

**Absolute Optical Power and Irradiance Comparisons with *SORCE/TIM* and *Glory/TIM* Instruments**

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The total solar irradiance (TSI) climate data record began with spacecraft measurements nearly 30 years ago. While each instrument demonstrates the sensitivity to detect small changes in the Sun's radiant energy and many instruments can even track internal on-orbit degradation, the offsets between these instruments on an absolute scale generally exceed the stated instrument uncertainties. As a first step to address these offsets, optical power comparisons of ground-based TSI instruments representative of those on orbit against a NIST optical power standard were proposed. The ground-based Witness unit of the Total Irradiance Monitor (TIM) currently flying on the SOLar Radiation and Climate Experiment (SORCE) was the first TSI instrument to perform this comparison, which was completed at NIST/Gaithersburg in 2006. We report on the findings of this comparison. One conclusion is that the TIM is not measuring optical power erroneously low by the net difference between it and the other TSI instruments, which have yet to perform this optical power comparison.

The next important step in addressing TSI instrument offsets is to perform comparisons in irradiance, rather than optical power, mode. The NASA Glory mission is funding the creation of the TSI Radiometer Facility (TRF) for such solar-power level irradiance calibrations. We describe here the details of the TRF, which is designed to achieve 0.01% absolute accuracy and operate the instruments in flight-like conditions.

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