

Highlights from the *SORCE / TIM*

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The first Total Irradiance Monitor (TIM) was launched on the Solar Radiation and Climate Experiment (SORCE) in 2003. This new space-borne instrument incorporated several innovations over its predecessors to more accurately and more precisely measure the total solar irradiance (TSI), the spatially- and spectrally-integrated radiant energy from the Sun (normalized to one astronomical unit) and thus the net energy powering the Earth's climate system.

Over the TIM's 17-year measurement duration, its accomplishments include:

- Establishing the new, more accurate, lower TSI value of 1361 W m^{-2} and thereby improving estimates of the Earth's energy (im)balance
- Achieving the best inherent stability and the lowest noise of any TSI instrument, improving measurements of short- and long-term solar variability, which provide important natural forcings for Earth-climate models
- Detecting the first solar flare in TSI, thus providing the first direct measurement of the net radiant energy released by a flare
- Observing two Venus and four Mercury transits, thereby giving insights into discovering exoplanets orbiting Sun-like stars via the planetary-transit method
- Recording the largest short-term decrease in the TSI during the spacecraft era
- Creating one of the longest-duration TSI measurement records from a single instrument

The SORCE/TIM has been succeeded by two follow-on TIMs, namely those flown on the TSI Calibration Transfer Experiment (TCTE) and the Total and Spectral Solar Irradiance Sensor (TSIS). The absolute accuracies of these three instruments are such that all agree within their stated uncertainties to the new, lower TSI value established by the SORCE/TIM. While the SORCE ends operations in early 2020, its TIM's legacy and the uninterrupted 41-year-long space-borne TSI measurement record continue into the foreseeable future with the TSIS/TIM.

In this presentation, I will describe the instrument innovations of the SORCE/TIM, its most important accomplishments, and comparisons to other past and present TSI instruments.