7. Examples of Network Data

The following sections present examples of data recorded by the NSF Spectroradiometer Network. These examples include both recent (Volume 8), as well as statistical data from as early as 1989. The discussions and data are presented by site, followed by site comparisons (Section 7.7.). For each site, noontime irradiance in the UV and visible, measured by the NSF network instruments, are contrasted with total column ozone data from NASA's Total Ozone Mapping Spectrometer (TOMS). Ozone data from the current season were downloaded from the TOMS website at toms.gsfc.nasa.gov. UV measurements are represented by the 298.507-303.03 nm irradiance integral, UV-B irradiance, and DNA-weighted irradiance (see Section 4.2.3). DNA-weighted irradiance is very sensitive to changes of solar zenith angle and atmospheric ozone. In addition, the 400-600 nm integral is shown, which includes wavelengths in the visible only. In contrast to the other quantities, this integral is not affected by atmospheric ozone concentrations.

From UV data measured in 1991-1997, average, standard deviation, and minimum and maximum values were calculated. These statistical quantities were contrasted to Volume 8 noontime measurements. This allows the reader to judge how measurements taken on a given day in the current season compare with historic data. All UV-data shown here is 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 for Ushuaia, 20:00 for San Diego, and 22:00 for Barrow). For the austral sites, only data for the period September to December is presented, as these months are the most affected by ozone depletion. Barrow data are shown for the months February to June inclusive since the most severe ozone depletion in the Northern Hemisphere is shifted by about six months compared to austral sites. Since there is little change in total ozone column for San Diego relative to polar regions, data from the whole year is presented.

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

$$D = \int_0^{24} E_{\text{bio}}(t)\,dt$$

Here E_{bio} symbolizes either erythemally or DNA-weighted irradiance, or spectral irradiance, integrated over 400-600 nm. The integration range is 00:00 GMT to 24:00 GMT. This means that a day is not centered at local apparent noon but is rather a "GMT-day", covering the same time range for all sites.

A comparison of daily doses from different sites is quite distinct from a comparison of noontime values, see Section 7.7. For example, for a high-latitude site the noontime values may be considerably lower than for San Diego. Daily doses, however, may be higher resulting from 24 hours of sunlight for sites inside the Polar Circle during summer.

Many of the plots to follow serve to illustrate the range of variation inherent in the complete dataset for the different locations. When selecting data for presentation it is important to keep in mind these variations, which are caused by factors such as total column ozone, solar zenith angle, cloud cover, and surface albedo. 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.