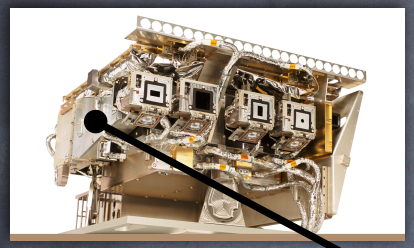
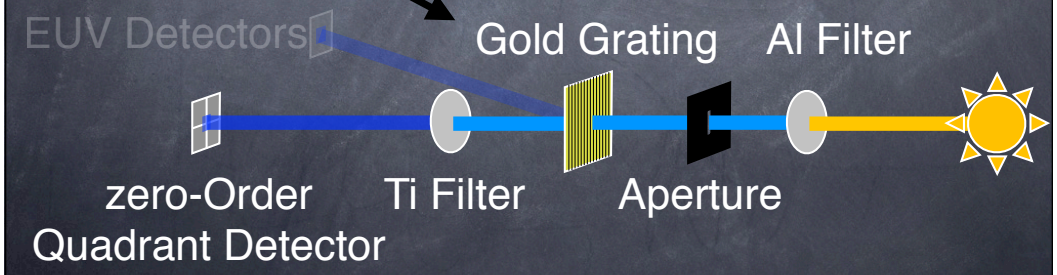
Locating Flares with SDO-EVE-ESP

Andrew Jones and the EVE team

EVE Space Weather Workshop October 6-8th. 2010

EUV SPECTROPHOTOMETER ESP

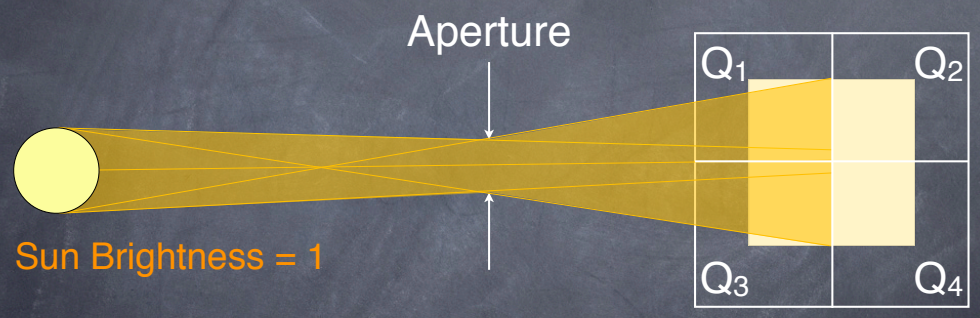




ESP Zero-Order Channel

- Filter Photometer 0.1 – 7nm
  - Matches EVE - SAM, XPS diode channel
- Quadrant diode
- Hi cadence (¼ second)
- Available with very low latency (L0CS)

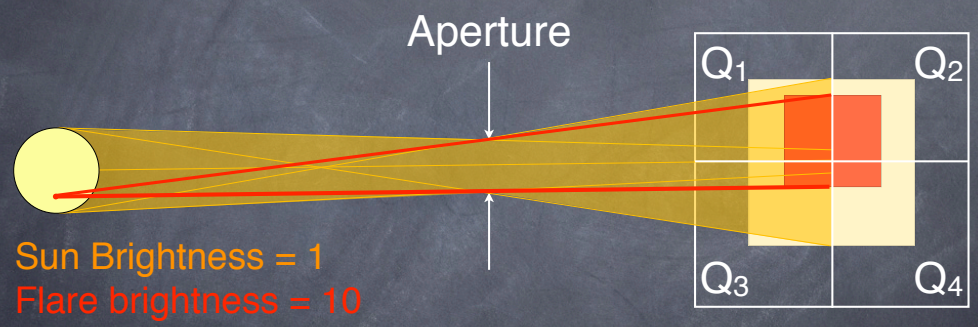
Flare Location



$X = [Q_2 + Q_4]-[Q_1 + Q_3]/sum = [(1/4)+(1/4)]-[(1/4)+(1/4)]/(1) = 0.00$

$Y = [Q_1 + Q_2]-[Q_3 + Q_4]/sum = [(1/4)+(1/4)]-[(1/4)+(1/4)]/(1) = 0.00$

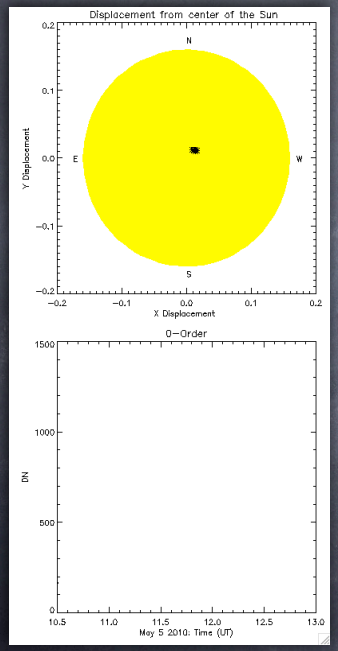
Flare Location



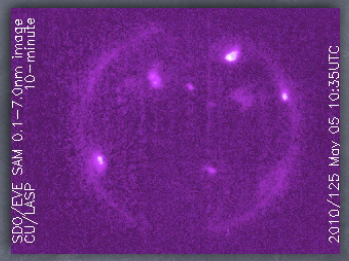
$X = [Q_2 + Q_4]-[Q_1 + Q_3]/sum = [(¼+4)+(¼+1)]-[(¼+4)+(¼+1)]/(1+10) = 0.00$

$Y = [Q_1 + Q_2]-[Q_3 + Q_4]/sum = [(¼+4)+(¼+4)]-[(¼+1)+(¼+1)]/(1+10) = \mathbf{0.55}$

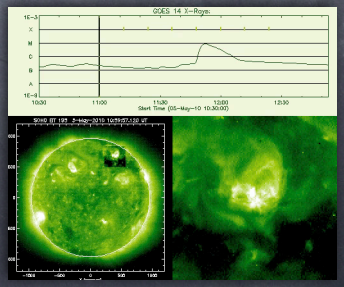
MEASURED POSITIONS



ESP



SAM



EIT

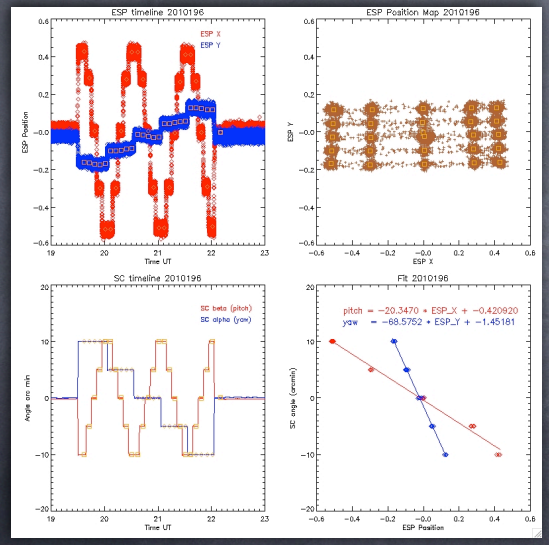
Center of Irradiance

- Measure the whole disk
  - Position reflects the COI
    - OK with Isolated Flares
    - Need to subtract pre-flare COI for better accuracy with more active Sun

Field Of View Maps

- EVE FOV maps every 3 months
- Calibrate the quadrant diode response:
  - ESP X, Y vs. S/C α, β
- OR... Have continuous calibration from SAM
  - Or AIA

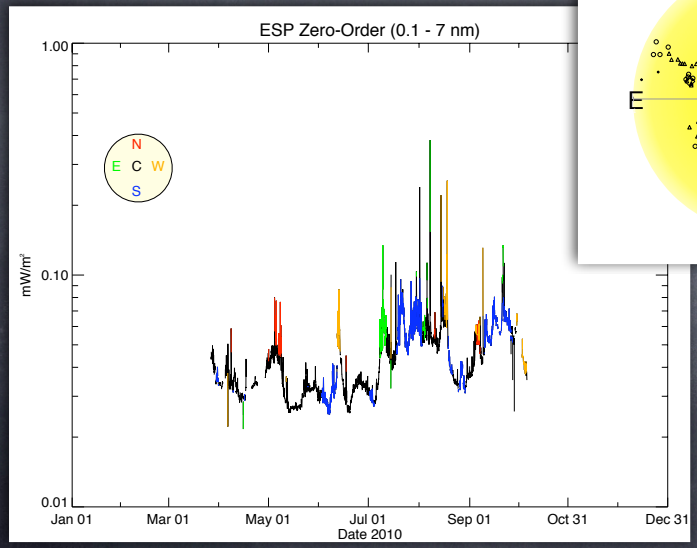
FOV Map Analysis

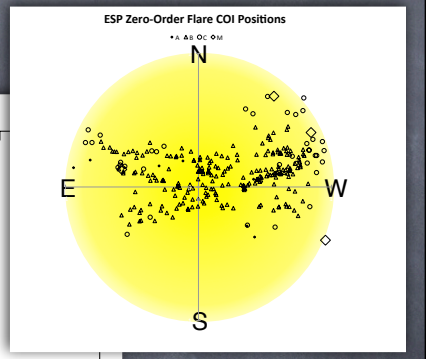


Automatically calculate slopes from S/C position data and ESP response

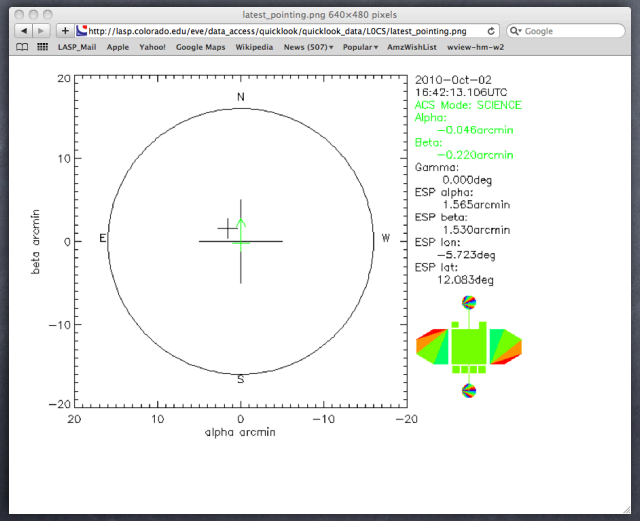
Different slopes as ESP aperture is not symmetrical

FLARE LOCATIONS



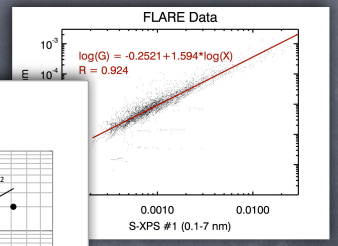


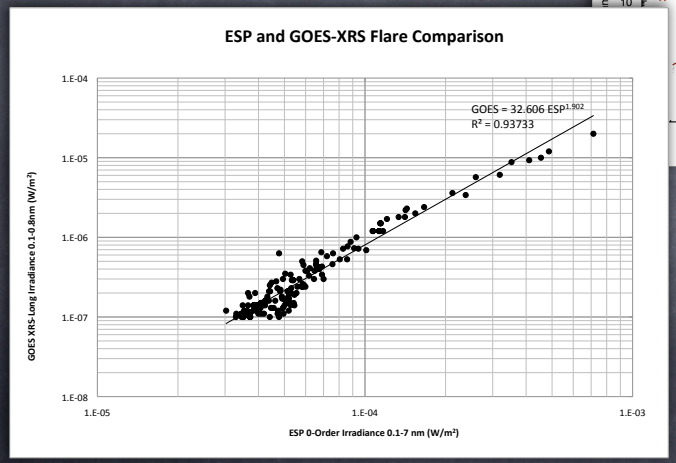
Current ESP COI on EVE Quick Look Page



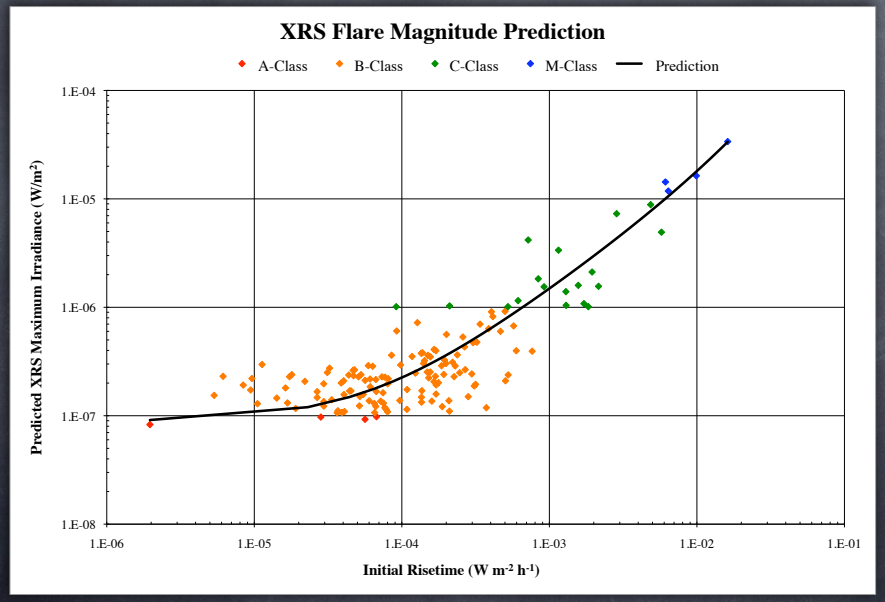
http://lasp.colorado.edu/eve/data_access/quicklook/quicklook_data/L0CS/latest_pointing.png

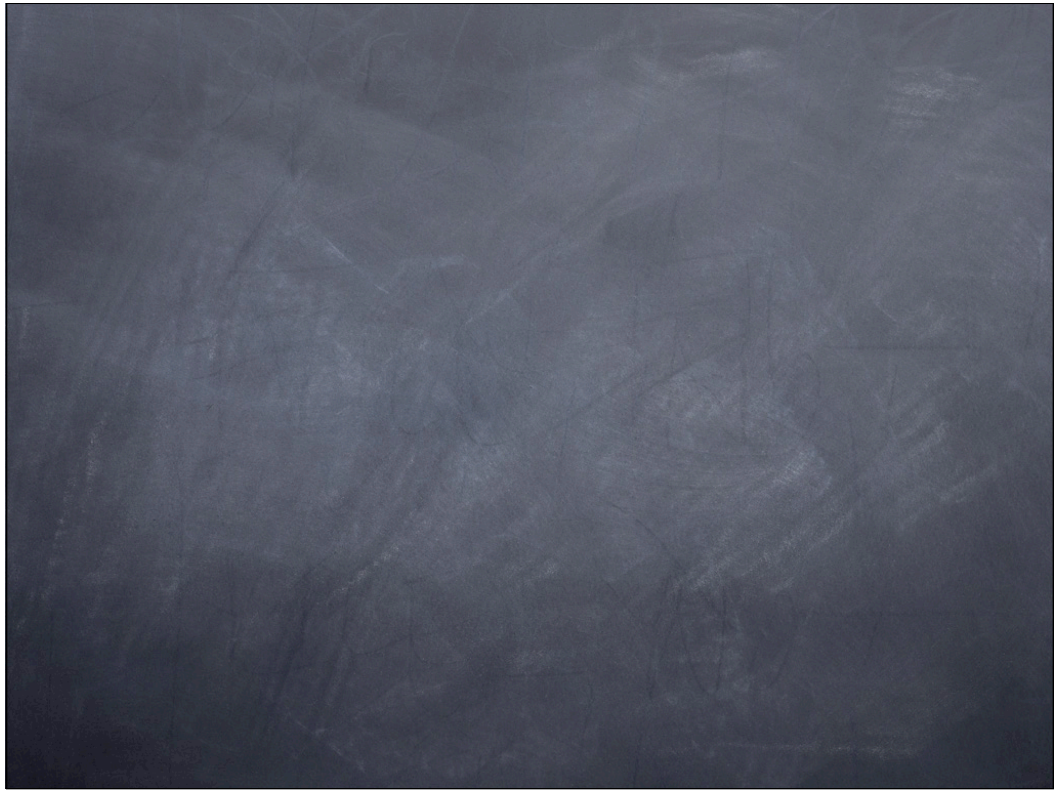
CORRELATION





Prediction Chart



CONCLUSIONS

- Flare magnitude and location provide vital clues to the effects likely to be experienced at Earth
- ESP can provide very fast flare location
- Positions calculated from FOV Maps and SAM are essentially identical
- This is a pathfinder for GOES-R EXIS XRS
- We have started to look at flare prediction