Spectral Decomposition of the TSI Record Using the SORCE TIM and SIM Instruments

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The SORCE SIM and TIM instruments have been making concurrent measurements of the total and spectral solar irradiance (TSI and SSI, respectively) since August 2003 up to the present solar minimum time frame. The SIM instrument measures spectral irradiance in the 200-2400 nm region covering 97.1% of the TSI with a resolving power ranging from 280 in the near UV to a minimum of 37 at 1260 nm. With this full spectral coverage, the spectral irradiance time series can be integrated into sub-ranges and compared to the TSI record, showing that different spectral regions provide different components to the total record with some offsetting long-term trends. The SORCE SIM record also provides the best understanding of the long-term trends in the infrared portion of the spectrum. In particular, the very high precision of the SIM near-infrared measurements provide a direct determination of the wavelength dependence of the facular and sunspot contrasts and serve to refine solar atmospheric models of the solar magnetic features that produce irradiance variability in emission from the deepest photospheric layers.