Creating Calibrated Images with SECCHI_PREP

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What is SECCHI_PREP?

- IDL software routine to read in and perform the latest calibration and image correction procedures for all SECCHI instruments.
- Available through SolarSoftWare
- SECCHI_PREP is intended to be the single routine that the user would interact with to process level 0.5 data level 1.0 data.

SECCHI Data Levels

- Level 0 : data downloaded from spacecraft
- Level 0.5 : data processed though pipeline
  - data users interact with
  - Comes from three sources : lz, pb, rt
  - Come in several favors :
    - Intensity, Polarized, TB (Total Brightness), Calibration, TBPP
- Level 1 : fully calibrated data
- Level 2 : any combination of level 1.0 data

The SECCHI_PREP Way

- Fast, Efficient, Flexible and Friendly
  - All procedures are modular
  - Calibration is easily updatable
  - Everything has a keyword
  - History contains all applied factors

- Error Handling

```
ERROR WHILE PROCESSING 20070504_154820_s7h2A.fts IMAGE SKIPPED
Traceback Report from SECCHI_PREP :
   % Variable is undefined: OBS
   % Execution halted at:  SCC_BYTSCL   87  ~/idl/prep/scc_bytscl.pro
   %                       SECCHI_PREP  500 ~/idl/prep/secchi_prep.pro
```

SECCHI_PREP

- General Procedures
  - Reads Image and Header
  - Trims Image
  - Generates Output Array
    - scales image and handles subfields
  - Calibrates Images
  - Updates Header
  - Writes Image Files
    - FITS, PNG, and JPG

Using SECCHI_PREP with EUVI

- Correction
  - SEB Image Processing Correction
    - SEB IP - divide by 2, 3, 4 and square root
  - Normalize to 'Clear Filter'
  - Subtract the Bias
  - Normalize Exposure Time
  - Apply a Calibration Image
    - flat field
  - DN to Detected Photons Correction

Using SECCHI_PREP with COR1

- Calibration
  - SEB Image Processing Correction
    - SEB IP - divide by 2, 3, 4 and square root
  - Subtract the Bias
  - Subtract Stray-light Background
  - Normalize Exposure Time
  - Apply a Calibration Image
    - vignetting and flat fielding
  - DN to MSB Calibration Factor

Using SECCHI_PREP with COR2

- Calibration
  - SEB Image Processing Correction
    - SEB IP - divide by 2, 3, 4 and square root
  - Subtract the Bias
  - Normalize Exposure Time
  - Apply a Calibration Image
    - vignetting and flat fielding
  - DN to MSB Calibration Factor

Creating Level 2 Images

- Polarization Image
  - Total Brightness
  - Polarized Brightness
  - Percent Polarized
  - Polarization Angle
- Restrictions
  - Input files must be sorted into triples
  - Only one type of image can be returned

Using SECCHI_PREP with HI1 & HI2

- Correction
  - SEB Image Processing Correction
    - SEB IP - divide by 2, 3, 4 and square root
  - Remove Cosmic Rays
  - Set Saturated Pixels to NaN
  - Corrects for Shutterless Mode (DN/sec)
  - Apply a Calibration Image
    - flat field
    - Coming Soon : DN to MSB Calibration Factor
      - HI1 only

Calibration Status

Calibration	EUVI	COR1	COR2	HI1	HI2
Shutterless readout correction	NA	NA	NA	hi_desmear .pro, v1.6, 2007/06/13	hi_desmear .pro, v1.6, 2007/06/13
Photometric calibration	get_calfac .pro, v1.1 2006/10/03	get_calfac .pro, v1.8 2008/02/13	get_calfac .pro, v1.9 2008/08/05	Publication imminent	Ongoing
Geometric distortion	NA	NA	Cor2_distortion.pro, v1.9 2008/08/06	get_hi_params.pro, v1.5 (PV2_1) 2008/07/28	get_hi_params .pro, v1.5 (PV2_1) 2008/07/28
Flat field + vignetting via get_calimg.pro	20060823_wav, 20080416_(grd,raw)	20071003_flatfd	20060929_vignet	20080129_flatfld	20080129_flatfld
Pointing	euvi_point .pro, v1.5 2007/05/08	cor1_point .pro, v1.9 2008/01/17	Cor2_point.pro, v1.1 2008/03/27	Hi_fix_pointing.pro, v1.1 2008/07/28	Hi_fix_pointing.pro, v1.1 2008/07/28

Example Calls

Default call:

```
IDL> secchi_prep, files, image, header
```

To limit the memory usage:

```
IDL> secchi_prep, files, image ,header, outsize = 512
```

To save FITS file and return to memory:

```
IDL> secchi_prep, files, image, header, /write_fts
```

To only save FITS file :

```
IDL> secchi_prep, files, /write_fts
```

SECCHI_PREP Keywords

```
SECCHI_PREP, filenames, images, headers
[,SAVEPATH=path] [,OUTSIZE=value] [,/WRITE_FTS]
[,/WRITE_PNG] [,/WRITE_JPG] [,/TRIM_OFF]
[,/ROTATE_ON] [,/CALIBRATE_OFF] [,/CALFAC_OFF]
[,/NORMAL_OFF] [,/DN2P_OFF] [,/BIAS_OFF]
[,/EXPTIME_OFF] [,/CALIMG_OFF] [,/SEBIP_OFF]
[,/NEW_CALIMG] [,CALIMG_FILENAME=filename]
[,/SHUTTERLESS_OFF] [/SMASK_ON] [/TELE_ONLY]
[,/MASK_ONLY]  [,/FILL_MEAN] [,/FILL_VALUE=value]
[/POLARIZ_ON] [,/pB] [,/MU] [,/PERCENT]
[,/COLOR_ON] [,/DATE_ON] [/LOGO_ON]
```

Websites

- SECCHI_PREP User Guide

  http://secchi.nrl.navy.mil/wiki/pmwiki.php?n=Main.SecchiPrep

- Feedback
  - SECCHI Bugzilla

    http://secchi.nrl.navy.mil/bugzilla/

SECCHI Prepped