CO Imaging of Two Organic Rich YSOs: IRS46 & IRS44

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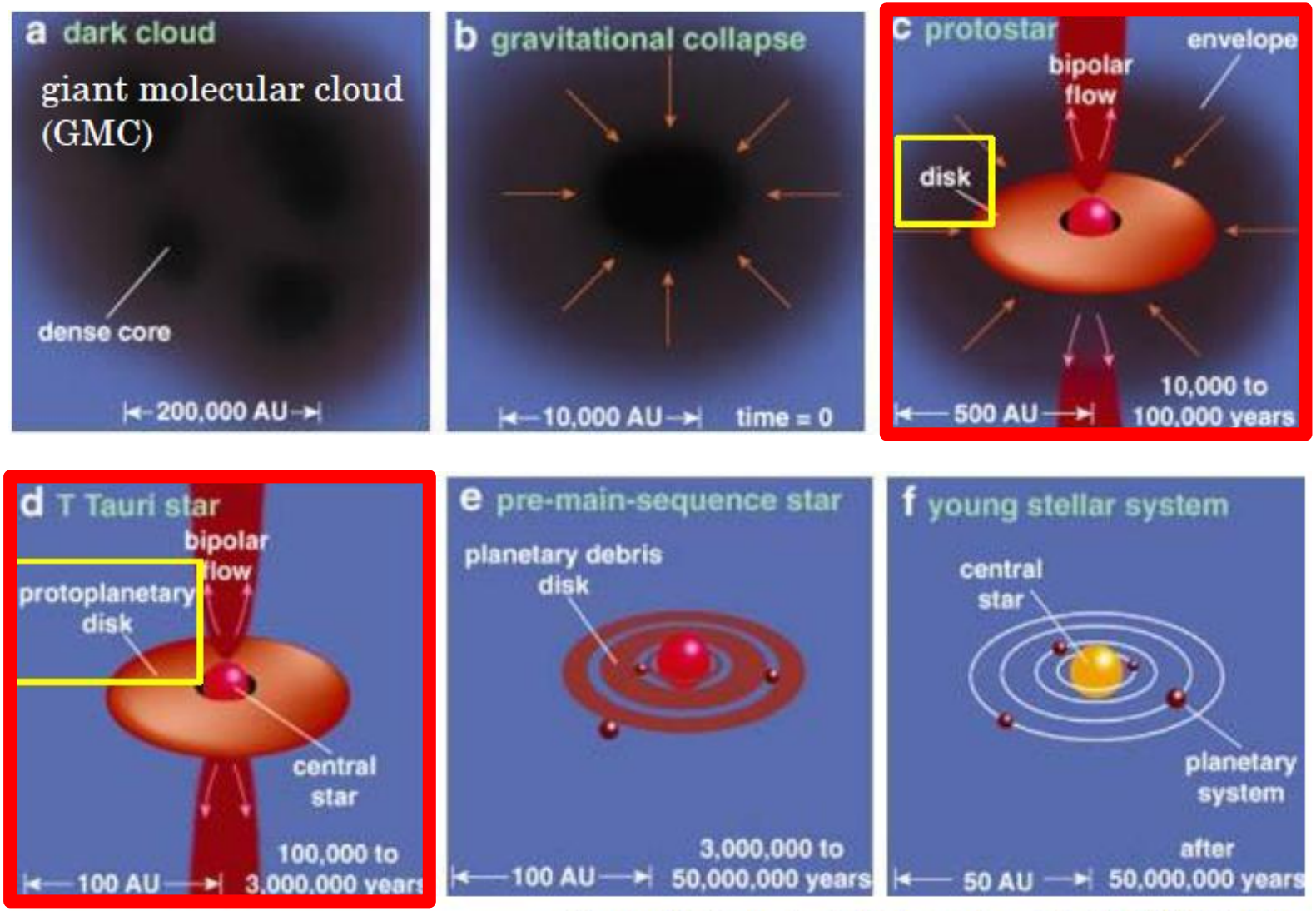
INTRODUCTION

Star Formation (Low Mass Star)

YSO



YSO

Greene, T., "Protostars", 2001, American Scientist, Vol.89, No.4

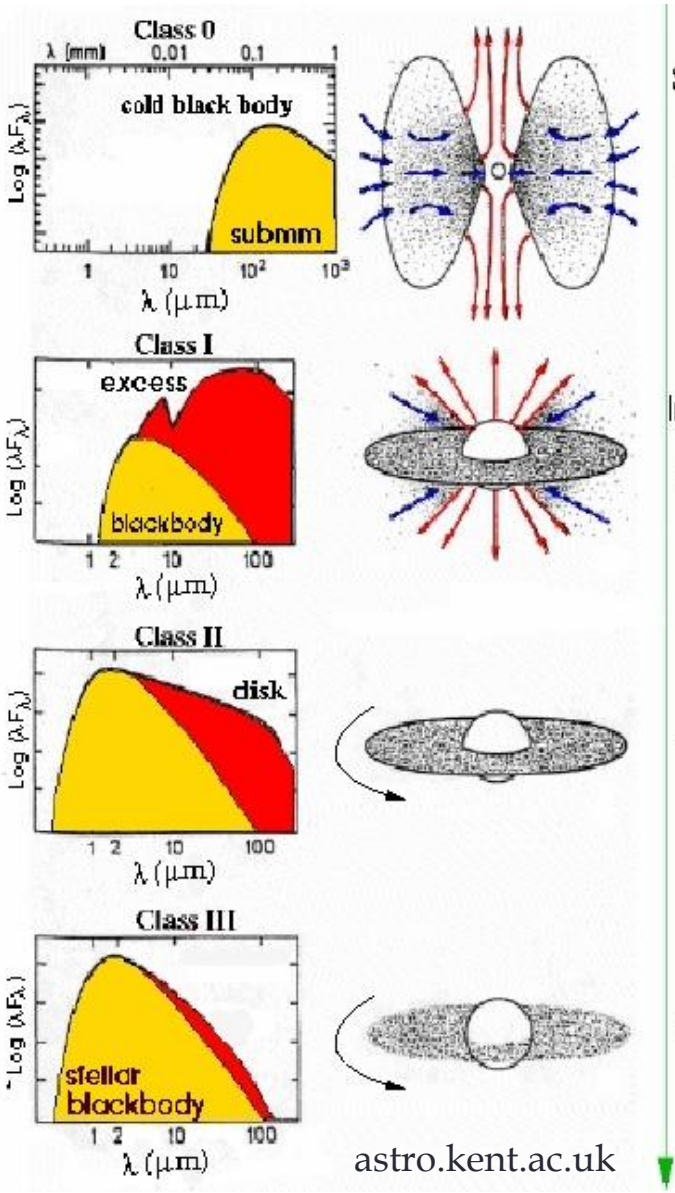
YSO = Young Stellar Object

Class 0

Class I

Class II

Class III



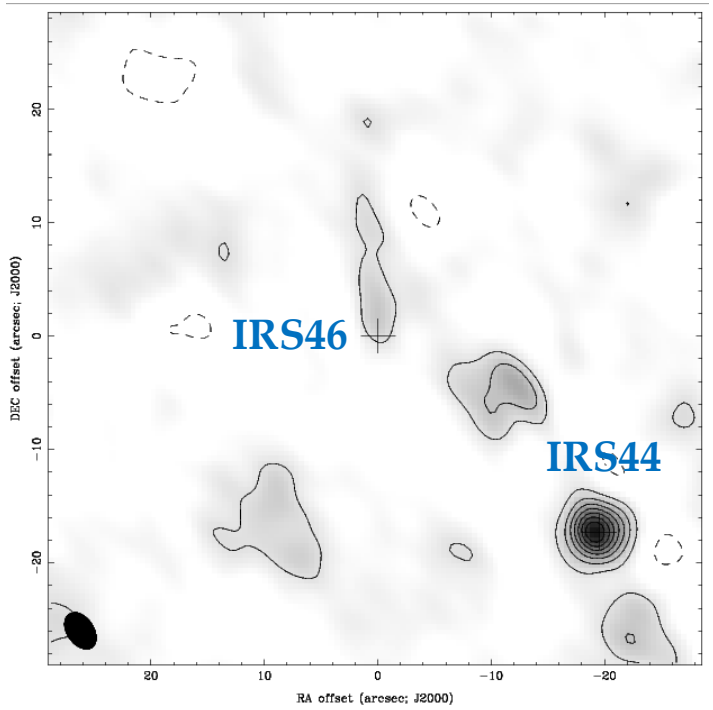
Some are rich in organic molecules

Are there YSOs at later stages with organic molecules?

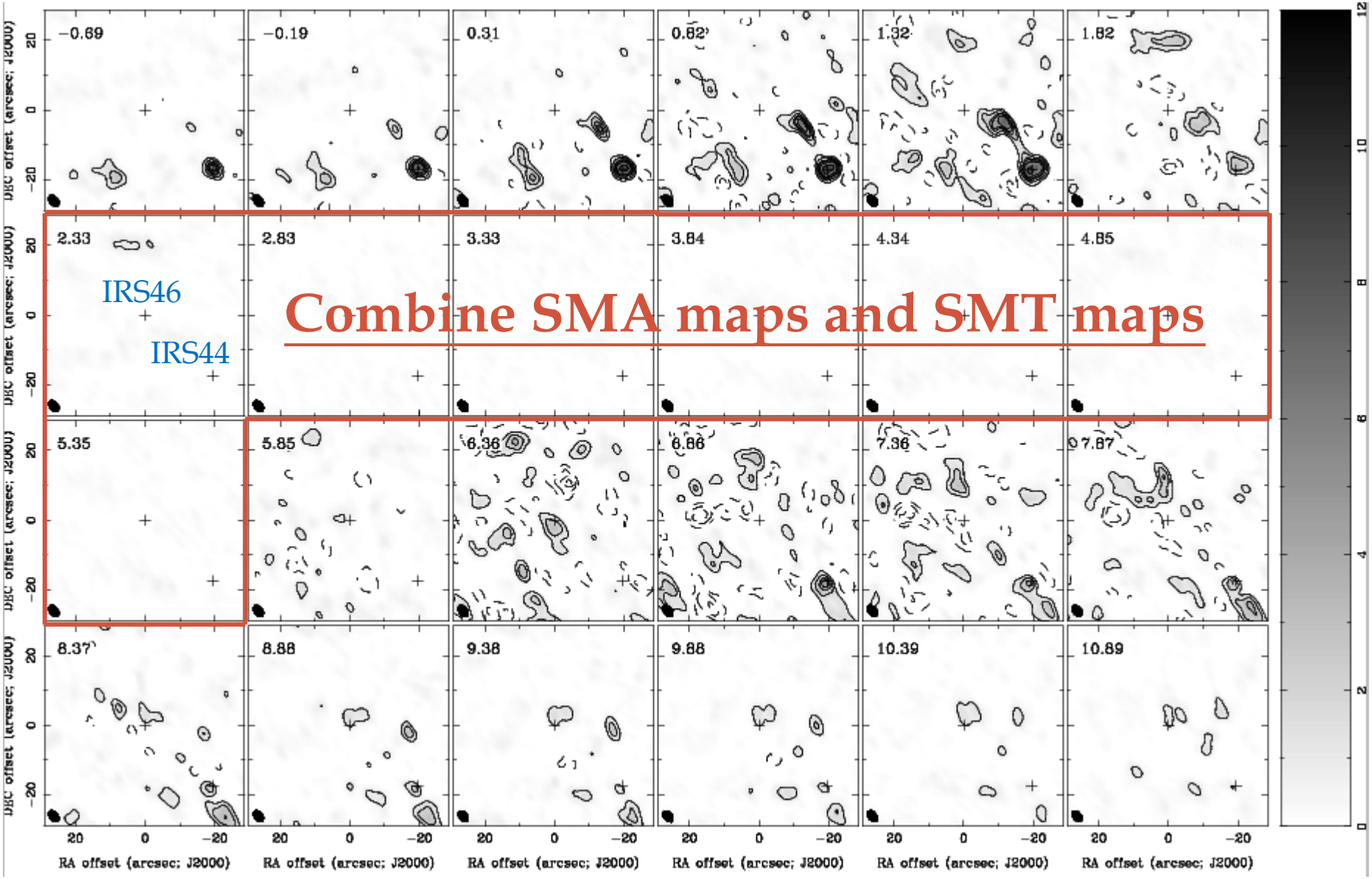
IRS46

Source-IRS46 & IRS44

- In ρ-Ophiuchus cloud
- **Low-mass(Sun-like)**, **Class I** source
- IRS46 contains some simple organics: C_2H_2, HCN
- IRS46 is found to have **organic molecules** such as H_2CO and CH_3OH
- IRS44 has strong CO emission



Motivation ~ SMA CO2-1 maps



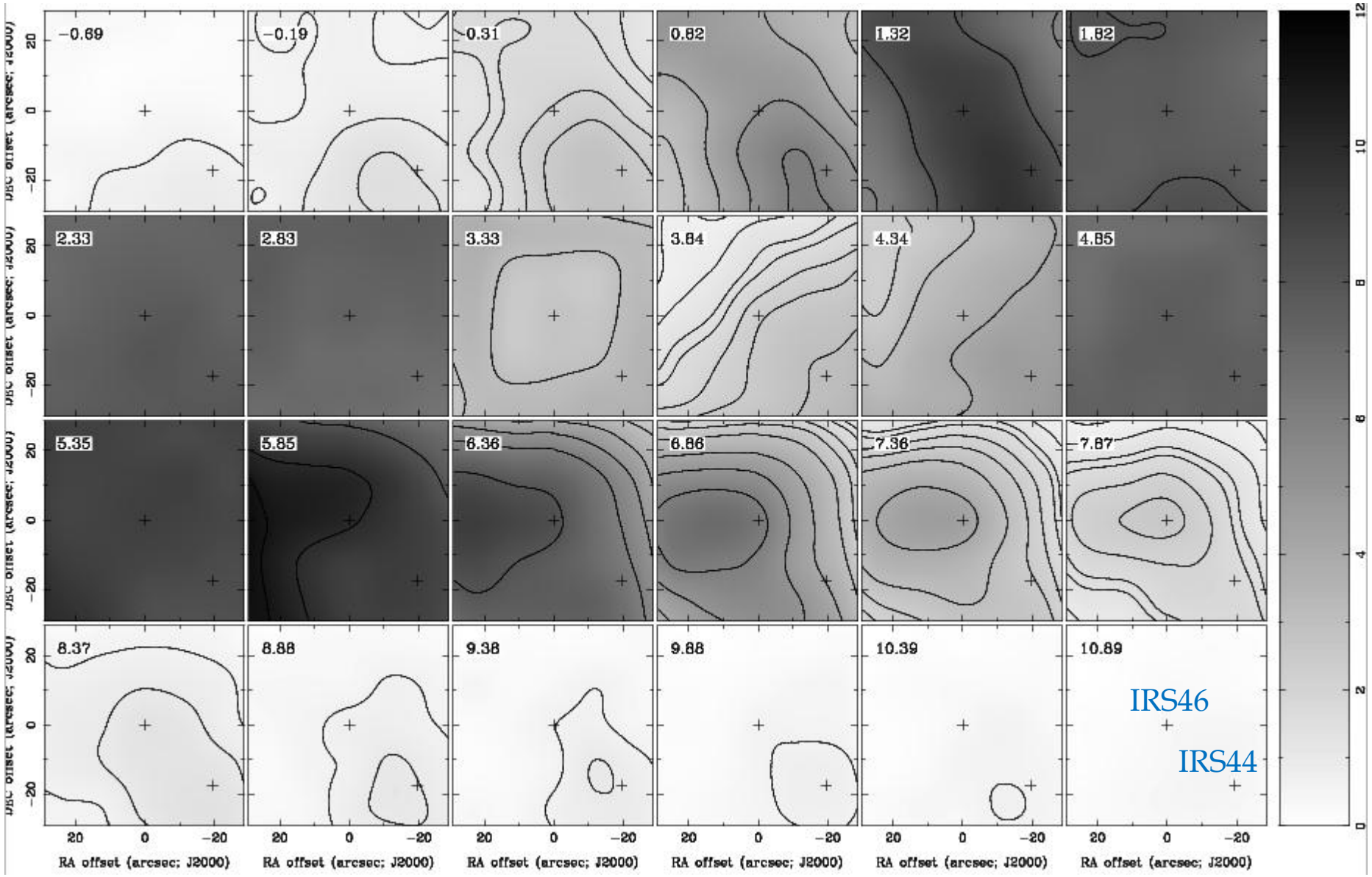
Observations

- CO 2-1 (230.538 Ghz)
- SMT (Submillimeter Telescope): single-dish data
- SMA (Submillimeter Array): interferometer data

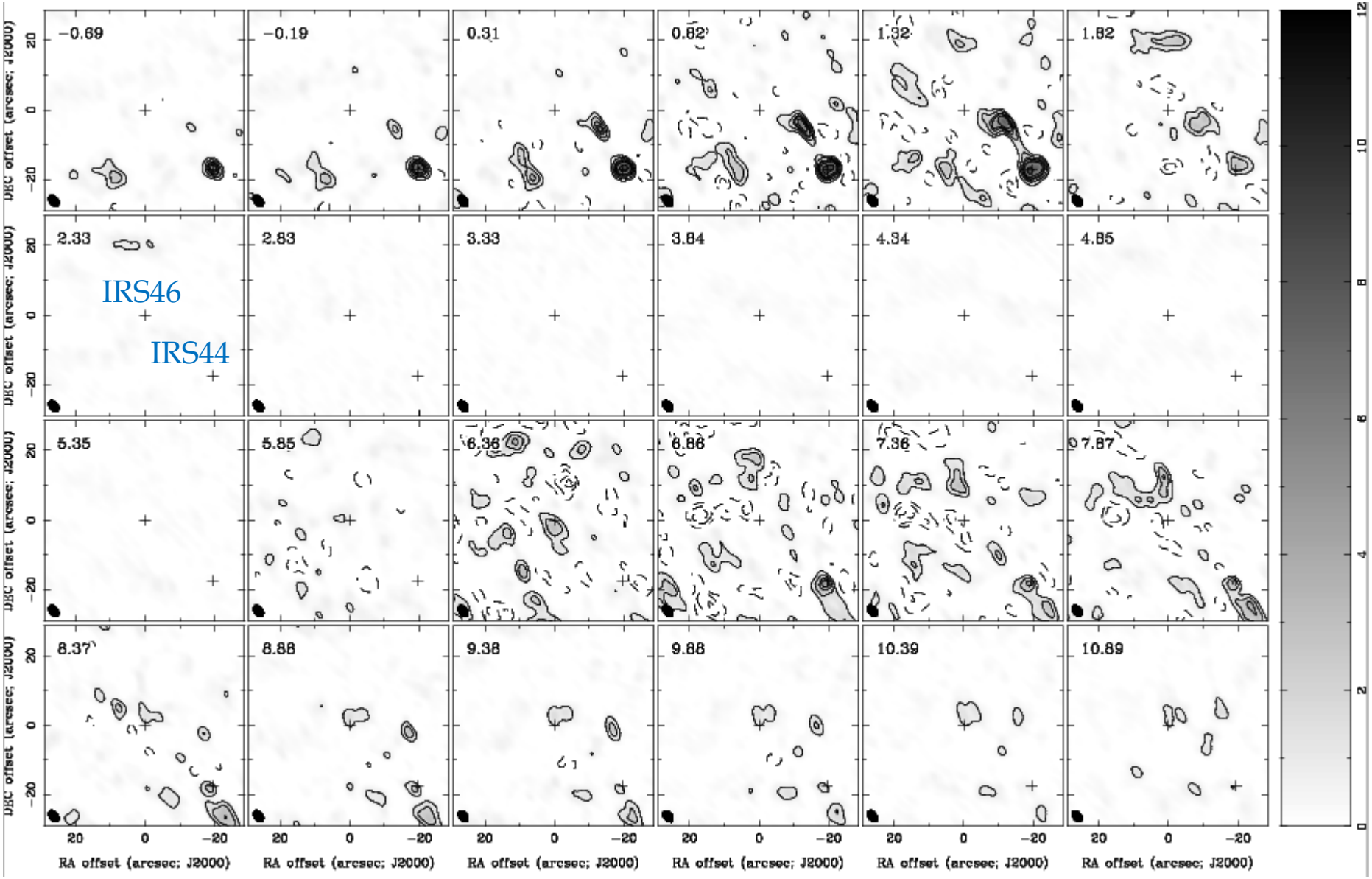
www.cfa.harvard.edu/sma/

RESULTS

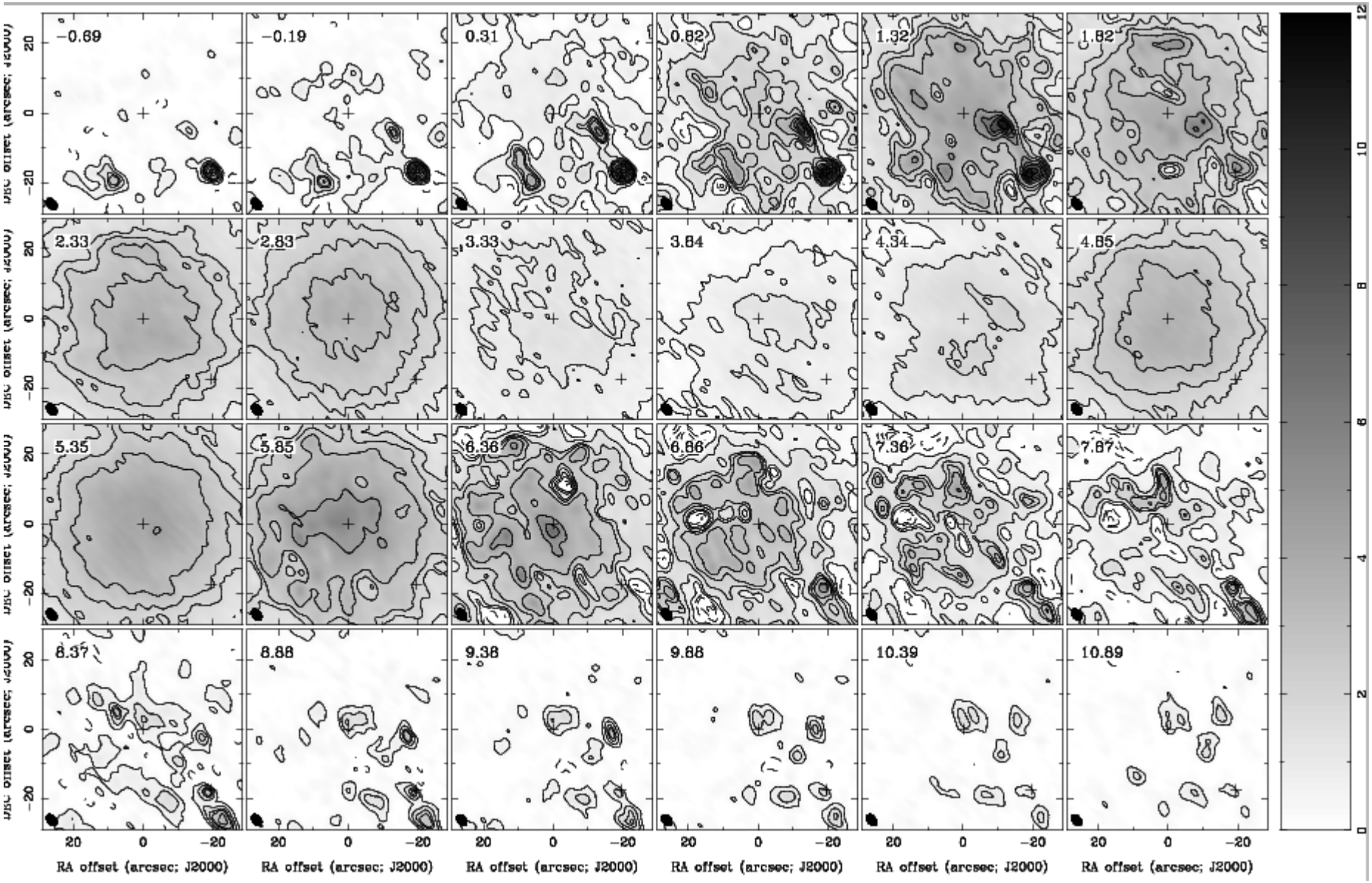
SMT CO 2-1 maps at IRS46



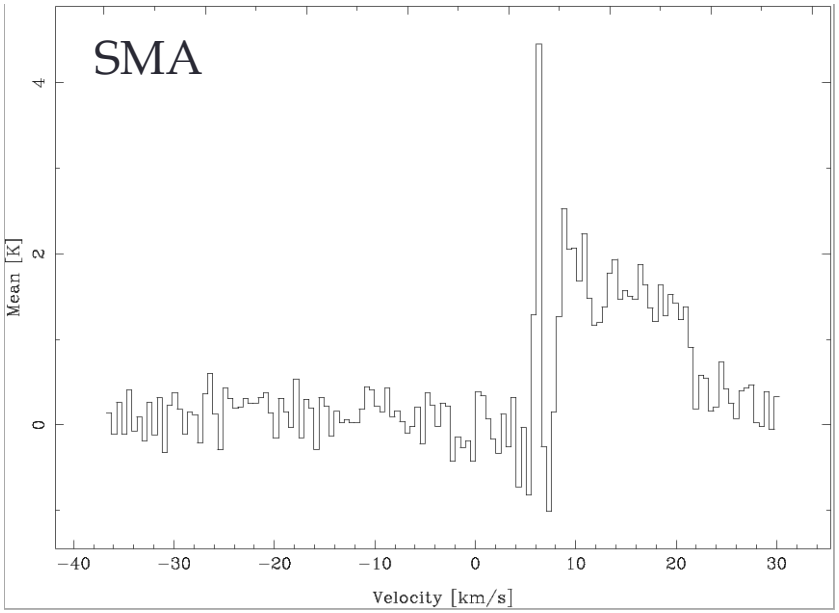
SMA CO 2-1 maps at IRS46

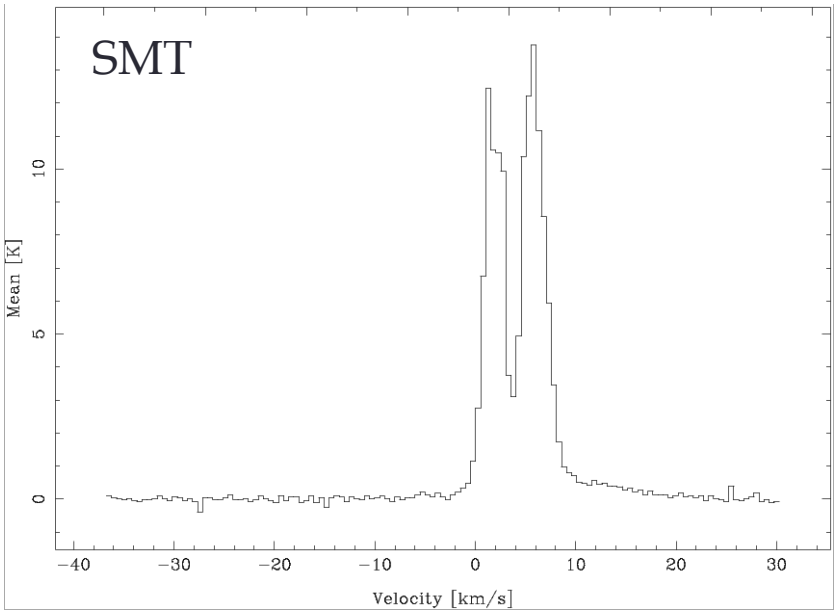


SMT, SMA CO2-1 combined maps at IRS46

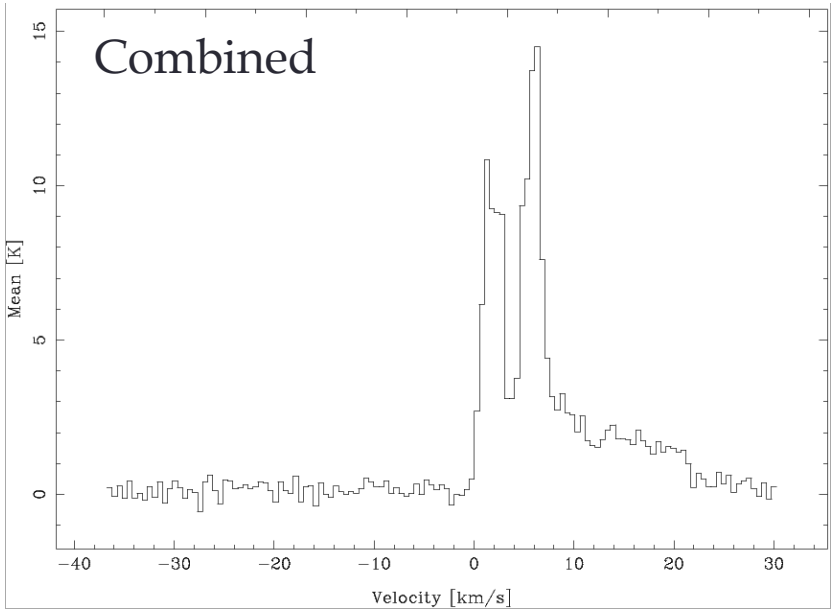


Spectrum of CO 2-1 at IRS46

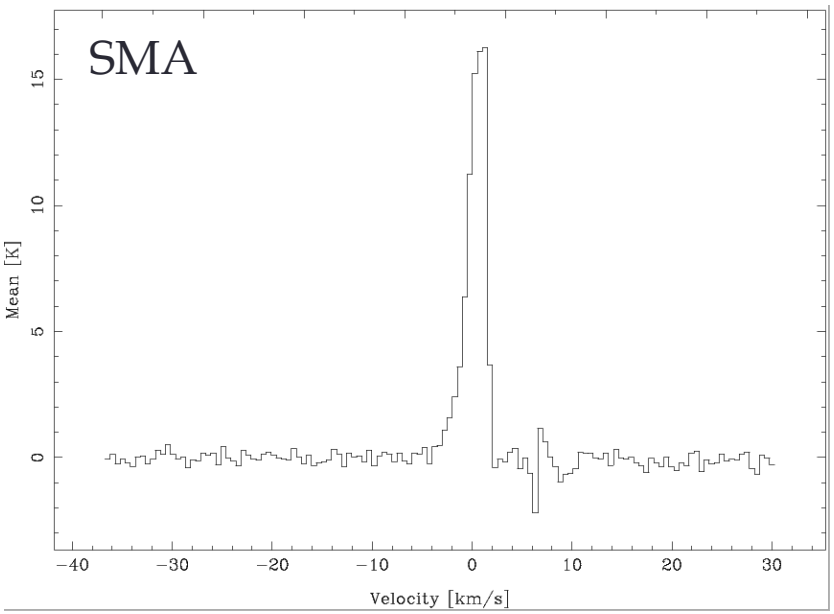


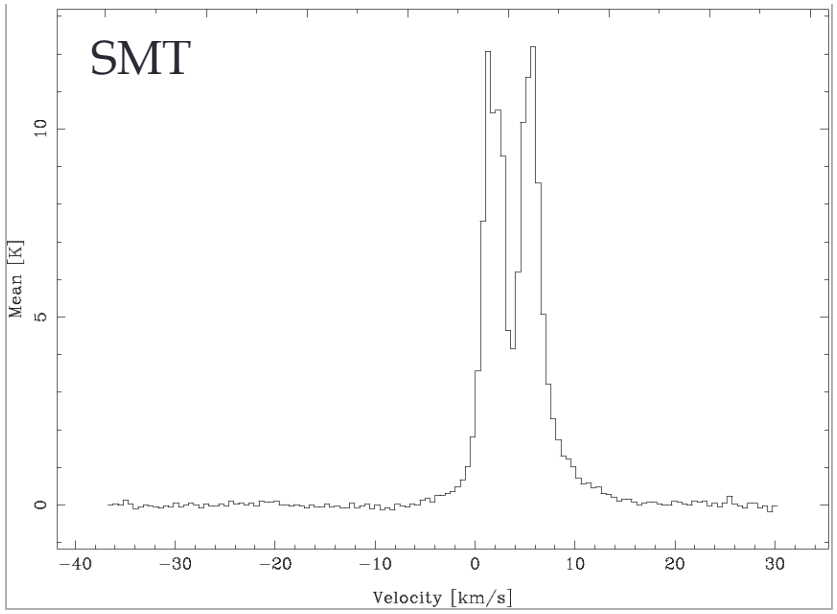


System velocity of CO: 4.4 km/s



Spectrum of CO 2-1 at IRS44





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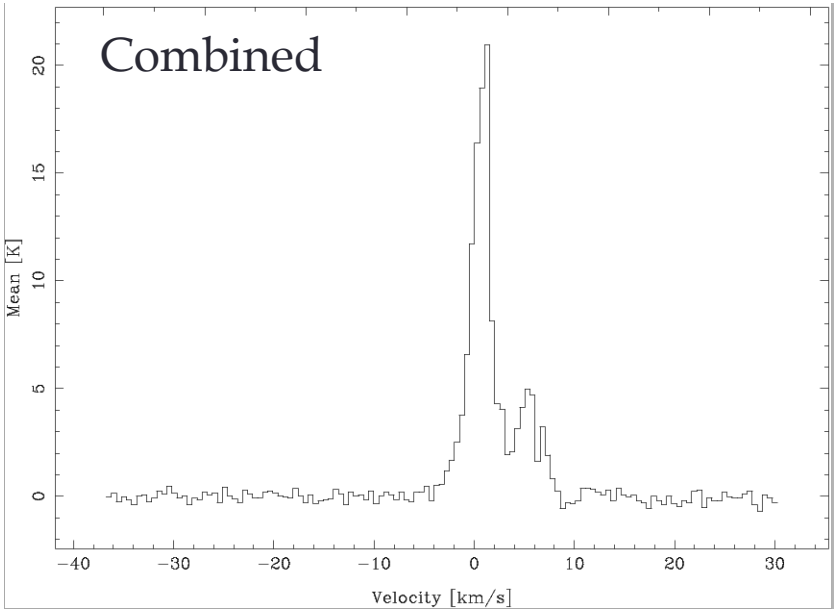

Conclusions

- In the spectrum at IRS46 and IRS44, it can be seen that CO molecules are mostly in the red shift area.
- The cause of the gorge-shape spectrum:

  1.The self-absorption of CO.

  2.CO is extended and uniformly distributed near the central velocity. SMA observed this structure as no emission.
- In the combined maps, there are three negative sidelobes on the left in the channels of velocity 6.36, 6.86 and 7.36. We think it is not its real image, so, to get better information, we should try other methods to combine the SMT and SMA data.

THANK YOU FOR LISTENING ！