

# SDO - EVE UPDATE AND OTHER THOUGHTS

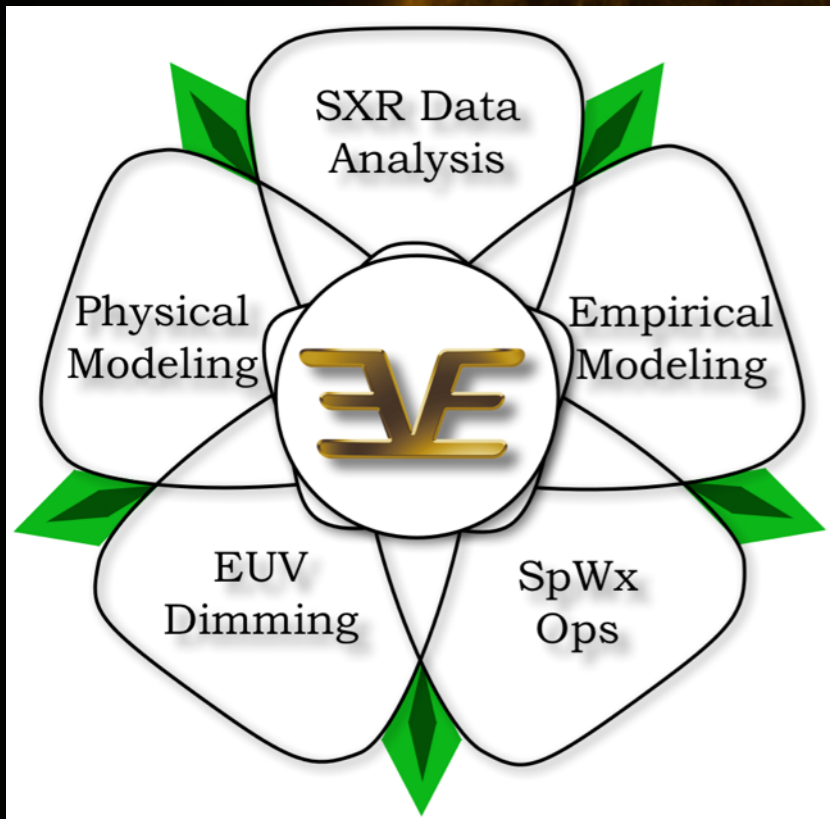


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# ACCOMPLISHMENTS SINCE LAST WORKSHOP

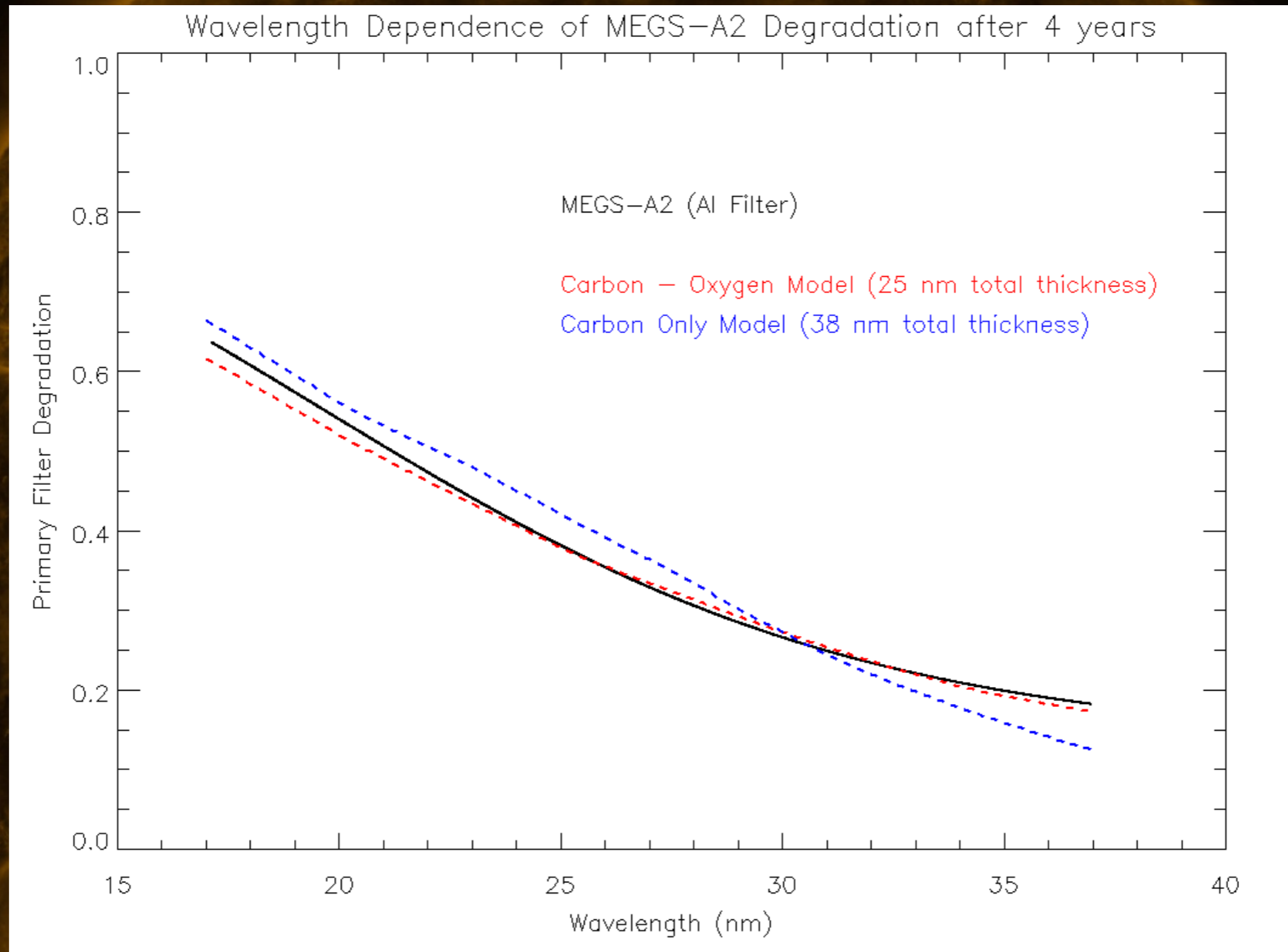
- ☀ **Released EVE Version 4 data**
  - ☀ **30.4 nm improvements (All especially Janet, Seth)**
  - ☀ **Short wavelength degradation improvements**
  - ☀ **Short wavelength scale (Giulio)**
- ☀ **Space Weather Products**
  - ☀ **SEM equivalent formed on low-latency ESP L0CS data**
  - ☀ **SAM flare positions used at SWPC**

# EVE SCIENCE WORKING GROUPS: SEPTEMBER 2013



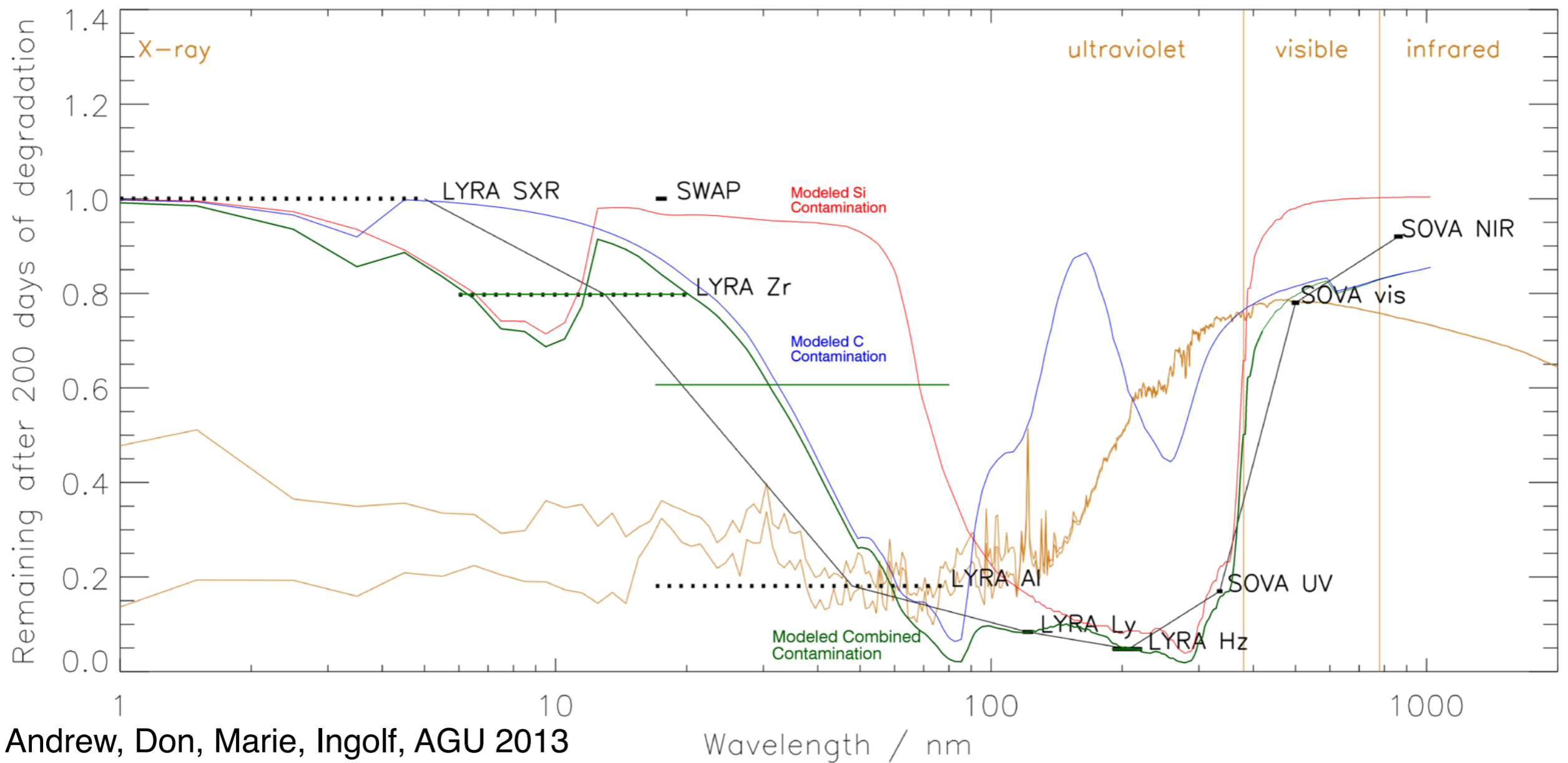
- ☀ More progress on SXR spectral modeling – DEMs using EVE and RHESSI
- ☀ Some SXR measurements becoming available:
  - ☀ EVE-SAM (Cissi)
  - ☀ EVE rocket SAM with objective grating
  - ☀ EVE rocket X123 X-ray spectrometer
  - ☀ MinXSS X123 will fly next year!

# MEGS-A FILTER MODEL



*Model fits better with a C O model than C.  
My current hypothesis is that oxidation and contamination  
contribute to the Al filter degradation.*

# LYRA DEGRADATION MODEL



*~ 13 nm of Si & C contaminants give a good fit for all channels except for the Al channel.*

*I have not examined oxidation yet! (next week...)*

# FUTURE

- ☀️ Add oxygen to LYRA analysis
- ☀️ NASA proposal to look at degradation in the lab
  - ☀️ Understand the Al/Zr differences
    - ☀️ Oxidation/temperature/secondary electrons/other?
  - ☀️ On-orbit “cleaning” of optics
  - ☀️ Materials selection
  - ☀️ Best practices for design and handling

# MEGS-A ANOMALY

- ☀ May 26 2014 - 23:36:18 page sent:  
"Some data failed limit/state checks -  
**ALARM:EVE State or Limit Violation**"
- ☀ MEGS A +24V voltage red low ( $\sim +10V$ )  
MEGS A +24V current red high (0.25A - limited)
- ☀ MEGS-A (and SAM) were switched off
- ☀ Power cycles next day in case it was an SEU:  
no change
- ☀ We are almost certain this is a failed capacitor

# MEGS-A ANOMALY 2

- ☀️ Tried power cycling MEGS-A 100 times
  - ☀️ This might 'split' the cap and clear the short
  - ☀️ Did not work
- ☀️ Working on other possible solutions, but outlook is not good
- ☀️ If ANYBODY has any suggestions please let us know





# ANDREW'S THOUGHTS ON EUV BEST PRACTICES

# MATERIALS

- ☀ No silicones
- ☀ No adhesives in the optical cavity
- ☀ Lubricants: be very careful what and where
- ☀ “Bakeable” materials and coatings
- ☀ What does solar EUV degrade to generate contaminants on-orbit we don't see on the ground?

# DESIGN

## ☀ DOOR!!!

- ☀ Do not open until the worst of the S/C outgassing is over
- ☀ We keep detectors and optics warm during this time too
- ☀ Multiple filters for degradation and inter-comparison
- ☀ Cold finger — is this how SWAP is immune?
- ☀ Cap filters against oxidization
  - ☀ Is this an issue on-orbit too?
- ☀ On-orbit cleaning?
- ☀ Non-stick filters?

# HANDLING AND PRODUCTION

- ☀ Bake and RGA/TQCM
  - ☀ parts/ vacuum chambers etc.
- ☀ Test and calibration time
  - ☀ Make sure optics and detectors are NEVER condensation points, in testing or flight
- ☀ Purge system to T0 (make sure purge is clean)
- ☀ Witness system (for instrument and purge)
  - ☀ Difficult optically, X-ray Photon Spectroscopy (XPS) or spectroscopic ellipsometry?

# UNDERSTAND ON-ORBIT DEGRADATION

- ☀ Where do the contaminants come from ?
  - ☀ Instrument
  - ☀ S/C
    - ☀ S/C cleanliness and materials
    - ☀ Propellants
    - ☀ What are the paths to the instrument
- ☀ What are the processes
  - ☀ Photon/electron induced cracking
  - ☀ Oxidation

# NON-CONTAMINANT DEGRADATION

- ☀ Radiation
- ☀ Detectors
- ☀ Multi-layers
- ☀ Electronics
- ☀ Charge depletion (PMTs, MCPs...)