



The Solar Radiation and Climate Experiment (SORCE): Measuring the Sun's influence on climate from space

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The NASA Solar Radiation and Climate Experiment, launched in January of 2003, is a suite of instruments that measures the variability of both the Sun's total solar irradiance (TSI) and its solar spectral irradiance (SSI) over the 110-2400 nm spectral range thereby accounting for more the 97% of the sun's radiant output. The SORCE spectrometers decompose the TSI signal into its spectral components, and the solar cycle trends in the 300-2400 nm have been measured for the first time. The SORCE instruments have revealed a number of important findings that have significance to the earth-climate system. 1) The Total Irradiance Monitor (TIM) measures the TSI with a precision of about 1.0 part per million (ppm) and very small degradation that is correctable to about 10 ppm. Furthermore, recent laboratory studies support the absolute calibration of the instrument's reported Solar Cycle 23 solar minimum irradiance value of 1360.75 Wm^{-2} , an important finding for Earth radiation budget analyses. 2) The time series from the Spectral Irradiance Monitor (SIM) shows that the observed TSI trends are the sum of offsetting spectral irradiance trends rather than the quasi-uniform change predicted from proxy/solar atmospheric models. These observed spectral irradiance changes will enable more realistic investigations of the mechanisms of climate responses to solar forcing. 3) The Solar Stellar Irradiance Comparison Experiment (SOLSTICE) is an ultraviolet spectrometer that was also onboard UARS satellite; the combined missions have a continuous observational record extending back to 1992 encompassing two solar minimum time periods. In the FUV portion of the spectrum (112-180 nm), the SOLSTICE data shows a lower spectral irradiance during the minimum of Solar Cycle 23 than during the minimum period of Solar Cycle 22 by about 5%.