

A Model of Long Term Variability of Solar UV and EUV Irradiance

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An empirical model of solar UV spectral irradiance has been developed at the Naval Research Laboratory. This model uses observed spectral radiance from the HRTS-9 rocket and CaII-K images to identify solar surface features. The initial wavelength range covered 18 nm near Mg II at 280 nm. This range is being expanded to cover from 120-400 nm using SKYLAB data and below 120nm using TIMED/SEE data and model spectra derived from SOHO/EIT observations.

The long wavelength portion of the model identifies three surface features: quiet-sun, active-sun, and sunspots and applies spectra for these features. The model requires detailed knowledge of the center-to-limb variation and a calibration derived from observations of several quiet days by SUSIM and SOLSTICE.

The short wavelength portion of the model uses linear regressions to estimate the solar EUV spectrum using correlations between the NOAA Mg II index and observed or model EUV spectra. The regression analysis covers a full solar cycle and the model output is a solar EUV spectrum at 1 nm resolution from 17-55 nm. Resulting spectra are compared with measurements of solar EUV flux to estimate model accuracy and variability.

The model has concentrated on the period 1990-1995 but this is currently being extended to estimate spectral irradiance back to the early 1900's. This will be done using the recently digitized Ca II K images from Mt Wilson Observatory (MWO).

In this presentation, we review the model, the input spectra, and the methods being developed for correction of the MWO images.