7. Examples of Network Data

The following sections present examples of data recorded by the NSF Spectroradiometer Network. These examples contrast recent data (Volume 16) with historic data. Data are presented by site, followed by a comparisons of measurements at different sites (Section 7.8.). For each location, UV data measured by NSF network instruments are also contrasted with total column ozone data from NASA's Total Ozone Mapping Spectrometer (TOMS) and the Ozone Monitoring Instrument (OMI) installed on NASA's AURA platform. UV measurements are represented by the 298.507-303.03 nm irradiance integral, and DNA- and erythemally (CIE) weighted irradiance (Section 4.2.3). Both quantities are very sensitive to changes of solar zenith angle and atmospheric ozone. Peaks in data usually coincide with minima in ozone.

Volume 16 noon-time data are compared to data from the years 1991-2004. In addition to individual data points, average values for the years 1991-2004 are presented. All UV-data shown here are based on observations recorded near local apparent noon (01:00 GMT for McMurdo, 16:00 GMT for Palmer, 00:00 GMT for South Pole, 17:00 GMT for Ushuaia, 20:00 GMT for San Diego, 22:00 GMT for Barrow, and 15:00 GMT for Summit). For the austral sites, only data for the period September to December (months most affected by ozone depletion) are presented.

In addition to noon-time values, daily doses D are presented for all sites, which were derived by integrating instantaneous irradiance values over time:

$$D = \int_{x-12}^{x+12} E(t)\,dt$$

The integration range is centered at the approximate local apparent noon. The implementation of the integration is described in Section 4.2.4. $E(t)$ symbolizes either DNA-weighted irradiance, erythemal irradiance, or the wavelength integral of 400-600 nm.

A comparison of daily doses from different sites is quite distinct from a comparison of noontime values. For example, noontime values at a high-latitude site are typically considerably lower than at San Diego. Daily doses on the other hand may be higher due to 24 hours of sunlight during summer at sites inside the Polar Circle. Many of the plots to follow serve to illustrate the range of variation inherent in the complete dataset for the different locations. Rather than trying to provide an encyclopedic data summary, we attempt to show examples that serve both to stimulate discussion and to illustrate some of the types of comparisons possible.

Section 7.9 analyzes trends in UV radiation based on data from all austral station. Section 7.10 gives a comprehensive overview of all factors affecting UV radiation at the ground such as solar zenith angle, total column ozone, clouds, surface albedo, aerosols, and altitude.