Measurements of solar UV and EUV irradiance and their proxies

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Solar UV and EUV irradiance (30–400 nm), especially its long-term evolution, plays a critical role in terrestrial atmospheric and climatic processes. Experiments making these measurements which must be conducted above the Earth's atmosphere have continued for decades, typically aboard satellites that are not recovered. Obtaining an accurate long-term measurement record from these experiments is made difficult by trends in instrument responsivity caused, in part, by EUV and UV radiation. The actual long-term variation of the EUV and UV spectral irradiance is a strong function of wavelength, varying by more than a factor of 2 at shorter wavelengths and by less than 1longer wavelengths. These variations are apparently caused by surface magnetic features such as sunspots, faculae, and active network which emerge and decay over time. Accordingly, these variations exhibit two dominant periodicities, rotation ($\sim$27 day) and activity cycle ($\sim$11 yr).

As accurate measurements are not always available, solar indices such as the F10.7 cm radio flux and the MgII core-to-wing ratio have served as proxies for solar EUV and UV measurements. The MgII index is derived from space-based measurements, but is constructed to minimize undesired instrumental effects. Currently, a composite MgII index is available spanning the period of late 1978 to the present. Past and current UV and EUV measurements are examined to understand their consistency and probable accuracy as a function of wavelength. Their relationship to solar proxies, especially the MgII index, is also analyzed as are their behaviors over the long term.