SORCE SIM Release Notes for Version 23, Level 3 data product

SIM data Version 23 appears in two locations, at the LISIRD website (see: http://lasp.colorado.edu/lisird/sorce/) and on the SORCE website (see: http://lasp.colorado.edu/home/sorce/data/). An IDL reader for the ASCII formatted data present on the SORCE web site is available at:
http://lasp.colorado.edu/home/sorce/data/lasp.colorado.edu/sorce/file_readers/read_lasp_ascii_file.pro

Table 1 below gives a description of available time and wavelength ranges at the SORCE and LISIRD web sites.

Time Range	Wavelength Range (nm)		
	240-1600	300-1600	1600-2400
2003/04/14-present	SORCE	LISIRD	SORCE/LISIRD See Figure 1 for data gaps

The largest gaps in the spectral record shown in Table 1 and Figure 1 occur in the infrared portion of the spectrum where spacecraft operations limit the available time to acquire the infrared portion of the spectrum. For the majority of the mission (2004/04/14-2011/05/09) when the instruments were operational full time, the data extends to 2400 nm, but during the time period where the instrument is power cycled every orbit (2011/05/09-2013/07/30) a smaller wavelength range is available in the infrared (1600-2200 nm). Presently in the SORCE Day Only operation mode (DO-op, starting March 12, 2014) a partial infrared data set is acquired. Also note that because of lower thermal stability in the DO-op mode greater scatter and more frequent occurrences of missing data are expected in this mode.

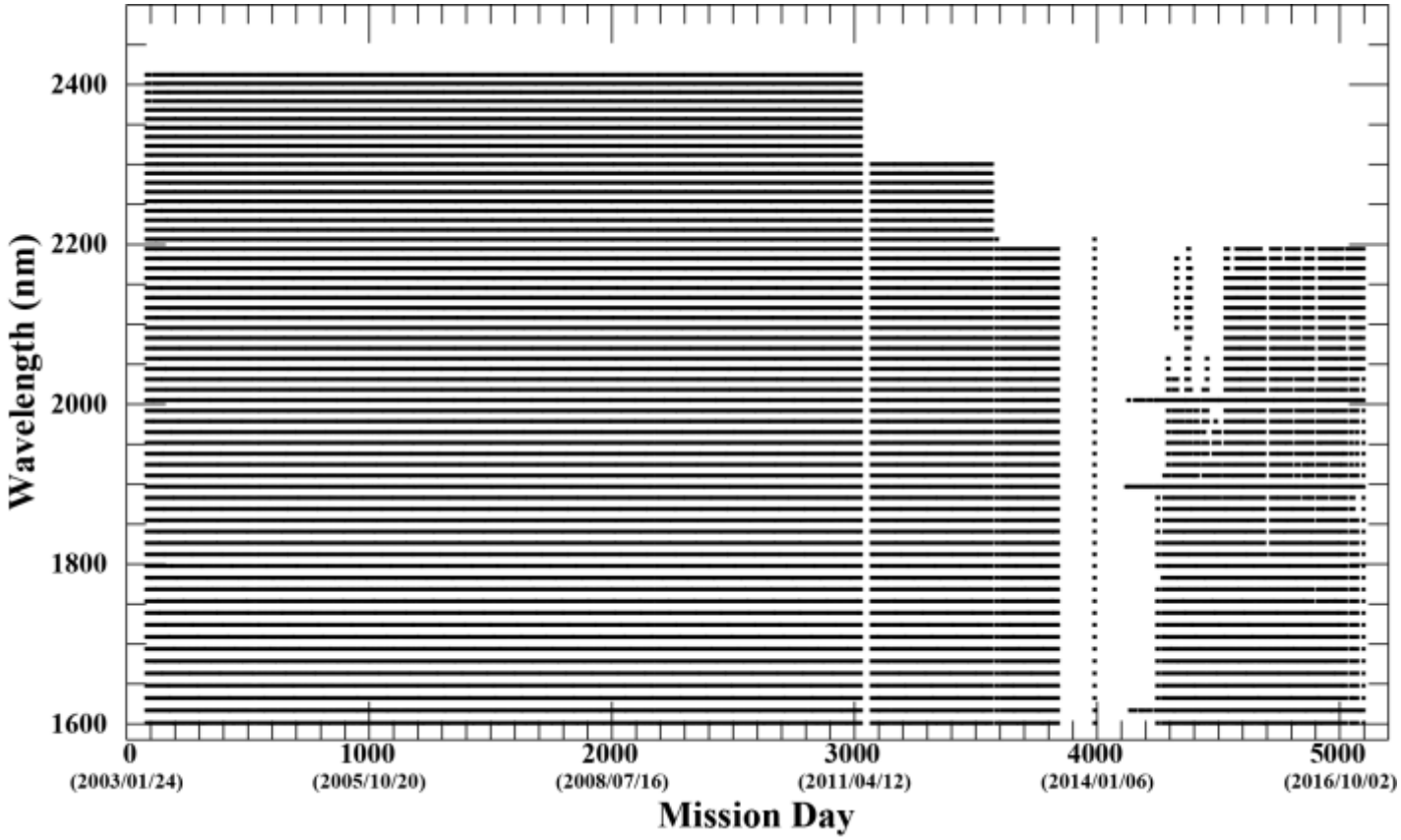

Figure 1 shows the full data acquisition record for the infrared portion of the spectrum (1600-2400 nm).

Version 23 of SORCE SIM employs the same correction methodology as employed in Version 22 SIM but now includes a revision in the exposure time record bringing the exposure record up-to-date rather than extrapolating the exposure and increases the exposure time in before day 180 to account for non-physical trends in the earlier part of the mission.

1. Processing code re-instates the daily calculation of SIM A and SIM B exposure time. This step required additional processing code changes because the SORCE planning page (as employed prior to the Do-op mode) does not necessarily reflect the actual executed experiments.
2. As in Version 22 data, offset corrections are performed at the boundaries where spacecraft safe-hold events introduce offsets in the measured irradiance. Offset corrections are made by selecting time periods before and after the safe-hold events where the passages of solar active regions do not disturb the locally flat time series. The difference in the median irradiance for these two time ranges is added to the time series after the safe-hold event. This problem is exacerbated in the SIM data during the DO-op mode since there is an ambiguity in closing the 225-day data gap in the extension of this record.
3. In addition, several code improvements were made which results in 2-4 additional days of processed data per thirty days during DO-op.

Users of SIM Version 23 should consult the Version 22 and 21 version notes found at
http://lasp.colorado.edu/home/sorce/instruments/sim/sorce-sim-data-products-release-notes/
for more information about the data correction methodology.

The successful resumption in the production of daily SIM data is reflected by continued agreement between the SIM A and SIM B channels in a time period spanning the 225-day time period. Examples of this are shown in Figure 2 for two cases at 340 and 515 nm. The high level of coherence between the two SIM channels indicates that degradation methodology used for SIM corrections can be continued into the indefinite future. Overall refinements of the degradation methodology are still required to account for systematic trend errors since the onset of power cycling.

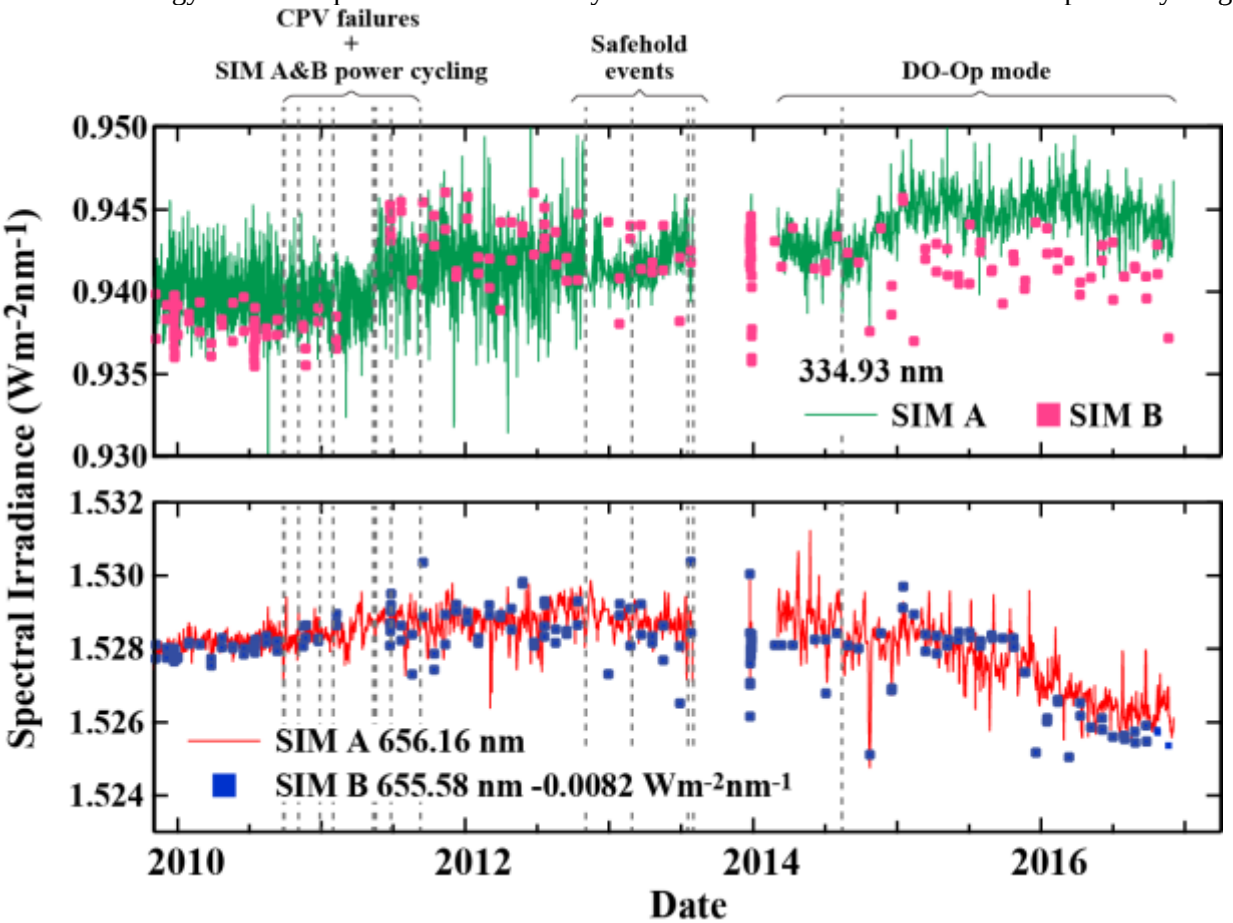

Figure 2. The time series of the SIM A and B solar irradiances for 335 nm and 656 nm leading up to the December 2013 SORCE irradiance campaign and then into the DO-Op mode in 2014 highlight the instrument performance. SIM data in the power-cycling 2011-2013 period have higher uncertainties due to larger temperature changes over each orbit. SIM quality improved slightly in the DO-Op mode due to more consistent instrument operations.

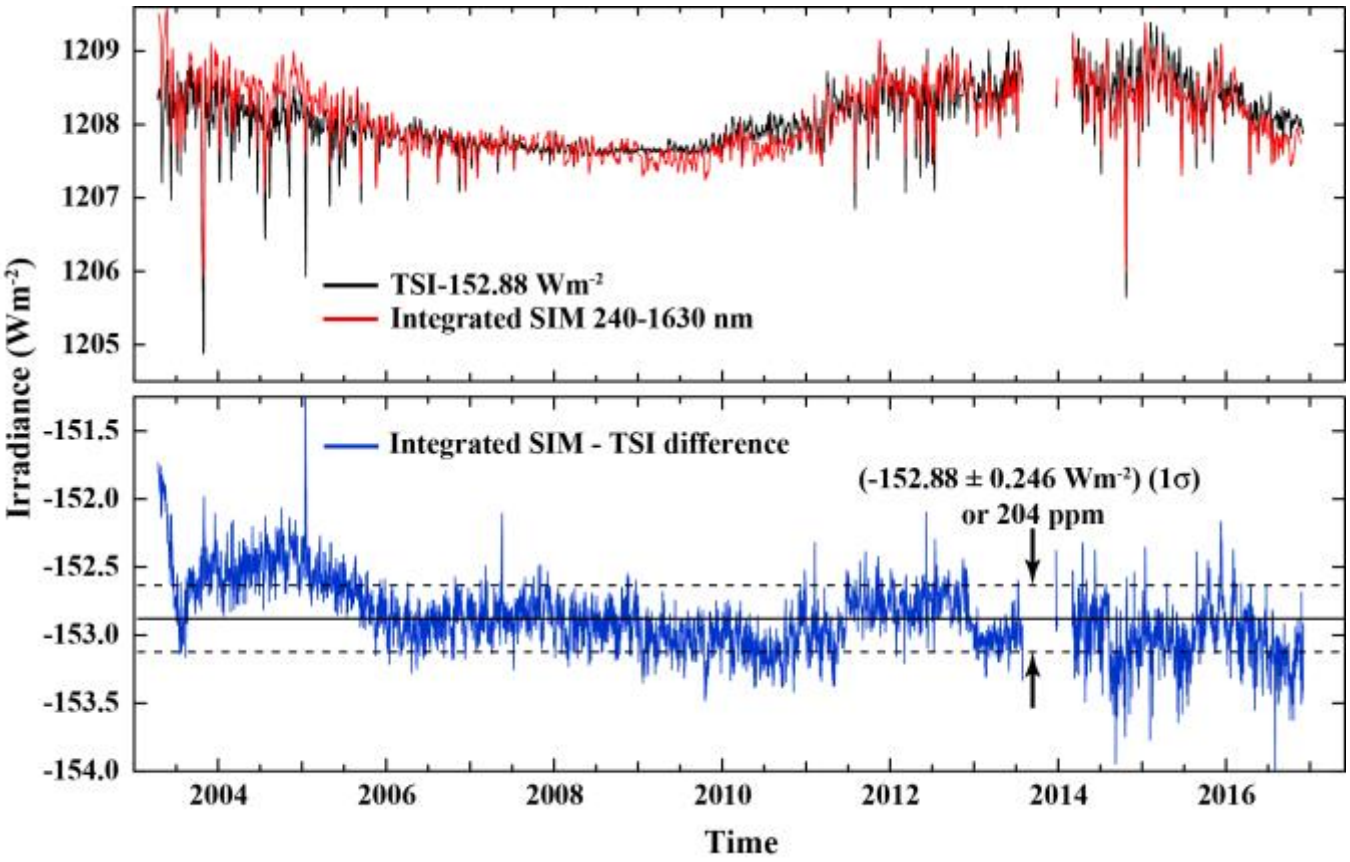

Figure 3. The SIM V23 data integrated from 240 to 1600 nm are consistent with the TSI with an offset of 146.96 W/m^2 to account for the other wavelengths not measured by SIM. The differences of ±0.24 W/m^2 (200 ppm) are comparable to the preflight SIM 100 ppm/year stability goal. The majority of the difference seen between the TIM and the integrated SIM are related to the inability to perfectly correct the irradiance jumps at the safe-hold boundaries.

Version 24 of SIM Processing will include the following activities with emphasis on:

1. Continued analysis of the effective solar exposure for the UV and the VIS photodiodes as the measurements proceed.
2. The ESR data remains significantly noisier after the start of the power cycling due to temperature instabilities. These are attributed to either changes in the electrical characteristics of the ESR or a potential lag in the measured and actual temperatures of the ESR. This same observation is appropriate for the visible photodiode in the 850-950 nm range where some of the structure seen in the data reflect uncorrectable temperature instabilities.