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 | DOUBLE  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | STRING  STRING | [N]  -  [2] | Detector ID.  e.g., “0=primary, 1=secondary” |
| SLIT\_WIDTH  SLIT\_WIDTH:TITLE  SLIT\_WIDTH:VALID\_RANGE | STRING  STRING | [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 | INT  STRING | [N]  - | “Dark Count Pixel” |
| DISKPIXELDATA  DISKPIXELDATA\_TITLE  DISKPIXELDATA\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N,132,16,5]  -  - | The decompression error for the disk pixels in counts.  “Decompression Error”  “Counts” |
| LIMBCOUNTSERROR  LIMBCOUNTSRROR\_TITLE  LIMBCOUNTSERROR\_UNITS | FLOAT  STRING  STRING | [N,24,8,5]  -  - | The decompression error for the limb pixels in counts.  “Decompression Error”  “Counts” |
| DISKDETECTORRATIO  DISKDETECTORRATIO\_TITLE | FLOAT  STRING | [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 | FLOAT  STRING | [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 | BOOL  STRING  BOOL | - | Calibration table present. |
| DISK\_RESPONSIVITIES  DISK\_RESPONSIVITIES\_TITLE | FLOAT  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | -  -  - | 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 | FLOAT  STRING  STRING | -  -  - | 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 | FLOAT  STRING  STRING | -  -  - | 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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING | [2,3,24,8,5]  - | Calibration uncertainty for the limb (1st cal file).  “Limb Calibration Uncertainty” |
| DARK\_COUNT\_CORRECTION  DARK\_COUNT\_CORRECTION\_TITLE | INT  STRING | -  - | Correct counts for dark counts.  “Corrected for Dark counts (1-Yes, 0-No)” |
| SCATTER\_LIGHT\_1216\_CORRECTION  SCATTER\_LIGHT\_1216\_CORRECTION  \_TITLE | INT  STRING | -  - | Correct counts for 1216 scattered lights.  “Corrected for 1216 scattered light (1-Yes,  0-No)” |
| SCATTER\_LIGHT\_1304\_CORRECTION  SCATTER\_LIGHT\_1304\_CORRECTION  \_TITLE | INT  STRING | -  - | Correct counts for 1304 scattered lights.  “Corrected for 1304 scattered light (1-Yes,  0-No)” |
| OVERLAP\_1304\_1356\_CORRECTION  OVERLAP\_1304\_1356\_CORRECTION  \_TITLE | INT  STRING | -  - | Correct counts for 1304/1356 overlap.  “Corrected for 1304/1356 overlap (1-Yes, 0-No)” |
| LONGWAVE\_SCATTER\_CORRECTION  LONGWAVE\_SCATTER\_CORRECTION  \_TITLE | INT  STRING | -  - | Correct counts for long-wave scattered light.  “Corrected for long-wave scattered light  (1-Yes, 0-No)” |
| RED\_LEAK\_CORRECTION  RED\_LEAK\_CORRECTION .TITLE | INT  STRING | -  - | 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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N,132,16,5]  -  - | Disk pixel calibration uncertainty  “Disk Calibration Error”  “Rayleighs” |
| DISK\_BG\_DARK  DISK\_BG\_DARK\_TITLE  DISK\_BG\_DARK\_UNITS | FLOAT  STRING  STRING | [N,132,16,5]  -  - | Dark background for the disk.  “Disk Background - Dark”  “Counts” |
| DISK\_BG\_1216  DISK\_BG\_1216\_TITLE  DISK\_BG\_1216\_UNITS | FLOAT  STRING  STRING | [N,132,16,5]  -  - | 1216 background for the disk  “Disk Background – 1216”  “counts” |
| DISK\_BG\_1304  DISK\_BG\_1304\_TITLE  DISK\_BG\_1304\_UNITS | FLOAT  STRING  STRING | [N,132,16,5]  -  - | 1304 background for the disk.  “Disk Background – 1304”  “counts” |
| DISK\_BG\_LONG  DISK\_BG\_LONG\_TITLE  DISK\_BG\_LONG\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N,132,16,5]  -  - | SAA background for the disk.  “Disk Background - SAA”  “Counts” |
| DISK\_BG\_RED  DISK\_BG\_RED.TITLE  DISK\_BG\_RED.UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N,24,8,5]  -  - | Limb pixel calibration uncertainty  “Limb Calibration Error”  “Rayleighs” |
| LIMB\_BG\_DARK  LIMB\_BG\_DARK\_TITLE  LIMB\_BG\_DARK\_UNITS | FLOAT  STRING  STRING | [N,24,8,5]  -  - | Dark background for the limb..  “Limb Background - Dark”  “Counts” |
| LIMB\_BG\_1216  LIMB\_BG\_1216\_TITLE  LIMB\_BG\_1216\_UNITS | FLOAT  STRING  STRING | [N,24,8,5]  -  - | 1216 background for the limb  “Limb Background – 1216”  “counts” |
| LIMB\_BG\_1304  LIMB\_BG\_1304\_TITLE  LIMB\_BG\_1304\_UNITS | FLOAT  STRING  STRING | [N,24,8,5]  -  - | 1304 background for the limb.  “Limb Background – 1304”  “counts” |
| LIMB\_BG\_LONG  LIMB\_BG\_LONG\_TITLE  LIMB\_BG\_LONG\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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\_SCAN  DQI\_TOTAL\_SCAN\_TITLE  DQI\_TOTAL\_SCAN\_UNITS | UNSIGNED SHORT  STRING  STRING | [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\_SCAN  DQI\_COLOR\_SCAN\_TITLE  DQI\_COLOR\_SCAN\_UNITS | UNSIGNED SHORT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | INT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING | [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 | FLOAT  STRING  STRING | -  -  - | 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 | FLOAT  STRING  STRING | [N,132,16]  -  - | “Latitude of Pierce Point”  “Geographic coordinates, degrees” |
| PIERCEPOINT\_DAY\_LONGITUDE  PIERCEPOINT\_DAY\_LONGITUDE\_TITLE  PIERCEPOINT\_DAY\_LONGITUDE\_UNITS | FLOAT  STRING  STRING | [N,132,16]  -  - | “Longitude of Pierce Point”  “Geographic coordinates, degrees” |
| PIERCEPOINT\_NIGHT\_ALTITUDE  PIERCEPOINT\_NIGHT\_ALTITUDE  \_COMMENT | FLOAT  STRING | -  - | 350 km reference altitude  “Nightside reference altitude for all pierce point location calculations” |
| PIERCEPOINT\_NIGHT\_LATITUDE  PIERCEPOINT\_NIGHT\_LATITUDE\_TITLE  PIERCEPOINT\_NIGHT\_LATITUDE\_UNITS | FLOAT  STRING  STRING | [N,132,16]  -  - | “Latitude of Pierce Point”  “Geographic coordinates, degrees” |
| PIERCEPOINT\_NIGHT\_LONGITUDE  PIERCEPOINT\_NIGHT\_LONGITUDE  \_TITLE  PIERCEPOINT\_NIGHT\_LONGITUDE  \_UNITS | FLOAT  STRING  STRING | [N,132,16]  -  - | “Longitude of Pierce Point”  “Geographic coordinates, degrees” |
| TANGENTPOINT\_LATITUDE  TANGENTPOINT\_LATITUDE\_TITLE  TANGENTPOINT\_LATITUDE\_UNITS | FLOAT  STRING  STRING | [N,24,8]  -  - | “Latitude of Tangent Point”  “Geographic coordinates, degrees” |
| TANGENTPOINT\_LONGITUDE  TANGENTPOINT\_LONGITUDE\_TITLE  TANGENTPOINT\_LONGITUDE\_UNITS | FLOAT  STRING  STRING | [N,24,8]  -  - | “Longitude of Tangent Point”  “Geographic coordinates, degrees” |
| TANGENTPOINT\_ALTITUDE  TANGENTPOINT\_ALTITUDE\_TITLE  TANGENTPOINT\_ALTITUDE\_UNITS | FLOAT  STRING  STRING | [N,24,8]  -  - | “Altitude of the true tangent point”  “Kilometers” |
| RA  RA\_TITLE  RA\_UNITS | FLOAT  STRING  STRING | [N,24,8]  -  - | “Right Ascension”  “Decimal degrees” |
| DEC  DEC\_TITLE  DEC\_UNITS | FLOAT  STRING  STRING | [N,24,8]  -  - | “Declination”  “Decimal degrees (90 to –90)” |
| STAR  STAR\_TITLE | SHORT  STRING | [N] | Scans that may be contaminated with stellar emissions.  “Star passage likely in limb scan” |
| STAR\_LOCATION    STAR\_LOCATION\_TITLE | SHORT  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 TITLE  PHOTOMETER\_DMSP\_TIME\_OFFSET\_UNITS | FLOAT  STRING  STRING | -  -  - | 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 | DOUBLE  STRING  STRING | [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 | FLOAT  STRING  STRING | [N,Ns]  -  - | DMSP Spcaeraft latitude.  "Geodetic latitude of the DMSP spacecraft at 1 second resolution"  "Degrees” |
| DMSP\_LONGITUDE  DMSP\_LONGITUDE\_TITLE  DMSP\_LONGITUDE\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N,Ns]  -  - | Spacecraft Subsolar latitude.  "Subsolar latitude at 1 second resolution"  “degrees” |
| DMSP\_SOLAR\_LON  DMSP\_SOLAR\_LON\_TITLE  DMSP\_SOLAR\_LON\_UNITS | FLOAT  STRING  STRING | [N,Ns]  -  - | Spacecraft Subsolar longitude.  "Subsolar longitude at 1 second resolution"  “degrees” |
| DMSP\_COORDS\_TIME    DMSP\_COORDS\_TIME\_TITLE  DMSP\_COORDS\_TIME\_UNITS | FLOAT  STRING  STRING | [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 TITLE  PHOTOMETER\_DMSP\_TIME\_OFFSET\_UNITS | FLOAT  STRING  STRING | -  -  - | 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 | BYTE  STRING  STRING | [N]  -  - | Flag to indicate which detector was used  "Detector ID, 0=primary, 1=secondary"  “” |
| SLIT\_WIDTH  SLIT\_WIDTH\_TITLE  SLIT\_WIDTH\_VALID\_RANGE | BYTE  STRING  STRING | [N]  -  - | Flag to indicate which slith was used  "Slit width, 0=wide, 1=medium, 2=narrow"  “” |
| SIS data fields |  |  |  |
| DARKCOUNTPIXEL  DARKCOUNTPIXEL\_TITLE | INT  STRING | [N]  - | “Dark Count Pixel” |
| COUNTS\_RAW  COUNTS\_RAW\_TITLE  COUNTS\_RAW\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N]  -  - | Discriminator setting for detector 1 particle filter  "MeV particle noise candidate Discriminator 1";  "dimensionless"; |
| MEVDISCRIMINATOR2  MEVDISCRIMINATOR2\_TITLE  MEVDISCRIMINATOR2\_UNITS | FLOAT  STRING  STRING | [N]  -  - | Discriminator setting for detector 2 particle filter  "MeV particle noise candidate Discriminator 2";  "dimensionless"; |
| MEVTHRESHOLD1  MEVTHRESHOLD1\_TITLE  MEVTHRESHOLD1\_UNITS | FLOAT  STRING  STRING | [1]  -  - | Discriminator threshold setting for detector 1 particle filter  "Threshold for Discriminator 1";  "dimensionless"; |
| MEVTHRESHOLD2  MEVTHRESHOLD2\_TITLE  MEVTHRESHOLD2\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING | [N]  - | Raw count rates from the instrument.  e.g., “Input rate data” |
| DETECTOR\_OUTPUT\_RATE  DETECTOR\_TITLE | FLOAT  STRING | [N]  - | Discriminated count rates from the instrument.  e.g., “Output rate data” |
| RADIANCECALIBRATIONERROR  RADIANCECALIBRATIONERROR\_TITLE    RADIANCECALIBRATIONERROR\_UNITS | FLOAT  STRING  STRING | [NIC, Natp]  -  - | Calibration Errors by across track pixel and color  “Spectrograph mode radiance data calibration errors"  "Percent" |
| RESPONSIVITYCTSPERRAYLEIGH  RESPONSIVITYCTSPERRAYLEIGH  \_TITLE  RESPONSIVITYCTSPERRAYLEIGH\_UNITS | FLOAT  STRING  STRING | [NIC, Natp]  -  - | The responsivity to the 5 imaging colors  "Spectrograph mode responsivity"  "Counts per rayleigh" |
| SUBTRACTEDCOUNTS  SUBTRACTEDCOUNTS\_TITLE    SUBTRACTEDCOUNTS\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N, NIC, Natp]  -  - | Raw counts separated by imaging color  "Raw counts in each imaging color"  "Counts per integration period” |
| RADIANCECOUNTSSTATERROR  RADIANCECOUNTSSTATERROR\_TITLE  RADIANCECOUNTSSTATERROR\_UNITS | FLOAT  STRING  STRING | [N, NIC, Natp]  -  - | Statistical error from counting in counts  "1-sigma statistical error in each imaging color"  "Counts per integration period"; |
| RADIANCECOUNTSDECOMPERROR  RADIANCECOUNTSDECOMPERROR\_TITLE  RADIANCECOUNTSDECOMPERROR\_UNITS | FLOAT  STRING  STRING | [N, NIC, Natp]  -  - | Errors from count compression procedure  "Decompression error in each imaging color"  "Counts per integration period" |
| RADIANCEDATA  RADIANCEDATA\_TITLE  RADIANCEDATA\_UNITS | FLOAT  STRING  STRING | [N, NIC, Natp]  -  - | Calibrated radiance for each imaging color  "Spectrograph mode radiance data, 5 color"  "rayleighs (R)" |
| RADIANCEDATASTATERROR  RADIANCEDATASTATERROR\_TITLE  RADIANCEDATASTATERROR\_UNITS | FLOAT  STRING  STRING | [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 | SHORT  STRING  STRING | [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 | SHORT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N, NIC, Natp]  -  - | Background 1216 counts removed in each imaging color/pixel  "1216 background (scattered light)"  "in counts" |
| BACKGROUND1304  BACKGROUND1304\_TITLE  BACKGROUND1304\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N, Natp, Nw]  -  - | Spectrographic radiances  "Individual pixel spectra"  "rayleighs per angstrom (R/A)" |
| PIXELERRORS  PIXELERRORS\_TITLE  PIXELERRORS\_UNITS | FLOAT  STRING  STRING | [N, Natp,Nw]  -  - | Spectrographic radiance errors  "Individual pixel spectra 1-sigma errors"  "rayleighs per angstrom (R/A)" |
| PIXELDATADECOMPERROR  PIXELDATADECOMPERROR\_TITLE  PIXELDATADECOMPERROR\_UNITS | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N,Natp]  -  - | Solar zenith angle at pixel geolocation  "Pixel Solar Zenith Angle - Day";  "degrees (0 - 180)"; |
| PIXELLONGITUDE  PIXELLONGITUDE\_TITLE  PIXELLONGITUDE\_UNITS | FLOAT  STRING  STRING | [N,Natp]  -  - | Pixel longitude geolocated at PIXELALTITUDE  "Pixel Longitude - Day";  "degrees (0 - 360)"; |
| PIXELLATITUDE  PIXELLATITUDE\_TITLE  PIXELLATITUDE\_UNITS | FLOAT  STRING  STRING | [N, Natp]  -  - | Pixel latitude geolocated at PIXELALTITUDE  "Pixel Latitude - Day";  "degrees (-90 - +90)"; |
| PIXELNIGHTLONGITUDE  PIXELNIGHTLONGITUDE\_TITLE  PIXELNIGHTLONGITUDE\_UNITS | FLOAT  STRING  STRING | [N,Natp]  -  - | Pixel longitude geolocated at PIXELNIGHTALTITUDE  "Pixel Longitude - Night";  "degrees (0 - 360)"; |
| PIXELNIGHTLATITUDE  PIXELNIGHTLATITUDE\_TITLE  PIXELNIGHTLATITUDE\_UNITS | FLOAT  STRING  STRING | [N,Natp]  -  - | Pixel latitude geolocated at PIXELNIGHTALTITUDE  "Pixel Latitude - Night";  "degrees (-90 - +90)"; |
| PIXELAURORALLONGITUDE  PIXELAURORALLONGITUDE\_TITLE  PIXELAURORALLONGITUDE\_UNITS | FLOAT  STRING  STRING | [N,Natp]  -  - | Pixel longitude geolocated at PIXELAURORALALTITUDE  "Pixel Longitude - Auroral";  "degrees (0 - 360)"; |
| PIXELAURORALLATITUDE  PIXELAURORALLATITUDE\_TITLE  PIXELAURORALLATITUDE\_UNITS | FLOAT  STRING  STRING | [N,Natp]  -  - | Pixel latitude geolocated at PIXELAURORALALTITUDE  "Pixel Latitude - Auroral";  "degrees (-90 - +90)"; |
| DQIPIXEL  DQIPIXEL\_TITLE  DQIPIXEL\_UNITS | SHORT  STRING  STRING | [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 | FLOAT  STRING  STRING | [N]  -  - | "Spacecraft Latitude";  "degrees (-90 - +90)"; |
| SC\_LONGITUDE  SC\_LONGITUDE\_TITLE  SC\_LONGITUDE\_UNITS | FLOAT  STRING  STRING | [N]  -  - | "Spacecraft Longitude";  "degrees (0 - 360)" |
| SC\_ALTITUDE  SC\_ALTITUDE\_TITLE  SC\_ALTITUDE\_UNITS | FLOAT  STRING  STRING | [N]  -  - | "Spacecraft Altitude";  "km"; |
| PIXELALTITUDE  PIXELALTITUDE\_TITLE  PIXELALTITUDE\_UNITS | FLOAT  STRING  STRING | [1]  -  - | Pixel default altitude for (dayside) data  "Pixel Altitude - Day";  "km"; |
| PIXELNIGHTALTITUDE  PIXELNIGHTALTITUDE\_TITLE  PIXELNIGHTALTITUDE\_UNITS | FLOAT  STRING  STRING | [1]  -  - | Pixel altitude for night data  "Pixel Altitude - Night";  "km"; |
| PIXELAURORALALTITUDE  PIXELAURORALALTITUDE\_TITLE  PIXELAURORALALTITUDE\_UNITS | FLOAT  STRING  STRING | [1]  -  - | Pixel altitude for auroral data  "Pixel Altitude - Auroral"  "km"; |
| LATITUDE  LATITUDE\_TITLE  LATITUDE\_UNITS | FLOAT  STRING  STRING | [N]  -  - | Duplicate of SC\_LATITUDE  "Unspecified";  "degrees (-90 - +90)" |
| LONGITUDE  LONGITUDE\_TITLE  LONGITUDE\_UNITS | FLOAT  STRING  STRING | [N]  -  - | Duplicate of SC\_LONGITUDE  "Unspecified";  "degrees (0 - 360)" |
|  |  |  |  |