

The Solar Ultraviolet Spectral Slope during the Last 270 Years

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The radiative output of the Sun is variable on different time scales, but the most prominent variability over the last few centuries has been the 11-year cycle. Total Solar Irradiance shows changes of around 0.1% during the 11-year cycle, with different spectral regions (e.g. UV) changing by different amounts. Solar UV variability is extremely important for the stratospheric ozone, which has an impact on Earth's atmospheric structure and dynamics through radiative heating and ozone photochemistry.

We use the SOLSTICE/SORCE data to investigate the variability in FUV and MUV during the descending phase of cycle 23 and ascending phase of cycle 24. We introduce the [FUV-MUV] color index to measure the solar UV spectral slope and study its dependence on solar activity using the Mg II index Bremen composite and the sunspot number. We find a clear correlation between the color and Mg II index, as well as a difference in the UV spectral slope during the descending phase of cycle 23 and ascending phase of cycle 24, which we attribute to a residual uncorrected time-dependent performance of SOLSTICE UV channels. We use the correlation between the color and Mg II index to reconstruct the solar UV spectral slope between 1978 and today, and the correlation between the color and the sunspot number to reconstruct the slope between 1749 and today.