README file for Level 2 version 3 release (3/6/13)

Files in this directory were created at the Laboratory for Atmospheric and Space Physics in Boulder, Colorado for the NASA Solar Dynamics Observatory (SDO) Extreme Ultraviolet Variability Experiment (EVE). The Science Processing and Operations Center (SPOC) is responsible for creating and maintaining access to all EVE products.

This is a new release of EVE Level 2 data products. We have made every effort at verification and validation, but if you have any questions or encounter any problems with the data, please let us know about them. For access and data product issues please contact Don.Woodraska@lasp.colorado.edu. For science issues please contact Frank.Eparvier@lasp.colorado.edu.

EVE Overview

EVE spectrographs measure the solar extreme ultraviolet (EUV) radiation spectrum from 6-105 nm with a resolution of approximately 0.1 nm and a cadence of 10 seconds from geosynchronous orbit. A series of photometers are used to also provide broadband measurements at a 4 Hz cadence.

More information about the EVE instrument measurements, and calibrations can be found in these references:

Woods, T. N., F. G. Eparvier, R. Hock, A. R. Jones, D. Woodraska, D. Judge, L. Didkovsky, J. Lean, J. Mariska, H. Warren, D. McMullin, P. Chamberlin, G. Berthiaume, S. Bailey, T. Fuller-Rowell, J. Sojka, W. K. Tobiska, and R. Viereck, "Extreme Ultraviolet Variability Experiment (EVE) on the Solar Dynamics Observatory (SDO): Overview of Science Objectives, Instrument Design, Data Products, and Model Developments", *Solar Physics, 275*, 115-143, doi: 10.1007/s11207-009-9487-6, 2012.
   http://lasp.colorado.edu/home/eve/files/2011/06/EVE_Overview_SolarPhys.pdf

Hock, R. A., P. C. Chamberlin, T. N. Woods, D. Crotser, F. G. Eparvier, D. L. Woodraska, and E. C. Woods, "Extreme Ultraviolet Variability Experiment (EVE) Multiple EUV Grating Spectrographs (MEGS): Radiometric Calibrations and Results", *Solar Physics, 275*, 145-178, doi: 10.1007/s11207-010-9520-9, 2012.
   http://lasp.colorado.edu/home/eve/files/2011/06/Final_Sol_Phy_Hock_1April_2010.pdf

Didkovsky, L., D. Judge, S. Wieman, T. Woods, and A. Jones, "EUV SpectroPhotometer (ESP) in Extreme Ultraviolet Variability Experiment (EVE): Algorithms and Calibrations", *Solar Physics, 275*, 179-205, doi: 10.1007/s11207-009-9485-8, 2012.

Daily activities are performed to maintain calibration; otherwise EVE has nearly continuous solar observing capability.

Data Availability/Gaps

Daily calibrations are performed that last a total of about 30 minutes; however, the channel calibrations are staggered so that one of the science channels is always observing the Sun during the daily calibration. These daily calibrations allow for EVE to directly measure dark signals on the detectors to track changes. For the CCDs, the flatfield LEDs are also used. On Sundays, a slightly longer calibration is performed to increase statistics.

Two annual eclipse outage periods of about 3 weeks occur as the spacecraft orbit aligns with the Earth and Sun. These can last up to 72 minutes each day. After longer eclipses (10+ minutes), some thermal settling causes a wavelength shift on MEGS-A that is not yet corrected. Around the 2 eclipse seasons, additional off-pointing maneuvers are performed including EVE cruciform scans (9 hours), EVE FOV maps (~2 hours), plus maneuvers for the other instruments and the guide telescopes. In 2010, the late eclipse season lasted from Sept. 15-Oct. 8, and the early season in 2011 will begin on March 11.

The spacecraft is also subject to being blocked by the moon, but this is infrequent. Other infrequent activities include momentum management, and station-keeping thruster firings.

CCD bakeouts may occur as needed to maintain instrument sensitivity. The first bakeout started on June 16 (day 167), 2010 and continued through June 18 (day 169), 2010. The second CCD bakeout was much longer lasting from September 23 (day 266) through September 28 (day 271), 2010. After each bakeout, there is a period of several days where the detectors change rapidly, and this is not corrected in version 3.

Detailed daily information is provided in the Science Operations Mission Log and is available at this location:

http://lasp.colorado.edu/eve/data_access/evewebdata/EVE_sciopslog.html

Product Overview

The following sections describe the level 2 data products available in the version 3 release.

Level 2 Products

Two types of EVE level 2 products are routinely created: **Spectra** (EVS) and **Lines** (EVL).

Level 2 spectra are the merged spectral measurements from the two spectrographs, A and B. The A detector is designed to measure from 6-17 nm, and 16-38 nm using two filters, while the B detector is designed to measure 35-105 nm. Level 2 processing stitches these pieces to form one spectrum. This version includes all of measured wavelengths spanning 5.8-106.2 nm. All level 2 irradiances are adjusted to 1 AU.

Lines are integrated from low to high bounds, and the 4 Hz photometer data are averaged down to the same time-scale as the spectrum. No continuum is subtracted from the line irradiances.

There are two sets of flags included. One is EVE-specific flags, and the other is Spacecraft flags.

Values in the FLAGS field are the bitwise OR of these values.
Bit 0 (value   1) - MEGS-A data is missing
Bit 1 (value   2) - MEGS-B data is missing
Bit 2 (value   4) - ESP data is missing
Bit 3 (value   8) - MEGS-P data is missing
Bit 4 (value   16) - Possible clock adjust in MEGS-A
Bit 5 (value   32) - Possible clock adjust in MEGS-B
Bit 6 (value   64) - Possible clock adjust in ESP
Bit 7 (value 128) - Possible clock adjust in MEGS-P

Values in the SC_FLAGS field are the bitwise OR of these values.
Bit 0 (value   1) - 4-bit obstruction indicator (0 is no obstruction)
Bit 1 (value   2) - 4-bit obstruction indicator (0 is no obstruction)
Bit 2 (value   4) - 4-bit obstruction indicator (0 is no obstruction)
Bit 3 (value   8) - 4-bit obstruction indicator (0 is no obstruction)
Bit 4 (value   16) - Observatory is off-pointed by more than 1 arcmin

Obstruction flag values:
Value 0 - No obstruction
Value 1 - Warmup from Earth eclipse
Value 2 - Atmosphere penumbra
Value 3 - Atmosphere umbra
Value 4 - Penumbra of Mercury
Value 5 - Umbra of Mercury
Value 6 - Penumbra of Venus
Value 7 - Umbra of Venus
Value 8 - Penumbra of Moon
Value 9 - Umbra of Moon
Value 10 - Penumbra of solid Earth
Value 11 - Umbra of solid Earth

If more than one obstruction is taking place, only the highest-numbered one will be indicated.

Generally, any flags being set mean some data are missing or possibly suspect.

Missing or corrupted data is replaced using the "fill" value of -1.0. Fill values should be discarded since these are not science measurements.

MEGS-B is included in this product release for wavelengths spanning 37-106.2 nm. Previously in Version 2 products, the MEGS-B data were only in the 37-65 nm range.

Because of unexpected preflight degradation or early orbit degradation, MEGS-B has a reduced-exposure operation where the detector is exposed for 5 minutes each hour and an additional 3-hour period each day. This operational change began on August 16, 2010 (day 228). Note that there was 24-hour coverage per day for MEGS-B from April 30, 2010 to May 18, 2010.

Since CCD bakeouts do not recover the full sensitivity of the detectors, the routine operational exposure was changed on November 19, 2012 (day 324). MEGS-B is now only exposed for 5 minutes each hour (120 min/day).

MEGS-B is also used to support flare campaign operations. Each flare campaign lasts 24 hours and starts at 16:00 UT. The flare campaigns to date are summarized below. There are several other flare observations by MEGS-B in the daily 3-hour observation between August 16, 2010 and November 18, 2012, but those are not listed in the following table. Note that only MEGS-B has reduced cadence and that MEGS-A and ESP have 24/7 coverage and have thus observed almost all of the flares since April 30, 2010.

Listing of MEGS-B Flare Campaigns

Date (starts at 16 UT on first day)	NOAA GOES X-ray Flares during 24-hour campaign
2010/291-292 (Oct 18-19)	C2.5, C1.2, B7.3, C1.3, C1.1, B2.6, B5.1, B5.8
2011/021-022 (Jan 21-22)	C2.2, C1.1, C1.3, B3.2, B1.7, B1.5, B1.4, C2.4, B3.7, B4.3
2011/045-047 (Feb 14-16) extended 48-hours	C7.0, *M2.2*, C6.6, C2.7, C2.7, ***X2.2***, C4.8, C4.8, C6.6, C2.0, *M1.0*, C2.2, C5.9, C2.1, *M1.1*, C9.9, C3.2, *M1.6*, C7.7
2011/112-113 (Apr 22-23)	C5.5, C4.2, C3.6, B9.5, C2.7, C2.4, C2.9, C1.3, B8.6, B6.1, C1.9, C1.1, C1.2, C2.4, B5.5, B8.1, C1.0
2011/194-195 (Jul 13-14)	B4.3, B5.7, B4.0
2011/209-210 (Jul 28-29)	C1.6, C3.5, C2.3, C4.1, C1.0, C1.2, C1.1, B8.9, C1.1, C1.1, B8.0, C1.4, C1.1, C3.9, C1.3, C6.3
2011/215-216 (Aug 3-4)	C2.3, C8.5, C1.7, C3.2, *M9.3*, C3.5C2.5, C1.6, C1.2, C2.1, C1.0, C1.8
2011/251-252 (Sep 8-9)	C2.5, C1.1, C1.2, B7.1, *M2.7, M1.2*, C3.2
2011/265-266 (Sep 22-23)	C4.0, C5.5, C4.1, C9.6, *M1.6*, C2.7, C6.9, C3.2, C2.1
2011/307-308 (Nov 3-4)	C2.2, C4.5, ***X1.9***, C5.4, C5.8, C9.2, *M2.1*, C3.8, C5.4, C8.6, C1.8
2012/019-020 (Jan 19-20)	*M3.2*
2012/024-025 (Jan 24-25)	C1.3
2012/039-040 (Feb 8-9)	C2.9 (Arecibo ionosphere campaign)
2012/066-067 (Mar 6-7)	C4.2, C1.5, C2.7, *M1.3*, C1.8, *M1.0*, ***X5.4***, ***X1.3***
2012/131-133 (May 10-12)	C3.3, C1.4, *M1.7*, C3.1, C1.0, C1.9, C1.1, C1.3, C1.2, C1.2, C1.7, C2.8, C2.3, C1.3, B9.6, C1.2, C1.3, C1.5, C4.3, C3.5, C2.1, C6.1, C1.6, C4.1, C3.2, C1.2, C1.3, C1.9, C1.7, C1.5, C1.4, C1.4, C2.5
2012/184-185 (Jul 2-3)	C2.0, C3.7, C4.5, C7.4, C1.4, C2.5, *M3.8*, C1.9, C3.4, C6.5, *M2.0*, C1.9, C2.6, C2.7, C9.9, C2.4, C2.8, C2.0, C2.2, C4.2, C8.2, C4.1
2012/187-188 (Jul 5-6)	C6.2, C5.1, C6.1, C4.8, *M1.6*, *M1.6*, C5.0, C6.8, M2.9, C5.0, *M1.0*, C5.8, C7.7, C7.4, *M1.5*, C3.8, *M1.8*, *M1.2*, C7.8
2012/297-298 (Oct 23-24)	C1.9, C1.1, C2.4, C4.2, C1.7, C2.9, C1.3, C1.4, C1.0
2012/326-327 (Nov 21-22)	C1.3, C2.5, C1.1, B6.3, B9.5

The spectrum bins should not be used individually for analysis due to the possibility of small-scale wavelength shifts. Rather, users should integrate over the features of interest. MEGS-A (5-37 nm) is the most sensitive to these small wavelength shifts.

The MEGS-P Lyman-alpha diode measurement is susceptible to low energy particles. Our initial attempt to remove the low energy particle noise using the dark diode needs refinement. Rather than exclude this measurement, we filter it based on those periods of increased particle noise. Therefore, the MEGS-P Lyman-alpha measurement is sometimes very complete, and sometimes only available from about 6-12 UT each day. The Lyman-

alpha measurement uses the same filter mechanism as MEGS-B, so it is also operating with the same reduced-exposure scenario.

Also, due to random large particle hits, the Lyman-alpha measurement is filtered using a 10-second Kalman smoothing technique. Additional filtering was implemented for version 3 where data are pre-filtered using a median technique. Unfortunately, the Lyman-alpha measurement is very noisy, and therefore most useful after averaging to a daily value. Except for flare campaign days, MEGS-P measures the Sun for about 20% of a day.

Naming Convention:
Level 2 products follow this naming convention `EV?_L2_YYYYDDD_HH_vvv_rr.fit` where:
 `EV` designates this as an EVE product
 `?` is either S (spectrum) or L (lines/bands)
 `L2` designates this as a level 2 product
 `YYYY` is the year
 `DDD` is the day of year (001-366)
 `HH` is the UT hour of day (00-23)
 `vvv` is the version number (002)
 `rr` is the revision number (01-99)

Each EVE Level 2 data file spans one hour.

The version number only increments after major software changes or after major calibration updates. These are expected to change after the incorporation of each suborbital rocket calibration flight. When referencing EVE data in scientific papers, users agree to mention this version number.

The revision increments whenever updated information are available. Generally, revision 1 is considered "preliminary". After 30 days, products become "definitive" since no new telemetry can be delivered after this period of time due to finite storage capacity of the SDO ground station. For most days, revision 2 will be the final revision.

Level 2 Spectra Products:
Level 2 products are stored in the scientific format called FITS as binary tables. FITS was first introduced in 1979. As one of the oldest scientific data formats, it continues to be widely used and expanded.

FITS reference: FITS: A Flexible Image Transport System, Wells, D. C., Greisen, E. W., and Harten, R. H., *Astronomy & Astrophysics Supplement Series*, 44, 363-370, 1981.
http://adsabs.harvard.edu/cgi-bin/nph-bib_query?bibcode=1981A%26AS...44..363W&db_key=AST&high=3db47576cf05627

FITS Binary Table reference: Binary Table Extension to FITS, Cotton, W. D., Tody, D. B., and Pence, W. D., *Astronomy & Astrophysics Supplement Series*, 113, 159-166, 1995.
http://adsabs.harvard.edu/cgi-bin/nph-
bib_query?bibcode=1995A%26AS..113..159C&db_key=AST&high=3db47576cf06210

Additional detailed documentation is available on-line.
http://fits.gsfc.nasa.gov/fits_documentation.html

Standard reader software is available from GSFC for many different languages. A graphical program called "fv" is useful for browsing the contents without writing any programs.
```
http://heasarc.gsfc.nasa.gov/docs/software/ftools/fv/
```

For IDL, we use mrdfits.pro.
```
http://idlastro.gsfc.nasa.gov/mrdfits.html
http://idlastro.gsfc.nasa.gov/fitsio.html
```

An example of using mrdfits directly follows:

```
IDL> data1 = mrdfits( 'EVS_L2_2010151_20_002_01.fit.gz', 1 ,hdr,
/unsigned )
```

This reads HDU #1 and returns an array of structures called "data1". Note that HDU #0 is reserved for image data, so it is NULL.

Alternatively, we provide an IDL function called eve_read_whole_fits.pro (replaces read_generic_fits.pro) that is available from the EVE website to read all of the HDUs in the EVE FITS files. It iterates over the HDUs and builds a structure containing all of the HDU data. It is really a wrapper for the mrdfits.pro functions. This may be more useful for users that wish to read all of the data with one function call.

```
IDL> d=eve_read_whole_fits('EVS_L2_2010120_00_003_01.fit.gz')
% Compiled module: EVE_READ_WHOLE_FITS.
% Compiled module: FITS_INFO.
% Compiled module: SXPAR.
% Compiled module: GETTOK.
% Compiled module: STRN.
% Compiled module: MRD_SKIP.
% Compiled module: VALID_NUM.
% Compiled module: MRDFITS.
% Compiled module: FXMOVE.
% Compiled module: MRD_HREAD.
% Compiled module: FXPAR.
% Compiled module: MATCH.
% Compiled module: MRD_STRUCT.
IDL> help,d,/str
** Structure <1a27e28>, 8 tags, length=16906744, data length=16903140,
refs=1:
   PRIMARY          LONG                      0
   PRIMARY_HEAD     STRING     Array[5]
   SPECTRUMMETA     STRUCT     -> <Anonymous> Array[5200]
   SPECTRUMMETA_HEADER
                    STRING     Array[27]
```

```
   SPECTRUMUNITS     STRUCT      -> <Anonymous> Array[1]
   SPECTRUMUNITS_HEADER
                     STRING      Array[39]
   SPECTRUM          STRUCT      -> <Anonymous> Array[360]
   SPECTRUM_HEADER STRING        Array[91]
```

The primary data unit is null for the level 2 spectrum file, but there is a standard 5 line header that is returned in PRIMARY_HEAD. The next substructure contains metadata for the spectrum (SPECTRUMMETA) with an array of strings created from the header. The next structure contains the units with brief descriptions (SPECTRUMUNITS). The data is in the SPECTRUM substructure. The tags in the SPECTRUM and SPECTRUMUNITS structures match for easier use. The SPECTRUM also has associated keyword that are returned in the SPECTRUM_HEADER string array.

The SPECTRUMMETA array of structures contains 5200 elements, with one of the structure tags corresponding to the wavelength. Accuracy is not yet implemented.

```
IDL> help,d.spectrummeta,/str
** Structure <153ecc8>, 2 tags, length=8, data length=8, refs=2:
   WAVELENGTH      FLOAT          3.01000
   ACCURACY        FLOAT         -1.00000

IDL> help,d.spectrumunits,/str
** Structure <156c518>, 9 tags, length=144, data length=144, refs=2:
   TAI             STRING     'seconds // International Atomic Time seco'...
   YYYYDOY         STRING     'NA // 4-digit year and 3-digit day of yea'...
   SOD             STRING     'seconds // seconds of the UT day at the c'...
   FLAGS           STRING     'NA // 0=good, other values indicate data '...
   SC_FLAGS        STRING     'NA // 0=good, other value indicate spacec'...
   INT_TIME        STRING     'seconds // the duration of the exposure'
   IRRADIANCE      STRING     'W m^-2 nm^-1 // Spectral power per unit a'...
   PRECISION       STRING     'NA // relative precision, 0=perfect measu'...
   BIN_FLAGS       STRING     'NA // flag for each spectral bin, 0=good,'...


IDL> help,d.spectrum,/str
** Structure <18da608>, 9 tags, length=46840, data length=46830, refs=2:
   TAI             DOUBLE        1.6512768e+09
   YYYYDOY         LONG          2010120
   SOD             DOUBLE           10.265536
   FLAGS           BYTE         0
   SC_FLAGS        BYTE         0
   INT_TIME        DOUBLE           10.000000
   IRRADIANCE      FLOAT      Array[5200]
   PRECISION       FLOAT      Array[5200]
   BIN_FLAGS       BYTE       Array[5200]
```

To plot one integration from this file of 360 spectral measurements, this IDL command could be used. The plot is shown below.

```
IDL> plot, d.spectrummeta.wavelength, d.spectrum[0].irradiance, /ylog, $
     yr=[1e-6,1e-2], xr=[6,106], xs=1, $
     xtitle='Wavelength (nm)', ytitle='Irradiance (W/m^2/nm)'
```
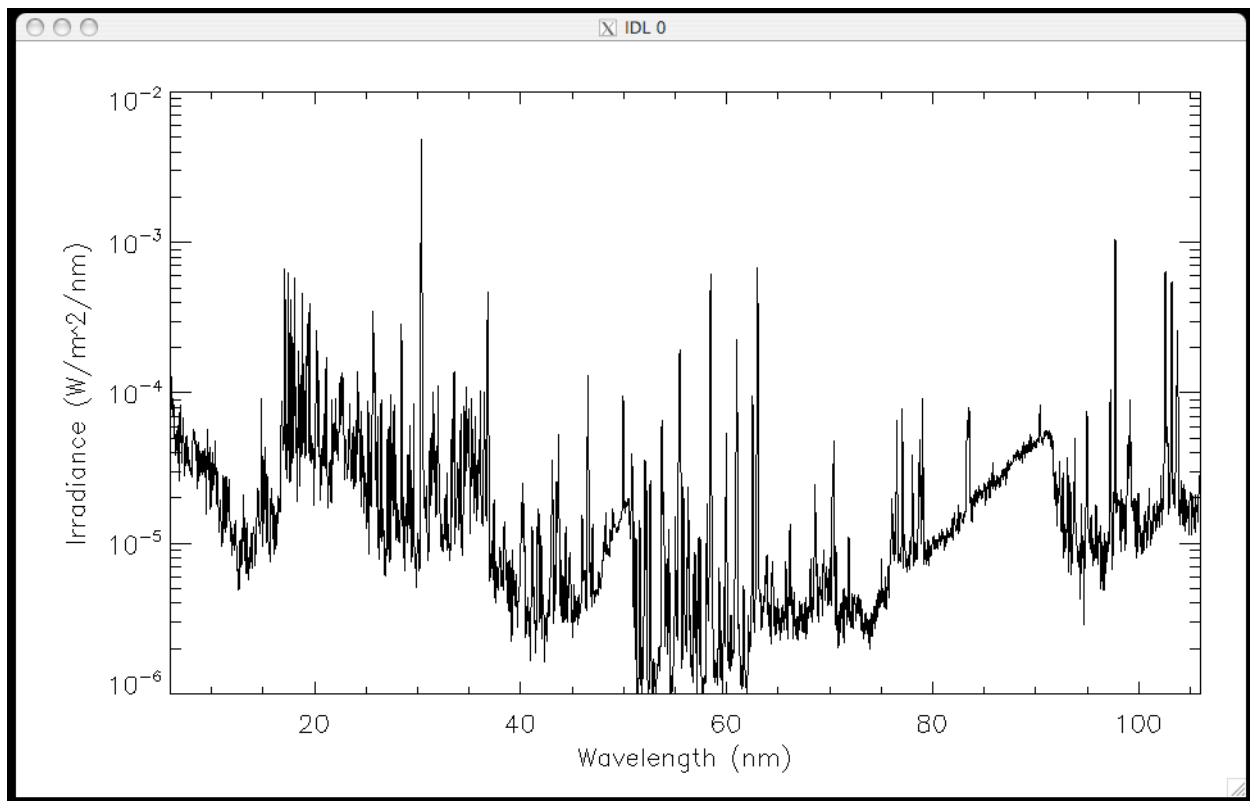
Figure 1. The first normal operations spectrum from EVE, April 30, 2012.

`TAI` is the number of seconds elapsed since the TAI epoch (Jan 1, 1958).
`YYYYDOY` is the year and day of year.
`SOD` is the seconds of day.
`FLAGS` contain 32-bit fields that are used to indicate validity.
`INT_TIME` is the integration time in seconds.
`IRRADIANCE` is the irradiance in Watts / meter^2 / nanometer at 1-AU.
`PRECISION` is the relative uncertainty based on counting statistics (0-1).
`BIN_FLAGS` is a byte flag for each spectral bin (0=good).

Additional information is in the string array header.

Level 2 Lines/Bands Products:
These products are read the same way as the spectra products, except there are 6 non-null HDUs available to read.

Reading the data directly with mrdfits is one option.

```
IDL> data1 = mrdfits( 'EVL_L2_2010151_20_003_01.fit.gz', 1, hdr,
/unsigned)
```

Another is to read the whole file with eve_read_whole_fits.pro. The mrdfits library of tools will still need to be in the IDL path.

```
IDL> d=eve_read_whole_fits('EVL_L2_2010120_00_003_01.fit.gz')
% Compiled module: EVE_READ_WHOLE_FITS.
% Compiled module: FITS_INFO.
% Compiled module: SXPAR.
% Compiled module: GETTOK.
% Compiled module: STRN.
% Compiled module: MRD_SKIP.
% Compiled module: VALID_NUM.
% Compiled module: MRDFITS.
% Compiled module: FXMOVE.
% Compiled module: MRD_HREAD.
% Compiled module: FXPAR.
% Compiled module: MATCH.

IDL> help,d,/str
** Structure <18f7008>, 14 tags, length=293272, data length=289668, refs=1:
   PRIMARY         LONG                  0
   PRIMARY_HEAD    STRING    Array[5]
   LINESMETA       STRUCT    -> <Anonymous> Array[30]
   LINESMETA_HEADER
                   STRING    Array[46]
   BANDSMETA       STRUCT    -> <Anonymous> Array[20]
   BANDSMETA_HEADER
                   STRING    Array[28]
   DIODEMETA       STRUCT    -> <Anonymous> Array[6]
   DIODEMETA_HEADER
                   STRING    Array[27]
   QUADMETA        STRUCT    -> <Anonymous> Array[4]
   QUADMETA_HEADER STRING    Array[27]
   LINESDATA       STRUCT    -> <Anonymous> Array[360]
   LINESDATA_HEADER
                   STRING    Array[124]
   LINESDATAUNITS  STRUCT    -> <Anonymous> Array[1]
   LINESDATAUNITS_HEADER
                   STRING    Array[55]

IDL> help,d.linesmeta,/str
** Structure <15661b8>, 7 tags, length=64, data length=64, refs=2:
   WAVE_CENTER     FLOAT          9.39260
   WAVE_MIN        FLOAT          9.33000
   WAVE_MAX        FLOAT          9.43000
   LOGT            FLOAT          6.81000
   NAME            STRING    'Fe XVIII'
   TYPE            STRING    'F '
   BLENDS          STRING    '              '
```

The LINESMETA tag is from HDU #1. It contains the binary table of information related to the extracted solar emission lines. Currently there are 30 lines, and the first is Fe XVIII.

```
IDL> help,d.bandsmeta,/str
** Structure <1565078>, 2 tags, length=32, data length=32, refs=2:
   NAME            STRING    'AIA_A94       '
   TYPE            STRING    'AIA '
```

The BANDSMETA tag is a binary table of the extracted bands from the EVE spectrum that correspond to the 7 AIA spectral bands, two GOES-14 bands, 4 extracted MEGS spectral

bands corresponding to the ESP diodes, two very broadbands used for creating the Q$_{EUV}$ proxy, two MEGS-A broadbands representing each slit, and 3 MEGS-B bands . The band names are printed here.

```
IDL> print,d.bandsmeta.name
AIA_A94        AIA_A131      AIA_A171      AIA_A193      AIA_A211      AIA_A304
AIA_A335       GOES-14 EUV-A GOES-14 EUV-B MA171         MA257         MA304
MA366          E7-37         E37-45        MEGS-A1       MEGS-A2       MEGS-B short
MEGS-B both    MEGS-B long
```

The diode measurements (ESP and MEGS-P) are averaged down to the 10-second spectrum cadence from the 4 Hz measurements to create a more convenient way to compare the data to other measurements.

```
IDL> help,d.diodemeta,/str
** Structure <1568368>, 2 tags, length=32, data length=32, refs=2:
   NAME            STRING     'ESPQ    '
   TYPE            STRING     'ESP  '
```

The ESP central quad diode contains information about the center of brightness for the 0.1-7 nm bandpass. These are normalized to provide a relative measure of the distribution of irradiance. During flare periods, the difference of flare and pre-flare measurements indicates the flare position.

```
IDL> help,d.quadmeta,/str
** Structure <15642d8>, 2 tags, length=32, data length=32, refs=2:
   NAME            STRING     'Q0'
   TYPE            STRING     'ESP'
```

The actual science measurements are all contained in LINESDATA.

```
IDL> help,d.linesdata,/str
** Structure <191f608>, 17 tags, length=752, data length=742, refs=2:
   TAI             DOUBLE        1.6512768e+09
   YYYYDOY         LONG             2010120
   SOD             DOUBLE          10.265536
   FLAGS           BYTE          0
   SC_FLAGS        BYTE          0
   LINE_IRRADIANCE FLOAT      Array[30]
   LINE_PRECISION  FLOAT      Array[30]
   LINE_ACCURACY   FLOAT      Array[30]
   BAND_IRRADIANCE FLOAT      Array[20]
   BAND_PRECISION  FLOAT      Array[20]
   BAND_ACCURACY   FLOAT      Array[20]
   DIODE_IRRADIANCE
                   FLOAT      Array[6]
   DIODE_STDEV     FLOAT      Array[6]
   DIODE_PRECISION FLOAT      Array[6]
   QUAD_FRACTION   FLOAT      Array[4]
   QUAD_STDEV      FLOAT      Array[4]
   QUAD_PRECISION  FLOAT      Array[4]
```

```
IDL> help,d.linesdataunits,/str
** Structure <191ec08>, 17 tags, length=272, data length=272, refs=2:
   TAI             STRING     'seconds // International Atomic Time seco'...
   YYYYDOY         STRING     'NA // 4-digit year and 3-digit day of yea'...
   SOD             STRING     'seconds // seconds of the UT day at the c'...
   FLAGS           STRING     'NA // 0=good, other values indicate data '...
   SC_FLAGS        STRING     'NA // 0=good, other value indicate spacec'...
   LINE_IRRADIANCE STRING     'W m^-2 // Power per unit area at 1-AU ove'...
```

```
LINE_PRECISION   STRING    'NA // relative precision'
LINE_ACCURACY    STRING    'NA // relative accuracy'
BAND_IRRADIANCE  STRING    'Mixed: W m^-2 or avg counts AIApixel^-1 s'...
BAND_PRECISION   STRING    'NA // relative precision'
BAND_ACCURACY    STRING    'NA // relative accuracy'
DIODE_IRRADIANCE
                 STRING    'W m^-2 // Power per unit area at 1-AU mea'...
DIODE_STDEV      STRING    'W m^-2 // one-sigma spread of 4 hz integr'...
DIODE_PRECISION  STRING    'NA // relative precision'
QUAD_FRACTION    STRING    'NA // fraction of the 0.1-7 nm irradiance'...
QUAD_STDEV       STRING    'NA // one-sigma spread of 4 Hz integratio'...
QUAD_PRECISION   STRING    'NA // relative precision of quadrant diod'...
```

SolarSoft

SolarSoft and IDL users may wish to download the EVE SolarSoft software package. It is available at our web site by browsing the Data Access page.

http://lasp.colorado.edu/home/eve/data/data-access/

Additional information about SolarSoft can be found through the LMSAL website, http://www.lmsal.com/solarsoft.

Note that the EVE SolarSoft package can be run in IDL without SolarSoft.