Introduction to CASA

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CASA website: download

Website: https://casa.nrao.edu

Releases:

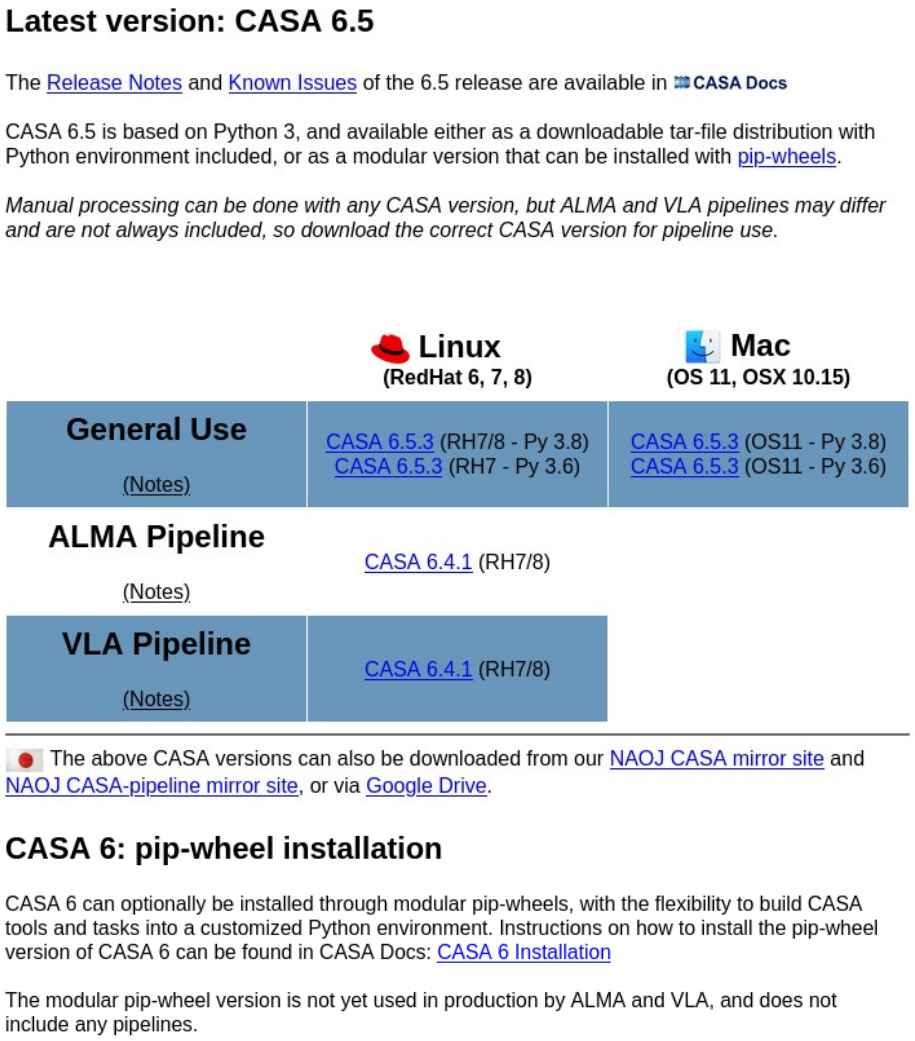
Every ~2 months

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/

Search docs

- Release Information
- Index
- API
- Task List
- Using CASA
- CASA Fundamentals
- External Data
- Calibration & Visibilities
- Imaging & Analysis
- CARTA
- Pipeline
- Simulations
- Parallel Processing
- Memo Series & Knowledgebase

Read the Docs v: stable

» 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.

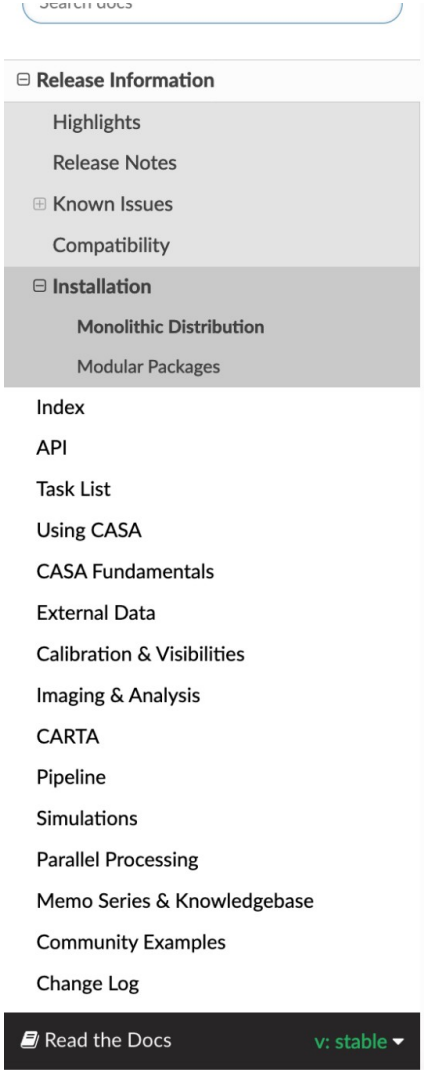
6.4.0 Release

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: Funtionality for plotcal has been migrated to plotms, and plotcal was deprecated.
- plotms: calibration table averaging with channel selection is now supported.
- fringefit: memory usage of fringefit 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.

CASA Installation & Compatibility



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
```

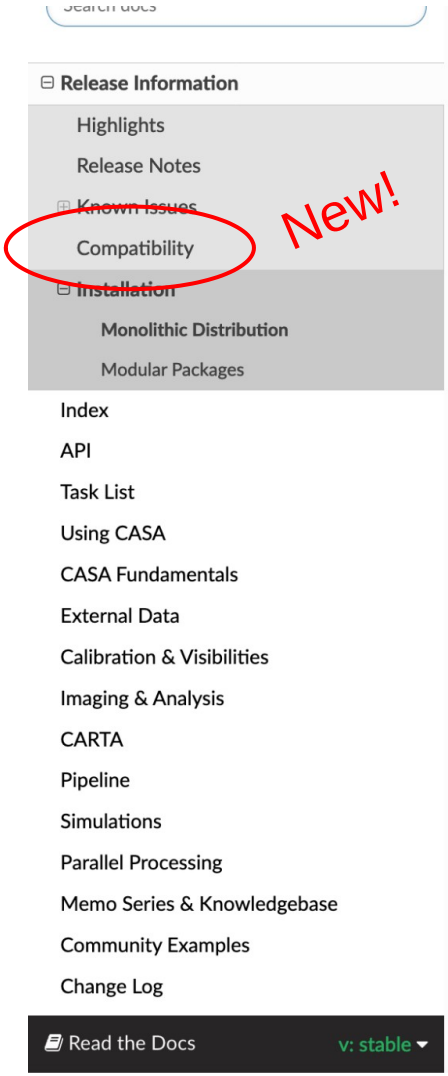
Otherwise, you will encounter errors like:

```
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



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 plotms 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*
– fringefit 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

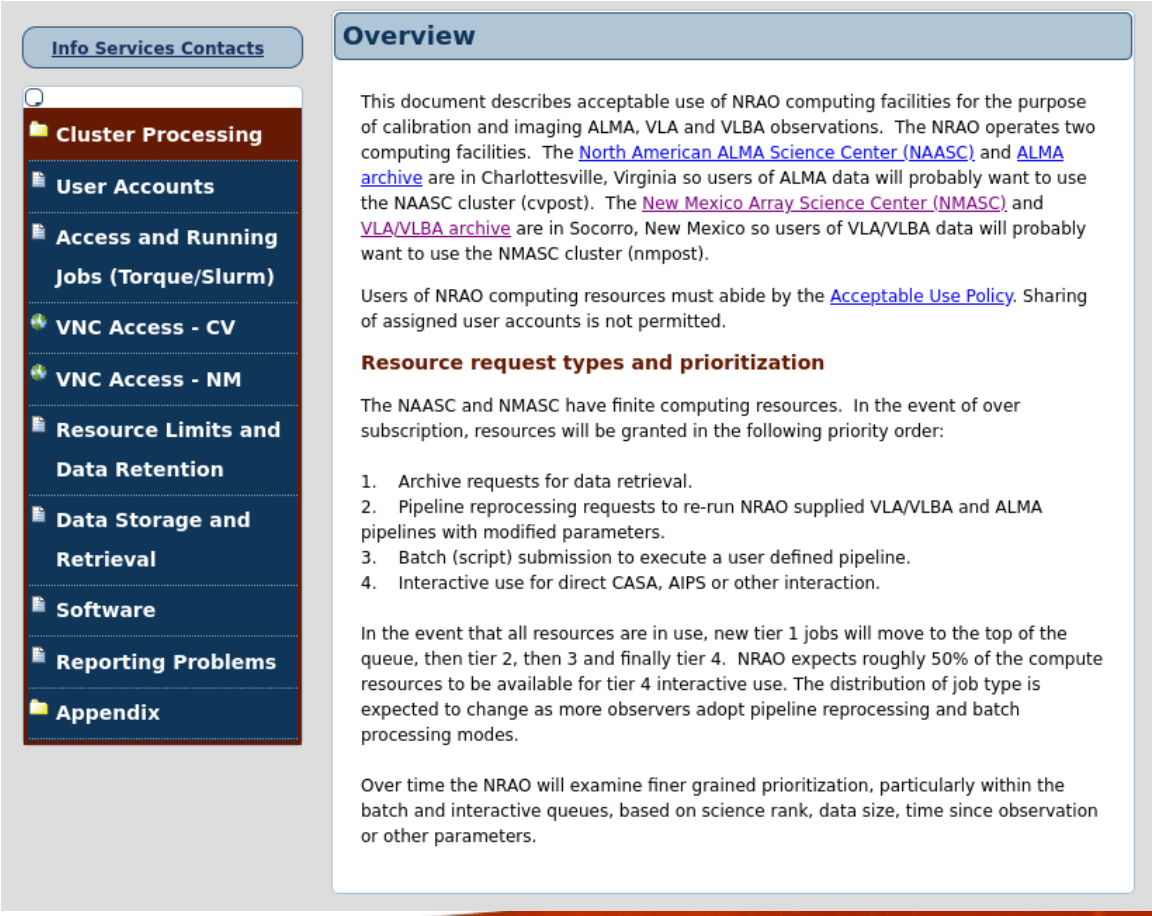
NRAO can provide temporary computing services to its users for the purpose of data processing:

→ 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



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