Ultraviolet Radiation and Total Ozone Correlations at Mauna Loa Observatory, and Boulder, Colorado

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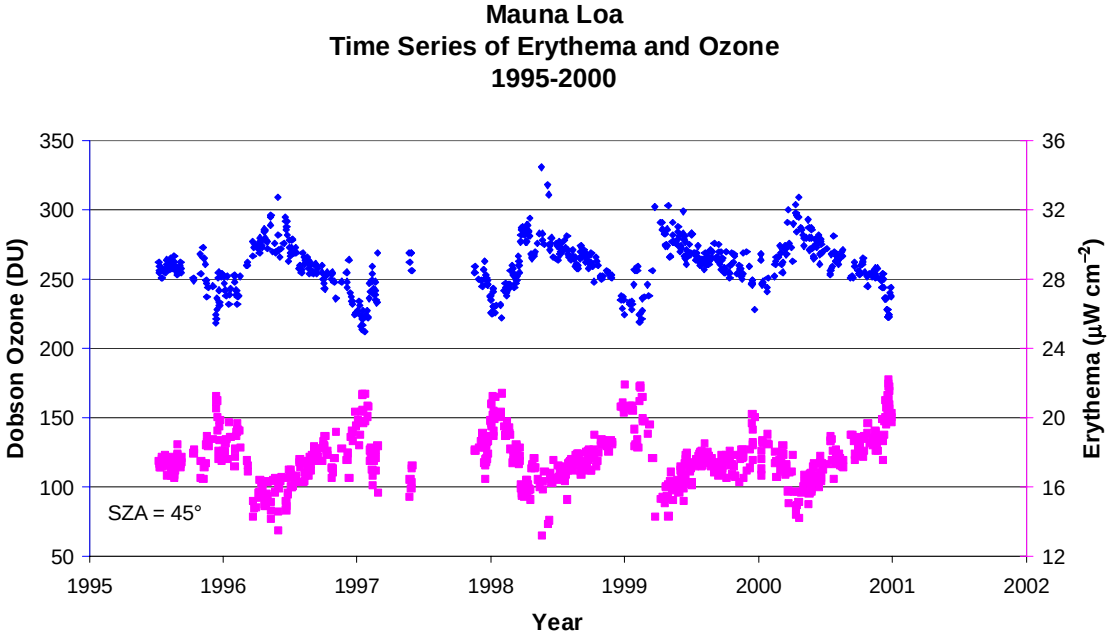
A UV spectroradiometer was installed at Mauna Loa Observatory (MLO), Hawaii, in July 1995. A similar instrument was installed at Boulder, Colorado, in June 1998. Total column ozone is also measured at both sites using Dobson ozone spectrophotometers. The range of the spectroradiometers is 285-450 nm, and spectra are obtained for every 5 degrees of solar zenith angle during daylight hours. Data are available in spectral form and also integrated over the erythemal wavelength range (290-320 nm). Furthermore, spectra may be easily integrated over any other action spectrum. UV and ozone data were selected for clear mornings at Mauna Loa. Data were selected for both clear mornings and afternoons at Boulder in order to obtain more data points. Erythemal irradiance is higher at Mauna Loa, primarily because of the higher altitude, but also because total ozone is lower, on average, at Mauna Loa than it is at Boulder. The range of ozone values above Mauna Loa is ~220-320 DU with a maximum in June and a minimum in December, whereas the range of ozone above Boulder is ~260-400 DU with a maximum in April and a minimum in October. UV irradiance shows a strong negative correlation with ozone at both sites (figure). The radiative amplification factor (RAF), defined as the percent change of UV divided by the percent change of ozone, is a function of solar zenith angle (SZA), but is about 1.2 at both locations at SZA = 65°. However, the RAF at Boulder is subject to more uncertainty because of its shorter record of data and less ideal atmospheric conditions. This paper presents 1995-2000 data for MLO, and 1998-2000 data for Boulder.



Ozone (top) and erythema (bottom) at MLO during July 1995-December 2000. Erythema values were calculated from UV spectra at SZA = 45°. Note the strong negative correlation between the two data sets.