TSIS SIM Release Notes for Version 2, Level 3 data product

TSIS SIM data Version 2 appears in three locations on the LISIRD website (see http://lasp.colorado.edu/lisird/data/tsis_ssi_24hr) the TSIS website (see: http://lasp.colorado.edu/home/tsis/data/) and on the NASA DAAC (see: https://disc.gsfc.nasa.gov/datasets/)
An IDL reader for the ASCII formatted data present on the TSIS web site is available at:
http://lasp.colorado.edu/data/tsis/file_readers/read_lasp_ascii_file.pro
Version 2 change list:

- Updated degradation correction method. The new method incorporates the bi-annual Channel C scans and has significantly improved the measurement trending over the course of the mission.
    - Version 1 release did not contain any contributions from Channel C scans as we only had the initial first light scan at that time.
    - In version 2 we are not applying any degradation correction past 1050nm. At this point in the mission any degradation at these longer wavelengths is indistinguishable from noise. We will continue to monitor the trending at these wavelengths going forward and make corrections as needed.
- Fixed bug in applying Doppler shift correction. Also applied a slight re-adjustment to the wavelength scale to align with Kurucz reference spectrum and to improve inter-channel agreement. The net effect of these changes is a wavelength shift of 20ppm-50ppm
- Improved diode responsivity temperature correction above 600nm. This improvement primarily affects the ~800nm - 1000nm region near the edges of the Si and InGaAs diodes.
- Adjusted diode responsivity between 300nm-400nm to better match the ESR. We have sparse coverage in this region on the ESR and did not have enough data to do this calibration for the initial release. We are still working on improving this region, we have identified an offset from the ESR which indicates we may be slightly under correcting degradation in this region.
- Fixed a bug in the scattered light correction that was creating a few incorrect outliers. This primarily affects the 200nm-220nm region.
- Removed un-used measurement Uncertainty column
- Added measurement stability uncertainty. See definition section at end of notes for details.
- Fixed bug in Level3 processing which lead to excessive variance at a few discrete wavelengths, primarily in the IR above 1700nm.

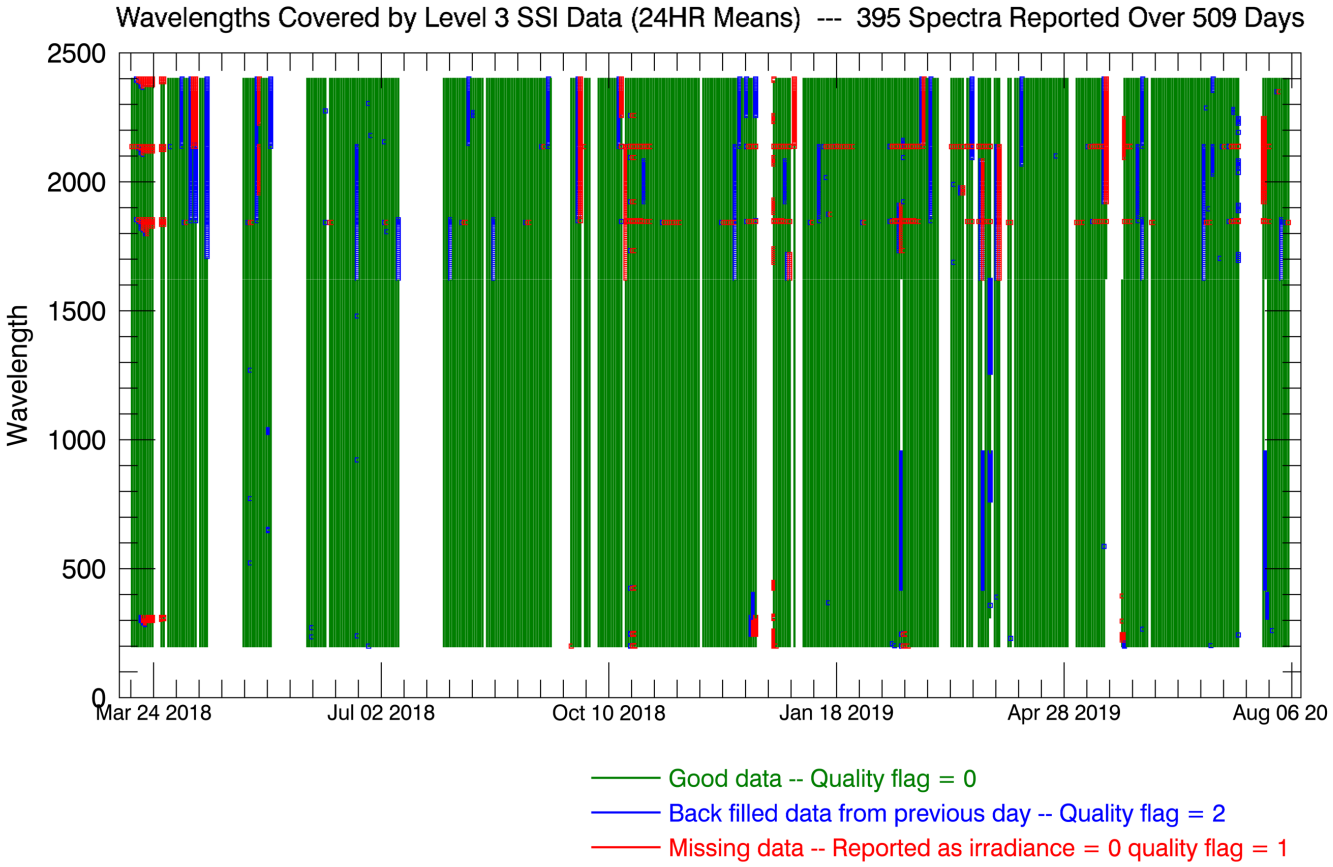
Table 1 gives a description of available time and spectral range for the data. A data latency of nominally 25 days will occur for the processing of instrument degradation correction. This delay may be extended due to ISS operations and high beta angles. The data latency is driven by the cadence at which observations on the secondary channel, which are used in the degradation correction model, are obtained.

Table 1: Time and spectral range of the dataset.

Time Range	Wavelength Range (nm)
2018/03/14 - present	200-2400

Temporal gaps in acquiring TSIS SIM data have occurred due to a number of factors. These factors include ISS operational activities (i.e. orbit boost), ISS anomalies (i.e. power outages), and ISS obstructions that occur at extreme beta angles. The ISS obstructions can result in partial or complete loss of spectra for a given day. A partial loss of spectra occurs when shortened data collection time periods preclude observations of the full solar spectrum. Early in the mission, spectral gaps also occurred due to an error in instrument planning and

operations. That error has since been fixed. Figure 1 shows the TSIS SIM data acquisition record. Colored points indicate portions of the spectrum that are missing (indicated in the data record with a quality flag = 1) or that have been backfilled from the previous day (indicated in the data record with a quality flag = 2). Backfilling is never done when temporal gaps in the data exceed 1 day.



As of 8/29/19 TSIS SIM data is available on 78% of days since the beginning of nominal operations.

Definition of Uncertainties

Instrument Uncertainty (in Watts/m^2/nm) is a pre-launch measure of instrument uncertainty with contributions from component and unit-level instrument laboratory characterizations and calibrations with the final end-to-end full spectrum validation of the measured irradiances against a NIST-traceable cryogenic radiometer performed in LASP's Spectral Radiometer Facility. Reported uncertainties for Version 1 represent an upper limit to the calibration accuracy for each spectral band pending the resolution of an additional correction in the polarization dependence of the entrance slit transmission discovered after SIM launch.

Measurement Precision (in Watts/m^2/nm) is derived from a measure of the on-orbit variance in the scan-to-scan repeatability in the observed spectral irradiances. This value is an upper limit of measurement precision.

Measurement Stability (in Watts/m^2/nm) is a relative metric of the overall on-orbit degradation correction uncertainty. It has contributions from uncertainty due to post-processing of data (including correction of instrument degradation), and uncertainty due to differences between observed irradiances for the 3 separate SIM channels.