

First look with MALT90

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The MALT90 survey

- ▶ 3000 dense cores from ATLASGAL (870 μm)
- ▶ 3' \times 3' maps of 90-GHz molecular lines with Mopra
- ▶ Cores divided into 4 categories based on mid-IR emission
 - ▶ Quiescent: cores without signs of star formation
 - ▶ Protostellar: cores with an embedded protostar, typically seen at 24 μm
 - ▶ HII region: HII regions, whether large or small
 - ▶ PDR: these regions near HII regions and will show up as extended emission at 8 μm . Often the swept up dust here has little sign of star formation but is still not really quiescent

Selecting HCHII region candidates in MALT90

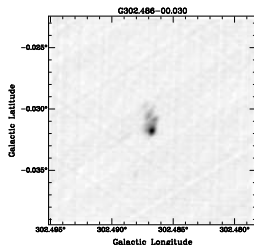
Started with sources from Andres Guzman

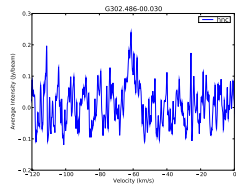
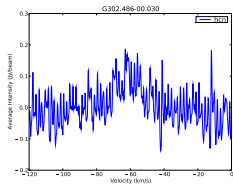
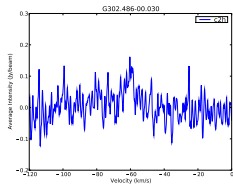
- ▶ 3 and 6 cm RMS flux densities give a positive spectral index
- ▶ MSX flux density for every source
- ▶ 50 out of 79 overlap between Guzman sources and MALT90 catalog
- ▶ majority of Guzman sources fall into 'HII region' and 'Protostellar' categories
 - ▶ why not 100% overlap?

- ▶ Guzman sources have MSX detections ($8.28 \mu\text{m} - 21.3 \mu\text{m}$) but not all have IRAS detections ($12 \mu\text{m} - 100 \mu\text{m}$), biased toward stronger mid-IR sources
 - ▶ biased toward hotter, more evolved YSOs
- ▶ MALT90 catalog comes from ATLASGAL (survey at $870 \mu\text{m}$), $>50\%$ of ATLASGAL sources discovered have no counterpart in IRAS and MSX
 - ▶ biased toward colder, younger YSOs

G302.486-00.030

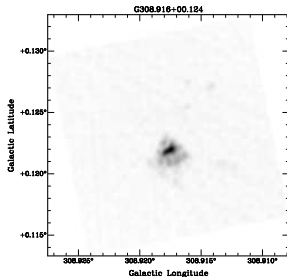
MALT90 classification	HII region
8.6-GHz flux density	24.4
8.6-GHz size (pc)	0.08567
distance (kpc)	3.83484
luminosity (L_{\odot})	8447.35
22-GHz water maser?	yes
6.7-GHz methanol maser?	-
EGO present?	-

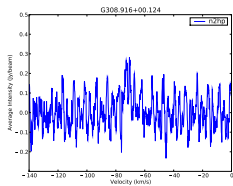
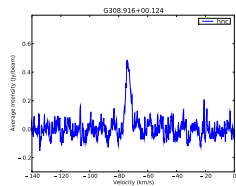
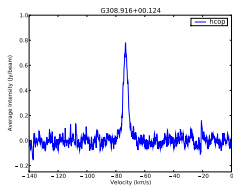
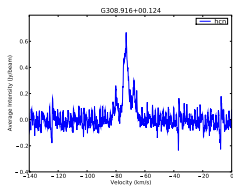
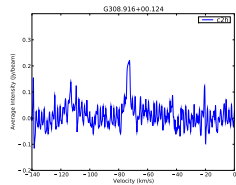
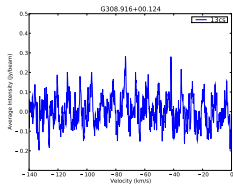
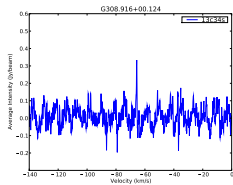




G308.916+00.124

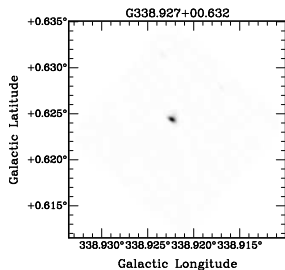
MALT90 classification	HII region
8.6-GHz flux density	374.1
8.6-GHz size (pc)	0.16033
distance (kpc)	3.82749
luminosity (L_{\odot})	133325
22-GHz water maser?	yes
6.7-GHz methanol maser? (107-GHz also)	yes
EGO present?	-

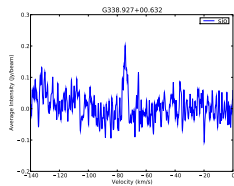
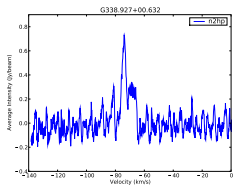
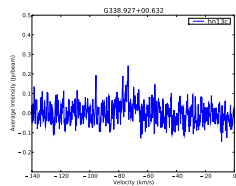
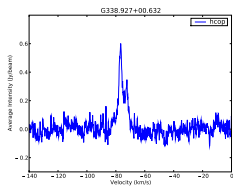
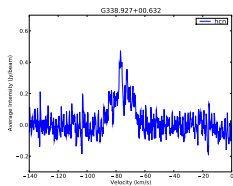
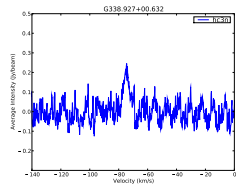
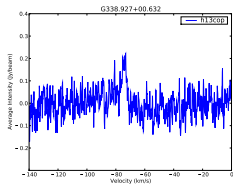
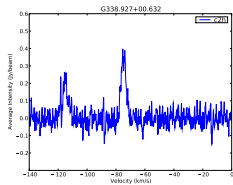




G338.927+00.632

MALT90 classification	Protostellar
8.6-GHz flux density	166.5
8.6-GHz size (pc)	0.07505
distance (kpc)	4.3
luminosity (L_{\odot})	153331
22-GHz water maser?	-
6.7-GHz methanol maser?	-
EGO present?	-

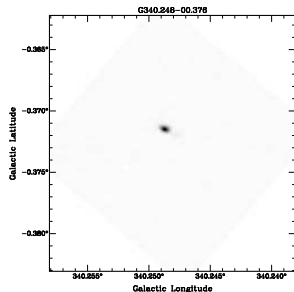


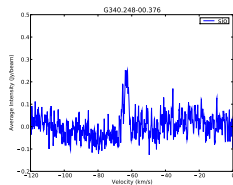
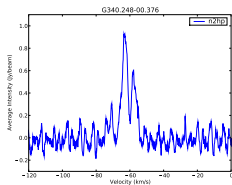
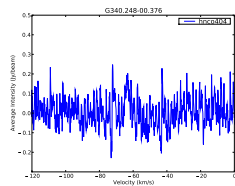
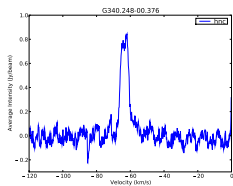
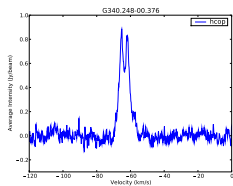
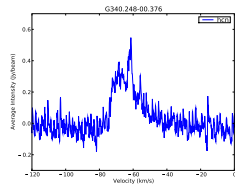
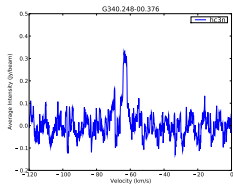
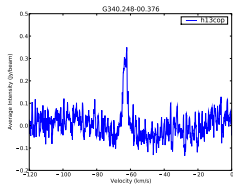


G340.248-00.376

MALT90 classification
8.6-GHz flux density
8.6-GHz size (pc)
distance (kpc)
luminosity (L_{\odot})
22-GHz water maser?
6.7-GHz methanol maser?
EGO present?

Protostellar
150.8
0.05969
3.8
51000
-
-
-





	G302...	G308...	G338...	G340...	
13c34s	-	y	y	-	Optical depth
13cs	-	y	-	-	Optical depth
c2h	offset	y	y	-	PDR
ch3cn	-	-	-	-	Hot core
h13co+	-	-	y	y	Optical depth
h41a	-	-	-	-	Ionized gas
hc13ccn	-	-	-	-	Hot core
hc3n	-	-	y	y	Hot core
hcn	y	y	y	y	Density
hco+	-	y	y	y	Density
hn13c	-	-	y	-	Optical depth
hnc	y	y	y	y	Density
hnco404	-	-	-	y	Hot core
hnco413	-	-	-	-	Hot core
n2h+	-	offset	y	y	Density
sio	-	-	y	y	Shock/outflow

Conclusions/future work

- ▶ look for trends in all the Guzman sources in MALT90
- ▶ 2011 aim to observe promising candidates with the ATCA to model SEDs
- ▶ look for HCHII region candidates not included in the source list from Guzman
 - ▶ MALT90 'Protostellar' bin may be the place to start
 - ▶ generally more compact in their radio emission
 - ▶ SiO and perhaps more hot core tracers