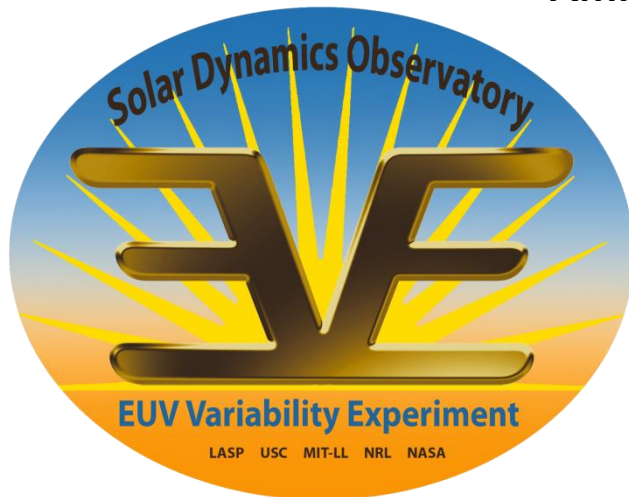


EVE/SAM

On Our Way to Spectral Irradiance

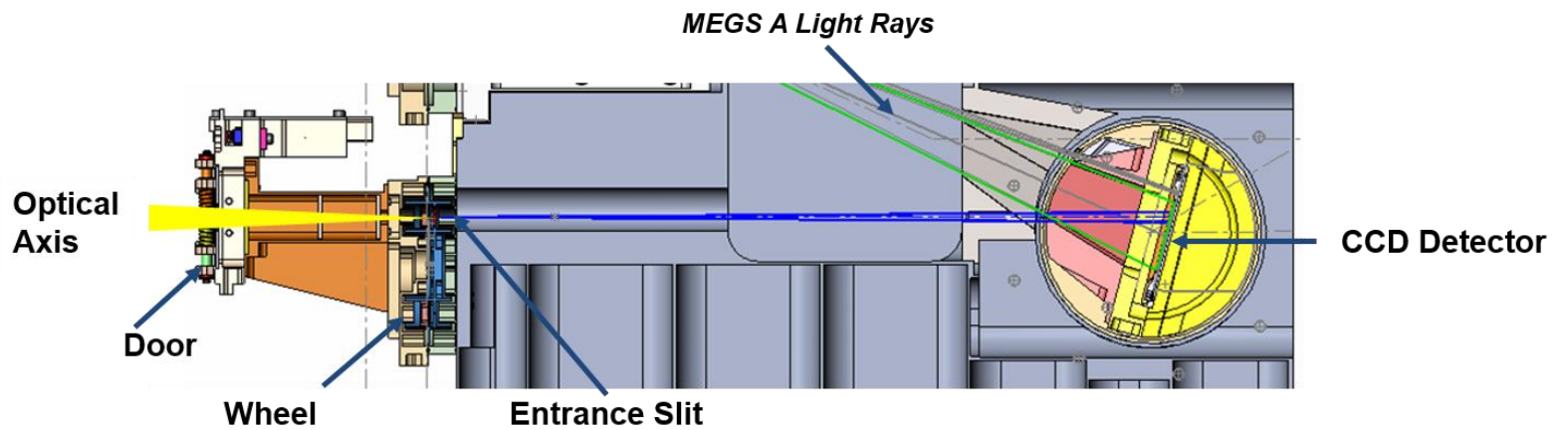
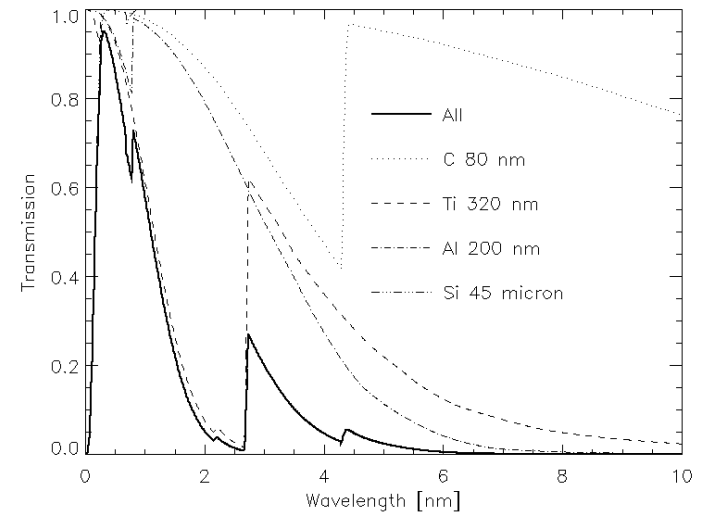
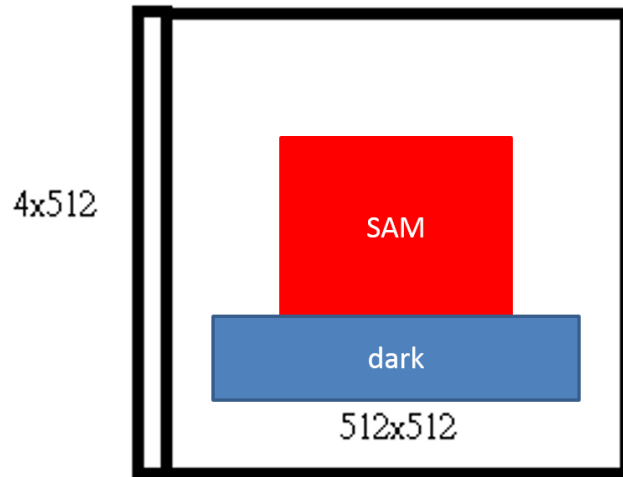
**Cissi Lin, Scott Bailey
Andrew Jones, Don Woodraska,
Amir Caspi, Tom Woods, Frank Eparvier
& All EVE Team**



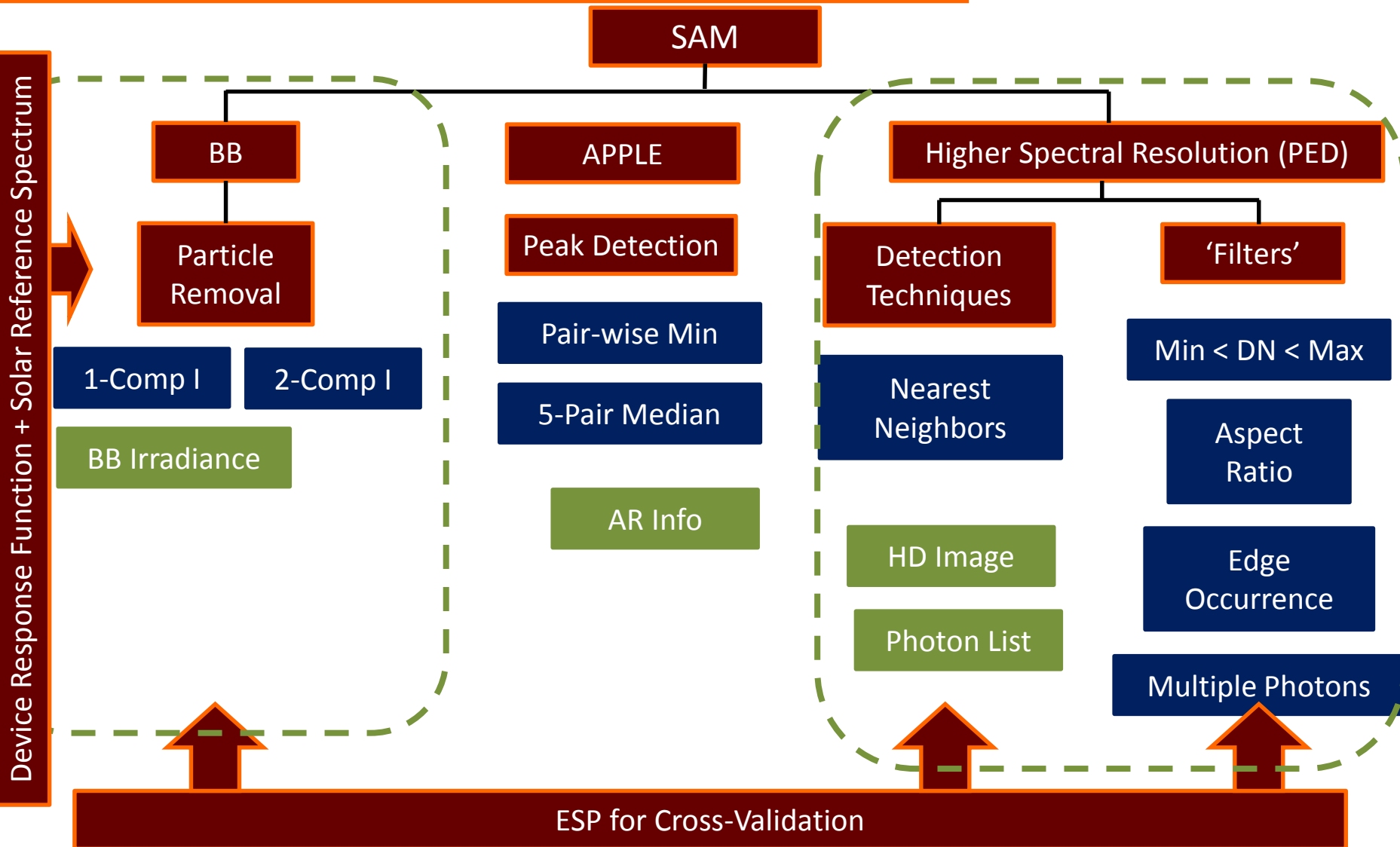
Outline

- Introduction
- Broadband (BB)
- Apertural Progression Procedure for Light Estimate (APPLE)
- Photon Event Detection (PED)
- Summary

Introduction

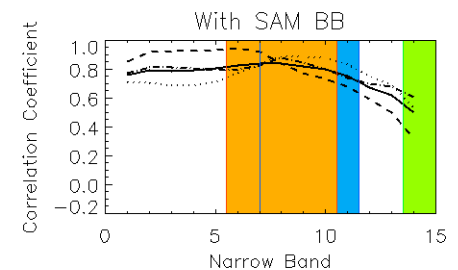
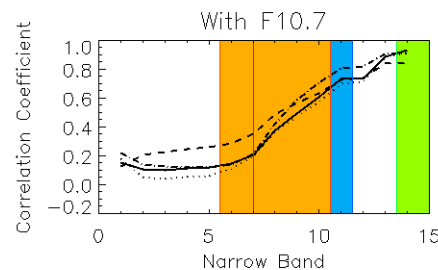
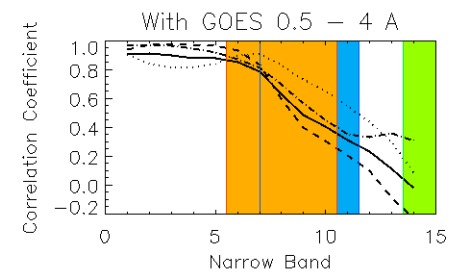
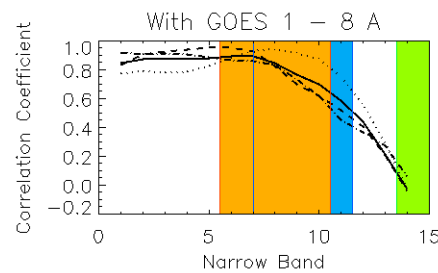
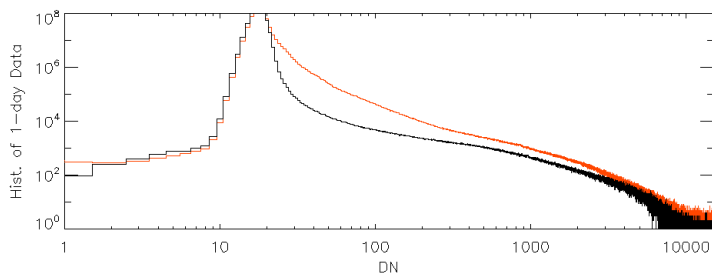
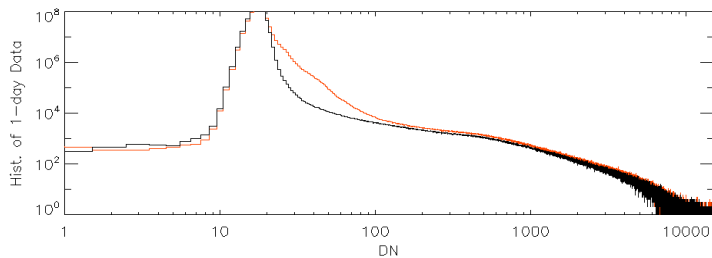


SAM Analysis



DN Distribution & Narrow Bands

- Light & dark DN histograms are close at low- & high-DN ends.
- Difference of light & dark does not vary much at 10s–100s DN range.
- Light curve rises above dark curve during flares.
- High correlation between bands 1–8 and GOES, bands 10–15 with F10.7
- Decreasing correlation between narrow bands and broadband irradiance toward longer wavelengths. The variability of the shorter-wavelength bands dominates that of the broadband irradiance. A flaring component of the solar irradiance may be characterized by shorter-wavelength bands.



1-Comp, 2-Comp, and Hybrid

- Use NB for active and particle terms, correlate the quieter component with F10.7

$$I_r = I_{s,1-comp} + s_{p,1-comp}$$

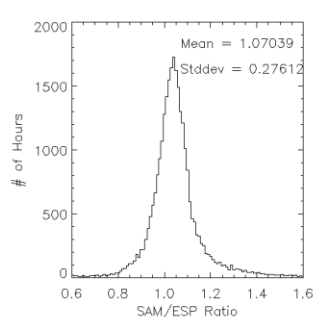
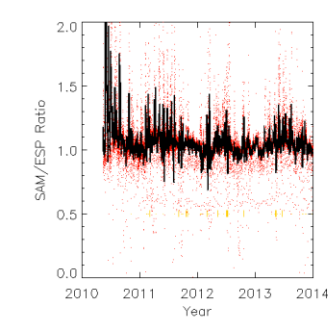
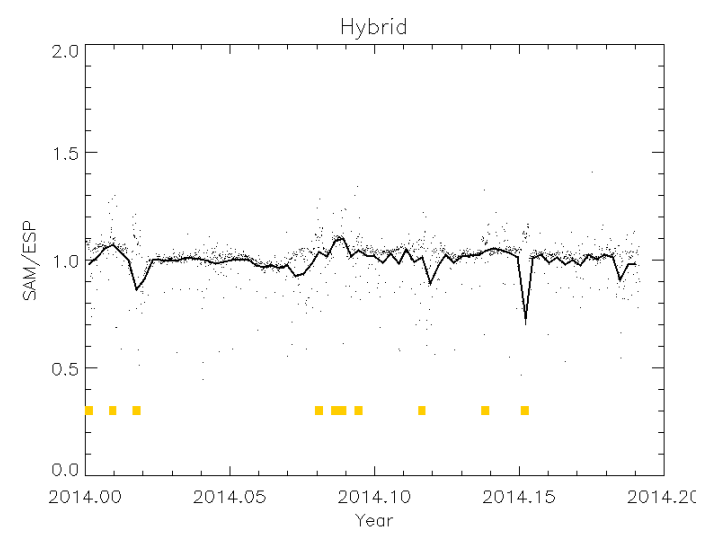
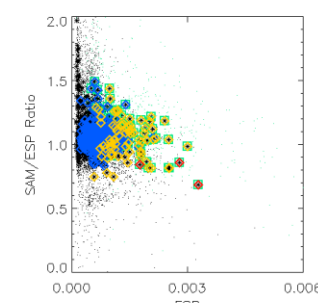
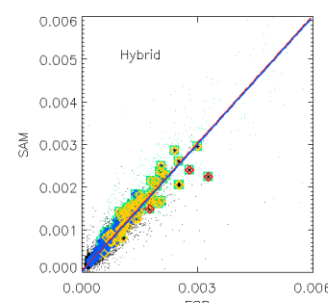
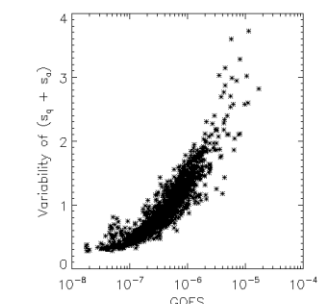
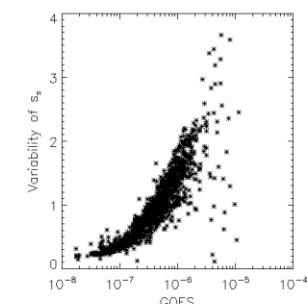
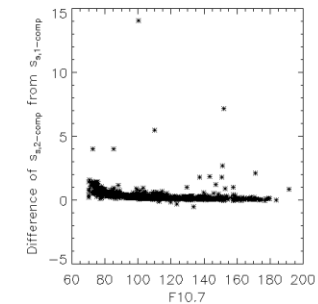
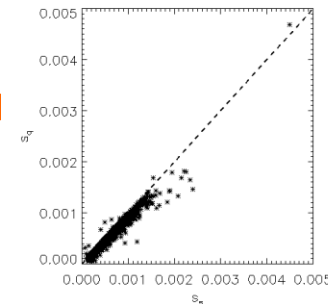
$$I_{BB} = I_{s,1-comp} + A \cdot I_{NB1-6}$$

$$I_r = I_{s,2-comp} + s_{p,2-comp}$$

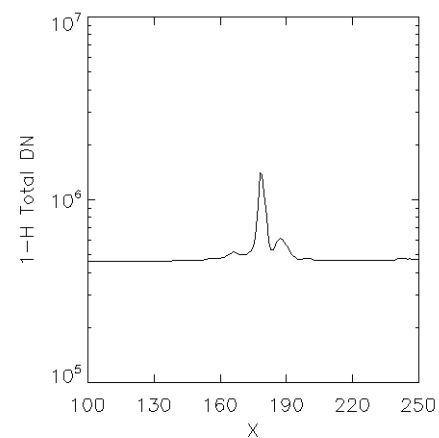
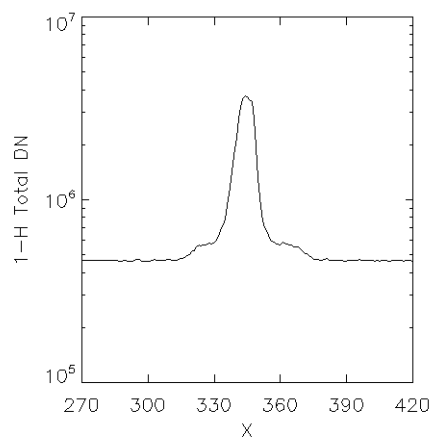
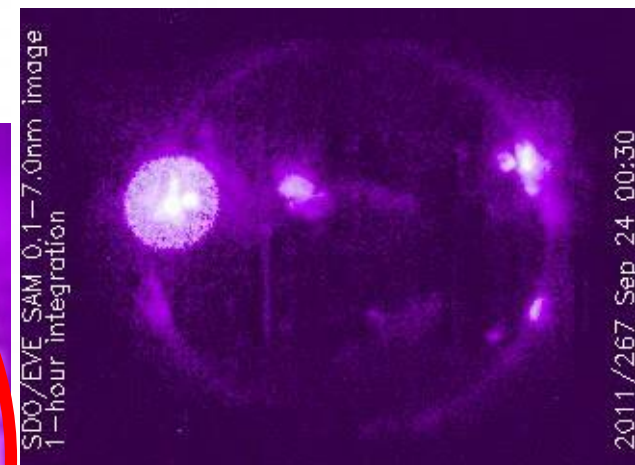
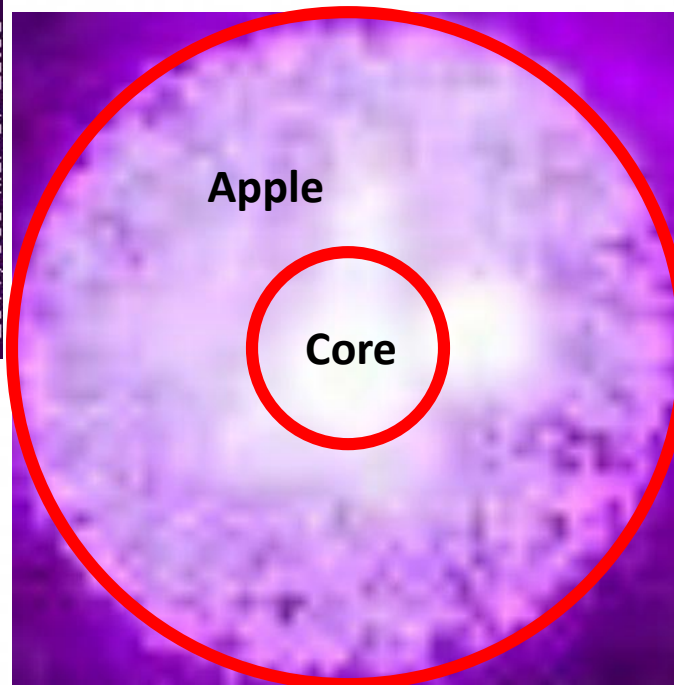
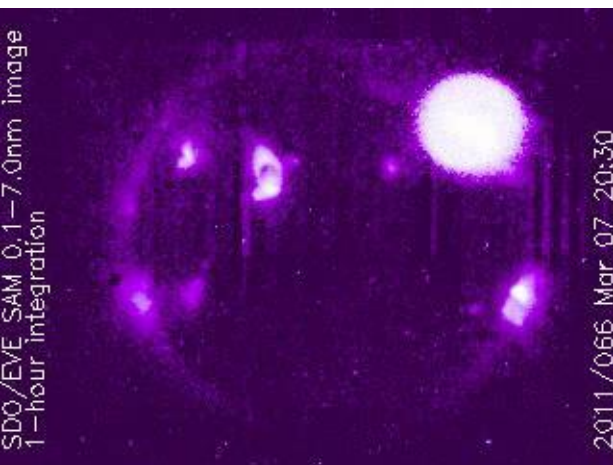
$$= I_q + I_a + s_{p,2-comp}$$

$$I_{BB} = I_q + B \cdot I_{NB6-8} + A \cdot I_{NB1-6}$$

- 1-comp better at low activities, 2-comp better at high activities → HYBRID!

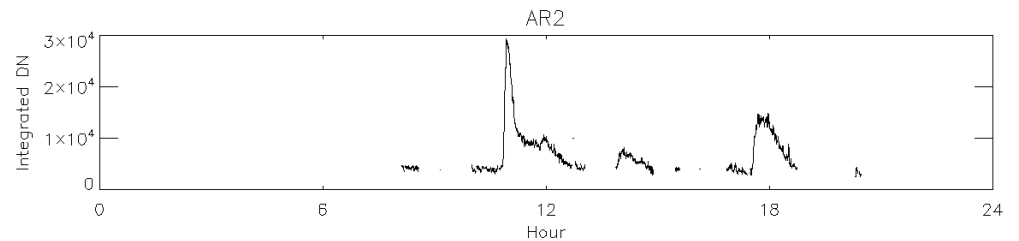
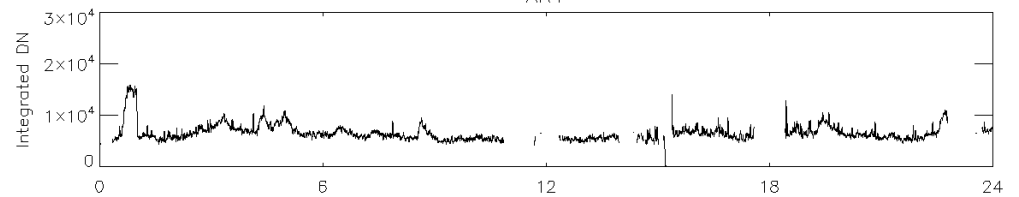
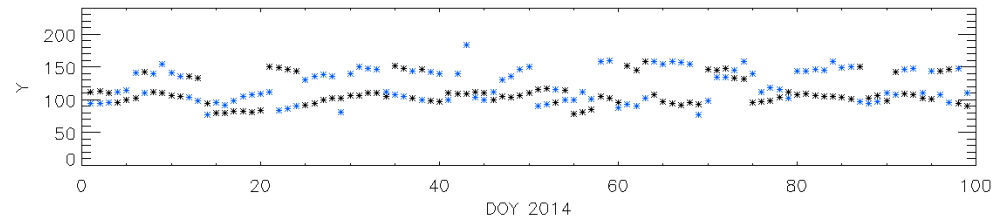
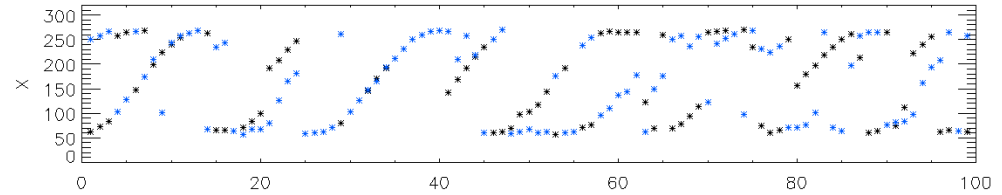
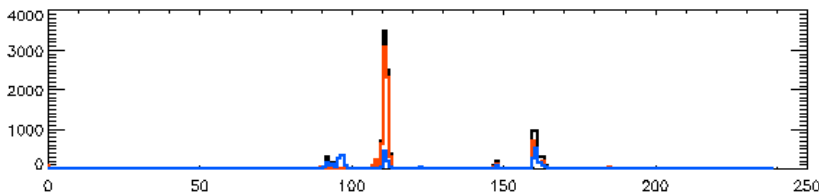
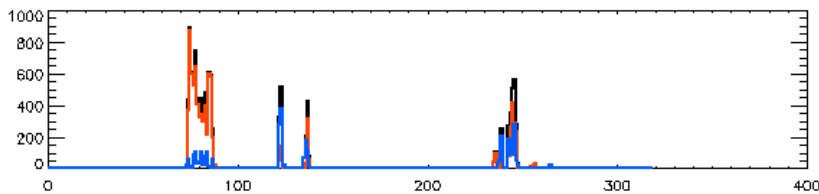
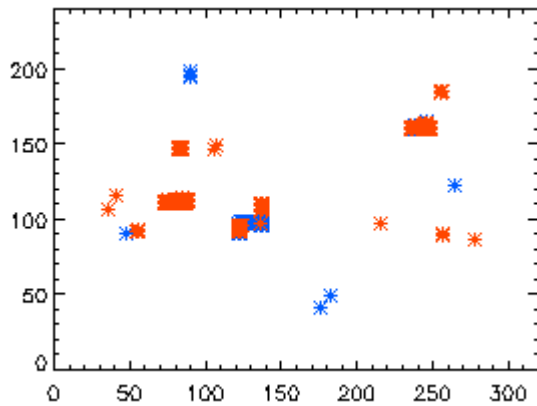


Apertural Progression Procedure for Light Estimate



APPLE – Active Region Detection

- Track 2 DN peaks
- Align peaks daily to locate ARs

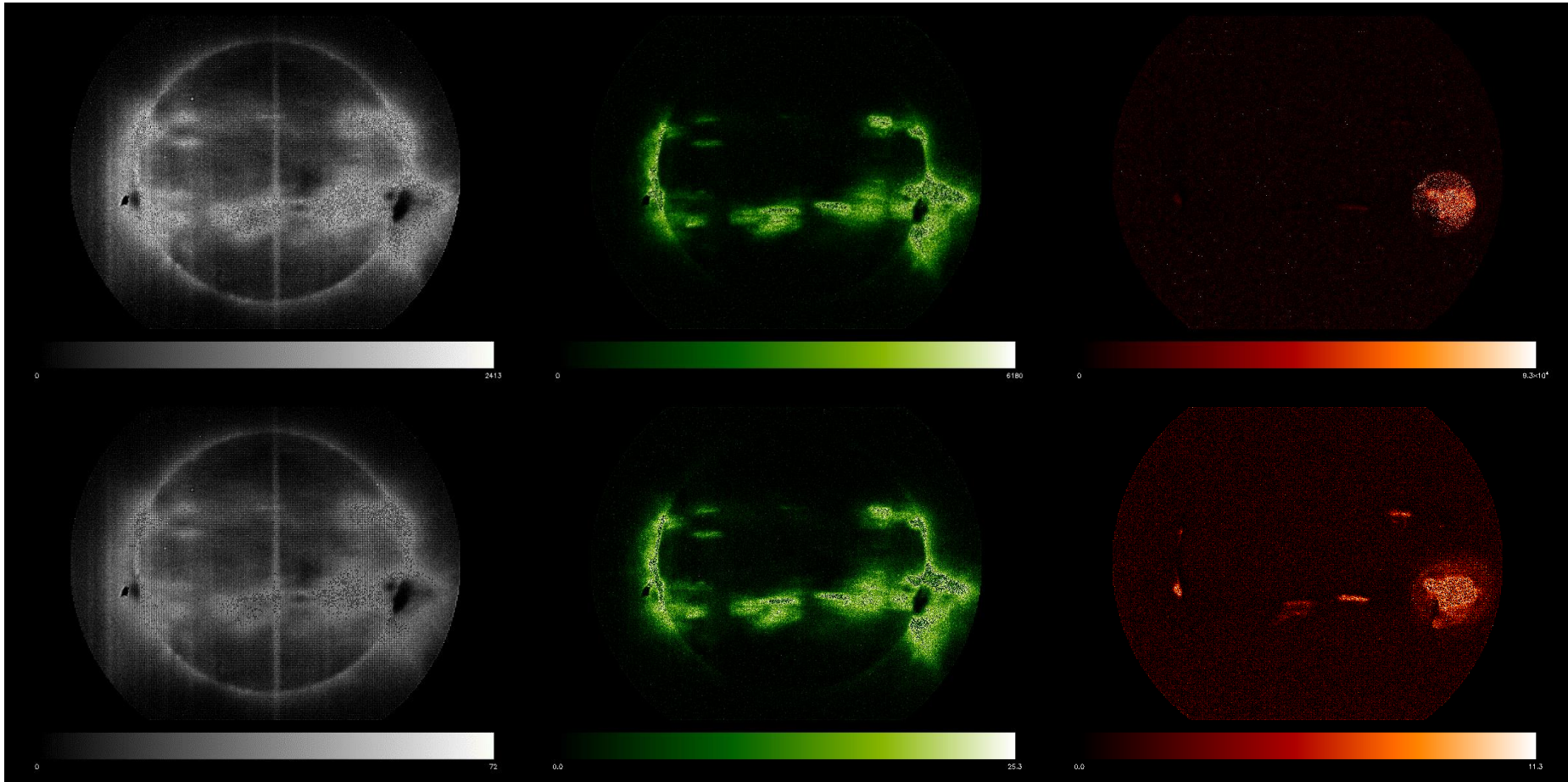


Fruit = BB + APPLE + PED

- PED procedures take in results from BB and APPLE for decision making:
 - BB tells PED if likely a flaring day or not
 - If flaring, PED reads in APPLE AR information to apply circular filters around 2 ARs (core/apple for 1st AR, core only for 2nd AR)
- Circular filters allow all detected events to be registered.
- Assumption: the most populated AR = the AR likely saturates CCD pixels
- Improvement from previous PED:
 - Photons in the flaring vicinity previously discarded are now recognized.
 - All screening filters (photons vs particles) may be applied.
- Photons are registered with their centroid location, total DN, size, and time.

High-Definition SAM Images

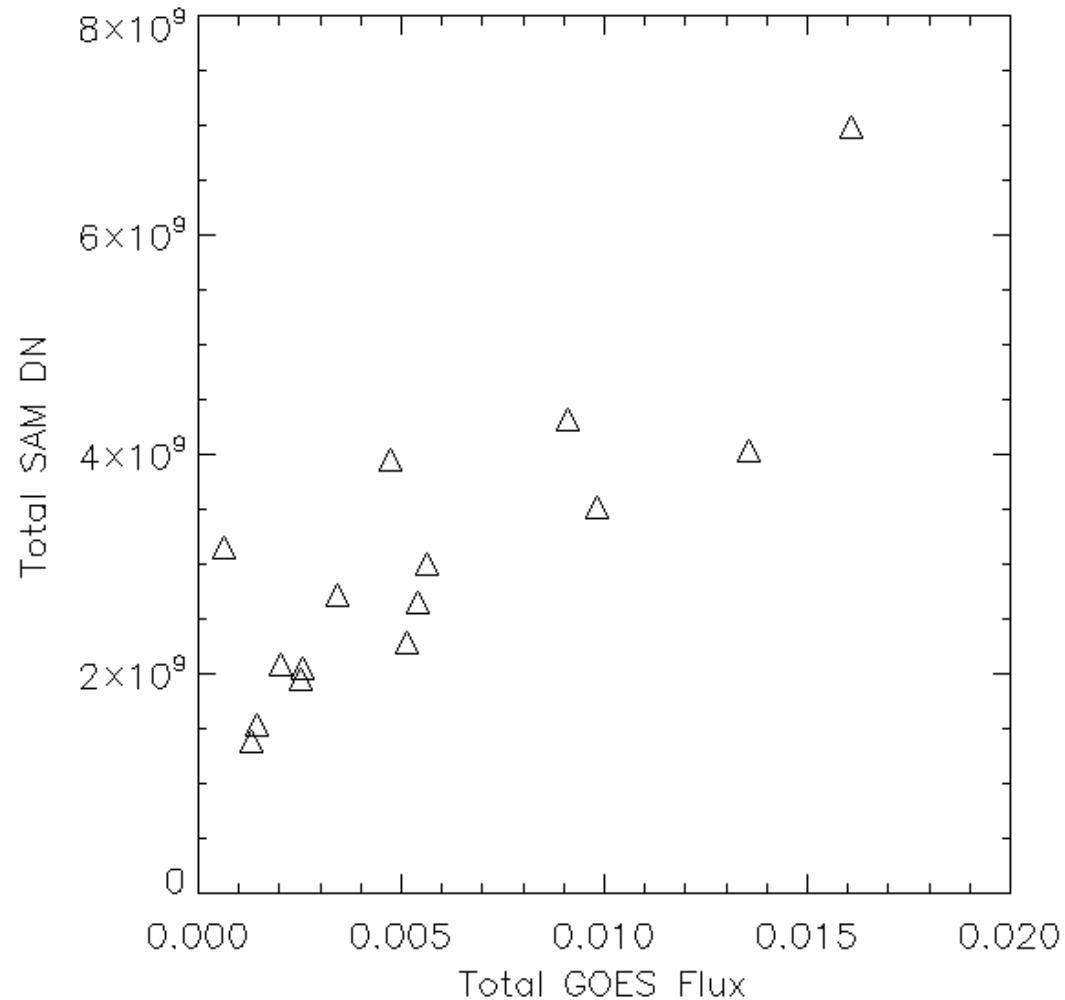
- Low-, middle-, high-energy daily SAM PED images (top). Maps (bottom) indicate photon population.



Flaring Days with PED

03/05/2013	064	M1.2
05/12/2013	132	M1.9
05/13/2013	133	X2.9
05/14/2013	134	X3.2
05/15/2013	135	X1.3
05/16/2013	136	M1.3
05/17/2013	137	M3.2
11/05/2013	309	X3.4
01/07/2014	007	X1.3
01/30/2014	030	M6.7
02/25/2014	056	X5.0
03/28/2014	087	M2.6
03/29/2014	088	X1.0
04/02/2014	092	M6.5
04/16/2014	106	M1.0
04/25/2014	115	X1.4

(* Flare class shown from 1-m data, slightly higher than from 5-m data)



Summary & Next Step

- SAM broadband irradiance is validated against ESP.
- PED is improved with knowledge learned from BB and APPLE.
- Forward modeling of photon pileups. Next step is to apply simulated photon-pileup effect to bin PED photons.

Spectrum on Jun 23, 2012

