From Circumstellar Disks to Planetary Systems: Introduction and overview

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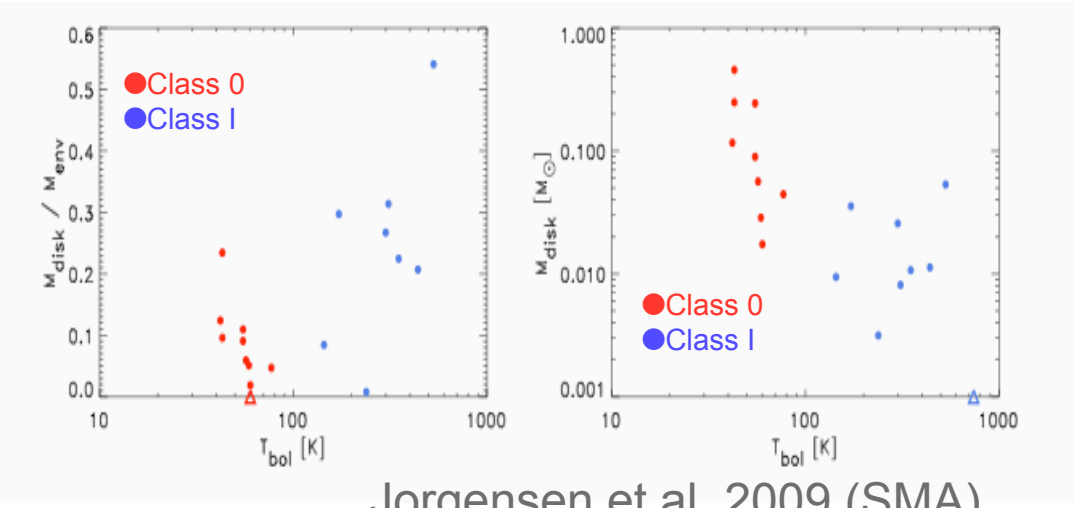
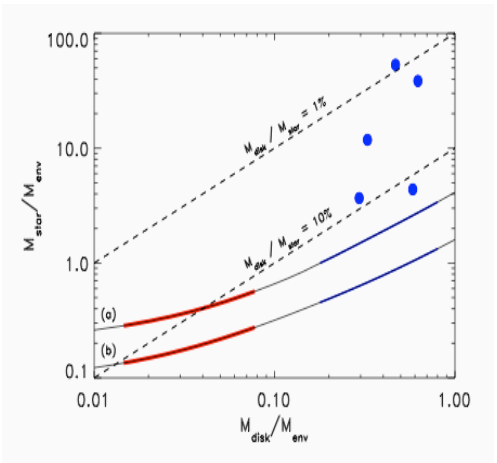
How disks form

- Disks form very early:
  - Class 0 have (massive) disks
    - Mdisk ≤ 0.1-1 Msun
    - Mdisk/Menv ≤ 0.1-0.2
  - Serpens FIRS1
    - massive (1 Msun)
    - Mdisk/Menv ~ 0.1),
    - large (300AU) disk

    (Enoch et al. 2009; Carma)
  - Class I have disks as Class II
    - Mdisk/Mstar ~ 0.1-0.01
- Disks contain 20% (at most) of the system mass



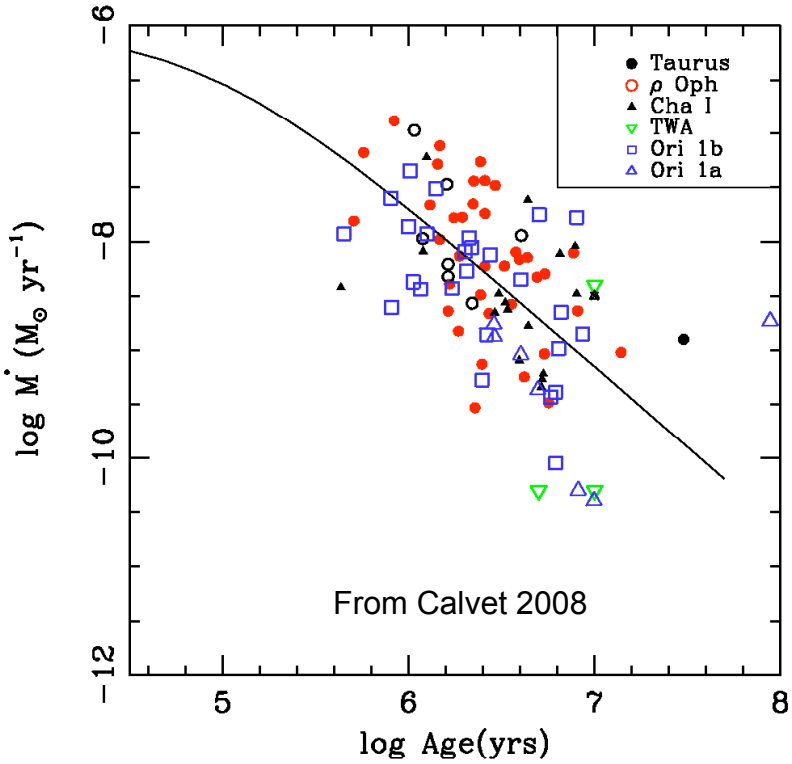
Jorgensen et al. 2009 (SMA)



What is the surface density profile of Class 0 disks?

What controls disk evolution

- Time
  - Fraction of disk
  - Accretion
  - SEDs (flatter)



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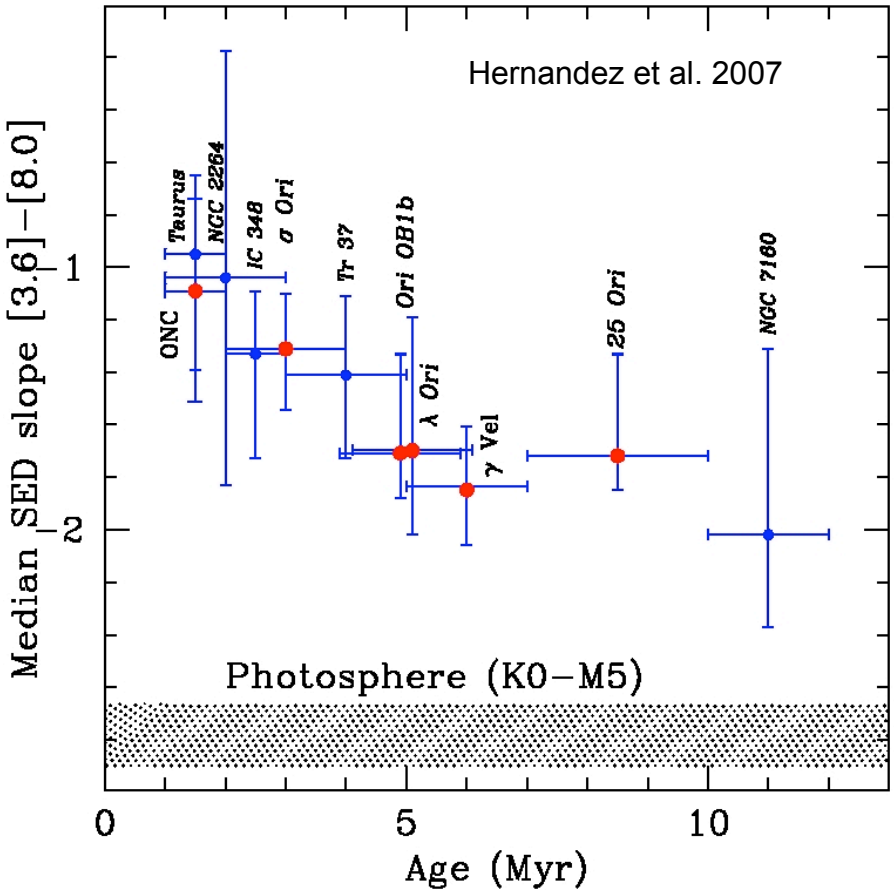

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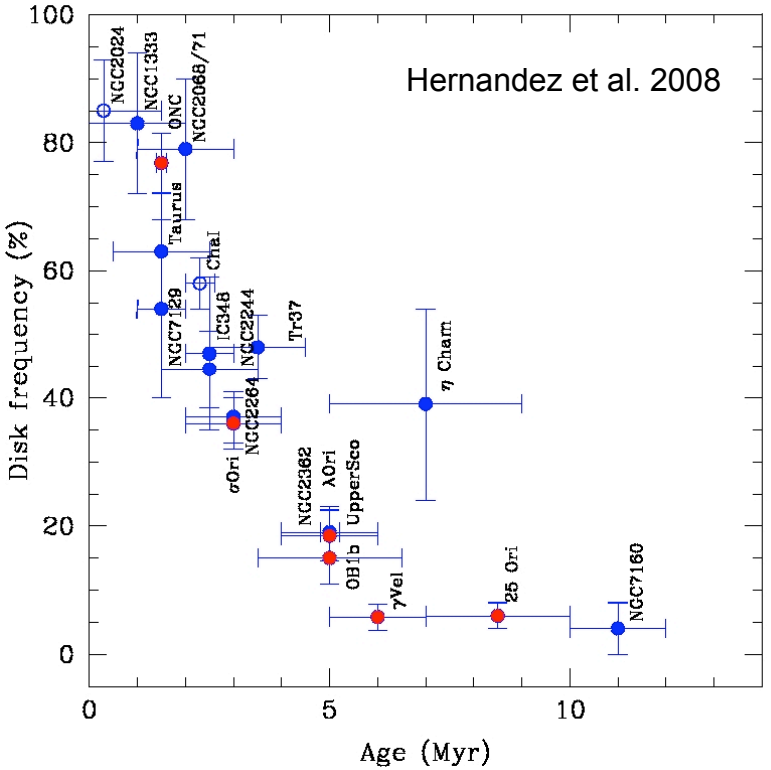
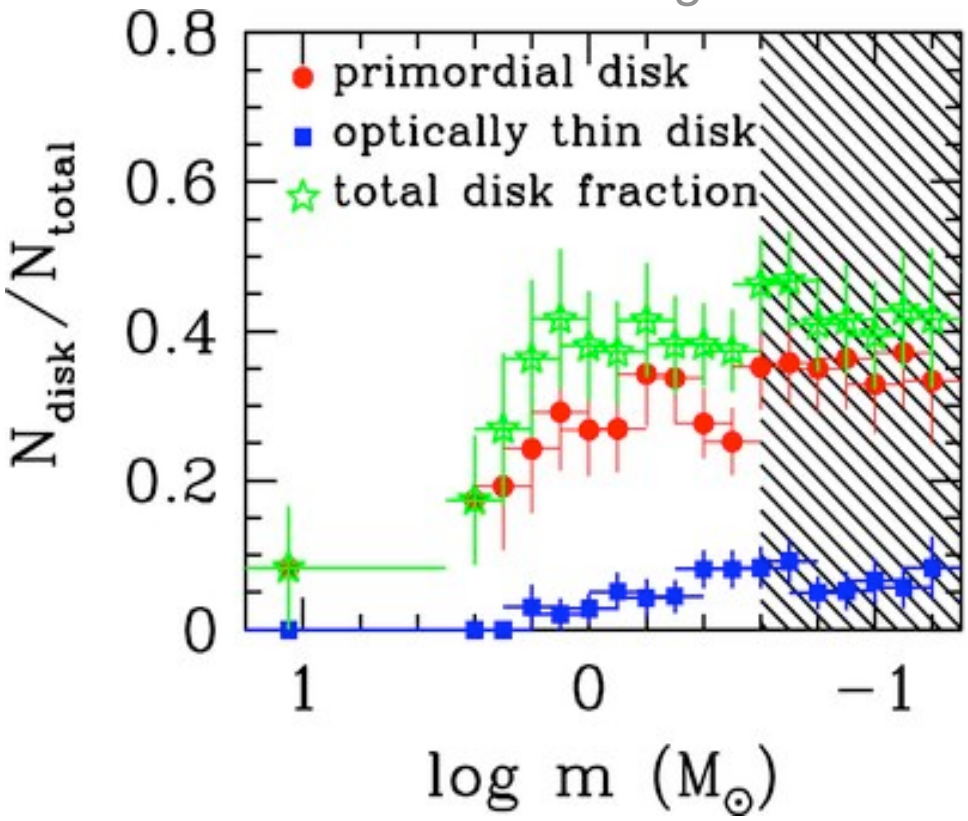


What controls disk evolution

- Time
  - Fraction of disk
  - Accretion
  - SEDs (flatter)
- Mass of the central star
  - Faster evolution in more massive stars

NGC2264: Sung et al. 2009

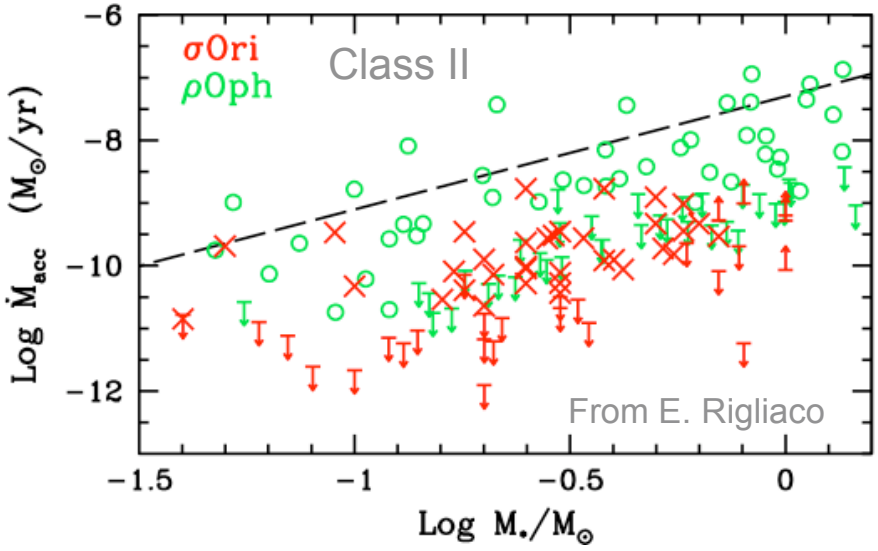


What else?

- Time
- Mass of the central star

A large spread

- Other properties of the central star?
- Initial conditions ?
- ??



Spread too large to be an age effect

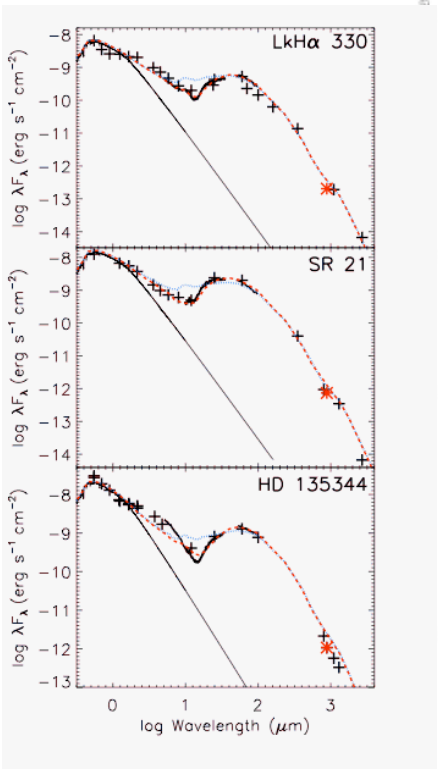
Physics: how disks accrete

- MRI (??)
- Gravitational instabilities (??)

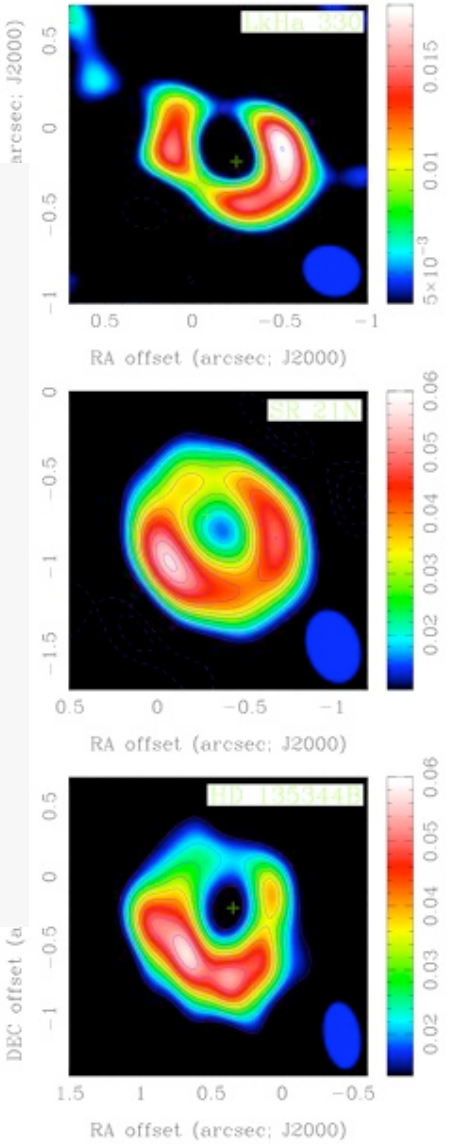
How disks die

- Accretion/ejection
  - Not alone
- Photoevaporation by the central star
- Environment
  - Only in specific cases
- Planet formation

Some evidence that disk dispersal begins from inside (transitional disks)



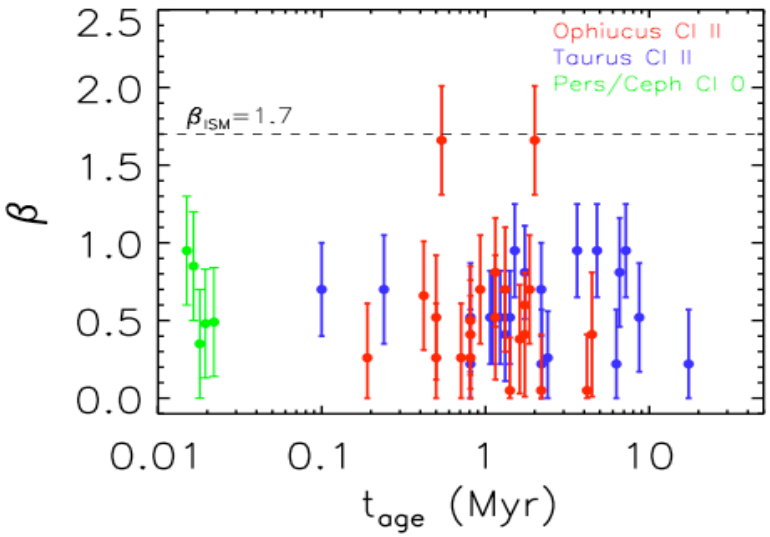
Brown et al. 2007, 2009



Many questions on planet formation

- Which disks form planets?
  - Massive enough
  - Chemistry (ices?)
- Are we looking at disks that a
  form planets?
  - Star forming regions have solar n
- Do disk properties determine
  of the planetary system?
  - Migration
- When does planet formation begin?
  - Grain properties

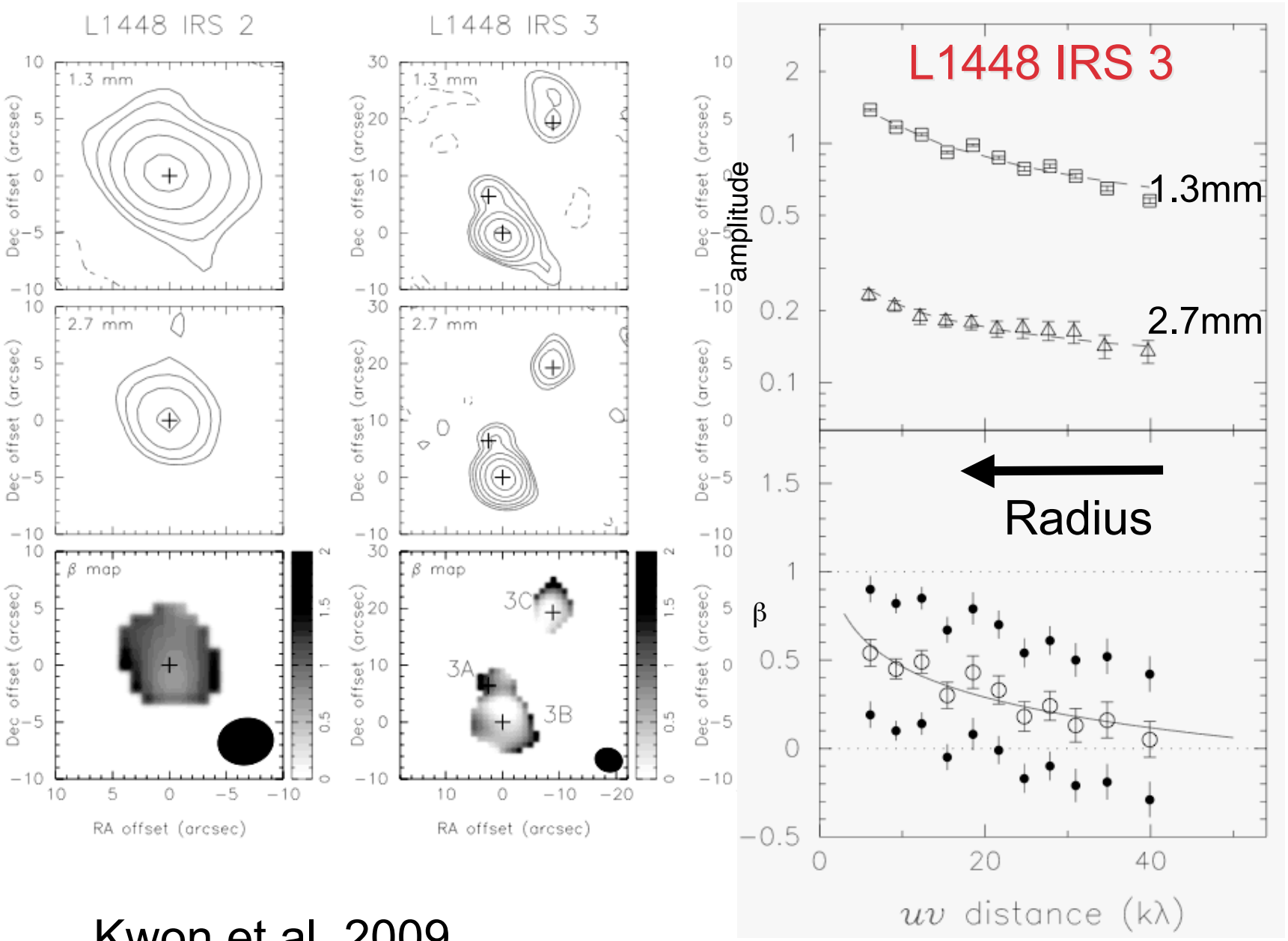
Evidence of very large grains?



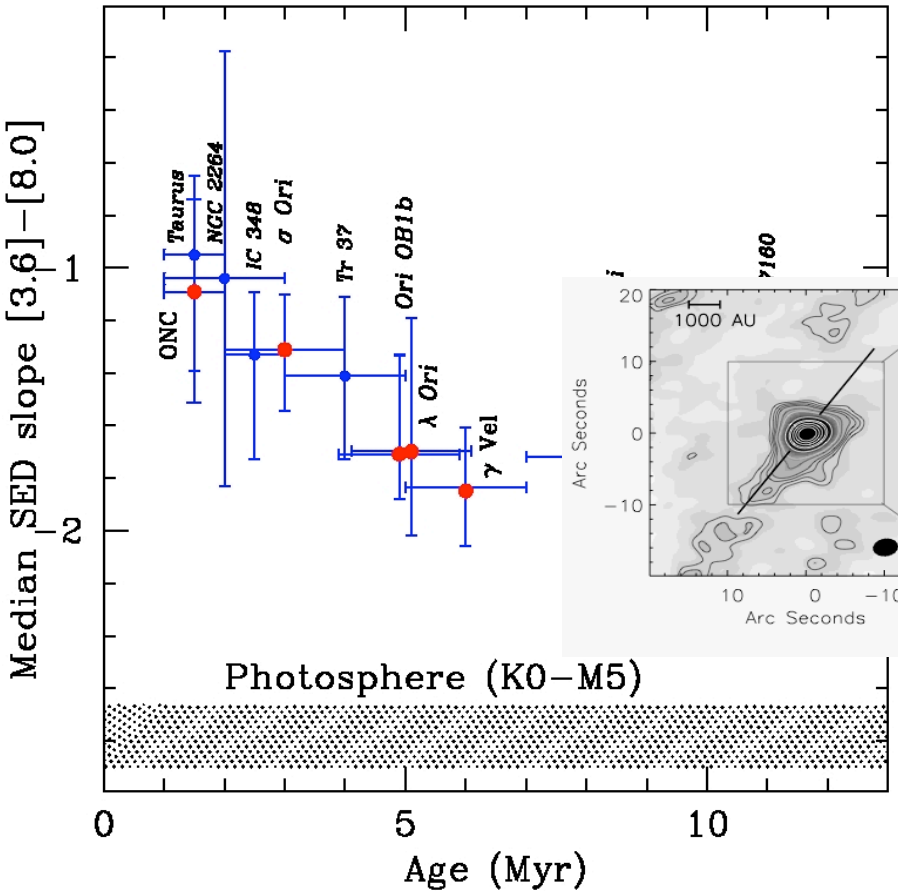
From L. Ricci

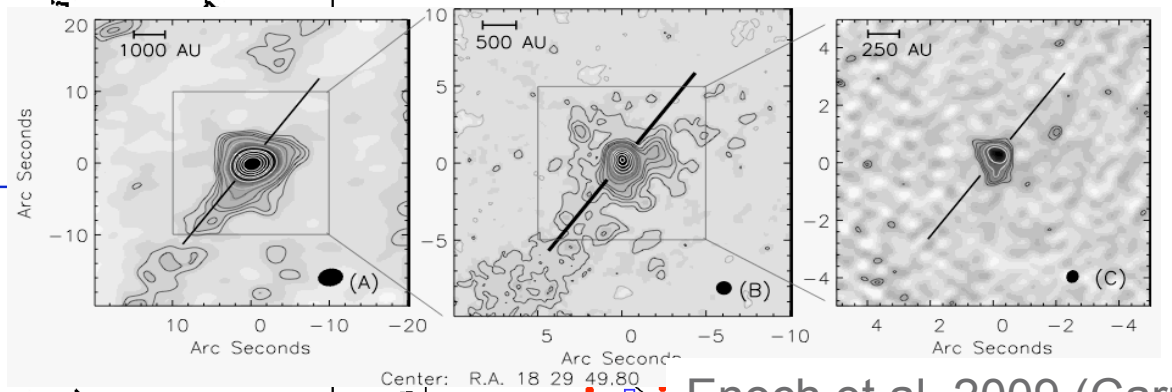
time to begin ....

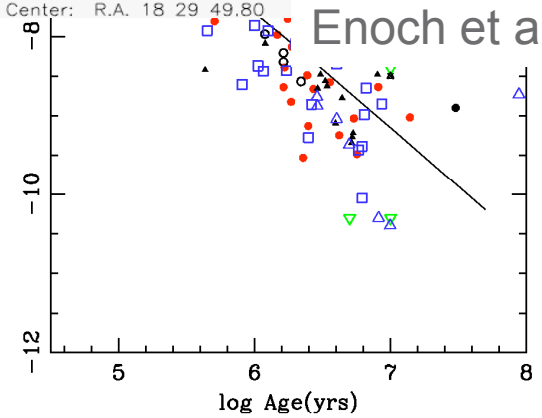
Class 0 very young cores: β~1



Kwon et al. 2009

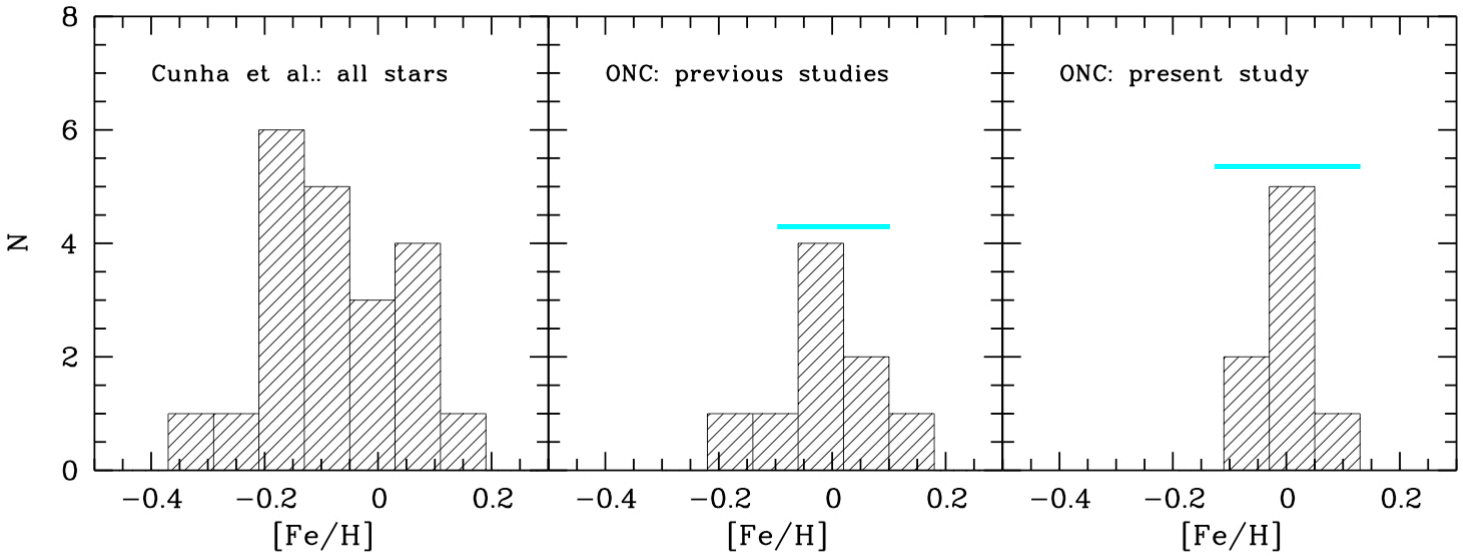






Enoch et al. 2009 (Carma)

Metallicity of CTTS



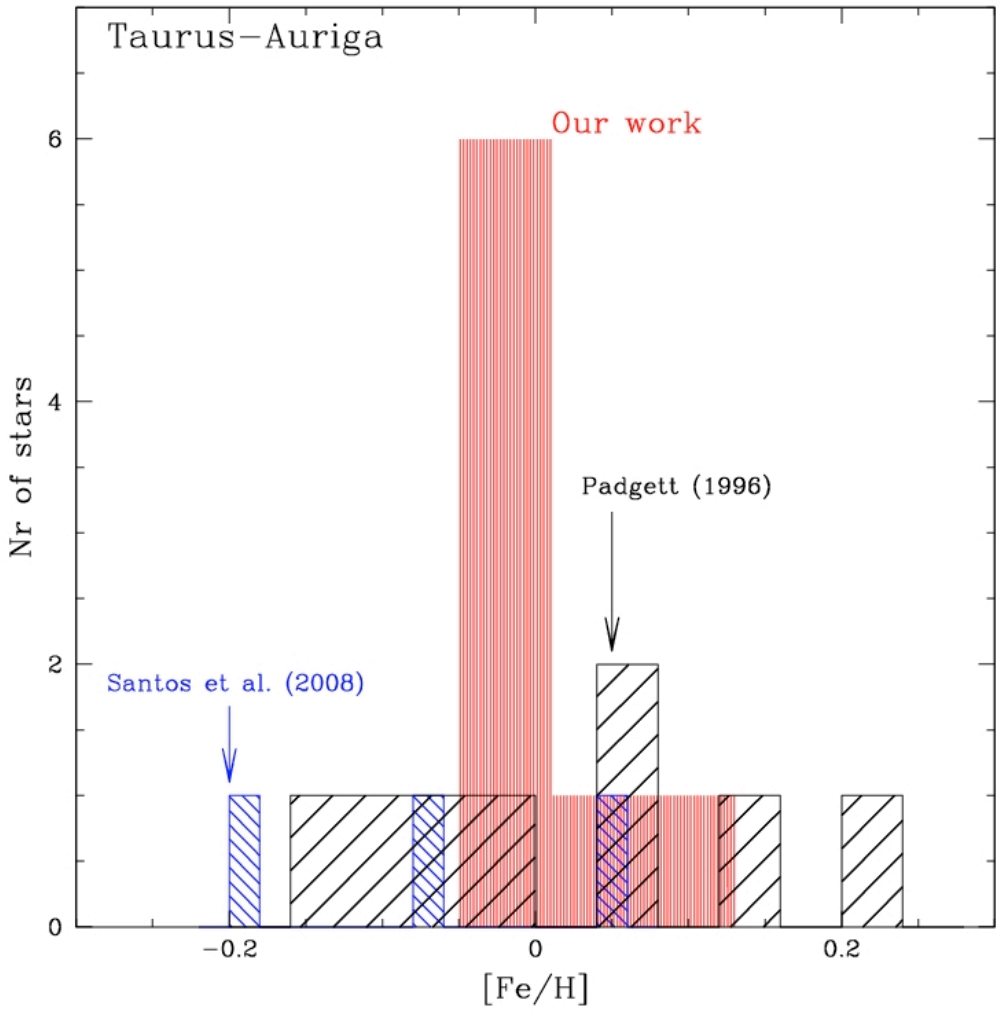
D'Orazi, Randich, Flaccomio, Palla, Pallavicini, Sacco 2009, A&A, in press

Very narrow distribution

ONC has a SOLAR metallicity
[Fe/H]=-0.02 ± 0.04

Taurus-Aurigae

D'Orazi et al. 2009, in preparation



Very narrow distribution

TAURUS has a SOLAR metallicity
[Fe/H]= 0.01 ± 0.04

No Difference CTTs vs WTTs