



**ISM PROCESSING IN THE
MAGELLANIC CLOUDS**

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Submm/THz/FIR Astronomy from Antarctica (Saclay, June 25-27, 2007)

Magellanic Clouds & Milky Way

Distance and size:

LMC	51 kpc	8°	7 kpc
SMC	63 kpc	2°	2 kpc

	MW	:	LMC	:	SMC
Mass:	1	:	0.02	:	0.006
Metallicity	1	:	0.5	:	0.2

Very extensive existing database of the Magellanic Clouds

provides

- * essential base for global investigations
- * excellent framework for detailed studies
- * ideal starting point for new observations

Magellanic Clouds in perspective

Gas-rich

Metal-poor

High star formation rate

Very large range of UV radiation densities

Laboratory for:

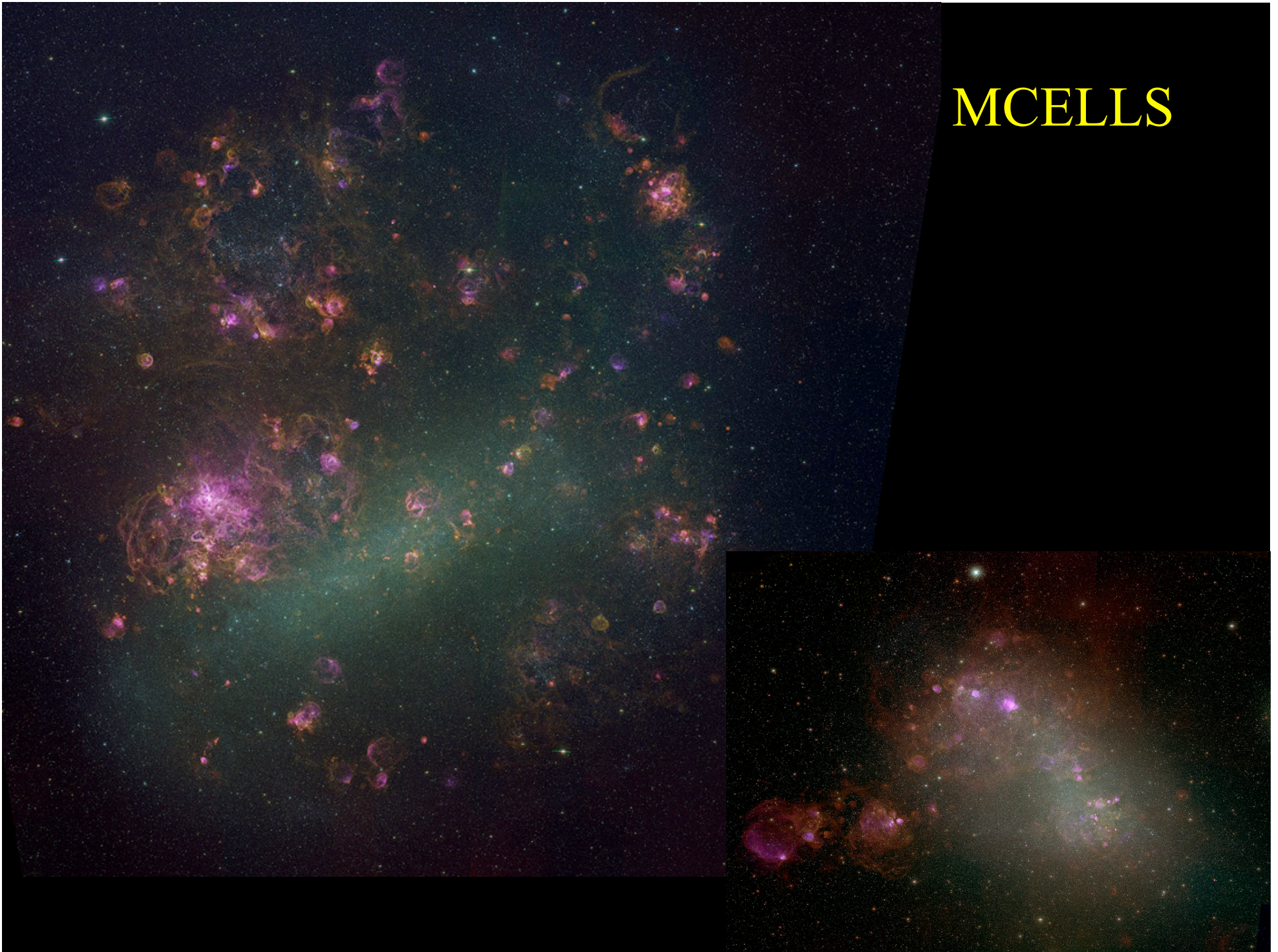
ISM as function of metallicity and radiation

Star formation as function of scale and time

Atomic and molecular gas

HII	LMC SMC	327 neb 167 neb
HI SGSs	LMC SMC	23 3 SGSs
CO	LMC SMC	107 GMCs >21 GMCs

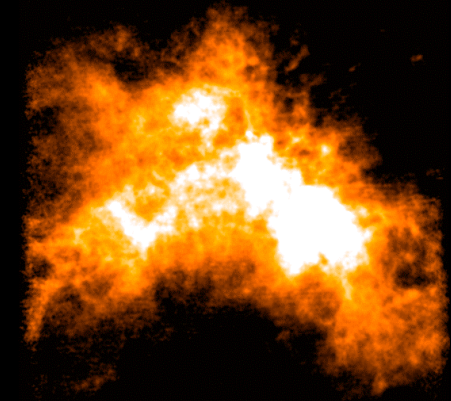
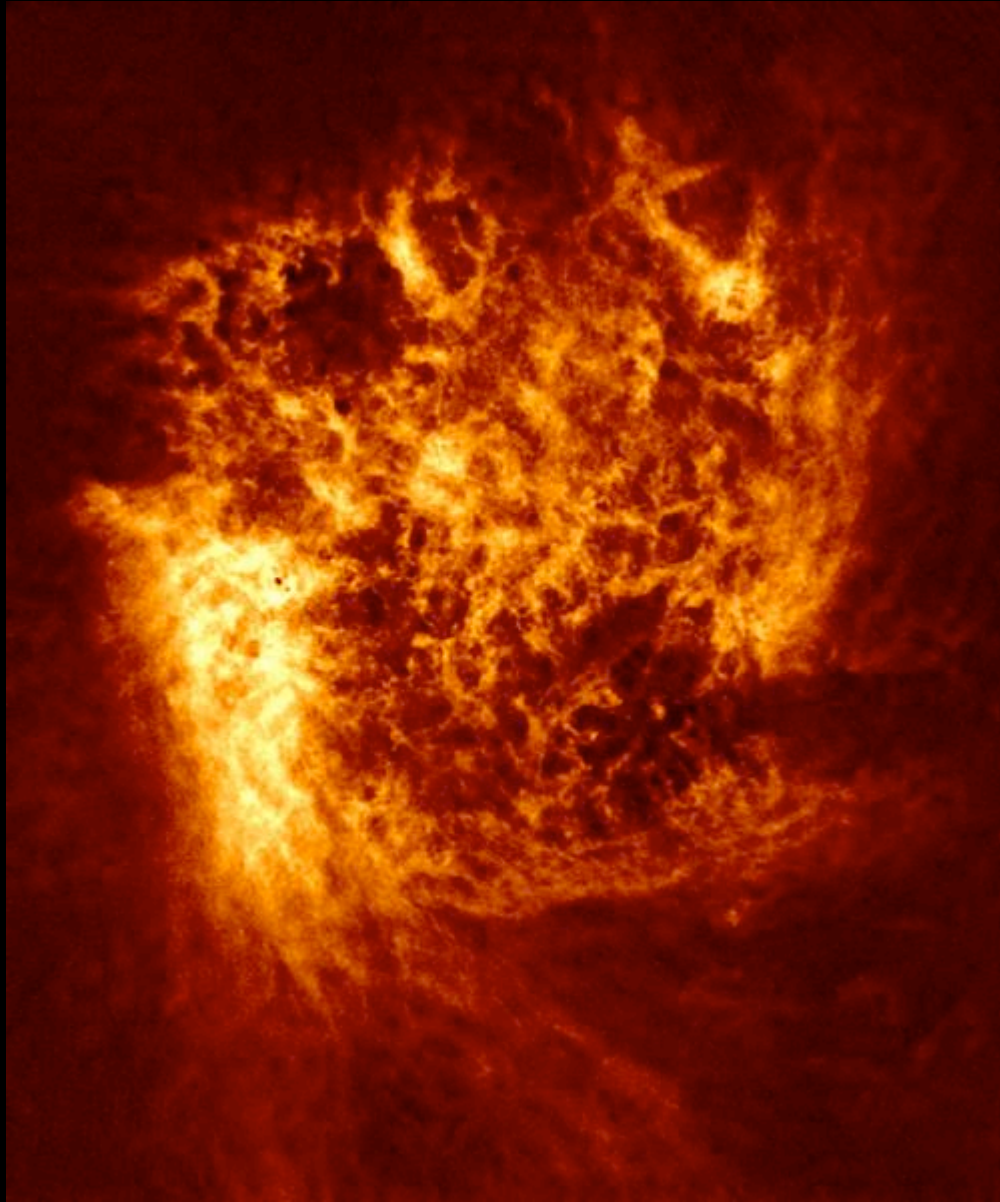
MCELLS



Atomic and molecular gas

HII	LMC		327 neb
	SMC		167 neb
HI	LMC	$3 \times 10^9 M_{\odot}$	23
SGSs			
	SMC	$0.5 \times 10^9 M_{\odot}$	3
SGSs			
CO	LMC		107 GMCs
	SMC		>21 GMCs

ATCA



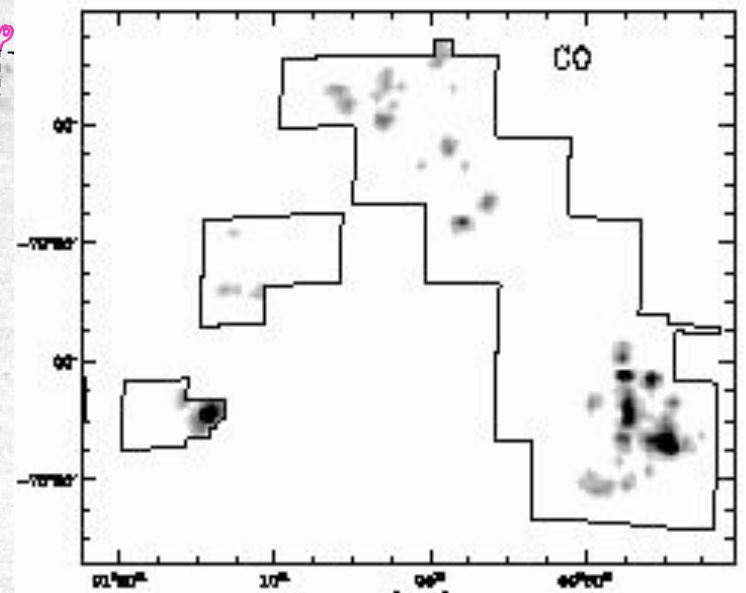
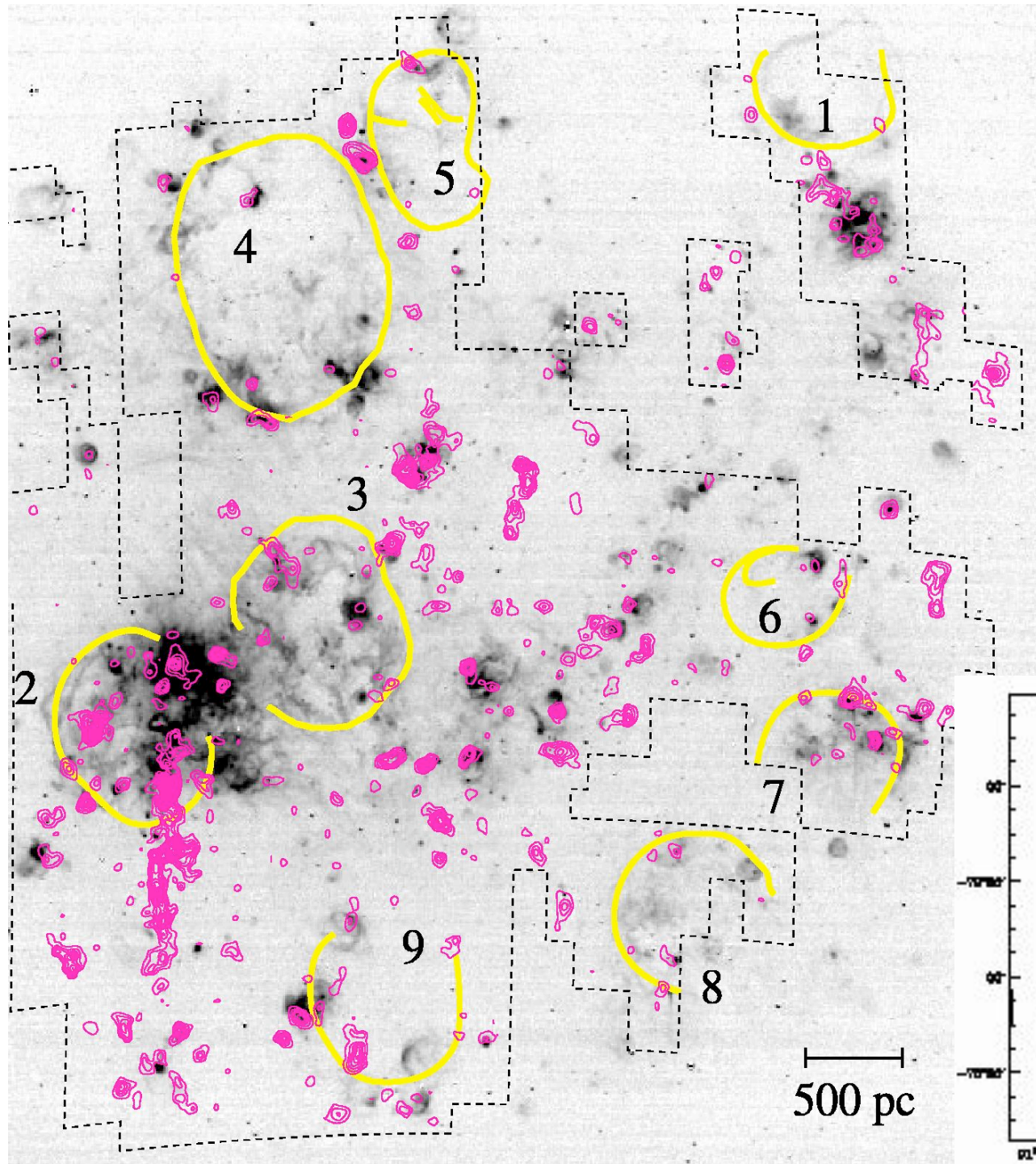
Atomic and molecular gas

HII	LMC	327 neb
	SMC	167 neb

HI	LMC	$3 \times 10^9 M_{\odot}$	23
SGSs			
	SMC	$0.5 \times 10^9 M_{\odot}$	3
SGSs			

CO	LMC	$0.1 \times 10^9 M_{\odot}$	107 GMCs
	SMC	$0.06 \times 10^9 M_{\odot}$	>21 GMCs

Nanten



Infrared emission from dust

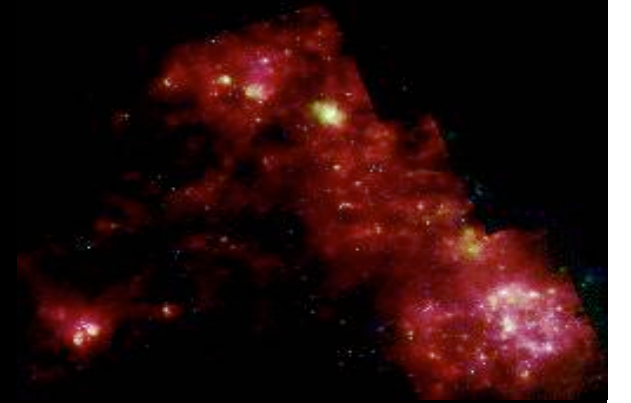
		LMC	SMC
IRAS	12-100 μ m	1,891	249
MSX	6-25 μ m	1,806	236
Spitzer	4-160 μ m	4,000,000	400,000

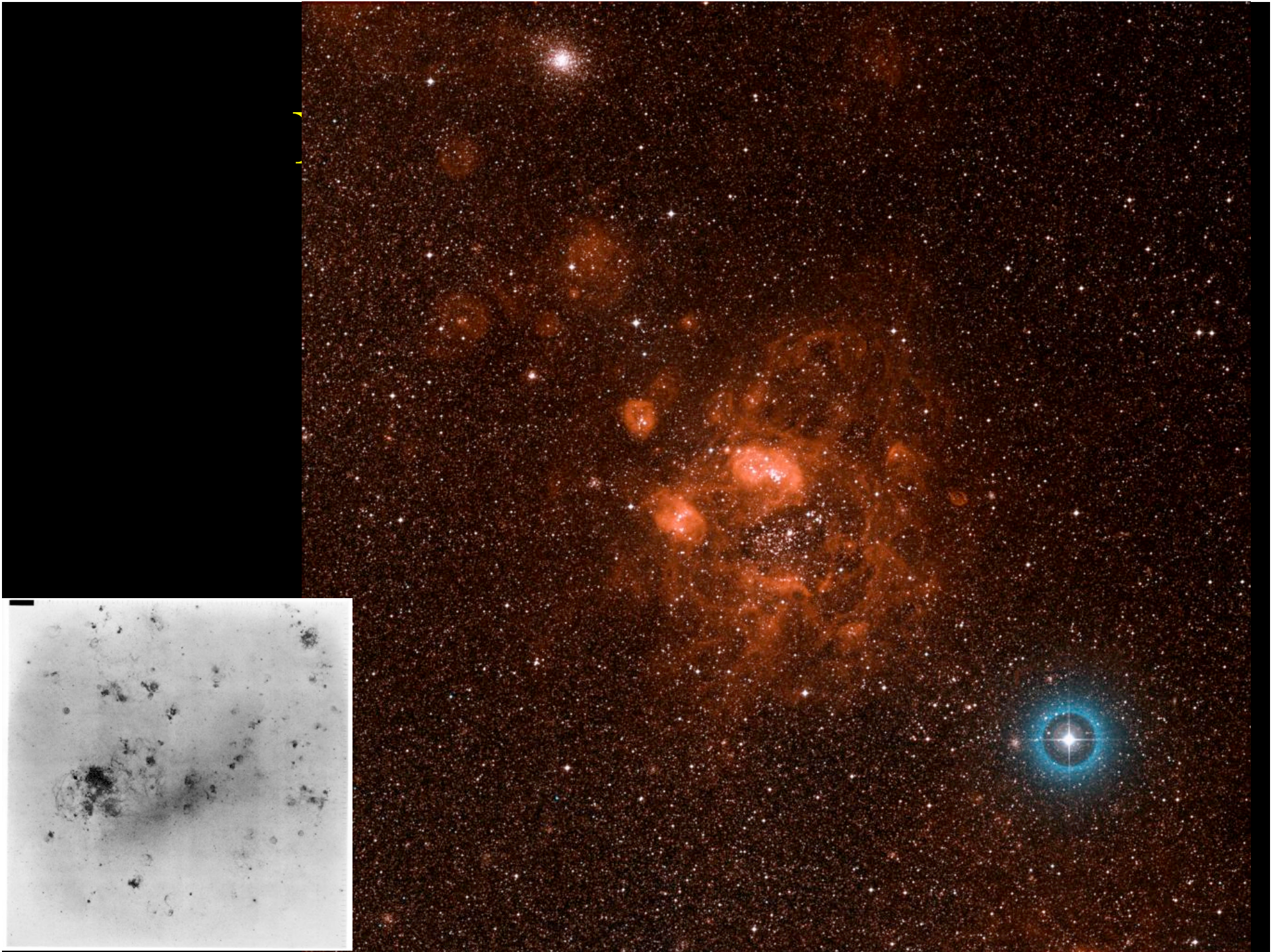


Spitzer

SAGE

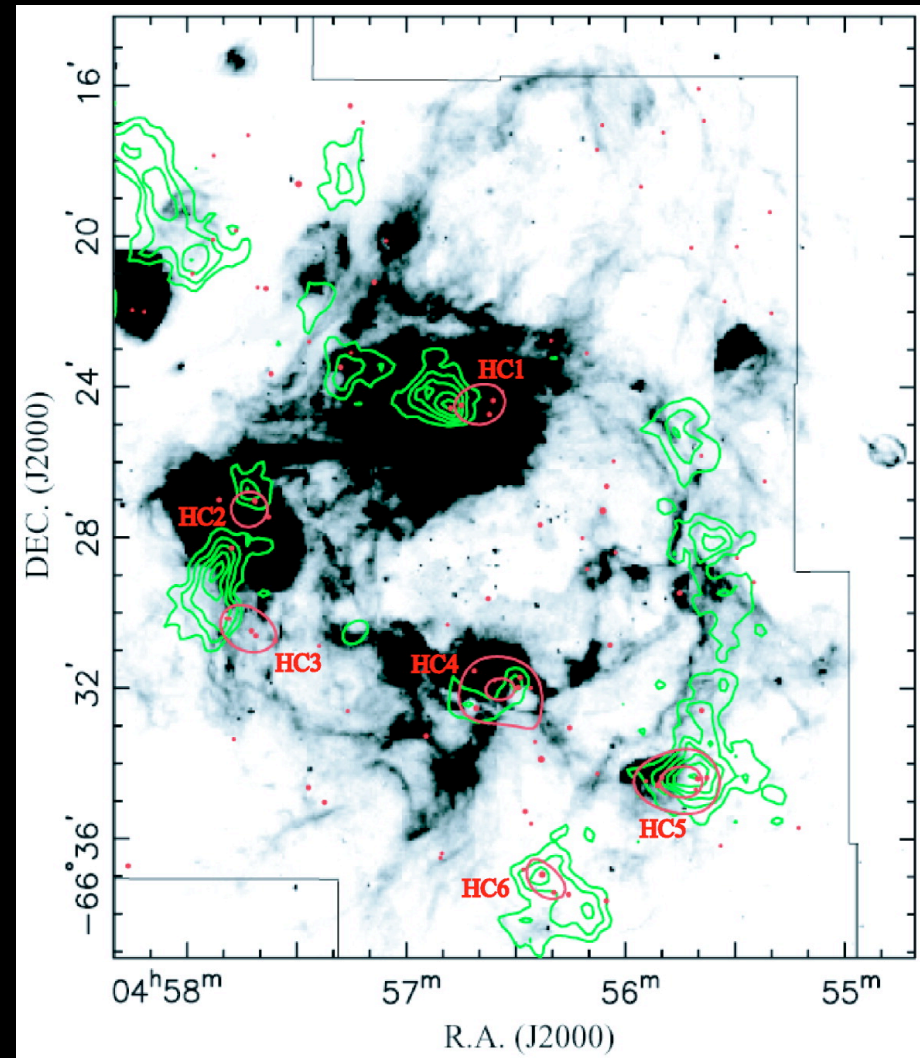
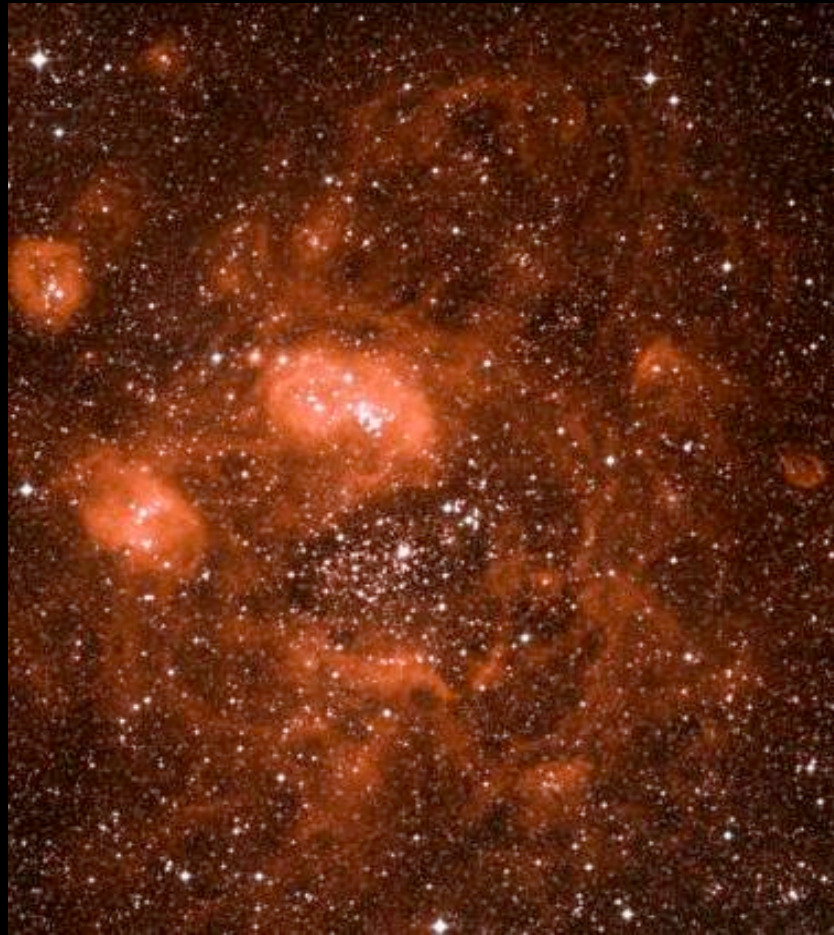
S3MC





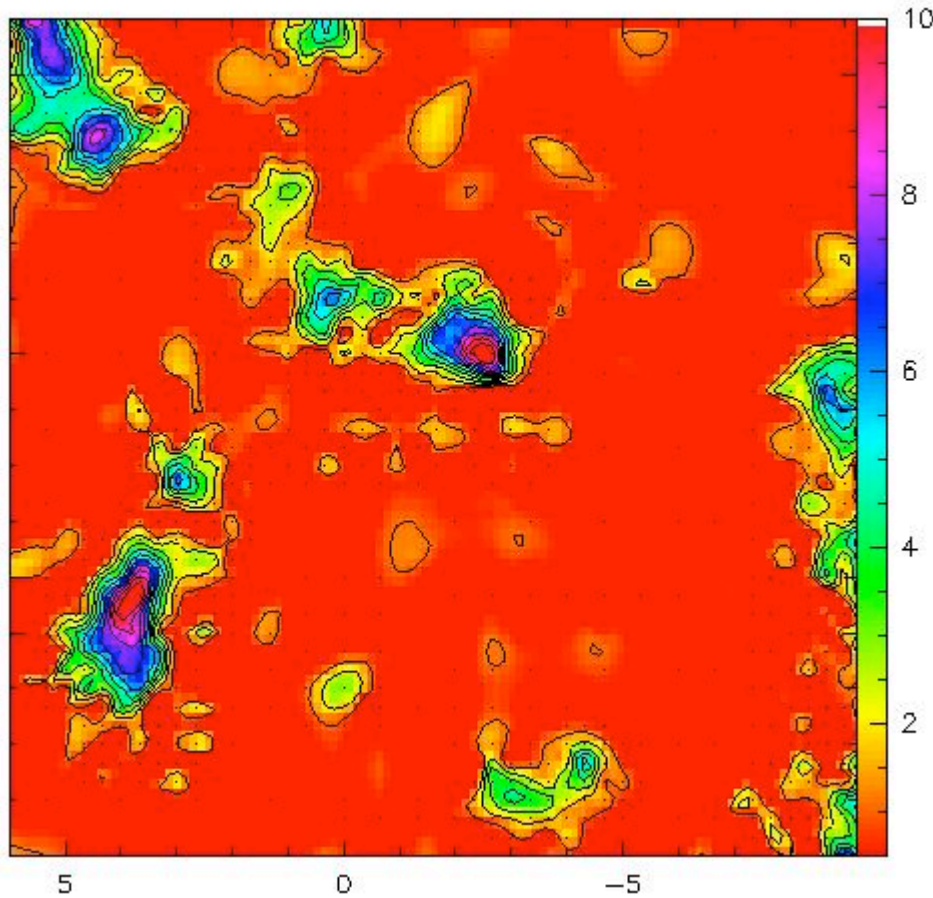
N11

CO (SEST) contours H-alpha (DSS) image



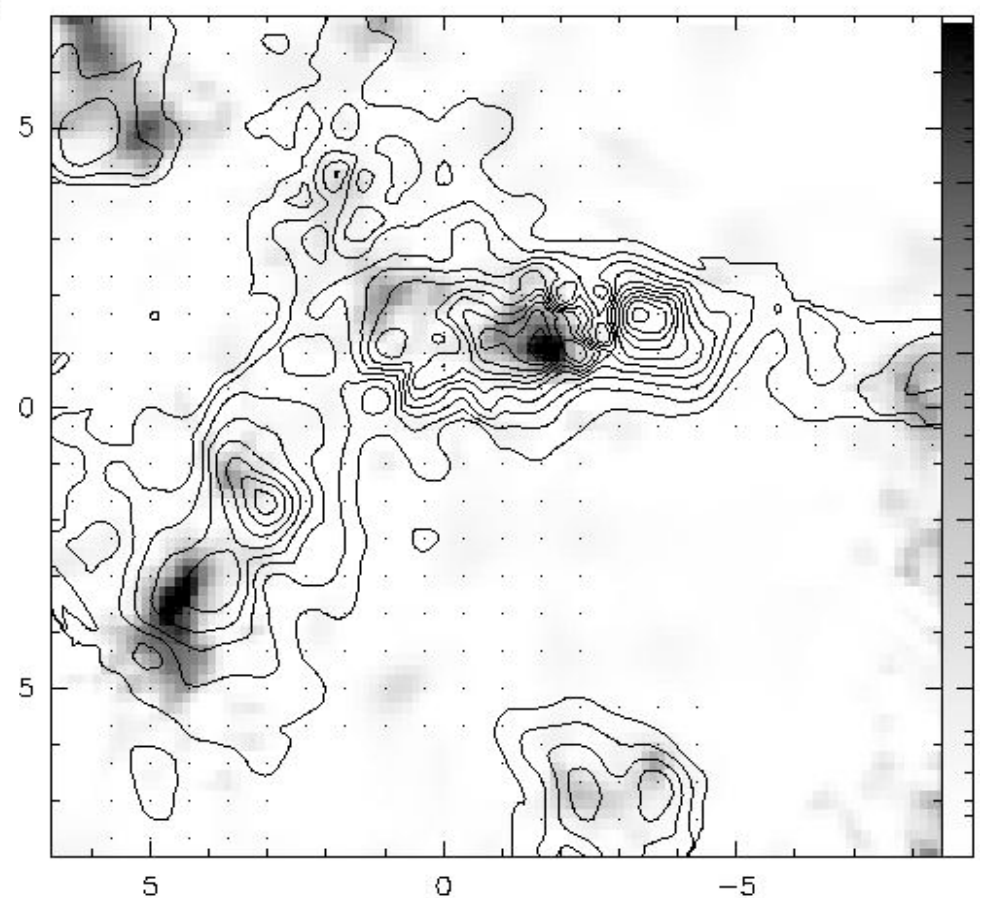
N11 molecular gas dissociation

LMC-N11SW CO J=1-0



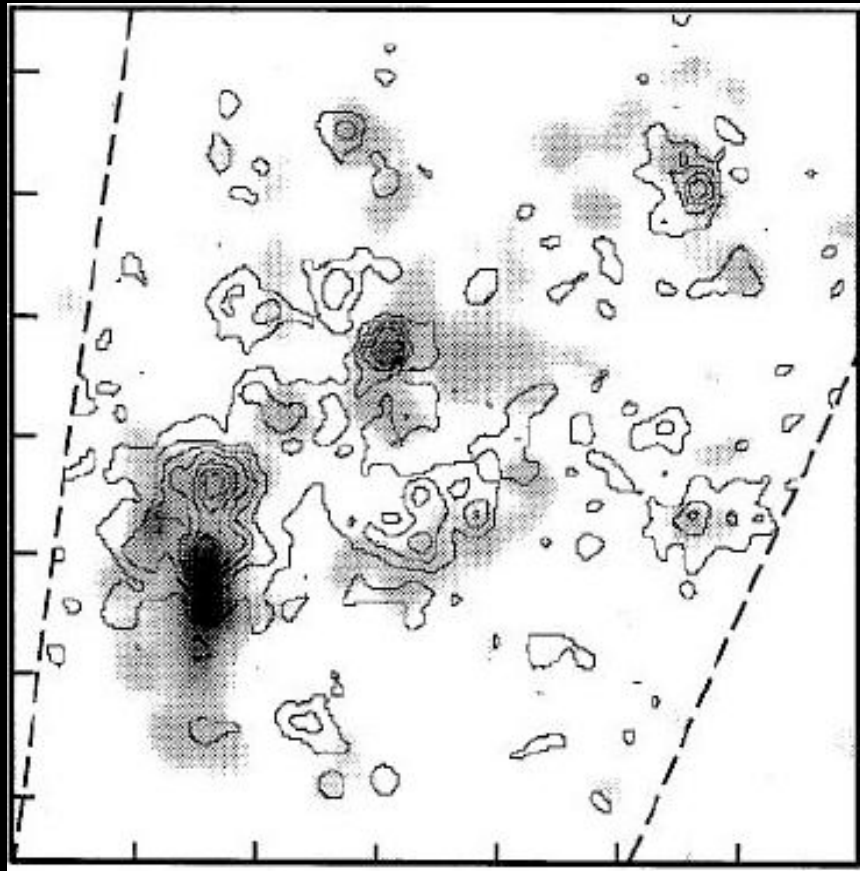
CO J=1-0 (SEST)

LMC-N11SW [CII]



[CII] (FIFI-KAO)

Erosion of molecular gas and dust

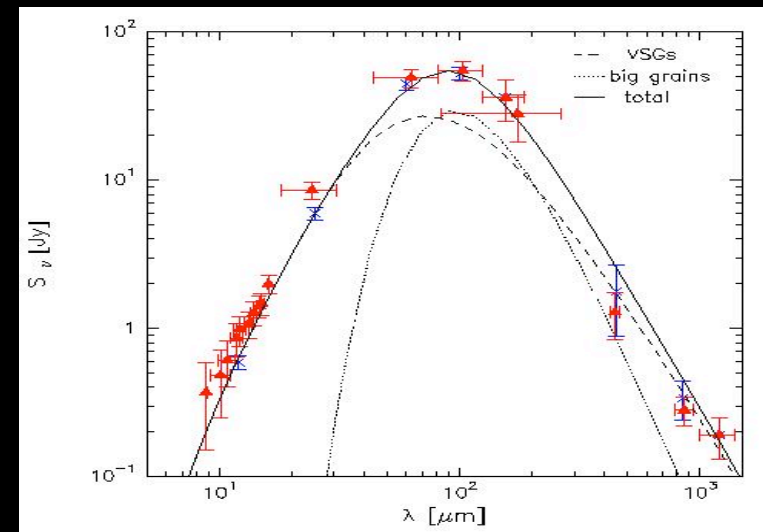
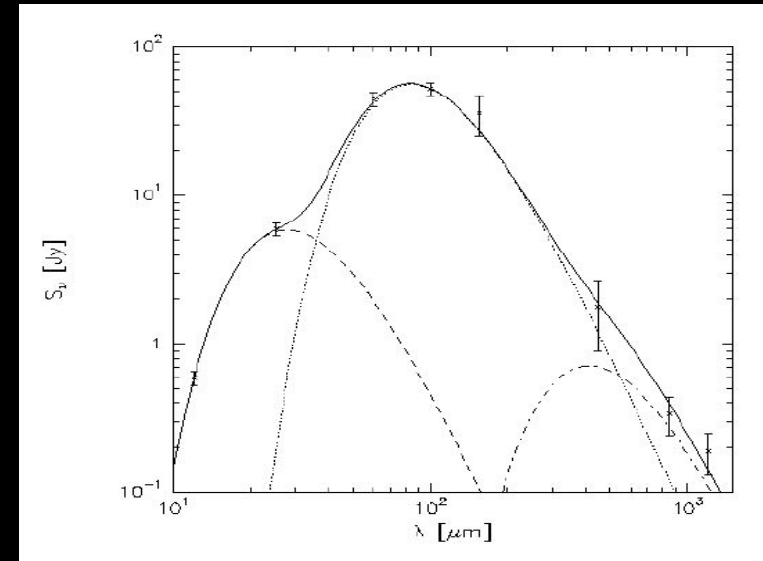
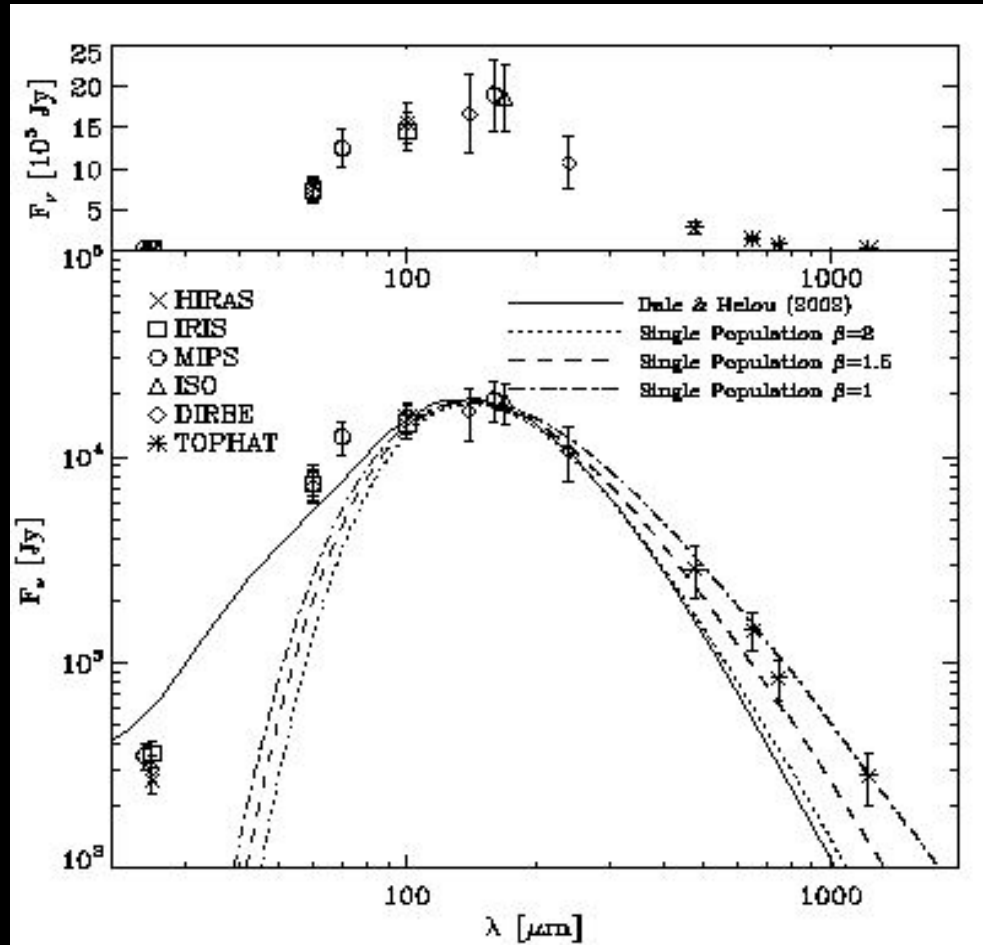


[CII] on CO (BICE, Mini)



FIR cont (IRAS)

The Nature of the Submm Excess



Leroy et al. (2007)
Lisenfeld et al (2002)

SED: Rayleigh-Jeans side

Accurate dust mass estimates

Dust response to local radiation fields

Metallicity-dependent variations in dust response

Relation to CO dissociation

FIR/Submm Continuum in the Magellanic Clouds

	LMC	SMC	sensitivity	
	Area	8	2	sq. deg
200	256	64	days	55 MJy/sr
350	172	48	days	7.5 MJy/sr
450	256	64	days	0.9 MJy/sr
600	172	48	days	0.15 MJy/sr
	Total	428	112	days

FIR/Submm Lines in the Magellanic Clouds

Truly exceptional night-time conditions:

[CII] 1900.54 GHz (157 mu)

Moderately good day-time conditions:

[CI] 809.342 GHz (371 mu)

[CI] 492.162 GHz (510 mu)

¹²CO, ¹³CO J=6-5 to J=8-7



Very Large Stellar Databases

IJK/JHK DENIS, 2MASS 1,300,000 LMC
300,000 SMC

UBVR CCD survey 179,655 LMC
84,995 SMC

UBVI photometry 24,107,004 LMC

Time-sequences 7,000,000 LMC

OGLE BVI/MACHO VR 2,000,000 SMC