

Status of the Total Solar Irradiance Sensor (TSIS) Mission

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The Total and Spectral Solar Irradiance Sensor (TSIS), first selected in 1998 for the National Polar-orbiting Operational Environmental Satellite System (NPOESS), re-manifested in 2010 on the NOAA-NASA Joint Polar Satellite System (JPSS), is now scheduled to be implemented as part of the newly established NOAA Polar Free Flyer (PFF) with launch planned for 2016 or 2017. The TSIS will acquire measurements of total and spectral solar irradiance (TSI and SSI, respectively). TSI is required for establishing the total energy input to Earth; SSI is necessary for determining how the Earth system responds to changes in the Sun's output. TSI and SSI, the required measurements of TSIS, represent some of the longest and most fundamental of all climate data records derived from space-based observations.

TSIS provides continuation of the Total Irradiance Monitor (TIM) and the Spectral Irradiance Monitor (SIM), currently flying on the NASA Solar Radiation and Climate Experiment (SORCE). Launched in 2003, SORCE is more than five years beyond its prime-mission lifetime. The launch failure of the NASA's Glory mission in 2011 coupled with diminished battery capacity on SORCE and delays in the launch of PFF/TSIS have put the continuous 35-year TSI record at risk. In 2012, a plan to maintain TSI continuity was rapidly implemented through the USAF Space Test Program: a TIM will fly on STPSat-3, with launch expected in late 2013. The shorter SSI record faces an almost certain gap between SORCE and TSIS.

This presentation will summarize the importance of highly accurate and stable observations of solar irradiance in understanding the present climate epoch and for predicting future climate; why continuity in the solar irradiance data record is required; improvements in the TSIS TIM and SIM, including their traceability to ground-based cryogenic standards; and the maturity and implications of transitioning solar irradiance data records from research-to-operations.