How I Found My Place in the Universe
(and helped everybody else find theirs)

By
Jessica Mink
Smithsonian Astrophysical Observatory

Harvard Smithsonian Center for Astrophysics, May 6, 2015
Outline

Planet Surfaces: 1973-4 Mars Observations

Stars and Planets: 1976-1990 Occultations

Milky Way: 1985-1990 IRAS and Spacelab 2 IRT

The Universe: 1990-2015 WCS, Plates, and Spectroscopy

American Museum of Natural History, April 13, 2015
It All Started With Mars

MIT Vidicon Spectrometer with camera monitoring slit in mirror

Spectrometer slit reprojected across Mercator projection of Mars surface
(Mink, MIT S.M. Thesis 1974)
It All Started With Mars

Aperture photos projected on observed planet disk and reprojected onto Mercator projection of Mars

(Mccord, Huguenin, Mink, and Pieters, Icarus 31, 1977)
Mars Photometry Projections

Orthographic: Face-on planet in sky

Mercator: Map of entire planet surface

Sky Plane Planetocentric: Predictions
Then Came Uranus

Occultation of SAO 158687 by Uranus and Its Rings

(Eliot, Dunham, and Mink, Nature 261, 328, May 26 1977)
Finding Stars to be Occulted

Map showing appulse of the Pluto/Charon system to a star
Note rotation of Charon around Pluto and variations in star position
Mapping observability

Geocentric prediction of Uranus 16

Sun down, Uranus up for Uranus 16
Predicting Occultations

Palomar Sky Survey overlay for stars occulted by Uranus

Sky plane map of Uranus ring occultation of KMU102
Predicting Occultations

Venus Occultation of SAO 160149 on January 21, 2003

Click here for predictions for various cities

Catalog positions at 2003-01-21 11:00 UT
The arcsec column gives the distance from the SAO position

<table>
<thead>
<tr>
<th>Catalog</th>
<th>RA(J2000)</th>
<th>Dec(J2000)</th>
<th>Mag</th>
<th>Type</th>
<th>Arcsec</th>
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<tbody>
<tr>
<td>SAO</td>
<td>16:51:54.416</td>
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<tr>
<td>PPM</td>
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<td>8.60</td>
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<td>2.87</td>
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<td>Tycho2</td>
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<td>V</td>
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The following positions are at the catalog epochs

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<th>Mag</th>
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<th>Band</th>
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<td>6</td>
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<td>GC ACT</td>
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<td>6</td>
<td>0</td>
<td>1</td>
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<td>2MASS</td>
<td>16:51:54.544</td>
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<td>7.399</td>
<td>7.151</td>
<td>1.067</td>
<td>1.93</td>
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Finding Charts

Click for larger map of Venus occultation of SAO position

Click for larger map of Venus occultation of PPM position

Click for larger map of Venus occultation of Tycho-2 position
Occultation Projections

Mercator: Observability maps of earth's surface

Linear: Sky maps with stars and planets

Sky Plane: Planetocentric Occultation Predictions
All Sky IR Mapping from Space

IRAS 120 µm
Aitoff All-Sky Projection
1984 Data Release HCON 1
IRAS Projections
(used with IRT, too)

Edited by C.A. Beichman, G. Neugebauer, H.J. Habing, P.E. Clegg, T.J. Chester
X. The Formats of the IRAS Catalogs and Atlases, D. Extended Emission

Polar: Maps of sky around North and South Poles

Aitoff: Map of entire sky

Sinusoidal: Maps of galactic plane

Gnomonic: Maps of regions of sky
All-Sky IR Mapping from Space

Spacelab 2 Infrared Telescope
(Space Shuttle Challenger, July 1985)
All Sky IR Mapping from Space

COMMENT PROJECTION FORMULAE:
COMMENT FORWARD FORMULA; XLON0 IS THE CENTER LONGITUDE OF THE
COMMENT MAP. ARC-SINE AND ARC-COSINE FUNCTIONS ARE REQUIRED.
COMMENT R2D = 45. / ATAN(1.)
COMMENT PIX = 2.
COMMENT RHO = ACOS( COS(XLAT) * COS((XLON-XLON0)/2.) )
COMMENT THETA = ASIN( COS(XLAT) * SIN((XLON-XLON0)/2.) / SIN(RHO) )
COMMENT F = 2. * PIX * R2D * SIN(RHO/2.)
COMMENT SAMPLE = -2. * F * SIN(THETA)
COMMENT XLINE = -F * COS(THETA)
COMMENT IF(XLAT .LT. 0.)  XLINE = -XLINE
COMMENT
COMMENT REVERSE FORMULA; XLON0 IS THE CENTER LONGITUDE OF THE MAP.
COMMENT ARC-SINE AND ARC-COSINE FUNCTIONS NEEDED.
COMMENT R2D = 45. / ATAN(1.)
COMMENT PIX = 2.
COMMENT Y = -XLINE / (PIX * 2. * R2D)
COMMENT X = -SAMPLE / (PIX * 2. * R2D)
COMMENT A = SQRT(4.-X*X-4.*Y*Y)
COMMENT XLAT = R2D * ASIN(A*Y)
COMMENT XLON = XLON0 + 2. * R2D * ASIN(A*X/(2.*COS(XLAT)))
COMMENT
COMMENT REFERENCES:
COMMENT IRAS SDAS SOFTWARE INTERFACE SPECIFICATION(SIS) #623-94/NO. SF05
COMMENT ASTRON. ASTROPHYS. SUPPL. SER. 44,(1981) 363-370 (RE:FITS)
COMMENT RECONCILIATION OF FITS PARMS W/ SIS SF05 PARMS:
COMMENT NAXIS1 = (ES - SS + 1); NAXIS2 = (EL - SL + 1);
COMMENT CRPIX1 = (1 - SS);       CRPIX2 = (1 - SL)
All Sky IR Mapping from IRT

1985 Day 213, Orbit 4, 50,964 0.1-sec frames

Spacelab 2 Infrared Telescope
(Space Shuttle Challenger, July 1985)
Galactic Center from IRT

FIG. 5.—Contour map of the 2.4 μm emission from the Galactic plane region. The contours are spaced logarithmically in 10 steps between $0.67 \times 10^{-10}$ and $16 \times 10^{-10}$ W cm$^{-2}$ μm$^{-1}$ sr$^{-1}$.

Linear Projection in Galactic Coordinates

(Kent, Mink, Fazio, Koch, Melnick, Tardiff, Maxson, ApJS 78:403-408, 1992)
Galactic Center from IRT

Linear Projection in Galactic Coordinates
(Mink, August 1990, unpublished)
All-Sky Maps meet Catalogs
All-Sky Maps meet Catalogs

Space Telescope Guide Star Catalog, Galactic Plane, Aitoff Projection
Galileo's Telescope Expands the Sky

Owen Gingerich will present a keynote address at a conference sponsored by the American Academy of Rome celebrating the moment in 1611 when Galileo Galliei proudly presented the "telescope" to the intelligentsia of Rome... the Academy asked Paine Professor of Astronomy and director of the Harvard-Smithsonian Center for Astrophysics Irwin Shapiro and his Center colleague Douglas Mink to produce a map of the stars as they appeared over Rome on the night of April 14, 1611. For their efforts, Shapiro and Mink received a Jeroboam of champagne; Gingerich, however, got a trip to Rome. (Harvard Gazette, April 10, 1997)
Onto the World Wide Web

The Smithsonian Astrophysical Observatory (SAO) is part of the Harvard–Smithsonian Center for Astrophysics in Cambridge, Massachusetts. The SAO/TDC creates and maintains software to process and archive data from optical and infrared telescopes in Harvard, Massachusetts and on Mt Hopkins in Arizona.

The SAO TDC distributes several pieces of software:
- RVSAO: an IRAF package for finding radial velocities from spectra
- RSC: a program for searching the Hubble Space Telescope Guide Star Catalog.
- SKYMAP: a program for mapping star catalogs onto the sky.

The staff of the TDC are:
- Doug Mink, software developer
- Mike Kurtz, software philosopher

Astronomical Software Elsewhere

Other Astronomical Resources

Navigating the Internet

A useful introduction to the World–Wide Web (WWW) is available from NASA/Goddard.

Last updated 12 November 1993
SKYMAP is an astronomical mapping program written in Fortran and C for Unix workstations by Doug Mink of the Smithsonian Astrophysical Observatory Telescope Data Center. If you just need positions, several other options are available. The WCSTools package contains C programs which can search the GSC, USNO, and SAO catalogs, among others. The obsolete programs, rgse for the Guide Star Catalog and star and its variants for other catalogs, use the same Fortran and C code as skymap.

Manual

Examples [Grid] [Guide Stars] [New Field] [Field from catalog]

Commands [Command Line] [Menu] [Cursor]

Installation

Parameters: [Dictionary] [Format]

Catalogs [ASCII] [Binary]

Reference D. Mink (1993), ADASS II [full text]

Notes

Versions

Last updated 3 April 2003 by Doug Mink, dmink@cfa.harvard.edu
Digitized Sky Survey Projection


PLTLABEL = 'E1356             ' /Observatory plate label
PLATEID = '08MC              ' /GSSS Plate ID
REGION = 'XE429             ' /GSSS Region Name
DATE-OBS= '23/03/55          ' /UT date of Observation
UT     = '06:02:00.00       ' /UT time of observation
EPOCH   = 1.9552226562500E+03 /Epoch of plate
PLTRAH  = 10               /Plate center RA
PLTRAM  = 7                /Plate center Dec
PLTRAS  = 5.5528480000000E+01 /Plate Scale arcsec per mm
PLTDECSN= '+' /Plate center Dec
PLTDECDec = 17             /Plate solution x coefficients
PLTDECM = 17               /Plate solution y coefficients
EQUINOX = 2.0000000000000E+03 /Julian Reference frame
equinox

EXPOSURE= 5.0000000000000E+01 /Exposure time minutes
BANDPASS= 8 /GSSS Bandpass code
PLTGRADE= 1 /Plate grade
PLTSIZE= 6.7200000000000E+01 /Plate Scale arcsec per mm
SITELAT = '+33:24:24.00       ' /Latitude of Observatory
SITELONG= '-116:51:48.00     ' /Longitude of Observatory
TELESCOP= 'Palomar 48-inch Schmidt' /Telescope where plate taken

CNPIX1 = 10748 /X corner (pixels)
CNPIX2 = 2023 /Y corner

DATATYPE='INTEGER*2        ' /Type of Data

XPIXELSZ= 2.5284450000000E+01 /X pixel size microns
YPIXELSZ= 2.5284450000000E+01 /Y pixel size microns

PPO1 = 0.00000000000000E+00 /Orientation Coefficients
PPO2 = 0.00000000000000E+00 /
PPO3 = 1.7747471555000E+05 /
PPO4 = 0.00000000000000E+00 /
PPO5 = 0.00000000000000E+00 /
PPO6 = 1.7747471555000E+05 /

AMDX1 = 6.7241844402360E+01 /Plate solution x coefficients
AMDX2 = 3.975784595110E-01 /
AMDX3 = -2.0498717200880E+02 /
AMDX4 = -1.3607216767070E-05 /
AMDX5 = -2.2201873529570E-05 /
AMDX6 = 7.4284599162830E-07 /
AMDX7 = 0.00000000000000E+00 /
AMDX8 = 1.9162087720540E-06 /
AMDX9 = -9.2146076767620E-10 /
AMDX10 = 2.1089546421680E-06 /
AMDX11 = -9.3945135632070E-08 /

AMDY1 = 6.7256622034650E+01 /Plate solution y coefficients
AMDY2 = -3.9844579471320E+01 /
AMDY3 = -6.8591056129870E+01 /
AMDY4 = -1.3176449798960E+05 /
AMDY5 = -7.8391468151820E-06 /
AMDY6 = -7.4802178840710E-07 /
AMDY7 = 0.00000000000000E+00 /
AMDY8 = 1.8834016180180E-06 /
AMDY9 = -1.9452422448560E-07 /
AMDY10 = 2.15740273462190E-06 /
AMDY11 = -1.6009508926300E-08 /
Digitized Sky Survey Projection


DS9 display of DSS image with previous header

DS9 display of same DSS image with regions generated by WCSTools imcat program which remotely accessed the GSC2 catalog
AIPS Projections

The eight most commonly-used projections of classic AIPS may be computed using the `worldpos` and `worldpix` subroutines written by Bill Cotton and Eric Greisen of NRAO:

SIN: Orthographic projection
TAN: Tangent plane projection
ARC: Zenithal equidistant projection
NCP: North celestial pole projection
GLS: Sanson-Flemsteed sinusoidal projection
MER: Mercator projection
AIT: Hammer-Aitoff equal area all-sky projection
STG: Stereographic projection (zenithal orthomorphic)

Fitting a WCS using WCSTools

USNO-B1.0 Catalog plotted over image using telescope pointing

FITS header with limited WCS keywords from telescope
Fitting a WCS using WCSTools

USNO-B1.0 Catalog plotted over image after imwcs WCS fit

FITS header with WCS keywords after WCS fit using imwcs
Finding Stars for WCSTools

WCSTools supports several ways to find the star-like objects in an image

• WCSTools IMSTAR task (also built into IMWCS)

• IRAF DAOFIND task (its X,Y,Magnitude is WCSTools standard position format)

• Sextractor (output formattable to WCSTools standard)
### FITS-WCS Projections


<table>
<thead>
<tr>
<th>AZP: Zenithal (Azimuthal) Perspective</th>
<th>COD: COnic equiDistant</th>
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<tbody>
<tr>
<td>SZP: Slant Zenithal Perspective</td>
<td>COE: COnic Equal area</td>
</tr>
<tr>
<td>TAN: Gnomonic = Tangent Plane</td>
<td>COO: COnic Orthomorphic</td>
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<tr>
<td>SIN: Orthographic/synthesis</td>
<td>BON: Bonne</td>
</tr>
<tr>
<td>STG: Stereographic</td>
<td>PCO: Polyconic</td>
</tr>
<tr>
<td>ARC: Zenithal/azimuthal equidistant</td>
<td>SFL: Sanson-Flamsteed</td>
</tr>
<tr>
<td>ZPN: Zenithal/azimuthal PolyNomial</td>
<td>PAR: Parabolic</td>
</tr>
<tr>
<td>ZEA: Zenithal/azimuthal Equal Area</td>
<td>AIT: Hammer-Aitoff equal area all-sky</td>
</tr>
<tr>
<td>AIR: Airy</td>
<td>MOL: Mollweide</td>
</tr>
<tr>
<td>CYP: CYlindrical Perspective</td>
<td>CSC: COBE quadrilateralized Spherical Cube</td>
</tr>
<tr>
<td>CAR: Cartesian</td>
<td>QSC: Quadrilateralized Spherical Cube</td>
</tr>
<tr>
<td>MER: Mercator</td>
<td>TSC: Tangential Spherical Cube</td>
</tr>
<tr>
<td>CEA: Cylindrical Equal Area</td>
<td>NCP: North celestial pole (special case of SIN)</td>
</tr>
<tr>
<td>COP: COnic Perspective</td>
<td>GLS: GLocal Sinusoidal (Similar to SFL)</td>
</tr>
</tbody>
</table>
## More Catalogs

These catalogs are available and supported by [SAO/TDC search and mapping software](https://www.astro.caltech.edu/SAO/TDC/).

<table>
<thead>
<tr>
<th>Catalog or Format</th>
<th>No. of Stars</th>
<th>Bytes</th>
<th>Region Search</th>
<th>Image Search</th>
<th>Mapping</th>
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<td>1,036,968,787</td>
<td>83,614,080,960</td>
<td>suab1 (scat)</td>
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<td>GSC II Catalog (2.2.01)</td>
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<td>GSC:ACT Catalog</td>
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<td>sgcsca (scat)</td>
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<td>SDSS Photometry Catalog</td>
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<td>HST Guide Star Catalog</td>
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<td>1,231,787,520</td>
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<td>22,734,656</td>
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<td>inppm (imcat)</td>
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<td>ship (scat)</td>
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<td>Yale Bright Star Catalog</td>
<td>3296</td>
<td>291,548</td>
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<td>Starbase tab-delimited ASCII</td>
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<td>scat</td>
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<td>TDC Space-Delimited ASCII</td>
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<td>TDC Binary</td>
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<td>USNO-A2.0 Catalog</td>
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<td>USNO-SA2.0 Catalog</td>
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<td>suan1 (scat)</td>
<td>inu1 (imcat)</td>
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<td>susa1 (scat)</td>
<td>inusa1 (imcat)</td>
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<tr>
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<td>238,538,168</td>
<td>sujc (scat)</td>
<td>inujc (imcat)</td>
<td>skmap</td>
</tr>
</tbody>
</table>
Testing Catalog Accuracy

216 1x1 degree fields from the 8K array on the KPNO 36-inch telescope cover half of the CfA Century survey, 50 degrees across the sky.
Testing Catalog Accuracy

The 2MASS Point Source Catalog plotted over one of the 1728 test images
Testing Catalog Accuracy

Astronomical Data Analysis Software and Systems XIII, F. Ochsenbein, M. Allen,
and D. Egret, eds. ASP Conference Series, Vol. 314, p. 141

Differences between catalogs and WCS fits to 1726 images
Testing Catalog Accuracy

D. J. Mink (2010) Unpublished

Differences between catalogs and WCS fits to 1726 images
Accommodating image distortions in WCSTools

WCSTools supports several methods of fitting distortions to images as this seems not to be standardizable:

- Digitized Sky Survey Plate Model
- IRAF TNX and ZPX projections with polynomial distortion
- Spitzer/STScI polynomial distortion model
- SWARP polynomial distortion model
## WCS projections supported by WCSTools

<table>
<thead>
<tr>
<th>Code</th>
<th>Projection</th>
<th>Code</th>
<th>Projection</th>
</tr>
</thead>
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<tr>
<td>PIX</td>
<td>Pixel WCS</td>
<td>COO</td>
<td>Conic Orthomorphic</td>
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<tr>
<td>LIN</td>
<td>Linear projection</td>
<td>BON</td>
<td>Bonne</td>
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<tr>
<td>AZP</td>
<td>Zenithal/Azimuthal Perspective</td>
<td>PCO</td>
<td>Polyconic</td>
</tr>
<tr>
<td>SZP</td>
<td>Zenithal/Azimuthal Perspective</td>
<td>SFL</td>
<td>Sanson-Flamsteed (Global Sinusoidal)</td>
</tr>
<tr>
<td>TAN</td>
<td>Gnomonic = Tangent Plane</td>
<td>PAR</td>
<td>Parabolic</td>
</tr>
<tr>
<td>SIN</td>
<td>Orthographic/synthesis</td>
<td>AIT</td>
<td>Hammer-Aitoff</td>
</tr>
<tr>
<td>STG</td>
<td>Stereographic</td>
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<td>Mollweide</td>
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<tr>
<td>ARC</td>
<td>Zenithal/azimuthal equidistant</td>
<td>CSC</td>
<td>COBE quadrilaterized Spherical Cube</td>
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<tr>
<td>ZPN</td>
<td>Zenithal/azimuthal Polynomial</td>
<td>QSC</td>
<td>Quadrilaterized Spherical Cube</td>
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<td>ZEA</td>
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<td>TSC</td>
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<td>Airy</td>
<td>NCP</td>
<td>Special case of SIN from AIPS</td>
</tr>
<tr>
<td>CYP</td>
<td>CYlindrical Perspective</td>
<td>GLS</td>
<td>Same as SFL from AIPS</td>
</tr>
<tr>
<td>CAR</td>
<td>Cartesian</td>
<td>DSS</td>
<td>Digitized Sky Survey plate solution</td>
</tr>
<tr>
<td>MER</td>
<td>Mercator</td>
<td>PLT</td>
<td>Plate solution (SAO corrections)</td>
</tr>
<tr>
<td>CEA</td>
<td>Cylindrical Equal Area</td>
<td>TNX</td>
<td>Tangent Plane (NOAO corrections)</td>
</tr>
<tr>
<td>COP</td>
<td>Conic Perspective</td>
<td>ZPX</td>
<td>Zenithal Polynomial (NOAO corrections)</td>
</tr>
<tr>
<td>COD</td>
<td>Conic equidistant</td>
<td>TPV</td>
<td>Tangent Plane (SCAMP corrections)</td>
</tr>
<tr>
<td>COE</td>
<td>Conic Equal area</td>
<td>TAN-SIP</td>
<td>Tangent Plane (Spitzer corrections)</td>
</tr>
</tbody>
</table>
Putting Positions on Harvard's Plates


From hand-written cards and logbooks
Putting Positions on Harvard's Plates


From three floors of cabinets of glass plates
Putting Positions on Harvard's Plates

From glass to bytes on home-built scanner
Putting Positions on Harvard's Plates

Zoom in and overplot stars using WCS

M44 in Plate MC21438

M44 in Plate MC21438 with Tycho 2 Catalog stars marked
Putting Positions on Harvard's Plates

100,000th Plate Scanned, April 7, 2015
sethead sets values of keywords in FITS Headers

Each keyword should be followed by an equal sign and the value to which it is to be set.

Values which are all numeric are assumed to be numbers and are aligned as such within the header.

A list of filenames may be used by prefacing the name of the file containing the list with a @.

Multiple FITS extension headers may be changed at once using -x [range of extension numbers]

Change the right ascension and declination of a FITS image to a different epoch.

Before:
RA = '9:51:19.45' /MEAN RA
DEC = '69:15:26.42' /MEAN DEC
EPOCH = 1950 /MEAN EPOCH


SETHEAD WCSTools 3.9.1, 24 March 2015, Jessica Mink (jmink@cfa.harvard.edu)
Set Header Parameter Values in FITS image file test.fts
RA = 09:55:25.177
DEC = +69:01:13.72
EPOCH = 2000
teste.fts: rewritten successfully.

After:
XRA = '9:51:19.45' /MEAN RA
XDEC = '69:15:26.42' /MEAN DEC
XEPOCH = 1950 /MEAN EPOCH
...
RA = '09:55:25.177'
DEC = '+69:01:13.72'
EPOCH = 2000
SETHEAD = 'SETHEAD 2.5 1998-09-01 13:31 RA, DEC, EPOCH updated'
gethead extracts information from FITS headers

Keyword names may be entered in either upper or lower case

Tab-separated table output, with column headers, is an option

A file containing a list of filenames may be used by prefacing it with a @.

Multiple parameters from list of FITS files

Get the image sizes from the NAXIS, NAXIS1, and NAXIS2 header keywords from a list of FITS and IRAF files, printing the output in tab table format:

```
$ gethead -th @fits.list naxis naxis1 naxis2
FILENAME        NAXIS   NAXIS1  NAXIS2
--------        -----   ------  ------
0083.19083010-0706459.fits      2       2720    161
hiptest.fits    2       600     600
 test.fits      2       2720    161
 test_fabien.fits      2       2080    2048
 testbin.fits    2       765     510
 testbinf.fits   2       680     450
 testbinfg10x10.fits     2       765     510
 testbinfg20x20.fits     2       765     510
 testbinfg40x40.fits     2       680     450
webccd-1.fits   2       680     450
webccd-2.fits   2       765     510
```
Redshifting Into the Universe

12,553 Spectra from the Hectospec SHERLS survey
Questions?

WCSTools:  http://tdc-www.harvard.edu/software/wcstools

RVSAO:     http://tdc-www.harvard.edu/iraf/rvsao/

SKYMAP:    http://tdc-www.harvard.edu/software/skymap/

Jessica:   http://tdc-www.harvard.edu/mink/
           http://www.jessicamink.com/change.html
Answers

Women In Astronomy

Tuesday, December 16, 2014

On Being a Transgender Astronomer

Posted by Jessica Kirkpatrick

Today's guest post is by Jessica Mink, a positional astronomer and software developer at the Smithsonian Astrophysical Observatory, who has written the commonly used software packages WCS Tools and RVSAO and worked on a variety of astronomical projects over 40 years. Much of her story is told in this interview with the American Astronomical Society's Working Group on LGBTQ Equality (WGLE).

While I consider myself to be a woman astronomer, I have not always been one. Since I made much of my reputation with a different gender expression and remain in the field, I have to accept the fact that I am also a transgender astronomer, and as a representative of that small group, serve as an ambassador to the rest of the astronomical world.

While gradually (over 40 years!) transitioning from male to female, I have thought a lot about gender and its various facets, but when I volunteered to write a blog entry representing my gender minority for the Women in Astronomy blog, I realized that I hadn’t been very systematic about it. It is likely that most readers don’t have any trans* friends (that they know about), but this far into the 21st century, most thinking people are aware of our existence and might even know of one of us.

Each human being has a gender identity. Most of us don’t think about it much because it usually matches our biological sex, but sometimes it doesn’t, and then we fall into the broad category of trans* people. Even though we are grouped with Lesbian, Gay, and Bisexual people under LGBT, and its variants, our category is not tied to our sexual orientation, so many of our issues are different. It appears that gender identity is usually innate, even when it does not match our biological sex. That means that many trans* people might not appear any different than their knowledge of their biological sex (how a person’s genes express in their physical appearance) would lead you to believe, while others may take hormones, have surgery, or simply change their wardrobe and appearance to match the gender which they feel themselves to be. Thus gender presentation or expression is a separate thing from gender identity, though it is often related. It should also be noted that while trans* people have many similar experiences, my view from the male-to-female side is not the same as that of my friends transitioning from female to male, nor is it identical to anyone going the same way I am.