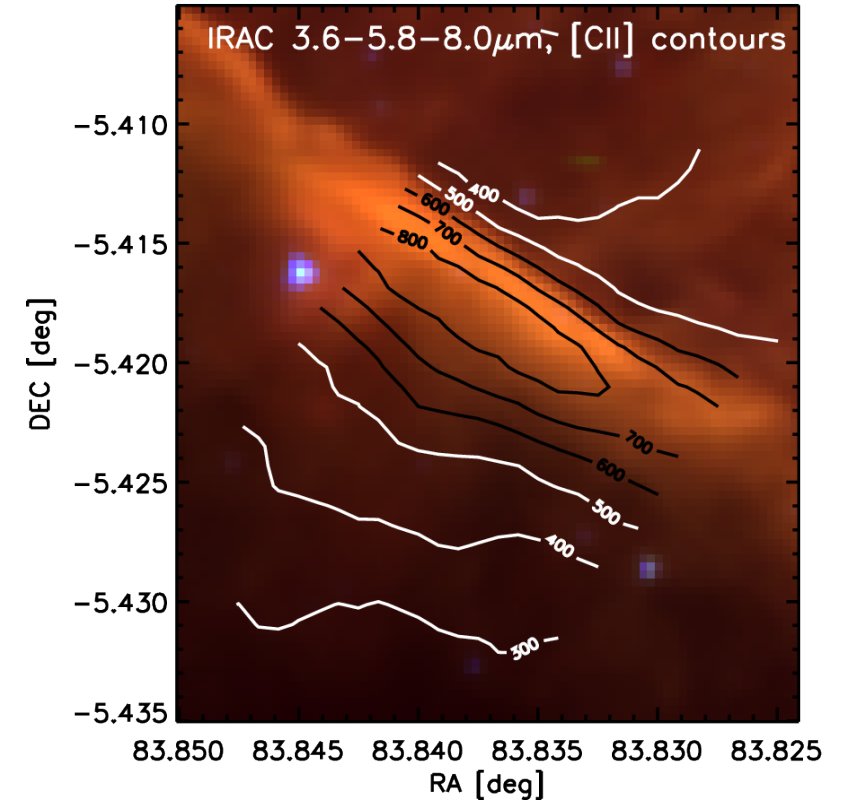
Spatial structure



C_2H

^{13}CO

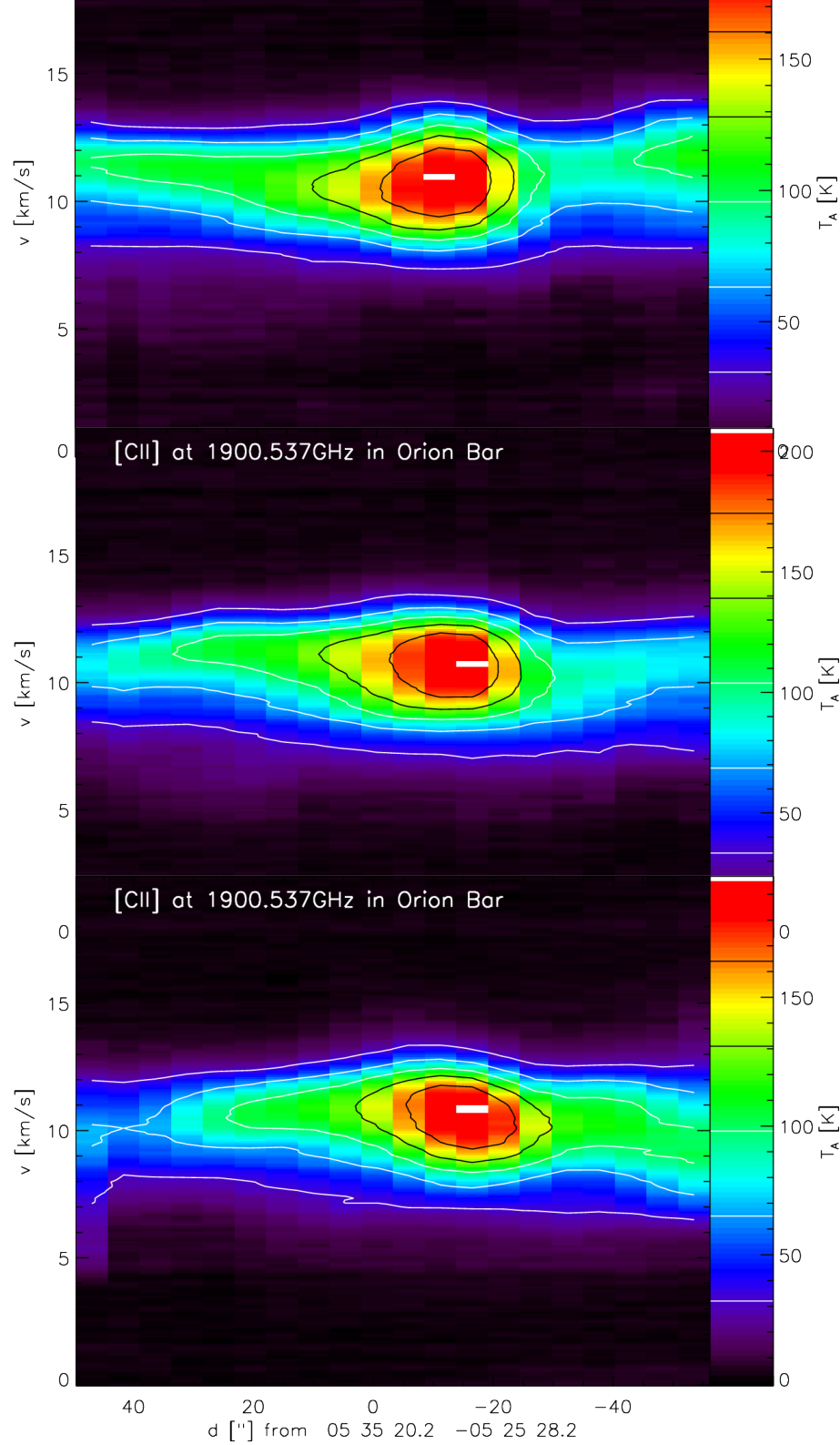
HCN



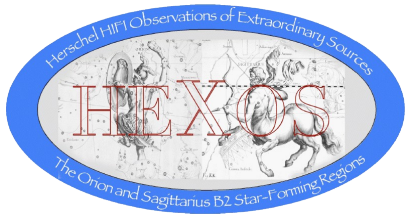
- Even smoother than ^{13}CO
- Best correlation with C_2H

Velocity structure

p-v diagrams for Northern, central and Southern stripe

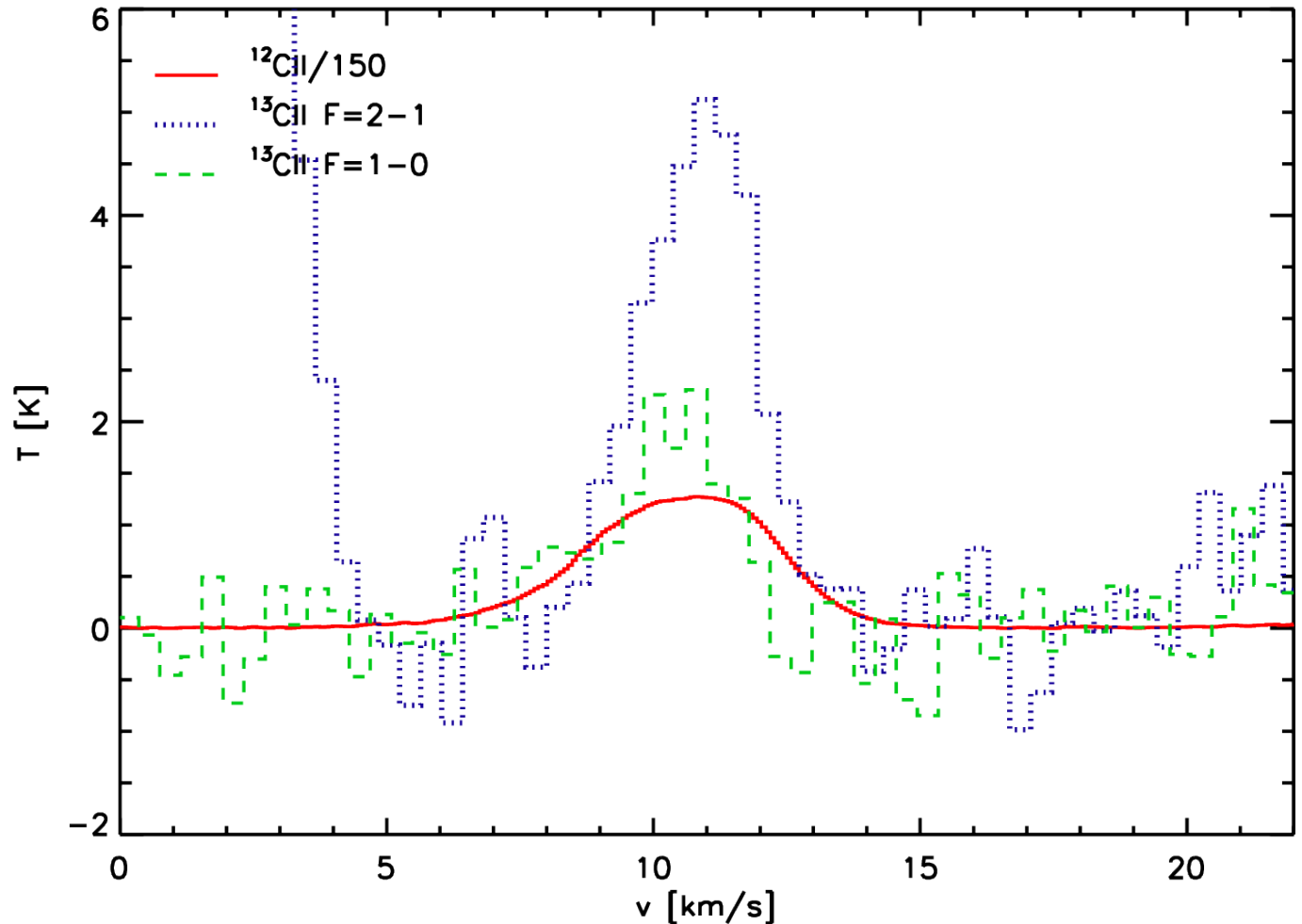


- No significant line broadening at the PDR surface
- No indications of evaporation flows
- Large-scale velocity gradient from North-East to South-West best visible in the veil



[¹³CII]

Average profile of the two strongest [¹³CII] hyper-fine components compared to the [¹²CII] profile scaled by 0.4/60 that would be expected from the canonical abundance ratio and optically thin lines.

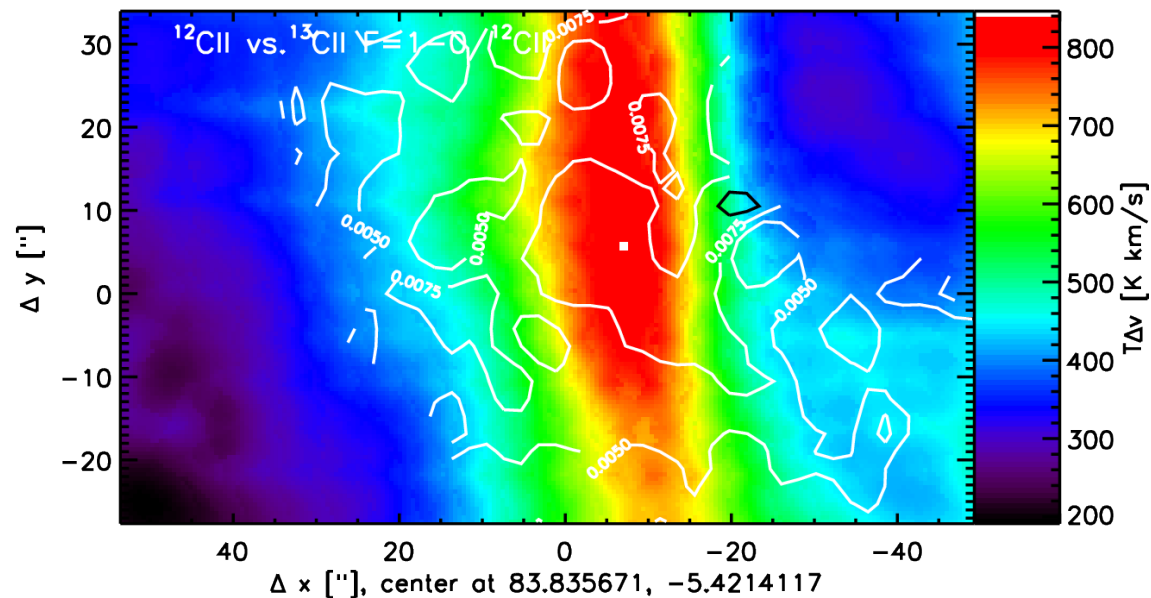
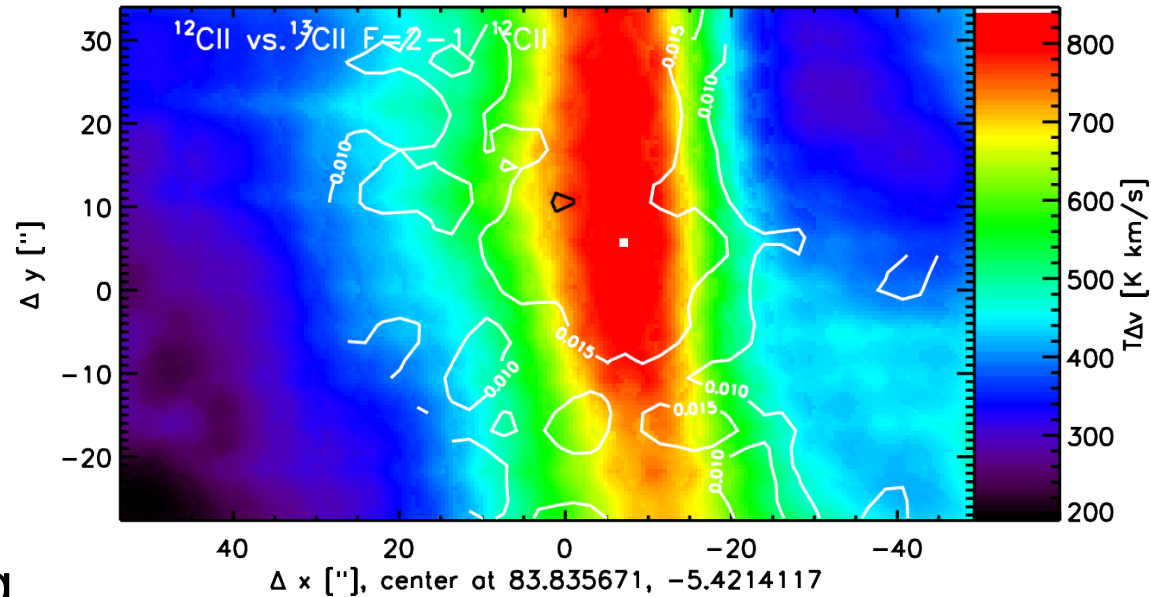


- F=1-0 is only slightly brighter than expected from optically thin [CII] emission and the normal isotopic ratio.
- F=2-1 is almost three times brighter.

[¹³CII]

- Good correlation of F=2-1 with general Orion Bar structure indicates [¹²CII] contamination as possible source for the anomaly
- Follow-up GT2 proposal submitted to measure missing F=1-1 component

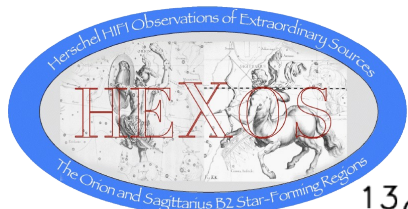
Contours of the [¹³CII] F=2-1/[CII] ratio (top) and the [¹³CII] F=1-0/[CII] ratio (bottom) overlaid on the integrated [CII] intensities.





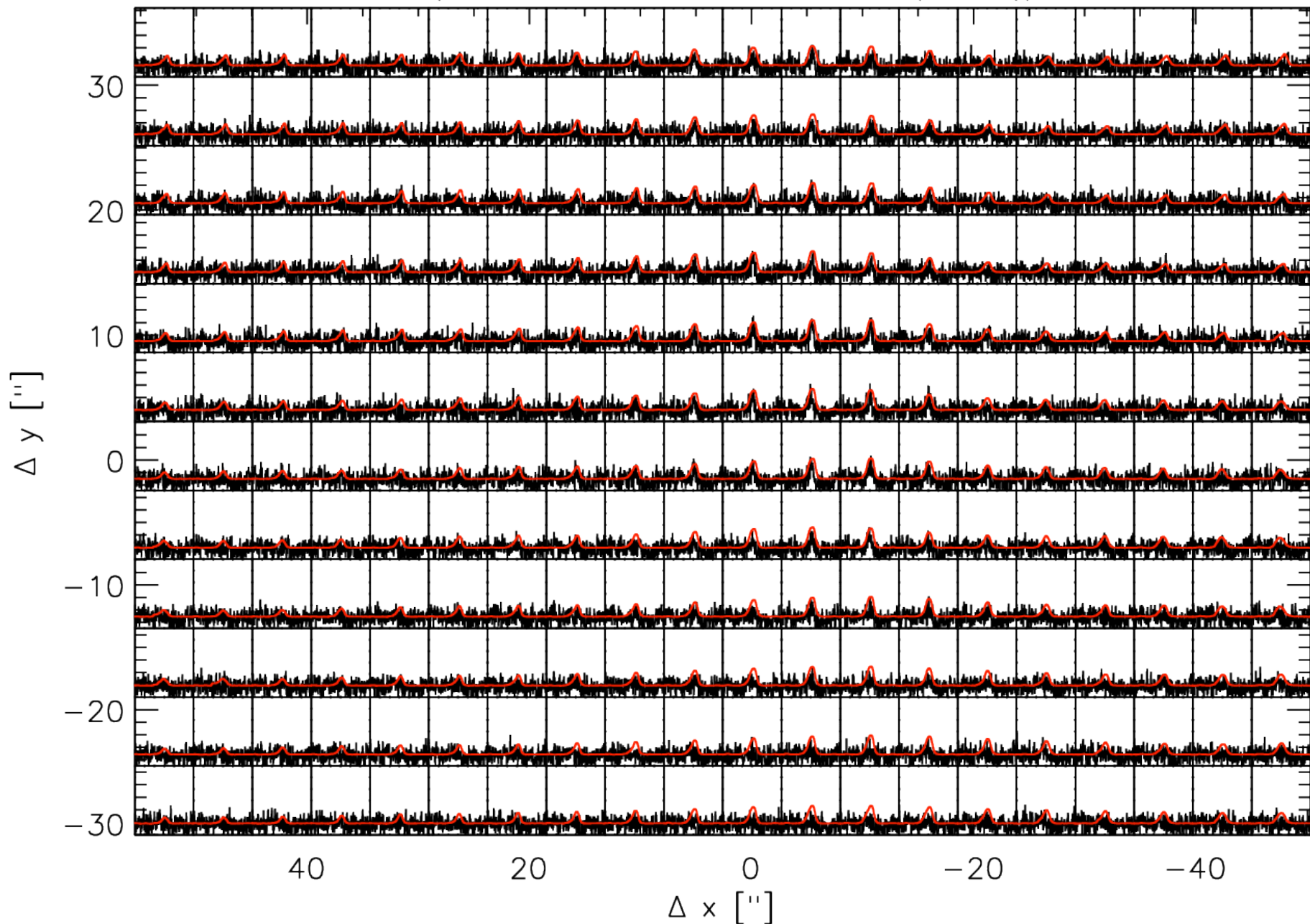
Summary

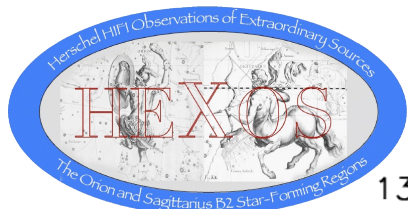
- [CII] considerably brighter than indicated by KAO observations
 - Very extended emission
 - Very smooth emission structure across the Bar
- Narrow peak coincident with C₂H peak
- Orion Bar velocity independent of large-scale gradient
- Anomalous [¹³CII] hyperfine ratio
 - F=1-0 consistent with $\tau([\text{CII}]) \sim 1.2\text{-}1.5$
 - F=2-1 three times brighter
 - Possibly contaminated by unknown [CII] velocity component



[¹³CII]

¹³CII F=1-0, CII/20*0.356, v=-5...25km/s, T_A*=-2.0...10.0K





[¹³CII]

¹³CII F=2-1, CII/20*0.444, v=-5...25km/s, T_A*=-2.0...10.0K

