

A Combined SUSIM / SBUV UV Solar Spectral Irradiance Dataset from 1991 to 2012

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The accurate determination of long-term atmospheric behavior requires the characterization of solar ultraviolet (UV) irradiance variability, which directly influences stratospheric ozone and atmospheric heating. Recent solar irradiance data taken by the Solar Radiation and Climate Experiment (SORCE) during the declining phase of Cycle 23 show significantly larger solar UV variations than previously observed. Solar UV irradiance models based on proxy index relationships yield much smaller variations for the same time period. The use of SORCE UV irradiance in atmospheric models gives very different changes in stratospheric ozone, temperature, and other quantities compared to model results using other UV irradiance values (e.g., the NRLSSI model). Since stratospheric ozone plays a dominant role in the chemistry and circulation of the stratosphere through radiative heating, this result represents a concern for the accuracy of predictions of future ozone and climate changes.

In order to critically evaluate the reported SORCE UV irradiance we are planning to develop a concurrent solar irradiance dataset by using UARS/SUSIM reference channel data to calibrate NOAA SBUV/2 observations. The SUSIM instrument aboard UARS measured the solar UV irradiance during the period 1991-2005 with a daily working channel as well as monthly and longer cadence channels which were less frequently exposed. These "reference" channels degraded much less and were calibrated using four onboard deuterium lamps. The plan of action is to improve the quality of the SUSIM data product during 2003-2005 and then use the SUSIM reference data to fully calibrate NOAA-16 and NOAA-17 SBUV/2 solar irradiance data sets that begin in 2001 and 2002 respectively. This will provide an alternative UV irradiance dataset that covers the entire time period of Cycle 23. We anticipate that corrections can be extended forward with NOAA-18 SBUV/2 data to examine solar changes during the current rising phase of Cycle 24. This presentation will discuss current plans and activities for the development of this combined UV irradiance dataset. This work is sponsored by NASA Earth Science Division and the NASA Living With a Star (LWS) program