AIPSLETTER

Volume XXIII, Number 2: December 31, 2003

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
505–835–7236; Fax 505–835–7027
`daip@nrao.edu`
`http://www.aoc.nrao.edu/aips`

General developments in *AIPS*

Spam and e-mail

We receive on the order of 100 offers each day, many to enlarge portions of daip's anatomy or to reduce the rest, to tranquilize aipsmail while exciting some portions, to make money fast from home, to get out of debt "legally," to cheat producers of DVDs and other entertainment, to add to our PhD degrees presumably to avail ourselves of the many government grant programs, and, of course, to help wealthy widows and orphans in Africa. And then there are those that are totally gibberish or in some unknown foreign language. Please, if you need to reach us via e-mail, put a subject line that will be obviously concerned with AIPS installation or execution difficulties. If you do not hear from us in a few days, send the e-mail again with an improved subject line. We hit the "d" key all too rapidly these days.

Current and future releases

We now have formal *AIPS* releases on an annual basis with binary releases only for Solaris and Linux. All architectures can do a full installation from the source files. The current release is called `31DEC03` and is now frozen. If you took a development copy of this version at some earlier date, you may use the "Midnight Job" (MNJ) to bring it up to date. You need to run a MNJ only once in 2004 to convert your copy of `31DEC03` into the now frozen version. This *AIPSLetter* is intended to advise you of developments in this release.

We have begun a new version, called `31DEC04`, 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 `31DEC04`, you may update your installation whenever you want by running the MNJ 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 `31DEC04` *AIPS* over the Internet (via *anonymous* ftp).

The MNJ has been changed. The secure shell, with all its fragile complexities, is no longer required. Instead `mnj.aoc.nrao.edu` will serve up *AIPS* incrementally — or as a whole — using the Unix tool `cvs` running with anonymous ftp. 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.

AIPS is now copyright © 1995 through 2004 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

New releases must be installed from the tar ball for that release. The `cvs` system 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 installation has been seen to work. 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 `$HOME/.AIPSRC` file may be left in place, but it will need to be edited. The lines giving the `DOWNLOADED` and `UNPACKED` parameters should be deleted and the `CCOMOPT` line should be changed to point to the current release rather than the previous one — the `-I` parameter really should be `-I$INC` but that seems to confuse `install.pl`. Therefore, for now, the `$INC` has to be given in its full path name, which forces a re-edit with each release. If you have made special versions of `UPDCONFIG` and `do_daily.`*host*, you should preserve them under new names and restore them after the install. The `$AIPS_ROOT/AIPSPATH.*SH` files will need to be edited after the install if you wish to run multiple different versions of *AIPS*.

For Linux and Solaris Ultra systems only, a binary installation is available from CDrom, supported by `install.pl`. Alternatively, there are binary files which may be downloaded from

`ftp://ftp.aoc.nrao.edu/pub/software/aips/31DEC03`.

With a modern computer, it will be faster to recompile the programs locally using `install.pl`.

Patch Distribution for `31DEC02`

As before, important bug fixes and selected improvements in `31DEC02` can be downloaded via the Web beginning at:

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

Alternatively one can use *anonymous* `ftp` on the NRAO CPU `ftp.aoc.nrao.edu`. Documentation about patches to a release is placed in the anonymous-ftp area `pub/software/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 `31DEC04` are found, they are simply corrected since `31DEC04` remains under development. Corrections and additions are made with a midnight job rather than with manual patches. Remember, no matter when you received your copy of `31DEC02` or `31DEC03` *you must* fetch and install its patches if you require them.

The `31DEC02` release had a few important patches including a new one in September. These were:

1. `KNTR` to handle `LTYPE` not 3 for polarization vectors *2003-01-03*.
2. `FITLD` to handle multiple data types in one tape *2003-01-03*.
3. `IRING` to correct the centering *2003-01-10*.
4. `LWPLA` to use `ASPMM` for new `GREYS`, `KNTR`, `PCNTR` plots *2003-01-16*.
5. `FILLM` and `PRTTP` to read short records in VLA archive disk files *2003-03-20*.
6. `INDXR` to fill VLBI `CL` table properly *2003-05-21*.
7. RedHat 9 to link edit requires fixed Z routines *2003-06-24*.
8. `SETFC` to format field numbers > 999 correctly *2003-06-27*.
9. `OPTIMIZE.LIS` needs to be updated for GNU gcc 3.2.2 to prevent errors in imaging and bandpass calibration application *2003-09-11*.

Improvements of interest to users in 31DEC03

We expect to continue publishing the *AIPSLetter* approximately every six months along with the annual releases. There have been a number of changes in 31DEC03. In the last edition, we reported on a port to the MacIntosh OS/X ("Darwin") operating system. We also reported on a new pipeline reduction package for VLA data called VLARUN and four new tasks, SCLIM to scale images, LAYER to combine images into a color display, SHADO to determine the loss in sensitivity due to shadowing in proposed array designs, and DQUAL to eliminate unwanted qualifiers from a data set. Four new verbs were also described: IMDIST determines the angular distance between two image pixels, TVDIST uses the TV to select inputs for IMDIST, IM2TV converts between image and TV pixels, and TVILINE draws a line on the TV between two image pixels.

In the last six months, we have developed a new verb COODEFIN to set the celestial coordinates in an image header and a new procedure TVCOLORS to set the PLCOLORS adverb to emulate the TV display. There are four more tasks as well: DSTOK to eliminate cross-hand polarizations from a data set, DELZN to determine the residual clock errors and atmospheric delay and to correct the CL table accordingly, DFCOR to correct a CL table for differential atmospheric delay between the target and phase-reference sources, and FIT2A to convert a FITS image to an ASCII table primarily for use with site masks for array modeling.

The development version 31DEC04 contains everything to be described for 31DEC03. In addition, it already contains a few new things thought to be a bit risky for a soon-to-be-frozen version. These include correct self-scaling for binned plots in UVPLT, flagging based on data weights and other options in CLIPM, new options for the times for which DELZN computes corrections, and improved instructions for editing Clean boxes on the TV. You should consider getting 31DEC04 and keeping up with new developments using the MNJ.

Other than relatively minor differences, 31DEC03 is compatible in all major ways with the 15OCT98 and later releases. There are significant incompatibilities with older versions.

Plotting

Using full color in line drawings

In 31DEC02 *AIPS* plot files began to contain color concepts. They were allowed to have pseudo-colored and true-color images and to have lines and characters of different "types." These types then can be colored differently when the plot files are interpreted to output devices such as PostScript printers. These concepts have now been extended in 31DEC03 to include lines of explicit color determined by the plot task. The implementation is really quite simple — the plot task puts a color into the plot file and then all "color lines" drawn until the next color will be of that color. We have probably only begun to scratch the surface of what can be done with this tool, but the new capabilities are already very useful.

PCNTR was changed to offer full-color lines in one of two fashions both of which are illustrated on the color pages (10 & 11) at the end of this *AIPSLetter*. One choice allows you to plot contours of multiple spectral channels in colors representative of the relative velocities. The other choice allows you to plot polarization vectors in colors representative of the polarization angle. It is difficult to see the angles of short lines, so this option lets you see regions of similar or changing angle that might not otherwise be apparent. KNTR was also given these options, but KNTR will draw the contours of different spectral channels in different frames rather than overlaying them.

VPLOT was re-written to allow multiple IFs in a single plot and to use full-color to distinguish them if desired. BPLOT can now use full color to distinguish the antennas or times appearing on each plot. UVPLT can use full color to distinguish multiple spectral channels and IFs. SNPLT uses color similarly (see page 9) and can also use color to distinguish antennas in the SUM mode. PLOTR allows a color for each symbol to be read and plotted.

Other changes

TVCOLORS is a new procedure that captures the current color setting of the TV graphics planes and sets adverbs to LWPLA to make a plot resemble that seen on the TV.

EXTLIST was overhauled to be current with the many plot tasks whose inputs have changed in the last year. It was restructured to give us a better chance of keeping it current.

Tick labeling can now go down to micro-arcseconds. The code was made more centralized to simplify maintenance. Overlapping strings are less likely to get plotted.

POSSM had its usual share of egregious errors corrected. One of these was rather peculiar handling of fully-flagged IFs. The other was the plotting of cross- and auto-correlations. In that case, the buffers destroyed their contents and then didn't plot the right thing anyway. The plots are now more sensible.

GREYS was given the option to plot antenna panels on top of the grey-scale from holography.

UV data handling and calibration

APCAL

APCAL was improved substantially in its ability to estimate and correct for atmospheric opacity. The weather table (WX) which comes attached to the data is now used rather than requiring the user to provide some external table. Note that FITLD did not write the WX table correctly until mid-November 2003; data loaded prior to then may have incorrect WX data. The user may input initial estimates of the opacities and receiver temperatures, but new routines allow the task to estimate these parameters for the user. Errors that arose when a TIMERANGE or a limited set of ANTENNAS were specified have been corrected. APCAL was also changed to do standard plot things, such as support GRCHAN including multiple graphics channels and pause for user input on page full. The right hand plots are now apparent zenith opacity versus time to allow the user to find and edit bad data.

VLA Calibration Transfer in VLBI experiments

Since the summer of 2003, we have been working on calibration transfer of the VLA in VLBI experiments. Beginning in mid-November 2003, we are distributing the VLA gain curve, VLA system temperature and VLA weather information available for VLBI experiments which use the VLA. These data are in the form of tables attached to the correlated data. That is, the *AIPS* calibration path for the VLA single-dish antenna in a VLBI experiment will be the same as for a VLBA antenna and can be done in one go using the VLBAUTIL procedures described in Appendix C of the *AIPS CookBook*. When the VLA phased array is used in the observation, the user must insert the source flux density in the SU table before calibration. This will work okay as long as one uses the latest sched version to make the schedule and as long as the VLA antenna(s) do not change frequency setups too often. In the rare cases in which multiple setups in the same frequency band are used, this may not work fully and observers will be required to use the previous ANTAB method to get proper calibration. However, for most users, the extra calibration burden of using the VLA in a VLBA experiment is a thing of the past.

Between June 2003 and November 2003, the ANTAB input files deposited for the VLA on the aspen server were modified to include a best guess for the INDEX line. This means that most users will have to check, but not actually edit, the ANTAB files from that period. They can simple import them directly with ANTAB in *AIPS*.

Currently we are also looking into updating and attaching the GBT gain curves.

DELZN and DFCOR

VLBI correlators remove some estimate of the atmospheric delay at the elevation and frequency of the observation from the data. These a priori models are usually fairly good, but careful observations can improve upon them. Beginning with the 31DEC03 release, *AIPS* offers a number of options to deal with this problem. The task DELZN will use the delays in an SN table to fit for both clock and atmosphere (at zenith) delays as functions of time. It works best if the observations include data on a variety of calibrators well distributed around the sky. DELZN applies its calibration to a new CL table and also writes a text file. Task CLCOR has a new option ('ATMO') which can read this text file and update a CL table if needed.

There is also a new task in 31DEC03 to deal with the effects of zenith delay in phase-referencing observations. Phases for the target source in phase referencing are corrected by the phases at the calibrator which usually is at a different elevation. Task DFCOR is a special version of CLCOR which applies the 'ATMO' operation to correct the CL table for the difference in elevation between the target source and adjacent calibration sources without applying the full atmospheric delay correction.

Other VLBI-related changes

FITLD was fixed to correct antenna numbers as weather tables are appended to existing ones. Previously, WX tables from the VLBA Correlator could contain data with erroneous antenna numbers. FITLD was also changed to allow the reading of multiple disk files in one execution, which simplifies the antenna renumbering among other things.

MSORT was overhauled to keep it from going into nearly infinite loop states. Larger buffers and an alternative, brute-force sort scheme now make this task competitive or better than UVSRT in most cases.

GPHAS was dropped from *AIPS* since FRING does what it was supposed (and failed) to do.

VLBAUTIL procedures were upgraded to eliminate "hidden" options.

FRING bugs related to large numbers of channels and negative channel increments were squashed.

VLA archive data

The archive of raw VLA data is being placed on-line by the e2e project at the NRAO. The information to select which data you need is available from NRAO's web site and methods to select all data from a specific project have been developed. Most data in the archive are public, available to anyone, while recent data are within a proprietary period and passwords are required to access them. From the *AIPS* perspective, this development made it desirable to read archive data from disk as well as tape. PRTTP and FILLM have both been revised to read one or more data files from a user-specified disk directory. The file names must all be the same except for an appended "tape-file" number. This capability received some corrections and improvements during 2003.

The main improvements to FILLM in 31DEC03 concern the on-line reading of data as they are observed and the movement of those data into the archive. The data are now mirrored to disk files at the VLA and AOC and it is these mirror disk files that on-line FILLM reads. This allows on-line FILLM to back up to the beginning of an experiment to acquire the data already observed and then to continue to read new data as they are observed. The new system appears more reliable than the old tape-based one and allows the data to be available in the official archive almost immediately after the end of each day. The VLA uses a different position for the antenna when the Pie Town antenna is included in the array; a correction for this was put into FILLM to avoid the output of "empty" antenna files.

Other changes

UVFIX had significant errors dealing with multiple subarrays. It would not recognize the start of a new subarray and had trouble remembering the epoch and coordinates it should be using.

SNSMO did not handle the clipping of solutions properly, requiring among other things both polarizations to be present or the one remaining would be retained when it should be clipped. The attempt to deal with phase wrapping was corrected to handle an intervening failed solution.

SNFLG was generalized to handle two polarizations and an unlimited number of IFs. It allows options to flag one or all IFs and/or polarizations when one is flagged. It was corrected to recognize missing antennas as antenna flags and otherwise to try to keep the number of flags reasonable.

CLCOR was given the option to write a new CL table when performing its operation.

Models are supposed to be scaled when the source table has a total flux for a source. A subroutine was created to scale a Clean components model to match the flux in the source table and, incidentally, to scale an image model from `JY/BEAM` to `JY/PIXEL` while complaining about the use of Clean images for modeling. This subroutine is now called everywhere that source models are used.

DSTOK is a new task to drop the cross-hand polarizations from a data set.

VPFLG was changed to offer the option of flagging all IFs when any one is flagged.

CLCAL in interpolating the `SN` to the `CL` table applied `CUTOFF` to require both calibrators to be within the specified range, forbidding the case where one was close and the other too far away.

ELINT was changed to write its corrections directly to a `CL` table. Use of an `SN` table instead made it hard to avoid having `CLCAL` interpolate incorrectly between sources.

Calibration adverbs were missing from many tasks that allowed some of the calibration options. `BLVER` and `DOPOL` were missing quite commonly and `DOBAND` was also often overlooked. All have been added rather universally even though they are not always perfectly relevant.

FIXWT was completely rewritten. It now determines apparent weights from the noise in the data using all spectral channels but separating IFs and polarizations. Previously one small part of the data was used and applied to everything. It is not clear that the output is any more correct than that produced by standard use of `FILLM` and `FITLD` weights with `DOCAL = 2`.

Imaging, modeling, analysis

Imaging

VTESS and the other tessellation tasks were changed to use the standard primary beam routines. The default is now to apply a beam correction.

Primary beam calculations were made more general to encompass defaults for other telescopes and a full set of parameters was added for the Autralia Telescope.

SMOTH was cleaned up and corrected so that it deals sensibly with blanked pixels.

IMAGR was changed to combat a tendency to Clean too deeply in a major cycle near the beginning of high dynamic range cases. This resulted in numerous erroneous "sources" that had to be removed in later major cycles.

Modeling

CCEDT was corrected to handle circular windows and to record its actions fully in the history file.

JMFIT and `IMFIT` put the deconvolved Gaussians into the CC file in arc seconds rather than degrees. The displays for small cell sizes were improved.

UVCON was provided with standard VLA configuration files in the `$AIPSTARS` area.

FIT2A is a new task to convert an image plane in FITS format to a simple text-file in tabular form. This allows conversion of the format for site masks used by `CONFI` and other array optimization programs.

CONFI was changed to read either FITS or ascii forms of the topography data.

General items

MacIntosh OS/X

AIPS now works on Apple MacIntosh systems running the OS/X "Darwin" operating system, both the Jaguar (10.2) and Panther (10.3) releases. Details of how to prepare a Mac to install *AIPS* are given on a page off the main *AIPS* web page. Basically, one has to acquire a development form of a C compiler, a Fortran compiler, and X Windows. These instructions have changed recently, partly because the Panther release is now standard, partly because our old friend fink appears now to be doing something incompatible, partly because GNU has caught up to the Mac, and partly because IBM seems to be giving away a good compiler for Macs.

The base C and X Windows should come with Panther and are readily available from Apple. After that, one downloads from NRAO the GNU readline and gcc 3.3.2 tarballs and, following simple instructions, installs them. It is important to compile 3.3.2 with itself following a "bootstrap" option and then to compile readline with the resulting 3.3.2 compiler. One may then choose to install the IBM compiler as well — our web page sends you to theirs and they provide the instructions. Then *AIPS* installation proceeds just about normally.

Performance numbers on Macs have varied considerably. On 800-MHz iBook (G3 cpu) and PowerBook (G4 cpu) laptops, we found an AIPSMark$^{(00)}$ of 18. On an 866-MHz desktop with a G4 cpu, we obtained an AIPSMark$^{(00)}$ of 24 using the GNU compilers and 36 using the IBM compilers. On a new 1.8-GHz desktop with a G5 cpu, an AIPSMark$^{(00)}$ of 103 was obtained on the `Y2K` test using the IBM compiler and 65 using the GNU 3.3.2 compiler. We are still experimenting with IBM compiler options, but so far have found that the simpler `-O3` works better with *AIPS* than the more complicated sets of more agressive optimizations. For comparison, a 2.8 GHz Pentium IV, dual-headed and threaded box from Dell achieves an AIPSMark$^{(00)}$ of 104 with the GNU 3.2.2 compiler under RedHat 9.

Miscellaneous matters for users

CookBook chapters were updated for `OUTPUTS`, `DEFAULT`, FITS and VLA disk files, `VLARUN`, `CLCOR`, color plotting, `PBCOR`, `DELZN`, `SNSMO`, `APCAL`

COODEFIN is a new verb to define the celestial coordinates in an image header.

FITTP and `FITAB` offer to write a range of catalog slot numbers. Empty extension files have to be written to support modeling with multiple facets, some of which may have no Clean components.

FITLD can now read multiple disk files in a single run, so long as they are properly named (post-fixed number from 1 through `NCOUNT`). `FITLD` and `IMLOD` will now read all possible extension files.

FITS readers were improved to understand the official coordinate keywords `CD`i_j and `PC`i_j and to convert them as much as possible into the *AIPS* coordinate forms. This will help in the importation of images from IRAF in particular.

Miscellaneous matters for programmer types

install.pl continues to receive attention as user sites encounter problems. It now copies the MAKE.MNJ script and edits it to use the declared C compiler. Skipping the tar-ball download is now the default; this may reduce multiple downloads from the same site. A page (5a) was added to set the `LAPTOP` variable, fix the host name, and edit `LOGIN.*SH`. The initial date for the MNJ was changed to be taken from other files if the tarball is missing. `UNSHR` is no longer build and used to unpack `SHR` files. They are now correctly created and `sh` is all that is needed. The special code for `PP.FOR` on HPs was corrected.

MAKE.MNJ was corrected to allow the compiler to be set during installation and to make a more reliable `do_daily` script.

SHR files need to be created with quotes around the "magic strings" which start and terminate each file. When this is done, unpacking can be done with `sh` rather than a special *AIPS* program.

XAS was changed to determine the order of colors in the most general possible way. Byte order on the display host is not the only predictor of that order, but X Windows does provide the needed information if one only knows how to extract it.

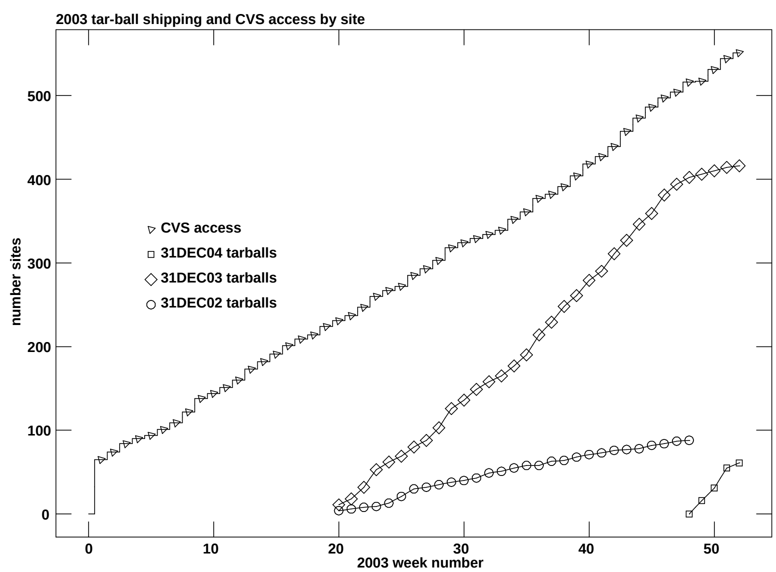
START_TVSERVERS was changed to avoid passing for example `$DISPLAY = localhost:11.0` to `XAS` since this really refers to some machine other than the local one. It now sends `$DISPLAY = $(`*tvdisp*`):0` where *tvdisp* is the machine on which `XAS` is supposed to run. This seems to cause problems when loop-back is not properly installed, but works better than the old way on most computers.

Character variables in call sequences should always be declared *e.g.*, `CHARACTER X*(*)`. If they are not and the calling routine sends too few or too many characters, bad things can and do happen.

AIPS Distribution

During all of 2003, we have been able to log accesses by IP number to our cvs site. Such accesses imply either an execution of `install.pl` (or more properly `MAKE.MNJ`) or the use of the "midnight job." Counting each unique IP address as a "site," there have been cvs contacts from 551 sites in 2003. This will be a bit of an over-estimate of real sites since dial-up connections may be assigned different IP addresses at different times. Nonetheless, it is impressive to us that well over 500 sites installed the `31DEC03` development version of *AIPS*. (Installations of `31DEC02` do not run `MAKE.MNJ` or the MNJ and so do not cause a cvs access.)

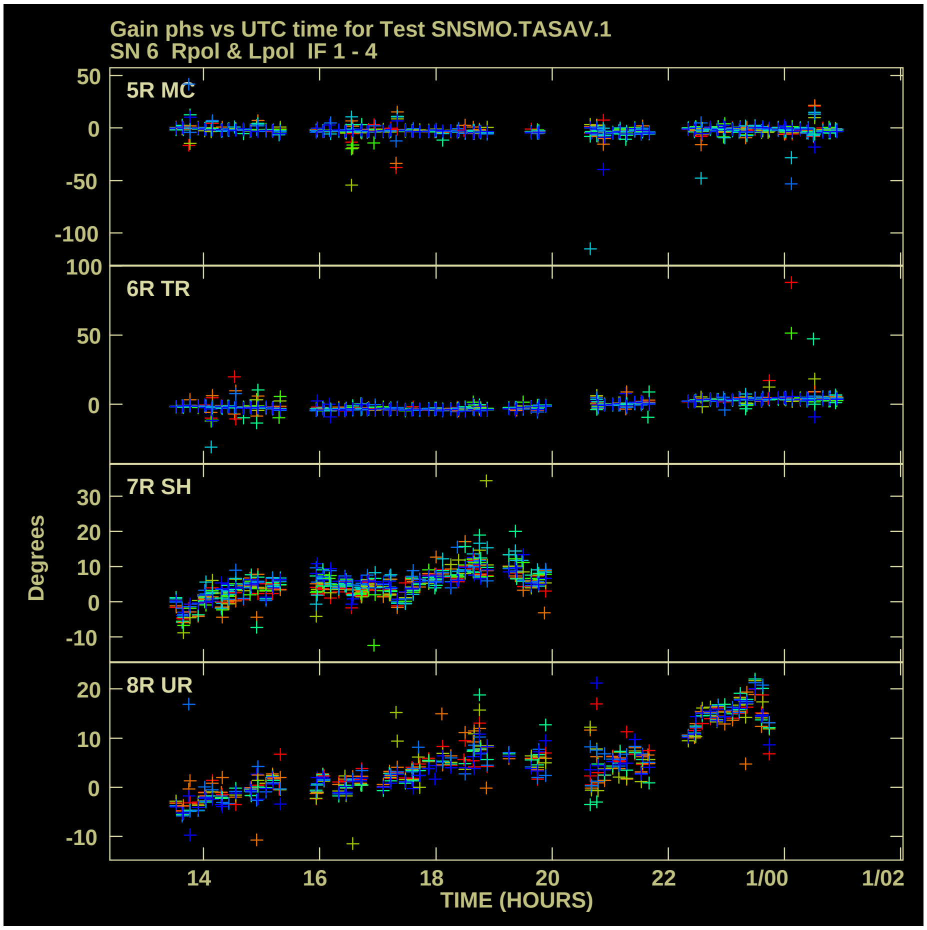
Beginning on May 18, 2003, we have been able to log the sites downloading the *AIPS* tar balls. During the rest of the year 88 separate IP addresses downloaded the `31DEC02` tar ball, while 416 downloaded that for `31DEC03`, and 63 have already downloaded `31DEC04`.. It is amazing to us how many sites download a tar ball (successfully) more than once. The rate of downloads seems to exceed that of cvs access sites, suggesting — not surprisingly — that not all tar balls get installed. The attached figure shows the cumulative number of cvs access sites and tar-ball download sites known to us as a function of week in 2003.



Recent *AIPS* and related Memoranda

All *AIPS* Memoranda are available from the *AIPS* home page. There are no new memoranda in the last six months. Chapters on FITS and *AIPS* written by Eric Greisen have now appeared in *Information Handling in Astronomy — Historical Vistas* edited by André Heck and published by Kluwer Academic Publishers.

Examples of color plotting

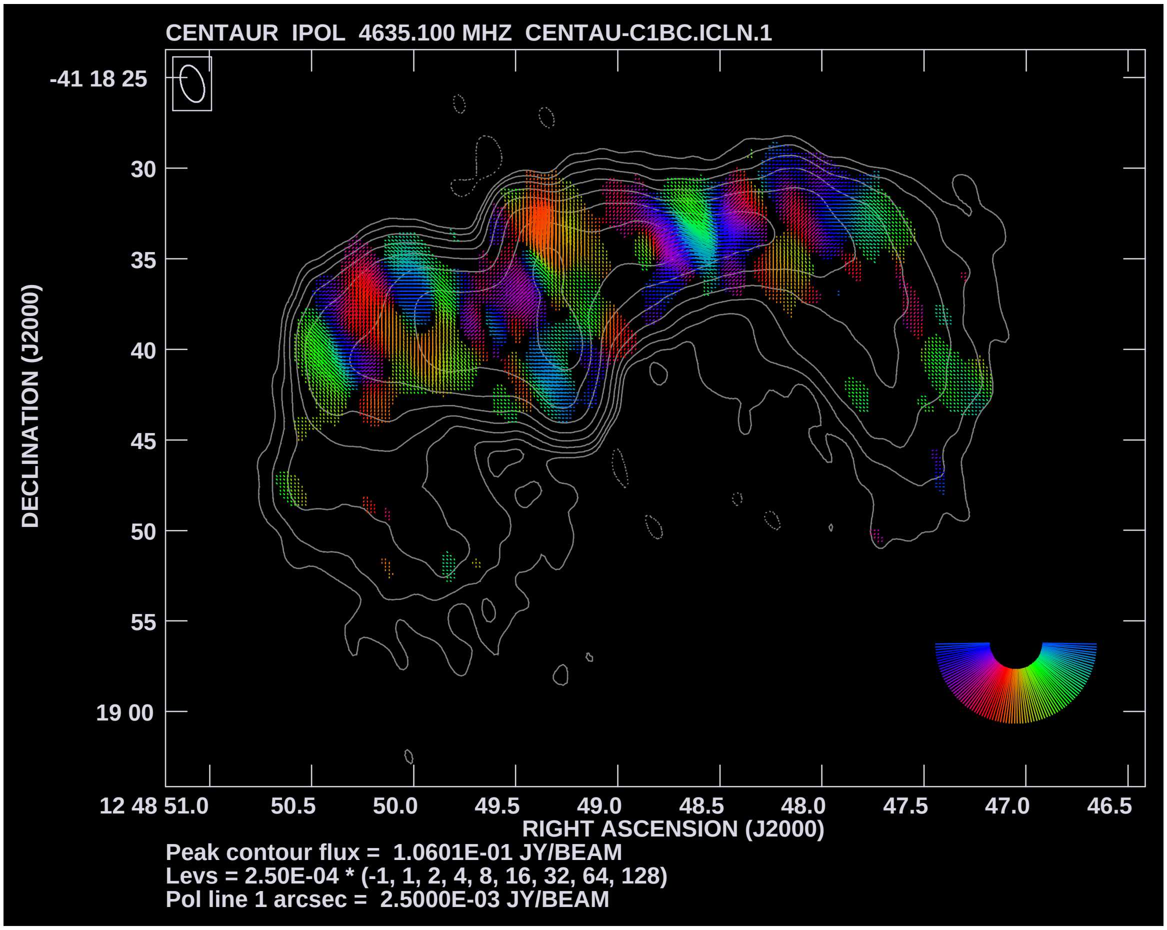



```
SNPLT:  Task to plot selected contents of SN, TY, PC or CL file.
INEXT      'SN'                    Input 'SN','TY','PC', 'CL'
INVERS       6                     Input table file version no.
STOKES     '    '                  Stokes type to plot: R, L,
                                      RR, LL, RRLL, DIFF, RATO
BIF          0                     First IF to plot, 0=>1.
EIF          0                     Last IF to plot 0 -> highest
ANTENNAS     5           6         Antennas to plot 0=>all
             7           8         *rest 0
NPLOTS       4                     Number of plots per page
XINC         1                     Plot every XINC'th point
OPTYPE     'PHAS'                  Data to be plotted:
                                   'PHAS','AMP ','DELA','MDEL',
                                   'RATE','TSYS','TANT','ATM ',
                                   'GEO ','DOPL','SNR ','SUM '
                                   'CCAL', 'DDLY', ' '=phas.
OPCODE     'ALSI'                  Type of plot:
                                   'IFDF' => diff BIF and EIF
                                   'IFRA' => ratio BIF and EIF
                                   'ALIF' => combine all IFs
                                   'ALST' => combine all Stokes
                                   'ALSI' => all IFs & Stokes
DO3COL       1                     > 0 use 3-color symbols for
                                   ALIF, ALST, ALSI OPCODEs and
                                   SUM OPTYPE.
XAXIS        0                     Variable data is to be
                                   plotted against, 0=>time.
```

```
FACTOR        1.5                Scale plot symbols by FACTOR
                                 0 -> 1
LTYPE        -3                  Type of labeling: 1 border,
                                 2 no ticks, 3 - 6 standard,
                                 7 - 10 only tick labels
                                 <0 -> no date/time

LWPLA:   Sends plot file(s) to a PostScript printer or file
PLVER         0                  Version # of PL file. 0=>last
INVERS        0                  PL file version #, upper
                                 limit if > PLVER
ASPMM         0                  Arc sec. per mm. 0=self scale
LPEN          3                  Pen width (dots).
RGBGAMMA      1           1      Gamma correction to apply
              2.5
DPARM       *all 0               (1,2) Clip recorded grays
                                     before FUNCTYPE (0 to 1)
DOCOLOR       1                  Use PLCOLORS ?
PLCOLORS      0.85        0.85   Line, character, background
              0.65        0.6    colors - see HELP.
              0.6         0.6      0           0
              0           0        0           0
              0.75        0.75     0.5         0
              0           0        0           0
              0           0        0           0
              0.75        0.75     0.5      *rest 0
```

SNPLT plots phases for four antennas with color indicating polarization and IF channel. Stokes 1, IF BIF is pure red changing through yellow, green, and cyan to Stokes 2, IF EIF as pure blue. When all symbols lie on top of each other, the last one (pure blue) will dominate.

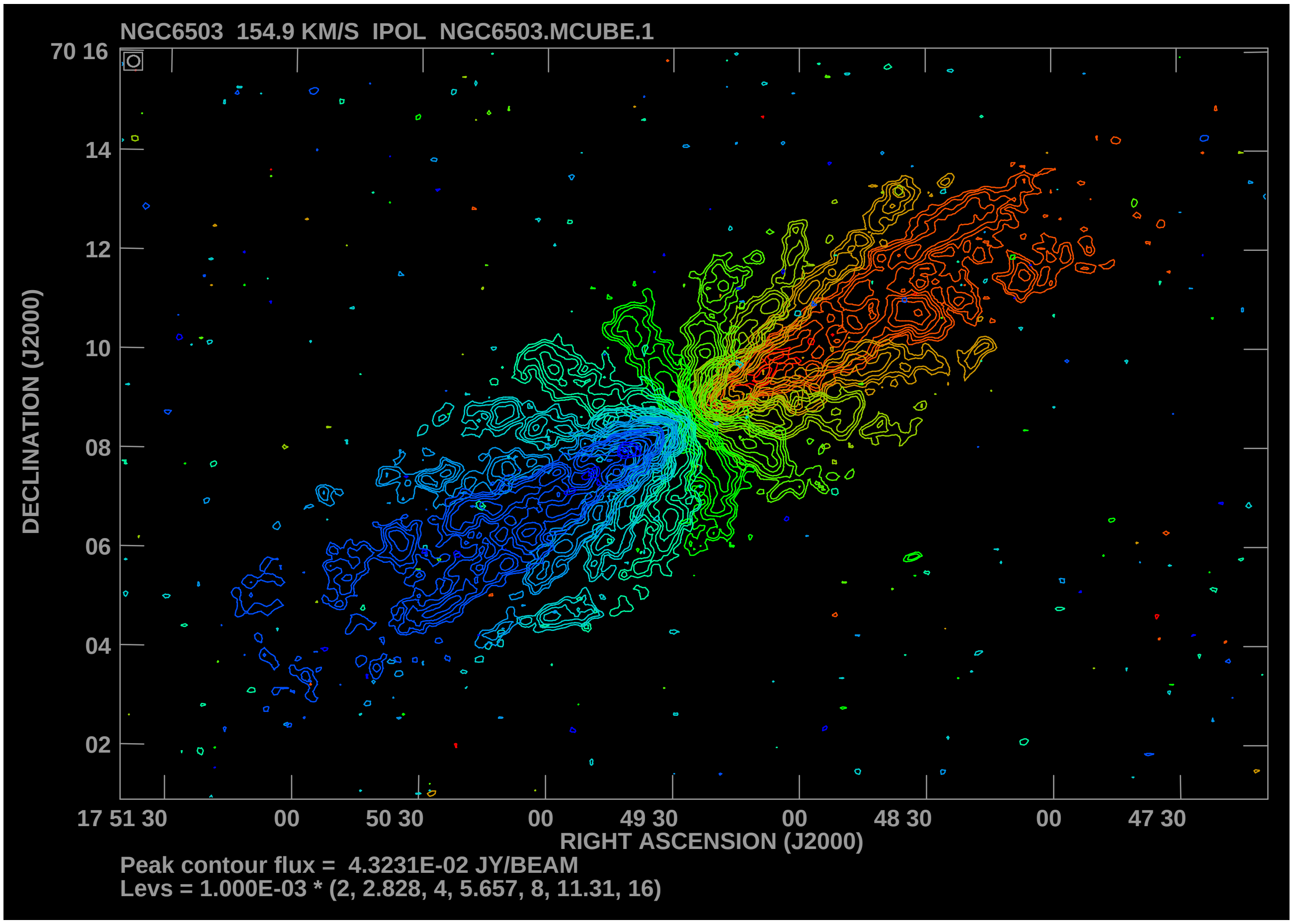



```
PCNTR:  Task to generate plot file for contour plus pol. vectors
DOCONT        1                    Draw contours? > 0 => yes
DOVECT        1                    Draw pol. vectors? > 0 => yes
DOGREY       -1                    Draw grey-scale image?
                                   Total intensity image:
INNAME     'CENTAU-C1BC '            Image name (name)
INCLASS    'ICLN  '                  Image name (class)
INSEQ         1                      Image name (seq. #)
INDISK        1                      Disk unit #
                                   Polarization intensity image:
IN2NAME    'CENTAU-C1BC '            (name) blank => INNAME
IN2CLASS   'QCLN  '                  (class) blank => 'PPOL'
IN2SEQ        1                      (seq. #) 0 => high
IN2DISK       0                      Disk drive #, 0 => any
                                   Polarization angle image:
IN3NAME    'CENTAU-C1BC '            (name) blank => INNAME
IN3CLASS   'UCLN  '                  (class) blank => 'PANG'
IN3SEQ        1                      (seq. #) 0 => high
IN3DISK       0                      Disk drive #,  0 => any
LTYPE        -3                    Type of labeling:
                                   <0 -> no date/time
CLEV       2.500E-04               Absolute value for levs
LEVS         -1           1        Contour levels (up to 30).
              2           4           8          16
             32          64         128        *rest 0
FACTOR     1000                    Mult. factor for Pol vector
                                      (see HELP)
```

```
ROTATE        0                    Angle to rotate Pol vector
                                      (in degrees)
XINC          1                    X-inc. of Pol vectors. 0=>1
YINC          1                    Y-inc. of Pol vectors. 0=>1
PCUT       1.250E-04               Pol. vector cutoff. P units.
ICUT       2.500E-04               Int. vector cutoff. I units.
POL3COL     160                    Color polarization vectors
                                   value in degrees = red
CBPLOT        4                    Position for beam plot:
                                     4: upper left


LWPLA:   Sends plot file(s) to a PostScript printer or file
RGBGAMMA      1           1        Gamma correction to apply
              2.5
DPARM      *all 0                  (1,2) Clip recorded grays
                                        before FUNCTYPE (0 to 1)
DOCOLOR       1                    Use PLCOLORS ?
PLCOLORS      0.85        0.85     Line, character, background
              0.9         0.5      colors - see HELP.
              0.5         0.5         0           0
              0           0           0           0
              0           0           0           0
              0           0           0           0
              0           0           0           0
              0.85        0.85        0.9      *rest 0
```

PCNTR plots contours and polarization vectors of Centaurus A. Color is used to show the complex changes in polarization position angle since the angles of short lines cannot be seen accurately. Data courtesy of Greg Taylor. For a discussion of this amazing pattern see Taylor, G.B., Fabian, A.C., & Allen, S.W. 2002, MNRAS, 334, 769, astro-ph/0109337 “Magnetic Fields in the Centaurus Cluster.”




```
PCNTR:  Task to generate plot file for contour plus pol. vectors
DOCONT        1                   Draw contours? > 0 => yes
DOVECT       -1                   Draw pol. vectors? > 0 => yes
BLC          51        167        Bottom left corner of images
             39       *rest 0
TRC         397        393        Top right corner of images
             89       *rest 0
CON3COL       5                   > 0 => overplot contours in
                                  color of multiple planes
                                  ZINC is CON3COL.
CLEV      0.001                   Absolute value for levs
LEVS          2         2.8284    Contour levels (up to 30).
              4         5.6569       8           11.3137
             16       *rest 0
CBPLOT        4                   Position for beam plot:
                                    4: upper left
```

```
LWPLA:     Sends plot file(s) to a PostScript printer or file
LPEN         3                        Pen width (dots).
RGBGAMMA     1           1            Gamma correction to apply
             2.5
DPARM     *all 0                      (1,2) Clip recorded grays
DOCOLOR      1                        Use PLCOLORS ?
PLCOLORS     0.6         0.6          Line, character, background
             0.6         0.06275      colors - see HELP.
             1           0              1            0.6706
             1           0              1            1
             0           0              0            0
             0           0              0            0
             0           0              0            0
             0.6         0.6            0.6       *rest 0
```

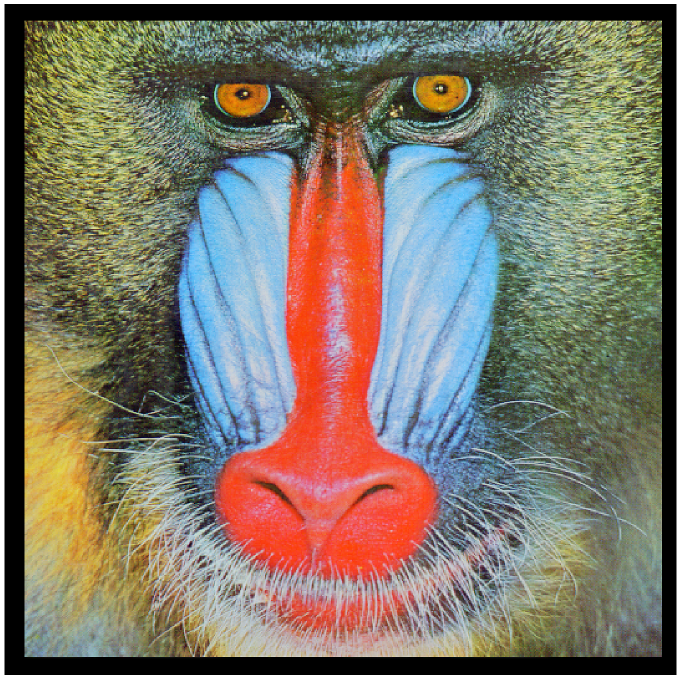
`PCNTR` plots contours every fifth plane from a data cube using colors related to the velocity. `LWPLA` adds coloring to the labeling and background and applies a gamma correction to blue. Data courtesy of Gustaaf van Moorsel and Eric Greisen.

AIPS Order Form

Conscientious readers will note that this issue does not contain a copy of the *AIPS* Order Form. Ernie Allen, who processes these forms, does not remember any of the paper forms being submitted this century. Henceforth, to submit a request for a binary copy of *AIPS* or paper copies of documentation, see

`http://www.aoc.nrao.edu/aips/forms/aipsorder.shtml`

or contact us at `daip@nrao.edu`.



December 31, 2003

AIPSLETTER
National Radio Astronomy Observatory
520 Edgemont Road
Charlottesville, VA 22903-2475
USA

FIRST CLASS

To:

DATED MATERIAL-DO NOT DELAY