SSUSI LEVEL 1B FILE

APLVersion 2.0.1

Data Product version 0109

Change Log

|  |  |  |
| --- | --- | --- |
| Revision | Date | **Changes Made** |
| 2.0.1 | 2/25/19 | Removed global attribute CALIBRATION PERIOD\_VERSION, updated L1B general description. |
| 2.0.0 | 10/17/16 | Updated L1B image file specs, and added L1B specs for spectrograph mode data.  |
| 1.11.1 | 1/7/11 | Fixed SLIT\_WIDTH variable name (had SLIT, but variable is actually SLIT\_WIDTH is the name) |
| 1.11.0 | 8/27/10 | Added Red Leak correction variables |
| 1.10.1 | 9/15/09 | Added bit definition for mirror positions unknown in the per scan Data Quality Index |
| 1.10.0 | 4/30/09 | Added SAA background counts and new data quality indicators. Removed some Aerospace L1B fields that were never implemented. Corrected some minor typos. |
| 1.9.0 | 10/4/08 | Reset numbering for full orbit L1B. Now RA, dec, and star\_location fields are filled in. SOFTWARE\_VERSION\_NUMBER and CALIBRATION PERIOD\_VERSION global attributes have been added. |
| 1.7.2 | 2/6/08 | Fixed typo, DISKCOUNTSDATA. LIMBCOUNTSDATA are O/I Uncorrected counts. |
| 1.7.1 | 3/20/07 | SOLAR\_ZENITH\_ANGLE was in L1B file but not documented. |
| 1.7.0 | 2/7/07 | Changed SCAN\_TYPE to SCAN\_MODE |
| 1.6.2 | 1/18/07 | Removed “\*” from calibration flag variables as they are already in the L1Bs now. |
| 1.6.1 | 1/16/07 | Moved geophysical parameters to globals and made geophysical index names consistent (index\_time). (note, technically this change should have caused the minor revision to change, but since no 0106 files have been written, there is no chance of a conflict.)  |
| 1.6.0 | 1/12/07 | “Uncommented” geophysical and variables so they are now part of the file. |
| 1.5.4 | 11/30/2006 | Fixed some minor typos. |
| 1.5.3 | 11/29/06 | Added AFWA example to geophysical info section |
| 1.52 | 11/6/06 | Fixed typo in description of DISK\_COUNTS\_MINUS\_BG and LIMB\_COUNTS\_MINUS\_BG |
| 1.5.1 | 10/16/06 | Fixed index order. Separated global attributes into a separate table, removed ECEF look vectors. |
| 1.5.0 | 10/2/06 | Added Title and Units to many fields, added DMSP\_NADIR\_ECI, DMSP\_SOLAR\_ECI, DMSP\_SOLAR\_LAT, and DMSP\_SOLAR\_LON. Removed DMSP\_COORDS\_ECEF and LIMB,DISK PIXELERROR terms. Added fields for backgrounds subtracted (1216, 1304, long, dark0 and the value of counts\_minus\_BG, (un-IO corrected) DISK and LIMB COUNTSDATA with ERROR terms. |
| 1.4.1 | 9/13/06 | Added color index lookup table |
| 1.4.0 | 8/21/06 | Removed TIME\_EPHEM and 1SEC values, since they are not useful. Added DMSP\_COORDS\_TIME for the array of 1 second cadence times used to generate the ephemeris in the DMSP\_ tagged variables. Removed photometer times; instead use the PHOTOMETER DMSP TIME OFFSET parameter relating the 1 second times of photometer measurements to DMSP\_COORDS\_TIME, Added new data product version number = MMmm; MM = data format document major revision, mm = data format document minor revision.  |
| 1.3.1 | 8/11/06 | Changed description of time field to indicate that it is the time when scan pointing is nadir. |
| 1.3.0 | 7/21/2006 | Artificially upping data product version numbers to 0013 because there are existing versions of L1B files with version 0012 and 0011 around. The 0013 marker will clearly indicate that this is a new version. Also we will call the version of this file 1.3.0 to correspond to this data product version |
| 1.0 | 7/21/2006 | Denoted TIME\_EPHEM as being used. Removed GEOID\_MODEL\_DESCRIPTION since it was redundant with GEOID\_MODEL\_USED.  |
| 0.9 | 07/19/2006 | Added NODAL\_CROSSING\_EPOCH to global attributes; Added data product version number that goes into files |
| 0.8 | 02/08/2006 | Put \* on fields not supported for 1st AFWA delivery and an – in front of variables that are implemented |
| 0.7 | 01/25/2006 | Initial version of data files based on Aerospace version 1.7 of the L1B document |

The SSUSI Level 1B imaging file contains both limb and disk reduced scan imaging mode data. The Level 1B spectrograph is a separate file that contains spectrograph mode data. The files are generated using calibration and geolocation routines contained in the APL L1B Generation IDL program. Each Level 1B file, when the telemetry is merged, contains up to a single orbit of data generated from the prep files generated by the reformatter processing program. Each imaging scan consists of 22 seconds of data. In the descriptions that follow it is assumed that there are N scans of data in a quarter orbit. Each scan consists of 24 limb integration steps with 8 spatial pixels and 132 disk integration steps with 16 spatial pixels. Therefore, there are 24+132=156 total readouts of the five SSUSI colors every 22-second scan. Note that in the definitions given below the step by step variable sizes are listed as N\*22 to indicate that an array is a vector, not a matrix, and that the length of the vector is the product of the number of scans in a given file and the number of seconds in a scan. Spectrograph data consists of 3 second “stares”, where the 8 spectrographic mode along-track pixels stare at a spot for 3 seconds and the integrated counts are reported for that time interval.

The five SSUSI “colors” in image files are really bandpass filters centered on certain ultra-violet wavelengths of interest. The color indices are mapped to the wavebands as indicated in the table below. While the spectrograph data includes reported measurements of the 168 wavelength bands in the SSUSI spectrum, it also recreates the 5 imaging colors from the spectrograph data as well.

|  |
| --- |
| SSUSI Colors |
| Color Array Index | Bandpass name |
| 0 | Lyman nanometers) |
| 1 | OI 130.4 nanometers |
| 2 | OI 135.6 nanometers |
| 3 | Lyman-Birge Hopfield 1 (LBH short) |
| 4 | Lyman-Birge-Hopfield 2 (LBH long) |

Those parameters not generated by the current build of the level 1B software are marked with a ‘\*’. They will not appear in the file, but they may be included in a later version of the file. NetCDF attributes associated with variables are listed together with the variable and are indented.

The original heritage Aerospace version of the L1B processing code distinguished between a “full” and reduced or “subset” version of L1B files to be generated. In practice the APL operational code makes files most like the L1B Subset file. The variables in the Aerospace full L1B that are being considered for the APL L1B are marked with a ‘+’ symbol in the following table. Practically speaking, the APL files will likely not ever include the variables that only appear in the Aerospace “full” L1B file.

# L1B Global Attributes

These are the attributes that apply to all data in the file.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable Name** | **Type** | **Dimensions** | **Value/Comment** |
| FILENAME | STRING | - | e.g.,”SSUSIF16\_Av0011r002\_2005248REV09722DOAE.image\_L1B” “” |
| MISSION | STRING | - | e.g., “F16” |
| DATA\_PRODUCT\_TYPE | STRING | - | “Level1B Imaging Data” |
| SOURCE | STRING | [#files] | Names of the Prep File(s) used to generate this file |
| DATA\_PRODUCT\_VERSION  | STRING | - | e.g., “0105” – the version of this document without dots in the name |
| DATA\_PRODUCT\_REVISION | STRING | - | e.g., “002” |
| SOFTWARE\_VERSION\_NUMBER | STRING | - | Software release sequence number, e.g. “009” |
| SOFTWARE\_VERSION | STRING | - | e.g., “1.0.1” |
| SOFTWARE\_NAME | STRING | - | “APL Prep to Level1B” |
| CALIBRATION\_VERSION\_PHOTOMETER | STRING | - | e.g., “001.0” |
| CALIBRATION\_TABLES\_NAMES | STRING | - | ‘;’ separated list of names of calibration files that were used. |
| CALIBRATION\_TABLES\_CREATED | STRING | - | ‘;’ separated list of calibration file creation times. |
| CALIBRATION\_PERIOD\_VERSION | STRING | - | Calibration period plus a count of which calibration version this is., e.g. “D0016” for Cal period D, and V03R11 is the 16th F16 calibration file. Note: this attribute is not included in the spectrograph version. |
| STAR\_CATALOG\_VERSION | STRING | - | Version for the star calalog used for calibration. E.g. “v0100” |
| STAR\_FLUX\_THRESHOLD | DOUBLE | - | Minimum star flux used for calibration |
| MEV\_INTENSITY\_THRESHOLD  | DOUBLE | - | Minimum MeV acceptance threshold. |
| MEV\_STAR\_REJECTION\_THRESHOLD | DOUBLE | - | Rejection threshold for star flux |
| MEV\_NOISE\_REJECTION\_THRESHOLD | DOUBLE | - | Rejection threshold for noise |
| MIN\_SZA\_SAA\_CORRECTION | DOUBLE | - | Minimum value for Solar Zenith Angle for SAA correction |
| SAA\_BOUND\_BOX | STRING | - | Bound box definition for SAA. E.g. “-60.000, 20.000, 240.000, 30.000” |
| DESCRIPTION | STRING | - | e.g., “Level1B Reduced Scan Imaging Mode Data” |
| COMMENT | STRING | - | e.g., “This file needs to include DQIs” |
| HISTORY | STRING | - | e.g., “No revisions” |
| DATE\_GENERATED | STRING | - | e.g., “20052489161552UT” |
| STARTING\_TIME | STRING | - | e.g., “20052472345500UT” |
| STOPPING\_TIME | STRING | - | e.g., “20052480012111UT” |
| STARTING\_ORBIT\_NUMBER | STRING | - | e.g., “09722” |
| STOPPING\_ORBIT\_NUMBER | STRING | - | e.g., “09722” |
| NODAL\_CROSSING\_EPOCH | DOUBLE | - | The CDF EPOCH of the Nodal crossing data in the GWC ephemeris from the Prep file. e.g., “63273228090000.” |
| NODAL\_DAY | INTEGER | - | The day of month of the Nodal Crossing |
| NODAL\_MONTH | INTEGER | - | The month of the Nodal Crossing |
| NODAL\_YEAR | INTEGER | - | The year of the Nodal Crossing |
| GEOID\_MODEL\_USED | STRING | - | “WGS84” |
| \*EPHEMERIS\_CODE | STRING | - | e.g., “SGP8 VERSION 1.1” |
| \*TLE\_LINE1 | STRING | - | First line of the TLE |
| \*TLE\_LINE2 | STRING | - | Second line of the TLE |
| \*TLE\_SOURCE | STRING | - | Origin of TLE file |
| \*TLE\_DATE | STRING | - | Date of TLE file creation |
| \*TLE\_FILE\_NAME | STRING | - | Name of TLE file as stored at APL |
| \*EPHEMERIS\_CREATION\_DATE | STRING | - | e.g., “12/25/2004 23:59” |
| INSTRUMENT\_MODE | STRING | - | e.g., “Imaging” |
| SCAN\_MODE | STRING | - | e.g., “Reduced” |
| Geophysical information (if available) |  |  |  |
| GEOPHYSICAL\_INFO\_UPDATE | STRING | - | e.g., “20010418:0000” |
| F10\_7\_81\_DAY | STRING | - | e.g., “ 0.000000” |
| F10\_7\_DAILY | STRING | - | e.g., “ 0.000000” |
| F10\_7\_SOURCE | STRING | - | e.g., “DYN\_PARAMS\_01108.TXT” |
| KP\_3\_HOUR | STRING | - | e.g., “ 2.00000” |
| KP\_DAILY | STRING | - | e.g., “ 2.00000” |
| KP\_AP\_SOURCE | STRING | - | e.g., “DYN\_PARAMS\_01108.TXT” |
|  |  |  |  |
| Only in Imaging mode: |  |  |  |
| PIERCEPOINT\_COMMENT | STRING | - | “Pierce point calculations use a reference geoid and a specified pierce point altitude”  |
| TANGENTPOINT\_COMMENT | STRING | - | “Tangent points quantities are calculated for all LOS at the true tangent point not the PIERCEPOINT\_ALTITUDE” |

# L1B Imaging Variables

In this table N is the number of scans in the file.

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable Name** | **Type** | **Dimensions** | **Value/Comment** |
| Time information follows. Note that the time information is written at two resolutions: the one-second resolution of the DMSP\_COORDS\_TIME variable and the 22-second resolution of the TIME variable. |
| TIME TIME\_TITLE  TIME\_UNIT | DOUBLESTRINGSTRING | [N]-- | The nadir time of each scan in seconds since the start of the day.  “Nadir Time of each scan”  “seconds” |
|  |  |  |  |
| The ‘Z-bits’ parameters are included here.  |
| COSCROSSINGANGLE | FLOAT | [N] | The cosine of crossing angle of subsatellite track with respect to local meridian. See p. 25 of DMSP Data Specification (IS-YD-821) Rev C. |
| COSLUNARAZIMUTH | FLOAT | [N] | Azimuth of moon relative to direction of satellite flight. However, this parameter seems to have been improperly scaled as it has a value greater than 1. It also exhibits discrete “stair step” behavior. |
| COSSOLARAZIMUTH | FLOAT | [N] | Azimuth of sun relative to direction of satellite flight. It has a value of close to 1 for F16, which doesn’t seem quite right. |
| EPHEMCLOCKPT1 | INT | [N] | Divided by 16 to get a time-like variable in units of seconds that rolls over every 512 seconds. This variable has zeros every ~53 seconds. |
| EPHEMCLOCKPT2 | INT | [N] | Multiply by 8 and then add (EPHEMCLOCKPT1 mod 128) divided by 16 to get the time in elapsed seconds since 0000Z (I *think* this is the right algorithm). This variable has zeros every ~53 seconds. |
| HEIGHTEARTHRADIUSRATIO | FLOAT | [N] | Ratio of altitude of spacecraft above subsatellite point at mean sea level to the Earth’s radius (R = 6378.145 km). This has a value of ~4400.  |
| LUNARELEVATION | FLOAT | [N] | Elevation of moon with respect to local orbit tangent plane (in degrees).  |
| LUNARPHASEANGLE | FLOAT | [N] | Angle between lunar and solar position vectors. Units should be degrees, but this has an integer value between 5 and 7, so it does not seem right.  |
| SOLARELEVATION | FLOAT | [N] | Elevation of sun with respect to local orbit tangent plane (in degrees).  |
| SUBPOINTLAT | FLOAT | [N] | Geodetic latitude of subsatellite point, WGS-72 (degrees). The values are very close to but not quite the same as those in LAT\_1. |
| SUBPOINTLONG | FLOAT | [N] | Longitude of subsatellite point, WGS-72 (degrees, from –180 to 180). The values are very close to but not quite the same as those in LONGITUDE.. |
| LATITUDE | FLOAT | [N] | Pre-computed GWC ephemeris: latitude (degrees) at a 22-second (per scan) cadence. The corresponding time array is TIME. Previously named LAT\_1.  |
| LONGITUDE | FLOAT | [N] | Pre-computed GWC ephemeris: longitude (degrees, 0 to 360) at a 22-second (per scan) cadence. The corresponding time array is TIME. Previously named LONG\_1. |
| ALTITUDE | FLOAT | [N] | Pre-computed GWC ephemeris: altitude (km) at a 22-second (per scan) cadence. The corresponding time array is TIME. The values exhibit discrete steps of 1 or 2 km. Previously named ALT\_1.  |
| JULDAY | INT | [N] | Precomputed GWC ephemeris: Julian day. Previously named JULDAY\_1. |
| SATH | FLOAT | [N] | Precomputed GWC ephemeris: ?. Not sure what this is, but it runs from 0 to 360 degrees within one file, so it looks like an orbit angle. Previously named SATH\_1. |
|  |  |  |  |
| Information in the “DMSP” fields is derived from smoothing and filtering the GWC ephemeris. Later, an ephemeris derived from integration of TLEs may be inserted into these DMSP fields in a later version of the file. |
| DMSP\_LATITUDE DMSP\_LATITUDE\_TITLE DMSP\_LATITUDE\_UNITS | FLOATSTRINGSTRING | [N,22]-- | DMSP latitude. For first delivery, using smoothed and filtered GWC ephem data."Geodetic latitude of the DMSP spacecraft at 1 second resolution""Degrees” |
| DMSP\_LONGITUDE DMSP\_LONGITUDE\_TITLE DMSP\_LONGITUDE\_UNITS | FLOATSTRINGSTRING | [N,22]-- | DMSP east longitude. For first delivery, using smoothed and filtered GWCephem data."Geodetic longitude of the DMSP spacecraft at 1 second resolution""Degrees” |
| DMSP\_RADIAL\_DISTANCE DMSP\_RADIAL\_DISTANCE\_TITLE DMSP\_RADIAL\_DISTANCE\_UNITS | FLOATSTRINGSTRING | [N,22]-- | DMSP radial distance. For first delivery, using smoothed and filtered GWCephem data.“Radial distance of the DMSP spacecraft from center of earth at 1 second resolution”“km” |
| DMSP\_ALTITUDE DMSP\_ALTITUDE\_TITLE DMSP\_ALTITUDE\_UNITS | FLOATSTRINGSTRING | [N,22]-- | DMSP altitude. For first delivery, using smoothed and filtered GWC ephem data."Altitude of the DMSP spacecraft from the surface of the earth at 1 second resolution"“km” |
| DMSP\_COORDS\_ECI DMSP\_COORDS\_ECI\_TITLE DMSP\_COORDS\_ECI\_UNITS | FLOATSTRINGSTRING | [N,3,22]-- | DMSP location in ECI coordinates. For first delivery, derived using smoothed and filtered GWCephem data."ECI coordinates of the DMSP spacecraft at 1 second resolution"“km” |
| DMSP\_NADIR\_ECI DMSP\_NADIR\_ECI\_TITLE DMSP\_NADIR\_ECI\_UNITS | FLOATSTRINGSTRING | [N,3,22]-- | DMSP nadir vector in ECI coordinates. For first delivery, derived using smoothed and filtered GWCephem data."ECI coordinates of the DMSP spacecraft nadir position at 1 second resolution”“km” |
| DMSP\_SOLAR\_ECI DMSP\_SOLAR\_ECI\_TITLE DMSP\_SOLAR\_ECI\_UNITS | FLOATSTRINGSTRING | [N,3,22]-- | Solar location in ECI coordinates. For first delivery, based smoothed and filtered GWCephem data."ECI position of the sun at 1 second resolution"“km” |
| DMSP\_SOLAR\_LAT DMSP\_SOLAR\_LAT\_TITLE DMSP\_SOLAR\_LAT\_UNITS | FLOATSTRINGSTRING | [N,22]-- | Subsolar latitude. For first delivery, derived using smoothed and filtered GWCephem data."Subsolar latitude at 1 second resolution"“degrees” |
| DMSP\_SOLAR\_LON DMSP\_SOLAR\_LON\_TITLE DMSP\_SOLAR\_LON\_UNITS | FLOATSTRINGSTRING | [N,22]-- | Subsolar longitude. For first delivery, derived using smoothed and filtered GWCephem data."Subsolar longitude at 1 second resolution"“degrees” |
| DMSP\_COORDS\_TIME DMSP\_COORDS\_TIME\_TITLE DMSP\_COORDS\_TIME\_UNITS | FLOATSTRINGSTRING | [N,22]-- | 1 second time steps used to generate the “DMSP\_” tagged coordinates"Time corresponding to each DMSP coordinate at 1 second resolution“Seconds” |
|  |  |  |  |
| SSUSI instrument parameters  |
| DETECTOR\_USED DETECTOR\_TITLE DETECTOR\_VALID\_RANGE | STRINGSTRING | [N]-[2] | Detector ID. e.g., “0=primary, 1=secondary” |
| SLIT\_WIDTH SLIT\_WIDTH:TITLE SLIT\_WIDTH:VALID\_RANGE | STRINGSTRING | [N]-[2] | Has a value of 129 on day 37, 2004. e.g., “Slit width, 0=wide, 1=medium, 2=narrow” |
|  |  |  |  |
| SIS data fields |
| DARKCOUNTPIXEL DARKCOUNTPIXEL\_TITLE | INTSTRING | [N]- |  “Dark Count Pixel” |
| DISKPIXELDATA DISKPIXELDATA\_TITLE DISKPIXELDATA\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | The raw instrument counts in the disk “Imaging Mode Disk Pixel Data” “O/I Corrected Decompressed Counts” |
| LIMBPIXELDATA LIMBPIXELDATA\_TITLE LIMBPIXELDATA\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | The raw instrument counts in the limb “Imaging Mode Limb Pixel Data” “O/I Corrected Decompressed Counts” |
| DISKCOUNTSDATA DISKCOUNTSDATA\_TITLE DISKCOUNTSDATA\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | The raw instrument counts in the disk “Imaging Mode Disk Pixel Data” “O/I UNCorrected Decompressed Counts” |
| LIMBCOUNTSDATA LIMBCOUNTSDATA\_TITLE LIMBCOUNTSDATA\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | The raw instrument counts in the limb “Imaging Mode Limb Pixel Data” “O/I UNCorrected Decompressed Counts” |
| DISKCOUNTSERROR DISKCOUNTSERROR\_TITLE DISKCOUNTSERROR\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | The decompression error for the disk pixels in counts.  “Decompression Error” “Counts” |
| LIMBCOUNTSERROR LIMBCOUNTSRROR\_TITLE LIMBCOUNTSERROR\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | The decompression error for the limb pixels in counts. “Decompression Error” “Counts” |
| DISKDETECTORRATIO DISKDETECTORRATIO\_TITLE | FLOATSTRING | [N,132]- | The output/input count ratio for each disk scan step multiplied by 64. “O/I ratio data for each mirror step per scan” |
| LIMBDETECTORRATIO LIMBDETECTORRATIO\_TITLE | FLOATSTRING | [N,24]- | The output/input count ratio for each limb scan step multiplied by 64. “O/I ratio data for each mirror step per scan” |
| PULSEHEIGHTDATA | FLOAT | [N,22] |  |
| FLIGHT\_SW\_VERSION | INT | [N] | Value imported from PREP file. |
| FLIGHT\_SW\_COLORTABLE\_VERSION | INT | [N] |  |
| DARKCOUNT | INT | [N] | The value of the dark count pixel for a scan. |
| BACKGROUNDCOUNT | INT | [N] | The value of the background count pixel for a scan. |
| MIRRORSTARTPOSITION | INT | [N] | The software defined position as the mirror passes the scan start indicator |
| NADIRPOSITION | INT | [N] | The software defined position as the mirror passess the scan nadir indicator |
| FAULTSTATUS | INT | [N] |  |
| PREVCOMMAND1 | INT | [N] |  |
| PREVCOMMAND2 | INT | [N] |  |
| SISSTATUS | INT | [N] |  |
| DETECTORCONFIG | INT | [N] |  |
| DETECTORHIGHVOLTAGE | INT | [N] |  |
| SISRADIATORTEMP | INT | [N] |  |
| SCANMIRRORTEMP | INT | [N] |  |
| DET1HIGHVOLTAGE | INT | [N] |  |
| DET2HIGHVOLTAGE | INT | [N] |  |
| FPE1TEMP | INT | [N] |  |
| FPE2TEMP | INT | [N] |  |
| SMBOARDTEMP | INT | [N] |  |
|  |  |  |  |
| Information for the photometers |
| PHOTOMETER427COUNT | LONG | [N,22] |  |
| PHOTOMETER629COUNT | LONG | [N,22] |  |
| PHOTOMETER630COUNT | LONG | [N,22] |  |
| FILTER427HEATER | INT | [N] |  |
| FILTER629HEATER | INT | [N] |  |
| FILTER630HEATER | INT | [N] |  |
| PHOTOMETERSTATUS | INT | [N] |  |
| FILTER427SETTEMP | INT | [N] |  |
| FILTER629SETTEMP | INT | [N] |  |
| FILTER630SETTEMP | INT | [N] |  |
| FILTER427TEMP | INT | [N] |  |
| FILTER629TEMP | INT | [N] |  |
| FILTER630TEMP | INT | [N] |  |
| PHVPSTEMP | INT | [N] |  |
| ILLUMSENSOR1 | INT | [N] |  |
| ILLUMSENSOR2 | INT | [N] |  |
| PHOTOMETER427HIGHVOLTAGE | INT | [N] |  |
| PHOTOMETER629HIGHVOLTAGE | INT | [N] |  |
| PHOTOMETER630HIGHVOLTAGE | INT | [N] |  |
|  |  |  |  |
| Calibration parameters |
| CALIBRATION\_TABLES CALIBRATION\_TABLES\_TITLE CALIBRATION\_TABLES\_UNITS | BOOLSTRINGBOOL | - | Calibration table present. |
| DISK\_RESPONSIVITIES DISK\_RESPONSIVITIES\_TITLE | FLOATSTRING | [2,3,156,16,5]- | The responsivity of the SSUSI instrument for the disk from the first calibration file that was used. “Disk Responsivities” |
| LIMB\_RESPONSIVITIES LIMB\_RESPONSIVITIES\_TITLE LIMB RESPONSIVITIES UNITS | FLOATSTRINGSTRING | [2,3,24,8,5]- | The responsivity of the SSUSI instrument for the limb (1st cal file). “Limb Responsivities” “Cts/sec/pixel/Rayleigh” |
| DISK\_INTEGRATION\_TIME DISK\_INTEGRATION\_TIME\_TITLE DISK\_INTEGRATION\_TIME\_UNITS | FLOATSTRINGSTRING | --- | The integration time for a single disk pixel measurement (1st cal file). “Disk Integration Time” “Seconds” |
| LIMB\_INTEGRATION\_TIME LIMB\_INTEGRATION\_TIME\_TITLE LIMB\_INTEGRATION\_TIME\_UNITS | FLOATSTRINGSTRING | --- | The integration time for a single limb pixel measurement (1st cal file). “Limb Integration Time” “Seconds” |
| DARK\_INTEGRATION\_TIME DARK\_INTEGRATION\_TIME\_TITLE DARK\_INTEGRATION\_TIME\_UNITS | FLOATSTRINGSTRING | --- | The integration time for the SSUSI dark pixel (1st cal file). “Dark Integration Time” “Seconds” |
| DISK\_DARK\_MASKS DISK\_DARK\_MASKS\_TITLE DISK\_DARK\_MASKS\_UNITS | FLOATSTRINGSTRING | [2,3,16,5]-- | Dark count mask for the disk (1st cal file). “Disk Dark Mask” “Counts” |
| LIMB\_DARK\_MASKS LIMB\_DARK\_MASKS\_TITLE LIMB\_DARK\_MASKS\_UNITS | FLOATSTRINGSTRING | [2,3,8,5]-- | Dark count mask for the limb (1st cal file). “Limb Dark Mask” “Counts” |
| DISK\_1216\_BACKGROUND\_MASK DISK\_1216\_BACKGROUND\_MASK\_TITLE | FLOATSTRING | [2,3,16,5]- | 1216 scattered light mask for the disk (1st cal file). “Disk 1216 Background Mask” |
| LIMB\_1216\_BACKGROUND\_MASK LIMB\_1216\_BACKGROUND\_MASK\_TITLE | FLOATSTRING | [2,3,8,5]- | 1216 scatter light mask for the limb (1st cal file). “Limb 1216 Background Mask” |
| DISK\_1304\_BACKGROUND\_MASK DISK\_1304\_BACKGROUND\_MASK\_TITLE | FLOATSTRING | [2,3,16,5]- | 1304 scattered light mask for the disk (1st cal file). “Disk 1304 Background Mask” |
| LIMB\_1304\_BACKGROUND\_MASK LIMB\_1304\_BACKGROUND\_MASK\_TITLE | FLOATSTRING | [2,3,8,5]- | 1304 scatter light mask for the limb (1st cal file). “Limb 1304 Background Mask” |
| DISK\_LONG\_BACKGROUND\_MASK DISK\_LONG\_BACKGROUND\_MASK\_TITLE | FLOATSTRING | [2,3,16,5]- | Long wavelength scattered light mask for the disk (1st cal file). “Long Wavelength Background Mask” |
| DISK\_CALIBRATION\_ERROR\_RATIO DISK\_CAL\_ERROR\_RATIO\_TITLE | FLOATSTRING | [2,3,156,16,5]- | Calibration uncertainty for the disk (1st cal file). “Disk Calibration Uncertainty” |
| LIMB\_CALIBRATION\_ERROR\_RATIO LIMB\_CAL\_ERROR\_RATIO\_TITLE | FLOATSTRING | [2,3,24,8,5]- | Calibration uncertainty for the limb (1st cal file). “Limb Calibration Uncertainty” |
| DARK\_COUNT\_CORRECTION DARK\_COUNT\_CORRECTION\_TITLE | INTSTRING | -- | Correct counts for dark counts.  “Corrected for Dark counts (1-Yes, 0-No)” |
| SCATTER\_LIGHT\_1216\_CORRECTION SCATTER\_LIGHT\_1216\_CORRECTION \_TITLE | INTSTRING | -- | Correct counts for 1216 scattered lights. “Corrected for 1216 scattered light (1-Yes, 0-No)” |
| SCATTER\_LIGHT\_1304\_CORRECTION SCATTER\_LIGHT\_1304\_CORRECTION \_TITLE | INTSTRING | -- | Correct counts for 1304 scattered lights. “Corrected for 1304 scattered light (1-Yes, 0-No)” |
| OVERLAP\_1304\_1356\_CORRECTION OVERLAP\_1304\_1356\_CORRECTION \_TITLE | INTSTRING | -- | Correct counts for 1304/1356 overlap. “Corrected for 1304/1356 overlap (1-Yes, 0-No)” |
| LONGWAVE\_SCATTER\_CORRECTION LONGWAVE\_SCATTER\_CORRECTION \_TITLE | INTSTRING | -- | Correct counts for long-wave scattered light.  “Corrected for long-wave scattered light  (1-Yes, 0-No)” |
| RED\_LEAK\_CORRECTION RED\_LEAK\_CORRECTION .TITLE | INTSTRING | -- | Correct counts for leaked red light.  “Corrected for red light leak  (1-Yes, 0-No)” |
|  |  |  |  |
| Calibrated, background-corrected data |
| DISK\_RADIANCEDATA\_INTENSITY DISK\_RADIANCEDATA\_INTENSITY\_TITLE DISK\_RADIANCEDATA\_INTENSITY\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | The calibrated disk pixel radiances “Imaging Mode Disk Radiance Data – corrected for background” “Rayleighs” |
| LIMB\_RADIANCEDATA\_INTENSITY LIMB\_RADIANCEDATA\_INTENSITY\_TITLE LIMB\_RADIANCEDATA\_INTENSITY\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | The calibrated disk pixel radiances “Imaging Mode Limb Radiance Data – corrected for background” “Rayleighs” |
|  |  |  |  |
| Error Tracking Variables |
| DISK\_CALIBRATIONERROR DISK\_CALIBRATIONERROR\_TITLE DISK\_CALIBRATIONERROR\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | Disk pixel calibration uncertainty “Disk Calibration Error” “Rayleighs” |
| DISK\_BG\_DARK DISK\_BG\_DARK\_TITLE DISK\_BG\_DARK\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | Dark background for the disk. “Disk Background - Dark” “Counts” |
| DISK\_BG\_1216 DISK\_BG\_1216\_TITLE DISK\_BG\_1216\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | 1216 background for the disk “Disk Background – 1216” “counts” |
| DISK\_BG\_1304 DISK\_BG\_1304\_TITLE DISK\_BG\_1304\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | 1304 background for the disk. “Disk Background – 1304” “counts” |
| DISK\_BG\_LONG DISK\_BG\_LONG\_TITLE DISK\_BG\_LONG\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | Long wavelength background for the disk. “Disk Background – long” “counts” |
| DISK\_BG\_SAA DISK\_BG\_SAA\_TITLE DISK\_BG\_SAA\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | SAA background for the disk. “Disk Background - SAA” “Counts” |
| DISK\_BG\_RED DISK\_BG\_RED.TITLE DISK\_BG\_RED.UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | Red leak light background for the disk. “Disk Background – Red Leak” “Counts” |
| DISK\_COUNTS\_MINUS\_BG DISK\_COUNTS\_MINUS\_BG\_TITLE DISK\_COUNTS\_MINUS\_BG\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | Remaining counts after all background subtractions for the disk. “Disk Counts after all background subtractions” “counts” |
| DISK\_COUNTERROR\_TOTAL DISK\_COUNTERROR\_TOTAL\_TITLE DISK\_COUNTERROR\_TOTAL\_UNITS | FLOATSTRINGSTRING | [N,132,16,5]-- | Total uncertainty in disk pixels from all statistical sources  “Disk Statistical Error from all sources (excluding any calibration bias)” “Rayleighs” |
| LIMB\_CALIBRATIONERROR LIMB\_CALIBRATIONERROR\_TITLE LIMB\_CALIBRATIONERROR\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | Limb pixel calibration uncertainty “Limb Calibration Error” “Rayleighs” |
| LIMB\_BG\_DARK LIMB\_BG\_DARK\_TITLE LIMB\_BG\_DARK\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | Dark background for the limb.. “Limb Background - Dark” “Counts” |
| LIMB\_BG\_1216 LIMB\_BG\_1216\_TITLE LIMB\_BG\_1216\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | 1216 background for the limb “Limb Background – 1216” “counts” |
| LIMB\_BG\_1304 LIMB\_BG\_1304\_TITLE LIMB\_BG\_1304\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | 1304 background for the limb. “Limb Background – 1304” “counts” |
| LIMB\_BG\_LONG LIMB\_BG\_LONG\_TITLE LIMB\_BG\_LONG\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | Long wavelength background for the limb. “Limb Background – long” “counts” |
| LIMB\_BG\_SAA LIMB\_BG\_SAA\_TITLE LIMB\_BG\_SAA\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | SAA background for the limb.. “Limb Background - SAA” “Counts” |
| LIMB\_COUNTS\_MINUS\_BG LIMB\_COUNTS\_MINUS\_BG\_TITLE LIMB\_COUNTS\_MINUS\_BG\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | Counts remaining after all background are subtracted for the limb. “Limb Counts after all background subtractions” “counts” |
| LIMB\_COUNTERROR\_TOTAL LIMB\_COUNTERROR\_TOTAL\_TITLE LIMB\_COUNTERROR\_TOTAL\_UNITS | FLOATSTRINGSTRING | [N,24,8,5]-- | Total uncertainty in limb pixels from all statistical sources  “Limb Statistical Error from all sources (excluding any calibration bias)” “Rayleighs” |
| DQI\_TOTAL\_SCANDQI\_TOTAL\_SCAN\_TITLEDQI\_TOTAL\_SCAN\_UNITS | UNSIGNED SHORTSTRINGSTRING | [N]-- | Bit Meaning if set to true 7: MeV Noise Present 6: unused 5: Pointing Unknown (mirror position unknown) 4-0 unused“Data Quality Indicator – per scan”“N/A” |
| DQI\_COLOR\_SCANDQI\_COLOR\_SCAN\_TITLEDQI\_COLOR\_SCAN\_UNITS | UNSIGNED SHORTSTRINGSTRING | [N,5]-- | Bit Meaning if set to true 7 – 0 unused “Data Quality Indicator – per color and scan”“N/A” |
|  |  |  |  |
| Pixel by pixel geolocation information. Note that both day and night pierce point locations are calculated for ALL disk pixels. |
| DISK\_SCAN\_TIMES DISK\_SCAN\_TIMES\_TITLE DISK\_SCAN\_TIMES\_UNITS | FLOATSTRINGSTRING | [132]-- | Time for each mirror step in a disk scan. “Time for each mirror step in a disk scan, relative to start of scan” “Seconds” |
| LIMB\_SCAN\_TIMES LIMB\_SCAN\_TIMES\_TITLE LIMB\_SCAN\_TIMES\_UNITS | FLOATSTRINGSTRING | [24]-- | Time for each mirror step in a limb scan. “Time for each mirror step in a limb scan, relative to start of scan” “Seconds” |
| SCAN\_MOTOR\_OFFSETS SCAN\_MOTOR\_OFFSETS\_TITLE SCAN\_MOTOR\_OFFSETS\_UNITS | INTSTRINGSTRING | [N]-- | The scan motor offsets detected for each scan. “Scan motor offsets relative to default scan.” “Steps” |
| DISK\_SCAN\_ANGLES DISK\_SCAN\_ANGLES\_TITLE DISK\_SCAN\_ANGLES\_UNITS | FLOATSTRINGSTRING | [3,132]-- | Disk cross track angle for each mirror step in a scan. “Cross track angle for each mirror step in a disk scan” “Degrees” |
| LIMB\_SCAN\_ANGLES LIMB\_SCAN\_ANGLES\_TITLE LIMB\_SCAN\_ANGLES\_UNITS | FLOATSTRINGSTRING | [3,24]-- | Limb cross track angle for each mirror step in a scan. “Cross track angle for each mirror step in a limb scan” “Degrees” |
| DISK\_PIXEL\_ANGLES DISK\_PIXEL\_ANGLES\_TITLE DISK\_PIXEL\_ANGLES\_UNITS | FLOATSTRINGSTRING | [2,16]-- | Angular offset of each along-track (along-slit) disk pixel. “Along track pixel angle (disk)” “Degrees” |
| LIMB\_PIXEL\_ANGLES LIMB\_PIXEL\_ANGLES\_TITLE LIMB\_PIXEL\_ANGLES\_UNITS | FLOATSTRINGSTRING | [2,8]-- | Angular offset of each along-track (along-slit) limb pixel. “Along track pixel angle (limb)” “Degrees” |
| DISK\_PIXEL\_OFFSETS DISK\_PIXEL\_OFFSETS\_TITLE DISK\_PIXEL\_OFFSETS\_UNITS | FLOATSTRINGSTRING | [3,16]-- | Corrections to disk scan angles for each along-track (along-slit) disk pixel. “Along track pixel scan angle correction (disk)” “Degrees” |
| LIMB\_PIXEL\_OFFSETS LIMB\_PIXEL\_OFFSETS\_TITLE LIMB\_PIXEL\_OFFSETS\_UNITS | FLOATSTRINGSTRING | [3,8]-- | Corrections to disk scan angles for each along-track (along-slit) limb pixel. “Along track pixel scan angle correction (limb)” “Degrees” |
| DISK\_LOOK\_VECTOR\_ECI DISK\_LOOK\_VECTOR\_ECI\_COMMENT | FLOATSTRING | [N,132,16,3]- | Disk look vectors in the ECI frame. “Unit look vector for the disk from s/c in ECI frame” |
| LIMB\_LOOK\_VECTOR\_ECI LIMB\_LOOK\_VECTOR\_ECI\_COMMENT | FLOATSTRING | [N,24,8,3]- | Limb look vectors in the ECI frame. “Unit look vector from s/c to the limb in ECI frame” |
| PIERCEPOINT\_DAY\_ALTITUDE PIERCEPOINT\_DAY\_ALTITUDE\_TITLE PIERCEPOINT\_DAY\_ALTITUDE\_UNITS | FLOATSTRINGSTRING | --- | 150 km reference altitude “Dayside reference altitude for all pierce point location calculations” “km” |
| PIERCEPOINT\_DAY\_LATITUDE PIERCEPOINT\_DAY\_LATITUDE\_TITLE PIERCEPOINT\_DAY\_LATITUDE\_UNITS | FLOATSTRINGSTRING | [N,132,16]-- |  “Latitude of Pierce Point” “Geographic coordinates, degrees” |
| PIERCEPOINT\_DAY\_LONGITUDE PIERCEPOINT\_DAY\_LONGITUDE\_TITLE PIERCEPOINT\_DAY\_LONGITUDE\_UNITS | FLOATSTRINGSTRING | [N,132,16]-- |  “Longitude of Pierce Point” “Geographic coordinates, degrees” |
| PIERCEPOINT\_NIGHT\_ALTITUDE PIERCEPOINT\_NIGHT\_ALTITUDE \_COMMENT | FLOATSTRING | -- | 350 km reference altitude “Nightside reference altitude for all pierce point location calculations” |
| PIERCEPOINT\_NIGHT\_LATITUDE PIERCEPOINT\_NIGHT\_LATITUDE\_TITLE PIERCEPOINT\_NIGHT\_LATITUDE\_UNITS | FLOATSTRINGSTRING | [N,132,16]-- |  “Latitude of Pierce Point” “Geographic coordinates, degrees” |
| PIERCEPOINT\_NIGHT\_LONGITUDE PIERCEPOINT\_NIGHT\_LONGITUDE \_TITLE PIERCEPOINT\_NIGHT\_LONGITUDE \_UNITS | FLOATSTRINGSTRING | [N,132,16]-- |  “Longitude of Pierce Point” “Geographic coordinates, degrees” |
| TANGENTPOINT\_LATITUDE TANGENTPOINT\_LATITUDE\_TITLE TANGENTPOINT\_LATITUDE\_UNITS | FLOATSTRINGSTRING | [N,24,8]-- |  “Latitude of Tangent Point” “Geographic coordinates, degrees” |
| TANGENTPOINT\_LONGITUDE TANGENTPOINT\_LONGITUDE\_TITLE TANGENTPOINT\_LONGITUDE\_UNITS | FLOATSTRINGSTRING | [N,24,8]-- |  “Longitude of Tangent Point” “Geographic coordinates, degrees” |
| TANGENTPOINT\_ALTITUDE TANGENTPOINT\_ALTITUDE\_TITLE TANGENTPOINT\_ALTITUDE\_UNITS | FLOATSTRINGSTRING | [N,24,8]-- |  “Altitude of the true tangent point” “Kilometers” |
| RA RA\_TITLE RA\_UNITS | FLOATSTRINGSTRING | [N,24,8]-- |  “Right Ascension” “Decimal degrees” |
| DEC DEC\_TITLE DEC\_UNITS | FLOATSTRINGSTRING | [N,24,8]-- |  “Declination” “Decimal degrees (90 to –90)” |
| STAR STAR\_TITLE | SHORTSTRING | [N] | Scans that may be contaminated with stellar emissions. “Star passage likely in limb scan” |
| STAR\_LOCATION  STAR\_LOCATION\_TITLE | SHORTSTRING | [N,24,8]- | Pixels that may be contaminated with stellar emission. “Probable star locations in limb scan” |
| DISK\_SOLAR\_ZENITH\_ANGLE DISK\_SOLAR\_ZENITH\_ANGLE.TITLE DISK\_SOLAR\_ZENITH\_ANGLE.UNITS | FLOATSTRINGSTRING | [N,132,16]-- | Angle from dayside (150 km altitude) disk pixel zenith to sun “Disk Solar Zenith Angle” “degrees” |
| LIMB\_SOLAR\_ZENITH\_ANGLE LIMB\_SOLAR\_ZENITH\_ANGLE.TITLE LIMB\_SOLAR\_ZENITH\_ANGLE.UNITS | FLOATSTRINGSTRING | [N,24,8]-- | Angle from tangentpoint limb pixel zenith to sun“Limb Solar Zenith Angle” “degrees” |
|  |  |  |  |
| Photometer Data |  |  |  |
| LAT\_PHOTOMETER | FLOAT | [N,22] | Latitude of each photometer radiance  |
| LON\_PHOTIMETER | FLOAT | [N,22] | Longitude of each photometer radiance |
| ALT\_PHOTOMETER | FLOAT | [N,22] | Altitude of the photometer for each radiance |
| PHOTOMETER\_DMSP\_TIME\_OFFSET PHOTOMETER\_DMSP\_TIME\_OFFSET TITLEPHOTOMETER\_DMSP\_TIME\_OFFSET\_UNITS | FLOATSTRINGSTRING | --- | Scan start time offset from DMSP\_COORDS\_TIME" Offset between ephemeris time and photometer scan start"“Seconds” |
| PHOTOMETER427\_RADIANCE | FLOAT | [N,22] | Calibrated Radiances from the 427 nm photometer in Rayleighs  |
| PHOTOMETER629\_RADIANCE | FLOAT | [N,22] | Calibrated Radiances from the 629 nm photometer in Rayleighs |
| PHOTOMETER630\_RADIANCE | FLOAT | [N,22] | Calibrated Radiances from the 630 nm photometer in Rayleighs |
| PHOTOMETER427\_VARIANCE | FLOAT | [N,22] | Variances of the 427 nm photometer radiances in Rayleighs\*\*2 |
| PHOTOMETER629\_VARIANCE | FLOAT | [N,22] | Variances of the 629 nm photometer radiances in Rayleighs\*\*2 |
| PHOTOMETER630\_VARIANCE | FLOAT | [N,22] | Variances of the 630 nm photometer radiances in Rayleighs\*\*2 |

# L1B Spectrograph Variables

In this table N is the number of stares in the file. The spectrograph contains the 168 different wavelength results as well as the reduced 5 imaging colors. In the table below Ns= “number of seconds”=3, Nd=”number of spatial dimensions”=3, Natp=”number of across track pixels”=8, Nw=”number of spectral wavelengths”=168, NIC=”number of imaging colors”=5

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable Name** | **Type** | **Dimensions** | **Value/Comment** |
| Time information follows. Note that the time information is written at two resolutions: the one-second resolution of the DMSP\_COORDS\_TIME variable and the 22-second resolution of the TIME variable. |
| TIME TIME\_TITLE  TIME\_UNITS  | DOUBLESTRINGSTRING | [N] | UT Time of day in seconds "Start time of each scan" "Seconds" |
|  |  |  |  |
| DMSP orbit information included here. This includes the‘Z-bits’ parameters.  |
| COSCROSSINGANGLE | FLOAT | [N] | The cosine of crossing angle of subsatellite track with respect to local meridian. See p. 25 of DMSP Data Specification (IS-YD-821) Rev C. |
| COSLUNARAZIMUTH | FLOAT | [N] | Azimuth of moon relative to direction of satellite flight. However, this parameter seems to have been improperly scaled as it has a value greater than 1. It also exhibits discrete “stair step” behavior. |
| COSSOLARAZIMUTH | FLOAT | [N] | Azimuth of sun relative to direction of satellite flight. It has a value of close to 1 for F16, which doesn’t seem quite right. |
| EPHEMCLOCKPT1 | INT | [N] | Divided by 16 to get a time-like variable in units of seconds that rolls over every 512 seconds. This variable has zeros every ~53 seconds. |
| EPHEMCLOCKPT2 | INT | [N] | Multiply by 8 and then add (EPHEMCLOCKPT1 mod 128) divided by 16 to get the time in elapsed seconds since 0000Z (I *think* this is the right algorithm). This variable has zeros every ~53 seconds. |
| HEIGHTEARTHRADIUSRATIO | FLOAT | [N] | Ratio of altitude of spacecraft above subsatellite point at mean sea level to the Earth’s radius (R = 6378.145 km). This has a value of ~4400.  |
| LUNARELEVATION | FLOAT | [N] | Elevation of moon with respect to local orbit tangent plane (in degrees).  |
| LUNARPHASEANGLE | FLOAT | [N] | Angle between lunar and solar position vectors. Units should be degrees, but this has an integer value between 5 and 7, so it does not seem right.  |
| SOLARELEVATION | FLOAT | [N] | Elevation of sun with respect to local orbit tangent plane (in degrees).  |
| SUBPOINTLAT | FLOAT | [N] | Geodetic latitude of subsatellite point, WGS-72 (degrees). The values are very close to but not quite the same as those in LAT\_1. |
| SUBPOINTLONG | FLOAT | [N] | Longitude of subsatellite point, WGS-72 (degrees, from –180 to 180). The values are very close to but not quite the same as those in LONGITUDE.. |
| ALTITUDE | FLOAT | [N] | Pre-computed GWC ephemeris: altitude (km) at a 22-second (per scan) cadence. The corresponding time array is TIME. The values exhibit discrete steps of 1 or 2 km. Previously named ALT\_1.  |
| JULDAY | INT | [N] | Precomputed GWC ephemeris: Julian day. Previously named JULDAY\_1. |
| SATH | FLOAT | [N] | Precomputed GWC ephemeris: ?. Not sure what this is, but it runs from 0 to 360 degrees within one file, so it looks like an orbit angle. Previously named SATH\_1. |
| Information in the “DMSP” fields is derived from smoothing and filtering the GWC ephemeris. (Later, an ephemeris derived from integration of TLEs may be inserted into these DMSP fields in a later version of the file – although this has not happened over the life of the program.) |
| DMSP\_LATITUDE DMSP\_LATITUDE\_TITLE DMSP\_LATITUDE\_UNITS | FLOATSTRINGSTRING | [N,Ns]-- | DMSP Spcaeraft latitude. "Geodetic latitude of the DMSP spacecraft at 1 second resolution""Degrees” |
| DMSP\_LONGITUDE DMSP\_LONGITUDE\_TITLE DMSP\_LONGITUDE\_UNITS | FLOATSTRINGSTRING | [N,Ns]-- | DMSP Spacecraft longitude. "Geodetic longitude of the DMSP spacecraft at 1 second resolution""Degrees” |
| DMSP\_RADIAL\_DISTANCE DMSP\_RADIAL\_DISTANCE\_TITLE DMSP\_RADIAL\_DISTANCE\_UNITS | FLOATSTRINGSTRING | [N,Ns]-- | DMSP spacecraft radial distance. “Radial distance of the DMSP spacecraft from center of earth at 1 second resolution”“km” |
| DMSP\_ALTITUD DMSP\_ALTITUDE\_TITLE DMSP\_ALTITUDE\_UNITS | FLOATSTRINGSTRING | [N,Ns]-- | DMSP Spacecraft altitude. "Altitude of the DMSP spacecraft from the surface of the earth at 1 second resolution"“km” |
| DMSP\_COORDS\_ECI DMSP\_COORDS\_ECI\_TITLE DMSP\_COORDS\_ECI\_UNITS | FLOATSTRINGSTRING | [N,Ns,Nd]-- | DMSP Spacecraft location in ECI coordinates"ECI coordinates of the DMSP spacecraft at 1 second resolution"“km” |
| DMSP\_NADIR\_EC DMSP\_NADIR\_ECI\_TITLE DMSP\_NADIR\_ECI\_UNITS | FLOATSTRINGSTRING | [N,Ns,Nd]-- | DMSP Spacecraft nadir vector in ECI coordinates. "ECI coordinates of the DMSP spacecraft nadir position at 1 second resolution”“km” |
| DMSP\_SOLAR\_ECI DMSP\_SOLAR\_ECI\_TITLE DMSP\_SOLAR\_ECI\_UNITS | FLOATSTRINGSTRING | [N,Ns,Nd]-- | Spacecraft Solar location in ECI coordinates. "ECI position of the sun at 1 second resolution"“km” |
| DMSP\_SOLAR\_LAT DMSP\_SOLAR\_LAT\_TITLE DMSP\_SOLAR\_LAT\_UNITS | FLOATSTRINGSTRING | [N,Ns]-- | Spacecraft Subsolar latitude. "Subsolar latitude at 1 second resolution"“degrees” |
| DMSP\_SOLAR\_LON DMSP\_SOLAR\_LON\_TITLE DMSP\_SOLAR\_LON\_UNITS | FLOATSTRINGSTRING | [N,Ns]-- | Spacecraft Subsolar longitude. "Subsolar longitude at 1 second resolution"“degrees” |
| DMSP\_COORDS\_TIME  DMSP\_COORDS\_TIME\_TITLE DMSP\_COORDS\_TIME\_UNITS | FLOATSTRINGSTRING | [N,Ns]-- | Spacecraft1 second time steps used to generate the “DMSP\_” tagged coordinates"Time corresponding to each DMSP coordinate at 1 second resolution“Seconds” |
| PHOTOMETER\_DMSP\_TIME\_OFFSET PHOTOMETER\_DMSP\_TIME\_OFFSET TITLEPHOTOMETER\_DMSP\_TIME\_OFFSET\_UNITS | FLOATSTRINGSTRING | --- | Scan start time offset from DMSP\_COORDS\_TIME" Offset between ephemeris time and photometer scan start"“Seconds” |
|  |  |  |  |
| SSUSI instrument configuration, health and safety parameters  |  |  |  |
| DETECTOR\_USED DETECTOR\_USED\_TITLE DETECTOR\_USED\_VALID\_RANGE | BYTESTRINGSTRING | [N]-- | Flag to indicate which detector was used"Detector ID, 0=primary, 1=secondary"“” |
| SLIT\_WIDTH SLIT\_WIDTH\_TITLE SLIT\_WIDTH\_VALID\_RANGE | BYTESTRINGSTRING | [N]-- | Flag to indicate which slith was used"Slit width, 0=wide, 1=medium, 2=narrow"“” |
| SIS data fields |  |  |  |
| DARKCOUNTPIXEL DARKCOUNTPIXEL\_TITLE | INTSTRING | [N]- |  “Dark Count Pixel” |
| COUNTS\_RAW COUNTS\_RAW\_TITLE  COUNTS\_RAW\_UNITS  | FLOATSTRINGSTRING | [N, Natp, Nw]-- | Counts as reported by the instrument.  "Compressed Counts (w/o IO ratio)"; "Counts / pixel"; |
| COUNTS\_DECOMPRESSED COUNTS\_DECOMPRESSED\_TITLE COUNTS\_DECOMPRESSED\_UNITS | FLOATSTRINGSTRING | [N,Natp, Nw]-- | Instrument compression of counts removed from lookup table "Decompressed Counts (w/o IO ratio)"; "Counts / pixel"; |
| COUNTS\_DECOMPRESSED\_ERROR COUNTS\_DECOMPRESSED\_ERROR\_TITLE COUNTS\_DECOMPRESSED\_ERROR\_UNITS | FLOATSTRINGSTRING | [N, Natp, Nw]-- | Errors associated with decompression of instrument reported counts "Data Decompression Error"  "Uncorrected Decompressed Counts" |
| COUNT\_RATE\_CORRECTED COUNT\_RATE\_CORRECTED\_TITLE COUNT\_RATE\_CORRECTED\_UNITS | FLOATSTRINGSTRING | [N, Natp, Nw]-- | Count rate decompressed and corrected for deadtime "Corrected Count Rate (w/ IO ratio)"; "Corrected Counts / pixel / second" |
| MEVDISCRIMINATOR1 MEVDISCRIMINATOR1\_TITLE MEVDISCRIMINATOR1\_UNITS | FLOATSTRINGSTRING | [N]-- | Discriminator setting for detector 1 particle filter "MeV particle noise candidate Discriminator 1"; "dimensionless"; |
| MEVDISCRIMINATOR2 MEVDISCRIMINATOR2\_TITLE MEVDISCRIMINATOR2\_UNITS | FLOATSTRINGSTRING | [N]-- | Discriminator setting for detector 2 particle filter "MeV particle noise candidate Discriminator 2"; "dimensionless"; |
| MEVTHRESHOLD1 MEVTHRESHOLD1\_TITLE MEVTHRESHOLD1\_UNITS | FLOATSTRINGSTRING | [1]-- | Discriminator threshold setting for detector 1 particle filter "Threshold for Discriminator 1"; "dimensionless"; |
| MEVTHRESHOLD2 MEVTHRESHOLD2\_TITLE MEVTHRESHOLD2\_UNITS | FLOATSTRINGSTRING | [1]-- | Discriminator threshold setting for detector 2 particle filter "Threshold for Discriminator 2"; "dimensionless"; |
| PULSEHEIGHTDATA | FLOAT | [N,3] |  |
| FLIGHT\_SW\_VERSION | INT | [N] | Value imported from PREP file. |
| FLIGHT\_SW\_COLORTABLE\_VERSION | INT | [N] |  |
| DARKCOUNT | INT | [N] | The value of the dark count pixel for a scan. |
| BACKGROUNDCOUNT | INT | [N] | The value of the background count pixel for a scan. |
| MIRRORSTARTPOSITION | INT | [N] | Not used in spectrograph mode |
| NADIRPOSITION | INT | [N] | Not used in spectrograph mode |
| FAULTSTATUS | INT | [N] |  |
| PREVCOMMAND1 | INT | [N] |  |
| PREVCOMMAND2 | INT | [N] |  |
| SISSTATUS | INT | [N] |  |
| DETECTORCONFIG | INT | [N] |  |
| DETECTORHIGHVOLTAGE | INT | [N] |  |
| SISRADIATORTEMP | INT | [N] |  |
| SCANMIRRORTEMP | INT | [N] |  |
| DET1HIGHVOLTAGE | INT | [N] |  |
| DET2HIGHVOLTAGE | INT | [N] |  |
| FPE1TEMP | INT | [N] |  |
| FPE2TEMP | INT | [N] |  |
| SMBOARDTEMP | INT | [N] |  |
| Information for the photometers |  |  |  |
| PHOTOMETER427COUNT | LONG | [N,22] |  |
| PHOTOMETER629COUNT | LONG | [N,22] |  |
| PHOTOMETER630COUNT | LONG | [N,22] |  |
| FILTER427HEATER | INT | [N] |  |
| FILTER629HEATER | INT | [N] |  |
| FILTER630HEATER | INT | [N] |  |
| PHOTOMETERSTATUS | INT | [N] |  |
| FILTER427SETTEMP | INT | [N] |  |
| FILTER629SETTEMP | INT | [N] |  |
| FILTER630SETTEMP | INT | [N] |  |
| FILTER427TEMP | INT | [N] |  |
| FILTER629TEMP | INT | [N] |  |
| FILTER630TEMP | INT | [N] |  |
| PHVPSTEMP | INT | [N] |  |
| ILLUMSENSOR1 | INT | [N] |  |
| ILLUMSENSOR2 | INT | [N] |  |
| PHOTOMETER427HIGHVOLTAGE | INT | [N] |  |
| PHOTOMETER629HIGHVOLTAGE | INT | [N] |  |
| PHOTOMETER630HIGHVOLTAGE | INT | [N] |  |
|  |
| Pixel calibration, counts, and radiances |  |  |  |
| DETECTOR\_INPUT\_RATE DETECTOR\_TITLE | FLOATSTRING | [N]- | Raw count rates from the instrument. e.g., “Input rate data” |
| DETECTOR\_OUTPUT\_RATE DETECTOR\_TITLE | FLOATSTRING | [N]- | Discriminated count rates from the instrument. e.g., “Output rate data” |
| RADIANCECALIBRATIONERROR RADIANCECALIBRATIONERROR\_TITLE   RADIANCECALIBRATIONERROR\_UNITS | FLOATSTRINGSTRING | [NIC, Natp]-- | Calibration Errors by across track pixel and color “Spectrograph mode radiance data calibration errors" "Percent" |
| RESPONSIVITYCTSPERRAYLEIGH RESPONSIVITYCTSPERRAYLEIGH\_TITLE RESPONSIVITYCTSPERRAYLEIGH\_UNITS | FLOATSTRINGSTRING | [NIC, Natp]-- |  The responsivity to the 5 imaging colors "Spectrograph mode responsivity" "Counts per rayleigh" |
| SUBTRACTEDCOUNTS SUBTRACTEDCOUNTS\_TITLE  SUBTRACTEDCOUNTS\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]- - | Background counts subtracted from raw counts "Background subtracted counts in each imaging color” "Counts per integration period” |
| RADIANCECOUNTS RADIANCECOUNTS\_TITLE RADIANCECOUNTS\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Raw counts separated by imaging color "Raw counts in each imaging color" "Counts per integration period” |
| RADIANCECOUNTSSTATERROR RADIANCECOUNTSSTATERROR\_TITLE RADIANCECOUNTSSTATERROR\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Statistical error from counting in counts "1-sigma statistical error in each imaging color" "Counts per integration period"; |
| RADIANCECOUNTSDECOMPERRORRADIANCECOUNTSDECOMPERROR\_TITLERADIANCECOUNTSDECOMPERROR\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Errors from count compression procedure "Decompression error in each imaging color" "Counts per integration period" |
| RADIANCEDATA RADIANCEDATA\_TITLE RADIANCEDATA\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Calibrated radiance for each imaging color "Spectrograph mode radiance data, 5 color" "rayleighs (R)" |
| RADIANCEDATASTATERROR RADIANCEDATASTATERROR\_TITLE RADIANCEDATASTATERROR\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Statistical error from counting in radiance "Spectrograph mode radiance data statistical errors, 1-sigma, 5 colors" "rayleighs (R)" |
| DQICOLOR DQICOLOR\_TITLE DQICOLOR\_UNITS | SHORTSTRINGSTRING | [N, NIC, Natp]-- | Data Quality Indicators by imaging color "Data quality indicators, per color" "Bit 0-4 unused, 5 Calibration Failure, 6 Zero radiance, 7 Negative radiance" |
| DQISCAN DQISCAN\_TITLE DQISCAN\_UNITS | SHORTSTRINGSTRING | [N]-- | Data Quality Indicator for effects that affect a stare of imaging color "Data quality indicators, per scan"; "0-3 unsed, 4-PVAT covarage invalid, 6-Scan mirror position invalid"; |
| BACKGROUND1216 BACKGROUND1216\_TITLE BACKGROUND1216\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Background 1216 counts removed in each imaging color/pixel  "1216 background (scattered light)" "in counts" |
| BACKGROUND1304 BACKGROUND1304\_TITLE BACKGROUND1304\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- |  Background 1304 counts removed in each imaging color/pixel  "1304 background (scattered light)" "in counts" |
| LONG\_BG\_SUB\_1216 LONG\_BG\_SUB\_1216\_TITLE LONG\_BG\_SUB\_1216\_UNITS | FLOATSTRINGSTRING | [N,Natp]-- | Long wavelegth background counts subtracted from each 1216 color/pixel "1216 background (scattered light)” "counts in long background pixel" |
| LONG\_BG\_SUB\_1304 LONG\_BG\_SUB\_1304\_TITLE LONG\_BG\_SUB\_1304\_UNITS | FLOATSTRINGSTRING | [N, Natp]-- | Long wavelegth background counts subtracted from each 1304 color/pixel "1304 background (scattered light)" "counts in long background pixel" |
| BACKGROUNDLONG BACKGROUNDLONG\_TITLE BACKGROUNDLONG\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Long wavelegth background counts subtracted from each imaging pixel "Long background (scattered light)" "in rayleighs (R) or counts? TBD" |
| BACKGROUNDDARK BACKGROUNDDARK\_TITLE BACKGROUNDDARK\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | Dark Count background counts subtracted from each imaging pixel  "Dark background" "in rayleighs (R) or counts? TBD" |
| BACKGROUNDSAA BACKGROUNDSAA\_TITLE BACKGROUNDSAA\_UNITS | FLOATSTRINGSTRING | [N, NIC, Natp]-- | SAA count background subtracted from each imaging pixel "SAA particle noise background" "in rayleighs (R) or counts? TBD" |
| PIXELSPECTRA PIXELSPECTRA\_TITLE PIXELSPECTRA\_UNITS | FLOATSTRINGSTRING | [N, Natp, Nw]-- | Spectrographic radiances "Individual pixel spectra" "rayleighs per angstrom (R/A)" |
| PIXELERRORS PIXELERRORS\_TITLE PIXELERRORS\_UNITS | FLOATSTRINGSTRING | [N, Natp,Nw]-- | Spectrographic radiance errors "Individual pixel spectra 1-sigma errors" "rayleighs per angstrom (R/A)" |
| PIXELDATADECOMPERROR PIXELDATADECOMPERROR\_TITLE PIXELDATADECOMPERROR\_UNITS | FLOATSTRINGSTRING | [N, Natp,Nw]-- | Spectrographic count decompression uncertainties "Decompression error in individual spectral bins"; "Counts per integration period"; |
| Pixel by pixel geolocation information. Note that both day and night pierce point locations are calculated for ALL disk pixels. |
| DISK\_SCAN\_TIMES DISK\_SCAN\_TIMES\_TITLE DISK\_SCAN\_TIMES\_UNITS | FLOATSTRINGSTRING | [Nctp]-- | Time for each mirror step in an imaging scan. “Time for each mirror step in a disk scan, relative to start of scan” “Seconds” |
| DISK\_SCAN\_ANGLES DISK\_SCAN\_ANGLES\_TITLE DISK\_SCAN\_ANGLES\_UNITS | FLOATSTRINGSTRING | [Ns,Nctp]-- | Cross track angle for each mirror step in an imaging scan. “Cross track angle for each mirror step in a disk scan” “Degrees” |
| PIXELSOLARZENITHANGLE PIXELSOLARZENITHANGLE\_TITLE PIXELSOLARZENITHANGLE\_UNITS | FLOATSTRINGSTRING | [N,Natp]-- | Solar zenith angle at pixel geolocation "Pixel Solar Zenith Angle - Day"; "degrees (0 - 180)"; |
| PIXELLONGITUDE PIXELLONGITUDE\_TITLE PIXELLONGITUDE\_UNITS | FLOATSTRINGSTRING | [N,Natp]-- | Pixel longitude geolocated at PIXELALTITUDE "Pixel Longitude - Day"; "degrees (0 - 360)"; |
| PIXELLATITUDE PIXELLATITUDE\_TITLE PIXELLATITUDE\_UNITS | FLOATSTRINGSTRING | [N, Natp]-- | Pixel latitude geolocated at PIXELALTITUDE "Pixel Latitude - Day"; "degrees (-90 - +90)"; |
| PIXELNIGHTLONGITUDE PIXELNIGHTLONGITUDE\_TITLE PIXELNIGHTLONGITUDE\_UNITS | FLOATSTRINGSTRING | [N,Natp]-- | Pixel longitude geolocated at PIXELNIGHTALTITUDE "Pixel Longitude - Night"; "degrees (0 - 360)"; |
| PIXELNIGHTLATITUDE PIXELNIGHTLATITUDE\_TITLE PIXELNIGHTLATITUDE\_UNITS | FLOATSTRINGSTRING | [N,Natp]-- | Pixel latitude geolocated at PIXELNIGHTALTITUDE "Pixel Latitude - Night"; "degrees (-90 - +90)"; |
| PIXELAURORALLONGITUDE PIXELAURORALLONGITUDE\_TITLE PIXELAURORALLONGITUDE\_UNITS | FLOATSTRINGSTRING | [N,Natp]-- | Pixel longitude geolocated at PIXELAURORALALTITUDE "Pixel Longitude - Auroral"; "degrees (0 - 360)"; |
| PIXELAURORALLATITUDE PIXELAURORALLATITUDE\_TITLE PIXELAURORALLATITUDE\_UNITS | FLOATSTRINGSTRING | [N,Natp]-- | Pixel latitude geolocated at PIXELAURORALALTITUDE "Pixel Latitude - Auroral"; "degrees (-90 - +90)"; |
| DQIPIXEL DQIPIXEL\_TITLE DQIPIXEL\_UNITS | SHORTSTRINGSTRING | [N,Natp]-- |  "Data quality indicators, per pixel"; "0-3 unused, 4-PVAT Covarage error, 5-Geolocation error, 6-Scan mirror position invalid, 7-Disk pixel invalid"; |
|  SC\_LATITUDE SC\_LATITUDE\_TITLE SC\_LATITUDE\_UNITS | FLOATSTRINGSTRING | [N]-- |  "Spacecraft Latitude"; "degrees (-90 - +90)"; |
| SC\_LONGITUDE SC\_LONGITUDE\_TITLE SC\_LONGITUDE\_UNITS | FLOATSTRINGSTRING | [N]-- |  "Spacecraft Longitude"; "degrees (0 - 360)" |
| SC\_ALTITUDE SC\_ALTITUDE\_TITLE SC\_ALTITUDE\_UNITS | FLOATSTRINGSTRING | [N]-- |  "Spacecraft Altitude"; "km"; |
| PIXELALTITUDE PIXELALTITUDE\_TITLE PIXELALTITUDE\_UNITS | FLOATSTRINGSTRING | [1]-- | Pixel default altitude for (dayside) data "Pixel Altitude - Day"; "km"; |
| PIXELNIGHTALTITUDE PIXELNIGHTALTITUDE\_TITLE PIXELNIGHTALTITUDE\_UNITS | FLOATSTRINGSTRING | [1]-- | Pixel altitude for night data "Pixel Altitude - Night"; "km"; |
| PIXELAURORALALTITUDE PIXELAURORALALTITUDE\_TITLE PIXELAURORALALTITUDE\_UNITS | FLOATSTRINGSTRING | [1]-- | Pixel altitude for auroral data "Pixel Altitude - Auroral" "km"; |
| LATITUDE LATITUDE\_TITLE LATITUDE\_UNITS | FLOATSTRINGSTRING | [N]-- | Duplicate of SC\_LATITUDE "Unspecified"; "degrees (-90 - +90)" |
|  LONGITUDE LONGITUDE\_TITLE LONGITUDE\_UNITS | FLOATSTRINGSTRING | [N]-- | Duplicate of SC\_LONGITUDE "Unspecified"; "degrees (0 - 360)" |
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