

Wiki: collab.phys.unsw.edu.au/mopraco
Web: www.phys.unsw.edu.au/mopraco

THE UNIVERSITY OF
NEW SOUTH WALES



Michael Burton



Overview

- Developed “fast-mapping” for Mopra telescope
 - 22m telescope, 8 GHz bandpass but single-pixel receiver
 - Apply “pulsar-binning” to each 2s cycle
 - 2009-10: suitable for large-scale CO mapping
 - ^{12}CO , ^{13}CO , C^{18}O , C^{17}O J=1-0
- 5 *bstrips*: n=3-7
 - March 2010: $4^\circ \times 6'$
- Mapped G323 (1^\square°)
 - March 2011: $l=323^\circ\text{-}324^\circ$, $b=\pm 0.5^\circ$
- To map next: G324-330 (6^\square°)
 - May + June 2011: $l=324^\circ\text{-}330^\circ$, $b=\pm 0.5^\circ$

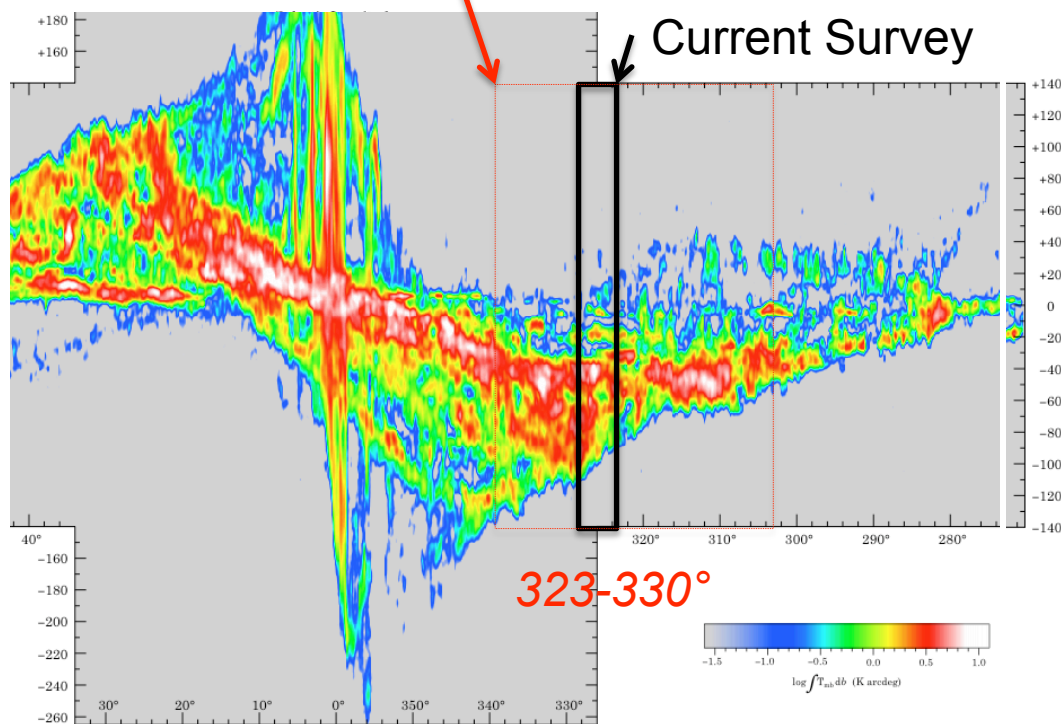
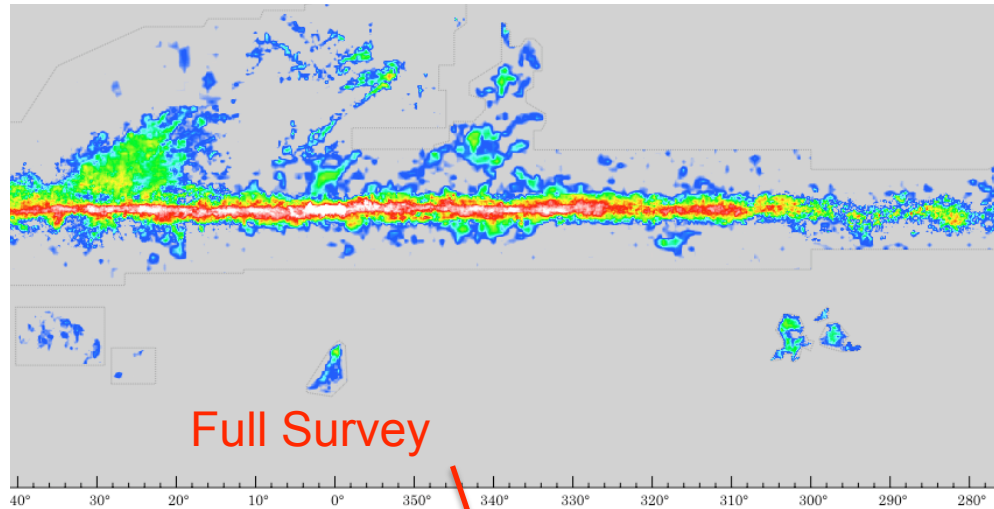
Line Parameters for Survey

IF	Frequency	Isotopologue	V_{low} (km/s)	V_{high} (km/s)
1	110.1 GHz	^{13}CO 1-0	-139	+238
2	109.7	C^{18}O 1-0	-154	+225
3	112.3	C^{17}O 1-0	-271	+100
4	115.2	^{12}CO 1-0	-227	+135

~30" Beam

4,096 channels x 0.1 km/s = ~400 km/s per line @ 0.1 km/s resolution

i.e. Cover -130 to +130 km/s at 0.1 km/s resn in principal CO 1-0 lines



+140 km/s

-140 km/s

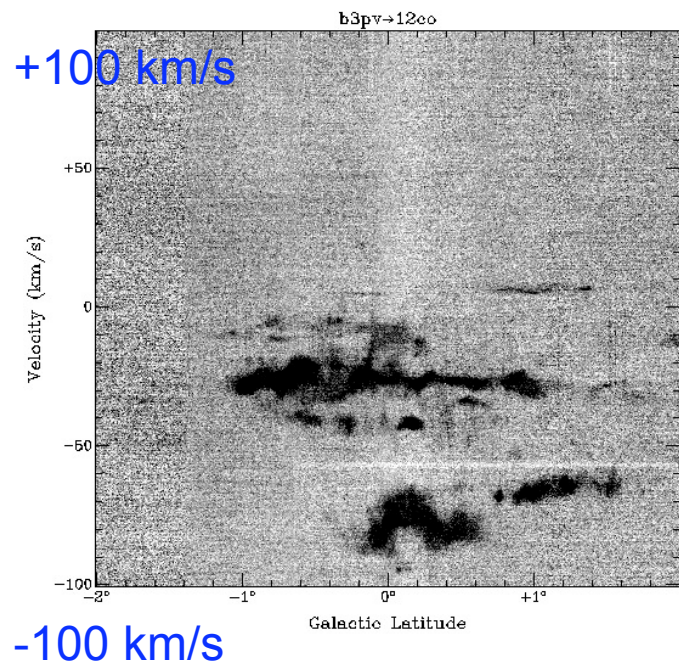
Dame et al ^{12}CO 1-0 survey

bstrips: *completed!*

bstrip3	342.54°
bstrip4	336.42°
bstrip5	330.00°
bstrip6	323.13°
bstrip7	315.57°

bstrip n @ $360^\circ - \arcsin(n/10)$

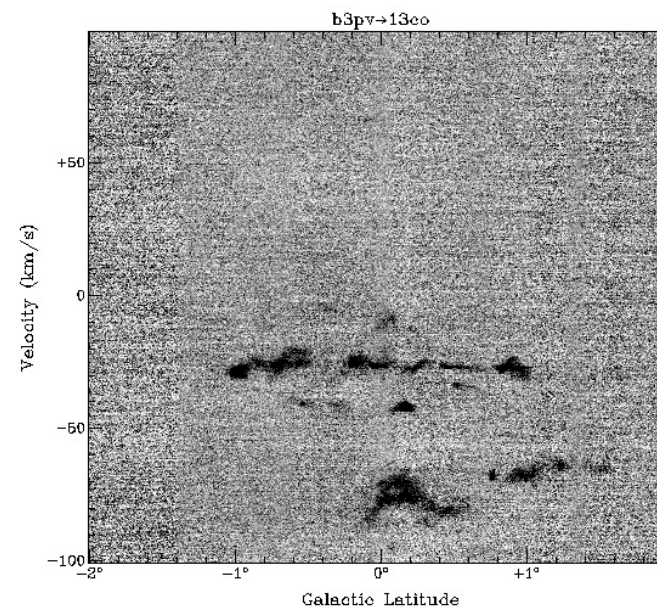
6' wide X 4° long ($b=-2^\circ$ to $+2^\circ$)



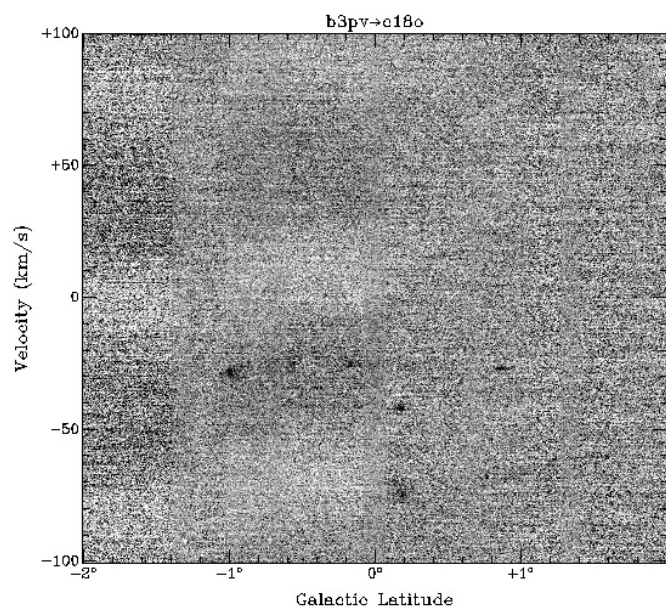
bstrip3

¹²C¹⁸O

¹³C¹⁸O

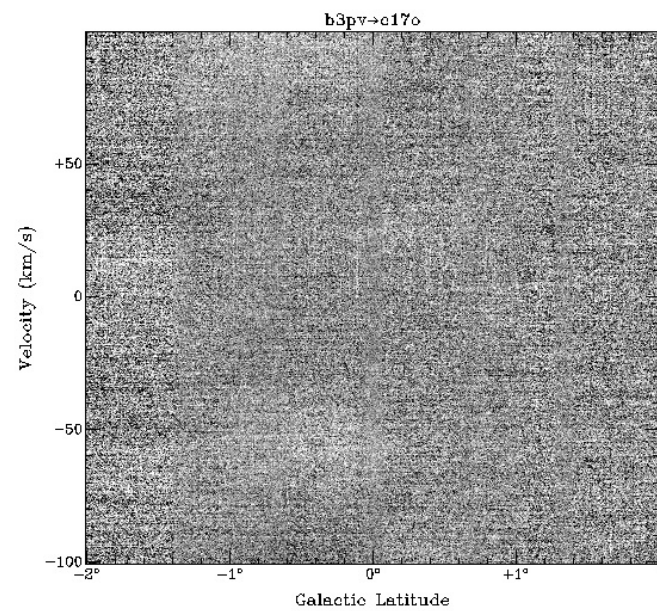


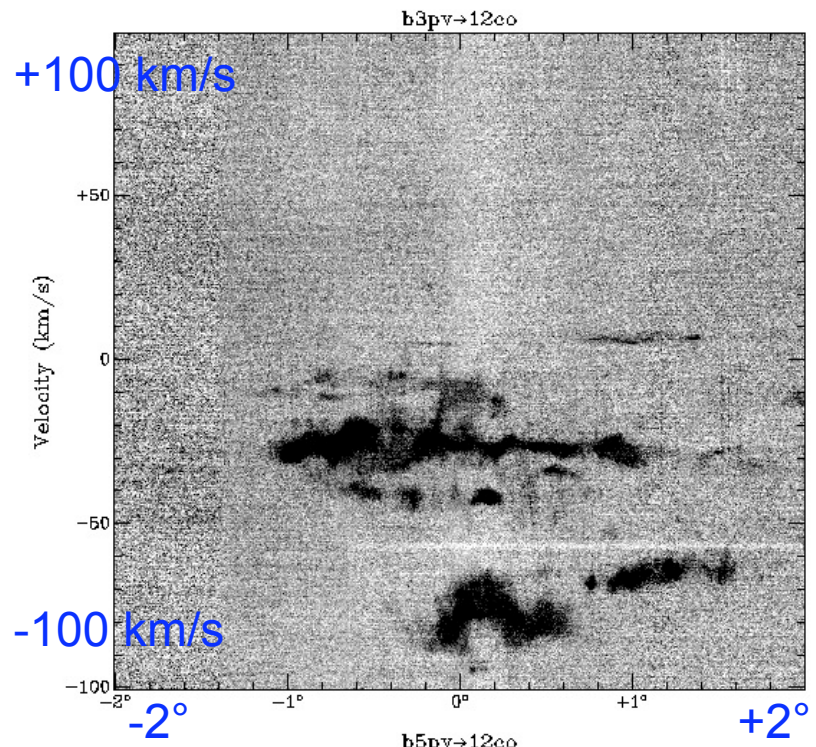
-2° +2°



¹⁸O

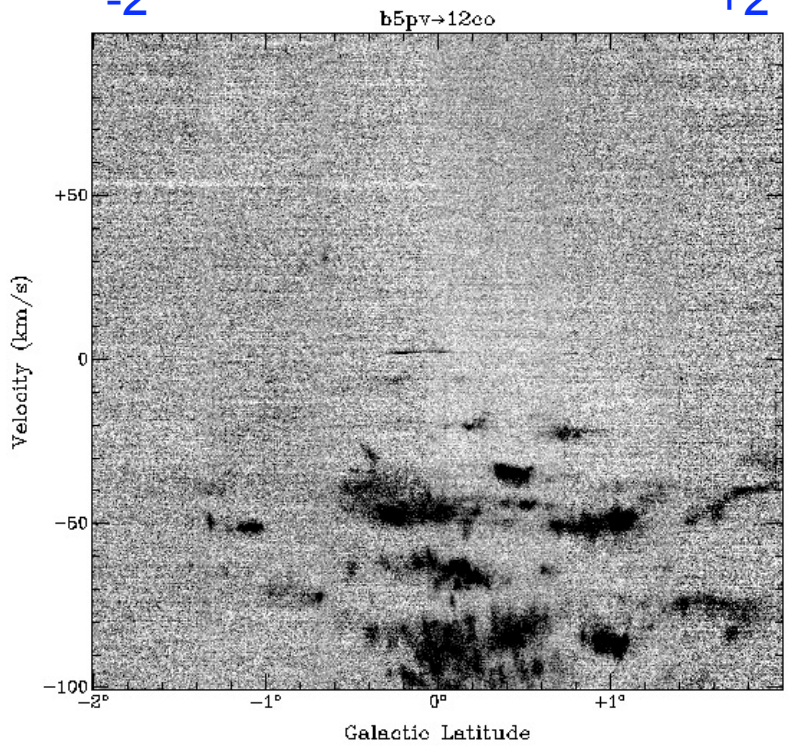
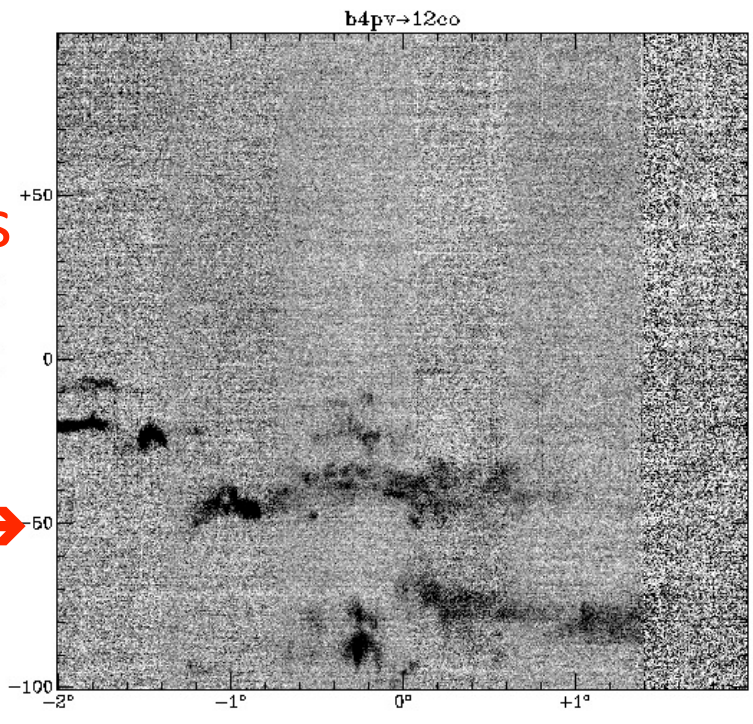
¹⁷O



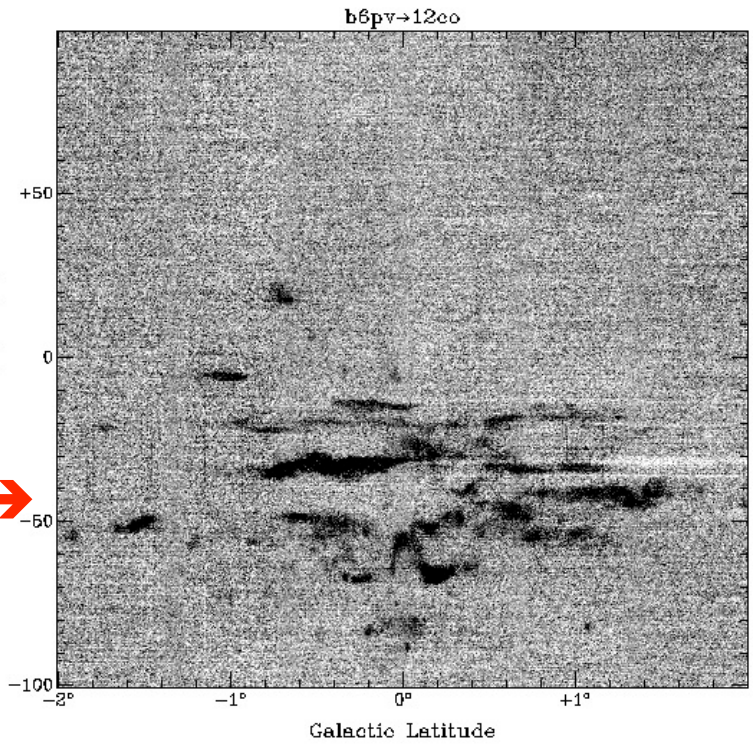


^{12}CO
bstrips

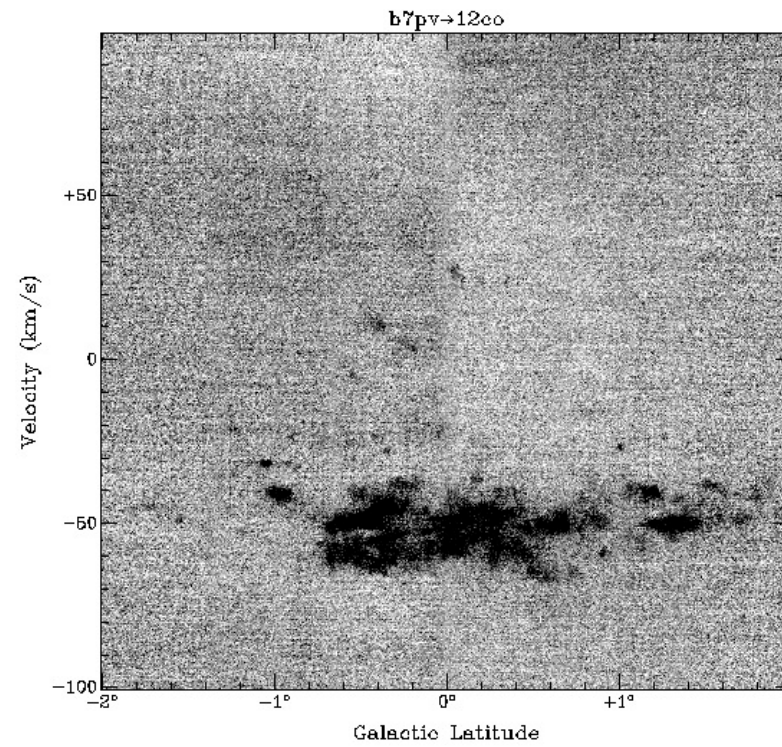
←3 4→

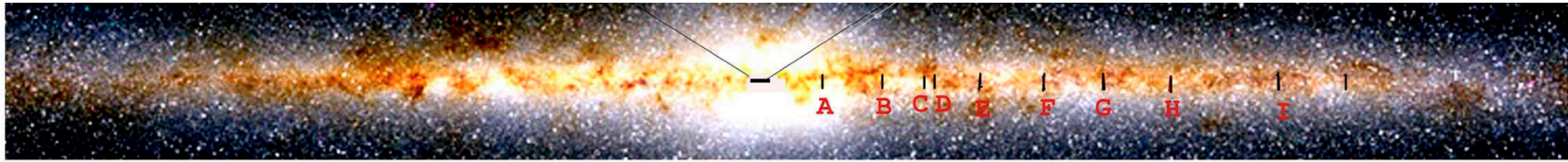


←5 6→

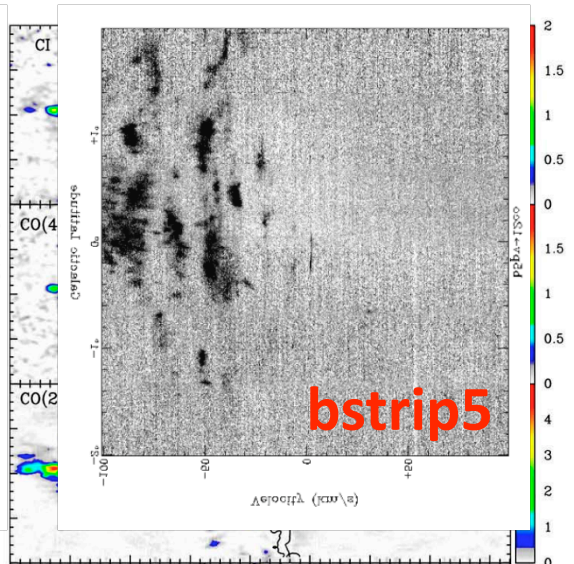
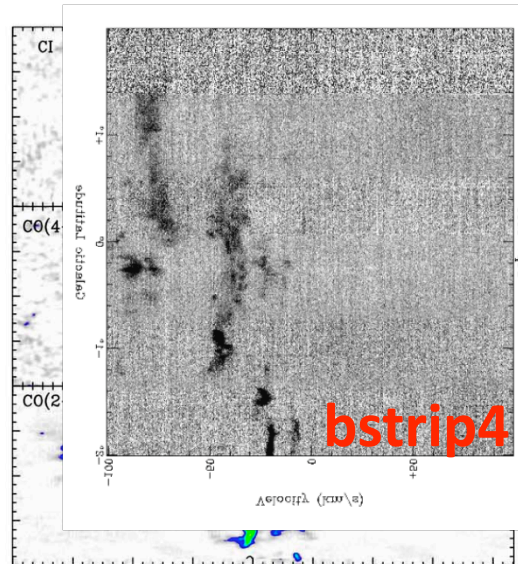
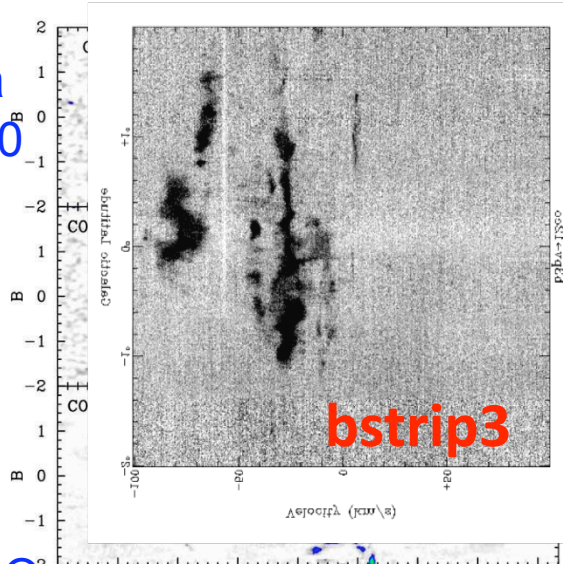


^{12}CO bstrip7



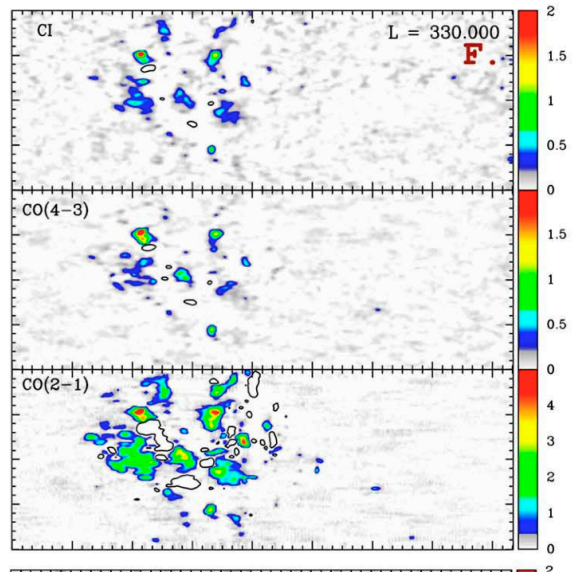
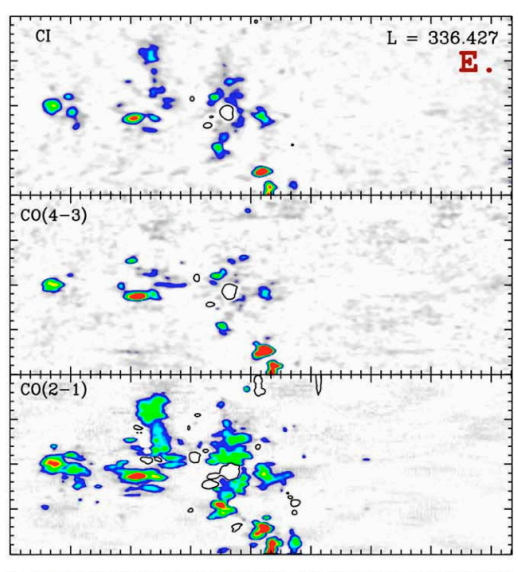
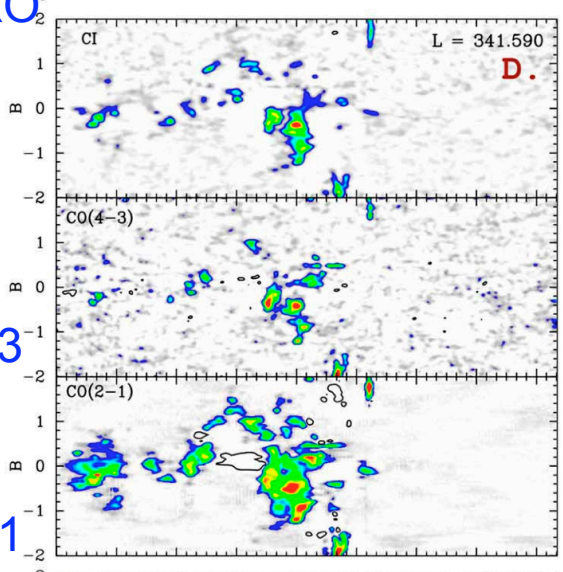


Mopra
CO 1-0



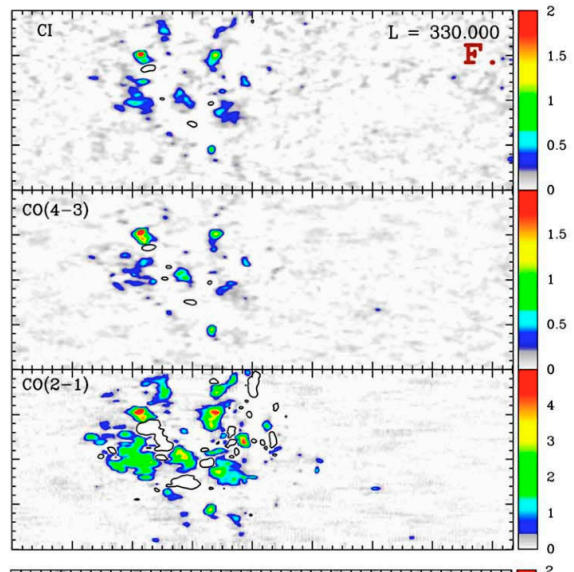
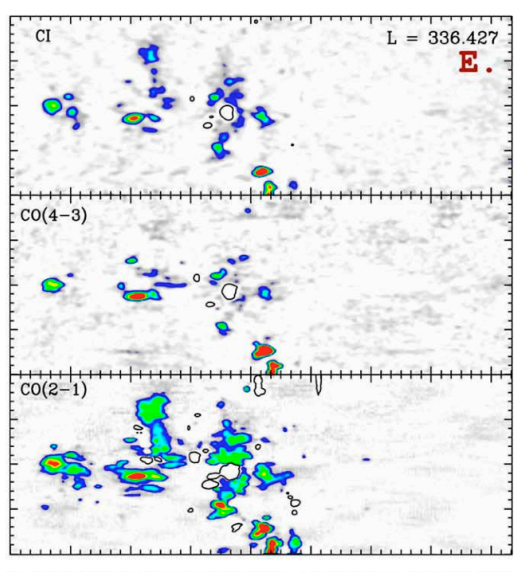
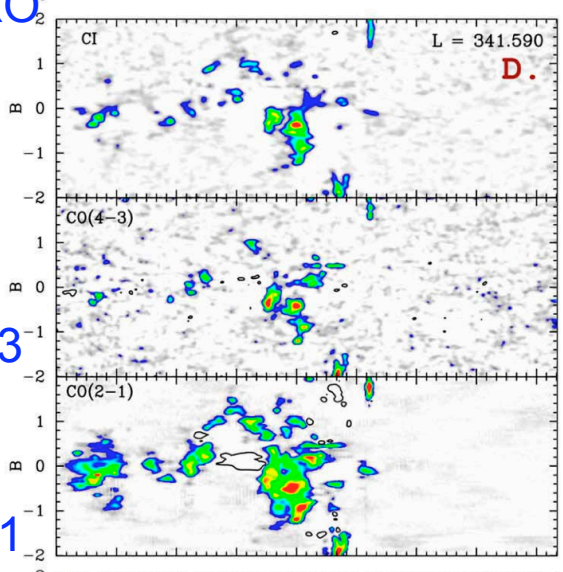
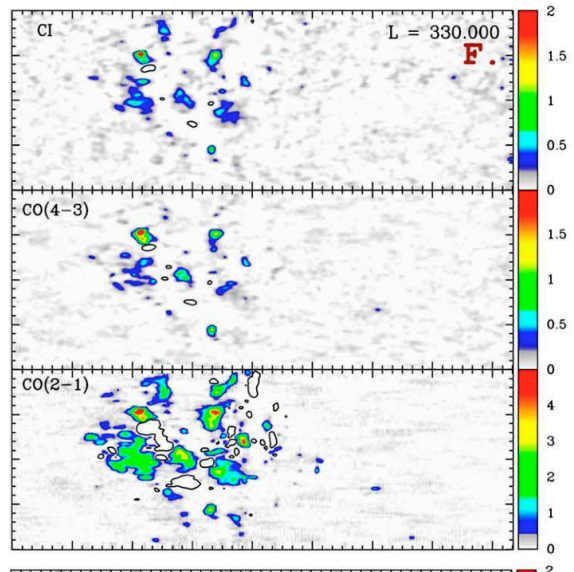
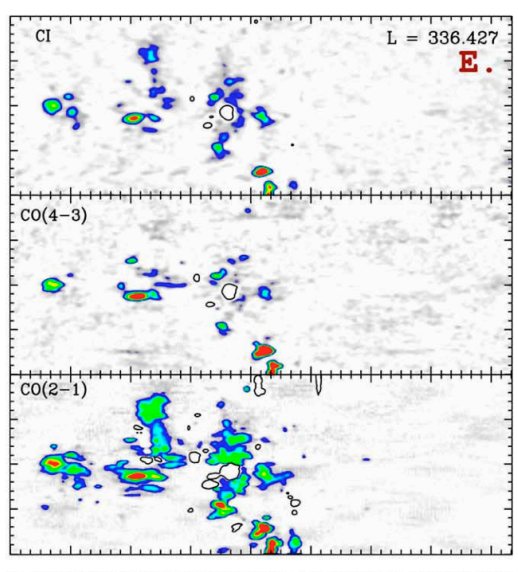
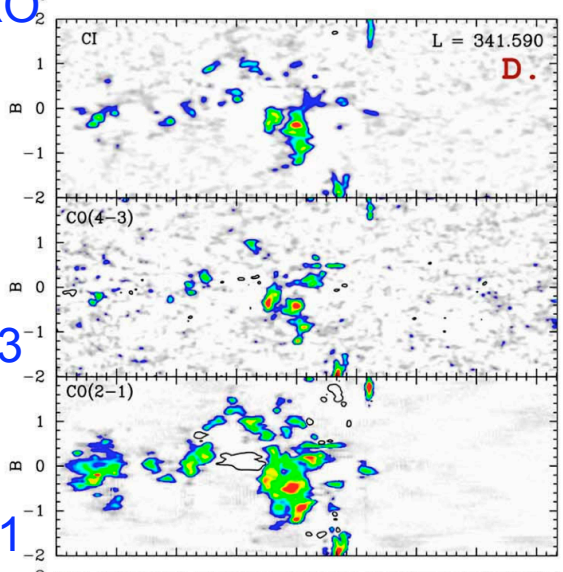
AST/RO

[CI]

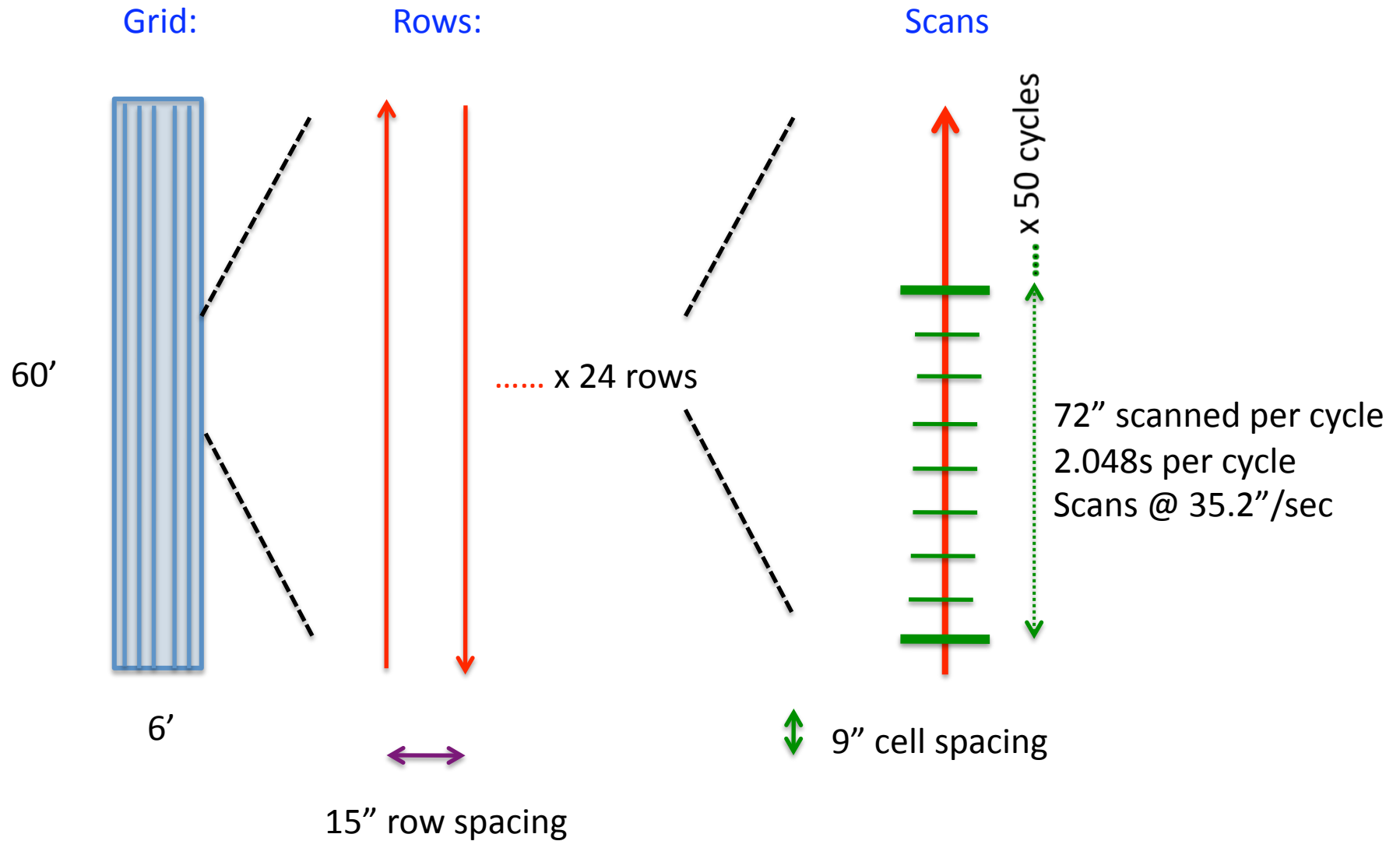


CO 4-3

CO 2-1

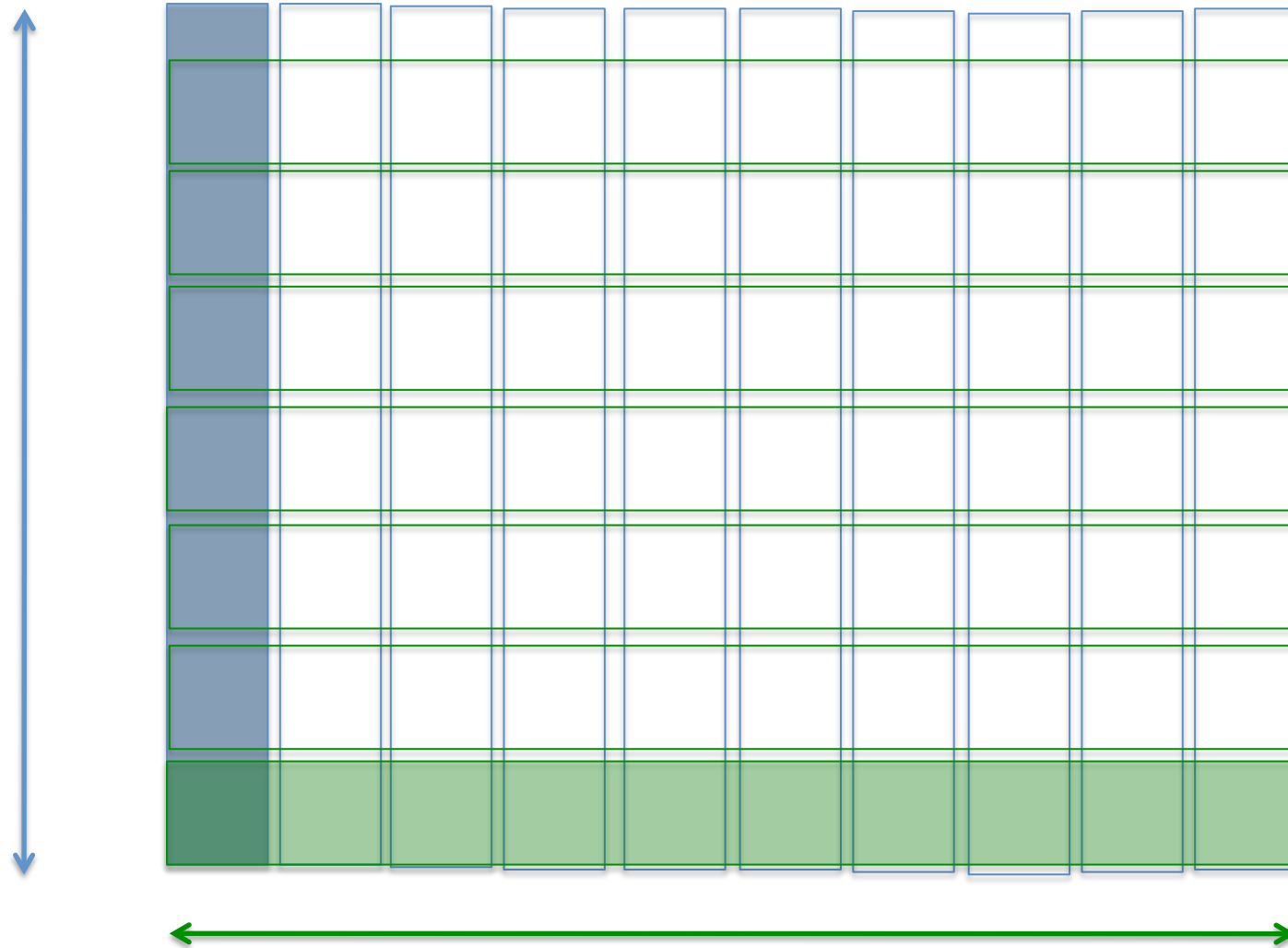


Mopra Fast Mapping



- (Absolute) Sky position after each row (i.e. every ~2 minutes) with 7 cycles
- 65 minutes per map.

Each 1 Degree Grid



10 rows x
10 columns

requires

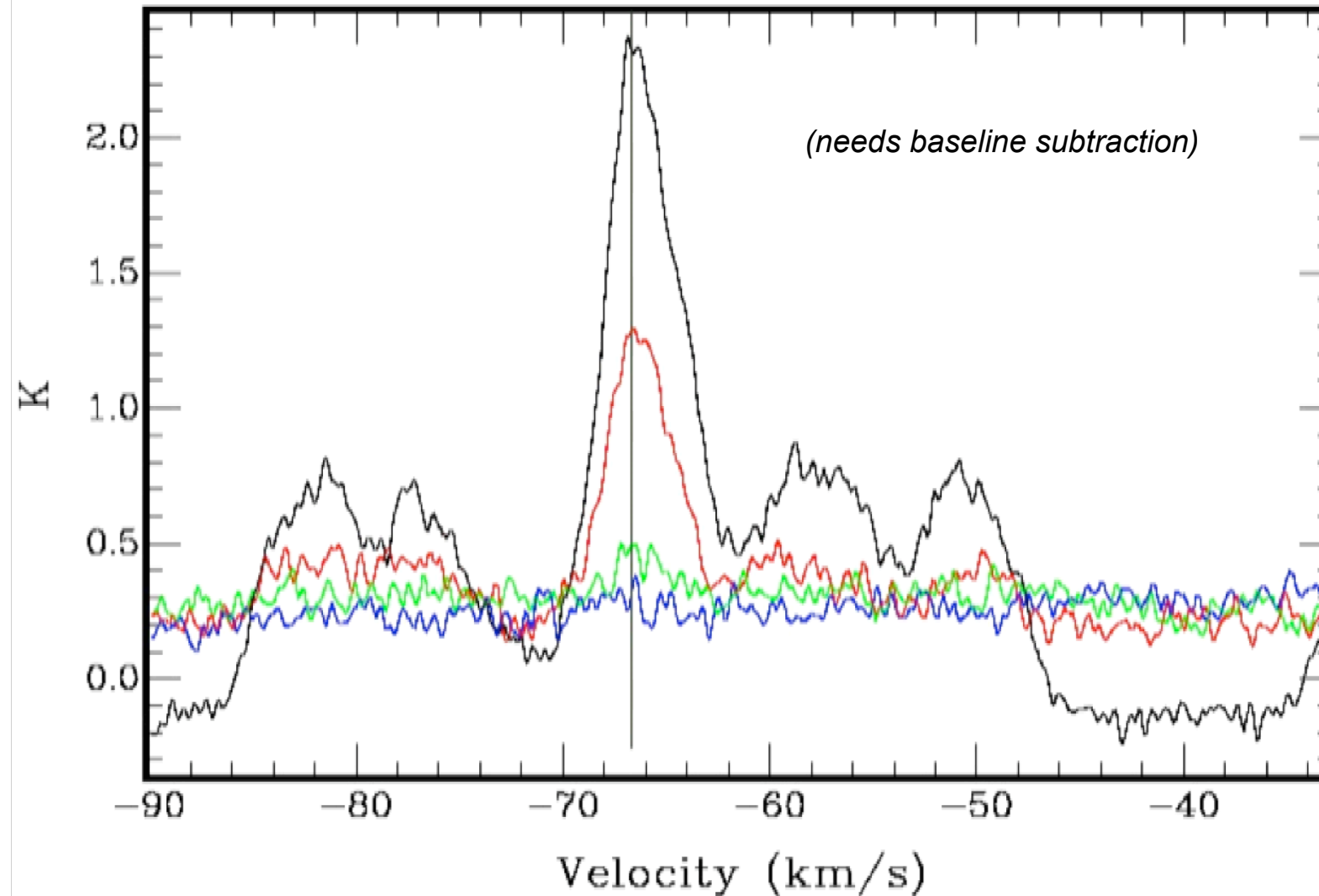
3 shifts per 1°

$^{12}\text{CO} + ^{13}\text{CO} + \text{C}^{18}\text{O} + \text{C}^{17}\text{O}$ J=1-0

G323 Averaged Spectrum

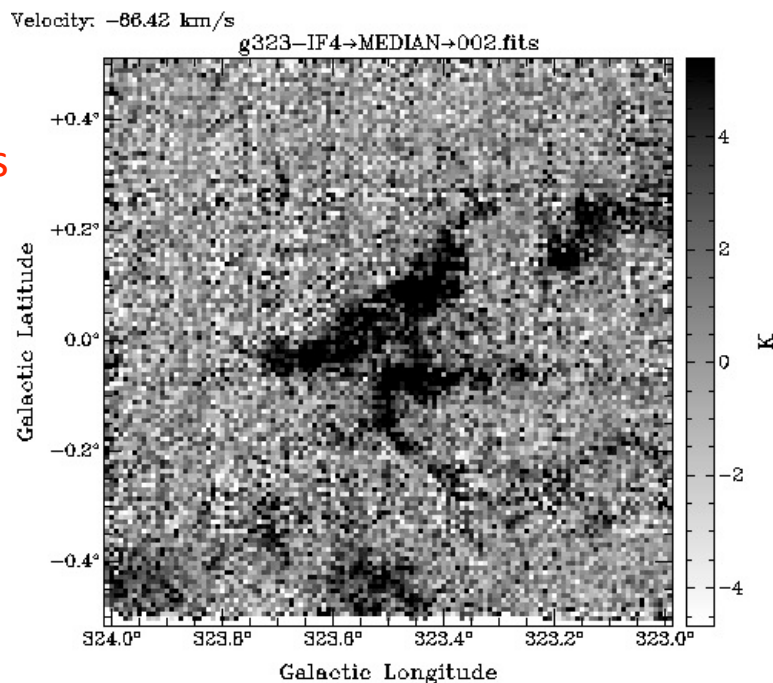
Glou: 323.51667°

Glou: +0.016666667°



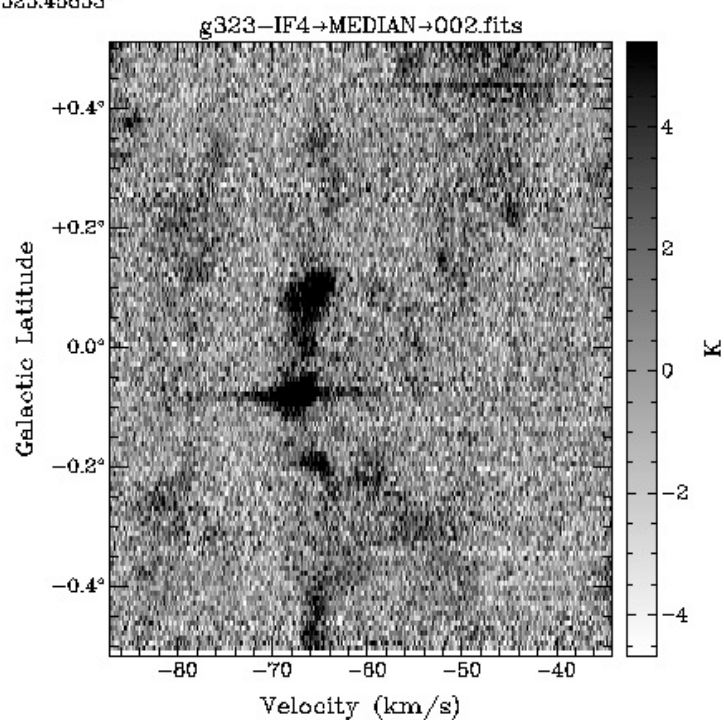
Velocity Channel = -66.4 km/s

G323
¹²CO



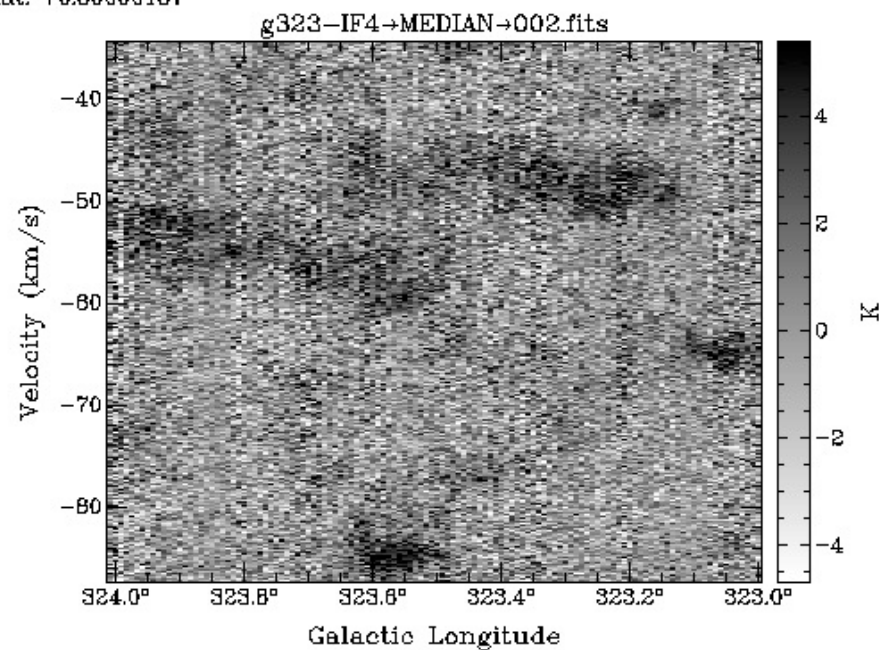
Latitude - Velocity

Glom: 323.45833°



Longitude - Velocity

Glac: +0.30000137°



2011 Activities

- Mopra Observing
 - G323:
 - March 10-30: Michael Burton + Nick Tohill, Paul Jones, James Urquhart, Andrew Walsh
 - G324-330:
 - May 9-16: Michael Burton + Cheryl Au
 - June 9-16: ??? **Volunteers Needed!!** (Tony Stark?)
 - June 17-26: Craig Kulesa
 - *Full reduction beyond current computer capacity!*
- Next Mopra proposal deadlines
 - June 15: for summer period (i.e. March 2012)
 - Dec 15: for winter period (i.e. May – July 2012)
- ARC Proposal
 - “Dark Gas and the Formation of Molecular Clouds”
 - Burton, Rowell & Hollenbach
- PASA Paper planned
 - Fast mapping and the Far Southern Galactic Plane CO survey