

# Observing with ALMA

## The NAASC: Canadian Roles



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National Research Council of Canada



# Who are we?

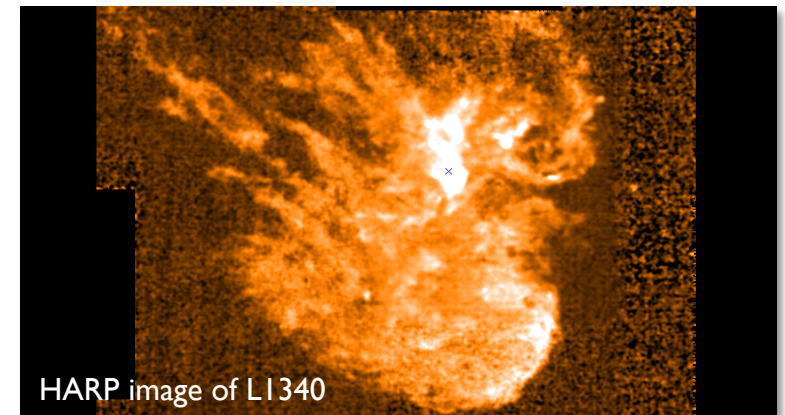
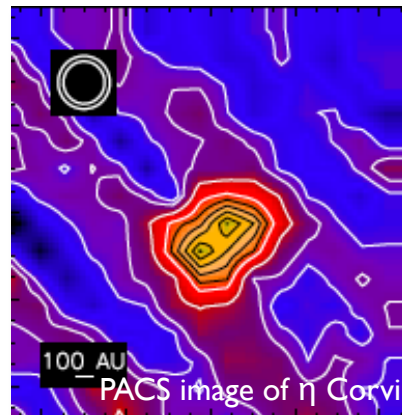
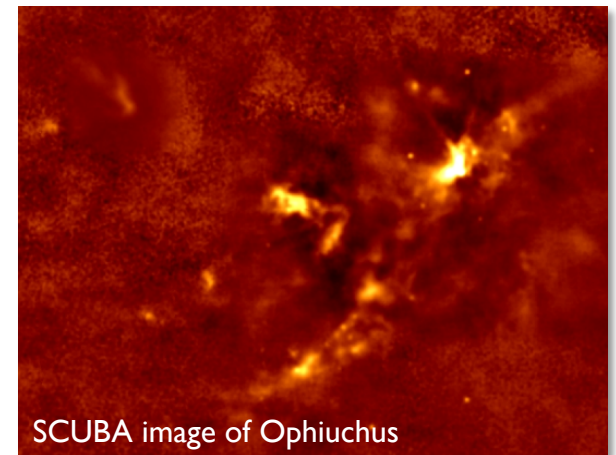
- National Research Council of Canada (NRC):
  - the Government of Canada's premier organization for research and development (est. 1916)
  - <http://www.nrc-cnrc.gc.ca>
- Herzberg Institute of Astrophysics (HIA):
  - Canada's "national laboratory" for astronomy
  - oversees Canadian involvement in national telescopes:  
e.g., Gemini, JCMT, DAO, DRAO, and now ALMA
  - Canada's premier instrumentation team:  
e.g., Altair, GMOS (Gemini), WIDAR correlator (EVLA), Band 3 Receiver suite (ALMA)
  - Canadian Astronomy Data Centre:  
e.g., Gemini, JCMT, DRAO, BLAST archives
  - located in Victoria, BC (DAO) and Penticton, BC (DRAO)



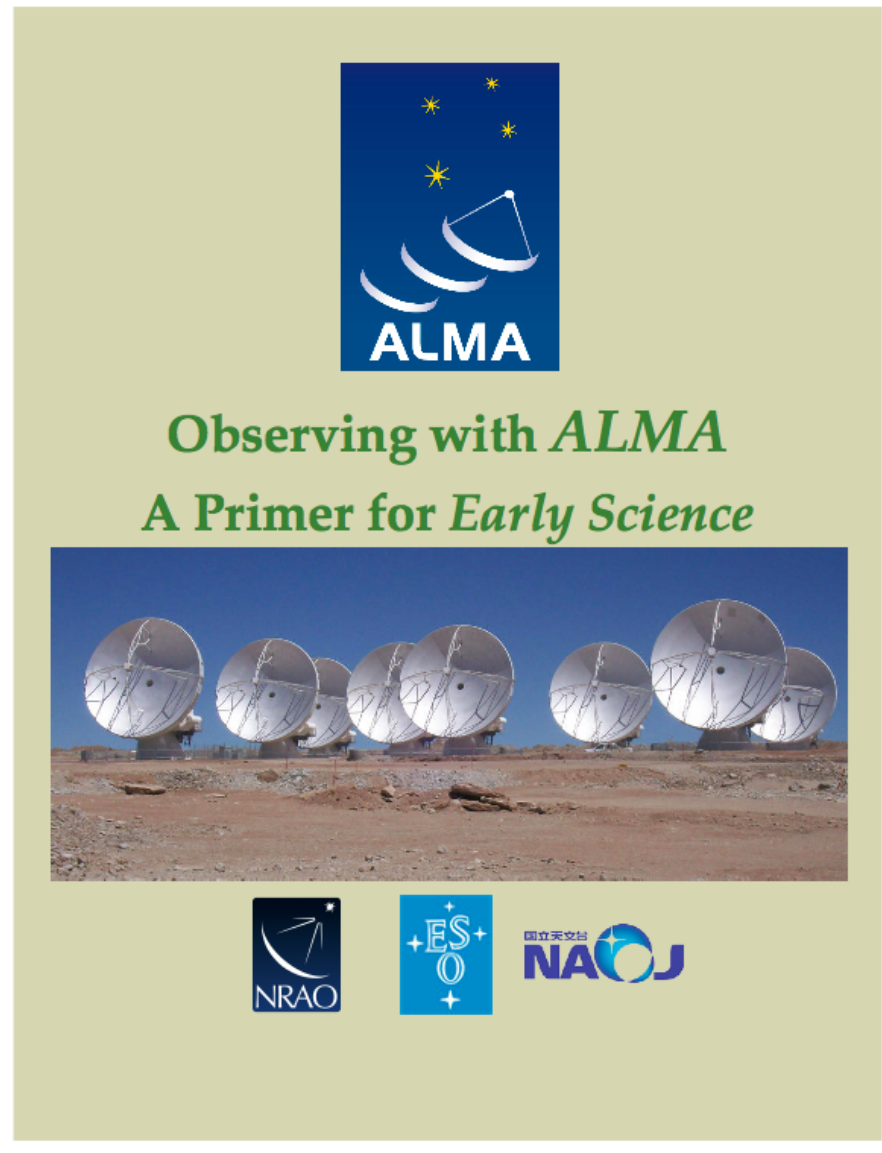


# Who are we?

- Millimetre Astronomy Group (MAG):
  - provided support for JCMT users for over 20 years
  - located in Victoria, BC
  - many combined years of millimetre/submillimetre single-dish/interferometer experience
  - transitioning to support for ALMA users in N.America
  - 4 members involved in ALMA support at present
- MAG roles in ALMA:
  - helpdesk support
  - proposal preparation, data quality analysis & processing
  - astronomer-on-duty support in Chile
  - user documentation



# The ALMA Early Science Primer

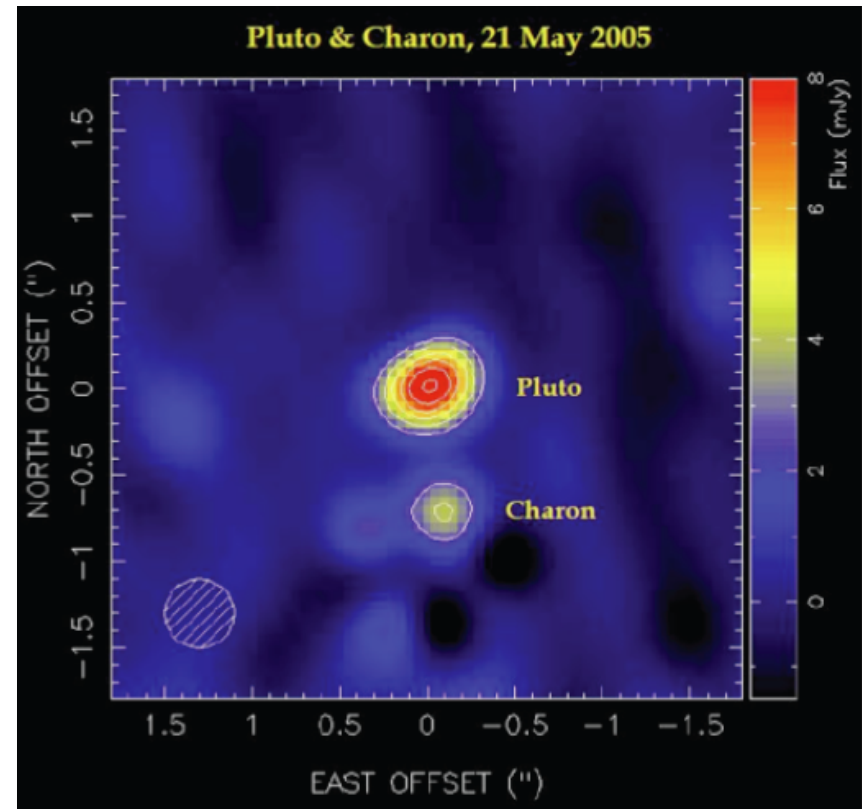


- 40 pages of useful information about ALMA Early Science, written in plain language for non-experts
- project led by NRC-HIA, after successful earlier version made for Hamilton 2008 ALMA workshop; many contributions by the NA, EU, and EA regional centers
- Contains concise descriptions of:
  - Early Science capabilities
  - proposals
  - examples of possible projects
  - interferometric concepts
  - expected data flow
- Available for the low, low price of \$0.00 at the NRAO booth!



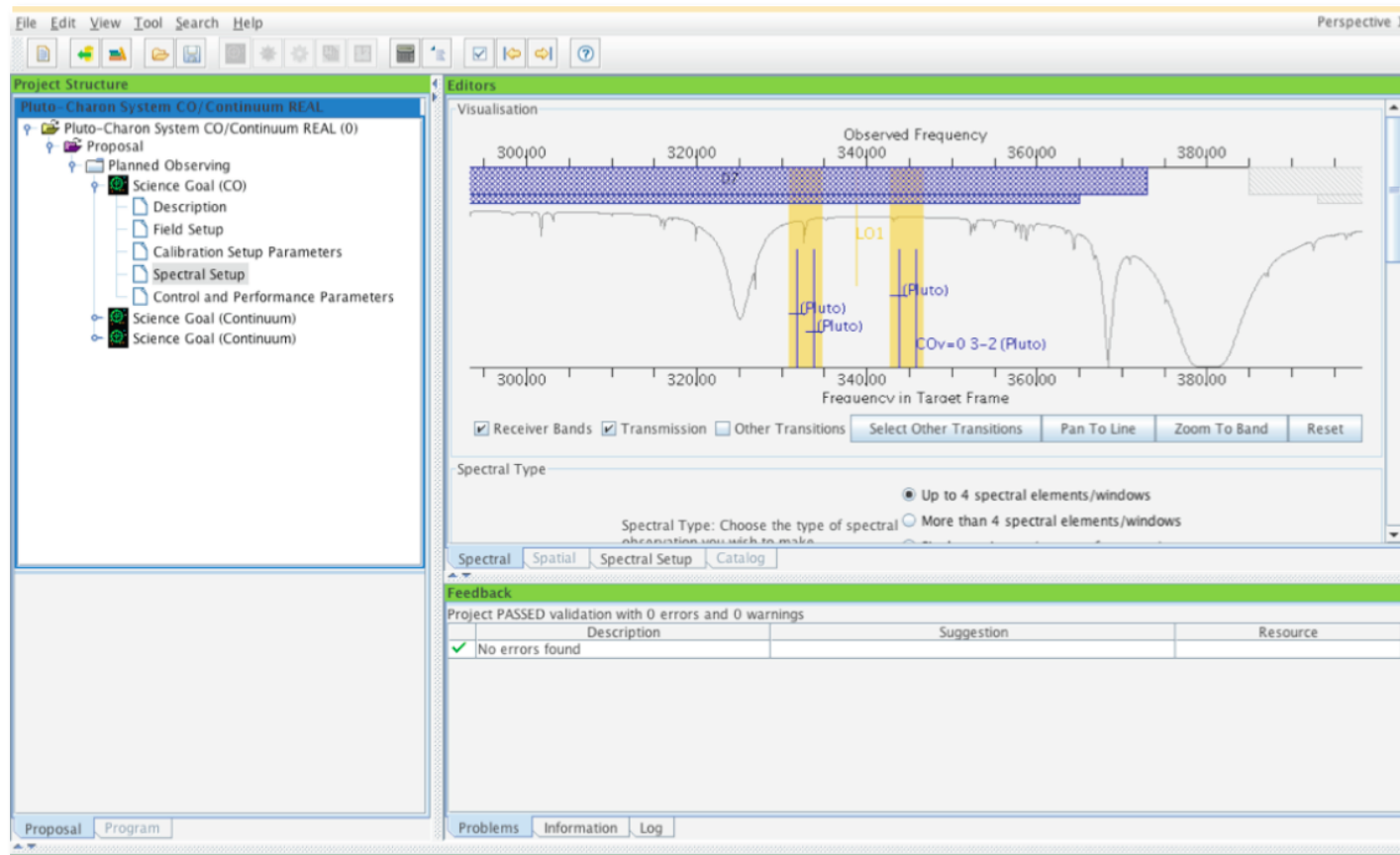
# Primer Example: ALMA data of Pluto

- Premise:
  - study CO in Pluto's atmosphere
  - constrain temperature of Pluto/Charon
  - constrain sizes of Nix & Hydra
- Strategies:
  - Bands 7 & 9 (850 & 450  $\mu\text{m}$ )
  - continuum and CO 3-2 data
  - angular resolution:
    - 0.8" & 0.4" FWHM respectively
  - spectral resolution:
    - continuum: mode 70 (8 GHz width)
    - CO 3-2: mode 8 (0.21 km/s channels)
- Desired Sensitivities:
  - continuum: 0.03 & 0.12 mJy/beam, allows  $5\sigma$  detections of Nix & Hydra
  - line: 10 mJy km/s, CO 3-2 peak should be 50-120 mJy in a line  $\sim 1$  km/s wide



*1.4 mm observations of Pluto & Charon from the SMA by Gurwell & Butler (2005) at 0.4" FWHM resolution, made using the most extended configuration of the SMA*

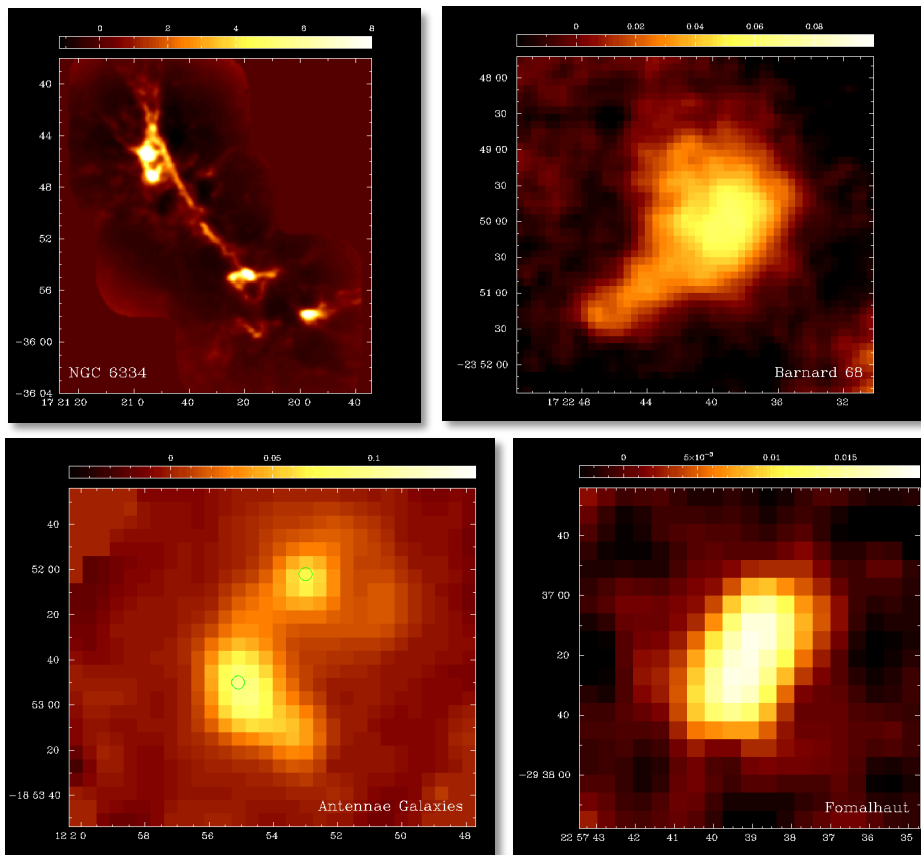
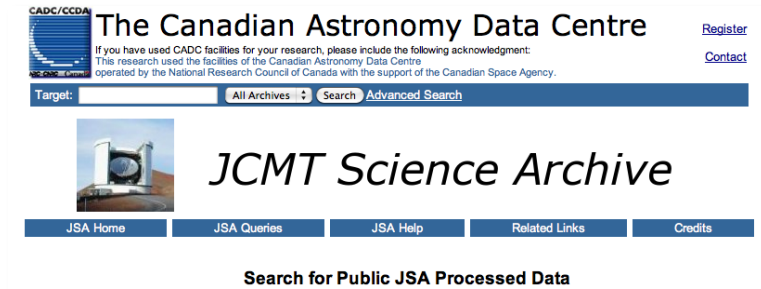
# Primer Example: ALMA data of Pluto



- Expected Observing Times (determined through ALMA sensitivity calculator in OT):
  - Continuum: Band 7 & 9 need 8.5 hr & 8.3 hr of exceptional weather respectively
  - Line: CO 3-2 needs only 4.3 hr
  - CO 6-5 needs higher sensitivity than available in ES and Nix & Hydra need wider array to be resolved: will wait until Full Operations for these projects

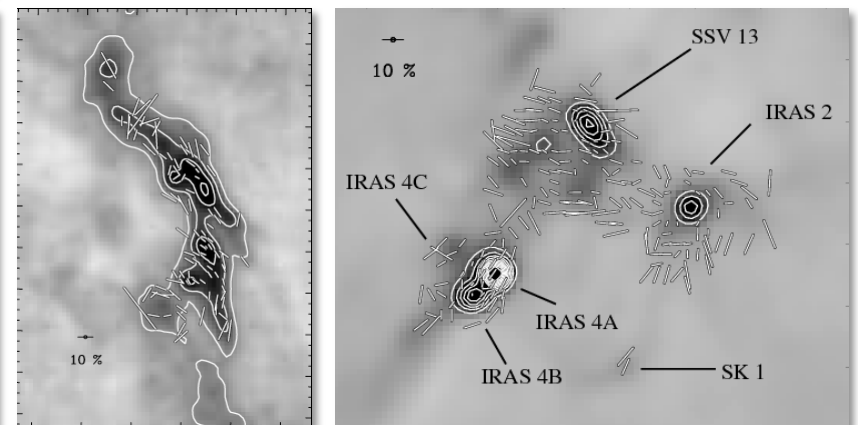
# Other Canadian Tools for ALMA

- JCMT archive at CADC:
  - contains public processed data products of continuum and line observations over the last 20 years over Bands 6, 7 and 9
  - Google “JCMT archive”



Di Francesco et al. (2008)

- SCUBA/SCUPOL Legacy Catalogues:
  - contains stacked, smoothed images of continuum data at 850 & 450 mm from SCUBA (1997-2005), catalogue of ~6100 identified objects
  - contains polarimetric data of 85 regions observed with the SCUBA polarimeter



Matthews et al. (2009)



# Summary

- As your North American partners, Canada will contribute to supporting both the American and Canadian astronomical communities for ALMA
- NA user support will also come from the Millimetre Astronomy Group at the Herzberg Institute of Astrophysics
- “*Observing with ALMA: A Primer for Early Science*” will help with your ALMA plans
- Early Science proposals may also benefit from public data in the JCMT Archive at the CADC, as well as the SCUBA and SCUPOL Legacy Catalogue data products



(view from our parking lot)