A I P S L E T T E R

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General developments in $\mathcal{AIPS}$

$\mathcal{AIPSLetter}$ publication

We have discontinued paper copies of the $\mathcal{AIPSLetter}$ entirely, at least for this issue. The $\mathcal{AIPSLetter}$ 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

$\mathcal{AIPS}$ 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 $\mathcal{AIPS}$ 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` $\mathcal{AIPSLetter}$ and is included with every distribution in file `$AIPS_ROOT/`*release-name*`/COPYING`.

We have formal $\mathcal{AIPS}$ 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 $\mathcal{AIPS}$ 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 $\mathcal{AIPSLetter}$ 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 $\mathcal{AIPS}$ 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` $\mathcal{AIPS}$ 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 $\mathcal{AIPS}$ architectures should consider updating their equipment.

We have had to update the operating systems on two of the other computers which prepare binaries for $\mathcal{AIPS}$. 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 $\mathcal{AIPS}$.

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 $\mathcal{AIPS}$ 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 $\mathcal{AIPS}$ 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, `RESTART`s 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 $\mathcal{AIPS}$.
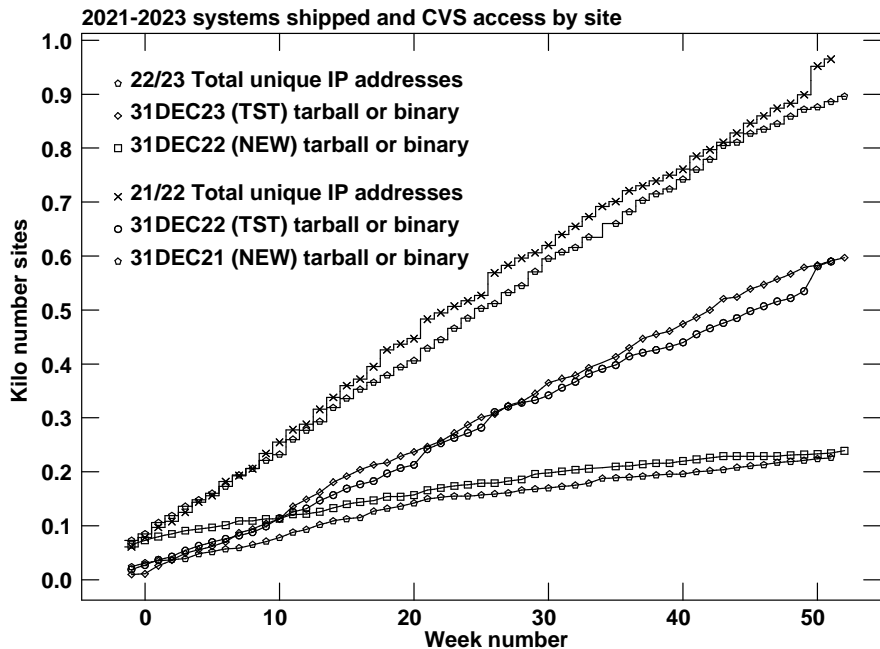
The `31DEC22` release is still available for installation, but is not recommended and will no longer receive patches even for egregious errors. It had a number of important patches during 2023. They are

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*

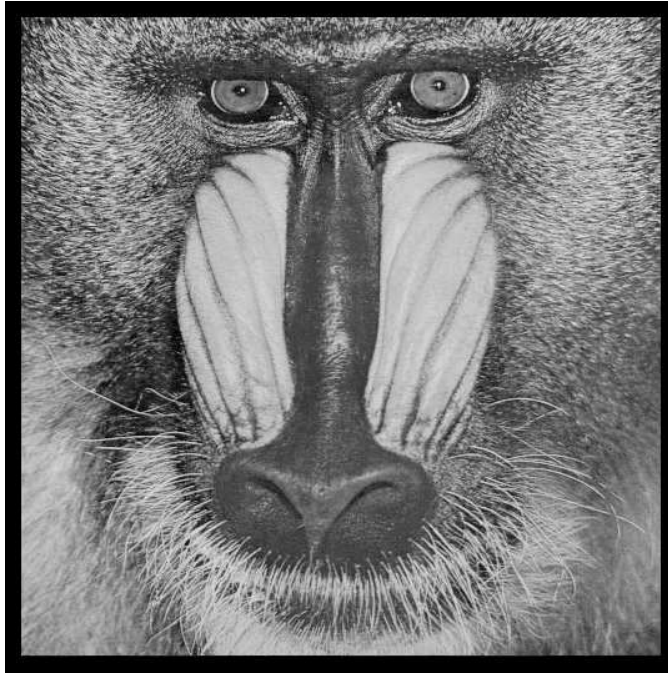28. $SYSUNIX/AIPSPATH.SH and .CSH had the wrong definitions for the 31DEC22 version. *2023-11-27*

𝒜𝒯𝒫𝒮 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 𝒜𝒯𝒫𝒮 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 𝒜𝒯𝒫𝒮. 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

2021-2023 systems shipped and CVS access by site

- ○ 22/23 Total unique IP addresses
- ◇ 31DEC23 (TST) tarball or binary
- □ 31DEC22 (NEW) tarball or binary
- × 21/22 Total unique IP addresses
- ○ 31DEC22 (TST) tarball or binary
- ○ 31DEC21 (NEW) tarball or binary

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