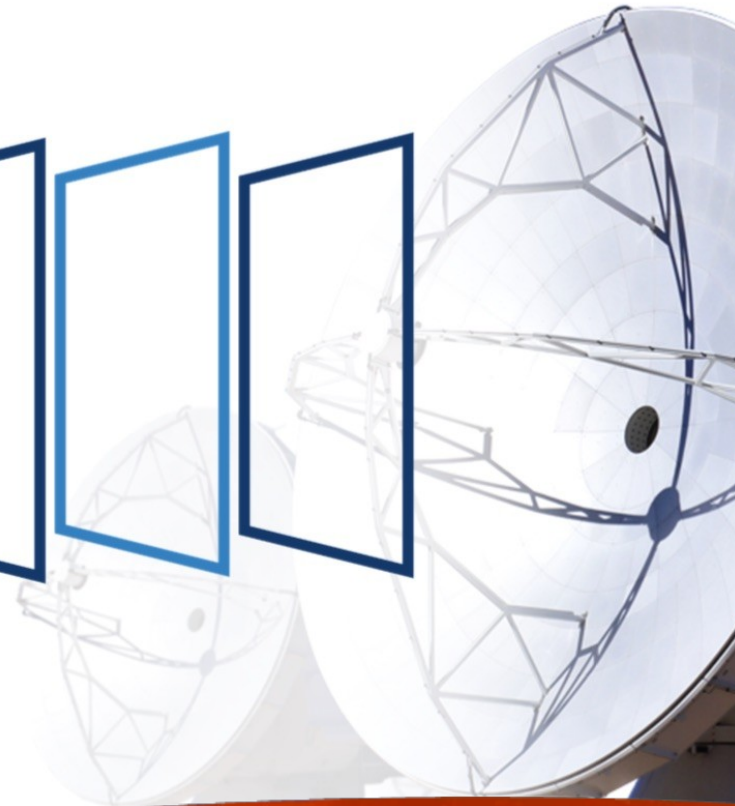


CASA

Common Astronomy
Software Applications



Introduction to CASA

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with contributions from Bjorn Emonts (NRAO)



CASA website: download

Website: <https://casa.nrao.edu>

Releases:

Every ~2 months

But... only some releases

Contain VLA pipeline (~yearly)!

Installation:



- Monolithic (all-inclusive ‘plug-and-play’)
- Pip-wheel (Pythonic, Jupyter Notebooks, Google Colab)

Latest version: CASA 6.5

The [Release Notes](#) and [Known Issues](#) of the 6.5 release are available in [CASA Docs](#)

CASA 6.5 is based on Python 3, and available either as a downloadable tar-file distribution with Python environment included, or as a modular version that can be installed with [pip-wheels](#).

Manual processing can be done with any CASA version, but ALMA and VLA pipelines may differ and are not always included, so download the correct CASA version for pipeline use.

	 Linux (RedHat 6, 7, 8)	 Mac (OS 11, OSX 10.15)
General Use (Notes)	CASA 6.5.3 (RH7/8 - Py 3.8) CASA 6.5.3 (RH7 - Py 3.6)	CASA 6.5.3 (OS11 - Py 3.8) CASA 6.5.3 (OS11 - Py 3.6)
ALMA Pipeline (Notes)	CASA 6.4.1 (RH7/8)	
VLA Pipeline (Notes)	CASA 6.4.1 (RH7/8)	

 The above CASA versions can also be downloaded from our [NAOJ CASA mirror site](#) and [NAOJ CASA-pipeline mirror site](#), or via [Google Drive](#).

CASA 6: pip-wheel installation

CASA 6 can optionally be installed through modular pip-wheels, with the flexibility to build CASA tools and tasks into a customized Python environment. Instructions on how to install the pip-wheel version of CASA 6 can be found in CASA Docs: [CASA 6 Installation](#)

The modular pip-wheel version is not yet used in production by ALMA and VLA, and does not include any pipelines.

CASA Documentation

<https://casadocs.readthedocs.io/en/stable/>



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» Common Astronomy Software Applications

[Edit on GitHub](#)

Common Astronomy Software Applications

CASA, the *Common Astronomy Software Applications*, is the primary data processing software for the Atacama Large Millimeter/submillimeter Array (**ALMA**) and Karl G. Jansky Very Large Array (**VLA**), and is often used also for other radio telescopes.

6.4.0 Release

CASA 6.4.0 can now be ([downloaded](#)) for general use. CASA 6.4.0 is available either as a downloadable tar-file, or through pip-wheel installation, which gives flexibility to integrate CASA into a customized Python environment.

Highlights:

- OS Support: CASA now supports RedHat 8, and Mac OS with Python 3.8, for both monolithic and modular versions. Note the Linux tarballs with different Python versions will extract to the same directory name.
- plotcal/plotms: Functionality for plotcal has been migrated to plotms, and plotcal was deprecated.
- plotms: calibration table averaging with channel selection is now supported.
- fringeft: memory usage of fringeft has been reduced, allowing larger datasets to be processed.
- imhead: updated to display microsecond precision.
- caltables: the storage of frequency meta information in caltables improved, making certain frequency-dependent calibration solutions more accurate.
- sdintimaging: now adds information to the history of produced images
- T+dT timerange selection improved in accuracy.

Read the Docs

v: stable

CASA Installation & Compatibility

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Monolithic Distribution

On Linux:

1. Download the .tar file and place it in a work directory (e.g. ~/casa)
2. From a Linux terminal window, expand the file:

```
$ tar -xvf casa-xyz.tar.xz
```

3. Start CASA

```
$ ./casa-xyz/bin/casa
```

4. The one caveat is that CASA on Linux currently will not run if the Security-Enhanced Linux option of the linux operating system is set to enforcing. For the non-root install to work, SELinux must be set to disabled or permissive (in `/etc/selinux/config`) or you must run (as root):

```
setsebool -P allow_execheap=1
```

Otherwise, you will encounter errors like:

```
error while loading shared libraries: /opt/casa/casa-20.0.5653-001/lib/liblapack.so.3.1.1: cannot r
```

On Macintosh:

1. Download the .dmg disk image file
2. Double click on the disk image file (if your browser does not automatically open it).
3. Drag the CASA application to the *Applications* folder of your hard disk.
4. Eject the CASA disk image.
5. Double click the CASA application to run it for the first time. If the OS does not allow you to install apps from non-Apple sources, please Change the settings in "System Preferences-> Security & Privacy -> General" and "Allow applications downloaded from: Mac App store and identified developers".
6. Optional: Create symbolic links to the CASA version and its executables (Administrator privileges are

CASA Instal

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Read the Docs v: stable ▾

Full Monolithic Distribution

	Python 2.7	Python 3.6	Python 3.7	Python 3.8
RHEL 6	5.8	<=6.3		
RHEL 7	5.8	>=6.1		>=6.4
RHEL 8				>=6.4
Ubuntu 18.04		>=6.2		>=6.4
Ubuntu 20.04		>=6.2		>=6.4
Mac OS 10.14	5.8	>=6.1		<=6.3
Mac OS 10.15	5.8	>=6.1		>=6.3
Mac OS 11 x86		>=6.3		>=6.3
Mac OS 12 ARM*				>=6.4

Note

For plotts to work on Mac OS 12, [XQuartz](#) needs to be installed.

Modular CASA

	Python 2.7	Python 3.6	Python 3.7	Python 3.8
RHEL 6		<=6.3	6.2	6.2
RHEL 7		>=6.0	>=6.2	>=6.2
RHEL 8		>=6.0	>=6.4	>=6.4
Ubuntu 18.04		>=6.0	>=6.2	>=6.2
Ubuntu 20.04		>=6.0	>=6.2	>=6.2
Mac OS 10.14		>=6.1		<=6.3
Mac OS 10.15		>=6.1		>=6.3
Mac OS 11 x86		>=6.3		>=6.3
Mac OS 12 ARM				>=6.4

WARNING: The 6.2.1 module of casatools is not available for Python 3.7.

CASA highlights (VLA/VLBA)

CASA Release 6.5:

- Calibration: updated VLA flux calibration model images (C,X,Ka)
- Imaging: improved performance by 10-16%
- Simulations: now works with primary beams and a component list with spectral structure
- Many bug fixes (<https://casadocs.readthedocs.io/en/stable/notebooks/introduction.html#Highlights>)

VLBA Data Calibration in CASA

- VLBA CASA guide available! / [VLBA Scientific Memo #38](#)
- fringeft task now supporting uvrange parameter

CASA Next Generation Infrastructure (CNGI)

Next-generation CASA needed to meet growing demands of radio telescopes (ngVLA)

- Prototyping completed and made available as a demonstration package to the community: <https://cngi-prototype.readthedocs.io/en/stable/>

CASA resources

Primary resources (CASA team)

CASA Docs → official CASA documentation (<https://casadocs.readthedocs.io>)

CASA Website → official CASA website (<https://casa.nrao.edu>)

Primary resources (VLA/VLBA instrument teams)

CASA Guides → data reduction strategies (<https://casaguides.nrao.edu>)

NRAO Helpdesk → VLA/VLBA data reduction questions (<https://help.nrao.edu>)

Subscriptions and CASA Contact

Casa-announce → announcements, releases (<https://casa.nrao.edu>)

CASA Newsletter → 2x per year (<https://casa.nrao.edu>)

casa-feedback@nrao.edu → general feedback

CASA Manual Data Processing

→ CASAguides

<https://casaguides.nrao.edu/>

Welcome to CASA Guides



CASA (Common Astronomy Software Applications) is a comprehensive software package to calibrate, image, and analyze radio astronomical data from interferometers (such as ALMA and VLA) as well as single dish telescopes. This wiki provides tutorials for reducing data in CASA.

Homepage 	Newsletter 	CASA Docs 	Download
Helpdesk 	Subscribe 	Forum 	Tips

CASA Tutorials



Extracting Scripts from Tutorials

CASA Manual Data Processing

→ CASAguides

Any problems, questions,
suggestions:

Contact us on
<https://help.nrao.edu/>

If you are new to CASA, you may start with

[Getting Started in CASA](#)

VLA Data Reduction Tutorials [\[edit\]](#)

High frequency (36GHz), spectral line data reduction: Carbon Star IRC+10216 [\[edit\]](#)

- [IRC+10216 Tutorial](#) (CASA 6.2.0)
- This tutorial requires to download a dataset **1.1GB** in size

Calibrate and make image cubes of the line emission from this asymptotic giant branch star. This is a high-frequency VLA dataset. Includes:

- Inspecting data; basic flagging & calibration
- Subtracting continuum emission
- Imaging the spectral lines
- Imaging the continuum
- Image analysis
- Self-calibration

6cm Continuum Imaging, Mosaicking: Supernova Remnant 3C391 [\[edit\]](#)

- [3C391 Tutorial](#) (CASA 6.4.1)
- This tutorial requires to download a dataset **3.1GB** in size

Calibrate VLA continuum data, image a mosaic of the region in Stokes I. Includes:

- Inspecting data; basic flagging
- Calibration
- Image Analysis
- Self-calibration

Polarization Calibration based on CASA pipeline standard reduction: The radio galaxy 3C75 [\[edit\]](#)

- [Polarization Calibration based on CASA pipeline \(3C75\)](#) (CASA 6.4.1)
- This tutorial requires to download a dataset **10GB** in size

This tutorial demonstrates continuum calibration with the standard VLA pipeline and focuses on linear polarization calibration based on pipeline products, as well as full Stokes wide-field imaging and analysis. It includes:

- Instructions on how to execute the VLA pipeline
- How to modify pipeline products for polarization calibration
- Linear Polarization Calibration
- Wide-field Polarization Imaging
- Self-calibration
- Analysis of Polarization Products

P-band continuum imaging data reduction tutorial: 3C129 [\[edit\]](#)

- [3C129 P-band Tutorial](#) (CASA 6.4.1)

CASA Manual Data Processing

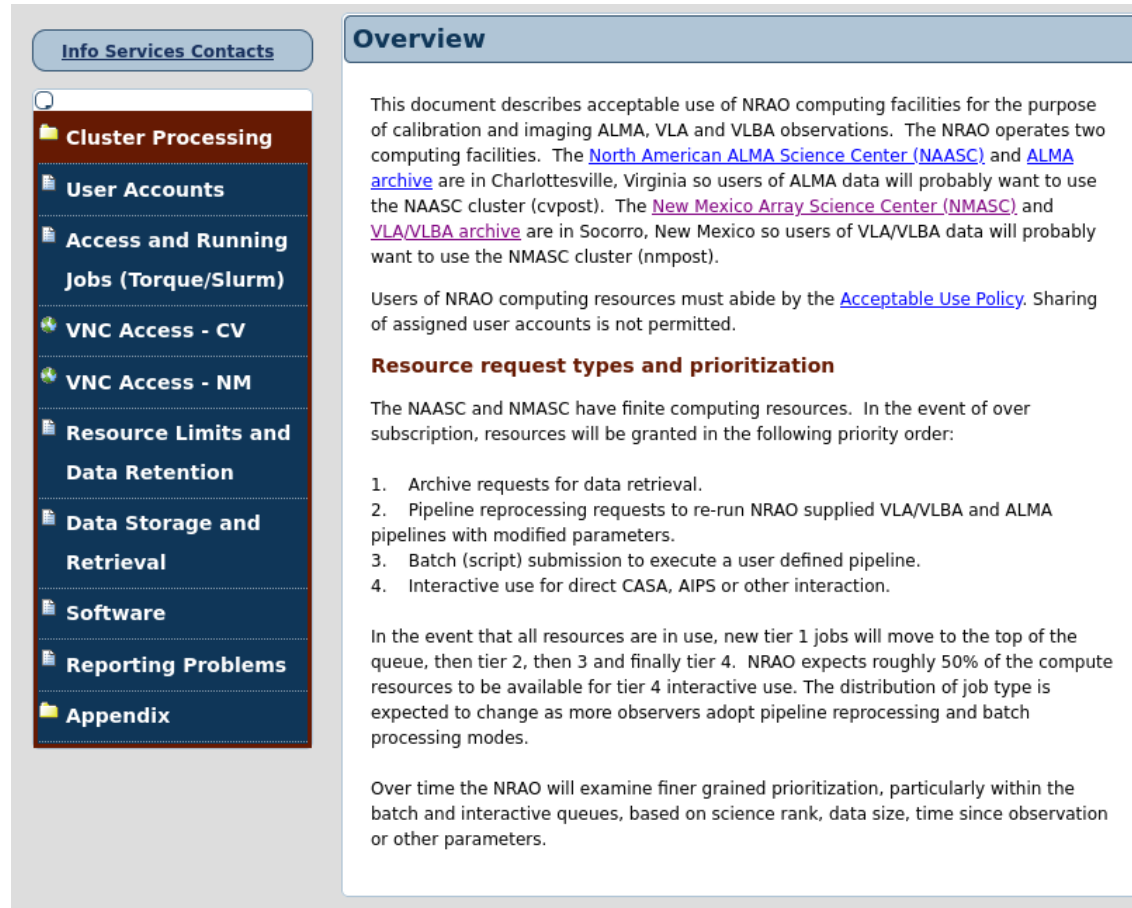
→ computing cluster

NRAO can provide temporary computing services to its users for the purpose of data processing:
→ VLA/VLBA projects on NM computing cluster
lustre

→ to request temporary account and access contact us via helpdesk

<https://help.nrao.edu/>

<https://info.nrao.edu/computing/guide/cluster-processing>



The screenshot shows a web page with a navigation menu on the left and an overview section on the right. The navigation menu includes: Info Services Contacts, Cluster Processing (highlighted), User Accounts, Access and Running Jobs (Torque/Slurm), VNC Access - CV, VNC Access - NM, Resource Limits and Data Retention, Data Storage and Retrieval, Software, Reporting Problems, and Appendix. The overview section contains text about acceptable use of NRAO computing facilities, a list of resource request types and prioritization, and information about resource availability and prioritization.

Overview

This document describes acceptable use of NRAO computing facilities for the purpose of calibration and imaging ALMA, VLA and VLBA observations. The NRAO operates two computing facilities. The [North American ALMA Science Center \(NAASC\)](#) and [ALMA archive](#) are in Charlottesville, Virginia so users of ALMA data will probably want to use the NAASC cluster (cvpost). The [New Mexico Array Science Center \(NMASC\)](#) and [VLA/VLBA archive](#) are in Socorro, New Mexico so users of VLA/VLBA data will probably want to use the NMASC cluster (nmpost).

Users of NRAO computing resources must abide by the [Acceptable Use Policy](#). Sharing of assigned user accounts is not permitted.

Resource request types and prioritization

The NAASC and NMASC have finite computing resources. In the event of over subscription, resources will be granted in the following priority order:

1. Archive requests for data retrieval.
2. Pipeline reprocessing requests to re-run NRAO supplied VLA/VLBA and ALMA pipelines with modified parameters.
3. Batch (script) submission to execute a user defined pipeline.
4. Interactive use for direct CASA, AIPS or other interaction.

In the event that all resources are in use, new tier 1 jobs will move to the top of the queue, then tier 2, then 3 and finally tier 4. NRAO expects roughly 50% of the compute resources to be available for tier 4 interactive use. The distribution of job type is expected to change as more observers adopt pipeline reprocessing and batch processing modes.

Over time the NRAO will examine finer grained prioritization, particularly within the batch and interactive queues, based on science rank, data size, time since observation or other parameters.



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