



[\(https://public.nrao.edu/news/2020-image-contest-winners/\)](https://public.nrao.edu/news/2020-image-contest-winners/)

Upcoming Events



36th Annual New Mexico Symposium (<http://www.aoc.nrao.edu/events/nmsymposium/2020/>)

Nov 13, 2020 | Virtual



Jansky Lecture: Prof. Martha P. Haynes (https://nrao-edu.zoom.us/webinar/register/WN_wbyYw192R5-xkN8JOTyIAG)

Nov 13, 2020 | Virtual



Jansky Lecture: Prof. Martha P. Haynes (https://nrao-edu.zoom.us/webinar/register/WN_ZMSCx5zvQya8f31Cc1PeUA)

Nov 17, 2020 | Virtual



NRAO Town Hall (<https://science.nrao.edu/science/meetings/2021/aas237/nrao-town-hall>)

Jan 13, 2021 | Virtual AAS Meeting

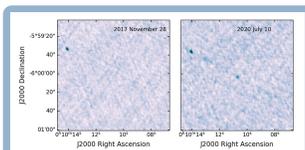


New Views of Galaxy Formation and Evolution
(<https://science.nrao.edu/science/meetings/2021/aas237/new-views>)

Jan 14, 2021 | Virtual AAS Meeting

VLASS Update

Mark Lacy



The transient associated with SN2019xhb is detected in VLASS 2.1 (right) but not in VLASS 1.1 (left).

Transient sources in the second epoch

The Very Large Array Sky Survey (VLASS) started to observe its second epoch in June 2020, and comparisons with Epoch 1 data taken ~ 32 months earlier are already finding transient sources in the first 1000 square degrees released. Hallinan et al. (2020, ATel 14020) announced the discovery of a 1.4 mJy radio source associated with SN2019xhb that appears in VLASS 2.1 data taken in July 2020, but was not present in the VLASS 1.1 data taken in November 2017.

VLASS data products & services from CIRADA

The Canadian Initiative for Radio Astronomy Data Analysis (CIRADA) is working with the VLASS project to provide enhanced data products and services for VLASS. CIRADA is currently offering an image cutout service and source catalogs based on VLASS Quick Look images.

The image cutout service is [accessed online \(http://cutouts.cirada.ca/\)](http://cutouts.cirada.ca/). It offers cutouts of all available VLASS data (epoch 1 and 2, where available), as well as other surveys in the radio, infrared, and optical. Besides

individual cutouts, it also allows batch submission of up to 100 cutout requests.

The CIRADA VLASS Quick Look catalog (Gordon et al. 2020, RNAAS, 4, 10) contains ~1.7M unique and reliable components, and >600k host identifications, and is [available online \(https://cirada.ca/catalogues\)](https://cirada.ca/catalogues). The catalogue, described in full in a catalogue User Guide—also available on the catalogue web page—is structured in three joinable tables:

- A Component Table (N_rows ~3.4M), providing measurements and additional quality metrics on the radio components detected in the quick look images;
- Host ID Table (N_rows ~700k), unWISE host identifications for bright and isolated radio sources (groupings of one or more radio components representing a single object) with relatively simple morphology - either a single component or double/triple sources smaller than 10 arcsec;
- Subtile Information Table (N_rows ~35k) that provides metadata and statistics for the individual quick look images.

Users should read the User Guide in full before using this data. At a minimum, be aware that the catalogue contains bad data as well as good, and we recommend only using data from the Component Table with `Quality_flag == 0` and `Duplicate_flag < 2`, and from the Host ID table with `P_Host > 0.8` and `Source_reliability_flag == 0` for most cases.

ngVLA Project News

Eric Murphy



Alert: Funded Community Studies

Building on the past success of the [ngVLA Community Studies Program \(https://ngvla.nrao.edu/page/commstudiesprogram\)](https://ngvla.nrao.edu/page/commstudiesprogram), the Project anticipates seeking and financially supporting a small number new studies for 2021.

Details regarding focus areas and the application process will be announced in the coming weeks. In the meantime, we urge the community to begin thinking about potential study topics.

New Views of Galaxy Formation and Evolution

The NRAO and the [ngVLA Project \(https://ngvla.nrao.edu/\)](https://ngvla.nrao.edu/) will convene a virtual Special Session titled [New Views of Galaxy Formation and Evolution \(https://science.nrao.edu/science/meetings/2021/aas237/new-views\)](https://science.nrao.edu/science/meetings/2021/aas237/new-views) on 14 January 2021 at the American Astronomical Society (AAS) meeting.

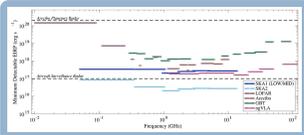
Sensitive ground- and space-based astronomical facilities are pushing the detection of galaxies well into the Epoch of Reionization, less than 1 Gyr after the Big Bang. Such detections are allowing us to begin piecing together a picture for how and when the first galaxies formed, along with the physical processes driving their evolution into the mature systems that we observe in the local Universe. This AAS Special Session will highlight recent scientific breakthroughs enabled by current investigations using large optical/IR, (sub-)millimeter, and radio facilities; describe planned near- and long-term improvements for ground- and space-based facilities; discuss major scientific leaps likely to result from next-generation facilities across the electromagnetic spectrum; and review the highest-priority goals that will be accomplished by the state-of-the-art observatories commissioned in the next decade.

This virtual AAS event will feature a session of invited oral presentations and an associated iPoster session with contributed presentations. Confirmed speakers include: Mark Dickinson (NOIRLab), Linda Tacconi (Max

Planck Institute for Extraterrestrial Physics), Justin Spilker (University of Texas), Xiaohui Fan (University of Arizona), Chris Willott (Herzberg Astrophysics), and Rachel Sommerville (Flatiron Institute). We anticipate that the iPoster session will draw 20+ contributions

Technosignature Searches with the ngVLA

Cherry Ng (Univ Toronto, SETI Institute, UC Berkeley), Andrew Siemion & Steve Croft (SETI Institute, UC Berkeley), Jill Tarter (SETI Institute)



Sensitivity of the ngVLA to narrow-band transmitters at 15 pc, as compared with other facilities actively performing SETI searches over the same band (Croft et al. 2018).

The next generation of radio telescopes will open a new window on the radio sky, providing the best chance to search for extraterrestrial intelligence (SETI) and test the hypothesis of whether extraterrestrial civilizations emit detectable signals from communication, propulsion, or other technologies.

Among these upcoming facilities, the ngVLA is particularly relevant for SETI experiments. The ngVLA offers unparalleled sensitivity in the 10 –100 GHz range (see figure), a region of the spectrum used by many human technologies and hence,

by extension, possibly other civilizations. The high time resolution of the ngVLA means we can detect the motion of a putative transmitter on a planet or spacecraft out to about 100 pc (Croft et al. 2018 (<https://ui.adsabs.harvard.edu/abs/2018ASPC..517..257C/abstract>)). In the event of a positive technosignature or biosignature detection, the ngVLA will provide critical capabilities for follow-up observations. Also, the ability to conduct commensal observations on the ngVLA will enable SETI searches on millions of stars as well as more distant targets such as galaxies, placing meaningful limits on the prevalence of technological civilization in the Universe.

A pathfinder study (<https://public.nrao.edu/news/nrao-seti-institute-new-research/>) has recently begun on the VLA, thanks to a new Agreement signed between the NRAO and the SETI Institute. A new ethernet interface will be deployed on the VLA that will allow multiple subscribed observers to access raw data from each VLA antenna at the same time, performing parallel analyses (Hickish et al. 2019 (<https://ui.adsabs.harvard.edu/abs/2019BAAS...51g.269H/abstract>)). This system, dubbed the Commensal Open Source Multimode Interferometer Cluster (COSMIC), will allow us to conduct a powerful, wide-area SETI survey that will be vastly more complete than any previous such search, while paving the way for a scaled-up operation when the ngVLA comes online.

This article continues a regular feature intended to highlight contributions to the [ngVLA Science Book](https://ngvla.nrao.edu/page/scibook) (<https://ngvla.nrao.edu/page/scibook>). We are especially interested in showcasing work done by early-career researchers. Anyone wishing to volunteer to author a feature should contact [Joan Wrobel](mailto:jwrobel@nrao.edu?subject=ngVLA%20science%20in%20eNews) (<mailto:jwrobel@nrao.edu?subject=ngVLA%20science%20in%20eNews>).

ALMA Program News

Al Wootten



ALMA operations crew in front of the newly-restarted generator at the Operations Support Facility in northern

With the improving pandemic situation in Chile, ALMA is now scheduled to begin the long process of recovering the telescope array in the Atacama on 1 October 2020, starting with preparation of the ALMA Operations Support Facility (OSF) at 2900 metres for the return of staff and contractors. In Chile, the Joint ALMA Observatory (JAO) has begun work in the Santiago offices, and a small team at the ALMA Operations Support Facility has reopened the Residencia for the gradual return of staff and contractors, restoring turbine power to the facility. Subsequently, the Return to Operations (RTO) Review Panel met 14 October, to review whether

Chile, after 199 days without power but now back to producing ~600 MW.

the observatory is ready to move to the OSF Ramp-Up phase of the RTO, during which JAO staff and contractors return to living at the OSF. The panel considered the state of evolution of the contagion within Chile, the progress in the current Extended Caretaker phase in preparing the OSF for the next stage, and the technical and virus risk management procedures. The plans and conditions were found appropriate for a move to the next phase of the RTO, and the ALMA Director accepted their recommendation to start the OSF Ramp-up on 21 October. ALMA is on the path back to full science.

UMass Amherst Astronomy Opens Elite Telescope to U.S. Institutions

Astronomers at the University of Massachusetts Amherst are marking an especially meaningful event this National Astronomy Week, as a team led by Professor Peter Schloerb recently received a three-year, \$5 million grant from the National Science Foundation to provide support for the Large Millimeter Telescope in Mexico and to offer – for the first time – access to it for astronomers from any U.S. institution. [More information is available online \(https://www.umass.edu/newsoffice/article/umass-amherst-astronomy-opens-elite\)](https://www.umass.edu/newsoffice/article/umass-amherst-astronomy-opens-elite).

Release of Full Polarization ALMA Test Data

On 1 October, ALMA released data acquired as part of the Extension and Optimization of Capabilities effort (EOC). The data were used to test, implement, and determine the accuracy of the linear-polarization mosaicking observing mode of ALMA. For additional information please see the ALMA portal.

Additional Representative Images for Legacy (ARI-L) ALMA development project

The first 60,000 data cubes and continuum images generated by the Additional Representative Images for Legacy (ARI-L) ALMA development project are now available to download from the ALMA Science Archive (ASA). In addition to the primary-beam-corrected images, the released products also include the primary beams, and mask for all targets and calibrators of more than 1200 Cycle 3 and 4 datasets. The ARI-L project is a European ALMA Development project, which officially started in June 2019. Recently, the ARI-L project successfully completed its first year review, with the reported activities well ahead of schedule. Please see additional information on the ALMA portal.

ALMA Ambassadors

[Applications for the 2021 ALMA Ambassadors program \(https://science.nrao.edu/facilities/alma/ambassadors-program\)](https://science.nrao.edu/facilities/alma/ambassadors-program) are now open. Please send a completed application form and a CV to naascrec@nrao.edu (<mailto:naascrec@nrao.edu>) no later than 23 October 2020, 5 p.m. Eastern Time.

Redesigning the ALMA User Experience

Would you like to join a focus group to help redesign the ALMA User Experience? If so, please [submit your information \(https://docs.google.com/forms/d/e/1FAIpQLSduAcrbUpodPOMtoAEOvTbGgeBmtmMuF_Vz50evVwdbGOXXEw/viewform\)](https://docs.google.com/forms/d/e/1FAIpQLSduAcrbUpodPOMtoAEOvTbGgeBmtmMuF_Vz50evVwdbGOXXEw/viewform) to have the opportunity to provide your feedback on ALMA data, services, tools, and user support. For more information, please contact [George Privon \(mailto:gprivon@nrao.edu?subject=Redesigning%20the%20ALMA%20User%20Experience\)](mailto:gprivon@nrao.edu).

Changes in the way NASA Data Files are Obtained

Claire Chandler

Our correlators, AIPS, and CASA depend on NASA's Crustal Dynamics Data Information System (CDDIS) for data files providing Earth Orientation Parameters (EOP) and also total electron content of the ionosphere (TEC). But changes are coming in the way these data can be accessed, which may result in users of AIPS and

CASA to experience error messages or other failures with the old or current release versions of those packages, effective 31 October 2020.

AIPS

AIPS has changed VLAPROCS and VLBAUTIL in both the 31DEC20 and 31DEC19 versions, as well as a number of help files, to support the new access methods, so users should just have to ensure their installations are up to date. For completeness, we also provide a description of the changes here. For the EOP file, an example of the new command to use (all on one line!) is:

```
curl -u anonymous:<your-email-address> --ftp-ssl  
ftp://gdc.cddis.eosdis.nasa.gov/vlbi/gsf/ancillary/solve_apriori/usno_finals.erp  
> /tmp/usno_finals.erp
```

For the TEC file, again on one line, an example new command is:

```
curl -u anonymous:<your-email-address> --ftp-ssl  
ftp://gdc.cddis.eosdis.nasa.gov/gps/products/ionex/YYYY/DDD/jplgDDD0.YYi.Z >  
/tmp/jplgDDD0.YYi.Z
```

where YYYY is the year (e.g., 2015), YY is the last 2 digits of the year (e.g., 15), and DDD is the day number within the year.

Experienced users may note that the lower levels of the paths to these files have not changed. The upper level name and the -u and --ftp-ssl are the necessary changes.

CASA

CASA users normally retrieve and process TEC files using a helper python script (tec_maps.py) that is distributed with the package and described in the CASA documentation. At the end of October this script will start failing for CASA versions 5.7 and earlier, unless the TEC file is already in the local working directory. Users should download the TEC file manually, using a command similar to that given above for AIPS, before running tec_maps.py. CASA 5.8/6.2 will have the retrieval commands fixed in tec_maps.py when those are released later this year.

Please note that CASA 6.1 did not include the tec_maps.py helper script; users wishing to do TEC corrections should use CASA 5.7 or earlier, or wait until CASA 5.8/6.2 is released. More information on manual TEC retrieval can be found in [CASA News Issue 10 \(October 2020 \(https://science.nrao.edu/enews/casa_010\)\)](https://science.nrao.edu/enews/casa_010). Finally, note that CASA distributes EOP and other general geodetic and ephemeris information via its data repository, and CASA users are not affected by CDDIS retrieval changes for EOP files.

Further details regarding the CDDIS change may be [found online \(https://cddis.nasa.gov/Data_and_Derived_Products/CDDIS_Archive_Access.html\)](https://cddis.nasa.gov/Data_and_Derived_Products/CDDIS_Archive_Access.html).

Robert L. Brown Outstanding Doctoral Dissertation Award

NRAO is accepting applications for the 2020 Robert L. Brown Outstanding Doctoral Dissertation Award which is administered by Associated Universities, Inc. (AUI) and the NRAO on behalf of Bob Brown's friends and family to honor Bob's life and career. The Award is given each year to a recent recipient of a doctoral degree



from any recognized degree granting institution in the United States, and is substantially based on new observational data obtained at any AUI operated facility and considered to be of an exceptionally high scientific standard.

Award: The Award is available to degree recipients of any nationality and consists of \$1000, a framed certificate, and an invitation to give a colloquium at the NRAO.

Application Guidelines: To be eligible, the applicant must have successfully defended the thesis during the calendar year of the Award.

The deadline for receipt of applications and supporting materials for the 2020 Award is December 31, 2020: Applicants should send an e-mail describing their dissertation, the date of their successful thesis defense, the date of the degree award, and the name and contact information of the primary thesis supervisor to [RLBrownAward@nrao.edu \(mailto:RLBrownAward@nrao.edu\)](mailto:RLBrownAward@nrao.edu). A copy of the thesis as a pdf file should be sent by e-mail to the same address or made available via a link given in the email. Published papers or papers in press, or portions thereof, based substantially on the dissertation should accompany the application. Verification of the successful thesis defense and statement that the applicant has successfully completed all university requirements for the Ph.D. should be sent directly by the appropriate university authority to [RLBrownAward@nrao.edu \(mailto:RLBrownAward@nrao.edu\)](mailto:RLBrownAward@nrao.edu).

Selection: The winning applicant will be selected by a committee appointed by the NRAO Director. If, in the opinion of the committee, in any given year none of the theses are sufficiently meritorious, the award will not be given in that year.

All questions should be addressed to [RLBrownAward@nrao.edu \(mailto:RLBrownAward@nrao.edu\)](mailto:RLBrownAward@nrao.edu).

Recent Media Releases



[ALMA Shows Volcanic Impact on Io's Atmosphere \(https://public.nrao.edu/news/alma-shows-volcanic-impact-on-ios-atmosphere/\)](https://public.nrao.edu/news/alma-shows-volcanic-impact-on-ios-atmosphere/)

21 October 2020



[Featured Video: The Very Large Array at 40 \(https://public.nrao.edu/news/videovla40/\)](https://public.nrao.edu/news/videovla40/)

7 October 2020



[NRAO Contest Winners Illustrate Diverse Cosmic Phenomena \(https://public.nrao.edu/news/2020-image-contest-winners/\)](https://public.nrao.edu/news/2020-image-contest-winners/)

6 October 2020



[VLA Marks 40 Years at the Frontier of Science \(https://public.nrao.edu/news/vla-marks-40-years/\)](https://public.nrao.edu/news/vla-marks-40-years/)

5 October 2020

From the Archives

Ellen Bouton

About this month's photo: Fifty years ago, using NRAO's 36-foot telescope on Kitt Peak, Arizona, R. W. Wilson, K. B. Jefferts, and A. A. Penzias discovered carbon monoxide (CO) in space. CO gas tends to be found in cold, dense, interstellar clouds, so its discovery meant astronomers could study these clouds in a new way



and see clouds of gas and dust throughout our Galaxy. And now ALMA observes light from CO gas to identify clumps within the planet-forming disks around young stars and within star formation regions in galaxies at the boundary of the known Universe.

In this photo, taken at the Rohr Corporation during the fabrication of the 36-foot, the milling machine is cutting the backup structure. The same machine was then used to mill the surface, with the hope that an RMS accuracy of 0.002 inch would be achieved.

It was not, and the telescope achieved almost *none* of its original design goals. Nevertheless, the instrument was unique and its staff ingenious in overcoming its shortcomings. With the discovery by Wilson, Jefferts, and Penzias, NRAO's 36-foot telescope became one of the most sought-after telescopes in the US, and helped open the whole new field of molecular astronomy.

From the Archives is an ongoing series illustrating NRAO and U.S. radio astronomy history via images selected from our collections of individuals' and institutional papers. If readers have images they believe would be of interest to the Archives, please contact [Ellen Bouton \(mailto:archivist@nrao.edu\)](mailto:archivist@nrao.edu).



The National Radio Astronomy Observatory is a facility of the National Science Foundation operated under cooperative agreement by Associated Universities, Inc.