



## **STSDAS Version 3.6 Release Notes**

**13 November 2006**

This release of STSDAS contains changes to SYNPHOT, NICMOS, CALSTIS, CALACS, MultiDrizzle, and the DITHER package.

New tasks have been added; namely,

- WX2D, MKTRACE and CTESTIS in the STIS package

Deprecated packages and tasks were removed; specifically,

- MODEINFO in the SYNPHOT package.

The specific changes are detailed in the following sections.

### **Platform Support**

Binaries for this release were built on Red Hat Enterprise Linux 3, Solaris 5.8, and Mac OS X 10.4 (PPC and Intel architecture).

Binaries for macintel were built and require iraf 2.13.beta from <http://iraf.net>.

### **Libraries**

#### **HSTIO**

The code in HSTIO which gets used for adding comments to FITS keyword cards in image headers was modified. Long keyword values occasionally caused segmentation violations when the length of the card would exceed 80 chars after adding the comment. A check was added to insure that adding the comment would not trigger this violation.

#### **HST\_CALIB**

#### **ACS**

CALACS has remained unchanged from the last release. However, the help files were cleaned up a bit to remove references to the STIS tasks used as the basis for some of the original code.

## NICMOS

The task SAACLEAN has been updated considerably from its initial (alpha) release in STSDAS v3.5.

### Parameter changes:

- The units of *histbinwidth* were changed so they match the units of the SAA persistence model image.
- The name of the parameter *histclip* was changed to *nclip*
- Two more legal values were added to the *applied* output parameter. It will now be set to *N/A* if the image was not SAA impacted, and to *aborted* if the task detected nonsensical values and failed gracefully.
- The task parameters were reordered so that the *thresh* parameter appears immediately after *fitthresh*.
- The *darkpath* parameter is now used to find the reference files only if the SAADFILE keyword is not set in the post-SAA exposure header, or if the file specified there cannot be found.
- Two additional diagnostic files are now created if the *alldiags* parameter is set. The *diag\_filenameroot\_hist.txt* file contains the version of the SAA persistence image histogram data that is actually fit. The *diag\_filenameroot\_gp\_iters.txt* contains the sequence of coefficients for each iteration in the gauss-poly fit.

### Algorithmic changes:

- Imagestats is no longer used to determine the domain threshold; instead, a gaussian-polynomial fit is performed to the SAA persistence image histogram (after some data massaging, as in the original IDL prototype). This produces a more robust estimate of the threshold. The final coefficients for the fit are printed to stdout. **Note:** This update changes the recommended values for parameters *histbinwidth* and *nclip* in the IRAF task parameters.
- The value of SCNAPPLD keyword in the *targimage* is now checked to ensure the correction is not applied twice to the same file. Text messages inform the user that this is not a good idea.
- The procedure for constructing the persistence model was changed to use a straight median, rather than a sigma-clipped median.
- The exception logic was changed for the case when the high-signal domain contains too few pixels; instead of raising an exception, a warning is now given and the task fails over to use the low-signal domain calculations only.

### Bugfixes:

- Corrected handling of the case when the specified *calcimage* is not the same as the *targimage*.
- Corrected number of pixels in each domain printed to diagnostic file.
- Corrected bug in reading the previously-existing SAA persistence model file (if *readsaper* is set)

## STIS

This release contains CALSTIS Version 2.23 (06-October-2006) and represents the calibration to be used for the final reprocessing of all STIS data taken prior to SM4. The new version of CALSTIS includes the following changes:

- blaze shift correction
  - Two problems need to be fixed for the CALSTIS echelle blaze shift correction. Part of

calculating the correction involves finding the observed wavelength at the middle of the reference spectral order. If the on-board Doppler shift was applied (or for time-tag data), this should be taken out when finding the index into the wavelength array. (The index also needs to be determined slightly differently for high-res data.) The second problem has to do with the wavelength array associated with the PCTAB (the correction for finite extraction height). The blaze shift correction is now applied to the wavelength array without the PCTAB info.

- The value written to keyword BLZSHIFT is now the average blaze shift over all orders in the output table.
- A new zero-point offset term has been added to the blaze shift correction.
- support for trace rotation as a function of time
  - The STIS team has determined that spectral traces show time evolution. This has been incorporated in new reference files. CALSTIS was changed to implement the rotation of the trace using the new reference files, providing more accurate traces.
- correction for a memory allocation problem when CTECORR is not PERFORM
- support for running x2d on the output of wx2d

New tasks were added to the STIS package.

- WX2D
  - This task uses wavelets to resample a 2-D spectral image in the cross-dispersion direction so that the spectral trace will be at a constant row number. The reason for creating this task is that it does a better job with undersampled data than does 'x2d'. The output from 'wx2d' will not be resampled in the dispersion direction, and it will not be flux calibrated; however, 'x2d' can be run on the output of 'wx2d' in order to perform both of these functions.
- CTESTIS
  - The purpose of the ctestis task is to correct signal levels of point-like sources in photometry tables measured from STIS CCD images for charge loss due to imperfect Charge Transfer Efficiency (CTE). The algorithm used to correct for CTE-induced signal loss is the one published in Goudfrooij, Bohlin, Maiz-Apellaniz, & Kimble, 2006, PASP, October 2006 edition (astro-ph/0608349). The values of CTE loss derived using this algorithm should be accurate to about 3% RMS (tested for data taken between March 1997 and August 2004).
- MKTRACE
  - This task refines the traces in a trace table based on a science spectrum and its grating and central wavelength. A trace is generated from a science file by fitting a gaussian to each column. The two traces bracketing the computed trace center are extracted from the trace table and interpolated. The correction is computed as the difference between the weighted linear fits to the science trace and to the interpolated trace. The correction is applied to all traces in the trace table with that particular OPT\_ELEM and CENWAVE. An updated trace table is then written out to the current directory.

The Python code for the tasks SSHIFT and STISNOISE were moved from the STIS package to the STSCI\_PYTHON tree. This allows the tasks to be distributed and run separately from IRAF or STSDAS, as they have no inherent dependencies on either environment. These tasks still retain their IRAF interfaces in the STIS package.

## Synphot

The MODEINFO task has been removed, since the Synphot Data Manual provides the same information

in more detail, and is on a yearly update schedule. The help file for the OBSMODE task was also updated to reference the Synphot Data Manual.

Preparations were made for supporting WFC3 and COS in the near future; specifically,

- wavelength tables for COS observing modes were added to the SYNPHOT data files, and
- WFC3 data range in *wavecat.dat* was modified to span from 1750-18000Å, while adding special ranges for WFC3 gratings G280, G102 and G141.

The Vega spectrum used by synphot (*vega.dat*) was replaced by an ascii version of the newly delivered *crcalspec\$alpha\_lyr\_stis\_003.fits*. Numeric precision in the ascii file was taken from the TDISP formats for the WAVELENGTH and FLUX columns in the FITS file. The new spectrum is described in Bohlin 2007, in *The Future of Photometric, Spectrophotometric and Polarimetric Standardization*, ASP Conference Series (in press).

## **ANALYSIS**

### **PyDrizzle**

PyDrizzle Version 5.7.0 (1-Sep-2006) eliminates any differences in results obtained from the the IRAF tasks DRIZZLE and WDRIZZLE. In addition to all the internal bug fixes necessary to obtain this agreement, the following changes were also made:

- When the distortion coefficients include a "flip", the computed overlap with kernel='square' now works instead of returning zero for the pixel overlaps.
- The IRAF interface code was revised to automatically update the version parameter based on the version of the Python code.
- The additional offset of 1,1 when the user specifies the output frame (RA, Dec, size, scale and/or orientation) was removed.

Testing indicates that the accuracy of the distortion coefficients and WCS header keywords now drive the errors in image alignment.