SORCE SIM Release Notes for Version 25, Level 3 data product

SIM data Version 25 (V25) appears in three locations, on the LISIRD website (see: http://lasp.colorado.edu/lisird/sorce/), on the SORCE website (see: http://lasp.colorado.edu/home/sorce/data/) and on the NASA DAAC (see: https://disc.gsfc.nasa.gov/datasets/SOR3SIMD_025/summary/).

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 for each location.

Time Range	Wavelength Range (nm)		
2003/04/14 - present	240 – 2400	300 – 2400	240 – 2400
	SORCE	LISIRD	NASA DAAC

Table 1. Time and wavelength ranges for each location

V25 of SORCE SIM employs the same correction algorithms as V24 with the following changes:

1) The diode temperature correction coefficients have been rederived for all diodes.
2) Two errors were identified and corrected in the processing code that applies the diode temperature corrections. This affects both the calculated irradiances and the CCD (wavelength) shifts for all modes.
3) The CCD shifts were recalculated using an improved 18-day smoothing method throughout the entire mission.
4) The time variability function (F-function) used to calculate the prism degradation models were enhanced in the following ways:
    a. The solar exposure record was being combined with the F-function prior to smoothing during the prism degradation calculation. The solar exposure record is now correctly applied after the F-function smoothing.
    b. The fitting parameters for the F-functions were changed to accommodate the change in smoothing over the whole mission.
5) The daily updates of the calibration database tables for the V24 CCD shifts and prism degradations were not being ingested properly.
6) Fiducial irradiance windows before and after the On-board Computer (OBC) "Jump" corrections (see Figure 1) were selected in the following ways:
    a. Minimize the spacecraft temperature differences before and after the correction. Typically, these temperature differences were < 0.5 °C.
    b. Minimize the irradiance difference measured by SORCE-TIM (typically < 0.1 W/m^2).
7) In previous versions, the UV diode data extended to 306 nm and the VIS diode data began at 310 nm. In V25, the UV-VIS gap from 306-310 nm has been eliminated by increasing the wavelength range of the UV diode after mission day 800 (April 3, 2005). Before April 3, 2005, 306—310 nm was saturated, preventing a reliable measurement of the irradiance (see Figure 2).

SORCE-SIM users should consult the V21--V24 version notes for calibration algorithm details at http://lasp.colorado.edu/home/sorce/instruments/sim/sorce-sim-data-products-release-notes/ .

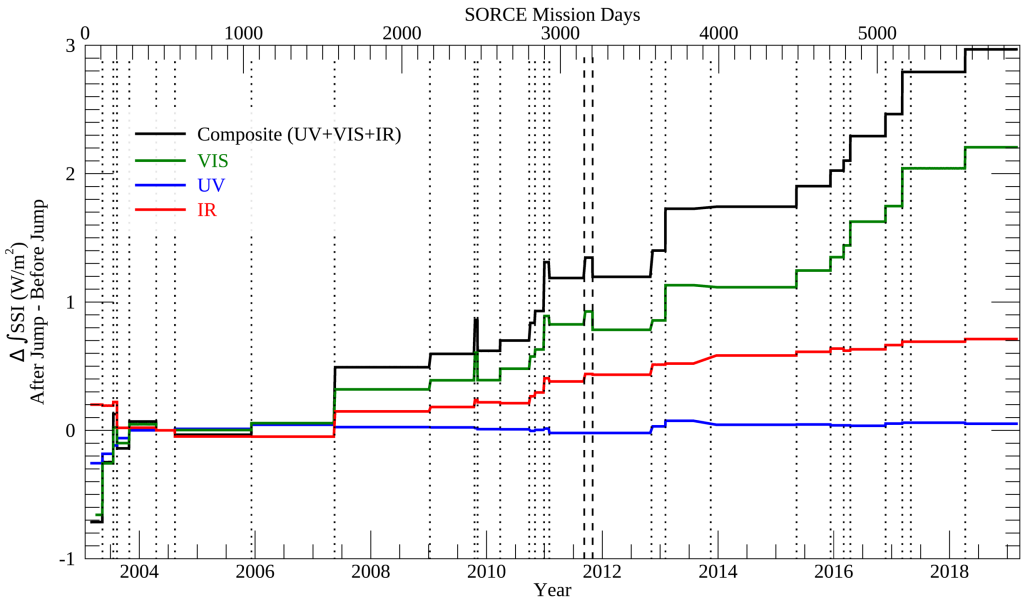

Figure 1: Cumulative "Jump'' corrections for each SIM diode show the corresponding integrated irradiance adjustments as a function of mission day and year. Vertical lines show the timestamp where an individual jump correction is applied. Dotted lines were applied to the UV, VIS and IR channels, while the dashed lines indicate jump corrections only applied to the UV and VIS channels.

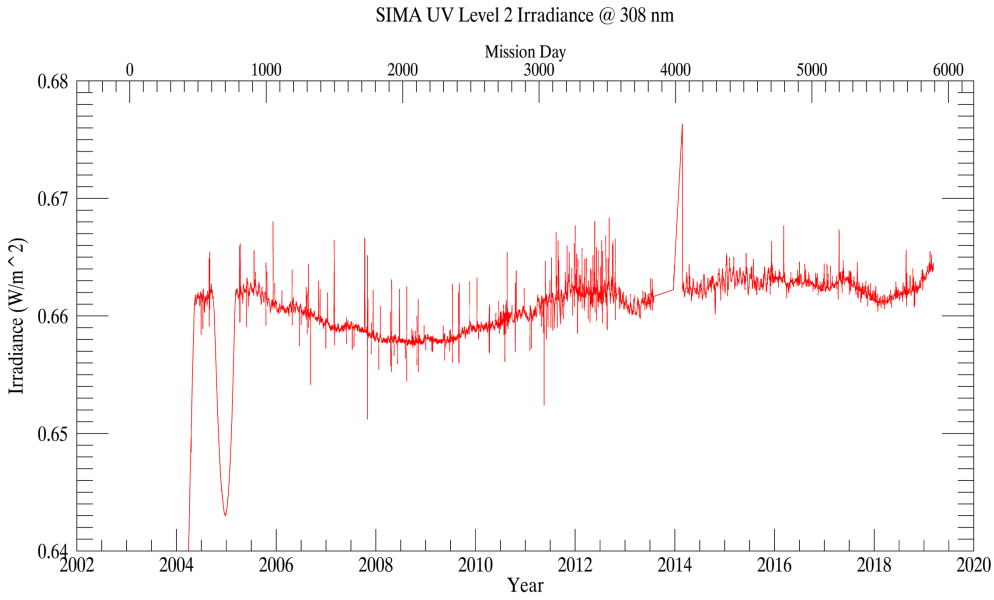

Figure 2: SIMA UV Level 2 irradiance at 308 nm. Prior to mission day 800 (April 23, 2005), the UV diode was often saturated. This prevented reliable irradiance measurements, as seen on mission day 709 (Jan 1, 2005); the Earth-Sun perihelion. As SORCE neared the Sun in 2005, the UV diode saturated. The UV diode was not saturated closer towards the 2004 Aphelion. Since the 2005 perihelion, SORCE prism throughput has decreased and the UV diode no longer saturates at any time of the year. Prior to mission day 460 (May 2004), the UV diode was continuously saturated in the 306—310 nm bandpass.

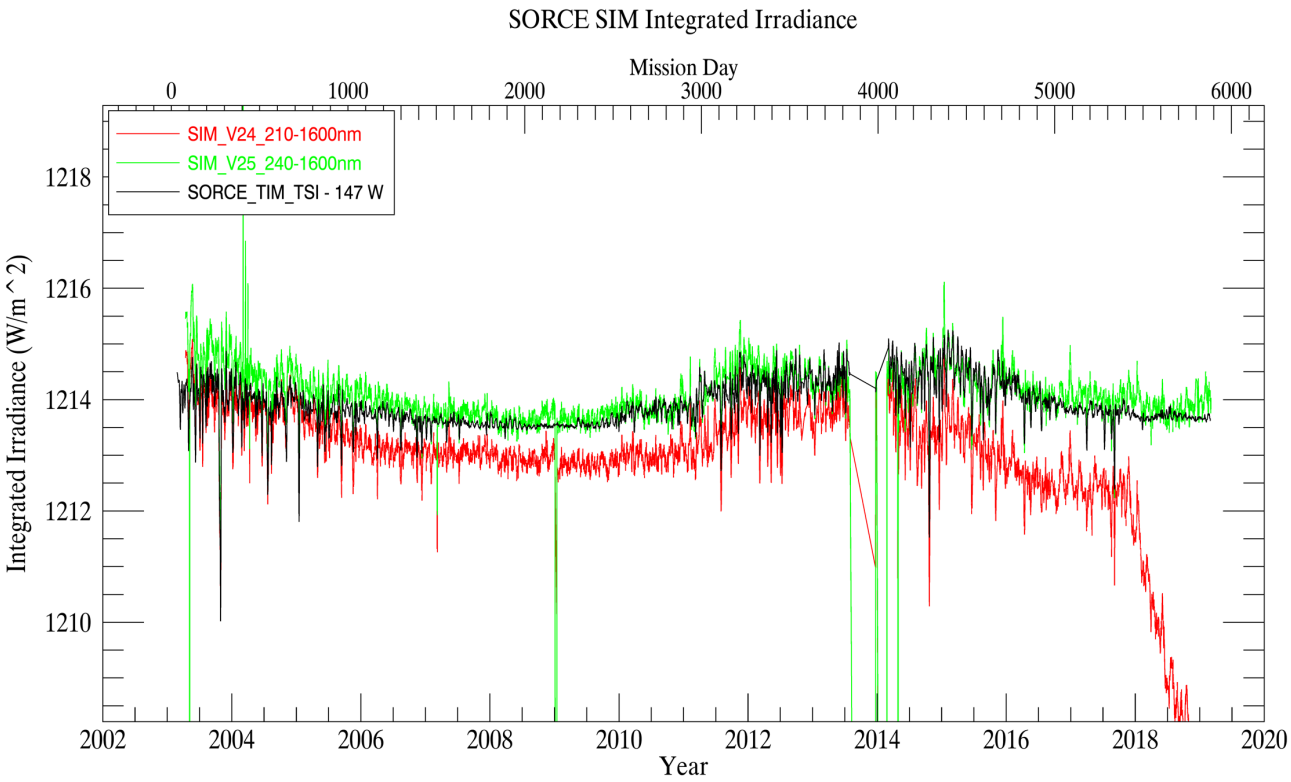

Figure 3: SORCE-SIM V24 (red) and V25 (green) Level 3 integrated Solar Spectral Irradiance (SSI) versus SORCE-TIM TSI (black). The SORCE-SIM TSI is a combination of the UV, VIS + IR channels from 210—1600nm. For display purposes, 147 W/m^2 has been subtracted from the TIM TSI to account for the different bandpasses. Note the rapid, and erroneous, decrease in V24 irradiance in 2018, this has been corrected in V25.

Revision History –

1.0 : 03/20/2019 – Initial Release: Stéphane Béland, James Mothersbaugh, Steven Penton, and Laura Sandoval