SORCE SIM Version 23 and SIM and OMI Comparisons

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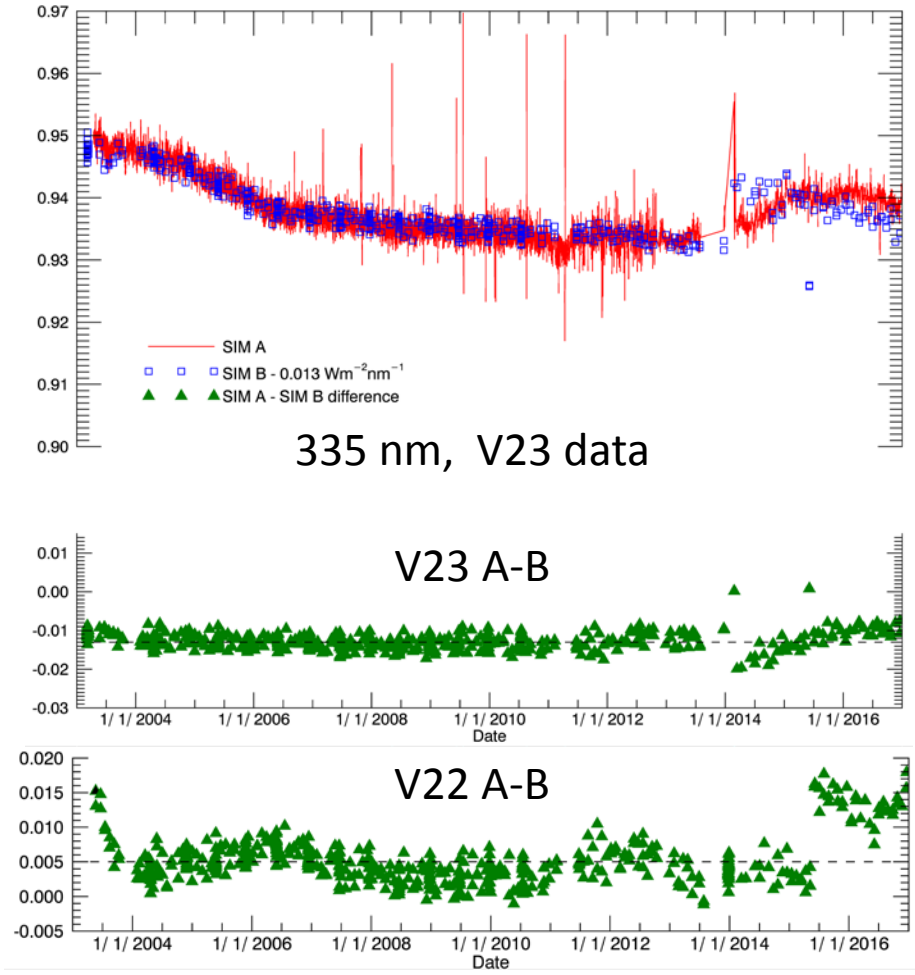
SORCE

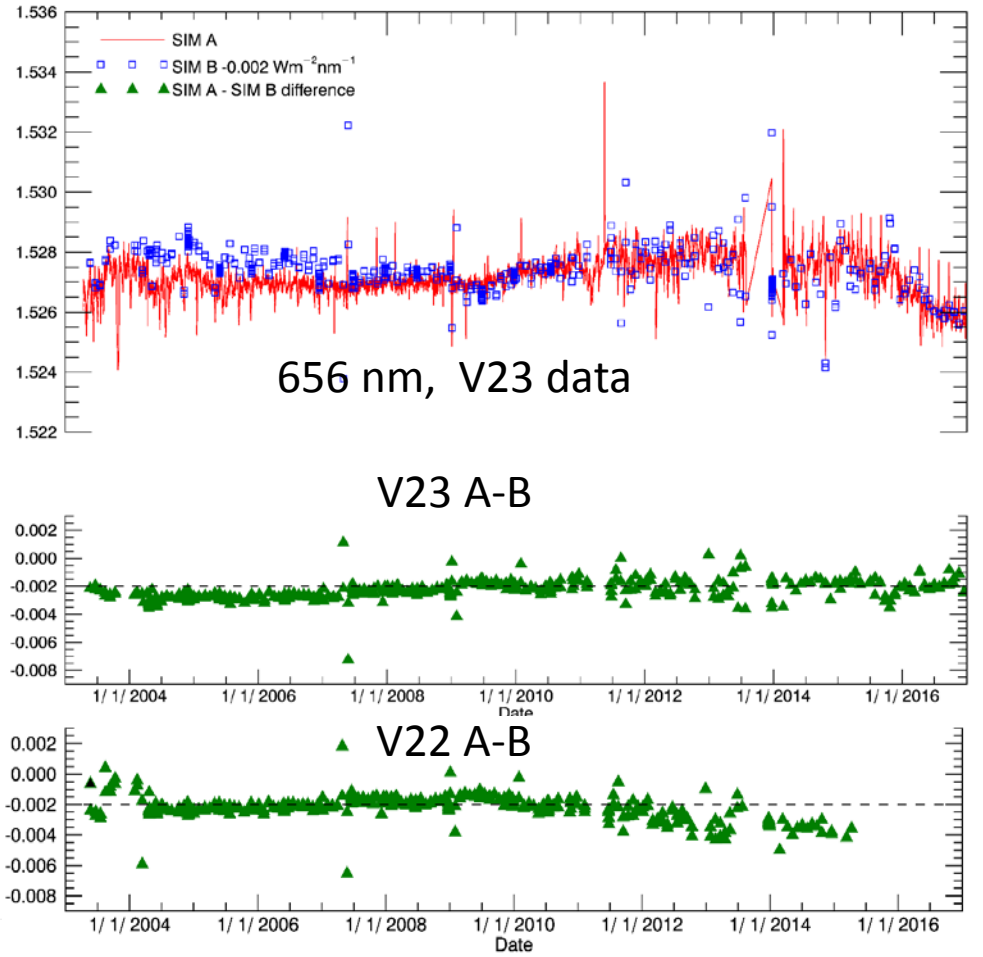
SIM Version 23 released this week

- The SIM A-B difference trends are improved in V23 primarily in the first year of the mission (2003) and in the DO-Op mode (2014-present).
- The SIM A-B differences are shown for Version 22 and 23.

SIM A SIM B

SIM A – SIM B





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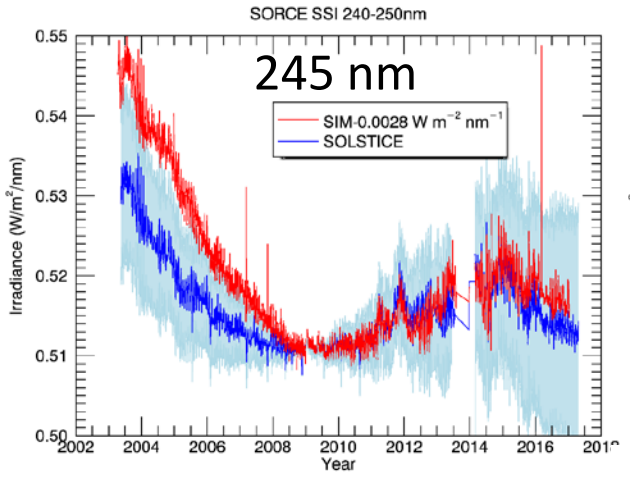
SIM-SOLSTICE Overlap

- SORCE SOLSTICE version 15 and SIM versions 22-23 data have improved corrections and consequently have improved comparisons.

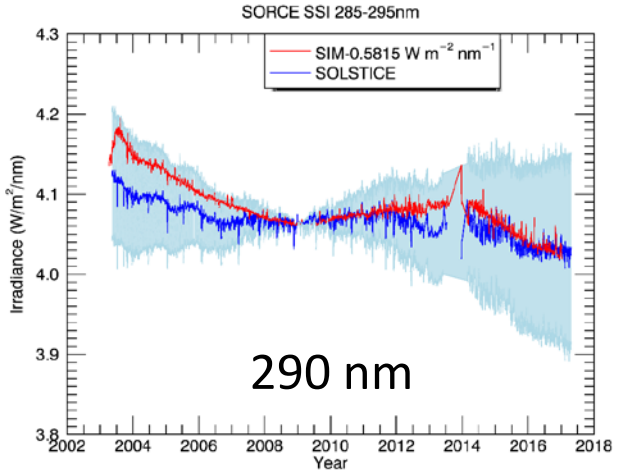
SOLSTICE and SIM overlap in the 240-305 nm range. SIM has small offset to normalize to SOLSTICE at solar cycle minimum in 2009.

Their trends agree very well between 2008 and 2017 and are within their stability uncertainty of ±2.5% (0.35%/year over 7 years) for 2003 to 2008.

There are on-going studies to better understand the early SORCE mission years.



260 nm



280 nm

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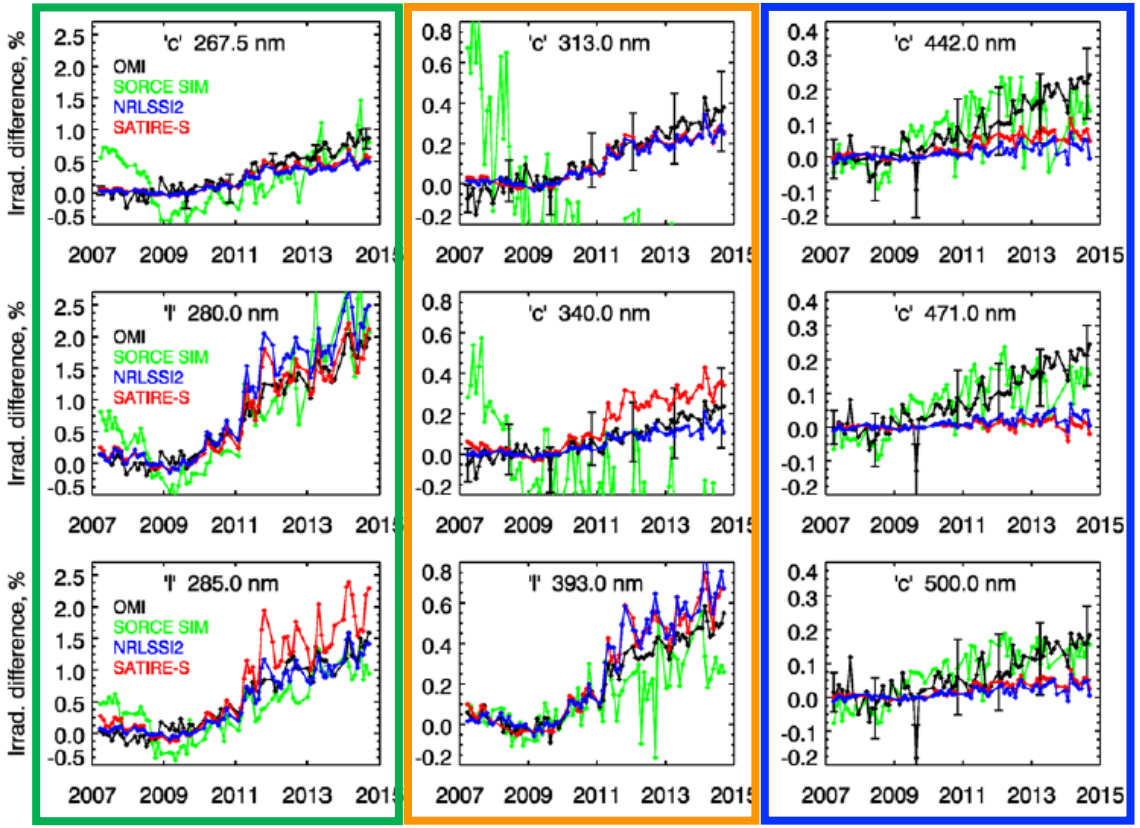
SIM and OMI Comparison

Measurements and models currently agree at some wavelengths and disagree at others.

Figure 2 from Marchenko *et al*. (*JSWSC*, 2016) is good example for such comparisons.

- SORCE, OMI, and model trends agree over 2009-2015 for 267.5 nm, 280 nm, and 285 nm.
- OMI and model trends agree but these disagree with SORCE for 313 nm, 340 nm, and 390 nm.
- SORCE and OMI trends agree but these disagree with models for 442 nm, 471 nm, and 500 nm.



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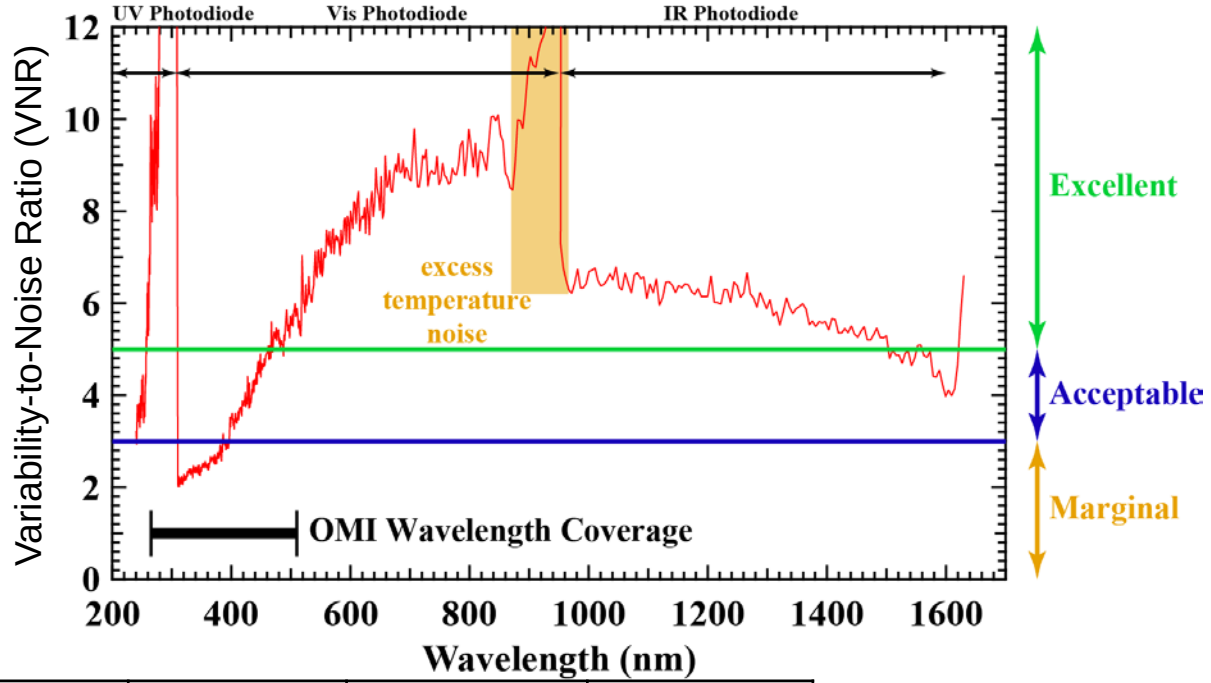
SORCE SSI Quality for TSIS-1 Overlap

- SORCE SIM data quality for the TSIS-1 overlap is acceptable at most wavelengths, but there are limitations at some wavelengths.
  - Each of the ~1800 wavelengths in the SSI have to be considered as independent data sets that need comparisons / validation with multiple data sets at the same wavelength.

One indication of SSI data quality is the ratio of the solar variability to the measurement noise, called the variability-to-noise ratio (VNR). The variability used for this ratio is the median of the monthly peak-to-peak solar variability over the SORCE mission. Quality categories for the SSI comparisons are as follows:

- VNR > 5: Excellent for comparison
- 3 < VNR < 5: Acceptable for comparison
- VNR < 3: Marginal for comparison



Category	Excellent	Acceptable	Marginal
Number Wavelengths	601	294	268
Percent of Total Wavelengths	52%	25%	23%

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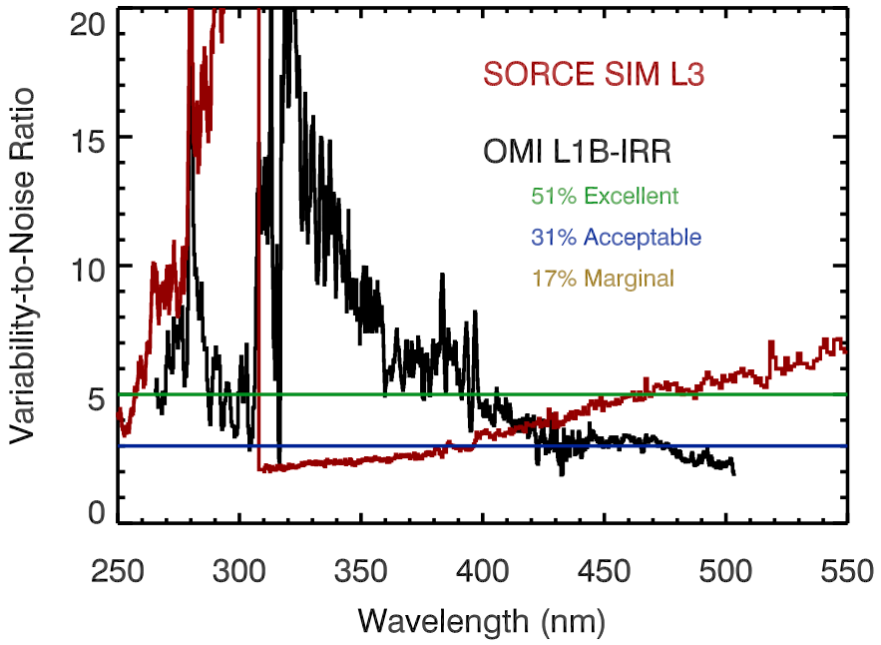
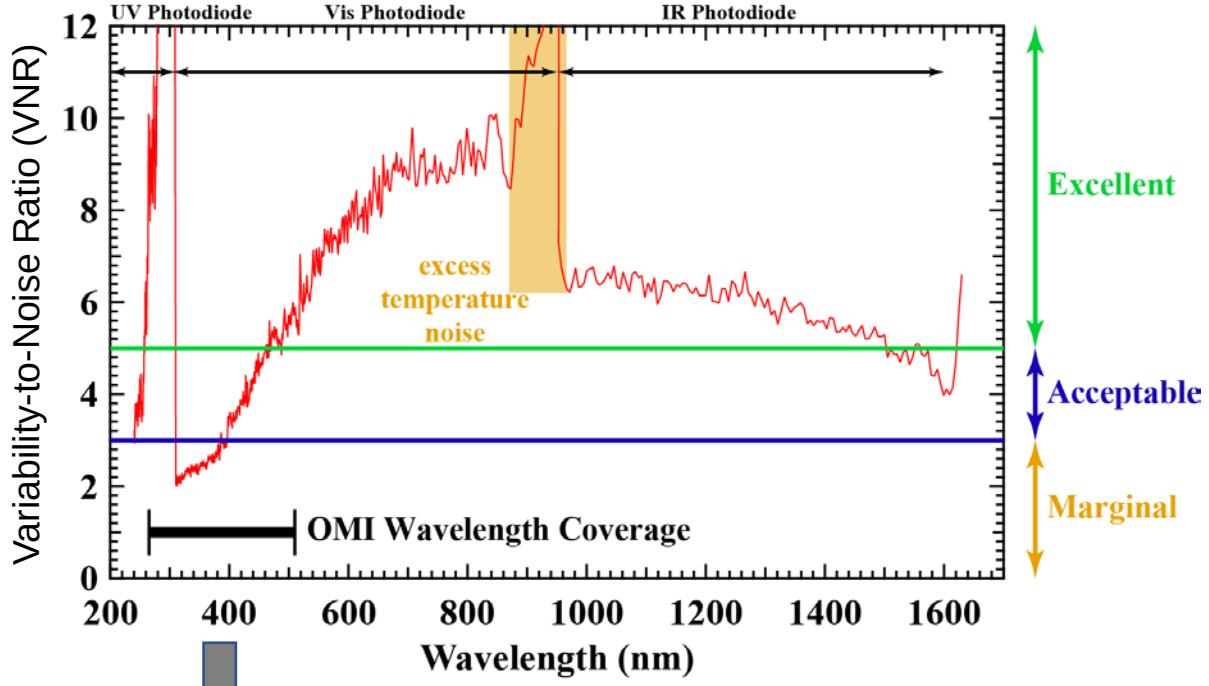
Comparison of SORCE SIM and OMI Quality

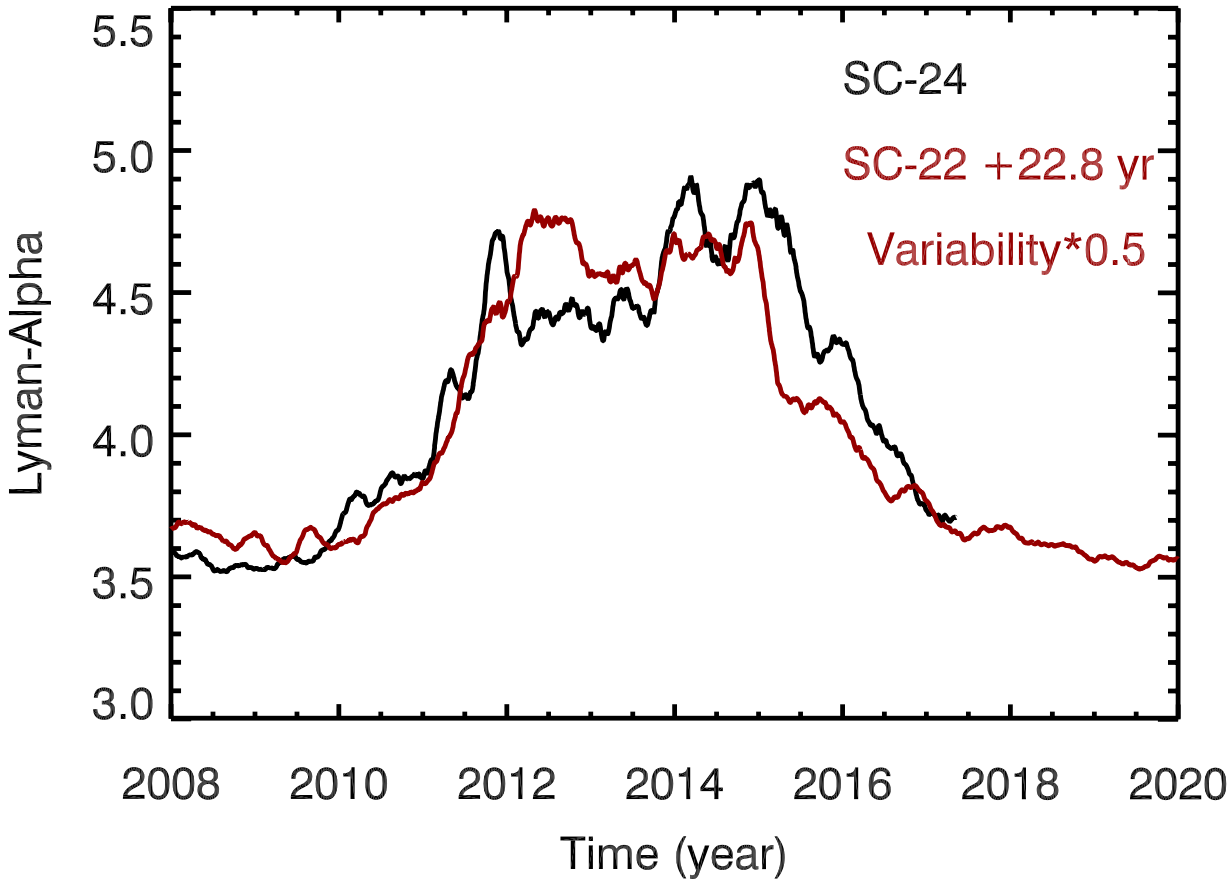
- OMI solar irradiance measurements provide additional validation in the 260-504 nm range.
- **SORCE Variability to Noise Ratio (VNR) values are better than OMI for λ < 305 nm and for λ > 420 nm. OMI VNR values are higher for 305-420 nm range.**





2017 has had 28 spot-free days (SSN=0)

- Solar Cycle minimum is expected in 2019-2020.



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