AIPSLETTER

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A newsletter for users of the NRAO
Astronomical Image Processing System

Written by a cast of *AIPS*

Edited by
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General developments in *AIPS*

Linux news

RedHat has released versions 7.0 and now 7.1 of their Linux system. The good news is that version 7.1 in particular contains numerous system improvements including the 2.4.2 kernel. This kernel allows *AIPS* to read and write files larger than 2 Gbytes. The bad news is that both of these releases include and depend on the "GNU compilers version 2.96." The quote marks are added because the GNU compiler group never released a version 2.96 and they have washed their hands of this "version" on their web site. We have found that the `g77` compiler appears to work on *AIPS* but produces optimized code that is unreliable. `IMAGR` is one of the tasks that does not work correctly under this compiler and one should never use `IMAGR` without optimization. There are also problems with TV window setting, `TVFLG`, and who knows what else. We do recommend RedHat release 7.1, but you must also install the older GNU compiler suite version 2.95 and change your local copies of `FDEFAULT.SH`, `CCOPTS.SH`, and `FDOPTS.SH` to point at it. Some other Linux distributions also include the 2.96 compiler with the same unfortunate results.

Personnel changes

Pat Murphy, because of the press of his other duties, has asked to be relieved of all official duties in the *AIPS* Group. He has been a valuable member of the Group for over ten years and he will be missed. Like Bill Cotton before him, he has volunteered to advise the remaining group privately as needed. Additional assistance with operating system matters will now be provided by the very capable members of the Computer Division at the Array Operations Center in Socorro. Please direct inquiries to `daip@nrao.edu` and not to Pat's e-mail address.

Amy Mioduszewski joined the *AIPS* Group in Socorro in January. She has already had a significant impact in writing and improving a variety of `PROCEDURE`s for simplified data reduction.

Current and future releases

We have reinstated the old practice of having formal *AIPS* releases, but on an annual basis with binary releases only for Solaris and Linux. All architectures can do a full installation from the source files. The next release will be called `31DEC01` and remains under development by the (reduced) *AIPS* Group. You may fetch and install a complete copy of this version at any time. This *AIPSLetter* is intended to advise you of developments to date in this new release. Having fetched `31DEC01`, you may update your installation whenever you want either as a whole or by running the so-called "midnight job" which uses transaction files to copy and compile the code selectively based on the code changes and compilations we have done. We expect users to take the source-only version of 31DEC01 *AIPS* over the Internet (via *anonymous* ftp).

Improvements of interest to users in 31DEC01

We expect to continue publishing the *AIPSLetter* approximately every six months along with the annual releases. Despite the reduction in personnel, there have been a surprising number of changes in 31DEC01 over the past six months. There are five new tasks: CHKFC to check the contents of an IMAGR BOXFILE, DEFLG to flag data based on the level of decorrelation, SNFLG to flag data on a baseline basis based on phase jumps in the SN or CL table, VPFLG to make sure that all polarizations are flagged in a sample if any are, and DRCHK to test the installation control files for correctness. A new verb was written called EPOCONV to convert epochs in the COORDINA adverb. New VLBA Utility procedures are also available.

Other than relatively minor differences, 31DEC01 is compatible in all major ways with the 2000, 1999, and 15OCT98 releases. There are significant incompatibilities with older versions.

Imaging

IMAGR

IMAGR was given a variety of more esoteric options during the past 6 months In the "OVERLAP n" mode, it tries to guess which field to Clean next by examining the residual images which mostly do not reflect the recently removed Clean components. IMAGR was changed to re-examine its selection after the particular field chosen is imaged with the current residual data. If the field no longer appears promising, IMAGR now tries again with another field. This can cause several fields to be re-imaged before one is Cleaned but avoids Cleaning noise. IMAGRPRM(20) was added to modify this action. The same loop that selects a field now checks to see if the FLUX level has been reached in all fields and causes the task to exit more reliably than it used to. The adverb FGAUSS was added so that a separate FLUX level could be used for each of multiple resolutions. The BOXFILE may now be used to add a spectral-channel-dependent scaling for the data weights. This allows bandwidth synthesis to use outer, less reliable channels but at a reduced weight.

A bug that caused all fields to be re-imaged whenever only one pixel in the field was cleaned has apparently been corrected.

Wide-field imaging

Because of a significant number of observation at 74MHz with the VLA, the tasks that assist with wide-field imaging received considerable attention. A new task called CHKFC was written. It makes "images" of all the fields and Clean boxes in a BOXFILE. Application of FLATN to the output produces an image of the wide field showing the location of each sub-field and each Clean box. This is particularly useful for finding areas not included in any Clean box.

SETFC was changed to take the maximum size of the circular Clean box into account as well as the user's overlap parameter. The latter needs to be only a few not something like 15 now. An option to write circular Clean boxes in outlier fields was added. This task and FACES were changed to try, in the fly-eye portion, an excessively large number of fields, selecting the innermost fields up to 512 and guaranteeing that (0,0) is in the center of the innermost field. A warning is issued if the 512 fields may not be enough to cover the requested area. The flux scaling was corrected and a scaling option was added to SETFC.

Improved VLA primary beam patterns at 327 and 74 MHz were measured by Rick Perley and added to the above tasks as well as to PBCOR and PATGN. PBCOR's handling of data cubes was repaired.

Other imaging changes

CCEDT was given both BOXFILE and CLBOX as alternative methods for entering Clean boxes. These are in pixels while CCBOX is in arc seconds.

SCMAP and SCIMG were corrected to handle taper properly, to set the correct defaults for Clean boxes, and to set and to propagate properly the "number of channels averaged" parameter.

WTMOD was improved to handle compressed data; that type of data is easier to deal with for weights than uncompressed.

New VLBA/VLBI calibration procedures in *AIPS*

For the past year the *AIPS* group has been developing procedures to simplify the reduction of VLBA data and, in many cases, other VLBI data as well. These procedures are contained in the RUN file VLBAUTIL available in the 31DEC01 release of *AIPS*. They include procedures to load, "fix", calibrate, and examine data, up to and including fringe fitting. Using these procedures, it takes only a few hours to take a typical twelve-hour continuum phase-referencing experiment from loading to imaging with most of the time being spent loading the data and fringe fitting. These procedures not only simplify the inputs to tasks, but run the variety of "bookkeeping" tasks that need to be performed for a calibration step. For example, the fringe-fitting procedures fringe fit and then apply the calibration by looping through the sources.

The procedures can be separated into three categories: procedures that should be run for all experiments, special case procedures (multiple subarrays, multiple frequencies and polarization data), and data examination procedures. In the first category there are procedures to load, remove redundant calibration tables, determine a-priori amplitude corrections, determine instrumental phase corrections, and fringe fit the data. The special case procedures will find subarrays, copy different frequencies to separate files, fix polarization labelling, correct parallactic angles, and calibrate cross-polarized delays. To examine data there are procedures that print the antenna and scan information for the experiment, plot the calibration tables verses time, and plot the cross-correlation spectrum.

Procedures needed to simplify many of the initial VLBI data reduction steps in *AIPS* are available to users after they enter the command RUN VLBAUTIL. An *AIPS* Memo (see later in this *AIPSLetter*) has been written to describe these procedures. They are also described in the latest versions of Chapter 9 and Appendix C of the *CookBook*. The procedures include:

- VLBALOAD: loads VLBA data with simplified inputs
- VLBASUBS: finds subarrays in VLBA data
- VLBAMCAL: removes redundant calibration data from tables
- VLBAFQS: copies different frequency IDs to separate files
- VLBAFPOL: fixes polarization labelling for common cases
- VLBASUMM: makes summary listings of your data set
- VLBACALA: determines *a-priori* amplitude calibrations
- VLBAPANG: determines phase corrections for parallactic angles
- VLBACPOL: calibrates cross polarization delays
- VLBAPCOR: determines instrumental phase corrections
- VLBAFRNG: does global fringe fit using FRING
- VLBAKRNG: does global fringe fit using KRING
- VLBAFRGP: does global fringe fit for phase referenced experiments using FRING
- VLBAKRGP: does global fringe fit for phase referenced experiments using KRING

- VLBASNPL: plots the SN or CL tables versus time
- VLBACRPL: plots the cross-correlation spectrum

The old procedure CROSSPOL has been replaced in functionality by VLBACPOL. The VLAPROCS run file also received some improvements mostly to remove the "hidden" adverbs which were not shown in the INPUTS but which affected the outcome. A DOPRINT adverb has been added to VLACALIB to control the amount of printed output.

Data reading and writing

FILLM, the task that translates VLA on-line data into AIPS was found to have several subtle but unpleasant bugs. One bug caused the program to go into "solar" mode if the ninth character of a source name was S or to fail to go into solar mode when it should if the first scan of the data set was not an observation of the Sun. Another bug caused it to trash a few visibilities at the end of a scan if it found the need to create a new file to hold the data of the next scan. FILLM also failed to respond properly if the number of antennas changed. The "channel-0" data computed by the on-line system is computed before certain operations such as Hanning smoothing and, as a result, does not completely match the data on the tape. FILLM now computes new channel-0 data by default rather than using those provided by the on-line system. The spectral-line observer may choose to include or discard autocorrelation data with the adverb DOACOR.

FITLD was corrected to turn off VLBA-specific corrections when the data, written in IDI FITS format, are found to be from a correlator other than the VLBA correlator. This simplifies and corrects the processing of data from the EVN (JIVE) correlator. The use of FREQSEL in FITLD to select a single frequency ID was corrected. Several tables were found not to be rearranged and edited to have the new numbers and not to have the unselected data. The logic for handling this selection was greatly simplified and it is now believed to be reliable.

FITS disk files were read and written in AIPS using standard Fortran I/O methods. Several operating systems have been improved to allow the use of files larger than 2 Gbytes. Unfortunately, these improvements did not extend to the Fortran implementations. Therefore, the AIPS reading and writing of FITS disk files were converted to use C methods similar to those used on the internal data files. Any size file should now be handled.

UV data calibration

Editing

Three new editing tasks were written in the last six months. SNFLG is based on code submitted by Lincoln Greenhill and Mark Reid of CfA. It examines an SN or CL table and flags data whenever the phase changes between two solution times by more than a user-specified amount. It does this on a baseline basis since the phase may be stable enough for interpolation between certain antennas (probably adjacent) but not between more widely spaced antennas. The task DEFLG also looks for a loss of coherence by examining the ratio of the vector averaged amplitude to the scalar averaged amplitude over a moving window in time. Clearly, this algorithm requires a mostly unresolved source with good signal-to-noise, but the algorithm may have considerable use in phase-referenced observations. The third task, VPFLG is designed primarily for observations that require the same data sampling in all polarizations. By default, the VLA on-line system and AIPS do not flag, for example, LL when RR is bad. VPFLG flags the data of all polarizations in a sample when one or more of the polarizations is flagged and also edits the FG table for the same purpose. CLIPM was changed to copy the input flag table before appending new flags to it. This will make it much easier to undo the operation if needed.

Bandpass calibration

The shifting of the bandpass as a function of time was done on a baseline basis in BPASS before the antenna bandpass shapes were determined. This was corrected to shift the individual antenna bandpass shapes after the fit with no shifts in advance. Both BPASS and CPASS were supposed to be able to use Clean component source models for normalization instead of a self-determined "channel-0." A bug was found and corrected that prevented this mode from working and, for convenience and speed, the CMETHOD adverb was added to both tasks. The vector division by a channel-0 suffers from a Ricean noise bias in the amplitude which becomes very serious in cases of low signal-to-noise. New normalization options have been added to BPASS which help with this problem.

CPASS was also revised to include but give zero weight to channels outside the BCHAN to ECHAN range. It now offers three options for a weighted solution: uniform, input data weights, and apparent uncertainty from the pre-averaging (tempered some by the input data weights). A "new" method of bandpass calibration appears promising. First, BPASS is run on a single strong calibrator scan and applied with SPLAT to remove the main, time-invariant portion of the bandpass shape. Then CPASS, with only a modest number of parameters, is used on the main (weaker) calibrator source to find the time variable portion of the bandpass shape.

With most of our data, the weights should be independent of spectral channel. However, the complex gains need not average 1.0 for amplitude. Indeed, CALIB is really not needed; BPASS could be used for all parts of the complex gain. The calibration application code was changed so that, when calibrating data weights, the average amplitude in the bandpass shape is determined and that average is applied to the weights. For VLB data, the average is determined over all channels; for other telescopes, the average is determined over the inner three quarters of the channels.

Other changes

PCAL has not computed errors correctly in some time. They appeared reasonable however until the new (correct) weights were instituted. Steve Myers provided corrections to the error computation that seem to provide meaningful results.

PCAL had a bug that caused it to use the data of the first spectral channel and first IF rather than averaging the spectral channels and (optionally) the IFs as claimed. Answers produced from multi-spectral data were much noisier as a result.

CALIB was given the option to limit the gain normalization determination to elevations above a user-specified angle.

CLCOR was changed to put source coordinate or antenna location corrections into the SU and AN tables, respectively, as well as, in the form of phase corrections, into the CL table. This means that one cannot undo source and antenna corrections simply by deleting a version of the CL table. They must be undone by re-running CLCOR with parameters of the opposite sign.

LISTR was changed to allow the display of T_{ant} as well as T_{sys} from the TY table and the scaling of such displays was improved.

Model computations can cause *uv* data to be flagged if the baseline lies outside the area of the gridded modeling. The routine responsible issued a few warnings and then went silent. Now it continues to count the total number of such deletions and reports that loudly.

FRING had an error computing the addresses in the AP for fringe fitting in the case of unevenly distributed frequency channels. The results were rather obviously bad since the FFTs overlapped each other.

Modeling

The subject of Gaussian fitting in the presence of correlated noise is being studied again. So far the results of these studies have not been incorporated into code, but they will be. The good news is that the error estimates from `JMFIT`, `IMFIT`, and `SAD` are reasonable even if they are not completely right. The one change to the code was the removal of a reduction of the error estimate by $\sqrt{2}$ when the component widths are held fixed. Such a reduction is appropriate when the object is very much larger than the correlation length in the noise (*i.e.*, the Clean beam), but astronomical objects never look like Gaussians when observed with such good resolution. For small-diameter objects, the noise in the peak value is actually higher when the widths are not fit. ***For such objects, the best estimate of the total flux is the peak value found when fitting all 6 parameters.***

The tasks `UVCON` and `CONFI` used to study array configurations will be discussed in a separate article in this *AIPSLetter*. `CONFI` was enhanced to allow up to 2000 antennas (*i.e.*, SKA) and to handle an initial configuration in the form of a hexagonal tile with an arbitrary number of antennas. It determines "bad" topography locations with greater accuracy and can now write an output file for use by `CONFI` as well as one used to restart `UVCON`. `UVCON` was corrected and enhanced to make images around any arbitrary coordinate from a normal *AIPS* multi-field Clean components model and to allow up to 2000 antennas.

Miscellaneous matters

EPOCONV is a new verb which converts the `COORDINA` adverb between J2000 and B1950 coordinate systems.

CookBook chapters have been updated to mention the new editing tasks, changes to `VLACALIB`, and especially the new `VLBAUTIL` procedures. See the *AIPS* Web pages for the changes and new copies of the relevant chapters.

PLOTR was enhanced to plot up to 10 parameters at the same time and to plot functions of the X and Y arguments other than simple linear axes.

POSSM was debugged yet again. It had trouble plotting multiple IFs particularly when looping for multiple time ranges. It listed frequencies incorrectly for single-source files as well.

VPLOT was changed to display the arbitrary 5-day offsets in multiple sub-array data sets; the absence of the offset was confusing since it is required in `TIMERANGE` and by `UVFLG` and other tasks.

TVFLG was corrected so that `CLIP BY FORM` would do its operation correctly. It was capable of aborting, doing nothing, or using the wrong Stokes-flag pattern half the time depending on the compiler.

Polar images encountered trouble when plotting the coordinate axes. The code for `DOCIRCLE` was corrected (and greatly simplified) although it may now be a bit slower.

Programmer tidbits

ZAP has been upgraded to deal with cases in which the file header is missing. The algorithm that attempts to delete all associated files is brutal but computers are fast now.

CCOPTS has been changed for Solaris Ultra and Linux to compile all C routines with 64-bit file offsets. This parameter is not known except to systems that can use it so, now, *AIPS* installations that can handle files greater than 2 Gbytes in size will actually be compiled to do so.

FDEFAULTS has been moved in part to system-dependent locations and reduced to handle only the appropriate system in each of the locations. The file will end up in `$SYSLOCAL` but the compile procedure searches first `$SYSLOCAL`, then `$AIPS_VERSION/$ARCH/SYSTEM` and finally `$SYSUNIX`. This will make it easier to make local versions of the file as required, for example, by RedHat 7.1.

PRTAC has been enhanced to allow the system manager to determine *AIPS* usage statistics over all computers at a site.

DRCHK is a new stand-alone utility that checks the `HOSTS.LIST`, `DADEVS.LIST`, and `NETSP` files for accuracy and agreement. It is very helpful for identifying missing computers, data areas, and incomplete descriptions of such things.

Accuracy of single-precision floating-point numbers became an issue twice in the last six months. Subarray numbers are stored as $0.01(Subar - 1)$ added to $256Ant_1 + Ant_2$ in the baseline code. If `DBCON` has to change the current subarray number too many times, the accumulated error in adding 0.01 several times was enough to make the scheme for finding the subarray number in most *AIPS* tasks fail. Comments were added to `DBCON`'s help file and the scheme was improved uniformly. `IMAGR` occasionally makes images with large values in the corners. This is due to a very large number (*e.g.*, 10^5) samples being gridded into the same *uv* cell, a case that arose with small fields, large data sets, and many pseudo-continuum spectral channels. Making larger images usually resolves this problem.

AIPS Distribution

By June 18, 2001, 266 copies of the `31DEC01` release had been distributed, all by ftp. This version remains under active development, so a few of the sites have begun taking updates regularly via the "midnight job." We recommend this to all serious *AIPS* users. Of the 40 sites which have registered their use of `31DEC01`, 2/3 report that Linux is their primary architecture and 1/3 Solaris.

Also by June 18, 2001, 174 copies of the now frozen `31DEC00` release had been distributed, 161 by ftp. (This is added to the 407 sites that took copies of `31DEC00` when it was called `31DEC99`, via ftp before it was frozen.) We believe that some sites have taken the full release more than once at different dates, but we do not have an accurate count of these. The distribution of `31DEC00` continues. Almost all of the distribution has been of source-code only. Binaries are distributed on CDs and 10 sites downloaded binaries via ftp in the last 6 months. Of 581 non-NRAO sites receiving `31DEC00` only 84 (14%!!) have registered. We remind serious *AIPS* users that registration is expected in order to receive user support.

The first table below shows the breakdown of how the (preliminary and frozen) copies of `31DEC00` were distributed. The second table below is based on the disappointing number of registered installations of the various releases. It indicates that the distribution over operating systems was heavily weighted toward Solaris previously, but that Linux is now slightly preferred. However, when asked about "primary" architecture, 71% of our users answered Linux for `31DEC00` and 20% answered some flavor of Sun OS. Linux has, for the moment, won.

	ftp	CDrom	8mm	4mm	ZIP	Floppy
15OCT98	242	71	8	1	0	0
15APR99	290	69	0	2	0	0
15OCT99	277	102	1	2	0	0
31DEC00	568	13	-	-	-	-

OS	31DEC00	15OCT99	15APR99	15OCT98	15APR98	15OCT97	15APR97	15OCT96
	%	%	%	%	%	%	%	%
Linux	46	33	27	27	19	23	16	19
Solaris	46	54	53	61	66	50	66	46
Dec Alpha	3	1	4	3	7	9	6	10
SGI	3	4	13	1	3	1	1	5
HP-UX	2	5	2	5	2	3	6	4
SunOS 4	0	1	1	1	4	14	5	13
Alpha Linux	0	1	0	0				
IBM /AIX		0	0	2	1	0	0	4

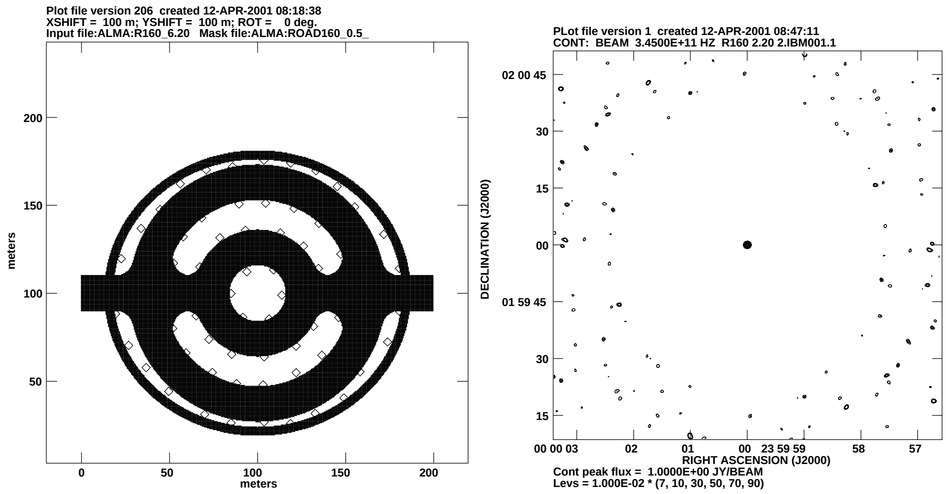


Figure 1: The version of ALMA's compact configuration including the road design. The optimization of the side lobes is carried out for the double total size of the antenna primary beam. The left plot presents antenna positions (diamonds) and roads to make an access to the antennas for the reconfiguration. The roads are specified as the input 'topography' file to the task CONFI. The right plot presents the two dimensional beam of the array.

AIPS participation in the design of array configurations

The optimization of an array configuration is very important in obtaining the best image quality from a given number of antennas of a given diameter. The algorithm of the optimization minimizing the worst side lobe at the given circle in the sky was designed by L. Kogan (*IEEE Transactions on AP*, Vol 48, No. 7, July 2000). The algorithm is coded as AIPS task `CONFI`. This task starts with an initial configuration given either as a table of antenna coordinates in an input text file or as one of several standard configurations such as one, two, or three circles or a hexagon tile. The optimization can be carried out under the following constraints: two circles, doughnut, topography, minimum distance between the antennas. The optimum configuration found is stored in the output file in two formats: (1) `CONFI` format to use the output file as input for `CONFI` to continue the process of optimization or (2).`UVCON` format to use the output file as the input for the simulation task `UVCON`.

The AIPS task `UVCON` is used to generate a *uv* database for an interferometric array whose configuration is specified by the user. Visibilities corresponding to a specified model and Gaussian noise appropriate for the specified antenna characteristics are calculated. The model can be specified as a point, a Gaussian source, an image, or a set of Clean components. The output is a standard AIPS *uv* data file. This task replaces and enhances an old procedure which required use of the AIPS tasks `UVSIM`, `UVSUM`, and `UVMOD` and verb `PUTHEAD`. The array geometry can be specified in four different coordinate systems: earth-centered equatorial, local tangent plane, geodetic, and array-centered equatorial. The coordinate system can be mixed for different antennas in the array. This feature allows for example adding new antennas in geodetic coordinates to the existing VLA antennas which use an array-centered equatorial coordinate system (as for the EVLA project).

The tasks `CONFI` and `UVCON` have been actively used in the study of configurations for ALMA by both the USA (M. Yun, L. Kogan) and European group (J. Conway). The simulation task `UVCON` has been used very intensively by Steven Heddle (Royal Observatory at Edinburgh, UK) for ALMA to compare the two group's designs (Alma Memo #290, March 2000, "Automation of Imaging simulation for array configurations using Classic AIPS" by S.Heddle and A. Webster, `http://www.heddle97.freeserve.co.uk/ALMA/CLEANIND.HTM`). `UVCON` was used for simulation of the future EVLA configuration (EVLA Memo #20 December, 2000, "Configuration Studies for the Expanded Very Large Array" by A. Cohen and R. Perley). Recently `CONFI` and `UVCON` were enhanced so they may be used in design of SKA, allowing up to 2000 antennas.

Recent *AIPS* and related Memoranda

The following new *AIPS* Memoranda are available from the *AIPS* home page.

105 *AIPS* Procedures for Initial VLBA Data Reduction
Jim Ulvestad, Eric W. Greisen, & Amy Mioduszewski (NRAO)
Version 2.0: April 26, 2001
This memo provides a guide to procedures currently available in *AIPS* (some in `31DEC00`, all in `31DEC01`) to do the initial processing steps of VLBA data reduction. These procedures are designed for VLBA-only observations, and make a number of assumptions that may not be appropriate for other types of VLBI experiments. Therefore, they should be used only with extreme caution for observations including non-VLBA antennas. The present memo discusses the key defaults that are used in the VLBA procedures, as well as the times when these procedures may not be appropriate. For more details regarding the procedures in the full context of VLBI data reduction, see Chapter 9 and Appendix C of the *AIPS CookBook*.

106 Making Movies from Radio Astronomical Images with *AIPS*
C. C. Cheung, D. C. Homan, J. F. C. Wardle, and D. H. Roberts
Brandeis University
June 6, 2001
We present a detailed recipe for making movies from multi-epoch radio observations of astronomical sources. Images are interpolated linearly in time to create a smooth succession of frames so that a continuous movie can be compiled. Here, we outline the procedure, and draw attention to specific details necessary for making a successful movie. In particular, we discuss the issues pertaining specifically to making polarization movies. The procedure described here has been implemented into scripts in NRAO's AIPS package (Brandeis AIPS Movie Maker – BAMM) that are available for public use (`http://www.astro.brandeis.edu`).

Patch Distribution for `31DEC00`

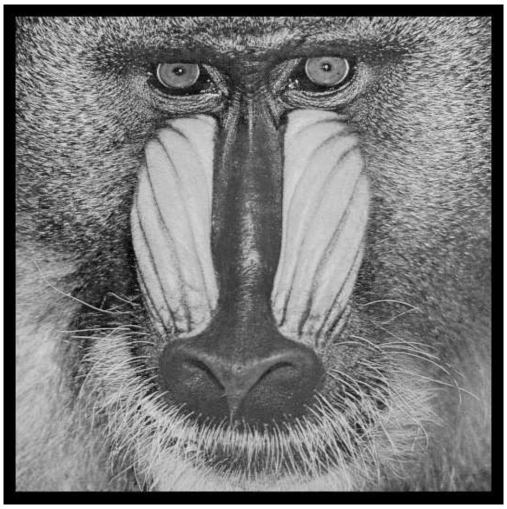
As before, important bug fixes and selected improvements in `31DEC00` can be downloaded via the Web beginning at:

`http://www.cv.nrao.edu/aips/patch.html`

Alternatively one can use *anonymous* `ftp` on the NRAO cpu `aips.nrao.edu`. Documentation about patches to a release is placed in the anonymous-ftp area `pub/aips/`*release-name* and the code is placed in suitable subdirectories below this. Information on patches and how to fetch and apply them is also available through the World-Wide Web pages for *AIPS*. As bugs in `31DEC01` are found, they are simply corrected since `31DEC01` remains under development. Corrections and additions are made with a midnight job rather than with manual patches. Remember, no matter when you received your `31DEC00` "tape," *you must* fetch and install its patches if you require them. Also note that we do not expect to make any more patches to `31DEC00`.

The `31DEC00` release had a few important patches including a new one in late May. These were:

1. `SCMAP` and `SCIMG` fail to handle taper correctly and `SCIMG` does not average channels and IFs. *2001-01-23*.
2. `FILLM` failed to catch Solar mode when it should and asserted that mode sometimes when it shouldn't *2001-01-26*.
3. `UVCON` needed updating to match changes made to the handling of model computation *2001-02-01*.
4. `PBCOR` fails to work correctly on data cubes *2001-04-09*.
5. `FRING` fails to work correctly on irregularly sampled data *2001-05-29*.



June 30, 2001

AIPSLETTER
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FIRST CLASS

To:

DATED MATERIAL-DO NOT DELAY