AIPSLETTER

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A newsletter for users of the NRAO
*A*stronomical *I*mage *P*rocessing *S*ystem

Written by a cast of *AIPS*

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General developments in *AIPS*

Reduction of VLB, VLA and ALMA data in *AIPS*

AIPS continues to be the main software system for the reduction of VLBI data from the VLBA and other telescopes. Since 2010, there have been numerous improvements to *AIPS* that enable full calibration of data from the Karl G. Jansky VLA and most imaging operations as well. The one exception is the wide-band (bandwidth synthesis) deconvolution algorithm ("MSMFS") being developed in CASA by Urvashi Rao Venkata, for which there is no comparable function in *AIPS*. Calibrated uv data may be exported from *AIPS* in "UVFITS" format for use in that program. ALMA data may also be reduced in *AIPS*, although the package is not fully qualified to calibrate data from linearly-polarized feeds. See Appendix E of the *AIPS* Cookbook, available via the *AIPS* web site, for details.

AIPSLetter publication

We have discontinued paper copies of the *AIPSLetter* other than for libraries and NRAO staff. The *AIPSLetter* will be available in PostScript and pdf forms as always from the web site listed above and will be shipped with all distributions of *AIPS*. It will be announced on the bananas and mnj list servers and, usually, in the NRAO e-News mailing.

Current and future releases

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 (PPC and Intel chips), Solaris, and Linux (32- and 64-bit) systems, but all architectures can do a full installation from the source files. If you develop *AIPS* code locally *or have system managers that forbid the use of* `rsync` or `cvs`, you will need to do a source-level installation. The current release is called `31DEC15` 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 2016 to convert your copy of `31DEC15` into the frozen version. However, when patches to `31DEC15` are announced in 2016, 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 `31DEC16`, 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 `31DEC16`, you may update your installation whenever you want by running the MNJ. This uses `cvs`, `rsync`, and/or transaction files 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 `31DEC16` *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 125-Mbyte `31DEC16.tar.gz` compressed tar file. Linux sites will almost certainly have `cvs` installed; other sites may have installed it along with other GNU tools. Secondary MNJs will still be possible using `ssh` or `rcp` or NFS as with previous releases. We have found that `cvs` works very well, although it has one quirk. If a site modifies a file locally, but in an *AIPS*-standard directory, `cvs` will detect the modification and attempt to reconcile the local version with the NRAO-supplied version. This usually produces a file that will not compile or run as intended. Use a new name for the task or put a copy of the task and its help file in a private disk area instead.

AIPS is now copyright © 1995 through 2015 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`.

Installing a new version

If compiling locally, new releases must be installed from the tar ball for that release. `31DEC15` contains 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`. The `cvs` system used in the MNJ requires this. 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).

`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. Note that the only version which we patch for major errors is `31DEC15`; even `31DEC14` is no longer changed.

Preview of coming attractions

The `31DEC16` release already contains a few changes that we decided were a bit risky or not needed in `31DEC15`. The new verb `DAYNUMBR` displays the day number in the year for the observation data of the image or *uv* file selected.

Improvements of interest to users in 31DEC15

We expect to continue publishing the *AIPSLetter* every six months along with the annual releases. Significant time was spent in the last six months on correcting the code to comply with modern compilers, particularly gfortran. There are a few new tasks and verbs released in the last six months nonetheless. ALVAR is a new task to compute and plot the Allan Variance of a *uv* data set as a function of the integration time. The old task by that name was renamed ALVPR to reflect its major printing role. New tasks XG2PL and RM2PL were written to display fit spectra from XGAUS plus ZEMAN and from RMFIT, respectively. New verb REVERSN was created to check the actual number of extension files of specified type present for a cataloged file.

In the first six months of 31DEC15 the new tasks were SNFIT to fit Gaussians to drift-scan gain solutions, UVFRE to re-grid visibility data in frequency space to match a second data set, HOLOG to transform and analyze holography data, PANEL to convert HOLOG output to panel adjustment tables, STACK to combine multiple images without regard for coordinates, and TVHLD to display and save histogram-equalized versions of images. New verb TVLAYOUT also assists in displaying holography results and new procedure DOVLAMP assists in converting EVLA SysPower data to gains for VLB usage.

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, this is somewhat of an oversight. We urge you to run the "Midnight Job" at least once after 31DEC15 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.

UV data

New Amplitude Calibration Strategy for the VLBA

The VLBA utilities (VLBAUTIL) and the VLBA reduction pipeline (VLBARUN) were changed to incorporate the new amplitude calibration strategy described by Craig Walker in VLBA Scientific Memo #37 "Flux Density Calibration on the VLBA" (2015). Three procedures were added to VLBAUTIL: VLBACCOR, VLBABPSS and VLBAAMP to aid in this new strategy. Also, several improvements were added to VLBARUN in order to have it behave more robustly.

These changes were made because it was reported that, with the advent of the Roach Digital Backend (RDBE), there were 10-15% errors in the amplitudes when compared to the 5% pre-sensitivity upgrade VLBA observations. For more information on the RDBE see the VLBA Observational Status Summary (https://science.nrao.edu/facilities/vlba/docs/manuals/oss/sig-path/rdbe). Craig Walker studied this problem and wrote VLBA Scientific Memo #37 (2015) describing a new VLBA amplitude calibration strategy to counter this problem. Three new procedures were added to VLBAUTIL to accommodate this new strategy and VLBARUN was modified to use the new calibration scheme. This new strategy interleaves the old *a priori* calibration with instrumental delay and complex bandpass calibration. So, instead of doing VLBACALA (ACCOR, APCAL, and accompanying tasks) and then proceeding with instrumental delay and bandpass calibration, one performs the following steps

VLBACCOR (ACCOR): calibrate sampler corrections.

VLBAPCOR (PCCOR) or VLBAMPCL (FRING): calibrate the instrumental delays.

VLBABPSS (BPASS): calibrate complex bandpass response function, making sure to normalize by the entire band (not just the inner 75% which is the default).

VLBAAMP (ACSCL and APCAL): apply autocorrelation correction (to adjust bandpass normalization) and do final amplitude calibration using T_{sys} and gain curves.

If you have data from before the sensitivity upgrade, this new method may improve your amplitudes a small amount, but the old strategy should still work.

Miscellaneous

RLDLY was changed to allow more than one calibration scan and to write an SN table under all circumstances. It was changed to allow control over the minimum SNR, to limit the delays used in averaging, and to display the rms over all reference antennas as well as the formal uncertainties.

DELZN was revised to offer the DISP opcode to solve for dispersion as another $1/\sin(\mathrm{elevation})$ parameter allowing it to plot the fit, correct the current CL table, and write a text file for CLCOR. The help file explanation of what is plotted was improved greatly.

CLCOR was given the DISP option to correct a CL table for dispersion as a function of time and elevation. The EOPS option was tested on EVLA data observed with a bad clock and found to work well now that we have a CQ table. Messages about "VLBA only" were toned down.

FITLD and UVLOD were changed to check and correct any index tables they might read and create new ones if the index table was not present in the FITS file.

DBCON was changed to try to use the incoming index tables to define the output scan structure, to correct the output frequency ID forms which were confused when there were several in the input, and to mark unknown sort orders with asterisks.

PCAL died on fully-flagged channels when doing models and died on end-of-file when doing SPECTRAL false. It also died when sample averages had some but not all polarizations flagged. Corrected the code to handle these "errors" gracefully. The XY SOLTYPE will be used on linearly-polarized data only if CPARM(5)>0. APPR works much better on unpolarized sources even with linearly-polarized feeds.

EDITA EDITR, and SNEDT now offer the DO3COLOR option to differentiate between IFs and polarizations in "crowded" displays. Times at the ends of the display were extended outward a bit in the flags.

RFLAG did not allocate enough memory for more than one source when doing the DOSCALE option.

FRING and RLDLY do not work if the increment between spectral channels in a group and between IFs in that same group have opposite sign. An error test for this was added to both.

FLOPM is the cure for the above issue and acquired a new option to flop only IFs, leaving the spectral channel order unchanged.

ALVAR is a new task to compute and plot the Allan variance from phases or normalized complex visibilities as a function of integration time. The old task, now called ALVPR prints the Allan Variance at a particular integration time separating baselines and IFs.

APCAL computed the spill-over correction improperly due to an incorrect call sequence found by gfortran.

TACOP was changed to allow flagging of SN, TY, and SY tables.

TYCOP is the new name for SYCOP to reflect its new ability to manipulate TY tables as well as SY tables in order to reduce bad values resulting from RFI.

VPFLG has an option to flag cross-hand data if one or more parallel-hand correlations are flagged as an alternative to flagging every polarization if any one is flagged.

EVAUV was given the SMODEL option for completeness. This allows comparison between a simple user model and the data.

TYSMO did not work when the data set contained only one polarization. Corrected pointers to know always that there is only one. The task used the smoothing time for T_{sys} when it should have used the smoothing time for gains.

UVFLG did not re-initialize all internal adverbs in the INTEXT option and, in particular, messed up a defaulted time-range. Added emphasis in the help file that each flag command in INTEXT is essentially independent.

ATLOD was corrected to work properly with magnetic tape.

UVHOL can now do scalar averaging over time and antennas and can average over moving antennas. It will do I polarization only on lineraly-polarized data.

PBEAM was overhauled to write out the data, model, and residual as cataloged image files and to do contour plots rather than row/column traces.

Analysis

From some initial user experiences, some of the rough edges in the spectral-fitting tasks XGAUS, ZEMAN and RMFIT have been addressed. In particular, all three now make the work tables over the full input images. Adverbs BLC(1) and TRC(1) are still used to control the spectral channels over which peak fluxes are found and so should probably be set to eliminate only bad edge channels if any. BLC(2), BLC3, TRC(2), and TRC(3) now only control the region over which the fit is done in the present execution. Since the images may now be large, all three tasks were given SET WINDOW and RESET WINDOW options in the image editing phase. The sub-images are blown up to fit the screen for easy viewing. The spectral baseline guess in XGAUS is now always zero and confusing adverbs BCHAN and ECHAN are gone. This works much better in most cases. OUTSEQ = 0 now works as expected with the many output images getting a new sequence number even if they are not all the same. The output of images did not work properly in RMFIT. The setting of flags was fixed to allow all parameter images to be written and the computation of the uncertainties in the output Q0 and U0 images was corrected.

In support of these tasks, two new tasks were written. XG2PL makes a plot file of the XGAUS solution for a selected pixel or the average over a circular or rectangular region. The fit from ZEMAN for the same pixel or region may be included as a lower panel in the plot. RM2PL was written to make similar plots of the Q and U solutions found by RMFIT. AIPS Memo 118 (see below) was updated to describe all of these changes and additions.

IRING used an incorrect geometry formula when figuring out the annulus to assign to each pixel when the inclination was not zero.

PATGN was given the option INVB to write out 1.0 divided by the primary beam.

MATHS was given the DIVP option to output a polynomial in 1.0 over the input image values.

NINER operation KRSH did only 4 of the 8 matrix cases and then required the data values to be greater than 1.0. Corrected the handling of the matrices and to allow any data values to be returned.

BLANK operation FLUW actually flagged all pixels less than DPARM(3) which is really operation SELC at least in part. Changed to access the code that correctly implements this operation (window set by flux).

RMSD was corrected to handle fully-blanked regions and to limit excessive verbiage. The robust method works better than the histogram.

MFPRT was changed to allow a wider range of scales and to apply FLUX to the beam-corrected total flux

OMFIT had some Fortran errors corrected and the default for NOISE(1) was changed to 1.0, which means the weights are correctly calibrated. The help file was changed to clarify the meaning of this adverb and its consequences in the reported solution rms.

Tests on units of brightness were changed in numerous tasks to avoid case sensitivity; CASA uses mixed case (*e.g.*, Jy/beam).

General: Miscellaneous

Apple has released a new version of its operating system numbered 10.11 and called "El Capitan." This change affects various things in software systems in the general interest of increasing security. AIPS binary distribution has depended on setting a library path to point at the Intel compiler run-time libraries. This is no longer allowed. A new script was written `fix_aips_elcap.sh` which is to be run under bash with `sudo` privilege. It makes links in `/usr/local/lib` to the needed libraries and then AIPS programs may be run. This script needs to be executed, in a separate window, near the end of running `perl install.pl -n`. `install.pl` was revised to copy the script to `$AIPS_ROOT` and `$SYSLOCAL` and then pause to allow the user to run the script in that separate window.

`install.pl` was also revised after watching numerous new users install AIPS. The user is now repeatedly warned about putting blanks in `$AIPS_ROOT` and paths to data areas and told not to use `NRAO` or `OARN` in site names. If no data area was specified, the suggested area is now created for the user. At the end, numerous added and highlighted messages appear about system services and, for Macs, about `/etc/sysctl.conf`. "Laptop" is now defaulted to true with a highlighted warning about the change.

Verbs `PRTHI` and `PRTMSG` can produce a great deal of paper accidentally when directed straight to a line printer. They were changed to count the number of lines about to be printed and to ask the user for confirmation if the number of lines exceeds 400. Let's save a tree! On occasion, the catalog header may lose track of how many extensions there are of some type. AIPS program error or outside user programs may cause this. An verb `REVERSN` was written to examine the disk contents to determine the maximum extension number of a given extension type and catalog entry there might be.

The *CookBook* was also given attention late in 2015. A number of minor changes were made throughout to describe the items in this and the previous *AIPSLetter*. In addition, some less commonly used items, particularly magnetic tape, were de-emphasized. The VLBI chapter 9 and Appendix C were overhauled to describe the significant changes made to VLB utility procedures (`VLBAUTIL`) and the data reduction pipeline (`VLBARUN`).

General: Fortran compilers

The binary distributions of AIPS are compiled with various older versions of compilers from Intel. People wishing to develop new AIPS tasks, or variants of existing AIPS tasks, have limited choices. They can ask us to compile and link a task for them, making the binary available on an anonymous ftp site. That works for well-tested programs, but is not appropriate for developing code. Since the versions of Intel compilers we use are no longer available, the only other alternative is to obtain a compiler and compile all of AIPS locally. The usual choice of compiler is `gfortran` plus `gcc` from gnu. Unfortunately, until recently, that has not worked well.

One of the reasons for the failures was the use of "automatic" variables, namely local variables that do not retain their value between invocations of the subroutine. The traditional compiler option `-fno-automatic` to prevent this is honored by some versions of `gfortran`, but not all. The `man` pages for `gfortran` claim that this option is present even when it is not, but no `gfortran --help` will admit to it. Therefore, considerable effort has been expended to identify variables that need to be `SAVE`d in order to retain their values between calls to the routine. Undoubtedly, more will be discovered later, so your editor's personal version of AIPS has been compiled with automatic variables allowed. It was also discovered that automatic allocation of largish buffers (*e.g.*, 1.5 Mbytes) can be horribly slow when that buffer is used a great deal (*e.g.*, in the data reading routine of the calibration package). It was found, however, after the large buffers were `SAVE`d, that a version with automatic variables completed the `Y2K` test about 10% faster than the same compiler with no automatic variables.

Another reason for the failures was an interaction between `gfortran` optimization and the dynamic allocation of memory for the pseudo-array processor. Modern `gfortran` versions do something bad when optimizing the "`Q`" routines, but work well if that memory is a fixed amount. Therefore `$INC/PAPC.INC` was changed to allow the choice of dynamic or fixed memory to be made before compiling AIPS. Another oddity that appeared connected with this was an apparent limitation of labeled `COMMON`s to a combined total of 2 Gbytes even in 64-bit versions. That still allows a mammoth pseudo-AP of say 200 million double-precision words. `gfortran` also handles the reading of an end-of-file in a Fortran text file differently from `g77` and has different options for the `OPEN` command. `ZTXOP2` was changed to handle this for both compilers.

Yet another issue has been the alignment of labeled `COMMON`s. Earlier Fortrans started each labeled `COMMON` block on a double precision address and we made sure that all double precision variables appeared first in the list of variables in each `COMMON` block. Now, `gfortran` starts each labeled `COMMON` block on a single-precision address unless every declaration of that block contains explicitly a double-precision variable at its start. A bad habit of declaring an image header in its integer form in the local include and then equivalencing it later to its floating and double-precision versions causes a misalignment of the `COMMON`. It is best repaired by declaring the double-precision equivalence in the local include block.

The various versions of `gfortran` produce a plethora of warning messages. These were reviewed in detail and many routines were altered to eliminate unused statement labels, variables, `FORMAT`s, and the like. This review also identified real errors including `NINER` operation `KRSH`, `IMAGR` when making a second copy of the data for filtering, `APCAL` when computing the spill-over correction, `TYSMO` when smoothing gains, and `BLANK` operation `FLUW`.

Recent *AIPS* Memoranda

All *AIPS* Memoranda are available from the *AIPS* home page. *AIPS* Memo 118 describing *AIPS*' spectral fitting was enhance with descriptions of the new plot tasks `XG2PL` and `RM2PL`.

118 **Modeling Spectral Cubes in *AIPS***
Eric W. Greisen, NRAO
June 19, 2014, *revised September 16, 2015*
AIPS has done Gaussian fitting along the x-axis of image cubes with task `XGAUS` since the 1980s. That task has recently been overhauled to be much easier to use and much more capable. In like fashion, new tasks `ZEMAN` and `RMFIT` have been developed. The former fits the standard leakage and scaling terms for Stokes V cubes, including a new option to do this for each of the Gaussians found by `XGAUS`. The latter fits polarization models to Stokes Q and U cubes, using the output of Faraday Rotation Measure Synthesis (*AIPS* task `FARS`) to assist with initial guesses. The models can contain multiple components each with a polarization flux, angle, rotation measure, and rotation measure "thickness." The present memo describes the functions of these tasks in some detail with numerous graphical examples. This memo also discusses two new tasks to plot spectra with model fits and a number of tasks which make visibility and image model files.

Patch Distribution for 31DEC14

Because of the extensive use of binary installations, we now patch the master copy of the most recently frozen version. Older versions are not corrected even for egregious errors. Thus, 31DEC14 was patched during 2015 and 31DEC15 will be patched as needed during 2016. Your copy of them may be corrected simply by running a Midnight Job. Information about patches and the code may be found using links from the main AIPS web page or by *anonymous* ftp to the NRAO server ftp.aoc.nrao.edu. Documentation about patches to a release is placed on this site at pub/software/aips/*release-name* and the code is placed in suitable sub-directories below this. Patches to older releases are kept here as well, but they will require local compilation.

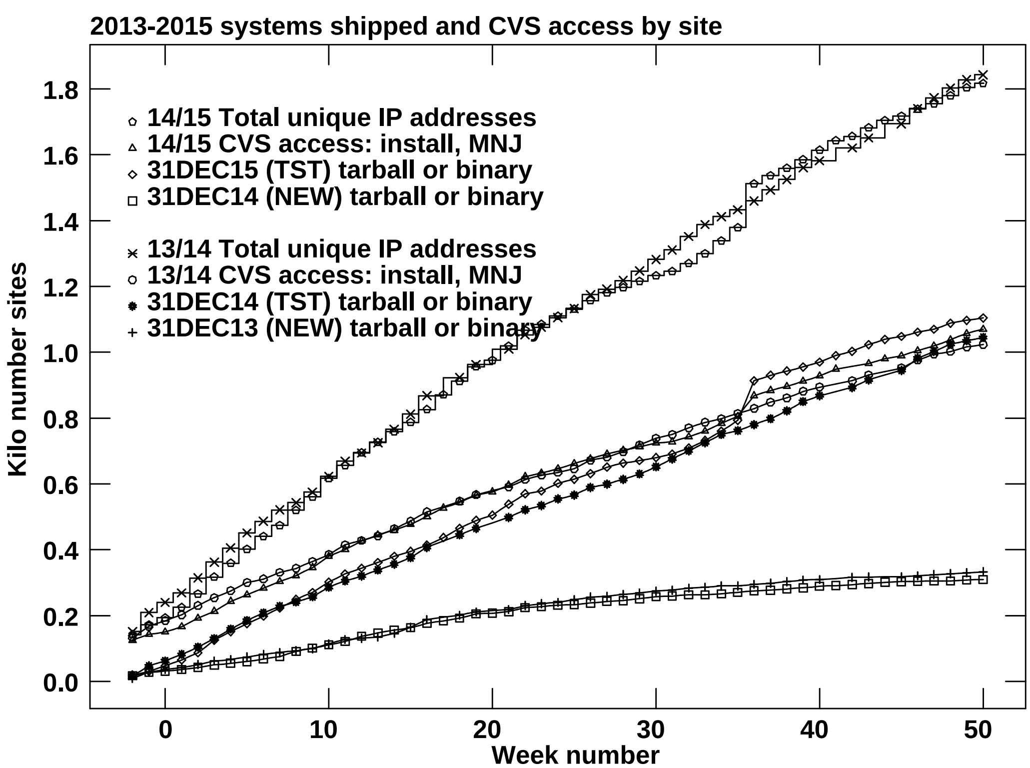
The 31DEC14 release is no longer available for installation and will no longer receive patches even for egregious errors. It had a number of important patches during 2015. They are

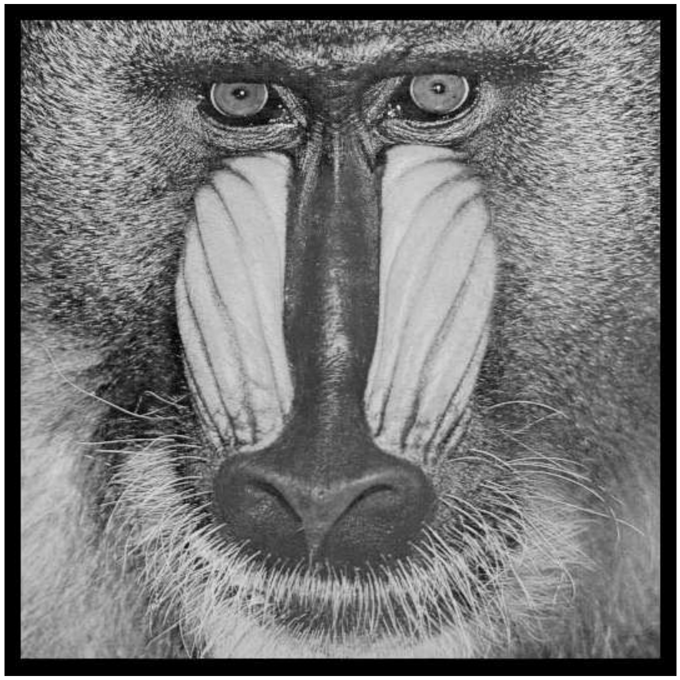
1. DOFARS procedure and inputs retained adverbs no longer used by FARS. *2015-01-02*
2. RMFIT failed to copy the FQ table to the output residual images. *2015-01-13*
3. FTFLG messed up antenna numbers in the output FG table when a single antenna or baseline was used. *2015-01-16*
4. VLBATECR had trouble around the end of the year deciding what files needed to be downloaded. *2015-01-19*
5. VLBARUN requires convert to make the html output files. Added tests and a control on DOTV. *2015-01-19*
6. BPASS had an array and history writing code which could not handle more than 32 antennas. *2015-01-20*
7. MORIF messed up bandpass and other spectral tables. *2015-01-29*
8. TYSMO did not apply clipping unless median-window filtering was also requested. *2015-02-11*
9. BPASS did not understand that low-level VLB routines expected left-handed antenna coordinates. *2015-02-21*
10. UV data disk I/O had an issue if the full file fit into the first of the two buffers and the disk file was exactly the right size! *2015-04-24*
11. START_AIPS, START_TVSERVERS needed a grammar change to support Mac Yosemite systems. *2015-04-24*
12. Basic calibration subroutines mis-computed the channel wavelengths and did not always do the dispersion correction. *2015-05-19*
13. XAS needed a change to support Mac Yosemite systems and also to write black character backgrounds. *2015-05-20*
14. KRING help file adverb list did not match that of the Fortran. *2015-06-17*
15. IMAGR did not do the baseline-based time averaging properly for the last samples written to the work file. *2015-06-22*
16. PCAL did not detect fully flagged channels when using a source model and so died. *2015-08-14*
17. SETJY had bad formats capable of aborting the task. *2015-08-22*
18. SAD and TVSAD hid the new model-fit table when making a stars table. *2015-09-07*
19. PCAL did not do mode SPECTRAL = FALSE correctly, leaving files open and then quitting. *2015-09-14*

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 2015, a total of 309 different IP addresses downloaded the frozen form of `31DEC14` and 1104 IP addresses downloaded `31DEC15` in tarball or binary form. Fully 1070 IP addresses accessed the NRAO cvs master. Each of these has at least installed some version of *AIPS* and 364 appear to have run the MNJ at least occasionally. The total number of unique IP addresses in these three lists was 1817. The `TST` and cvs numbers are a bit ahead of last year due mainly to an interferometry school held in Europe (see plot below). The other numbers are marginally behind last year. The table below shows these numbers as a function of year since we began recording them. The attached figure shows the cumulative number of unique sites, cvs access sites, and download sites known to us as a function of week in 2015. The numbers for 2014 are also plotted and show an increase in 2015 for `TST` and `cvs`, but a decrease for `NEW`.

year	`TST` name	`NEW` name	`TST`	`NEW`	`TST` binary	`NEW` binary	`cvs`	Total unique
2004	31DEC04	31DEC03	808	196			797	1276
2005	31DEC05	31DEC04	832	246	299	48	982	1460
2006	31DEC06	31DEC05	806	191	402	94	1050	1398
2007	31DEC07	31DEC06	965	277	669	161	1385	1811
2008	31DEC08	31DEC07	1058	246	986	303	1667	2107
2009	31DEC09	31DEC08	1228	307	1082	478	1855	2399
2010	31DEC10	31DEC09	1228	307	1203	477	1914	2416
2011	31DEC11	31DEC10	1105	270	1064	424	1747	2228
2012	31DEC12	31DEC11	940	284	1028	396	1309	1698
2013	31DEC13	31DEC12	1014	307	990	443	1264	1937
2014	31DEC14	31DEC13	1045	333	848	431	1023	1843
2015	31DEC15	31DEC14	1104	309	1001	350	1070	1817





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