

Solar Spectral Irradiance: Lyman Alpha, Magnesium II, and Sigma k proxiEs (SSIAMESE)

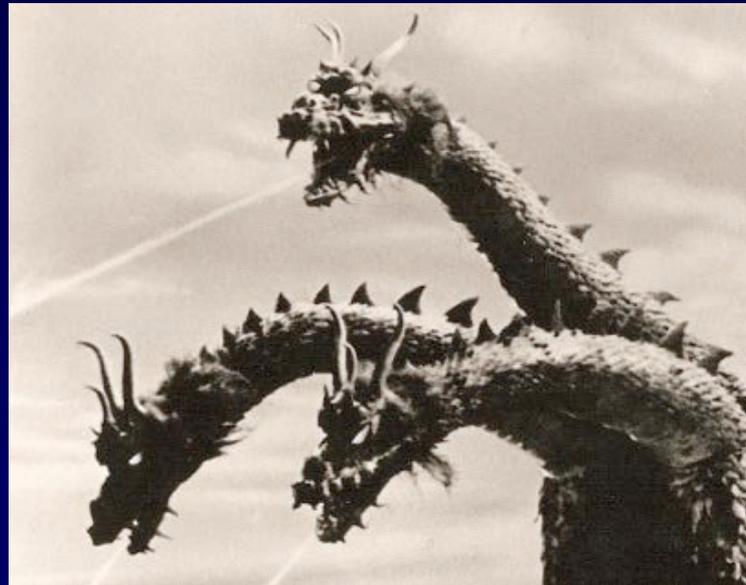
Martin Snow & Tom Woods (CU/LASP)

Janet Machol (CU/NOAA/NCEI)

Gary Chapman, Debi Choudhary, & Angie
Cookson (CSUN/SFO)

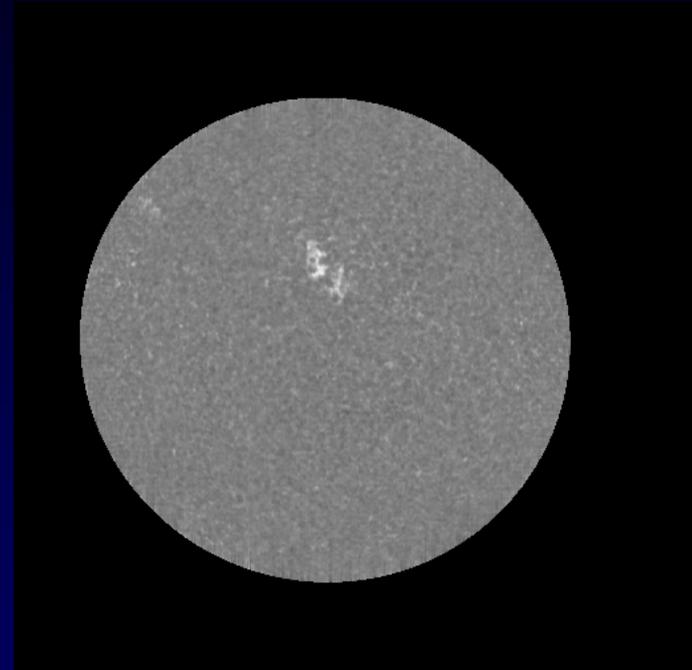
SSIAMESE Objectives

- Improve the SFO proxies
- Improve the Lyman alpha composite
- Improve the Magnesium II composite



San Fernando Observatory

- Several solar telescopes with a continuous synoptic observing campaign stretching back to the mid 1980's.
- Calcium II images, used to create sunspot darkening and facular excess proxies using contrast thresholds.



2017-04-14 at 19:24:08 U.T.

CFDT1 Ca II K-line (393.4 nm)



SFO Proxies

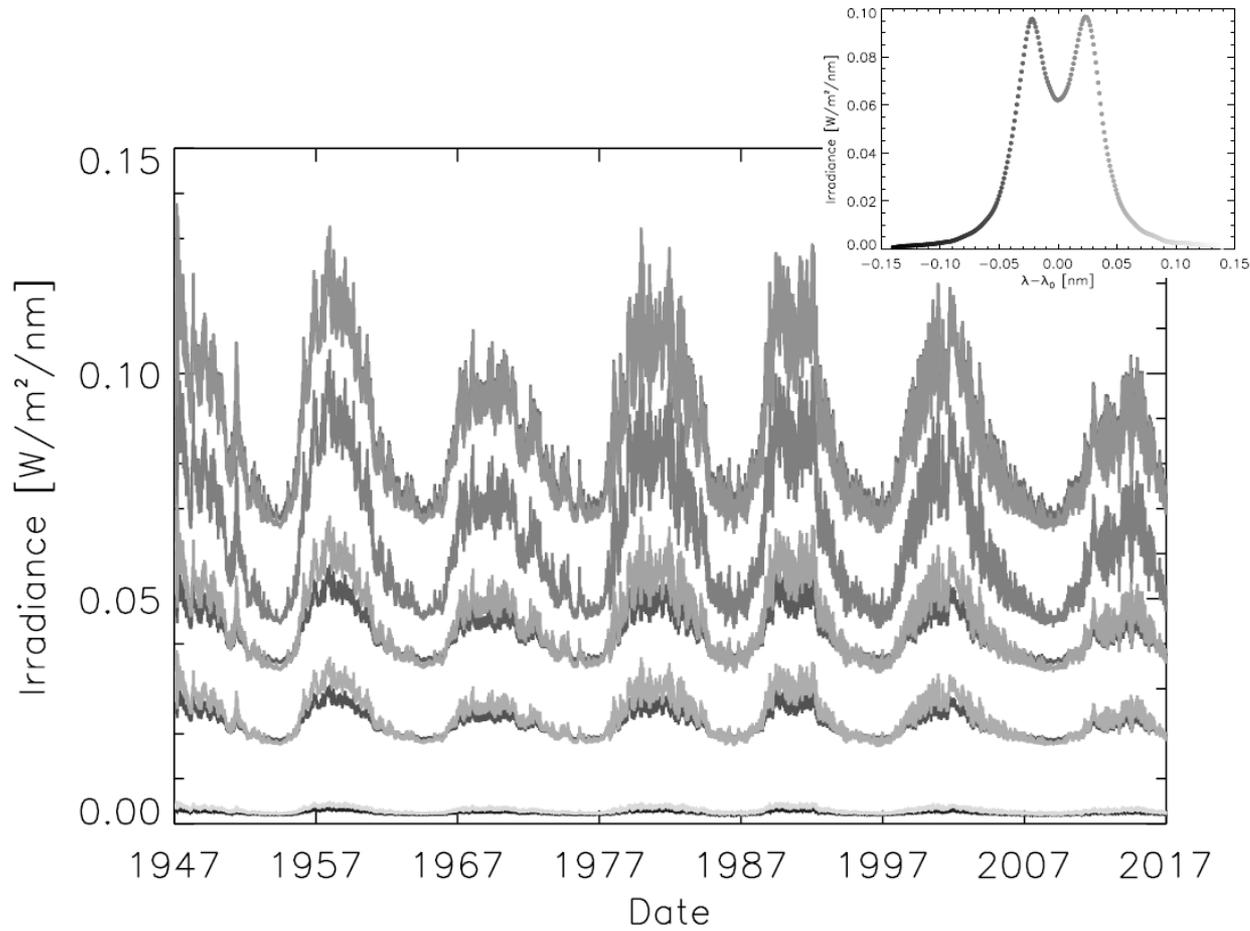


- Telescope move to campus is complete.
 - CFDT1 and CFDT2 are operational.
 - CFDT3 is under construction
- Work on preparing the indices for distribution through LISIRD has been largely put on hold during the move.
- Progress will resume this fall.

Lyman alpha

- Work on updating Lyman alpha composite has been delayed due to launch of GOES-16 (Janet).
 - GOES-16 will become primary data source for Lyman alpha composite later this year!
- Work on line profile models continue
 - Kretzschmar et al. (in preparation)
 - New SUMER observations acquired in April

SUMER Empirical Model



Magnesium II

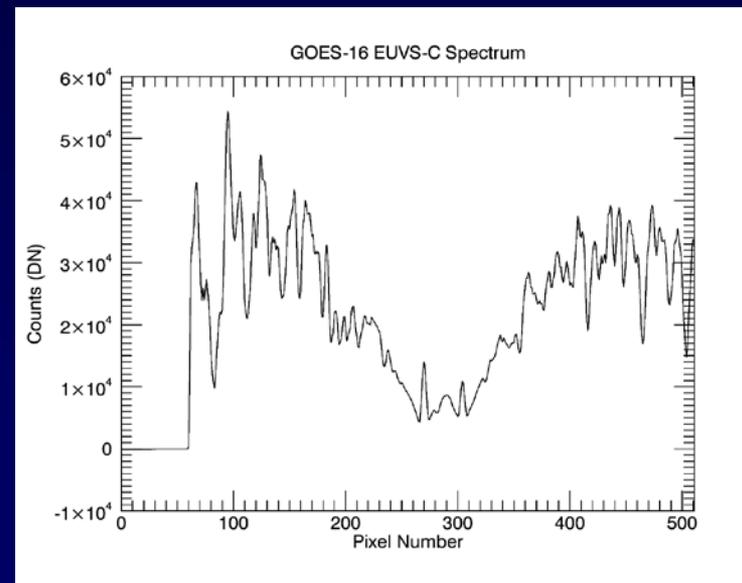
- GOES-16 EUVS-C
- Revision of SOLSTICE algorithm
- Revised scaling
- Intercomparisons



GOES-16 EUVS-C

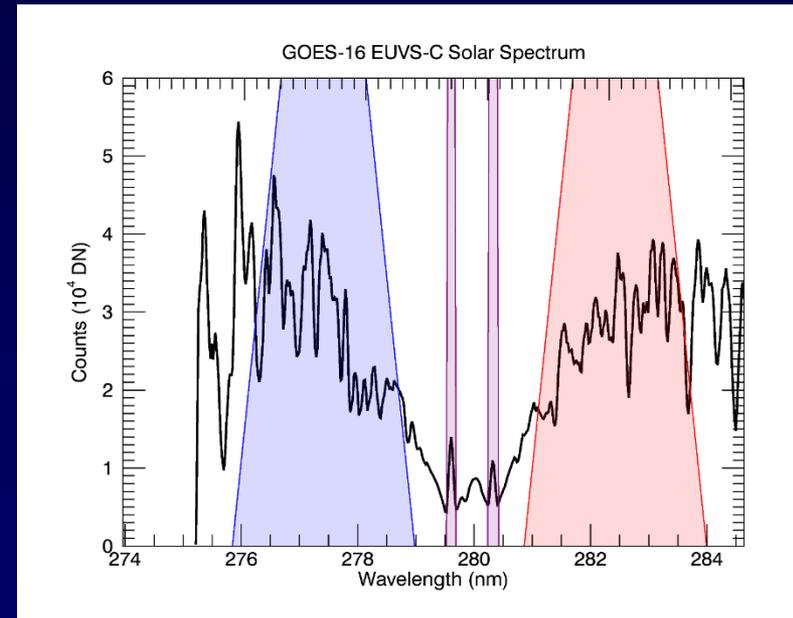


- First light: January 20, 2017
- Spectral resolution: 0.1nm
- 512-element diode array
- 3 second cadence
- Geostationary (24/7)
- SNR > 3000

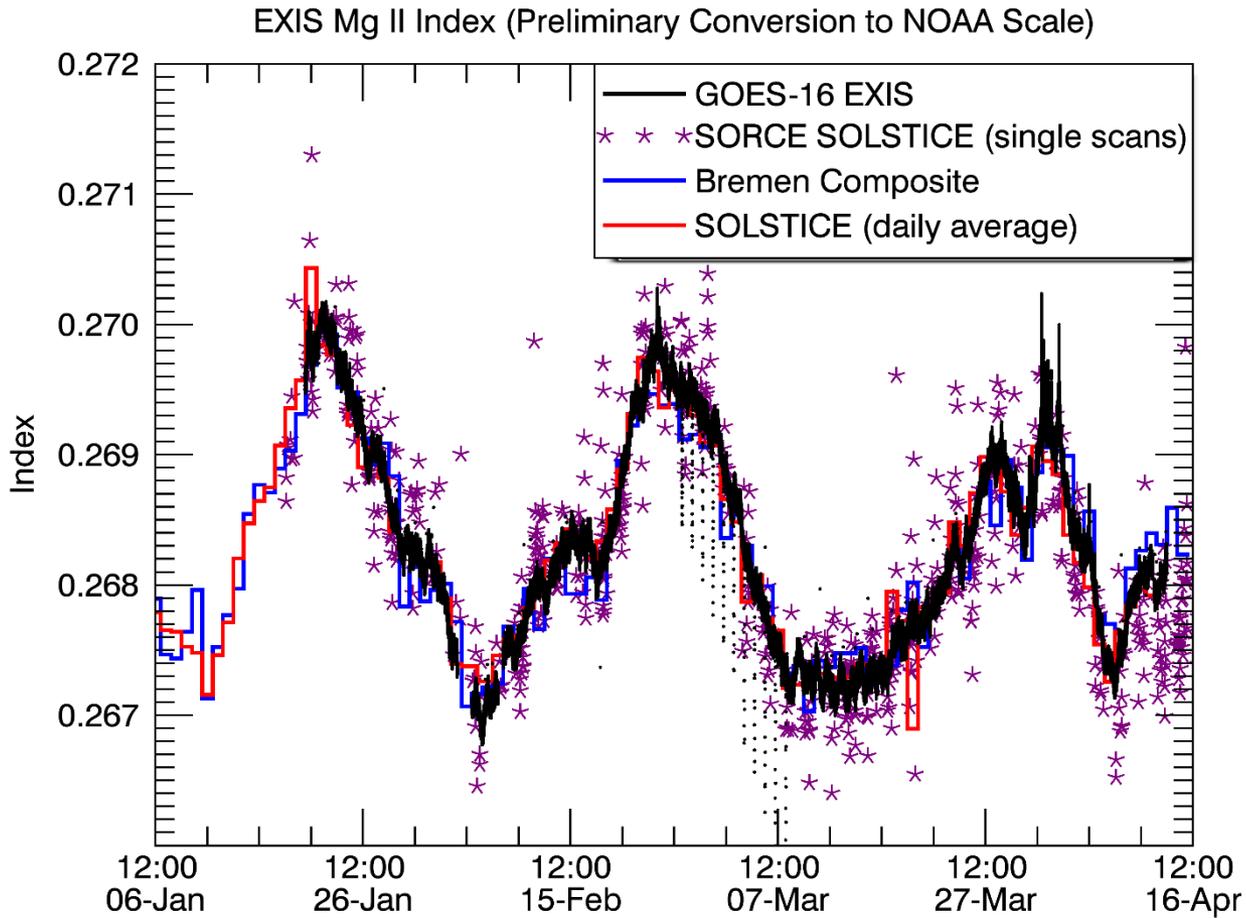


EUVS-C Algorithm

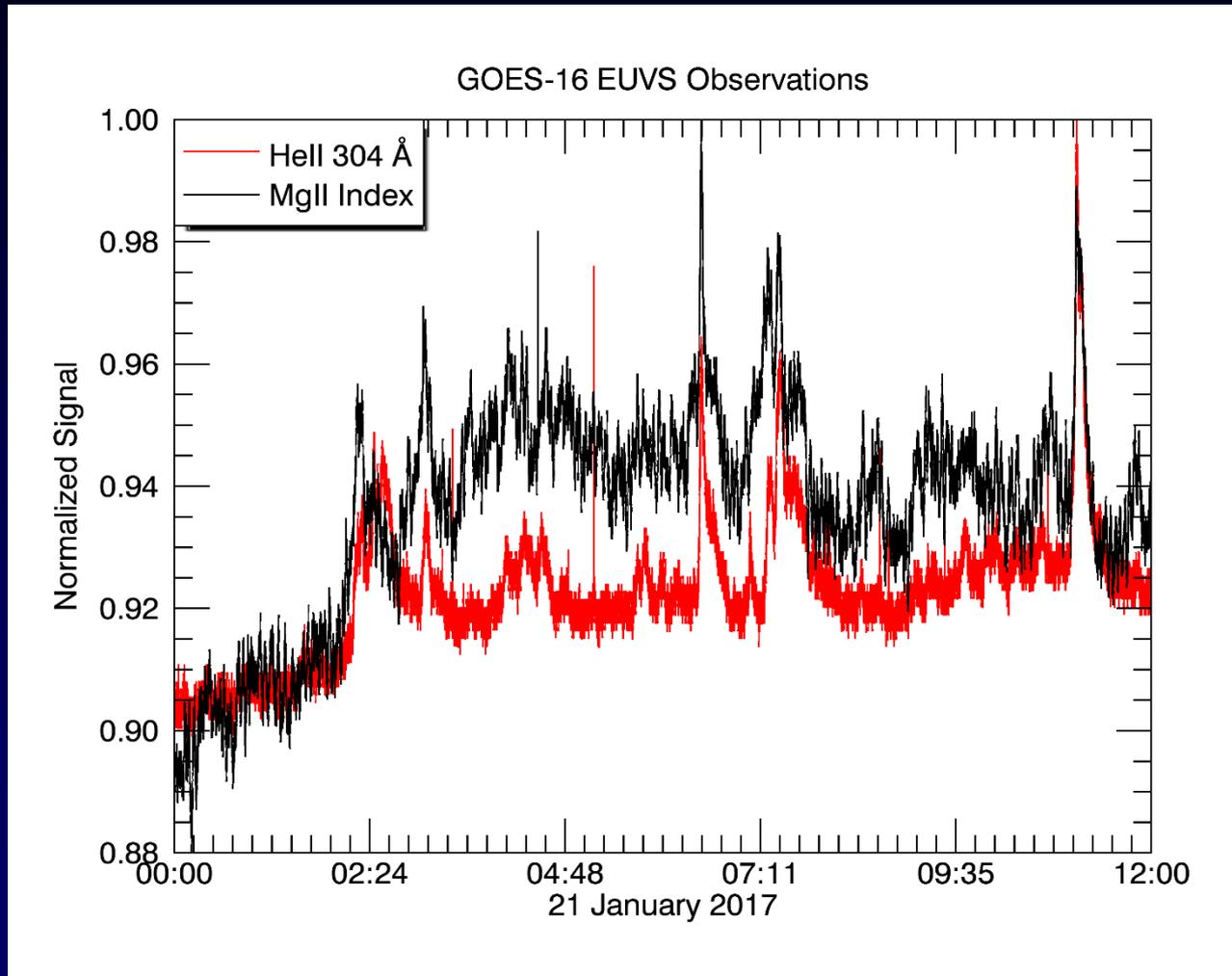
- Weighted sums produce "core" and "wing" values
- Masked pixels provide real-time background



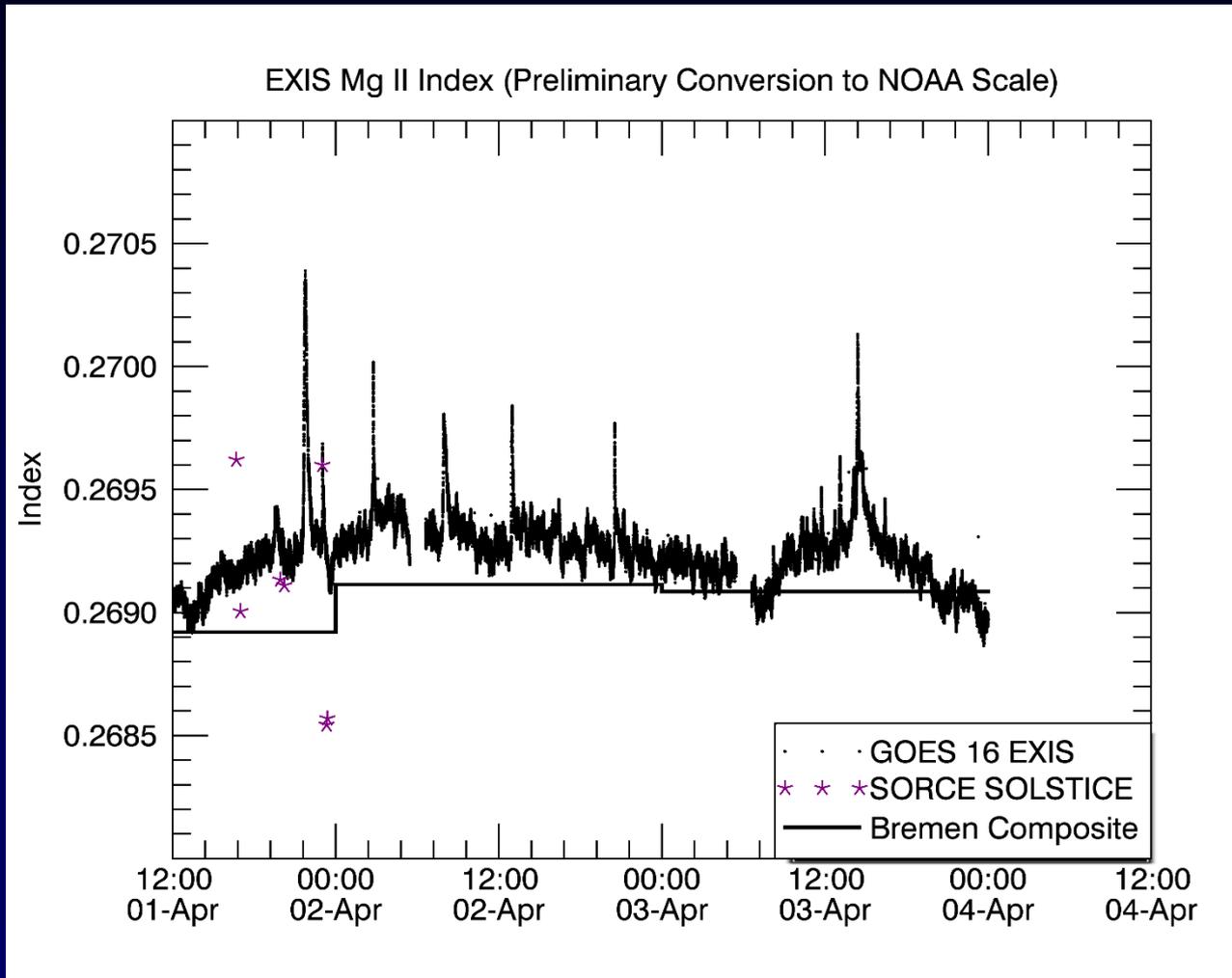
GOES-16 Time Series



Comparison to He II



M-class flares in April



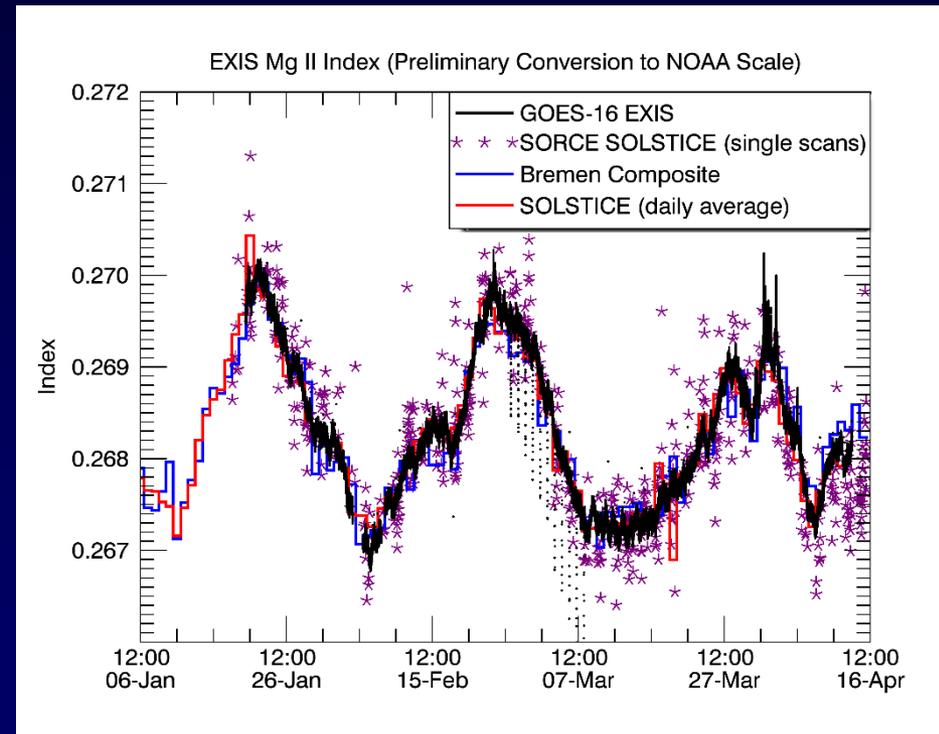


Lessons from GOES-16

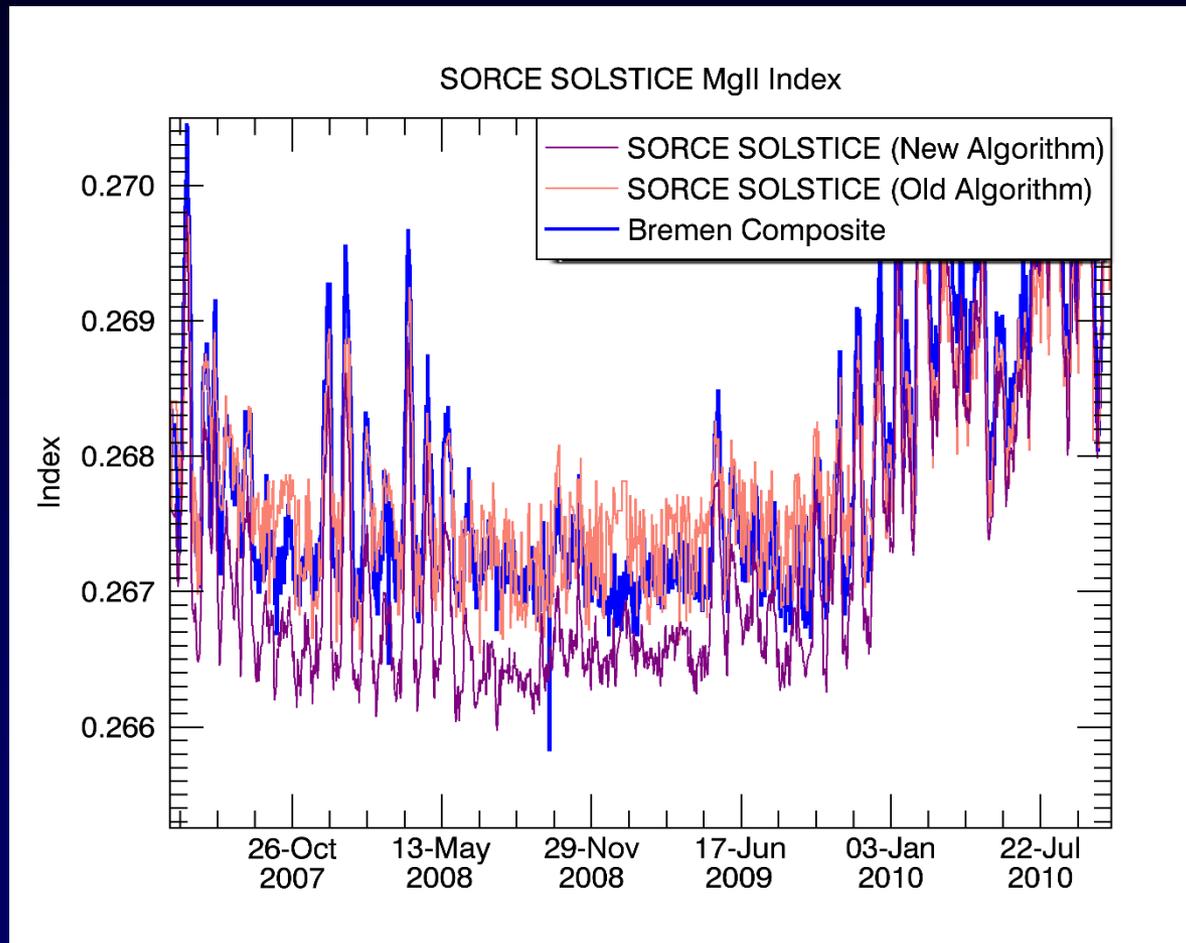
- Original plan was to use Gaussian fits to cores as was done for SOLSTICE.
- Performance was poor:
 - Fits don't always converge.
 - Operational code had trouble keeping up.
- Revised algorithm to use weighted sum (i.e. mean) for cores as well as wings.

Apply Lessons to SOLSTICE

- Variance of SOLSTICE measurements during the day larger than EXIS
- 0.1% unc/scan
- New method:
 - Combine 24 hours
 - Interpolate
 - Use EXIS masks



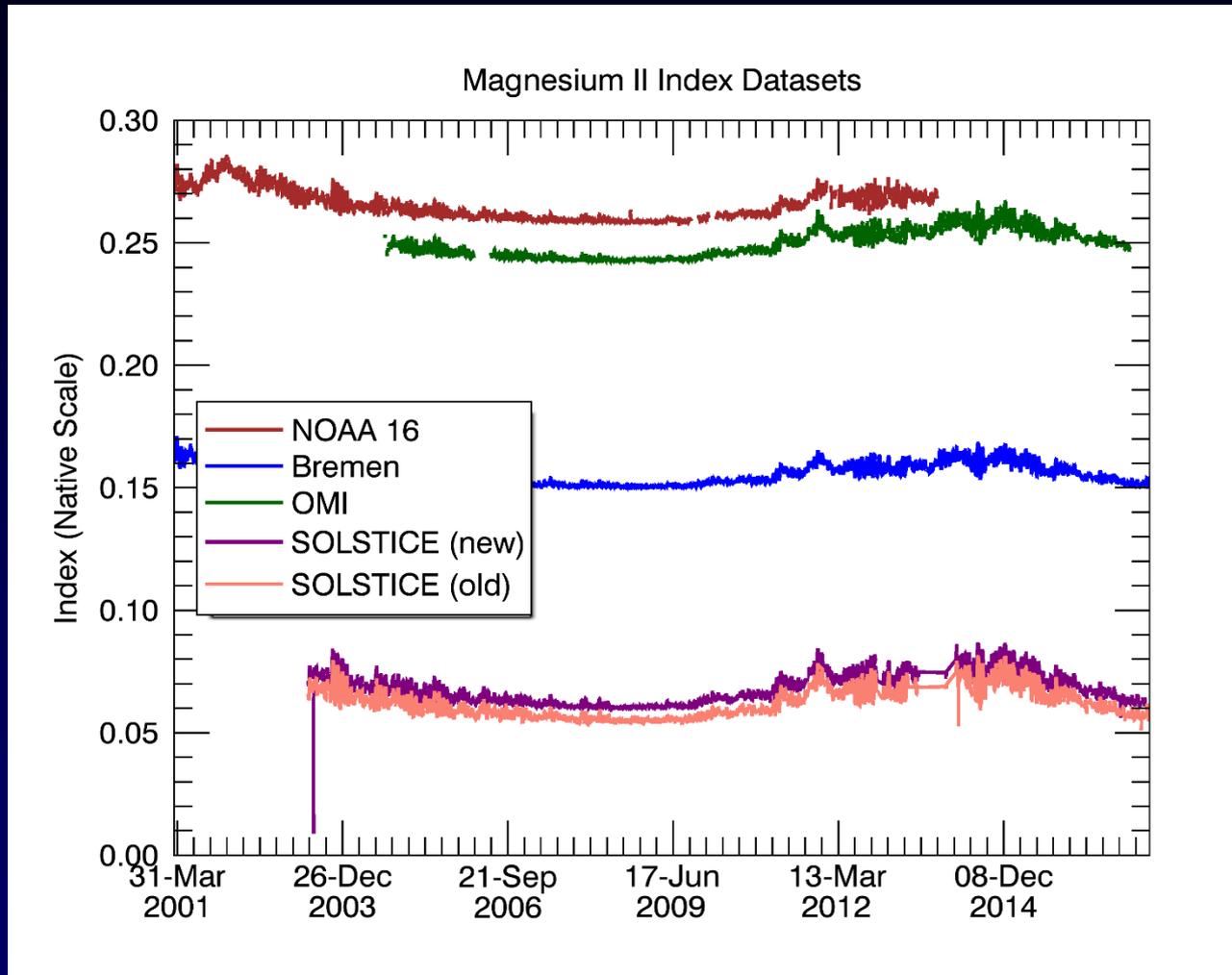
New algorithm at solar min



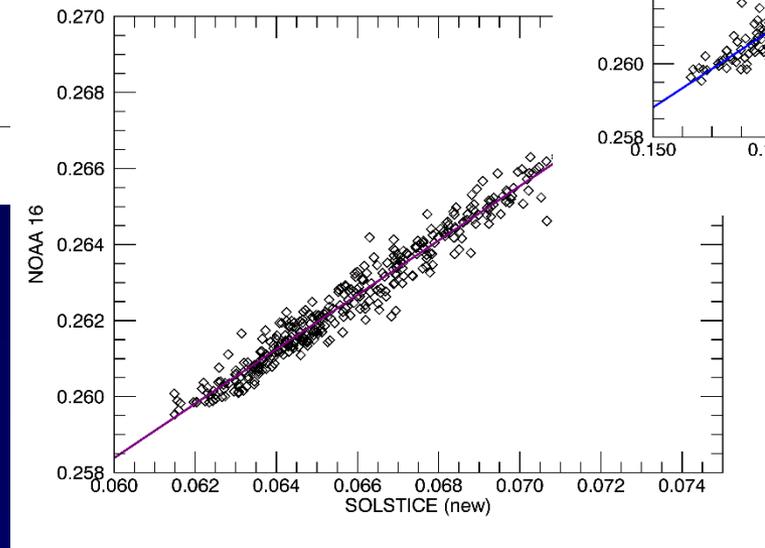
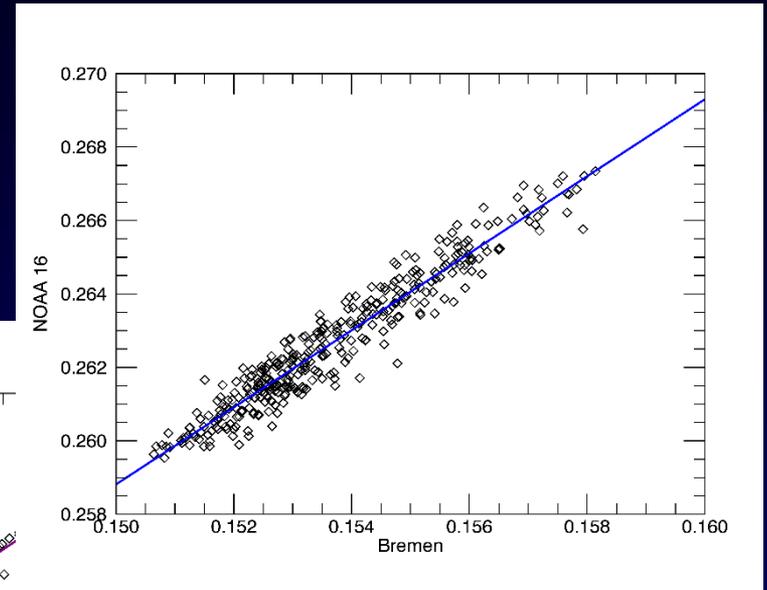
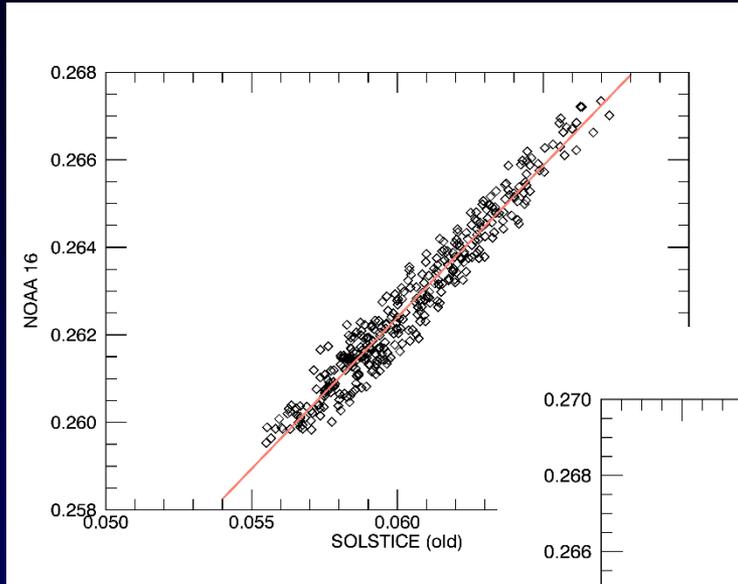
Comparisons....

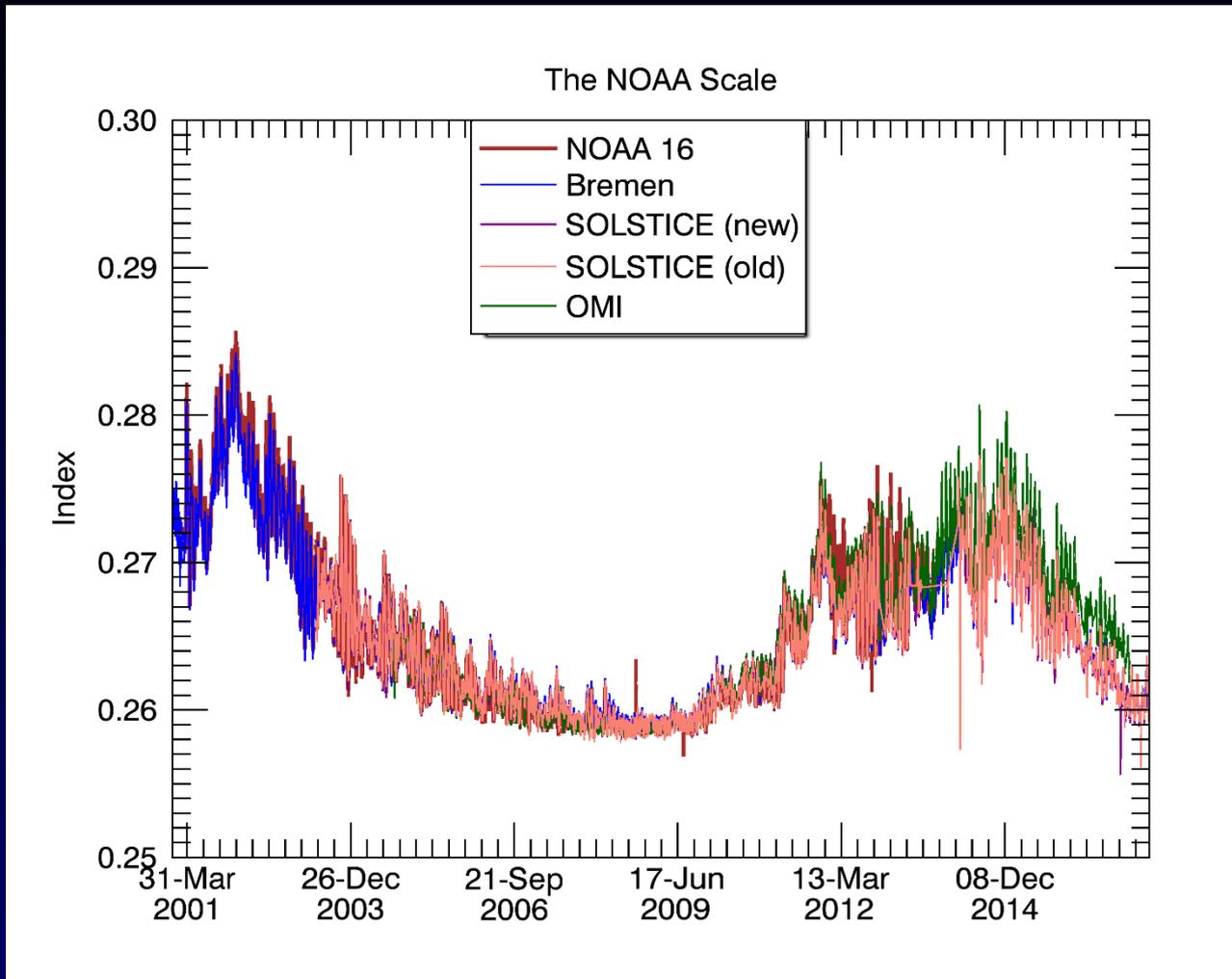


Native Scales

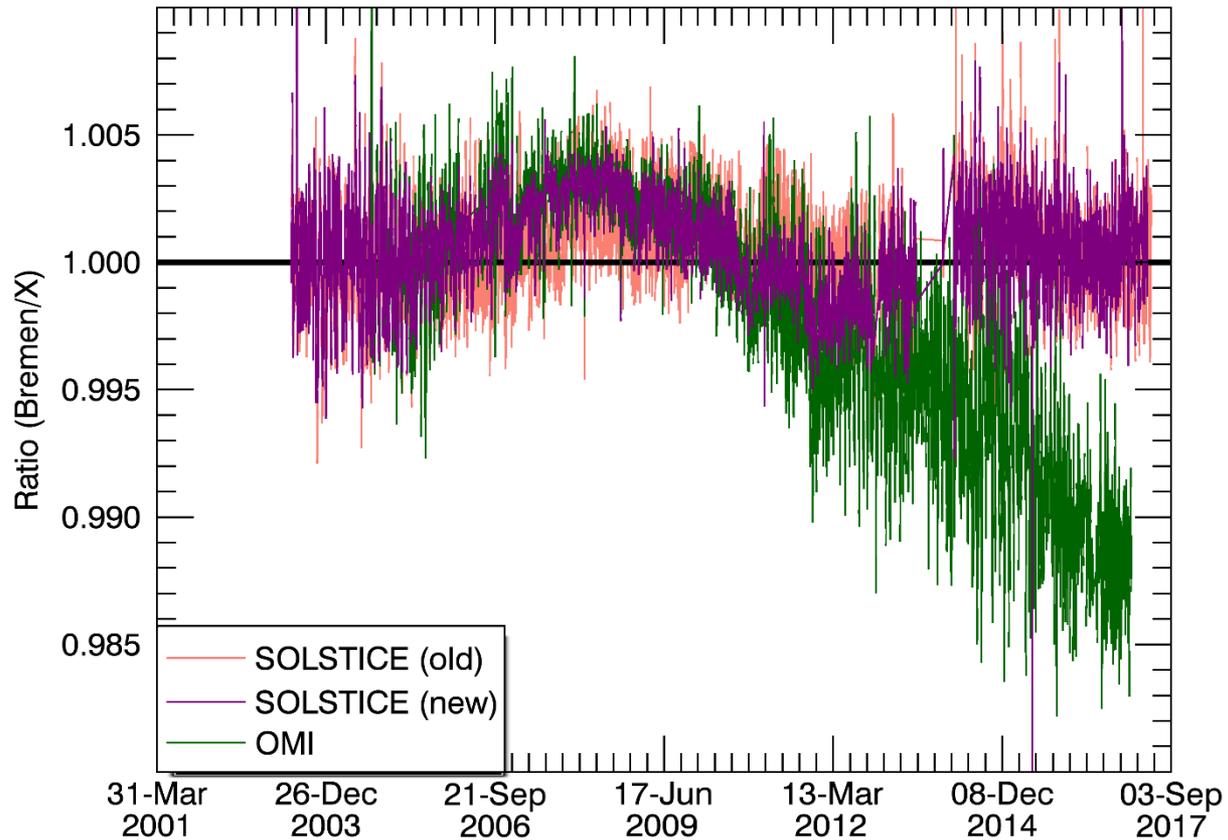


Scale all to N16 in 2005





Comparison to Bremen Composite





Magnesium Mafia

- Data providers should to agree upon a common scaling, i.e. the "NOAA Scale"
 - Snow et al. (Colorado) EXIS, SOLSTICE
 - Weber (Bremen) GOME, SCIAMACHY
 - Deland (SSAI) OMI, SBUV
 - Tobiska (SET)
 - Viereck (NOAA/SWPC)
 - Morrill, Floyd, several cats, Spiny Norman



SSIAMESE Summary

- SFO Indices work should resume this fall.
- Lyman alpha composite analysis is ongoing with three papers in preparation
- Magnesium II:
 - New Measurements
 - New Algorithms
 - New Comparisons

