

CO Mapping the Milky Way Using Mopra Telescope

Kerem Osman Çubuk

Supervisors:

Prof. Michael G. Burton

Dr. Marc Sarzi

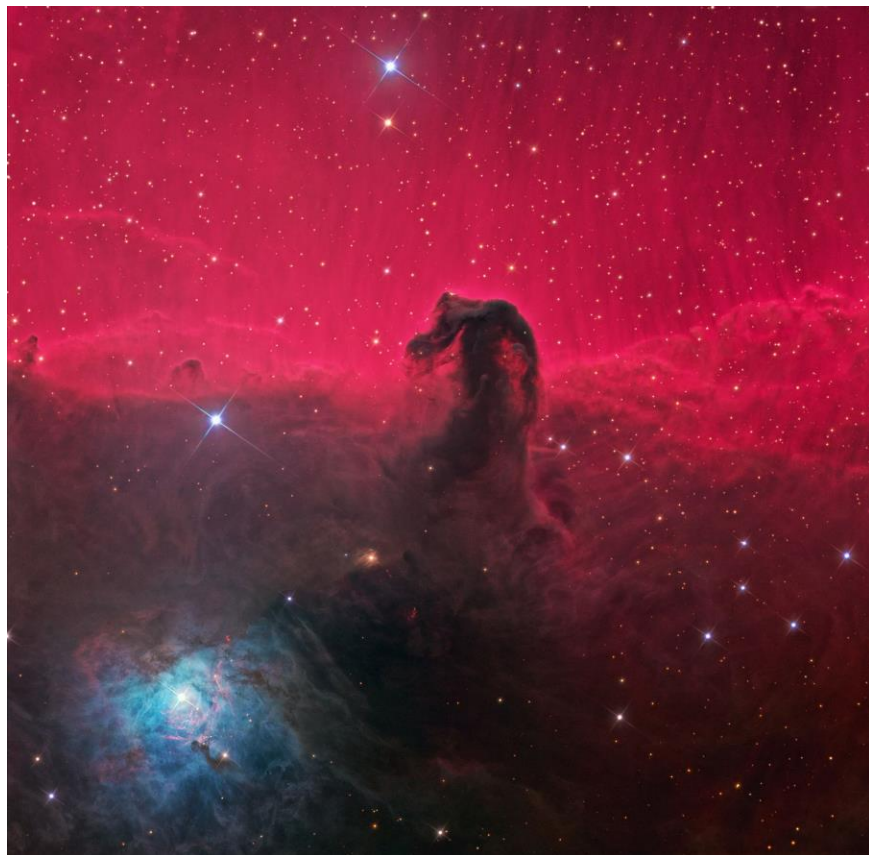
49th Young European Radio Astronomers Conference

26th - 29th August 2019

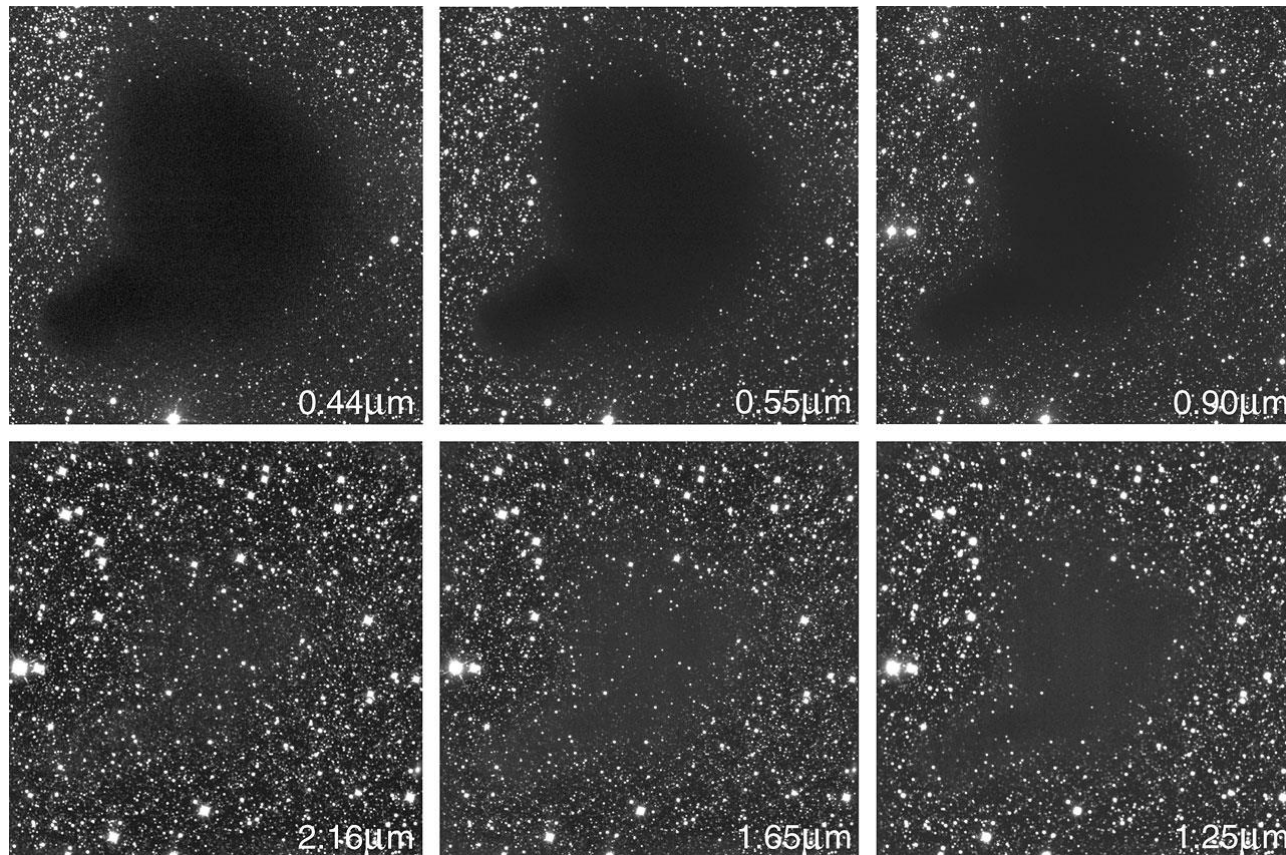
Summary

- Introduction to the Interstellar Medium
- Importance of Carbon Monoxide (CO)
- Previous CO Surveys
- Mopra CO Survey
- Nessie – Kinematics of a Molecular Filament

Introduction to the Interstellar Medium (ISM)



Barnard 33

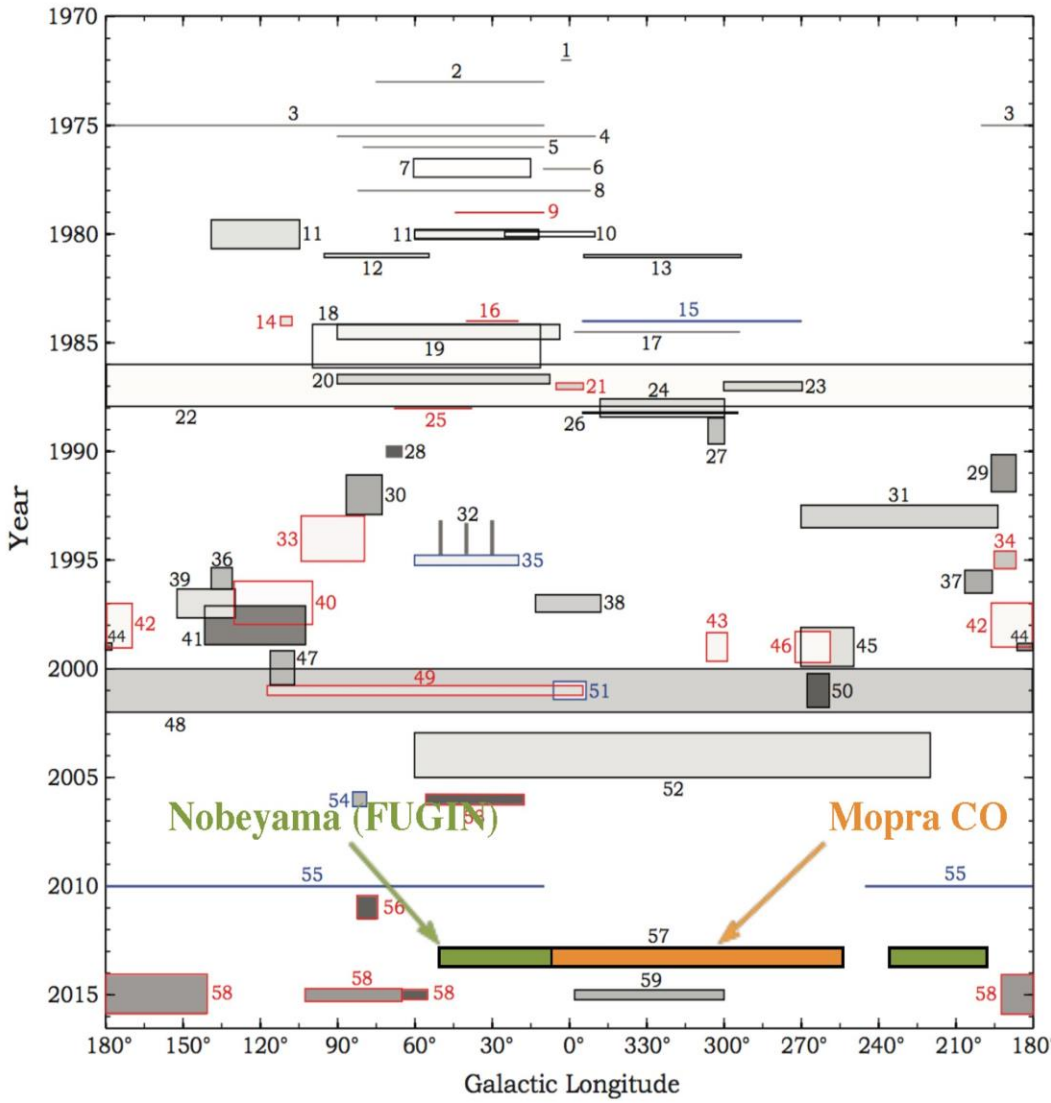


Barnard 68

Importance of Carbon Monoxide (CO)

- H₂ J=2-0 needs ~510K
- CO J=1-0 needs ~5.5K
- ¹²CO/¹³CO ratio is a tracer of optical depth.

Previous CO Surveys

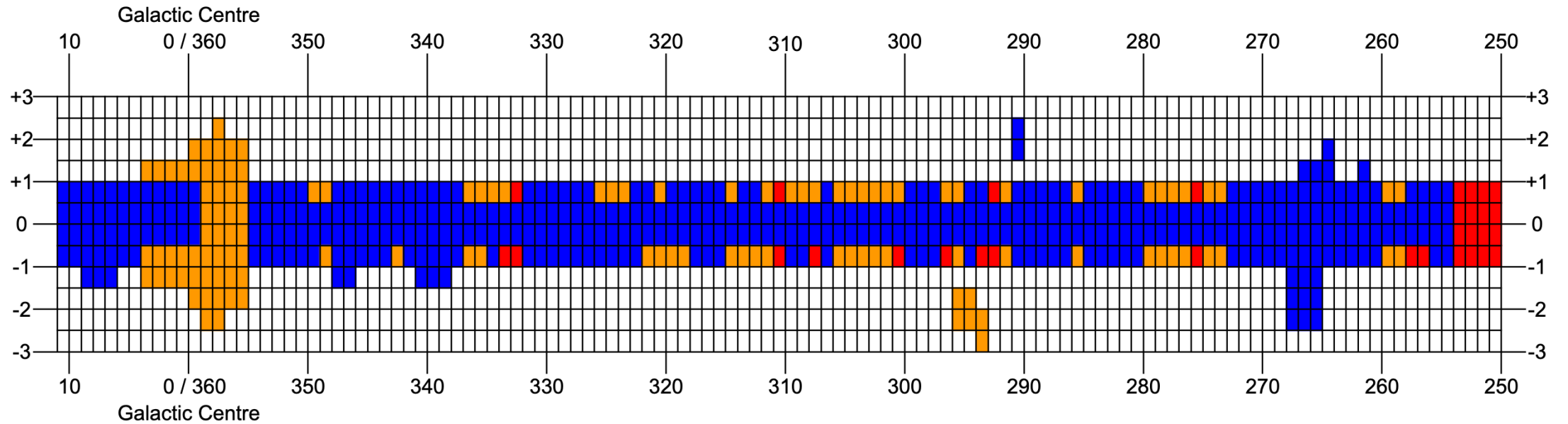


Mopra CO Survey

- Mopra 22m single dish telescope.
- Observations between early 2011 and late 2018.
- ^{12}CO , ^{13}CO , C^{18}O and C^{17}O are observed.
- It covers Southern Galactic Plane from +11 to -110 deg. galactic longitude and from +1 to -1 deg. galactic latitude. Also with some extensions whole coverage reaches to 272 square degrees.



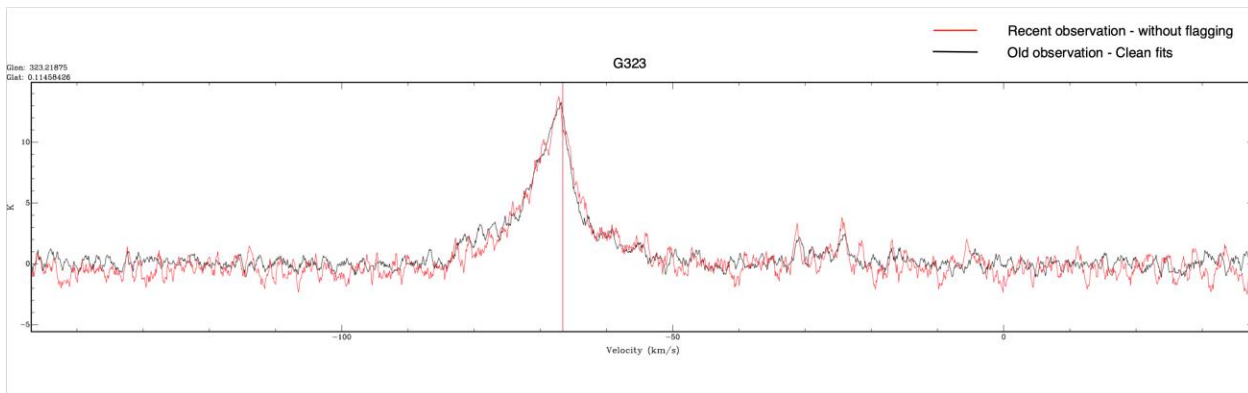
Mopra CO Survey Coverage



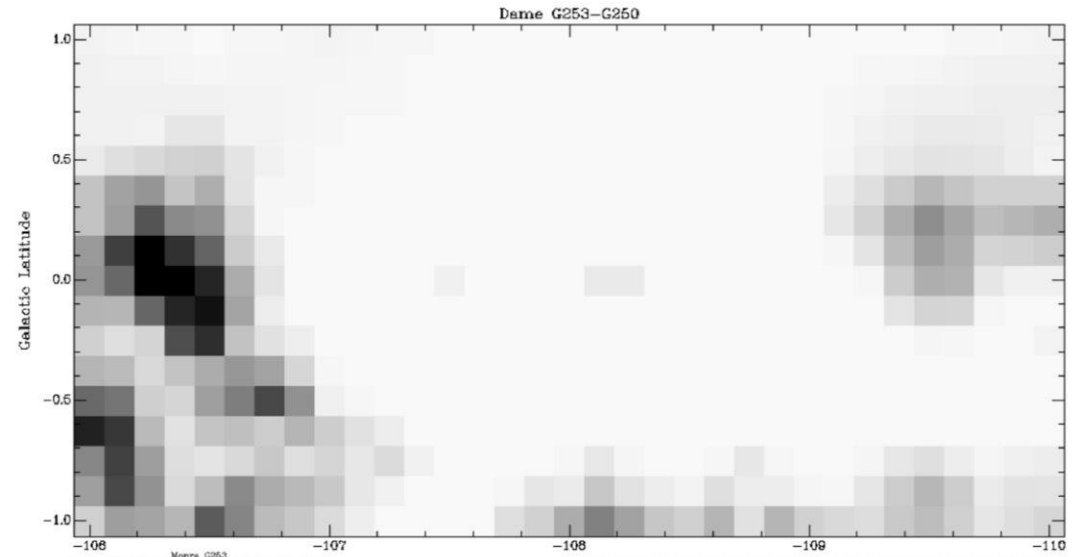
- Processed Data
- Processed Data by Kerem
- Raw Data

Mopra Data Reduction

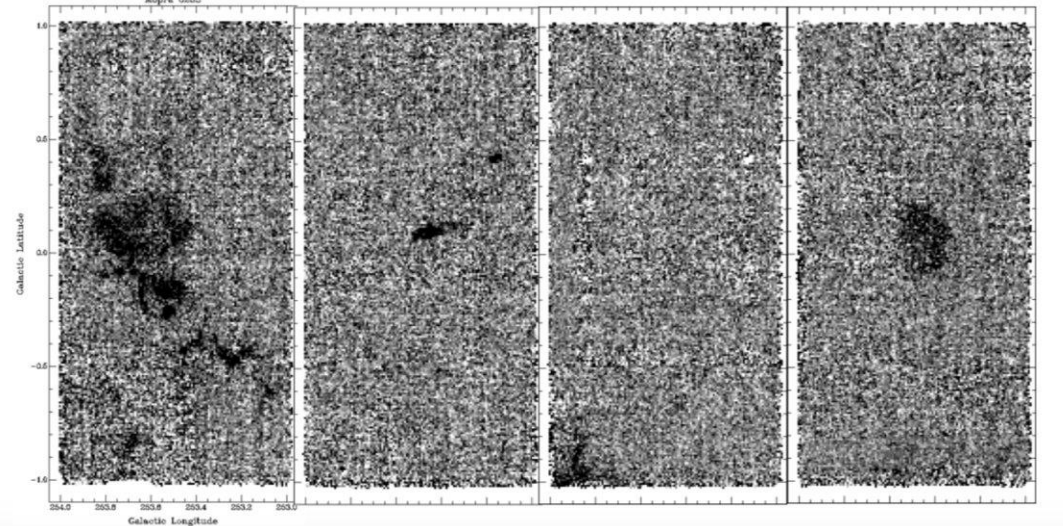
- 11 steps:
 - 4 main, 6 sub, 1 optional
- Pipeline:
 - livedata, gridzilla, miriad, karma, and several IDL routines.



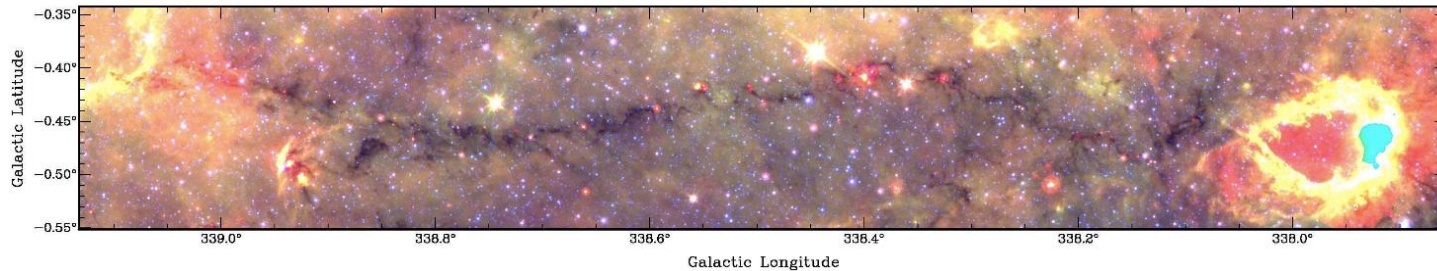
Dame CO Survey



Mopra CO Survey



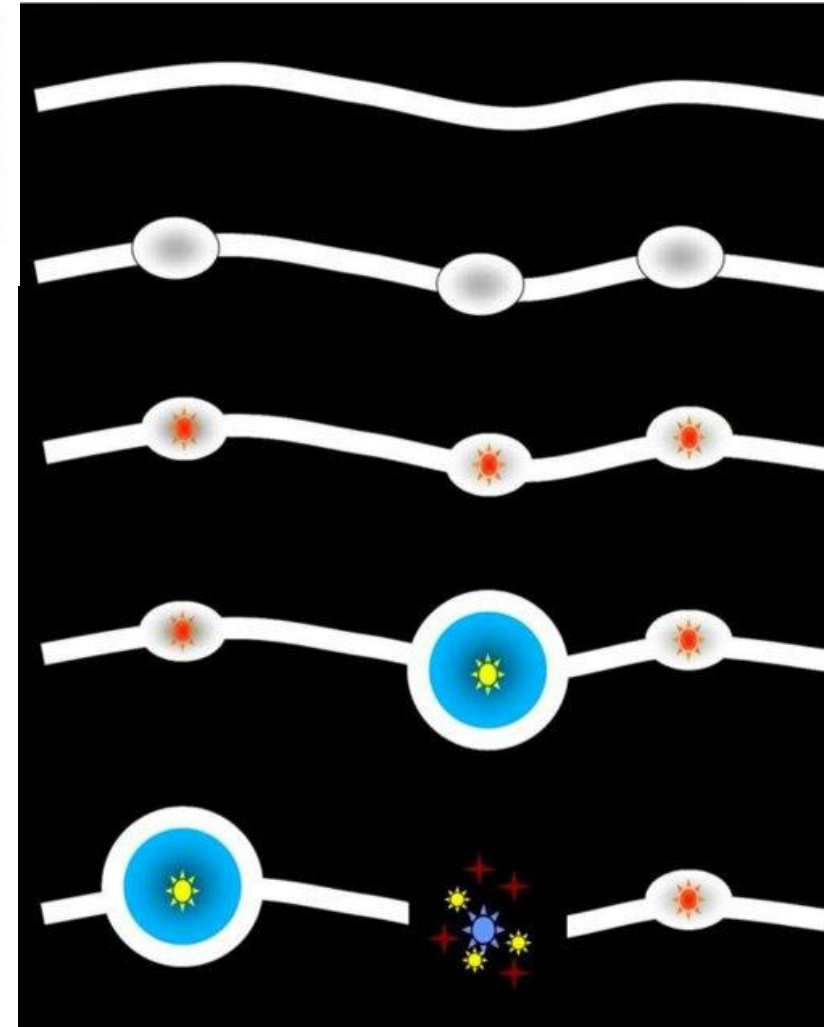
Nessie – Kinematics of a Molecular Filament



Nessie Nebula. The 3.6 μm (blue) and 8.0 μm (green) emission is from GLIMPSE, and the 24 μm (red) emission is from MIPS GAL.

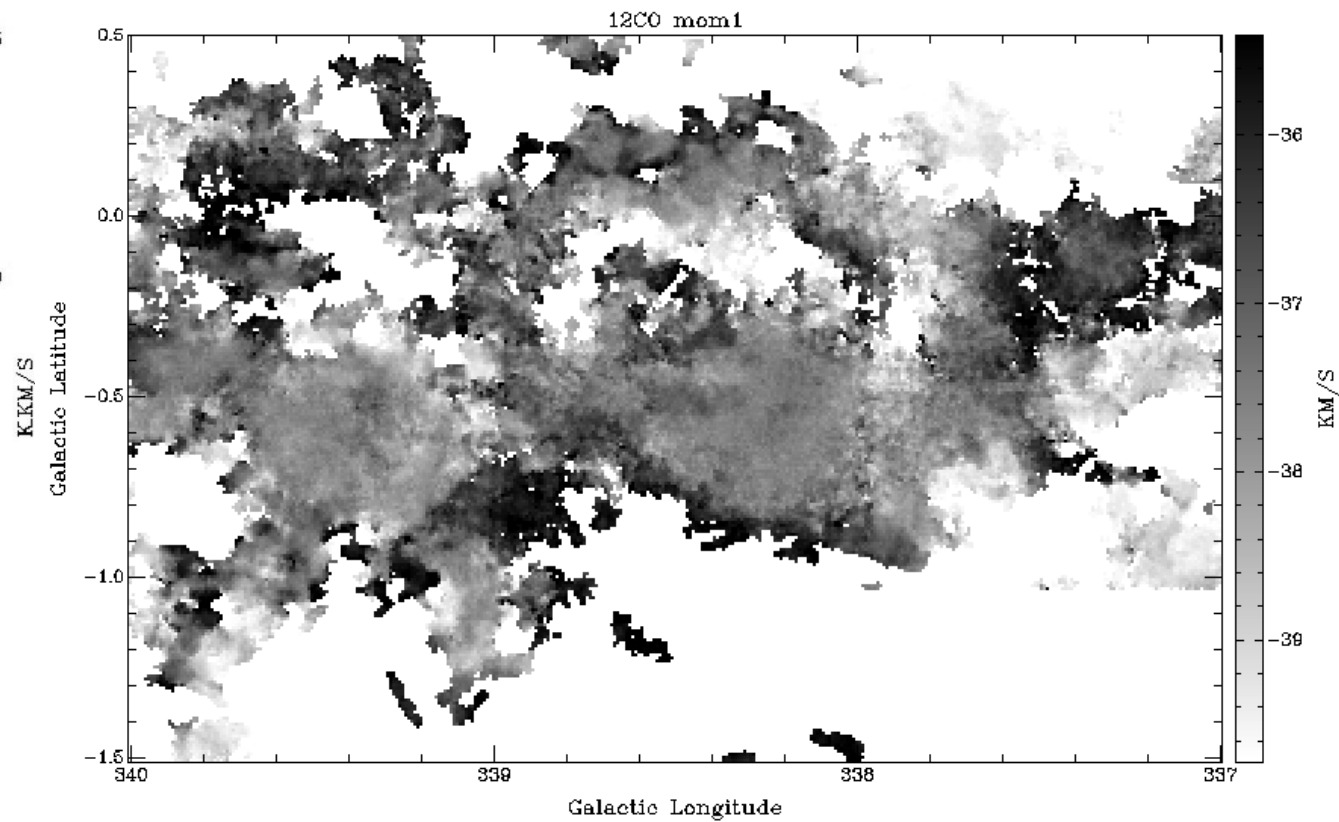
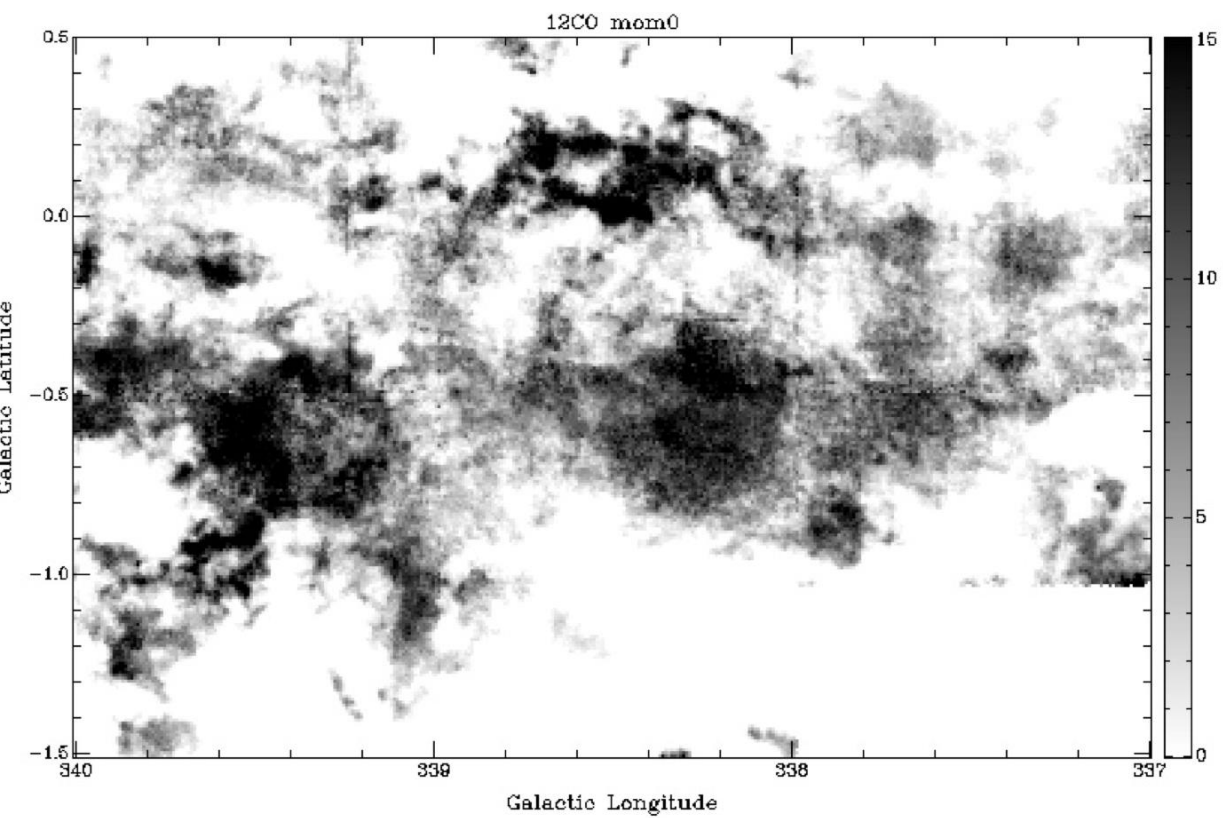


Loch Ness Monster - Nessie

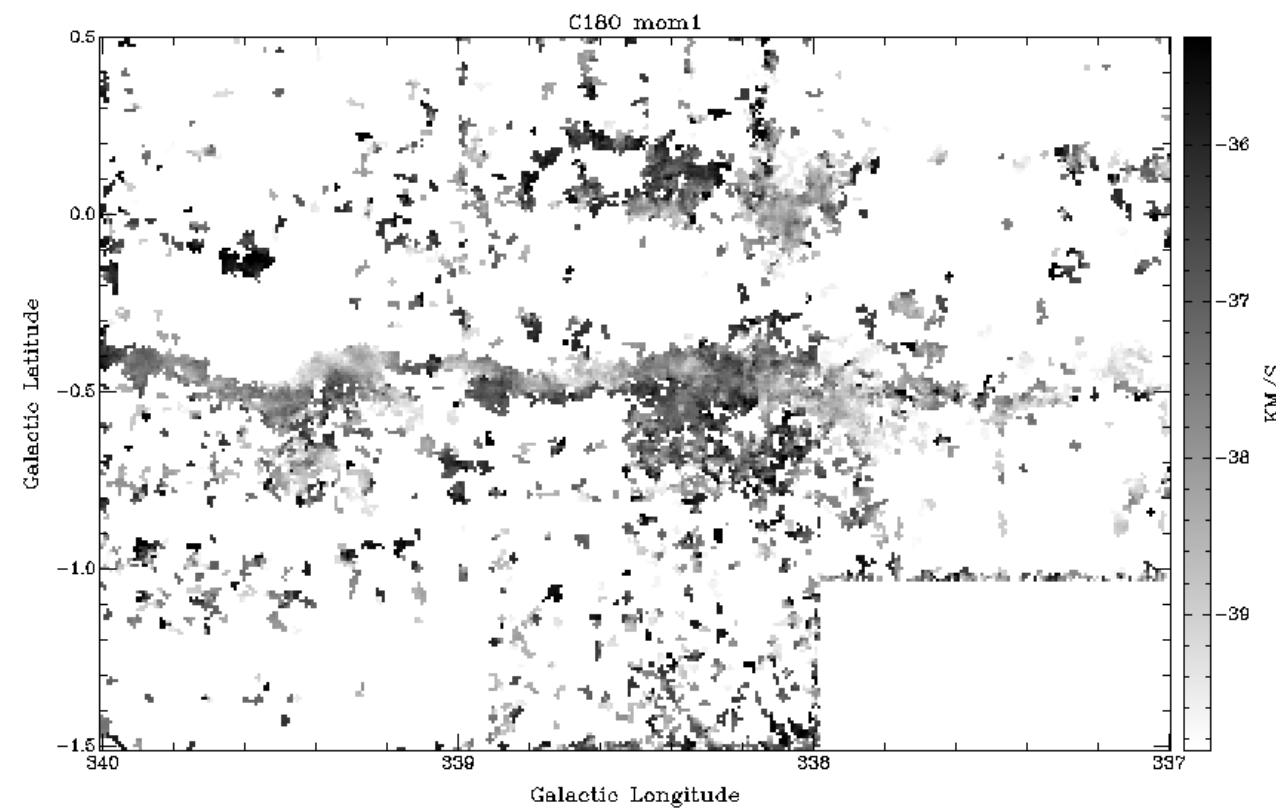
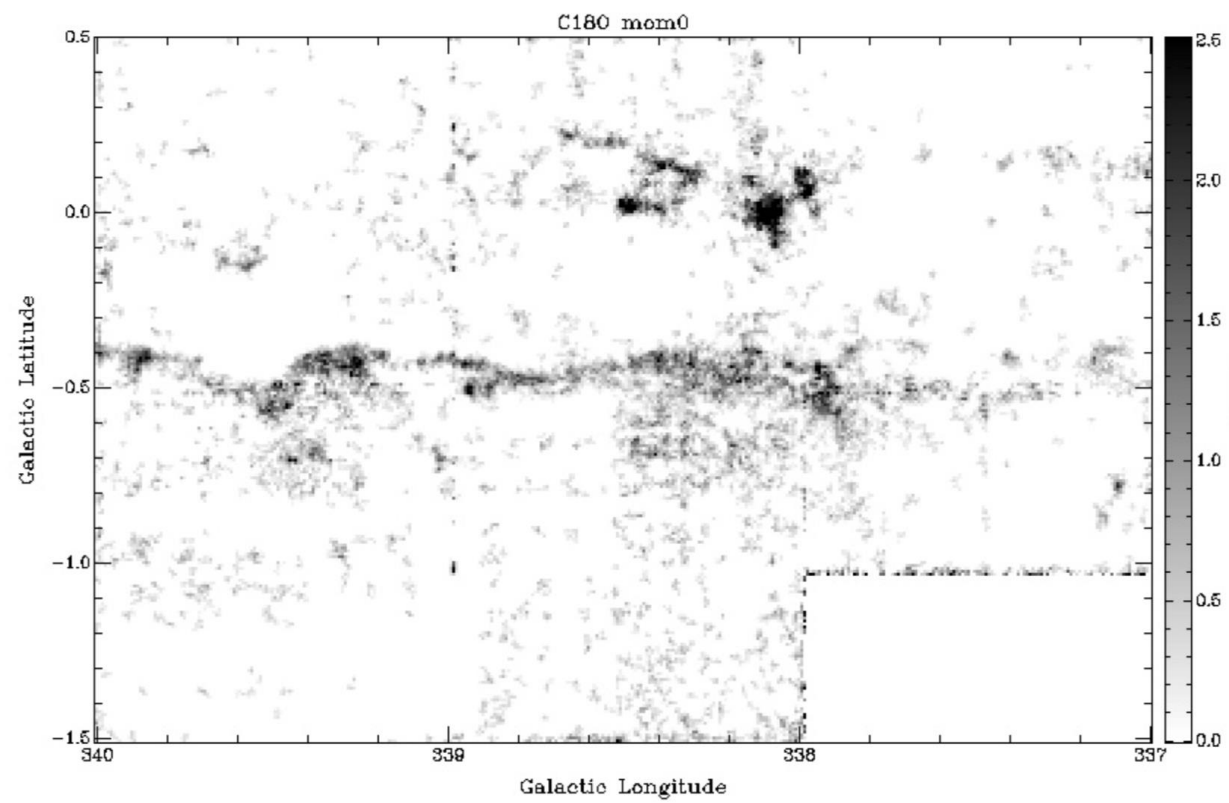


Hypothetical Evolution of Nessie (Jackson et. al. 2010)

Moment 0 (left) and Moment 1 (right) Maps of ^{12}CO

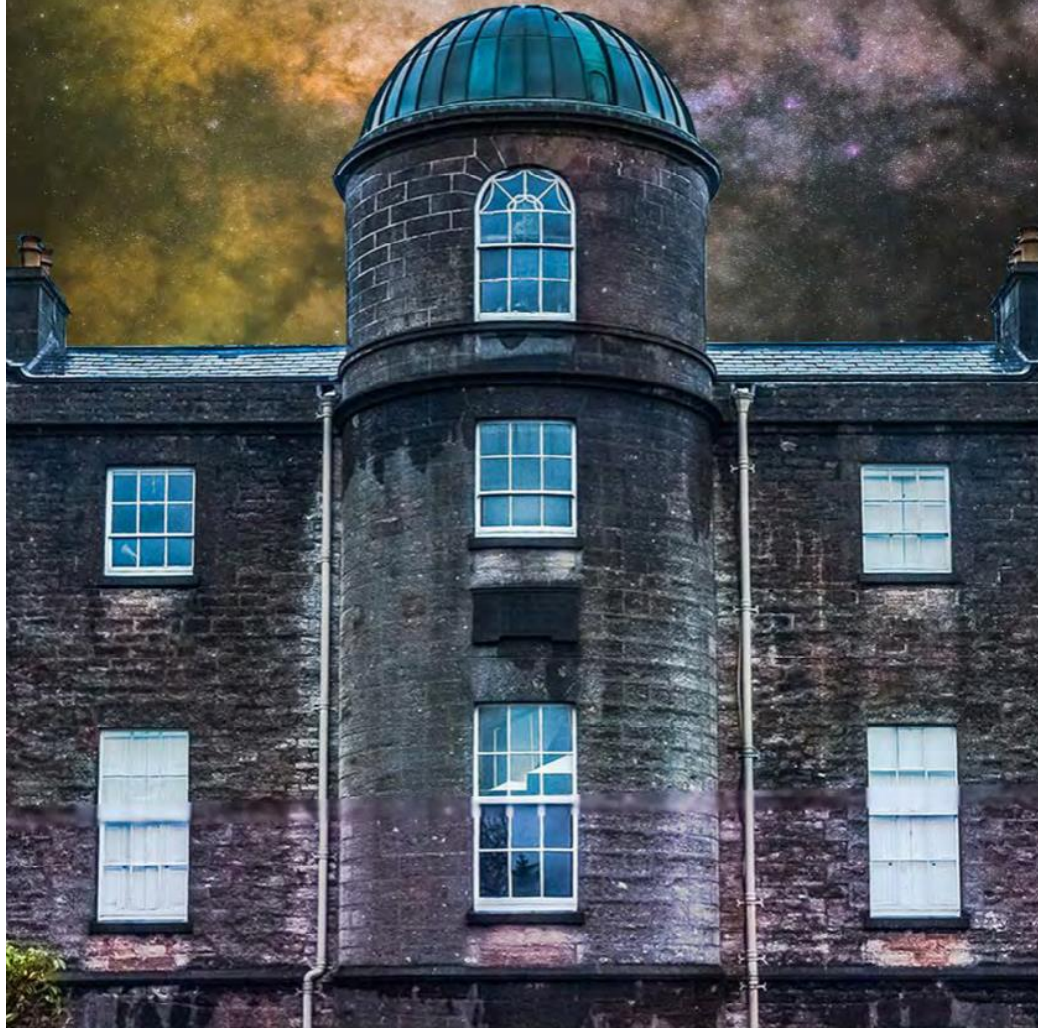


Moment 0 (left) and Moment 1 (right) Maps of C¹⁸O



Irish National Astronomy Meeting

2019



Annual ASGI meeting

4th - 6th of September, 2019, Armagh Observatory & Planetarium, Armagh,
Northern Ireland

Registration and program at: <http://www.inam2019.com>



www.inam2019.com

4th – 6th September

Armagh Observatory
& Planetarium

Thank You!