Solar Spectral Irradiance: lyman Alpha, Magnesium II, and Sigma k proxies (SSIAMESE).

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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.

**CFDT1 Ca II K-line (393.4 nm)**

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

EXIS Mg II Index (Preliminary Conversion to NOAA Scale)

- GOES-16 EXIS
- SORCE SOLSTICE (single scans)
- Bremen Composite
- SOLSTICE (daily average)

Index

06-Jan 26-Jan 15-Feb 07-Mar 27-Mar 16-Apr

11-12 May 2017 SIST Annual Meeting
Comparison to He II

GOES-16 EUVS Observations

- Hell 304 Å
- MgII Index

Normalized Signal

21 January 2017
M-class flares in April

EXIS Mg II Index (Preliminary Conversion to NOAA Scale)

- • GOES 16 EXIS
- • SORCE SOLSTICE

Bremen Composite
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

Magmasium II Index Datasets

- **NOAA 16**
- **Bremen**
- **OMI**
- **SOLSTICE (new)**
- **SOLSTICE (old)**

Index (Native Scale)

<table>
<thead>
<tr>
<th>Date</th>
<th>Value</th>
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<tbody>
<tr>
<td>31-Mar 2001</td>
<td>0.30</td>
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<td>26-Dec 2003</td>
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Scale all to N16 in 2005
Magnesium Mafia

- Data providers should 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