

IRTF Data Archive

Group Label Reference Document for SpeX and iSHELL

Filename: IDA-0012_IDA_glbl_Reference_v1706.odt

Modified Date: 2017-06-07



NASA Infrared Telescope Facility
Institute for Astronomy
University of Hawaii

Revision History

| Version | Description of Revision | Release Date |
|---------|--|--------------|
| 1.00 | Initial Release | 2016-08-23 |
| 1.10 | DATE changed to DATE_BEG; Added DATE_END keyword; Added LUN_AZ, LUN_EL; NAIF_ID of 2 ³¹ -1 defined as “unknown NAIF_ID”; Added ISHELL instrument keywords, see section under INST_ID 'icm' and 'ike'; For NAME, RA, DEC values, added alternate source if datatype is calibration; Added DARK_GP keyword; Added keywords for CAOM metadata. Added Appendix A - CAOM Notes. | 2017-05-05 |
| 1706 | Changed revision number to YYMM format updated ENERGY_SAMPLESIZE; RA,DEC – changed definition so that astrophysic object will use the LS_RA,DEC (catalog position) solar system object will use the TCS_RA,DEC (telescope position) | 2016-06-07 |

1. Purpose

The IRTF Data Archive (IDA) data products are jointly developed by the Infrared Processing and Analysis Center (IPAC) located in Pasadena, California, and the Infrared Telescope Facility (IRTF) located on Maunakea, Hawaii. This document is the specification for the IRTF Data Archive (IDA) .glbl group label file.

2. Introduction

The IRTF instruments SpeX and iSHELL produce FITS image files to be archived at IPAC. These files are logically grouped together into observation groups. These observation groups are the basic unit when searching and retrieving data from the archive. The IRTF will produce a .glbl label file containing the necessary information to build the data archive search and retrieval web pages based on these observation groups. This document provides the specification for the .glbl files.

3. Label File Format

The .glbl label files are text files.

The file name will consist of the name for the observation group identified by the GROUP_ID keyword, and the “.glbl” extension, ie:

```
GROUP_ID          sbd_20160322_190000
GROUP LABEL FILENAME: sbd_20160322_190000.glbl
```

- Any line beginning with '#' in the 1st column are comments.
- Each line contains a keyword, and its value.
- The keyword is the 1st token on the line. Spaces separated the keyword and values.
- The remaining tokens on the line are the values.

An example of some .glbl entries:

```
#
# This is a comment
#
PUBLIC_DATE 2017-02-01
GROUP_ID    sbg_20160322_190000
```

4. Keyword Reference

The keyword reference table describes the keywords in the label file. The column headers are :

KEYWORD – key of the key,value pair

EXAMPLE – an example value

TYPE – data type for the value. Range is: char, float, double, integer

- Char - character strings. The max number of char in indicated in the parentheses. String value matches should be case insensitive.
- Float – a single-precision floating point value.
- Double – a double-precision floating point value.
- Int – int32 signed integer.

DESCRIPTION – provides addition information such as unit, range, etc.

There is no explicit order for the keywords in the label file. They are grouped in this document for clarity.

Target identification and search parameter keywords

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|---------------|--|------------|--|
| GROUP_ID | sbg_20160322_190000 | char(20) | Group ID to represent an observation (a set of FITS files) described by the .gbl file. The group ID value consists of INST_ID + UTC_DATE + UTC_TIME of first image in the group. |
| PUBLIC_DATE | 2017-02-01 | char(10) | UTC Date (YYYY-MM-DD) when the FITS images are to be made public |
| PROGRAM_ID | 2016A999 | char(10) | IRTF Program ID. Each IRTF observing program is assigned a program ID for identification. The program ID format is YYYYSNNN. <ul style="list-style-type: none"> • YYYY – The year. • S – Semester in the year. Value is 'A' or 'B' • NNN – A program number, ie: 001, 002, etc. |
| PROGRAM_TITLE | Dynamical and physical structures of inner gaseous disk of a new FU Orionis type object, 2MASS J06593158-0405277 | char (300) | IRTF Program title from Program_YYYYSNNN.txt file. Provided for CAOM Proposal Title. |
| PROGRAM_PI | John Rayner | char(40) | IRTF Program_INV1 data from program_YYYYSNNN.txt file. Provided for CAOM Proposal Pi |
| RA | 00:07:58.00 | char(12) | RA Dec of the observation in FK5, J2000.0 at the DATE_BEG, TIME_BEG. For data with sidereal rate of 0 (astrophysics objects) the RA,Dec is obtained from the LS_* (Telescope slew destination). For data with sidereal rate != 0 (solar system objects), the RA,Dec is obtained from the 1 st image's TCS_RA,DEC (mean position of the telescope when the 1 st image was taken). |
| DEC | -00:39:58.0 | char(12) | See RA. |
| DATE_BEG | 2016-03-22 | char (10) | UTC date of observation. From the FITS header keyword DATE_OBS. |
| TIME_BEG | 19:00:00 | char (8) | UTC time of the 1 st observation. From the FITS TIME_OBS keyword. |
| DATE_END | 2016-03-22 | char(10) | UTC data the observation ended. From the FITS DATE_OBS + ELAPTIME keyword for the last observation. |
| TIME_END | 19:04:00 | char(8) | UTC time the observation ended. From the FITS TIME_OBS+ELAPTIME keyword for the last observation. |
| NAME | Mercury | char(40) | Name of the object observed as recorded in the FITS header. For datatype target, standard, use the LS_NAME FITS keyword value. For datatype calibration, use the NAME FITS keyword value.mo |
| NAME_SRC | jpl_horizon | char(20) | Indicates the source of the NAME from the LS_SRC FITS keyword. NULL if LS_ values are not used for NAME, RA, DEC (ie: calibration files). |
| AIRMASS | 1.25 | float | The mean airmass from the during the observation calculated from the AIRMASS FITS keyword. |
| NAIF_ID | 199 | char(15) | Identifies the solar system object using the NAIF ID value. Special values: <ul style="list-style-type: none"> • 2³¹-1 (2147483647)= unknown NAIF_ID • NULL = no NAIF_ID (astrophysics object) The IRTF will look up the NAIF_ID using the LS_NAME in the FITS Header. |
| JPL_HOR_REC | 499 # Major body Mars 499; # 499 Venusia (1902 KX) | char(15) | The JPL record number which can be used to search JPL Horizons for this object (NAIF_ID). This field primary support IRTF internal pipeline applications. Note the ';' character to denote minor bodies vs major bodies in the example. NULL for no REC number. |
| DATATYPE | Target | char(15) | Indicated the type of object being observed. Values can be: <ul style="list-style-type: none"> target – a science target standard – a standard object calibration – a calibration frame (dark, lamps, etc) Value from the FITS DATATYPE keyword. Could be corrected by the IRTF pipeline. |
| OPTICAL_DEPTH | 0.052 | float | An optical depth measurement using the TAU 225GHz sensor on Maunakea. From the FITS keyword TAU225. Value of -99.0 indicate “No Data” |
| SEEING | 0.526 | float | A seeing measurement from the Maunakea. Differential Image Motion Monitor (DIMM) instrument. Units in arcseconds From IRTF databases. Value of -99.0 indicate “No Data”. |

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|--------------|-------------|----------|--|
| LUN_FLI | 22.1 | float | Fraction Lunar Illumination (FLI) is the percent of the Moon's visible disk illuminated by the sun. Range is 0.0 to 100.0. |
| LUN_LIGHT | dark | char(8) | The lunar light level based on the lunar elevation (EL), and Fraction Lunar Illumination (FLI) values from JPH Horizon. Values are: <ul style="list-style-type: none"> • dark = 0% <= FLI <25.0%, or Moon Elevation < 0 degrees. • gray = 25% <= FLI < 75.0% with Moon Elevation > 0 degrees. • bright = 75.0 <= FLI, and Moon Elevation > 0 degrees. |
| LUN_SEP | 10.0 | float | The lunar separation in degrees of RA,DEC – moon. |
| LUN_EL | 83.8910 | float | The lunar position's Elevation in degrees, +90.0 to -90.0 |
| LUN_AZ | 31.4832 | float | The lunar position's Azimuth in degrees. 0-360. 0=North, 90=east. |
| SKY_TRANS | photometric | char(12) | A sky transparency evaluation based on a cloud coverage sensor on Maunakea call the ASIVA camera. Values are: photometric, cirrus, cloudy, unknown. |
| ENV_HUMIDITY | 23.0 | float | Environmental Humidity from FITS TCS_HUM keyword. Value of -99.0 indicates "No Data" Provide for CAOM Environment Humidity |

Instrument Setup

The INST_ID keyword identifies the instrument used for the observation. Each instrument has a unique set of keywords to describe its configuration. Each instrument set is described below. The values for the INST_ID are:

- sbd – SpeX Spectrograph, aka Bigdog.
- sgd – SpeX Imager/Guider, aka Guidedog.
- icm - ISHELL Spectrograph
- ike - ISHELL IR Guider.

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|-------------|----------------|----------|--|
| INST_ID | sbg | char(6) | This section describes the SpeX Bigdog INST_ID keywords |
| ITIME | 35.000, 10.000 | float | List the ITIME FITS keyword in the group, order by count (majority ITIME first). |
| GRAT | ShortXD | char(12) | Position of the grating wheel: Values are: ShortXD, Prism, LXD_long, LXD_short, SO_long, SO_short |
| SLIT | Open | char(10) | Position of the slit wheel. Value are: Open, Mirror, 0.3x15, 0.5x15, 0.8x15, 1.6x15, 3.0x15, 0.3x60, 0.5x60, 0.8x60, 1.6x60, 3.0x60 |
| OSF | Open | char(10) | OSF wheel position. The OSF is common to both sbd and sgd INST_ID. Values are: Open, PK_50, SP_2.5, 0.1xSTOP, Long4, Long5, Long6, Short3, Short4, Short5, Short6, Short7, CH4_s, CH4_l, Blank. |
| SLIT_LEN | 15 | int | Values are: 0 (open, Mirror), 15, 60 in arcseconds. From the FITS SLIT keyword. |
| PLATE_SCALE | 0.100 | float | plate scale of the array in arcsec/pixel. From the FITS keyword PLATE_SC. |
| WLEN_LOWER | 1.67 | float | Lower wavelength converge in microns. See WLEN_UPPER. |
| WLEN_UPPER | 4.20 | float | Upper wavelength converge in microns. Based on FITS GRAT and SLIT keywords values. The spex manual has the wavelength coverage for each grating: ShortXD 0.70–2.55 Prism 0.70–2.52 LXD_long 1.98–5.30 LXD_short 1.67–4.20 SO_long 3.10–5.30 w/Long4 4.40–5.30 w/Long5 3.59–4.14 w/Long6 3.13–3.53 SO_short 0.90–2.40 w/Short3 1.92–2.40 w/Short4 1.47–1.80 w/Short5 1.17–1.37 w/Short6 1.03–1.17 |

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|-------------------|-----------|-------|---|
| | | | w/Short7 0.91-1.00 |
| RESOLVING_POWER | 2500 | int | <p>Resolving Power of the spectra is based on the GRAT and SLIT settings</p> <p>slit_wid can be 0.3, 0.5, 0.8, 1.6, 3.0, 0 (open, mirror)</p> <pre># r will scale based on slit_wid if(slit_wid == 0) scale = 0 # open or mirror else scale = 0.3/slit_wid Prism r = 250 * scale ShortXD r = 2000 * scale LXD_short r = 2500 * scale LXD_long r = 2500 * scale SO_short r = 2000 * scale SO_long r = 2500 * scale</pre> <p>round r to nearest tenths.</p> <p>for example: SO_short with 0.5 slit = 2000 * (0.3/0.5) = 1200</p> <p>PRISM with 0.3 slit = 250 * (0.3/0.3) = 250</p> |
| ENERGY_SAMPLESIZE | 3.000e-04 | float | <p>Energy sample size is based on the GRAT setting:</p> <pre>Prism: 0.0024 microns/pixel shortXD: 0.0003 microns/pixel LXD_short, LXD_long: 0.0004 microns/pixel SO_short: 0.0003 microns/pixel SO_long: 0.0004 microns/pixel</pre> |

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|-------------|----------------|----------|---|
| INST_ID | sgd | char(6) | This section describes the SpeX Guidedog INST_ID keywords |
| ITIME | 35.000, 10.000 | float | List the ITIME FITS keyword in the group, order by count (majority ITIME first). |
| GFLT | Open | char(12) | Position of the guider filter: Values are: Open, Z, J, H, K, Lp, 5.1, FeII, H2, Bry, contK, CO+ND2, H+K, 3.417, ZYJHK. |
| OSF | Open | char(10) | OSF wheel position. The OSF is common to both sbd, and sgd INST_ID. Values are: Open, PK_50, SP_2.5, 0.1xSTOP, Long4, Long5, Long6, Short3, Short4, Short5, Short6, Short7, CH4_s, CH4_l, Blank. |
| PLATE_SCALE | 0.116 | float | plate scale of the array in arcsec/pixel. From the FITS keyword PLATE_SC. |

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|------------|---------|----------|---|
| INST_ID | icm | char(6) | This section describes the ISHELL Spectrograph INST_ID keywords |
| ITIME | 35.000 | float | Integration time of the images in the group. From the FITS ITIME keyword. |
| XDTILT | J1 | char(10) | iSHELL XD mode from the FITS XDTILT keyword. Values are: J1, J2, J3, H1, H2, H3, Hcus, K1, K2, Kgas, K3, L1, L2, L3, Lp1, Lp2, Lp3, Lp4, M1, M2, Darks, Custom |
| WLEN_LOWER | 1.10 | float | Lower wavelength converge in microns. |
| WLEN_UPPER | 1.23 | float | <p>Upper wavelength converge in microns.</p> <p>Use XDWLUPPR/LWR FITS header keyword values else set WLEN_UPPER/LOWER from XDILT Value (from Table 5 (page 6) from the ishell manual):</p> <pre>XDTILT WLEN_LOWER WLEN_UPPER ----- J1 1.11 1.22 J2 1.20 1.30 J3 1.27 1.36 H1 1.48 1.67</pre> |

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|-------------------|----------|----------|---|
| | | | <pre> H2 1.55 1.74 H3 1.64 1.82 K1 1.94 2.23 K2 2.09 2.38 K3 2.26 2.55 Kgas 2.18 2.47 L1 2.74 3.02 L2 2.96 3.24 L3 3.20 3.48 Lp1 3.28 3.66 Lp2 3.57 3.95 Lp3 3.83 4.18 Lp4 3.83 4.14 M1 4.52 5.25 M2 4.52 5.25 Dark 1.11 1.22 - Dummy values as there is no signal & XD position is unknown </pre> |
| SLIT | 1.5 | char(10) | Width of the slit in arcseconds from the SLIT FITS keyword Value are: Mirror, 4.00, 1.5, 0.75, 0.375. |
| SLIT_LEN | 15 | int | Values are: 5, 15, 25. Units in arcseconds. From the FITS DEKKER keyword (dekker mechanism controls slit len) |
| PLATE_SCALE | 0.125 | float | plate scale of the array in arcsec/pixel. From the FITS keyword PLATE_SC. |
| RESOLVING_POWER | 75000 | int | Resolving Power of the spectra is based on the SLIT_WID. Immersion grating has a R of 75000. slit_wid can be 0.375, 0.75, 1.50, 4.00, or 0 (Mirror) # r will scale based on slit_wid if(slit_wid == 0) # 0 for mirror scale = 0 else scale = 0.375/slit_wid r = 75000 * scale; round r to nearest hundreds. for example: slit_wid is 0.375 slit = 75000 * (0.375/0.375) = 75000 slit_wid is 4.0 slit = 75000 * (0.375/4.00) = 7031 = 7000 # after rounding. |
| ENERGY_SAMPLESIZE | 1.500e-5 | float | Energy sample size is based on the XROT FITS setting: lp: 0.000015 microns/pixel m1: 0.000020 microns/pixel m2: 0.000020 microns/pixel blank: 0.000005 microns/pixel (using the value for J) j: 0.000005 microns/pixel h: 0.000007 microns/pixel k: 0.000009 microns/pixel l: 0.000013 microns/pixel |

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|-------------|----------------|----------|--|
| INST_ID | ike | char(6) | This section describes the ISHELL Imager/Guider INST_ID keywords |
| ITIME | 35.000, 10.000 | float | List the ITIME FITS keyword in the group, order by count (majority ITIME first). |
| GFLT | Blank | char(12) | Position of the guider filter. Values are: K, Jo, PV, Blank, nbM, 3.46um, Lprime, Kcont |
| PLATE_SCALE | 0.10 | float | plate scale of the array in arcsec/pixel. From the FITS keyword PLATE_SC. |

Associated File, Groups, and other keywords

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|--------------|----------------------|----------|--|
| PROGRAM_INFO | program_2016B001.txt | char(25) | Identify the program information data product. This .txt file provides |

| KEYWORD | EXAMPLE | TYPE | DESCRIPTION |
|--|---|-----------|--|
| | | | basic information about the observing program. It is viewed when the archive user selects the [P] button on the web results page. This data product is also an optional download when requesting the FITS images. |
| TARGET_INFO | sbd_20160322_190500_target.txt sbd_20160322_190500_target.png | char(80) | Identifies the target info quick look product. They provide additional information on the observed target, and are viewed when the archive user selects the [T] button on the web results page. The value field may contain the .txt and/or .png. |
| QUALITY_INFO | sbd_20160322_190500_QA.txt sbd_20160322_190500_QA.png | char(80j) | Identifies the quality assessment info quick look information. They provides additional information on the quality of the data observed, and are viewed when the archive user selects the [Q] button on the web results page. The value field may contain the .txt and/or .png. |
| WEATHER_INFO | weather_20160322.png | char(50) | Identifies the weather info quick look information. They provide additional information on the weather conditions during the program observing time, and are viewed when the archive user selects the [W] button on the web results page. The value field may contain the .png. |
| IELOG_FILE | ielog_20160322.zip | char(25) | Identifies the ielog data product associated with the observation. This .zip file contains logs from the telescope control system and instruments during the UTC date indicated in the filename. This data product is an optional download when requesting FITS images. |
| WEATHER_FILE | weather_20160322.zip | char(25) | Identifies the weather data product associated with the observation. This .zip file contains external environment information collect during the UTC data indicated in the filename. This data product is an optional download when requesting FITS images. |
| STANDARD_GP | sbg_20160322_190500 | char(80) | Identifies the standard groups associated with this GROUP_ID. From 0 to 3 groups can be listed in the value field. Values could be blank if no group exists. This keyword allows for an option to download the related standards files, along with this GROUP_ID's files. |
| CALIBRATION_GP | sbg_20160322_191000 | char(80) | Identifies the calibration groups associated with this GROUP_ID. From 0 to 3 groups can be listed in the value field. Values could be blank if no group exists. This keyword allows for an option to download the related calibration files, along with this GROUP_ID's files. |
| GUIDER_GP | sgd_20160322_191000 | char(40) | For the spectrograph images, this keyword identifies the guider images taken simultaneously with the spectrograph images. From 0 to 1 group can be listed in the value field. This keyword allows for an option to download the related guider files along with this GROUP_ID's files. |
| DARK_GP | icm_20170215_040000 | char(20) | This keyword identified dark images associated with the GROUP_ID. From 1 group is listed in the value field. Value could be blank if no group exist. This keyword is intended to assign a dark group from program ID 901 to the icm data group. |
| GROUP_FILELIST_BEG GROUP_FILELIST_END | GROUP_FILELIST_BEG sbd.2016A999.160322.obj.00001.a.fits sbd.2016A999.160322.obj.00002.a.fits ... GROUP_FILELIST_END | N/A | The FITS files that make up the observational group GROUP_ID are listed between the GROUP_FILELIST_BEG/_END keywords. |

Appendix A – CAOM Notes

Observation

| CAOM keyword | Value | Remarks |
|----------------------|---------------------|---|
| PROPOSAL_PI | PROGRAM_PI value | |
| PROPOSAL_TITLE | PROGRAM_TITLE value | |
| REQUIREMENT_FLAG | TRUE | flag describing satisfied proposal requirements. Default to TRUE for IRTF data. |
| ENVIRONMENT_HUMIDITY | ENV_HUMIDITY value | |

Plane

| CAOM keyword | Value | Remarks |
|-------------------------|-------------------------------------|--|
| POSITION_BOUNDS | NULL | |
| TIME_EXPOSURE | ITIME | Data provide by .gbl's ITIME keyword. Spex and guiders may list multiple values. Always use the 1 st value as the representative exposure time for the group, as ITIMES are ordered by count. |
| POSITION_RESOLUTION | NULL | Median spatial resolution (FWHM) in arcseconds. (calculation based on data value – not part of archive pipeline). |
| POSITION_SAMPLESIZE | PLATE_SCALE (AS) value. | pixel scale along the spatial axis in arcsec. Equal to PLATE_SCALE (AS) |
| POSITION_DIMENSION1 | SLIT_LEN(AS)/PLATE_SCALE (AS/Pixel) | dimension(pixels) along spatial axis. equal to SLIT_LEN(AS)/PLATE_SCALE (AS/Pixel) NULL For darks (SLIT equal to blank or mirror) |
| ENERGY_BOUNDS_CVAL1 & 2 | WLEN_LOWER/UPPER values | Upper and lower wavelength range of the spectra |
| ENERGY_SAMPLESIZE | | median pixel size along the spectral axis in wavelength units. The ENERGY_SAMPLESIZE if a .gbl keyword. |