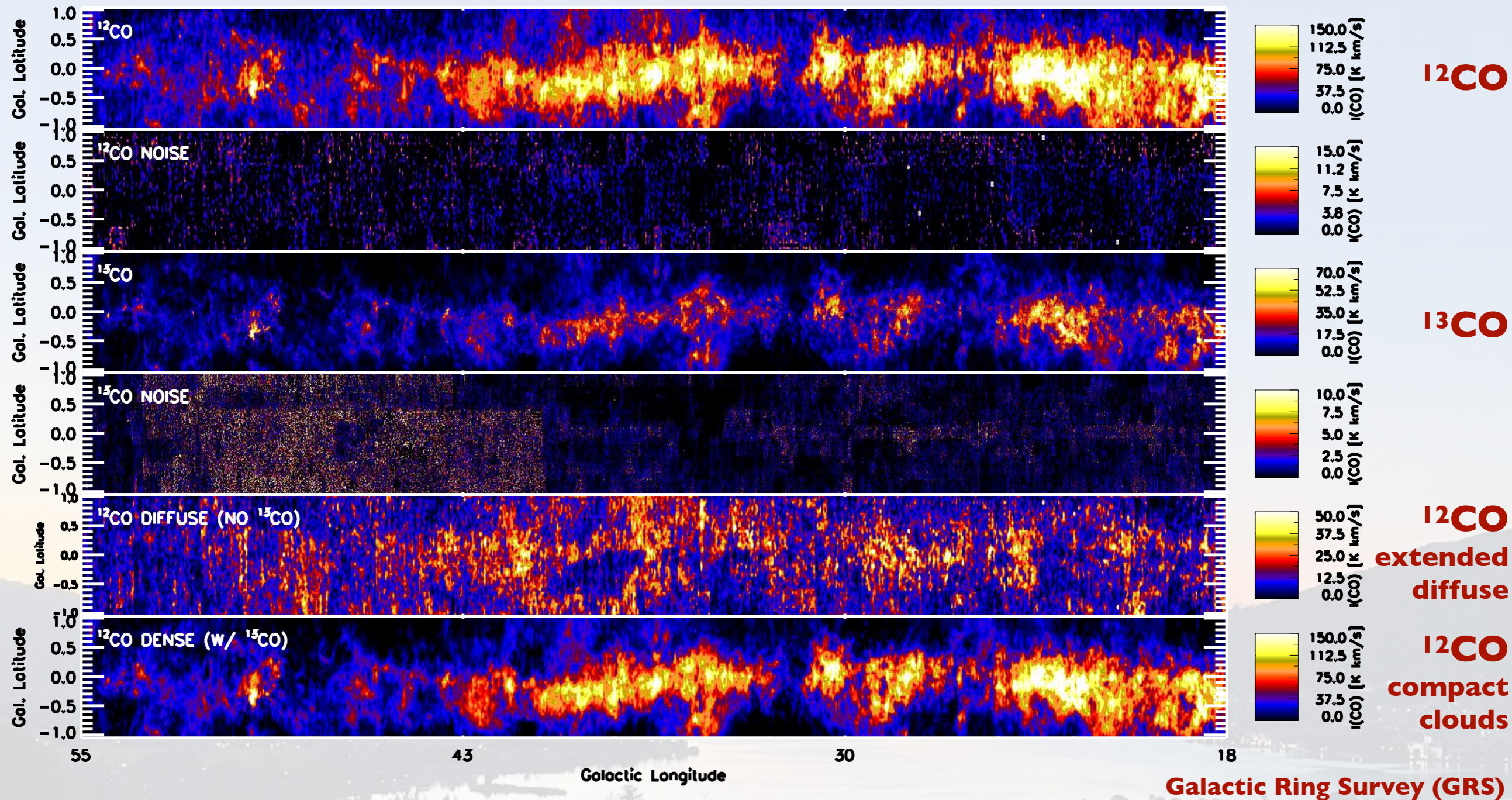




diffuse vs. dense vs. very dense gas



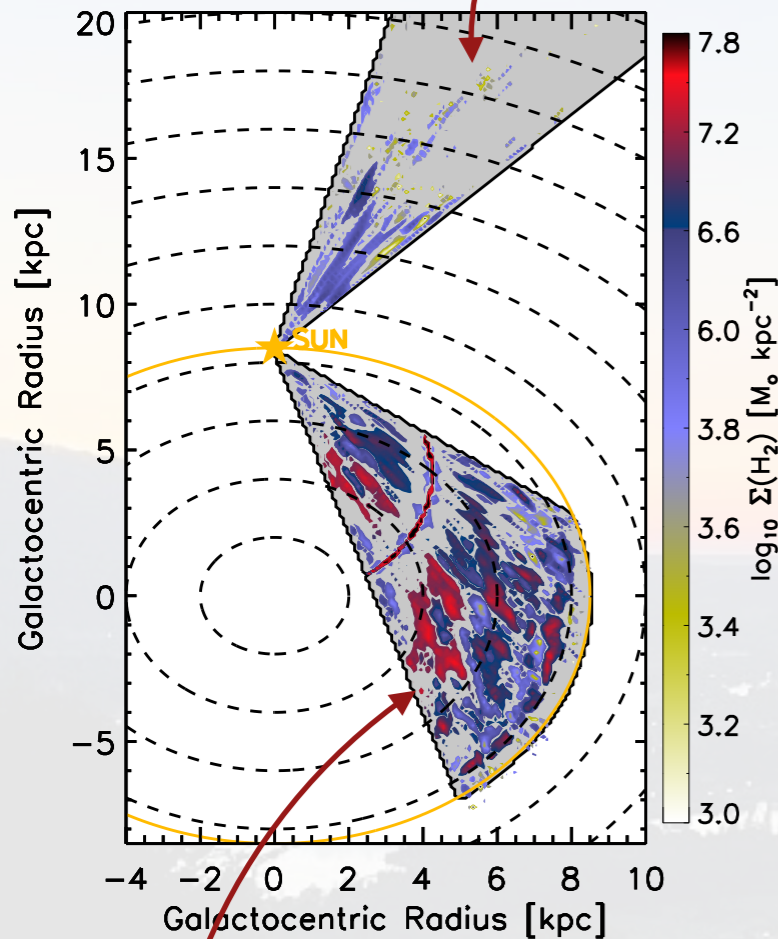
observational approach:

- comparison of ^{13}CO (tracing mostly dense clouds) and ^{12}CO tracing all the gas (including the more diffuse component)

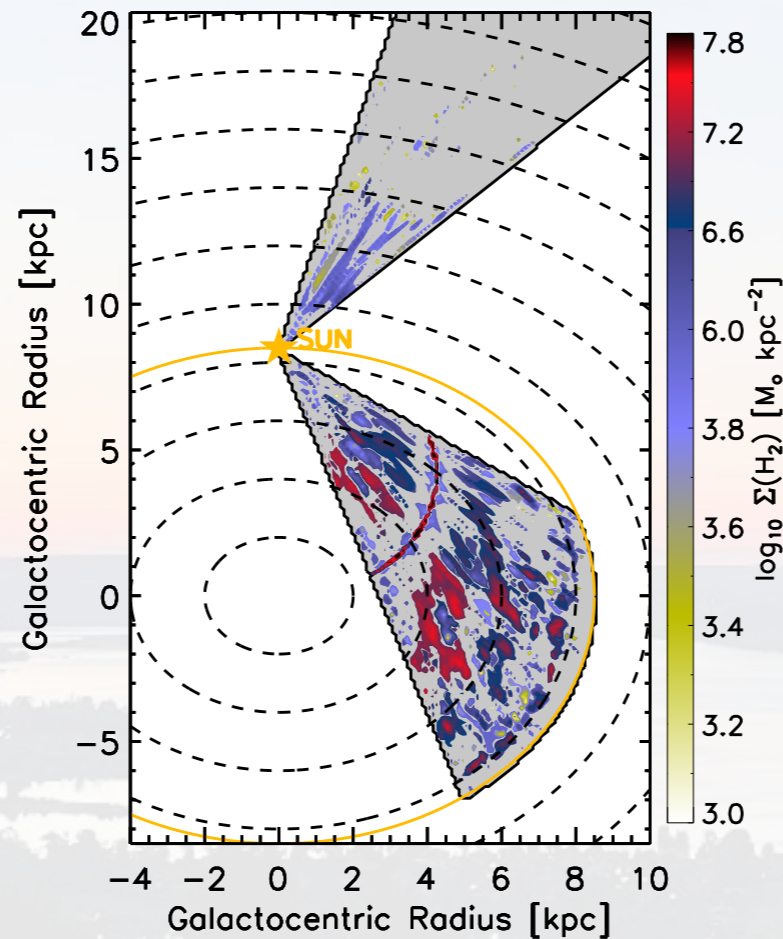
diffuse vs. dense gas

OUTER GALAXY:
EXEF survey

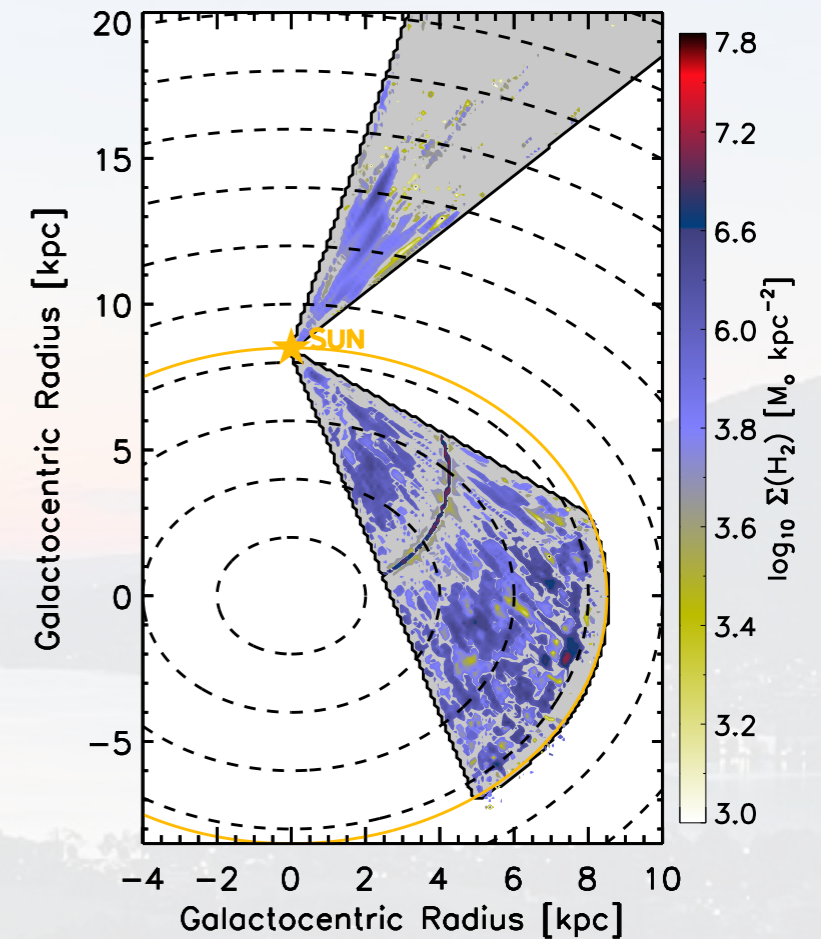
total gas



dense clouds



diffuse gas



Exeter-Five College Radio Astronomy Observatory (EXFC)
Galactic Ring Survey (GRS)

INNER GALAXY:
Galactic Ring Survey (GRS)

dense gas fraction as function of radius

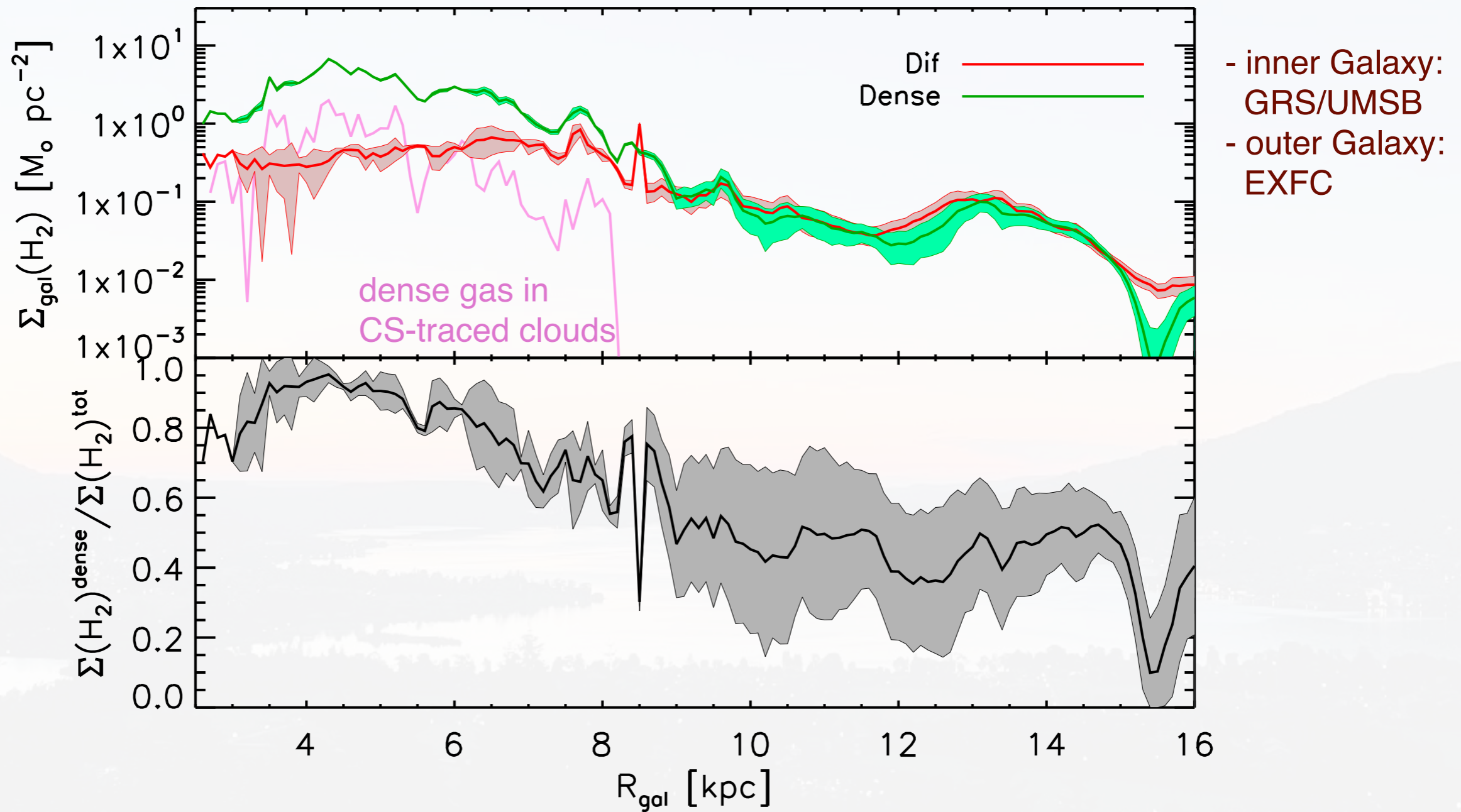
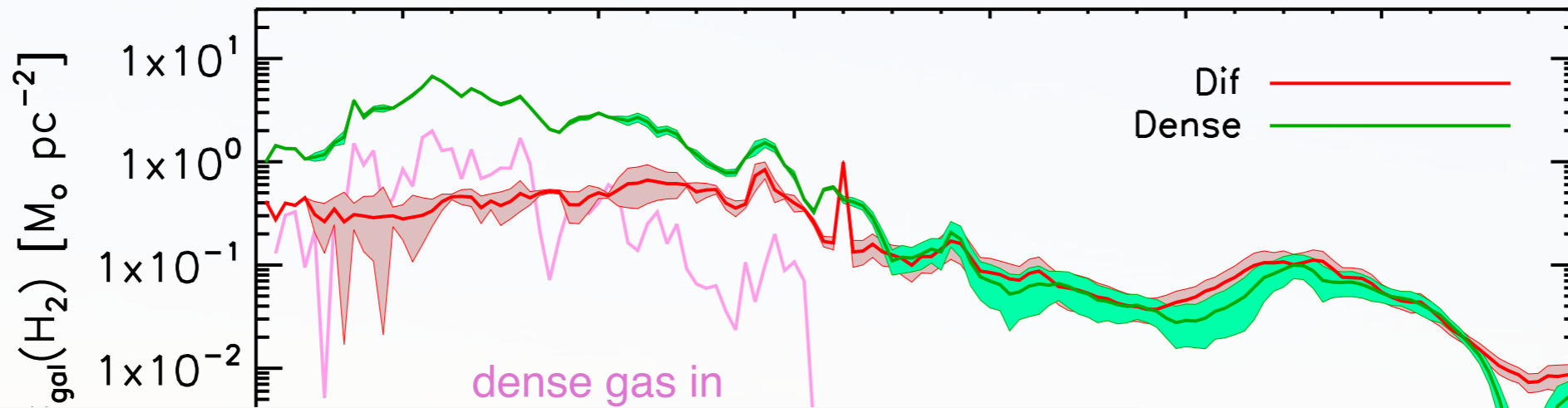


Figure 13. Average Galactic H_2 surface densities of the diffuse (red, detected in ^{12}CO , undetected in ^{13}CO) and dense (green, detected in ^{12}CO and ^{13}CO) components as a function of Galactocentric radius (in bins of width 0.1 kpc), in logarithmic scale, combining all data sets. In the inner Galaxy, the pink line indicates the surface density of H_2 in molecular clouds identified in Roman-Duval et al. (2010).

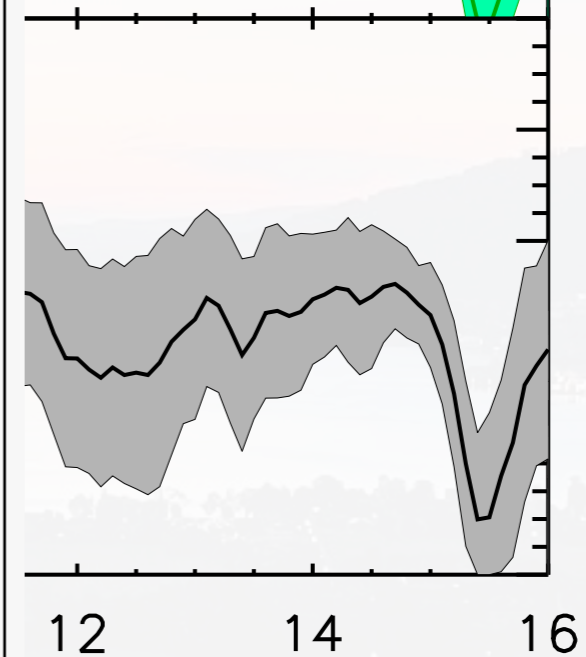
dense gas fraction as function of radius



- inner Galaxy:
GRS/UMSB
- outer Galaxy:
EXFC

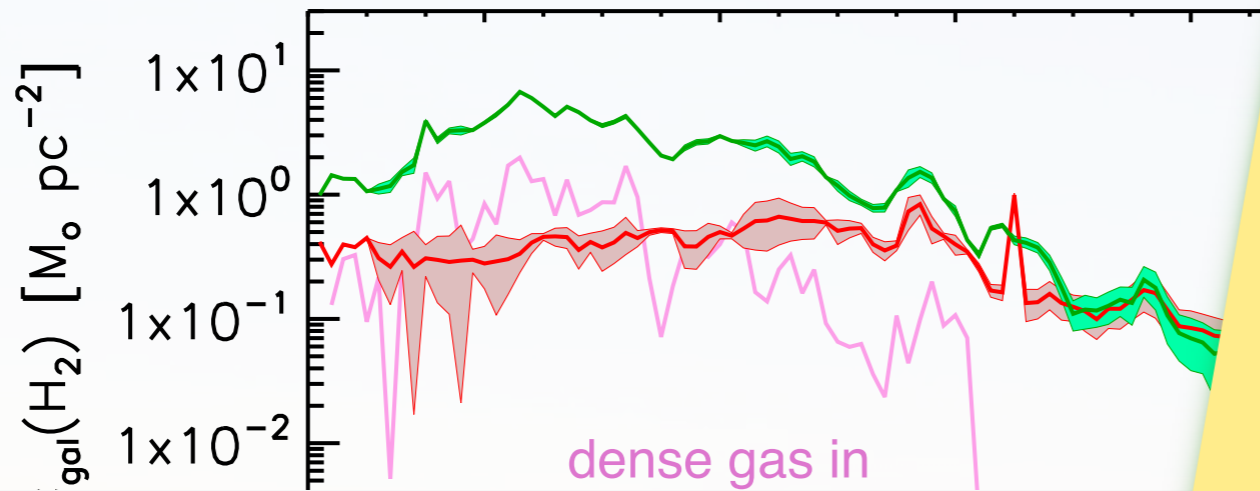
Table 5
Total Luminosity and Molecular Mass in the Milky Way in the Diffuse and Dense Components Traced by ^{12}CO

		Inner	Outer	Total
$L(^{12}\text{CO})$	Diffuse	2.0×10^1	4.0	2.4×10^1
	Dense	1.1×10^2	3.8	1.1×10^2
	Very dense	4.8	...	4.8
	Total	1.3×10^2	7.7	1.4×10^2
$M(\text{H}_2)$	Diffuse	9.3×10^7	6.0×10^7	1.5×10^8
	Dense	4.6×10^8	3.9×10^7	4.9×10^8
	Very dense	2.9×10^7	...	2.9×10^7
	Total	5.5×10^8	9.9×10^7	6.5×10^8



nd dense (green, detected in ^{12}CO and ^{13}CO) components
s. In the inner Galaxy, the pink line indicates the surface

dense gas fraction as function of radius

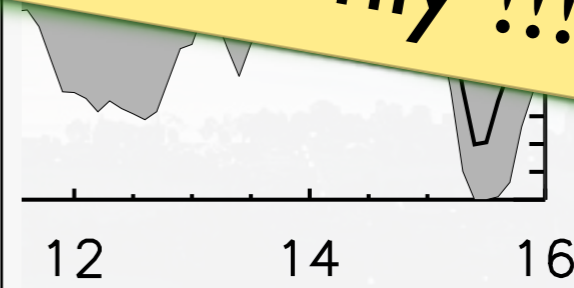


fraction CO-traced
H₂ gas in Milky Way:

- ~1/4 diffuse
- ~3/4 dense
- ~1/20 in very dense (SF?) clouds only !!!

Table 5
Total Luminosity and Molecular Mass in the Milky Way in the Diffuse and Dense Components Traced by ¹²CO

		Inner	Outer	
L(¹² CO)	Diffuse	2.0 × 10 ¹	4.0	
	Dense	1.1 × 10 ²	3.8	1.1 × 10 ²
	Very dense	4.8	...	4.8
	Total	1.3 × 10 ²	7.7	1.4 × 10 ²
M(H ₂)	Diffuse	9.3 × 10 ⁷	6.0 × 10 ⁷	1.5 × 10 ⁸
	Dense	4.6 × 10 ⁸	3.9 × 10 ⁷	4.9 × 10 ⁸
	Very dense	2.9 × 10 ⁷	...	2.9 × 10 ⁷
	Total	5.5 × 10 ⁸	9.9 × 10 ⁷	6.5 × 10 ⁸



nd dense (green, detected in ¹²CO and ¹³CO) components
s. In the inner Galaxy, the pink line indicates the surface

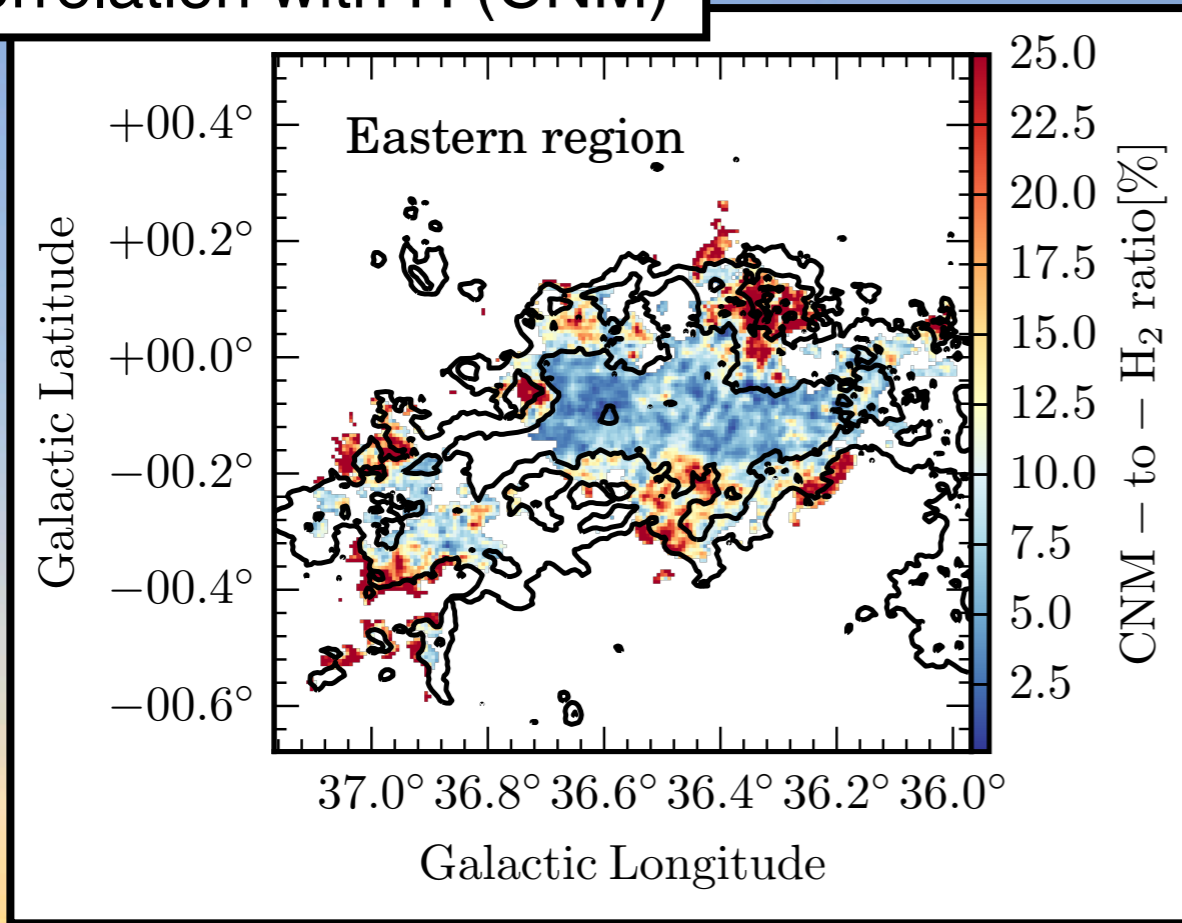
Fig
as a
densi

fraction CO-traced
H₂ gas in Milky Way:

- ~1/4 diffuse
- ~3/4 dense
- ~1/20 in very dense (SF?) clouds only !!!

in addition, about half of
the molecular gas in MW
seems to be CO-dark

correlation with H (CNM)



fraction CO-traced
H₂ gas in Milky Way:

- ~1/4 diffuse
- ~3/4 dense
- ~1/20 in very dense (SF?) clouds only !!!

in addition, about half of
the molecular gas in MW
seems to be CO-dark