A I P S L E T T E R

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A newsletter for users of the NRAO
Astronomical Image Processing System

Written by a cast of *AIPS*

Edited by
Eric W. Greisen
National Radio Astronomy Observatory
P.O. Box O, Socorro, NM 87801–0387
575–835–7236; Fax 575–835–7027
`daip@nrao.edu`
`http://www.aips.nrao.edu/`

General developments in *AIPS*

AIPSLetter publication

We have discontinued paper copies of the *AIPSLetter* entirely, at least for this issue. The *AIPSLetter* will be available in PostScript and pdf formats as always from the web site listed above. New issues will be announced in the NRAO eNews mailing and on the `bananas` and `mnj` list servers.

Current and future releases

AIPS is now copyright © 1995 through 2023 by Associated Universities, Inc., NRAO's parent corporation, but may be made freely available under the terms of the Free Software Foundation's General Public License (GPL). This means that User Agreements are no longer required, that *AIPS* may be obtained via anonymous ftp without contacting NRAO, and that the software may be redistributed (and/or modified), under certain conditions. The full text of the GPL can be found in the `15JUL95` *AIPSLetter* and is included with every distribution in file `$AIPS_ROOT/`*release-name*`/COPYING`.

We have formal *AIPS* releases on an annual basis. We recommend a full binary installation method for both the frozen and development versions for MacIntosh OS/X (Intel *and* ARM chips), and Linux (32- and 64-bit) systems, but all architectures can do a full installation from the source files. There are no longer binary versions available for Solaris and Mac PPC chip architectures. If you develop *AIPS* code locally *or have system managers that forbid the use of* `rsync`, you will need to do a source-level installation. The current release is called `31DEC23` and is now "frozen." If you took a development copy of this version at some earlier date, you should use the "Midnight Job" (MNJ) to bring it up to date. You need to run a MNJ only once in 2024 to convert your copy of `31DEC23` into the frozen version. However, when patches to `31DEC23` are announced in 2024, you may apply them with the MNJ. This *AIPSLetter* is intended to advise you of corrections and improvements in this release.

We have begun a new version, called `31DEC24`, which is now under development by the *AIPS* Group. You may fetch and install a complete copy of this version at any time. Having fetched `31DEC24`, you may update your installation whenever you want by running the MNJ. This uses `rsync` to copy all changed text files and then to copy the binary files or to compile the code selectively based on the code changes and compilations we have done. We expect users to take their source-only or binary version of `31DEC24` *AIPS* over the Internet (via *anonymous* ftp). Both versions require you to copy the installation procedure `install.pl` via `ftp`; the source-only version also requires you to ftp the 183-Mbyte `31DEC24.tar.gz` compressed tar file.

If compiling locally, new releases must be installed from the tar ball for that release. `31DEC15`, and now `31DEC22` and later versions contain improvements to the code which should make local compilation more reliable. If using the binary installation, a full new installation must also be done with `rsync`. When installing a new *AIPS* release in a system that already has a previous release, we recommend that `install.pl` be used and that the previous release be left in place, at least until the new installation has been verified. If you do this, then you will not have to re-edit the disk, printer, and tape lists and can simply skip all those pages in the `install.pl` menus. The old `$HOME/.AIPSRC` file may be left in place, but it will need to be edited. The lines giving the `DOWNLOADED` and `UNPACKED` parameters should be cleared and the `CCOMOPT` line should be changed to point to the current release rather than the previous one. If you have made a special version of `do_daily.`*host*, you should preserve it under a new name and restore it after the install. If you have an odd set of *AIPS* versions, the `$AIPS_ROOT/AIPSPATH.*SH` files may need to be edited after the install to set the desired versions. The file `$SYSLOCAL/UPDCONFIG` also needs to be edited to correct your e-mail address(es). A new installation will not change your current *AIPS* data files.

`31DEC09` contains a change in the format of antenna files. Previous releases will not understand the antenna coordinates for arrays that were traditionally left-handed (VLBI primarily). The format change occurs automatically when any `31DEC09` or later antenna-file specific code reads the file, after which older releases will have difficulties. `31DEC15` contains a change in the headers of *uv* data sets which will not be understood by previous versions. `31DEC20` contains a change to the `XAS` TV server which will cause problems with older versions. Note that the only version which we will patch for major errors is `31DEC23`; even `31DEC22` will no longer be changed. **Note that `31DEC22` did get a patch on 27 November 2023 however.**

Improvements of interest to users in `31DEC23`

In the latter half of 2023, three new tasks and one new verb appeared. The tasks are `HOLIS` to list the contents of a holography data set, `HOCLN` to apply a complex Clean to a holography image, and `CLNUP` to list and/or delete old "hidden" files left in a user's data areas. The new verb is `TUGET` to do a `TGET` but from a different user number. In the first six months of the year, there were nine new tasks in `31DEC23`. These are `LISUN` which does a `LISTR OPTYPE 'SCAN'` listing with the addition of the angle from each scan to the Sun, `SNRMS` which does statistics on selected columns in tables, `BLPCL` which divides pre-computed full polarization models into *uv* data to determine a baseline-based full polarization calibration, `AVGWT` which computes the average and rms weights of selected *uv* data, `SYFIX` which corrects source numbers in the `SY` table to match the *uv* data, `BPPLT` which plots bandpass data as a function of time, `TEPLT` which plots the output table from `TECOR`, `MFIMG` which makes images of *AIPS*' magnetic field models and of TEC data downloaded for use with `TECOR`, and `AMKAT` which changes antenna numbers in MeerKAT data files to match the station numbers. A new procedure, `BLPOLCAL` implements a baseline-based calibration for polarization data. Numerous bug fixes and minor improvements have also been made. Tests have confirmed that *AIPS* works fine on computers with Apple's new M2 version of the ARM chip using binaries computed on our M1 Mac mini. The performance is similar to the M1 chip, but that is very good.

Normally, bugs which appear in an *AIPS* `TST` version and then are fixed in that same version before its release get little or no discussion in the *AIPSLetter*. Since a rather large number of sites now install the `TST` version of *AIPS* during its development, not describing temporary bugs in `TST` is somewhat of an oversight. We urge you to run the "Midnight Job" at least once after `31DEC23` is frozen to bring it up to date and to fix all bugs of this sort. We urge active sites to use the MNJ and, when something odd occurs, to examine `CHANGE.DOC` using the cgi tool available from the *AIPS* documentation web page (`http://www.aips.nrao.edu/aipsdoc.html`). Please do not hesitate to contact us via the NRAO help desk (`https://help.nrao.edu`) or via e-mail `daip@nrao.edu` with any questions or suspicions that there are problems.

System matters and Midnight Job

Two of the computers that we use to prepare binaries are getting rather old and, if they die, cannot be replaced. The one that computes 32-bit "`LINUX`" binaries is so old that it runs RedHat 5! The other computes "`MACINT`" binaries and could not be updated past version 12 of the operating system. People using these older *AIPS* architectures should consider updating their equipment.

We have had to update the operating systems on two of the other computers which prepare binaries for *AIPS*. The Mac ARM machine was upgraded to version 13 (now 13.6) which required a new version of gfortran (12.2). The minimum system we can support is now 12. For the `LNX64` architecture, we have changed the computer on which the binaries are prepared to remain on RedHat 7. This is, of course, a temporary solution.

The latter update made it clear that our dependence of `cvs` is problematical. Therefore, the Midnight Job (MNJ) procedures were changed so that only the computers in this building use `cvs`. The MNJ for binary installations already used only `rsync`, so we changed the MNJ for source-code installations to use only `rsync` as well. The new script `UPDPSYNC` now does the `rsync` for all text files, but leaves the compilations and link edits to `UPDCOMRPL` and `UPDCOMLNK` as before. The MNJ was seen to have difficulties with this transition from `cvs` to `rsync`. If your site encounters this issue, consider copying the files `AIPSUPD`, `UPDPSYNC`, `UPDCONFIG`, and `UPDERROR` from `www.aips.nrao.edu/31DEC23` to your `$UPDATE` directory.

Holography

Two new holography related tasks were written. `HOLIS` is a form of scan listing to detail the contents of both pointed and on-the-fly holography data sets. It provides essential information about the way the data were observed and can find issues if there are errors. `HOCLN` is a complex Clean that attempts to deconvolve the illumination image of the antenna from the point-spread function. Since holography is usually critically sampled, this operation does not seem to improve the images significantly. An option was added to `PANEL` to allow the edges of each panel to be omitted from the functional fit used to determine the corrections to be applied. This permits edge effects from adjacent panels to be ignored which may be significant because of the usual limited spatial resolution.

UV data

NASA has changed the naming convention for TEC files on their `cddis` data site. Files taken after day 219 this year (August 7,2023) have the new names, older files have the previous names. `VLBAUTIL` and `VLAPROCS` have been changed to test the dates and use the new, rather longer names when appropriate. Note that the new files are gzipped, the old files are compressed.

When `DOPOL` is applied to linear polarization, all 4 input correlations are used to compute all 4 output correlations. Subroutine `DVHROT` does this but it did not check for flagging. Fixed this to flag all 4 if any 1 input correlation is flagged. This a bug that affected `31DEC23` beginning February 22, 2023 until December 7. 2023. The code in `31DEC22` was different and handled this issue correctly.

MORIF had problems with integer and character IF-dependent columns when reducing the numbers of IFs.

RLDIF and `VHDIF` were corrected to test for no data found. The history files were significantly improved.

SWPOL was changed to swap polarizations in many more table types, when possible.

IANTB was changed to write times with day numbers and to add more digits to frequencies and Tsys values.

e-Merlin antennas were added to those known by *AIPS*.

UV2MS was generalized to handle more forms of input random parameters.

SOUSP was changed to use `SRCNAME` rather than `SOURCES` and to plot the results in a better place.

SPIXR was corrected to handle error codes from the primary beam correction properly rather than taking them as serious.

VPLOT was changed to set the default ECHAN to the maximum when channels are averaged and to BCHAN when they are not.

UVRMS was changed to compute the answers even when plotting is stopped and to return them in the usual adverbs (PIXAVG, PIXSTD).

CLIP lost the values of DOCAL, DOBAND, and DOPOL whenever no data were found for one of the sources. All sources thereafter in the list had no calibration applied.

Imaging and Display

Modern computer displays can be quite large and have a great many pixels. The *AIPS* TV display (XAS) has only one font which is 7 by 9 pixels. It can however multiply this up by integer amounts. The AIPS verb CHARMULT allows the user to set this value. XAS sets the default multiplier to values greater than one for large screens when it starts. It now tells the user what it has done. Numerous editing tasks have been changed so that, if the characters are larger than 7x9 at the beginning or the XAS default is greater than 1, a CHAR MULT option is added to the interactive menus. The subroutine which displays the menus was changed to defend itself from character sizes that are too large for the screen. Tasks that were changed are SPFLG, TVFLG, FTFLG, PCFLG, BPEDT, PCEDT, PDEDT, IMAGR, SCIMG, SCMAP, EDITA, EDITR, and SNEDT.

PRTAB was corrected to handle selection of character-valued columns correctly. Previously it did not set the sizes to use in the display properly.

DISKU was changed to have the option to display all disks except those specified in BADDISK.

TADIF was changed to manage differences in keywords without quitting.

UVPLT was given the option to omit cross-correlation data when APARM(10)>0.

WIPER was given the option to omit cross-correlation data when BPARM(10)≥ 100.

General

TUGET is a new pseudo-verb that gets the last adverbs used for a task by a specified user number. Since people now use multiple user numbers this will allow transferring parameters between them.

CLNUP is a new task to show users "hidden" files that often get left primarily in *AIPS* data disk 1. This includes readline, message, SAVE/GET, and TPUT/TGET files. CLNUP will display and/or delete such files if they are old enough. It can also display other old files but will not delete them.

AIPS itself was changed to write readline files on RESTART operations as well as on EXIT and to read the readline history of the new user number. Previously, RESTARTs caused a mixing of multiple user number's history.

Task communication was changed to defend itself from Parseltongue, making sure the VERNAM parameter is properly initialized. Plot files now require this.

Patch Distribution for 31DEC22

Normally, this section lists the patches that have been released for 31DEC22. This was based on the assumption that users would want to download individual files to compile them locally. However, the "Midnight Job" ($HOME/do_daily.*hostname*) will do this for you on both locally-compiled and binary installations. Therefore there is no reason to continue the old procedure. Major bug corrections were moved to 31DEC22 as they occur and users should use the MNJ on occasion on both the NEW and TST versions of *AIPS*.

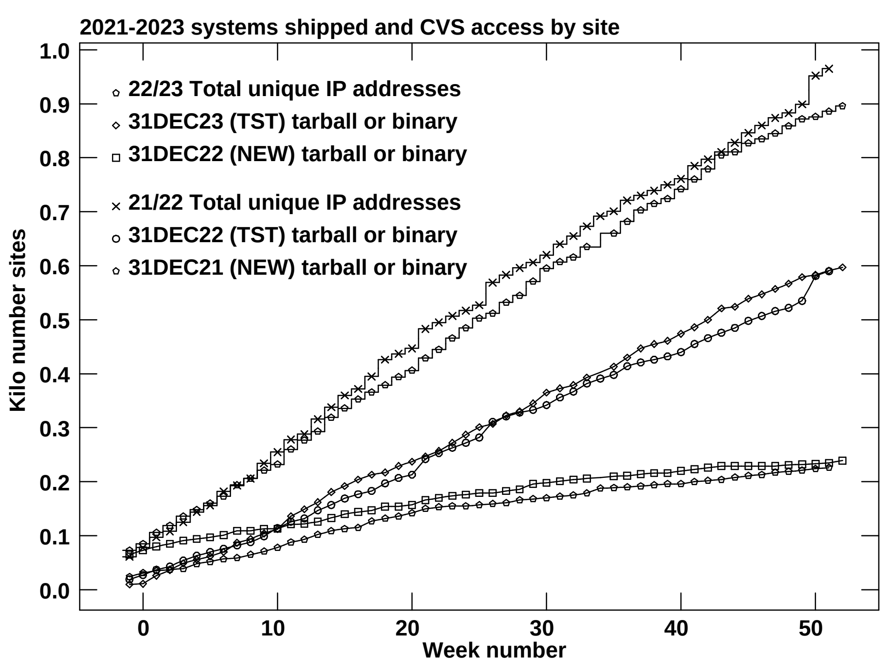
The 31DEC22 release is still available for installation, but is not recommended and will no longer receive patches even for egregious errors. It had a number of important patches during 2023. They are

1. `VHDIF` lost the `DOINVERS` true (add 180 degrees) result when smoothing the output average `PP` spectrum. *2023-01-03*
2. `POSSM` failed to make IF divider lines in columns > 1. Added numeric labels to all subimages. *2023-01-13*
3. `TADIF` had wrong length for units string and needed to trim the units and labels and take differences less seriously. *2023-01-13*
4. `TECOR` had an error in geometry affecting the IFR. *2023-01-23*
5. `LISTR` option `POLD` (difference of polarizations) failed mysteriously. *2023-02-10*
6. `UVPLT` would quit on a degenerate axis even if a plot range was specified. *2023-02-16*
7. `FIXFR` had bad file references. *2023-02-16*
8. `UVADD` did not copy essential tables (SU, FQ, AN, PO). *2023-02-24*
9. Mercator coordinates were not handled correctly. *2023-03-01*
10. `PCNTR` did not plot the polarization scale when requested if `XYRATIO` was set. *2023-03-20*
11. `FITLD` could overflow buffers when selecting IFs or channels with IDI format. *2023-03-28*
12. `RLDIF` has a new formula for the position angle of 3C286. *2023-03-28*
13. `SOUSP` used incorrect frequencies if IF selection was done after `SETJY` was run. *2023-03-29*
14. `POSSM` had several axis labeling issues. *2023-04-14*
15. `VBRFI` and `VLBRF` had errors in plotting data and in labeling the X axis. *2023-04-24*
16. `IMAGR` had an array that limited the number of channels entering an image to about 2000. *2023-04-28*
17. `UVMOD` was corrected to handle `FQCENTER` properly. *2023-05-24*
18. `UVSUB` and `OOSUB` did not compute `OPCODE 'MODL'` correctly for compressed data sets. *2023-06-12*
19. UV data sets without an `FQ` table could get wrong frequencies. *2023-06-14*
20. `POSSM` had horizontal axis labeling issues when not plotting all IFs and polarizations together (`APARM(9)` $\neq 0$). *2023-06-26*
21. `RLDLY` recorded the `REFANT` incorrectly in the history file. *2023-07-03*
22. `RLDIF` and `VHDIF` did not die when no data were found. Also improved the history file information. *2023-07-18*
23. `MORIF` mishandled integer and character table columns that depend on IF. *2023-08-22*
24. `SPIXR` confused the error return from the primary beam computation as a reason to quit. *2023-09-14*
25. `CALIB` closed the wrong flag table and then died when writing flags. *2023-10-02*
26. `EDITA` treated `DODELAY` incorrectly and so did not allow delays. *2023-10-02*
27. `VLAPROCS` and `VLBAUTIL` were changed in the TEC procedures to deal with the new file names in use after August 7, 2023. *2023-10-06, 2023-10-18*
28. `$SYSUNIX/AIPSPATH.SH` and `.CSH` had the wrong definitions for the `31DEC22` version. *2023-11-27*

AIPS Distribution

From the NRAO system logs, we count apparent MNJ accesses, downloads of the tar balls, and `rsync` accesses by unique IP address. Since DSL and some university and other connections may be assigned different IP addresses at different times, this will be a bit of an over-estimate of actual sites. However, a single IP address is often used to provide AIPS to a number of computers, so these numbers are at the same time an under-estimate of the number of computers running current versions of AIPS. In 2023, a total of 243 different IP addresses downloaded the frozen form of `31DEC22` and 597 IP addresses downloaded `31DEC23` in tarball or binary form. With the change to the MNJ (rsync only) we are unable even to guess how many sites have run the MNJ. The total number of unique IP addresses in these five lists was 896, 93 % of last year. The plot of numbers versus time and the table shows that 2023 was slightly ahead of 2022 in the `NEW` and `TST` numbers.

year	`TST` name	`NEW` name	`TST`	`NEW`	`TST` binary	`NEW` binary	Total unique
2004	31DEC04	31DEC03	808	196			1276
2005	31DEC05	31DEC04	832	246	299	48	1460
2006	31DEC06	31DEC05	806	191	402	94	1398
2007	31DEC07	31DEC06	965	277	669	161	1811
2008	31DEC08	31DEC07	1058	246	986	303	2107
2009	31DEC09	31DEC08	1228	307	1082	478	2399
2010	31DEC10	31DEC09	1228	307	1203	477	2416
2011	31DEC11	31DEC10	1105	270	1064	424	2228
2012	31DEC12	31DEC11	940	284	1028	396	1698
2013	31DEC13	31DEC12	1014	307	990	443	1937
2014	31DEC14	31DEC13	1045	333	848	431	1843
2015	31DEC15	31DEC14	1104	309	1001	350	1817
2016	31DEC16	31DEC15	878	222	788	372	1330
2017	31DEC17	31DEC16	874	408	768	386	1383
2018	31DEC18	31DEC17	684	368	603	343	1099
2019	31DEC19	31DEC18	754	406	686	388	1155
2020	31DEC20	31DEC19	796	434	750	470	1230
2021	31DEC21	31DEC20	659	399	604	376	1215
2022	31DEC22	31DEC21	590	226	572	221	965
2023	31DEC23	31DEC22	597	239	596	243	896



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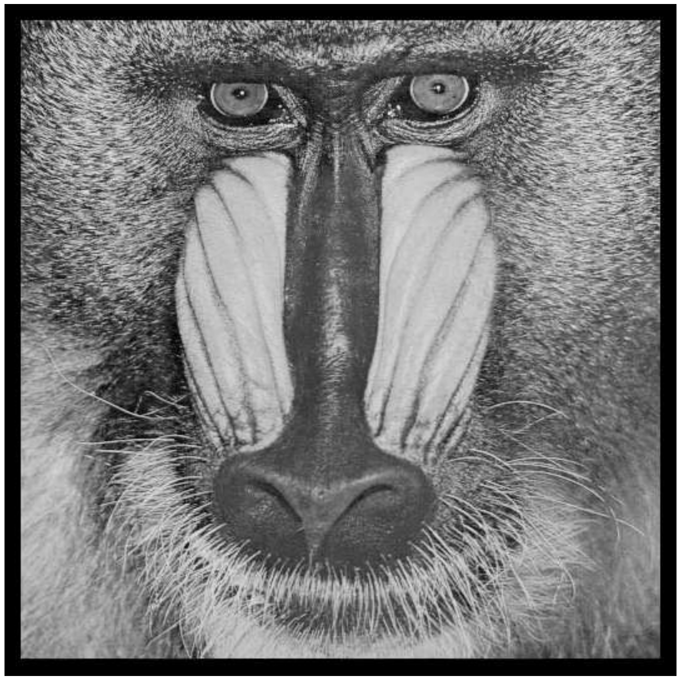

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AIPSLETTER
National Radio Astronomy Observatory
Post Office Box O
Socorro, NM 87801-0387
USA