

IRTF Data Archive

Group Label Reference Document for SpeX and iSHELL

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## Revision History

<b>Version</b>	<b>Description of Revision</b>	<b>Release Date</b>
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 <sup>31</sup> -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
1608	Added CATALOG_SPECTRAL_TYPE, CATALOG_MAGNITUDE keywords;	2017-08-30
1903	Amended RA, DEC to include “NULL” as a valid value.	2019-03-18

## 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 1<sup>st</sup> column are comments.
- Each line contains a keyword, and its value.
- The keyword is the 1<sup>st</sup> 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 .glbl 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"> <li>• YYYY – The year.</li> <li>• S – Semester in the year. Value is 'A' or 'B'</li> <li>• NNN – A program number, ie: 001, 002, etc.</li> </ul>
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 NULL	char(12)	RA Dec of the observation in FK5, J2000.0 at the DATE_BEG, TIME_BEG. The value “NULL” will be used to indicated no data.  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 <sup>st</sup> image's TCS_RA,DEC (mean position of the telescope when the 1 <sup>st</sup> image was taken).
DEC	-00:39:58.0 NULL	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 <sup>st</sup> 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.
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"> <li>• 2<sup>31</sup>-1 (2147483647)= unknown NAIF_ID</li> <li>• NULL = no NAIF_ID (astrophysics object)</li> </ul> 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.
CATALOG_SPECTRAL_TYPE	A0V	char (25)	Spectral type from the IRTF_REF_STARS list. Keyword and data exist to pass information to target_info.txt file. “NULL” indicate data was not provided.
CATALOG_MAGNITUDE	V=6.52, J=6.33, K=4.317	char(40)	List of magnitude values from the IRTF_REF_STARS list. Keyword and data exist to pass informaiton to target_info.txt. “NULL” indicates data was not provided.
DATATYPE	Target	char(15)	Indicated the type of object being observed. Values can be: 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

KEYWORD	EXAMPLE	TYPE	DESCRIPTION
			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".
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"> <li>dark = 0% &lt;= FLI &lt;25.0%, or Moon Elevation &lt; 0 degrees.</li> <li>gray = 25% &lt;= FLI &lt; 75.0% with Moon Elevation &gt; 0 degrees.</li> <li>bright = 75.0 &lt;= FLI, and Moon Elevation &gt; 0 degrees.</li> </ul>
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

KEYWORD	EXAMPLE	TYPE	DESCRIPTION
			<pre> 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 w/Short7 0.91-1.00 </pre>
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  round r to nearest tenths.  for example: SO_short with 0.5 slit = 2000 * (0.3/0.5)                 = 1200  PRISM    with 0.3 slit = 250 * (0.3/0.3)                 = 250 </pre>
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, 1.74
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	Upper wavelength converge in microns.

KEYWORD	EXAMPLE	TYPE	DESCRIPTION
			<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> XDILT  WLEN_LOWER  WLEN_UPPER -----  - J1      1.11        1.22 J2      1.20        1.30 J3      1.27        1.36 H1      1.48        1.67 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 &amp; 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

KEYWORD	EXAMPLE	TYPE	DESCRIPTION
			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 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 <sup>st</sup> 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.