

Solar ultraviolet spectral irradiance data for atmospheric studies

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Solar irradiance in the far and middle ultraviolet (UV) wavelength region (120-300 nm) represents less than 2% of the Sun's irradiance output, but has an important effect on the Earth's atmosphere. Variations in far-UV and mid-UV irradiance over a solar cycle constitute approximately 14% of the total observed solar energy variation. Solar far-UV irradiance is deposited in the atmosphere at altitudes ranging from the upper stratosphere to the lower thermosphere, so understanding the spectral and temporal dependence of these variations is critical to characterizing the long-term energy input over a wide vertical region. Regular spectral solar ultraviolet measurements began in late 1978 with the Nimbus-7 SBUV instrument, and have continued to the present using overlapping data sets from multiple instruments (SME, SBUV/2 on NOAA satellites, SUSIM and SOLSTICE on UARS). However, wavelength-dependent absolute biases and drifts are observed when any two data sets are compared. We are developing a composite spectral irradiance data set covering the wavelength range 120-400 nm that will provide a complete representation of solar UV forcing for analysis of long-term atmospheric changes during the period 1978-2004. We will describe the methods being used to merge the individual data sets and the status of the work. The composite UV irradiance data set can be extended into the future using data from the SOLSTICE and SIM instruments on the SORCE mission.