ALMA SOFTWARES
(Observing Tool and CASA)

Bartosz Dabrowski
ALMA Regional Centre, Czech Republic

ALMA (ESO/NAOJ/NRAO), C. Padilla

Autumn ALMA Workshop
22 – 23 October 2013, Toruń

EUROPEAN ARC
ALMA Regional Centre | Czech

Basic tool for ALMA

CASA

OBSERVING TOOL

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SPLATALOGUE
(database for astronomical spectroscopy)

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ALMA OBSERVATION SUPPORT TOOL
(simulates ALMA observations)

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HELPDESK

Basic tool for ALMA

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HELPDESK

USER PORTAL

CASA – **C**ommon **A**stronomy **S**oftware **A**pplications

CASA is a set C++ application libraries for the data reduction and analysis of radio astronomical data, developed for ALMA and EVLA projects but also for data from other radio, millimeter, and sub-mm telescopes. The package can process both interferometric and single dish data.

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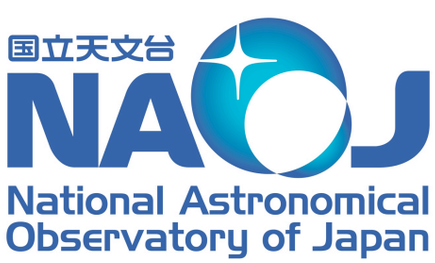
CASA is developed by an international consortium of scientists based at the:

* National Radio Astronomical Observatory (NRAO) – **guidance**,
* European Southern Observatory (ESO),
* National Astronomical Observatory of Japan (NAOJ),
* CSIRO Australia Telescope National Facility (CSIRO/ATNF),
* Netherlands Institute for Radio Astronomy (ASTRON).



CASA

The latest CASA release 4.1.0 (31 May 2013) is available for the following operating systems:

Linux

* RedHat 5.7 and 6.3 (64-bit)

Mac OS

* Mac OS 10.6 (Snow Leopard; 64-bit),
* Mac OS 10.7 & 10.8 (Lion/Mountain Lion; 64-bit)

CASA may also work on other flavors of Linux. The list above covers those operating systems that was a regularly tested. Note that from CASA 4.1 and onwards we support Mac OS 10.8 but may discontinue support for Mac OS 10.6. We will also restrict support of the Linux version to 64-bit.

Starting up CASA

command: **`casapy`**

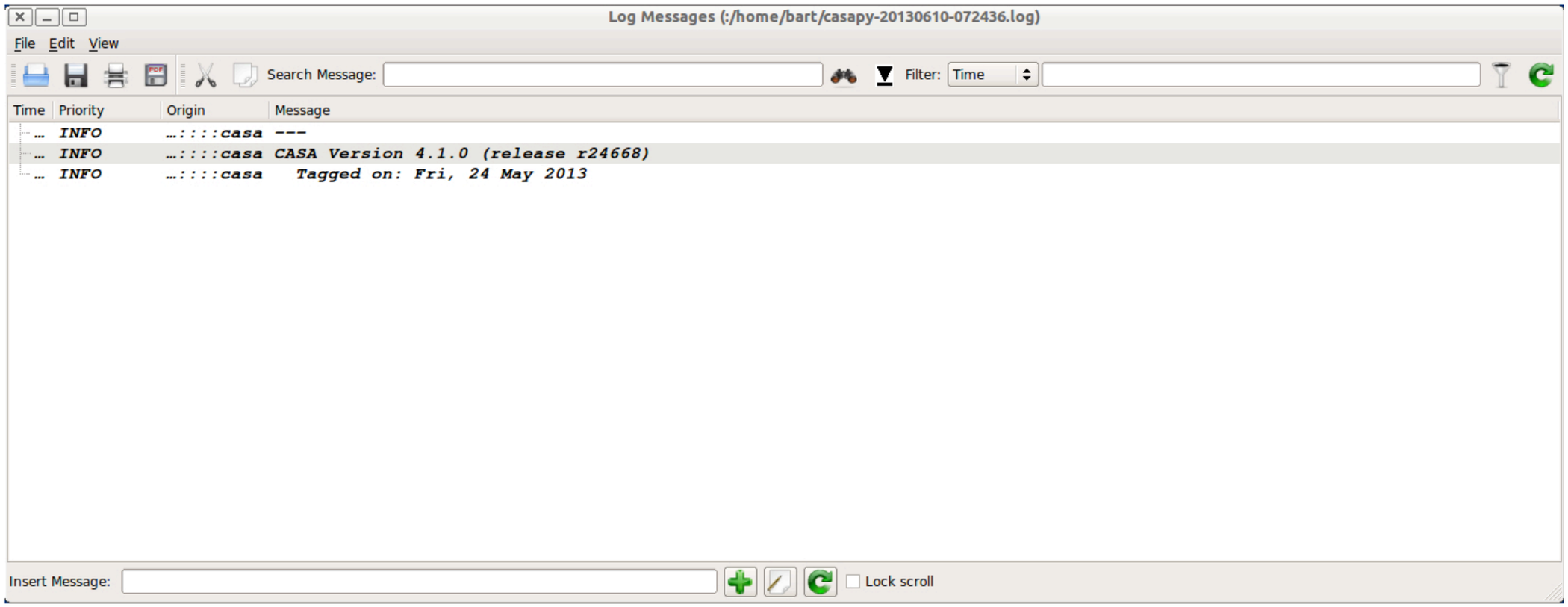
After started CASA a list of available tools are displayed and the "logger widow" will appear.

```
bart@arc: ~
are cached or not.
========================================

CASA Version 4.1.0 (r24668)
  Compiled on: Sat 2013/05/25 00:43:29 UTC

---------------------------------------------------------------------------
    For help use the following commands:
    tasklist                - Task list organized by category
    taskhelp                - One line summary of available tasks
    help taskname           - Full help for task
    toolhelp                - One line summary of available tools
    help par.parametername - Full help for parameter name

---------------------------------------------------------------------------
Activating auto-logging. Current session state plus future input saved.
Filename       : ipython-20130610-072445.log
Mode           : backup
Output logging : False
Raw input log  : False
Timestamping   : False
State          : active
*** Loading ATNF ASAP Package...
*** ... ASAP (trunk rev#23916) import complete ***

CASA <2>:
```

ALMA

Logger window

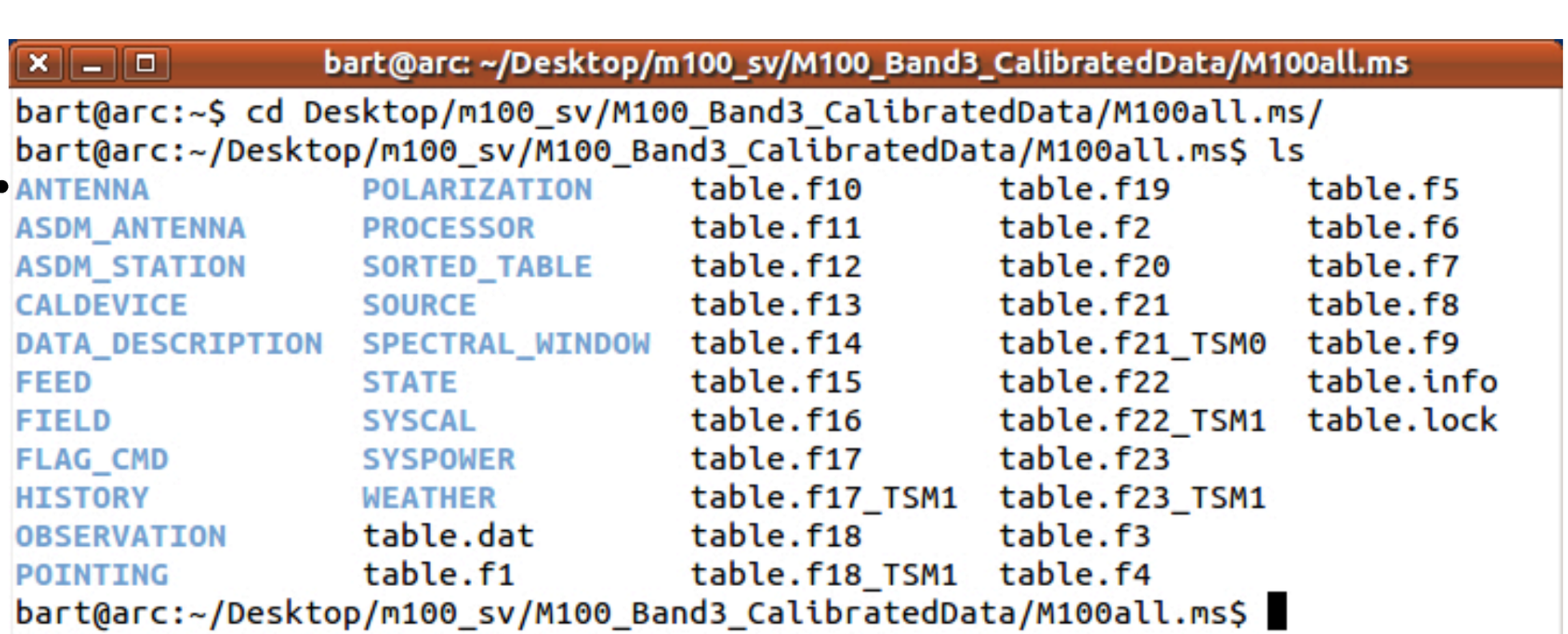
The CASA "Log Message" allows you to monitor the outcome of any command executed in the main CASA window.



Data Format

Data format in CASA:

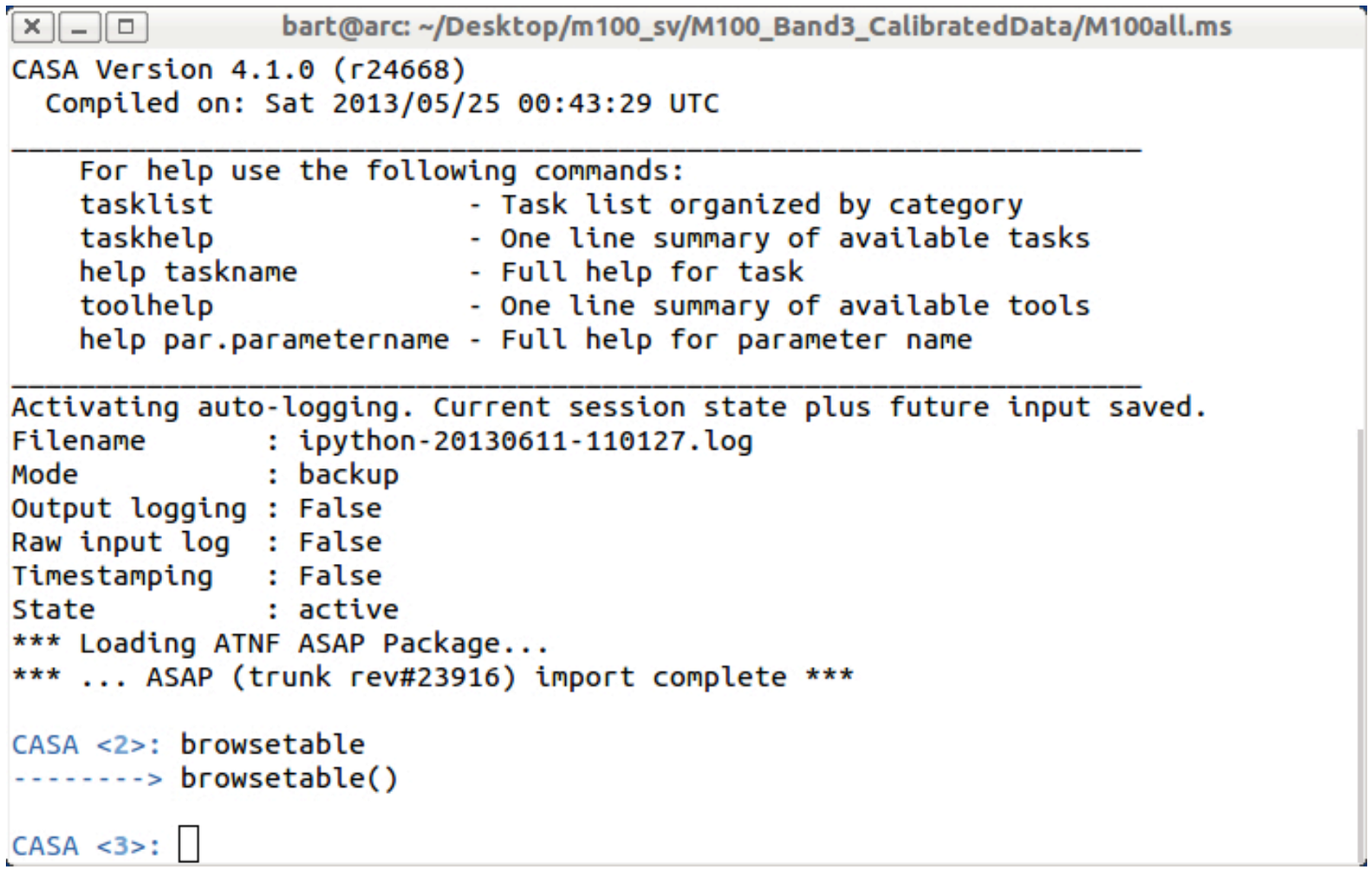
* data are stored in tables,
* visibility data are stored in Measurement Set (MS) table,
* the MS is a directory on the disk. An MS consists of:
  * MAIN table containing the visibility data,
  * sub-tables containing auxiliary information or secondary information.



Browse a Table

command: **`browsetable`**

This task allows you to display any CASA table.



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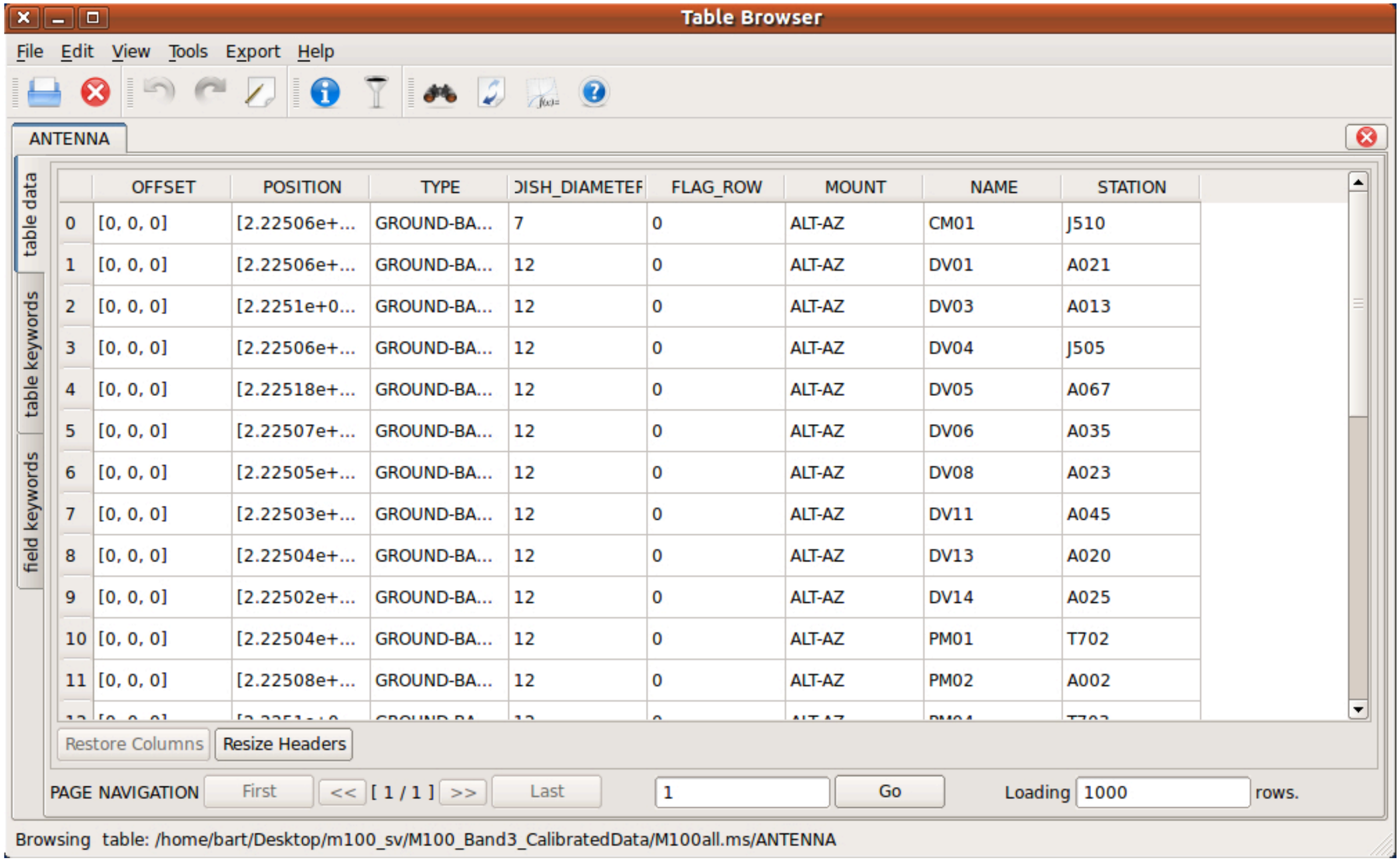
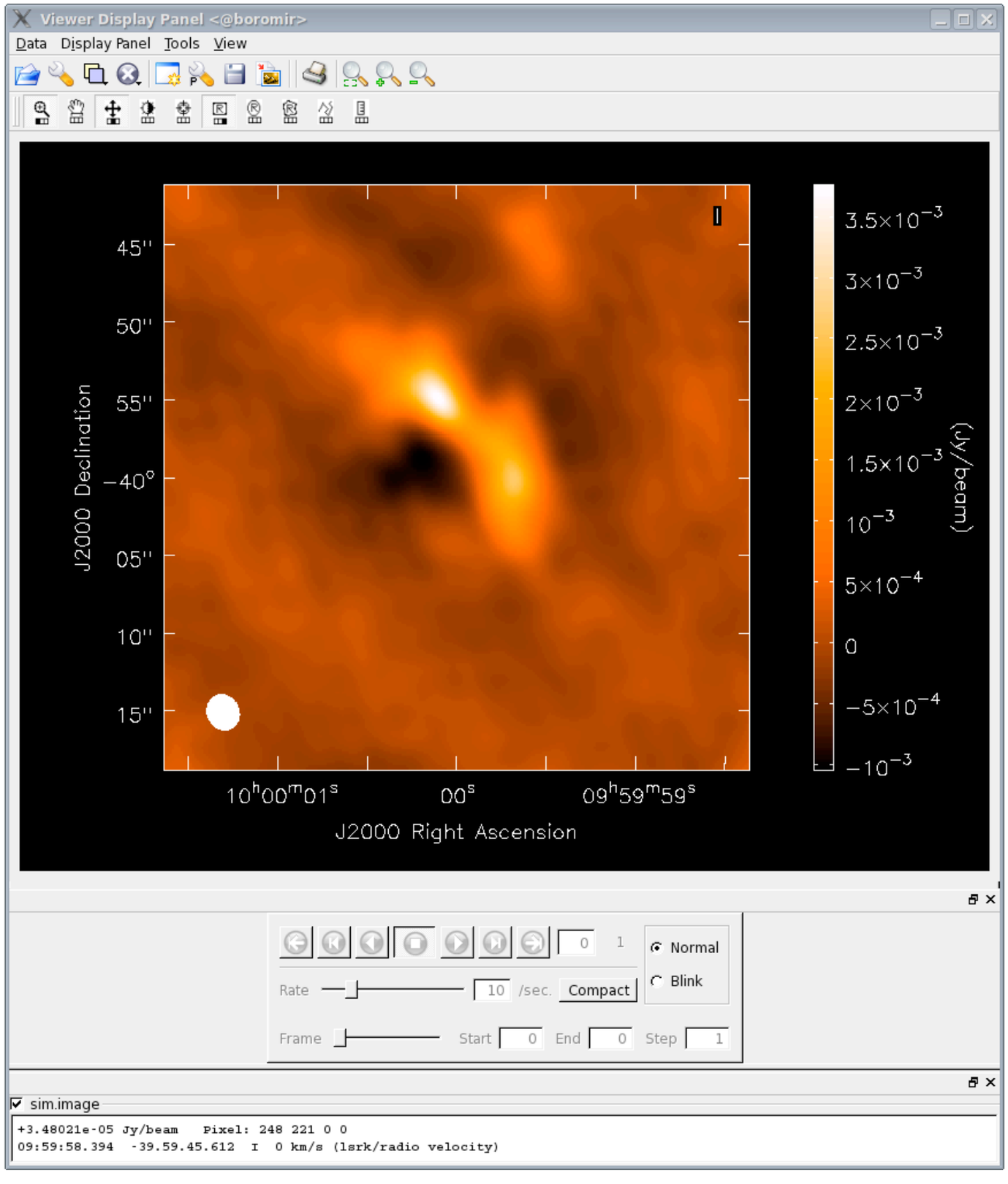


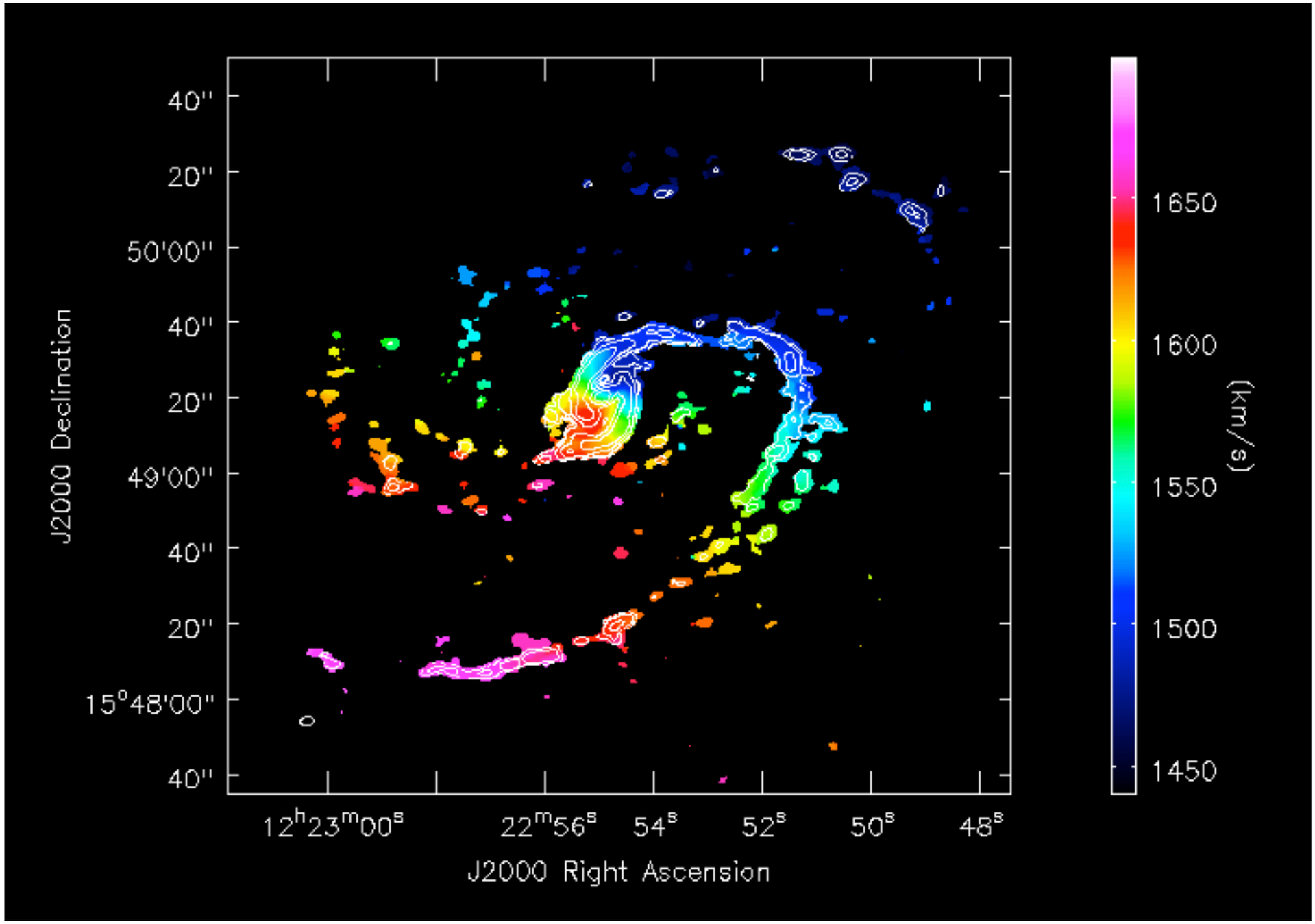
Viewer – view an image or visibility data set



In a typical CASA session you will use tools such as:

* **plotxy**: an X-Y plotter / interactive flagger for visibility data
* **plotcal**: an all-purpose plotter for calibration results
* **browsetable**: allows you to display any CASA table, e.g. Measurement Sets
* **viewer**: view an image or visibility data set
* **clean**: deconvolve an image with selected algorithm

CASA Result

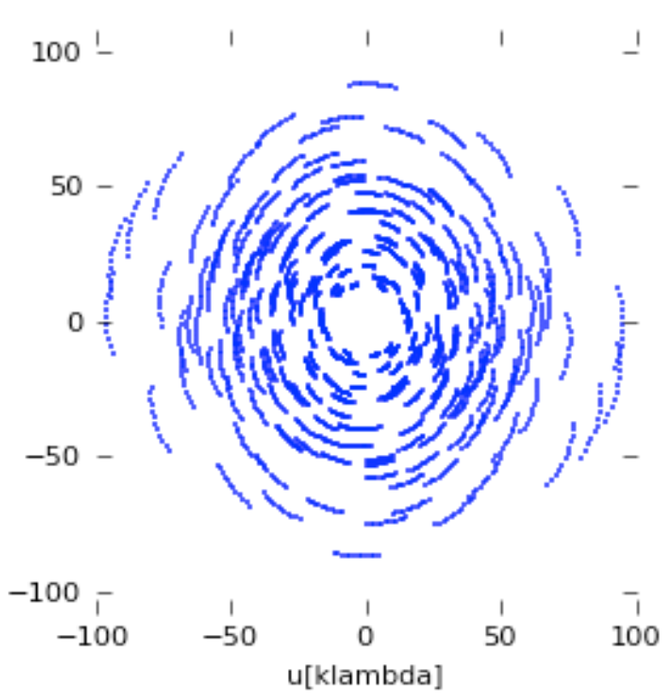


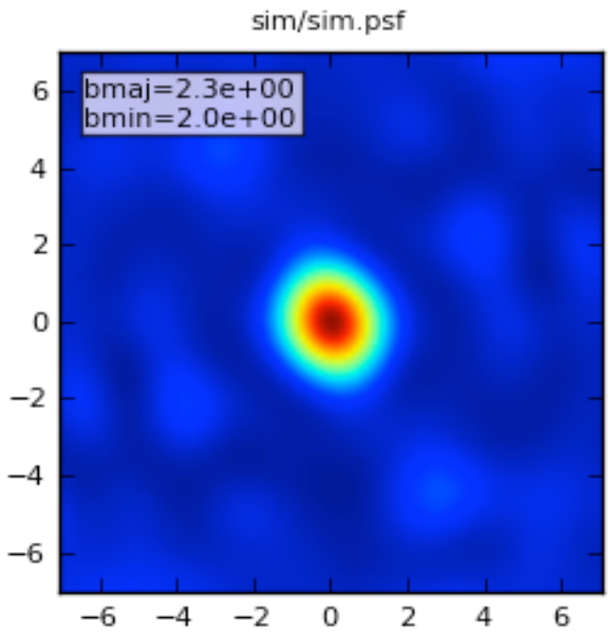
Intensity-weighted CO(1-0) velocity field of the grand-design spiral galaxy M100 (**Band 3** 84–116 GHz), with total intensity contours overlaid.

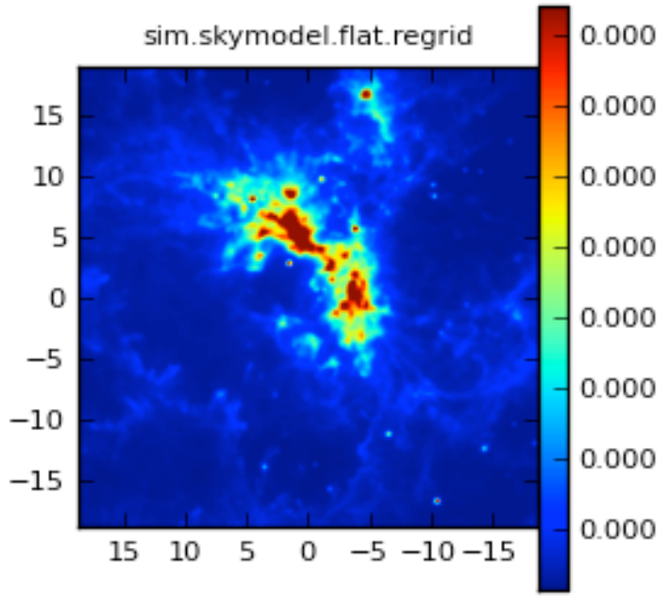
Simulating observations in CASA 4.1

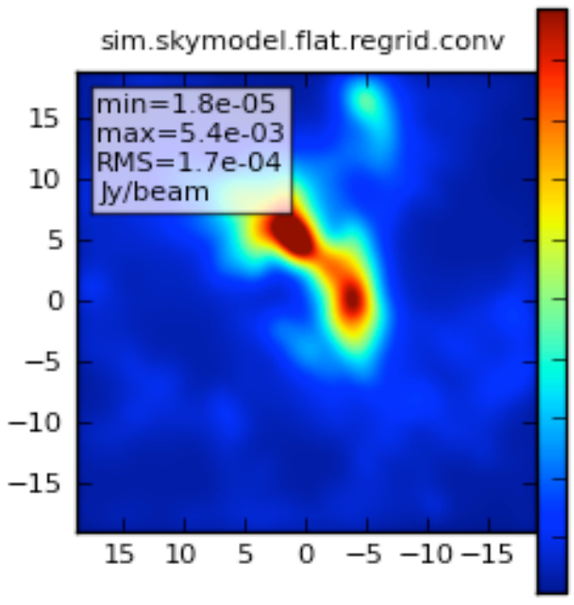
command: **`simobserve & simanalyze`**

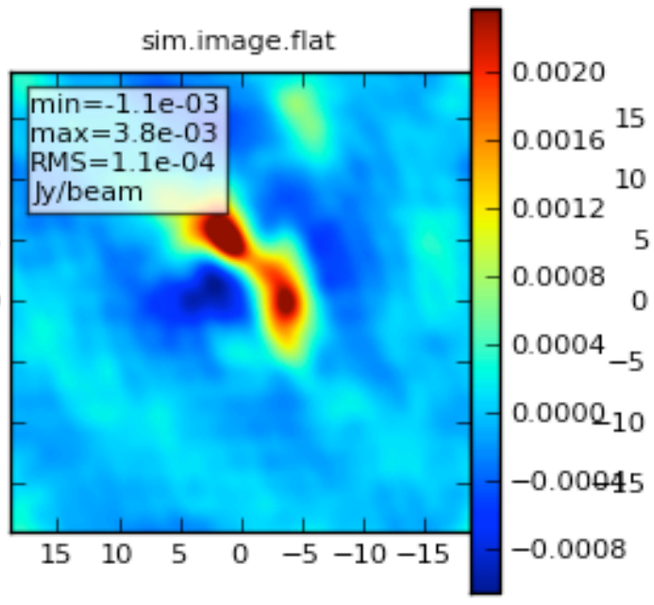
When planning an interferometric observation it is useful to simulate the output of the instrument under a variety of conditions. In CASA, interferometric observations can be simulated using task **`simobserve`** and quickly analyzed using task **`simanalyze`**.

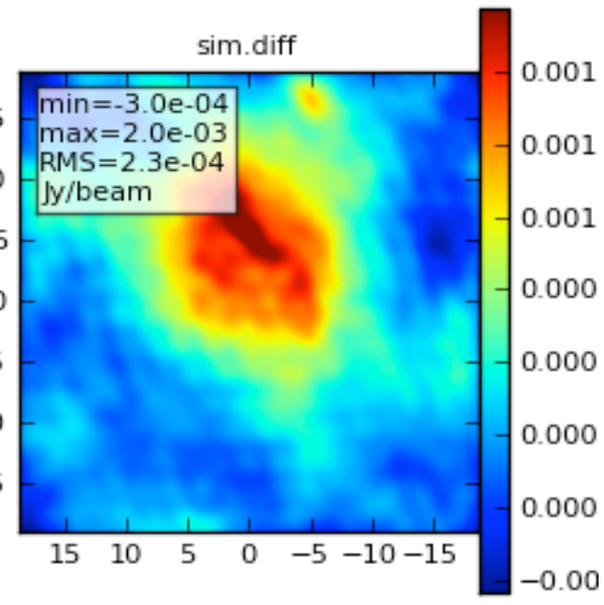












Plot of the six outputs generated by **`simanalyze`** (Tarantula Nebula – 30 Doradus) (1) the uv coverage in the 2 hour observation; (2) the synthesized ("dirty") beam; (3) the original sky model; (4) the convolved model (sky model convolved with the output "clean" beam); (5) the clean image (the sky as observed with the interferometer after deconvolution); (6) and the difference between the clean image and the convolved model.

CASA on the web

CASA Home Page
http://casa.nrao.edu

Obtaining the CASA
http://casa.nrao.edu/casa_obtaining.shtml

CASA Cookbook
http://casa.nrao.edu/Doc/Cookbook/casa_cookbook.pdf

CASA Training Materials
http://casa.nrao.edu/casa_training.shtml

CASA Scripts and Data
http://casa.nrao.edu/casa_scripts.shtml

About
Proposing
Observing
Data
Documents & Tools
Knowledgebase/FAQ

User Services at ARCs

- Helpdesk
- EU ARC
- NA ARC
- EA ARC

Welcome to the Science Portal at ESO

This is the website for **The ALMA Science Portal**, served from one of the **ALMA Regional Centers (ARCs)** of the ALMA partner organizations: ESO, NRAO or NAOJ. You may switch between the different instances of the portal through the links to the appropriate ALMA partner at the top banner. Through this portal you can find details about the technical capabilities of ALMA, how to propose for observing time, and how to access ALMA data. It includes links to all official ALMA documents and tools, including those for preparing and submitting proposals and processing ALMA data. In order to access some of the tools, users must register with the project and login to the portal via the links at the top banner.

Each of the three ARCs provides additional **User Services**, including a **Helpdesk** for all user queries. Each ARC maintains additional web pages with information on region-specific user services, such as visitor and student programs, schools, workshops, financial programs and public outreach activities. These are accessed via the links under the ***User Services at the ARCs*** area in the left menu.

ALMA Newsletter

Newsletter No. 9
May 23, 2012
More...

General News

ALMA Cycle 1 and Cycle 2 Timelines
May 31, 2013
Cycle 1 Progress Update
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Local News

43rd YERAC
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ALMA at UK NAM
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Apr 04, 2013
CESRA Workshop 2013
Mar 25, 2013
More...

ALMA SCIENCE PORTAL

WEB INTERFACE FOR ALMA USERS

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OBSERVING TOOL ←- - - -

Atacama Large Millimeter/submillimeter Array
In search of our Cosmic Origins

ESO NRAO NAOJ

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OBSERVING TOOL

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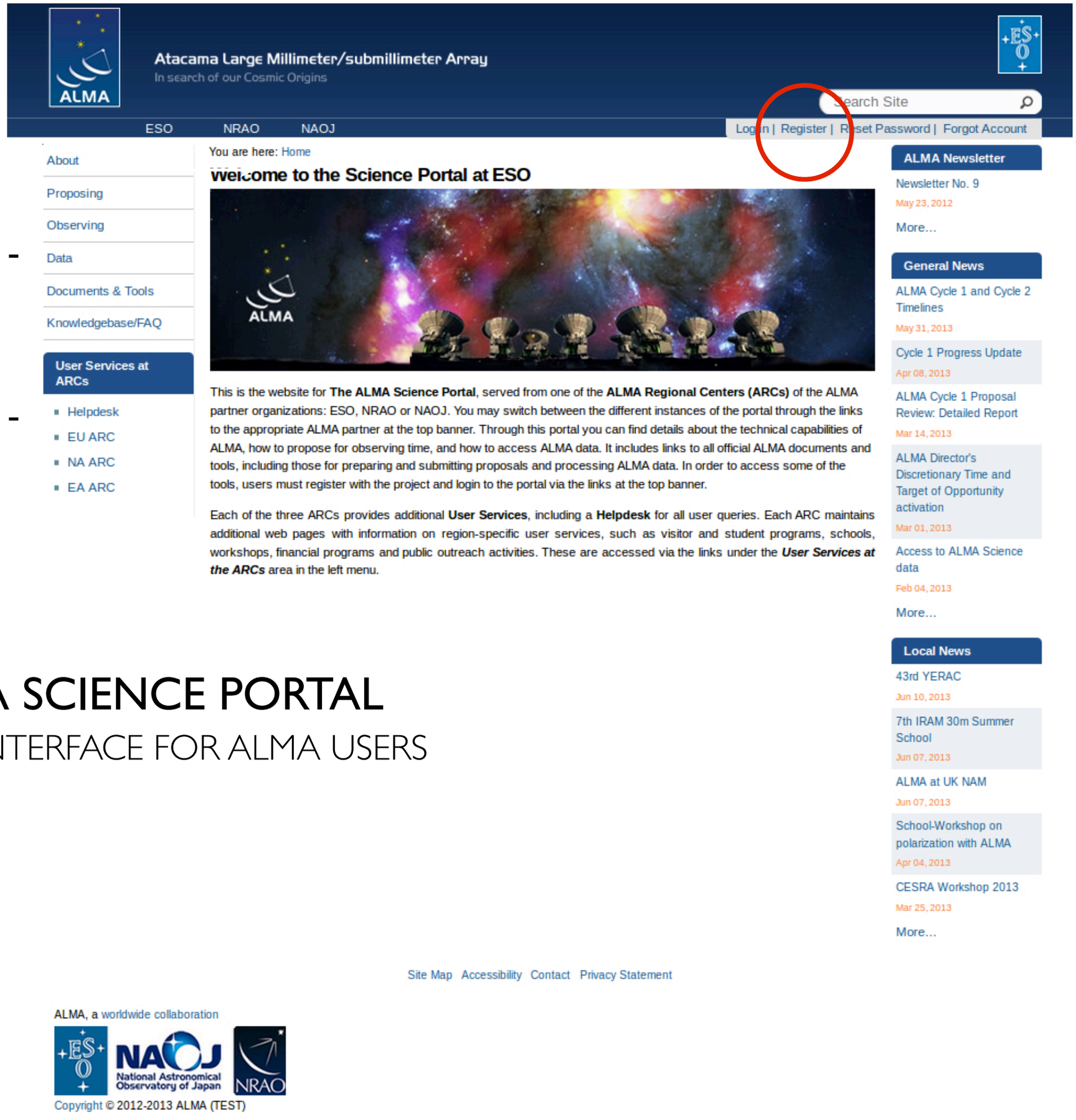


ALMA SCIENCE PORTAL

WEB INTERFACE FOR ALMA USERS

Observing Tool

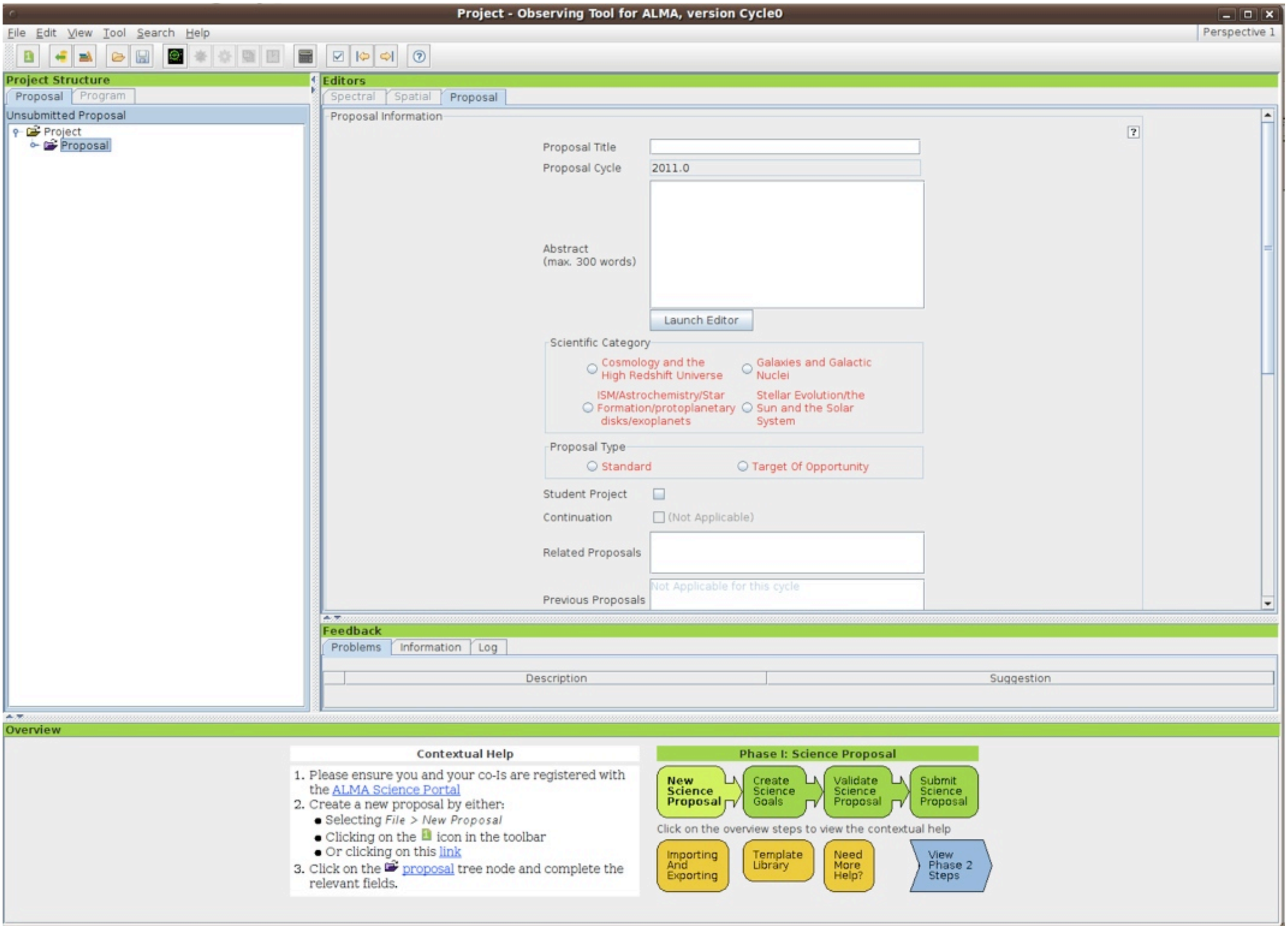
The ALMA Observing Tool (OT) is a Java application used for the preparation and submission of ALMA Phase I (observing proposal) and Phase II (telescope runfiles for accepted proposals) materials. Note that in order to submit proposals you will have to register with the ALMA Science Portal beforehand.

Download & Installation

The OT will run on most common operating systems, as long as you have Java 6 installed.

The ALMA OT is available in two versions: **Web Start** (recommended, automatically downloaded and installed on your computer) and **tarball** (installed manually).

OT Graphical User Interface



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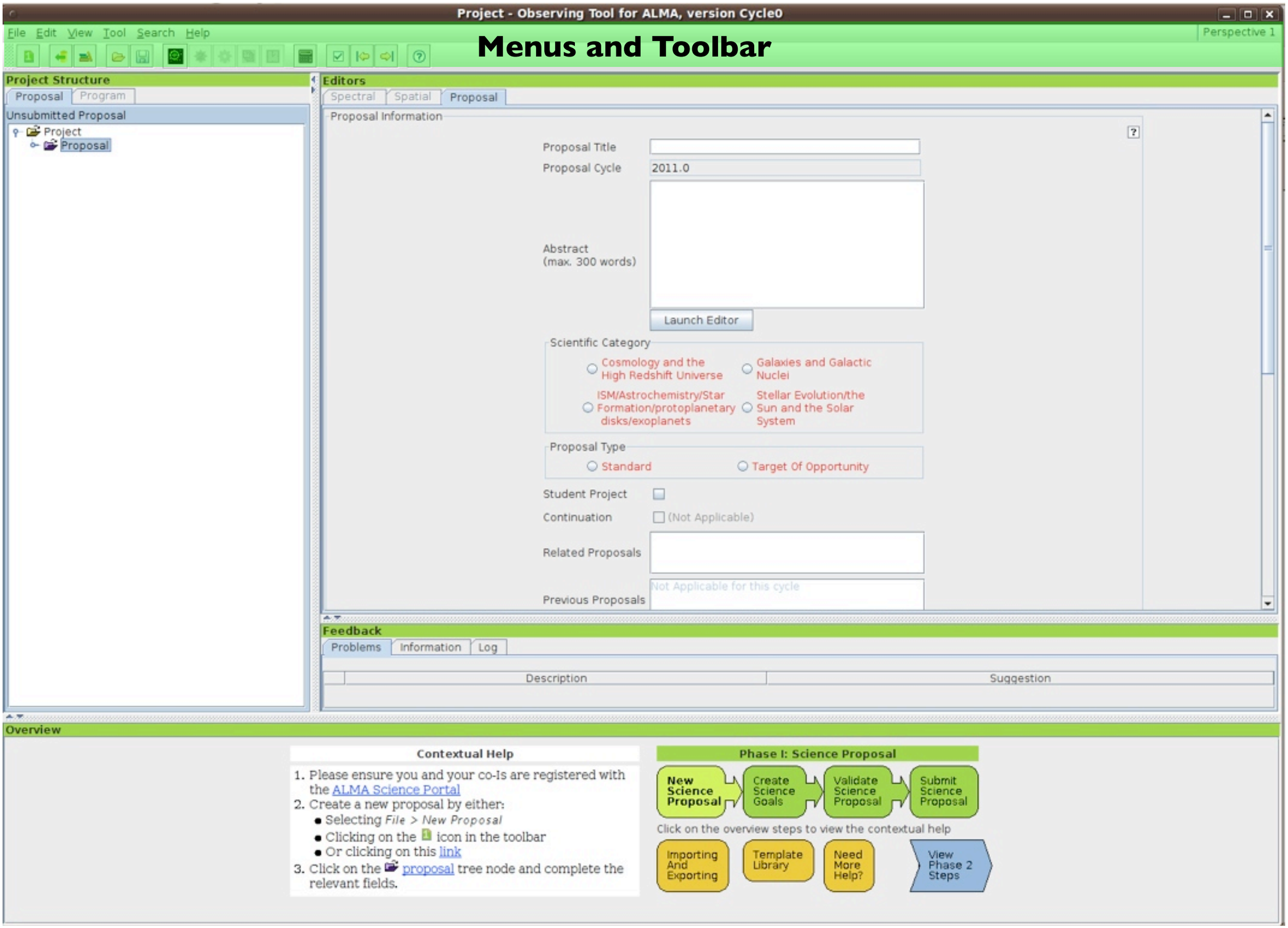

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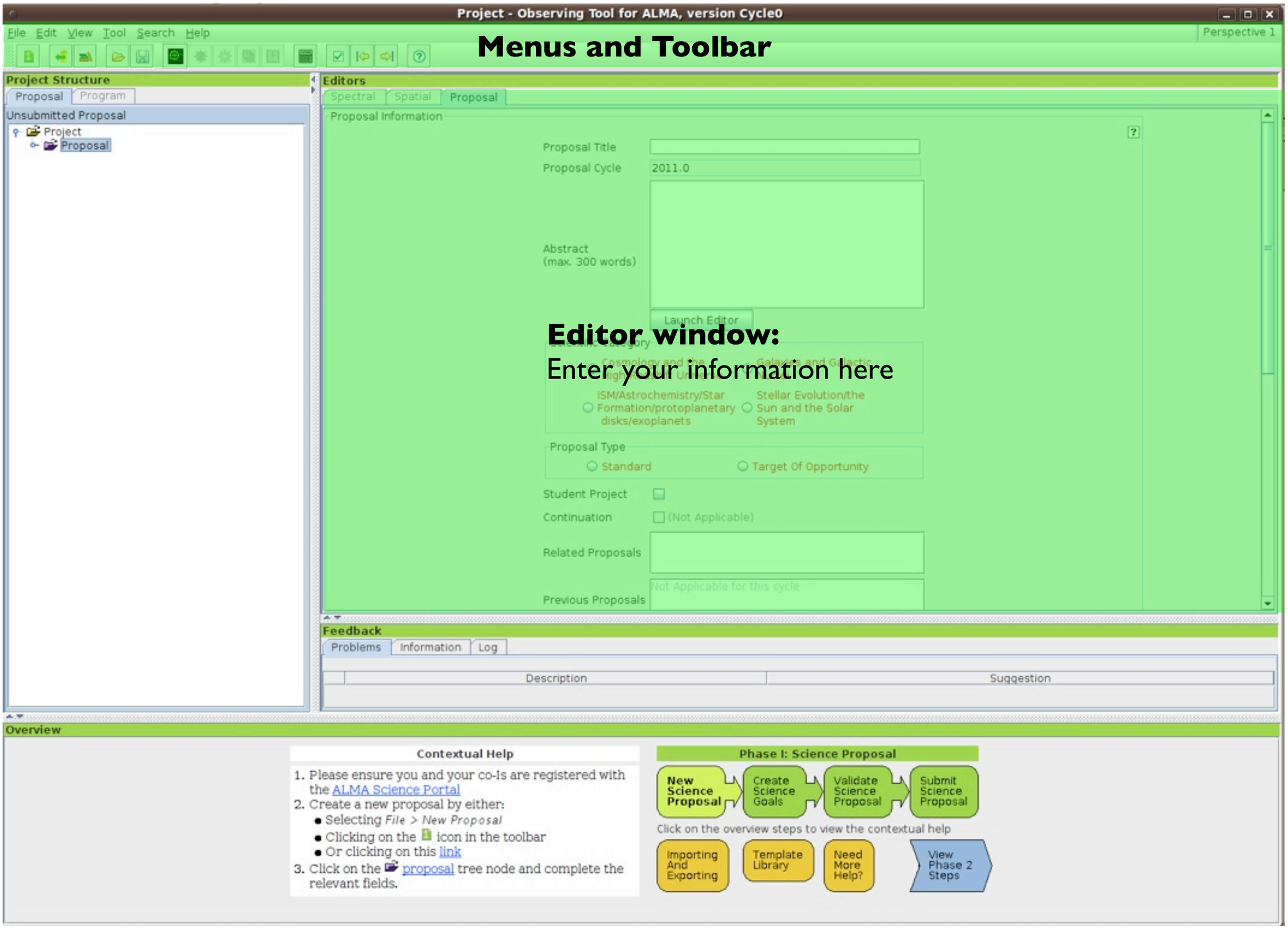

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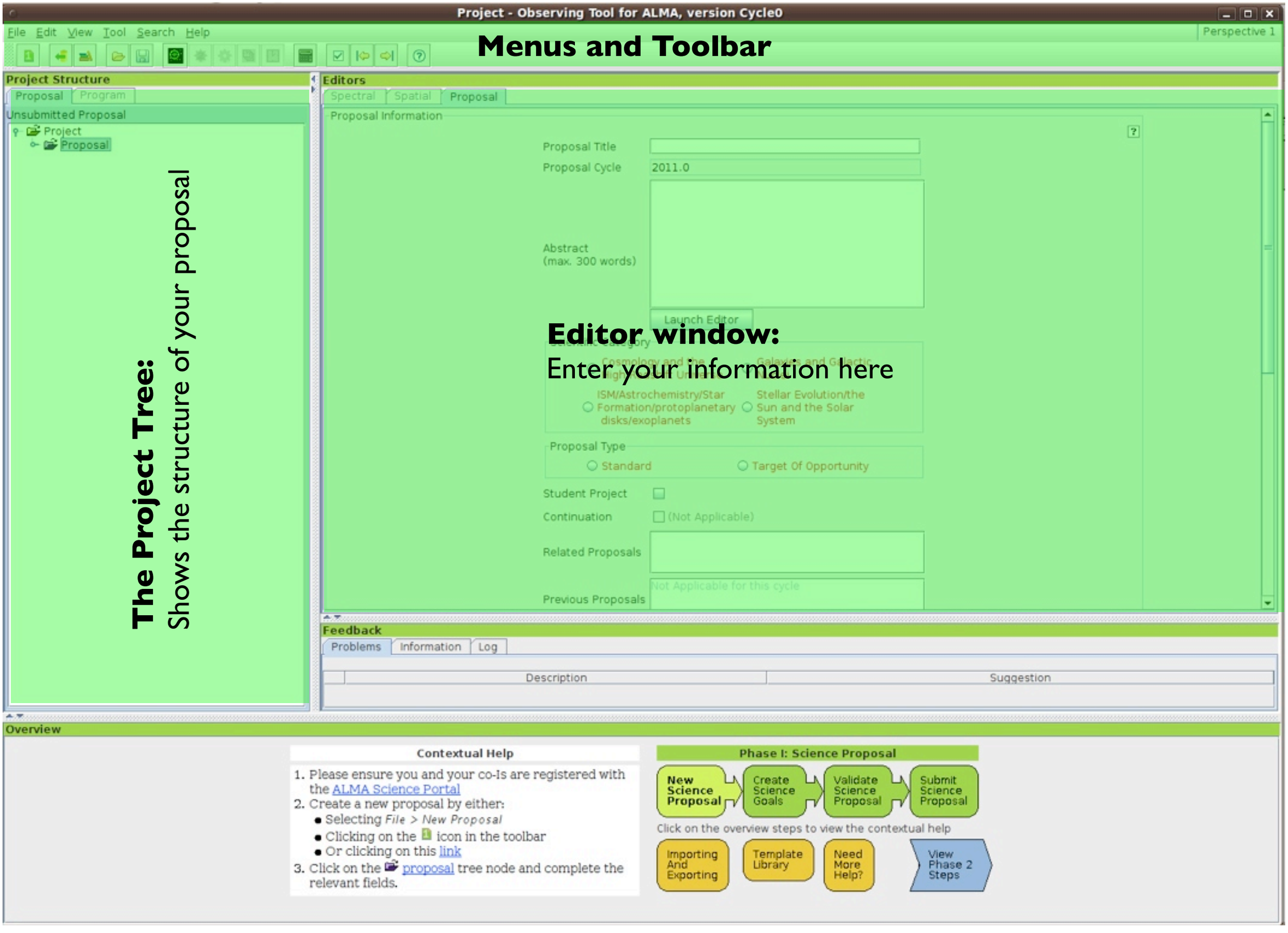

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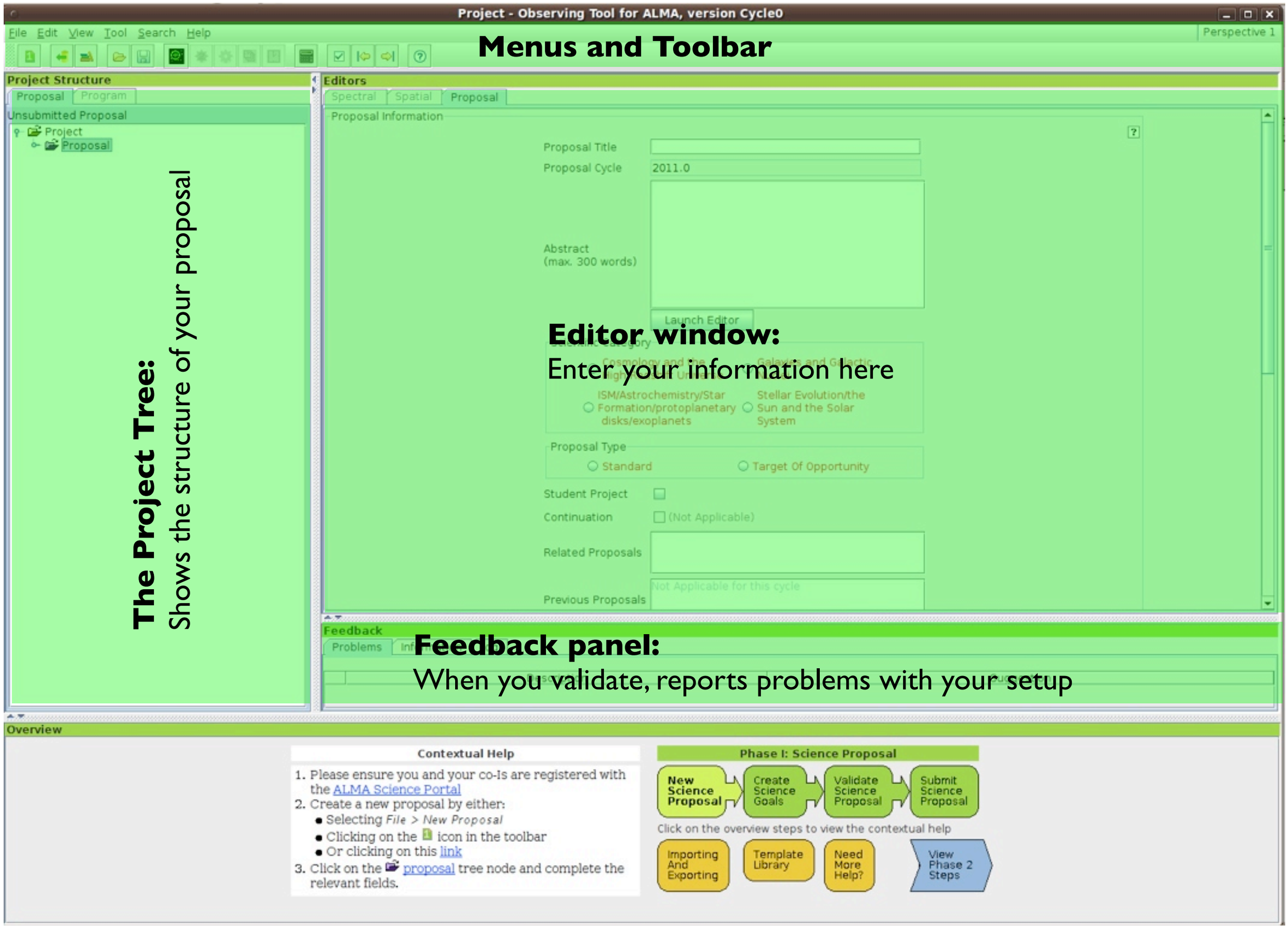

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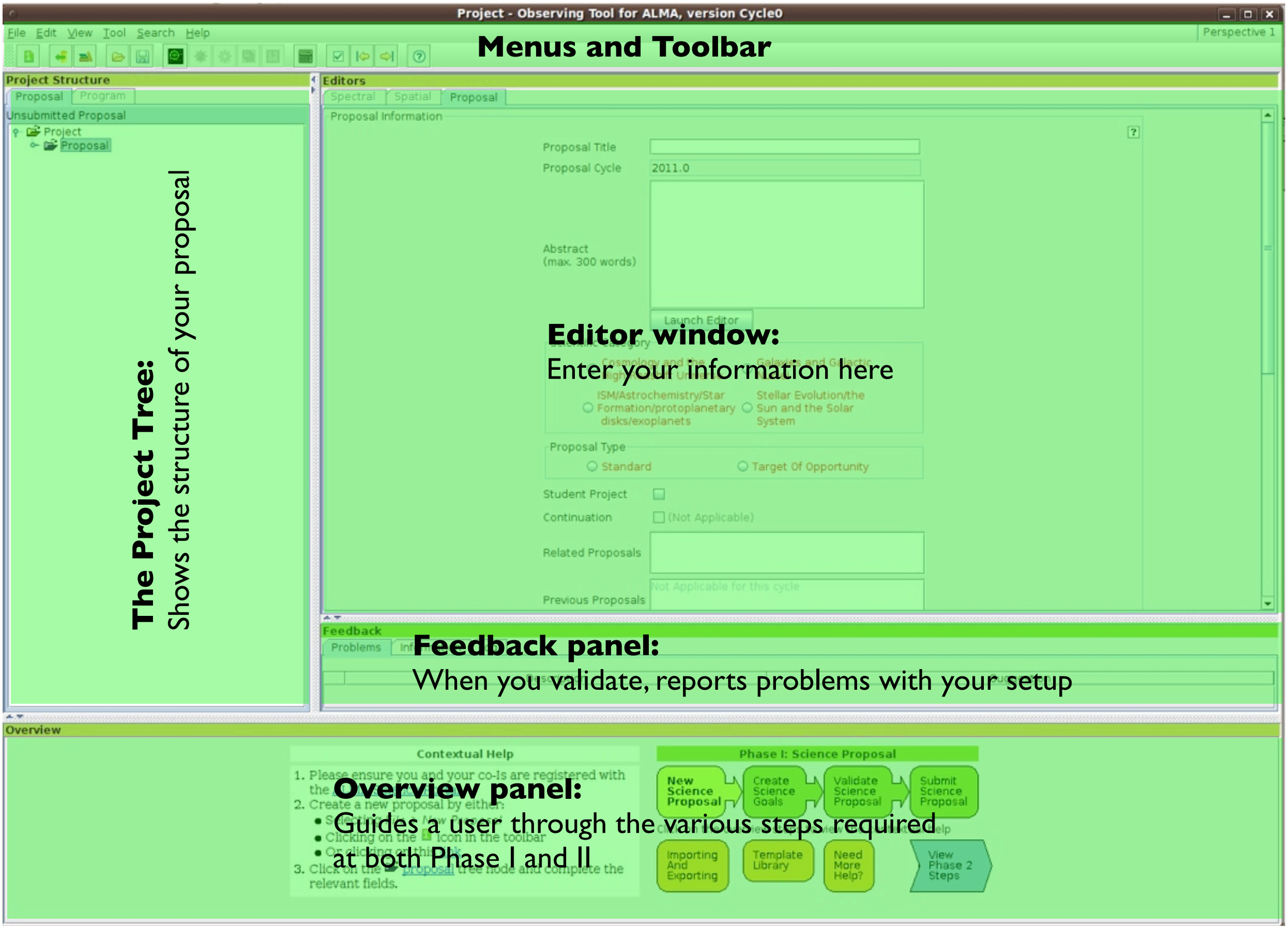

Observing Tool – documentation

OT is still under construction

* If you are a novice OT user you should start with the **OT Quickstart Guide**, which takes you through the basic steps of ALMA proposal preparation.

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* Audio-visual illustrations of different aspects of the OT can be found in the **OT video tutorials**. These are recommended for novices and advanced users.

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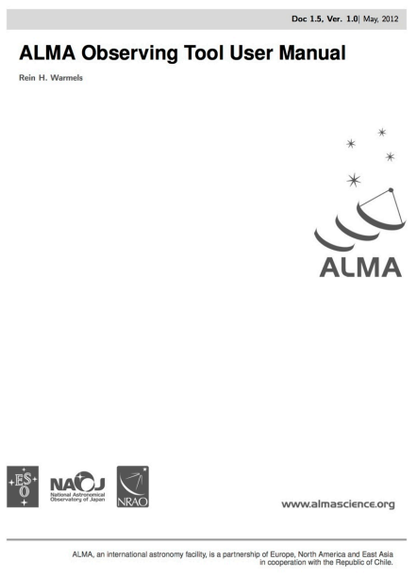
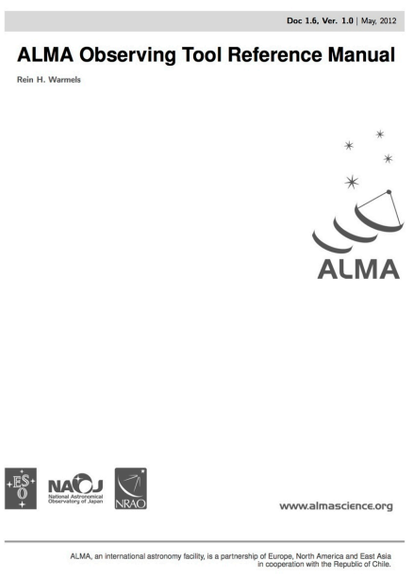
* More in-depth information on the OT can be found in the **User Manual**, while concise explanations of all fields and menu items in the OT are given in the **Reference Manual**.





ALMA helpdesk

To get support for questions regarding data reduction of ALMA observations with CASA, proposal preparation and other ALMA related inquiries you should contact the **ALMA helpdesk**.

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* Ask questions,
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* emergency tickets before the proposal submission deadline,

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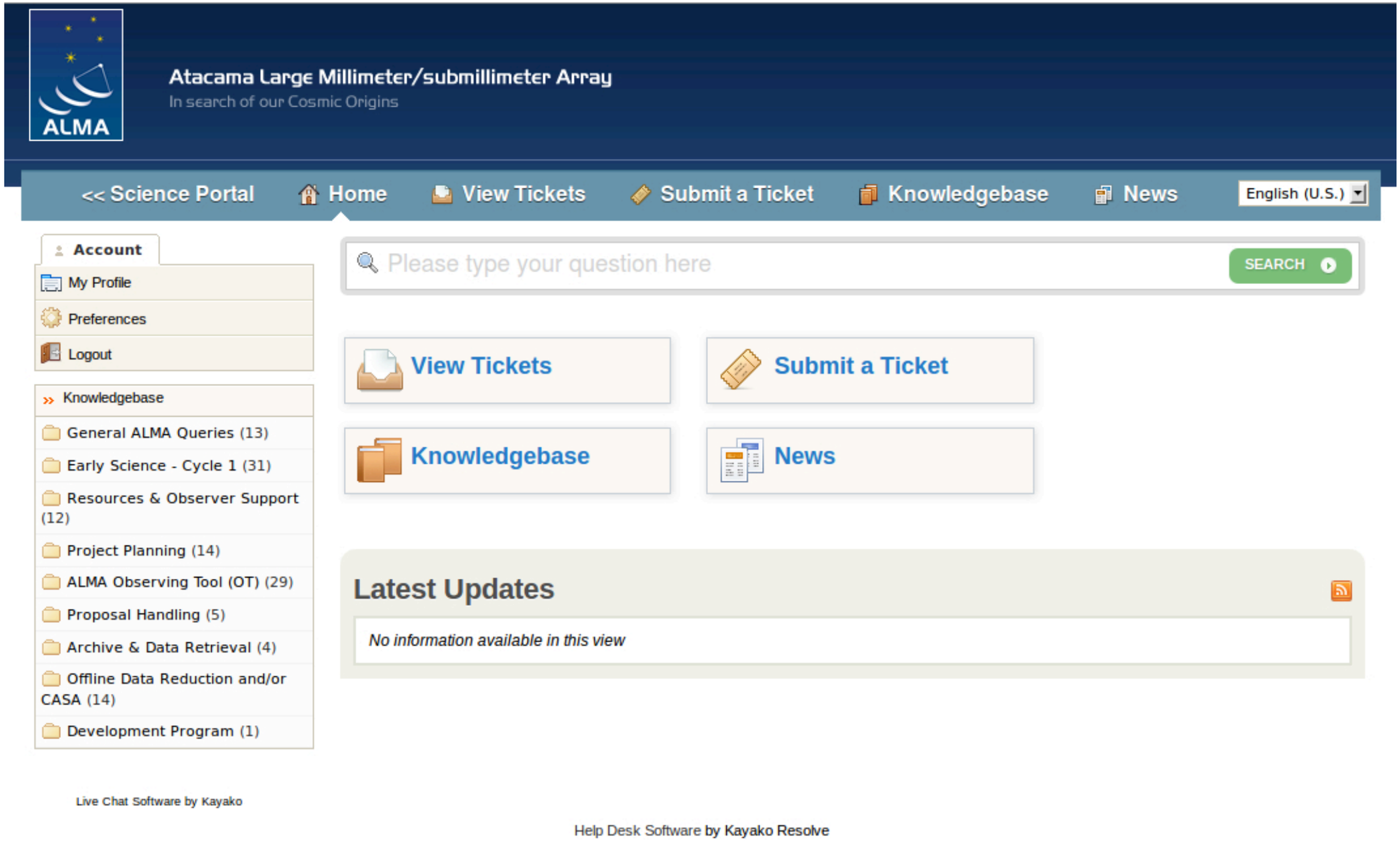
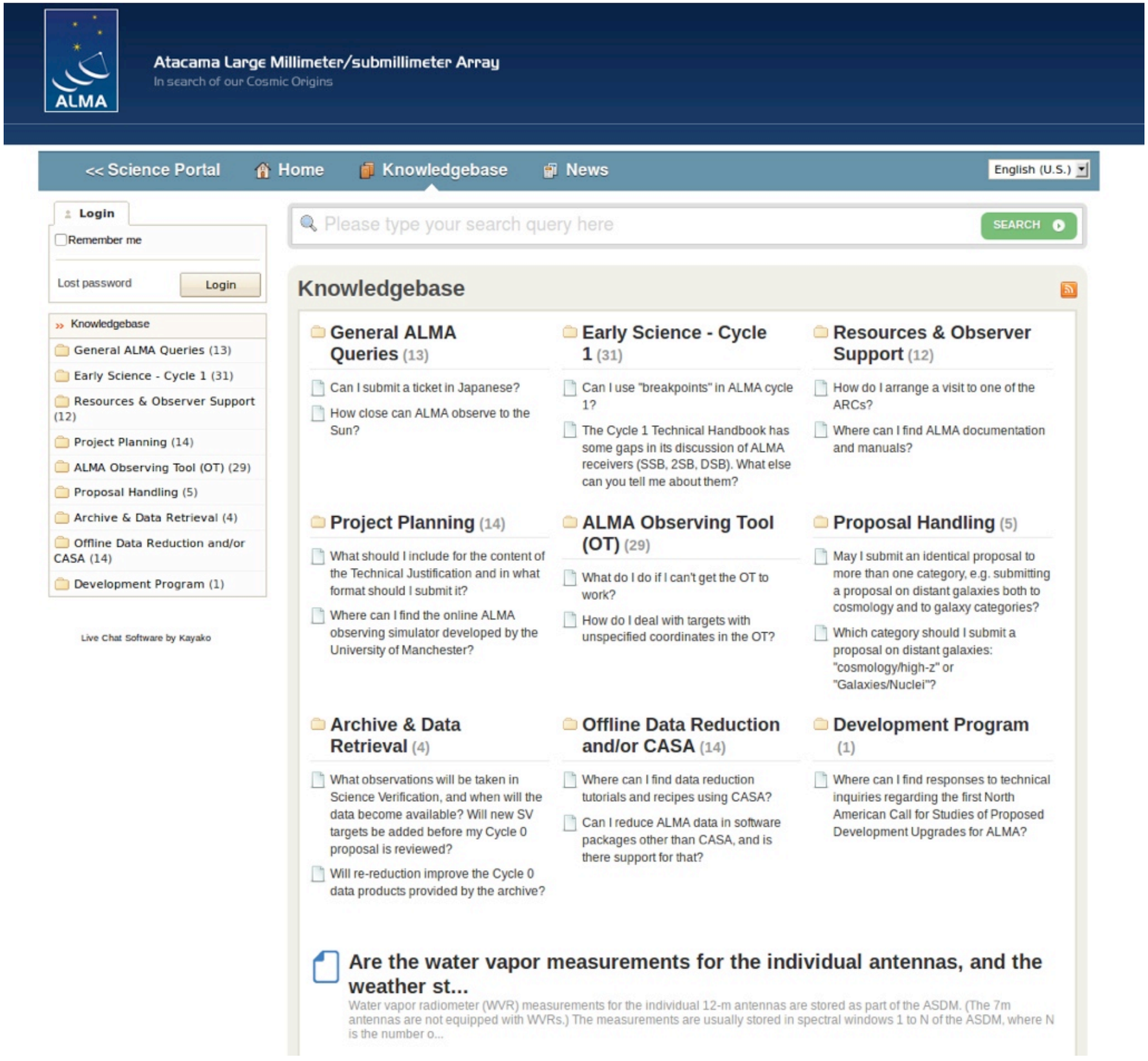
* Ask questions,
* FAQ and knowledgebase,
* emergency tickets before the proposal submission deadline,
* expect an answer within 2 working days.

ALMA helpdesk

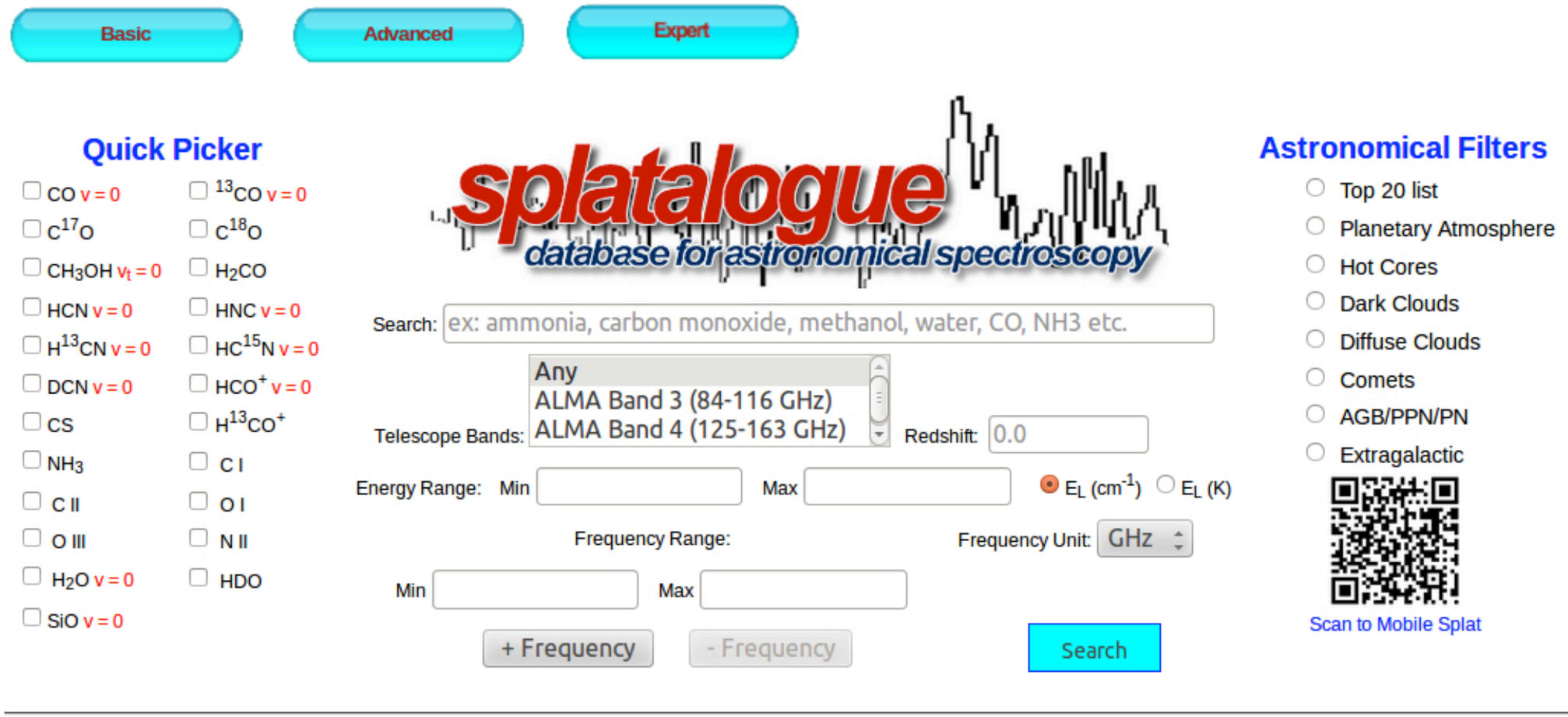


ALMA helpdesk – Knowledgebase



Splatalogue

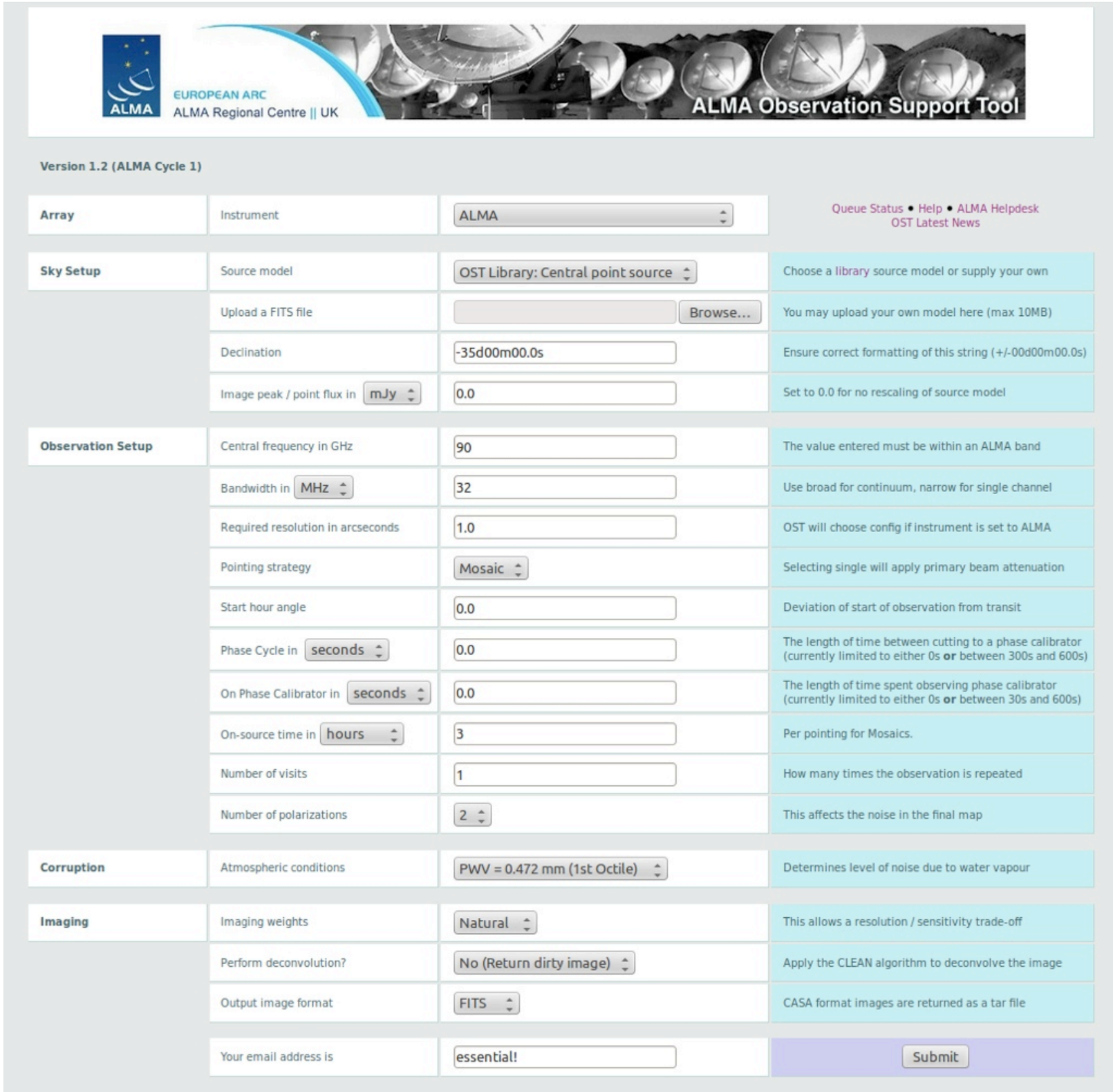
Splatalogue is a database for astronomical spectroscopy. Users can search for atomic and molecular transitions lines using several different search parameters such as name, transition, frequency range, energy range, line strength, etc. The Splatalogue is maintained by NRAO.



ALMA **O**bservation **S**upport **T**ool (OST)

The ALMA OST simulates ALMA observations. Users submit jobs to the OST via a standard web interface. They specify the parameters of an observation and either supply an arbitrary source model (by uploading a FITS image) or selecting a model from the pre-existing library. When the simulation is complete, the user receives by automated e-mail an hyperlink to a web page containing a simulated image, and some other information and figures. The OST is maintained by the EU ARC node in Manchester (UK) and at ESO

ALMA **O**bservation **S**upport **T**ool (OST)



Other useful tools for ALMA

ALMA Sensitivity Calculator

The ALMA Sensitivity Calculator (ASC) will calculate the necessary integration times for a given sensitivity, or vice versa, for your ALMA observing project.
http://www.eso.org/sci/facilities/alma/observing/tools/etc/index.html

Atmospheric Transmission at Chajnantor

This tool allows the user to model the atmospheric transmission as a function of frequency and amount of precipitable water vapor. The output is a plot of the transmission fraction. Up to six different amounts of water content can be selected.
http://almascience.eso.org/about-alma/atmosphere-model

THANK YOU

ALMA (ESO/NAOJ/NRAO), C. Padilla