GOES-NOP XRS/EUV SENSOR Instrument Design

Assurance Technology Corporation

October 19, 2011
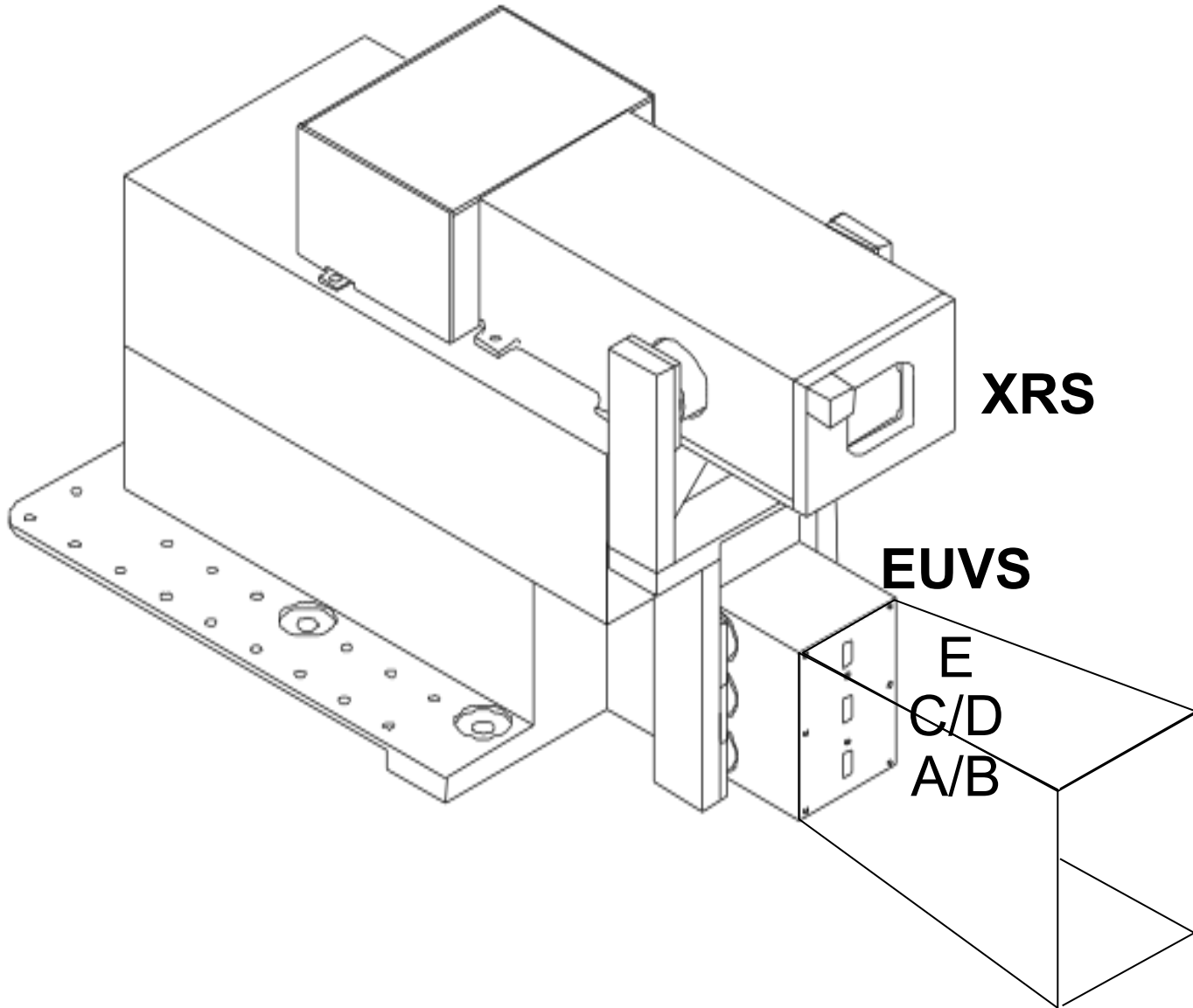
with additions from

Andrew Jones (LASP)

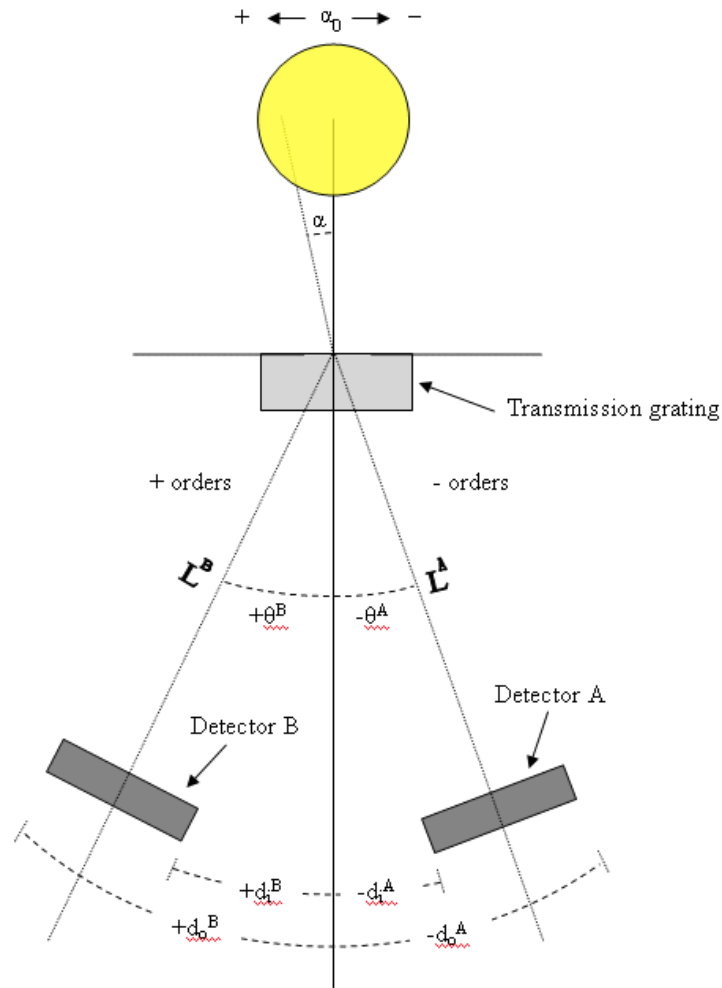Don McMullin (SSRCorporation)

Rodney Vierek (NOAA)

GOES-NOP XRS/EUV SENSOR

XRS

EUVS

E

C/D

A/B

General Design

- Mesh-supported gold transmission gratings
  - From Mark Schattenburgs's MIT Lab
    - As used for SEM, ESP and Chandra
- IRD Si photodiodes, with attached pre-amp
- Acton (Princeton Instruments) Lyman Alpha filter in Ch-E
- Optical and radiation shielding baffles

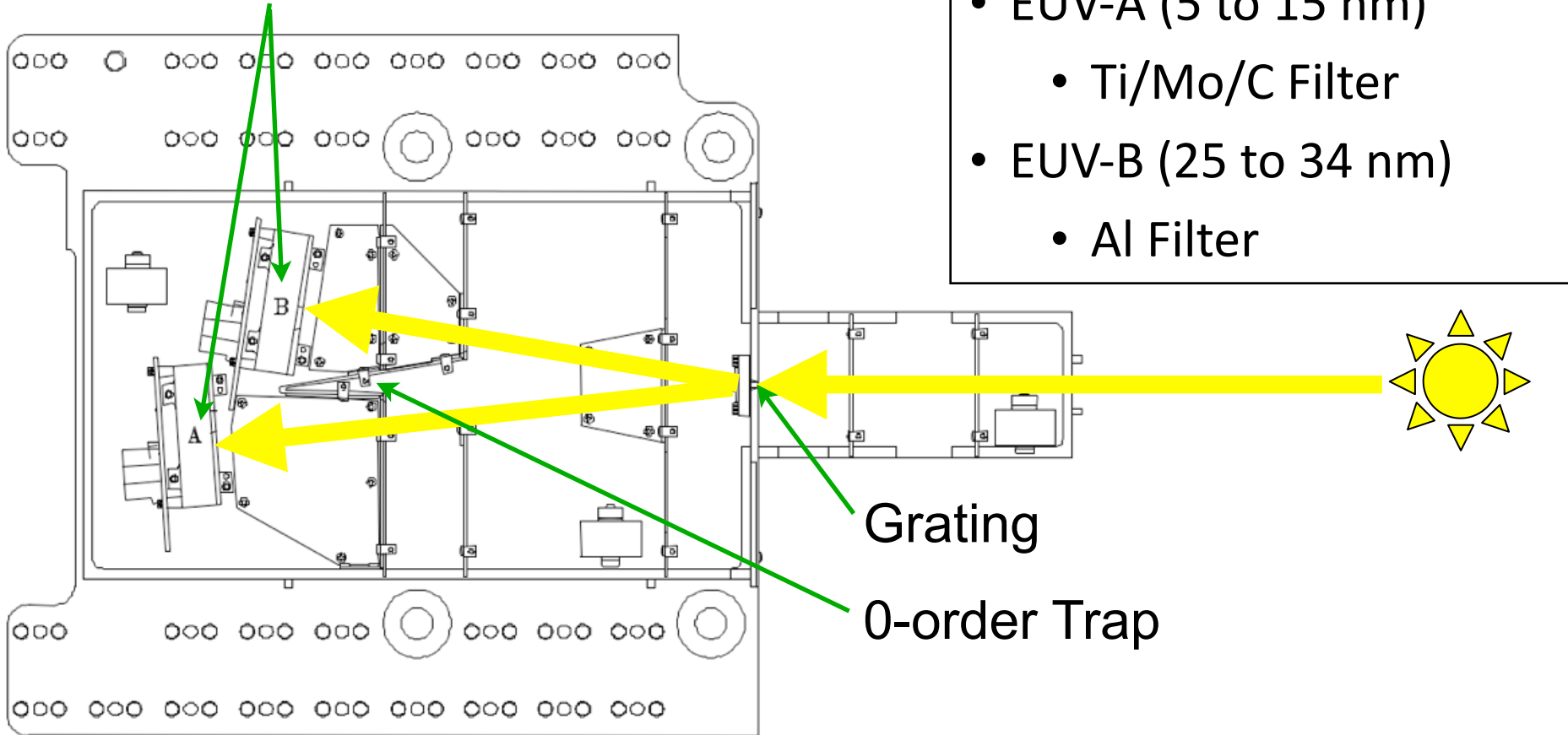- Zeolite contaminant absorbers

How EUVS Works

EUVS Channels

Channel	$\lambda_{min} \rightarrow \lambda_{max}$ (nm)	$\lambda'_{min} \rightarrow \lambda'_{max}$ (nm)
A	2→18	5→15
B	5→35	25→34
C	17→67	42→63
D	17→84	17→81
E	118→127	118→127

Column 2 shows the effective intervals over which total signals arise while
Column 3 shows examples of recommended intervals for reporting energy fluxes
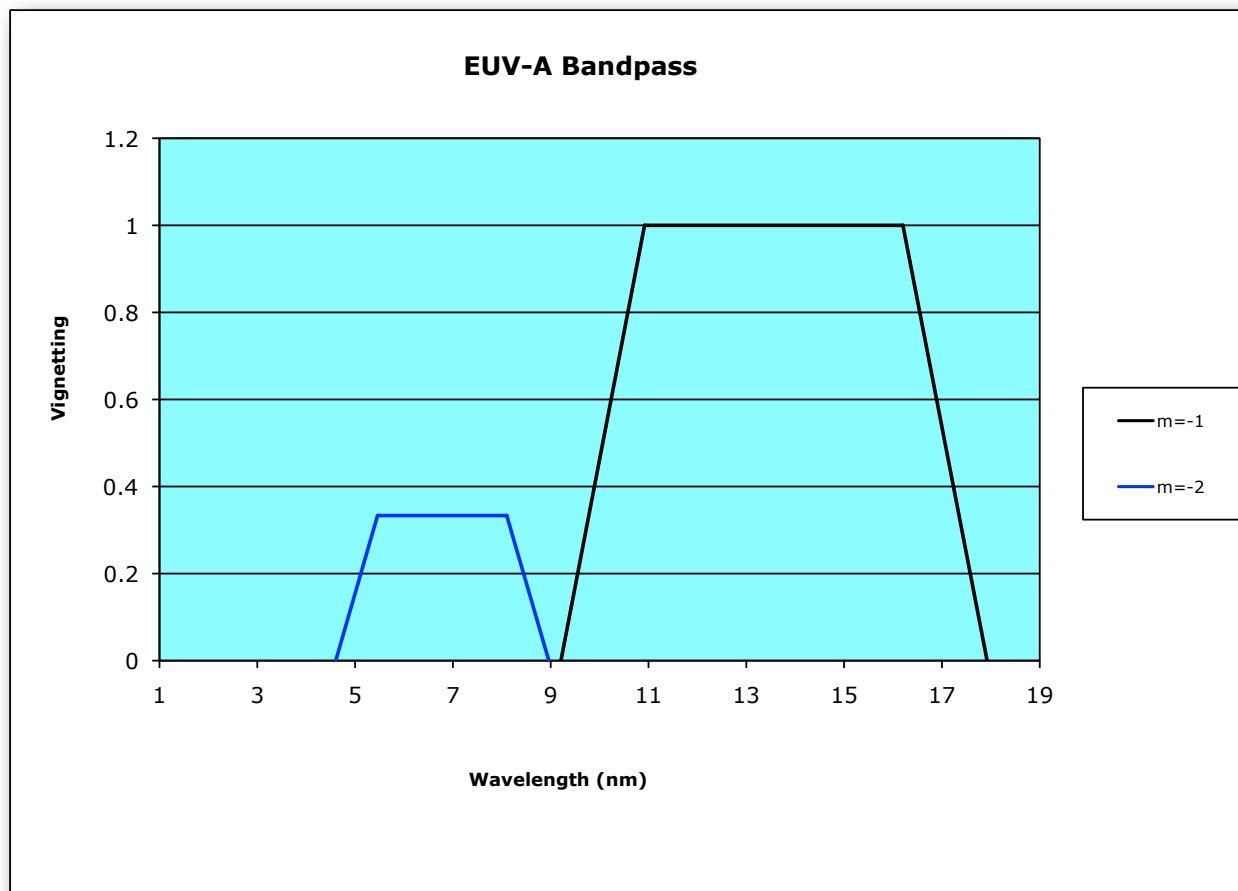
GOES-NOP EUV SENSOR
EUV-B and EUV-A Channel Design

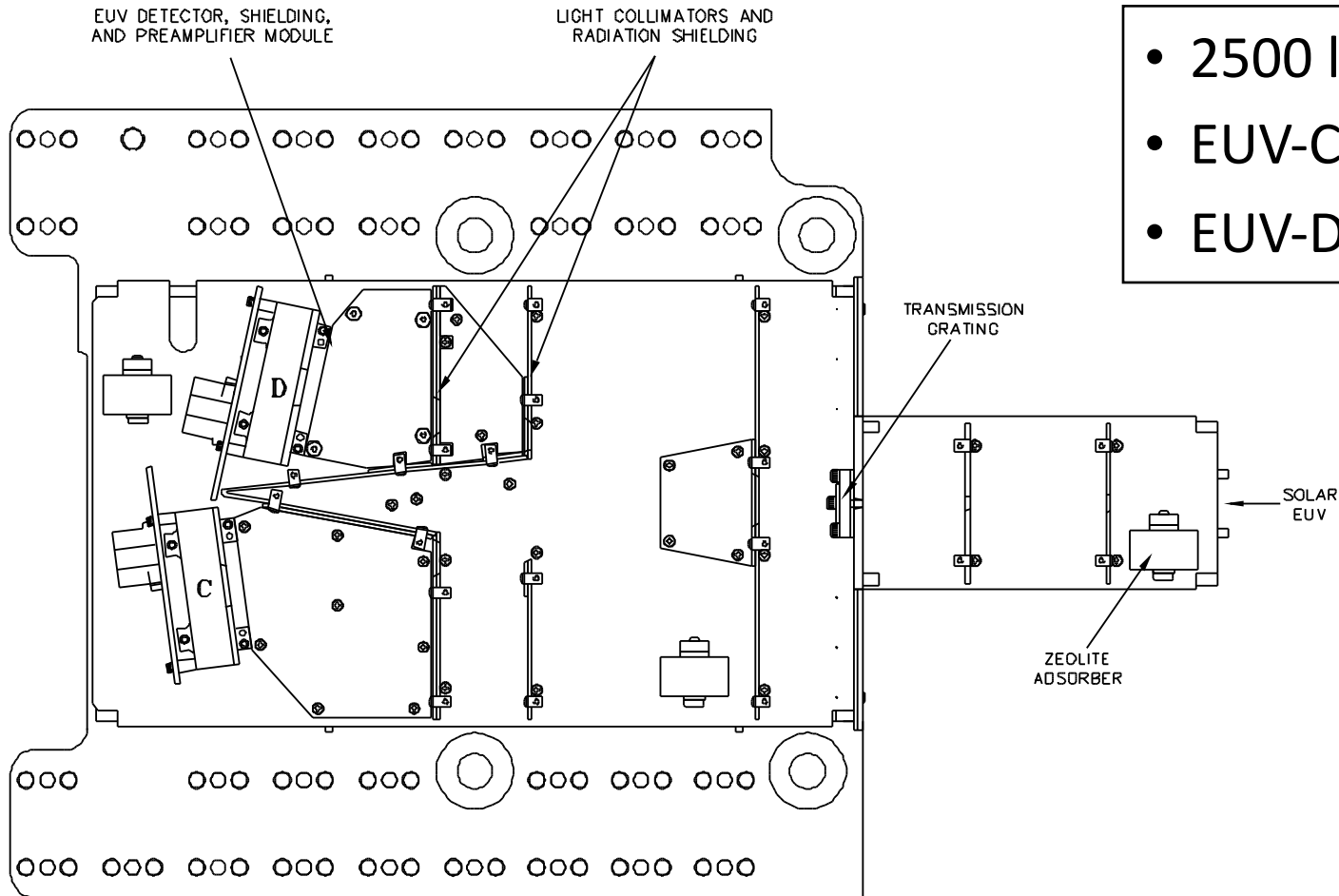Detector (with coated filter) Preamp assemblies

Grating

0-order Trap

- 5000 line/mm grating
  - EUV-A (5 to 15 nm)
    - Ti/Mo/C Filter
  - EUV-B (25 to 34 nm)
    - Al Filter

EUVS -A Sensitivity

- Uses 1$^{st.}$ and 2$^{nd.}$ order from grating

GOES-NOP EUV SENSOR
EUV-D and EUV-C Channel Design

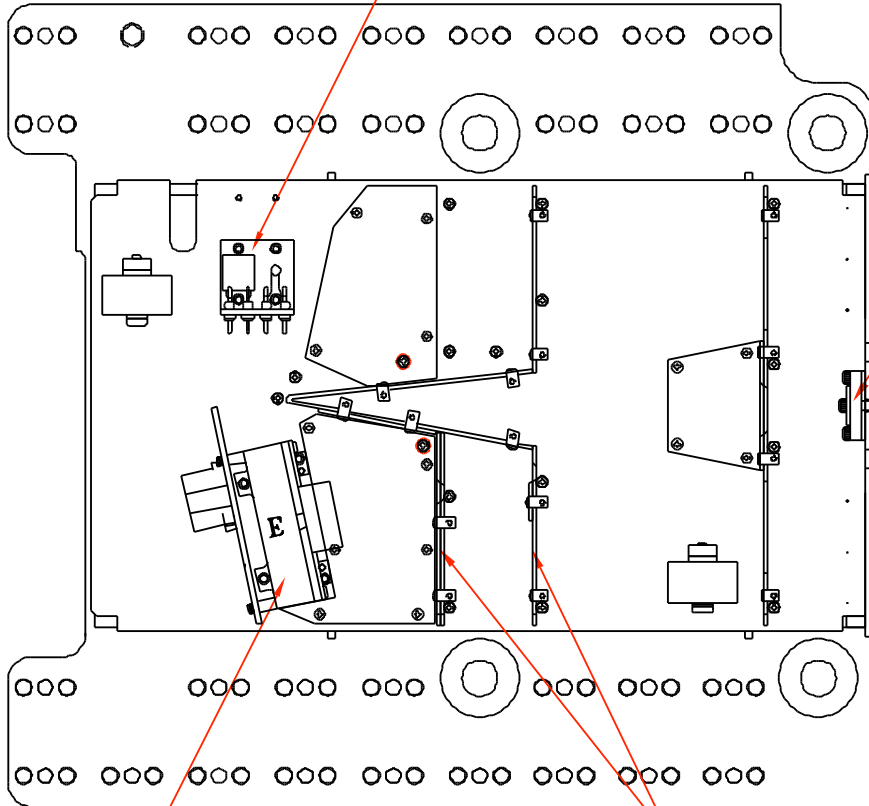- 2500 line/mm grating
- EUV-C: 42 - 63 nm
- EUV-D: 17 - 81 nm

EUV DETECTOR, SHIELDING, AND PREAMPLIFIER MODULE

LIGHT COLLIMATORS AND RADIATION SHIELDING

TRANSMISSION GRATING

SOLAR EUV

ZEOLITE ADSORBER

D

C

GOES-NOP EUV SENSOR
EUV-E Channel Design

- 1667 line/mm grating
- EUV-E: 118-127 nm
- Lyman-alpha filter

EUV TELESCOPE
TEMPERATURE MONITORS

TRANSMISSION
GRATING

SOLAR
EUV

ZEOLITE
ADSORBER

EUV DETECTOR, LYMAN ALPHA FILTER,
SHIELDING, AND PREAMPLIFIER MODULE

LIGHT COLLIMATORS
AND RADIATION SHIELDING

Issues

- **Pointing:**
- Inaccurate pointing leads to a band shift:
  - GOES-14 has 2 versions of the A/B channel one reversed and removes the C/D channel.
  - GOES-13 Ch-E is not centered on Lyman alpha
- **CH-A Heater noise:**
  - Can be remove to some degree the removal algorithm is in progress.
  - Noise also gets into the EUVB channel sometimes

Data set notes from Rodney:

1. There are weekly calibrations in some of the data. They look like big spikes from zero to some large number (testing the full electronic range)

2. There are other "features" in the data too numerous to list.

3. The absolute calibrations are off by quite a bit.

4. I have not scaled to 1-AU

5. The EUVE channel has terrible downward drift. relative to Tom Woods' Lyman Alpha Composite

6. I think that the time and dates are correct although sometimes a 1/2 day offset creeps in if I convert to Julian day.   My program uses the Julian Day starting at 0000UT not the one that starts at noon