Dust input to the interstellar medium from Magellanic Clouds AGB stars

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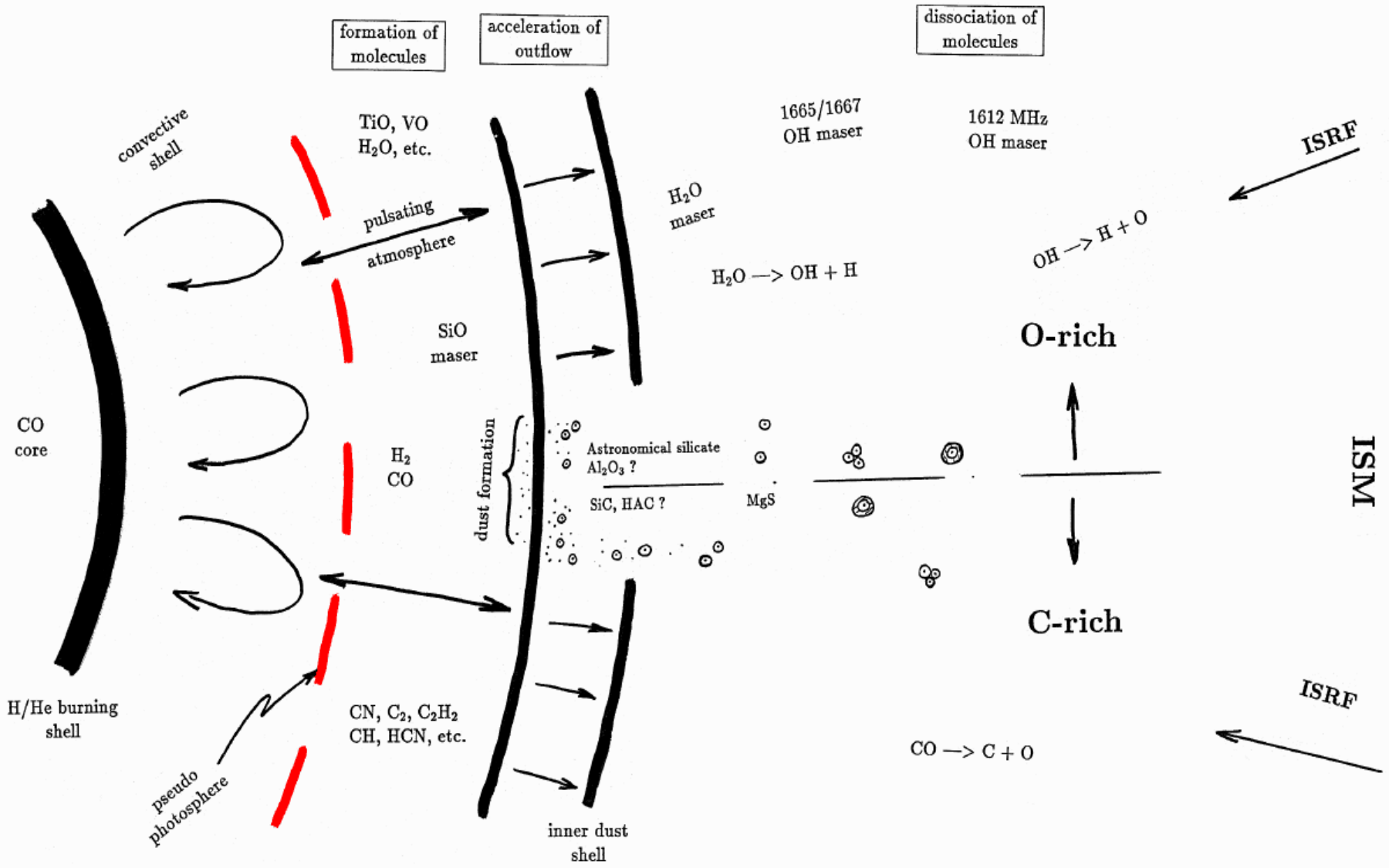
Mass-loss from AGB stars

- Due to radiation pressure on dust grains
- Main source of dust in the universe with WR and supernovae
- Dredge-up brings nuclear burning products to the surface
- Dust chemistry depends on C/O
- Metallicity dependence poorly known



	1	10	R (stellar radius)	1000
From Le Bertre			Angular diameter for d=100 pc (’’)	
et al. 1997	0.01	0.1		10

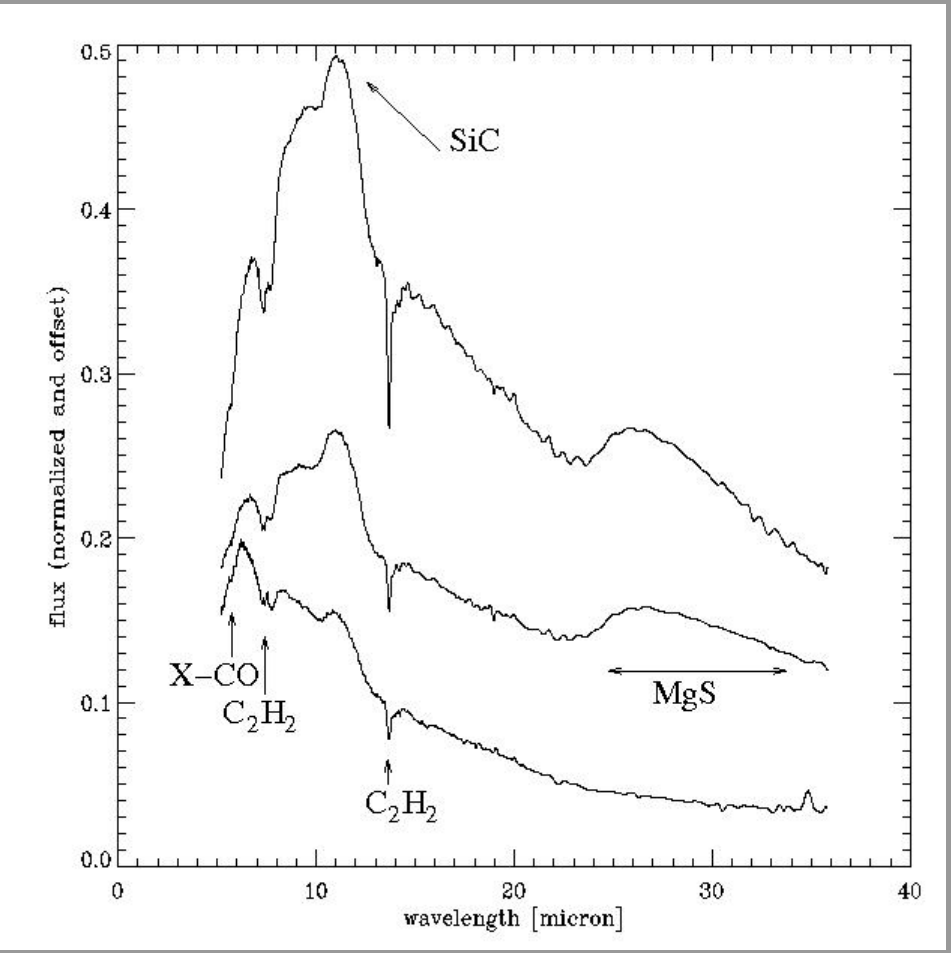
Spitzer spectroscopy of AGB stars in the Magellanic Clouds (MCs)

- Low resolution spectroscopy (5-38 microns)
- 29 stars in the LMC (Zijlstra et al. 2006)
- 14 stars in the SMC (Lagadec et al. 2007)
- Targets selected all along the AGB branch
- Study of molecules and dust features
- Definition of colours to study optical depths and temperature effects (Manchester System)

Why the Magellanic Clouds?

- Distance of the stars known : luminosity easy to determine
- Smaller metallicity than the Milky Way: study of the effect of metallicity
- Spitzer sensitive enough to study the mass-loss all along the AGB

Typical MCs AGB stars Spitzer spectra

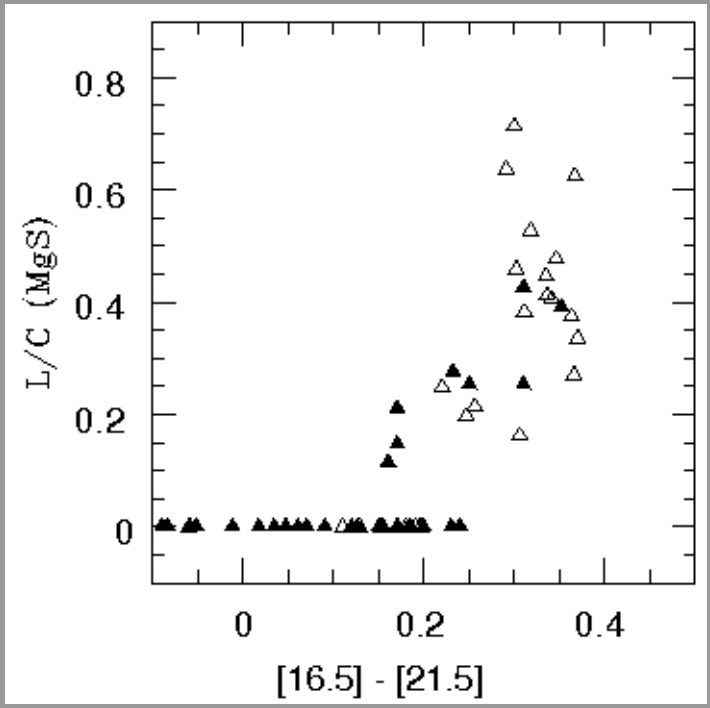


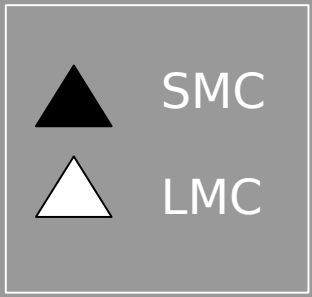
- SiC:11.65μm
- MgS:30μm
- C_2H_2: 7.5 and 13.7 μm
- Dust feature strength: Line to continuum ratio
- Continuum: line under the features

Gas:C_2H_2

- Fundamental to form organic molecules
- Strength larger in the SMC than LMC and Galaxy
- Increase with decreasing metallicity
- C/O higher at low metallicity (less O and efficient dredge up)
- Lead to carbon-rich dust formation

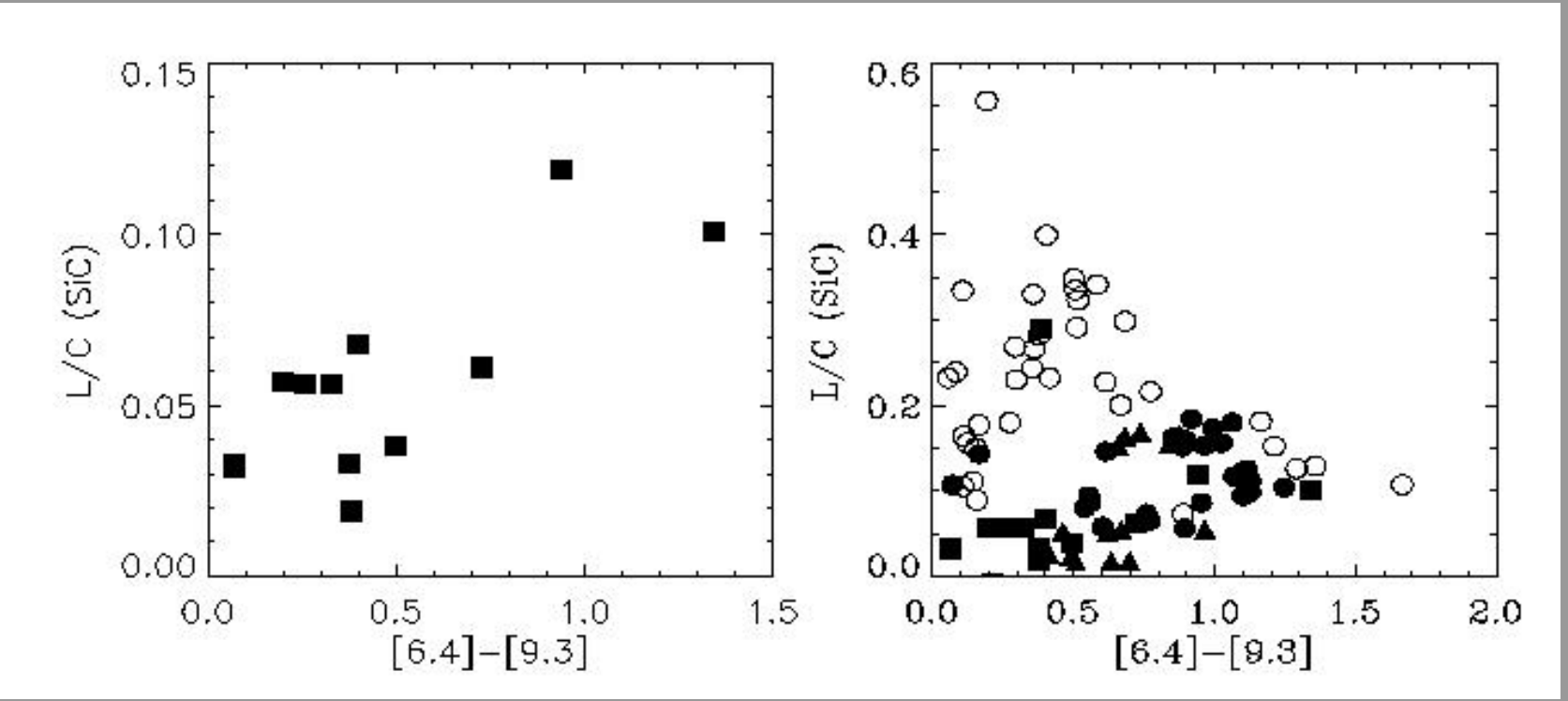
Dust: MgS





- Large feature around 30µm
- Observed only in the reddest stars (i.e. lowest dust temperature)
- MgS forms between 600 and 300K
- Similar strength in the SMC and LMC (T dependant)

Dust: SiC



SMC
LMC
Galaxy

- SiC weaker in the SMC
- Metallicity effect : less Si to form SiC
- Different condensation sequence: SiC forms earlier in the Galaxy

Conclusions

- Higher fraction of C-rich AGB stars in the MCs
- Dusty input mainly carbonaceous dust (Lagadec et al. 2007, Zijlstra et al. 2006)
- SiC weaker at low metallicity
- MgS in red stars
- Different condensation sequence in the MCs

Perspectives

- Study of the fundamental parameters of the stars (Wood et al. 2007, in preparation)
- Similar work in 5 Local Group Galaxies

Thank you!

Merci!

Grazie!

Trugarez!

Dank u!

Gracias!

Diolch !

Go raibh maith agat !