7.2. Palmer Station

The Antarctic "ozone hole" in the austral fall of 2003 was one of the largest on record; its size peaked at about 28 million km^2 in September. This is in stark contrast to the situation in 2002 when the maximum size was only 19 million km^2. Despite the large size in September, the ozone depleted area decreased faster than in many of the previous years. UV levels observed at Palmer Station between October 8 and November 24 were smaller than the long-term average, with few exceptions.

Figure 7.2.1 shows total column ozone measured by satellites at Palmer Station. The figure indicates that ozone amounts were exceptionally low until 10/8/03. Between 10/10/03 and 11/26/03, the center of the ozone hole moved away from Palmer Station and total ozone raised to values above 220 DU. Values dropped again below 220 DU on 11/26/03 when the hole's center was located above Palmer Station. During this time the ozone hole had already decreased substantially in size in depth. No TOMS measurements are available for the period 11/27/03 – 12/3/03, but UV data suggest that ozone was below the long-term average during this period.

Noontime values of the 298.51 - 303.03 nm integral (Figure 7.2.2) clearly anticorrelate with ozone. Between 9/28/03 and 10/5/03, integral values are close to the upper envelope formed by data of previous years. Data are well below the long-term average between 10/11/03 and 11/24/03. Erythemal noontime irradiance exhibited a similar pattern (Figure 7.2.3).

Figure 7.2.4 and Figure 7.2.5 show the annual cycles in DNA-weighted daily dose and erythemally weighted daily dose, respectively. Doses observed during the first five months of 2004 compare well to historic records. Both figures also demonstrate that variability in daily UV doses is much smaller between January and March than it is between September and November, the period affected by the ozone hole. Comparatively high doses can be observed until 10/5/03, and on 11/25/03 and 12/5/03.

Daily doses in the 400-600 nm range are shown in Figure 7.2.6. This data product depends only little on atmospheric ozone concentrations. Measurements from 2003 compare well to historic data.

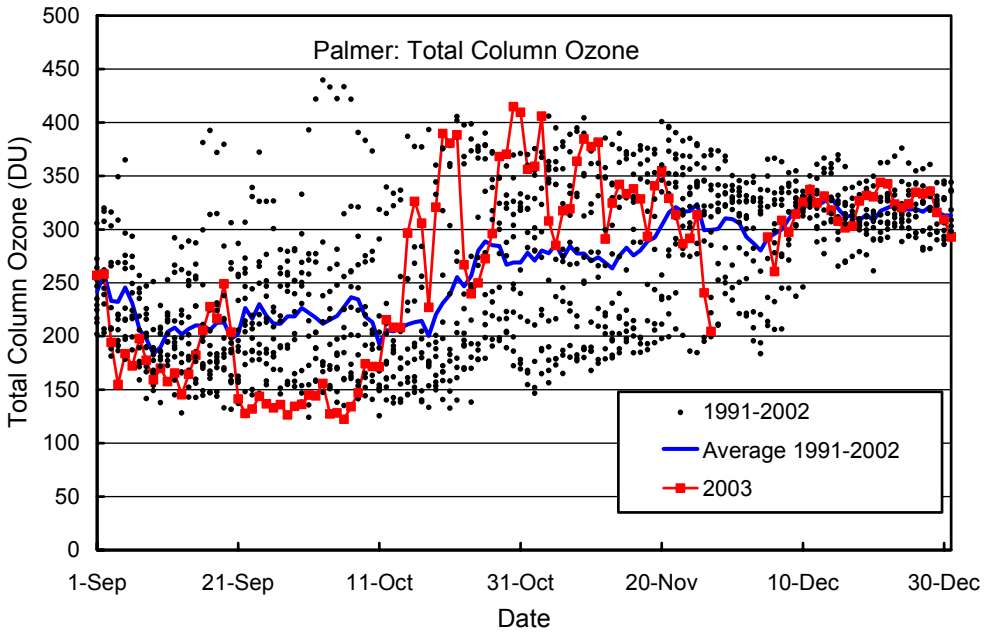

Figure 7.2.1. *Total column ozone in Palmer. TOMS/Earth Probe measurements from 2003 are contrasted with ozone data from the years 1991-1999 recorded by TOMS /Nimbus-7(1991-1993),TOMS/ Meteor-3 (1993-1994), NOAA/TOVS (1995-1996), and TOMS/Earth Probe (1997-2002) satellites.*

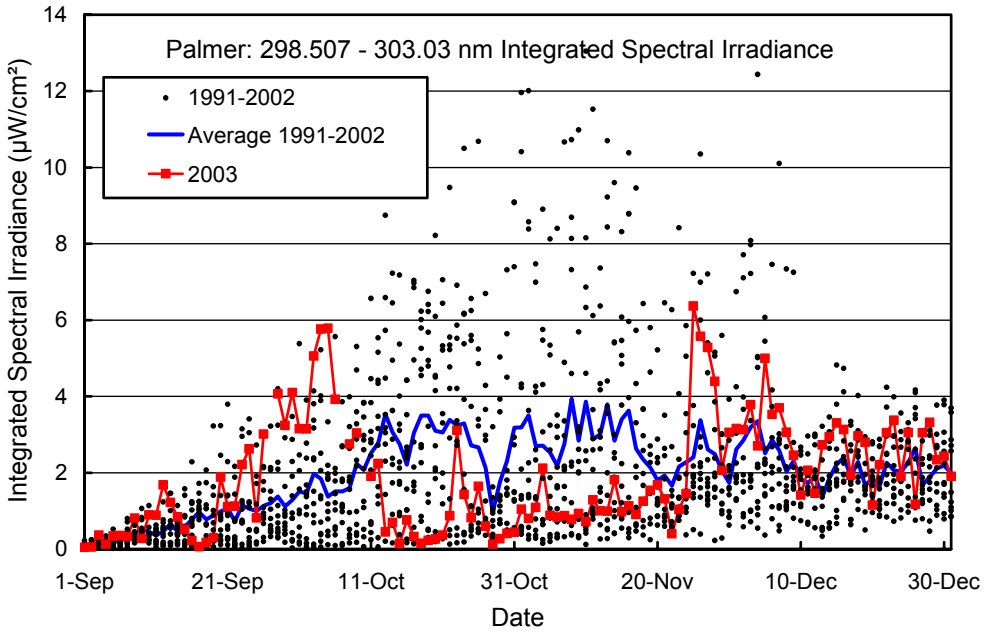

Figure 7.2.2. *Noontime integrated spectral UV irradiance (298.51 - 303.03 nm) at Palmer. Measurements from 2003 (squares) are contrasted with individual data points and the average of measurements taken between 1991 and 2002.*

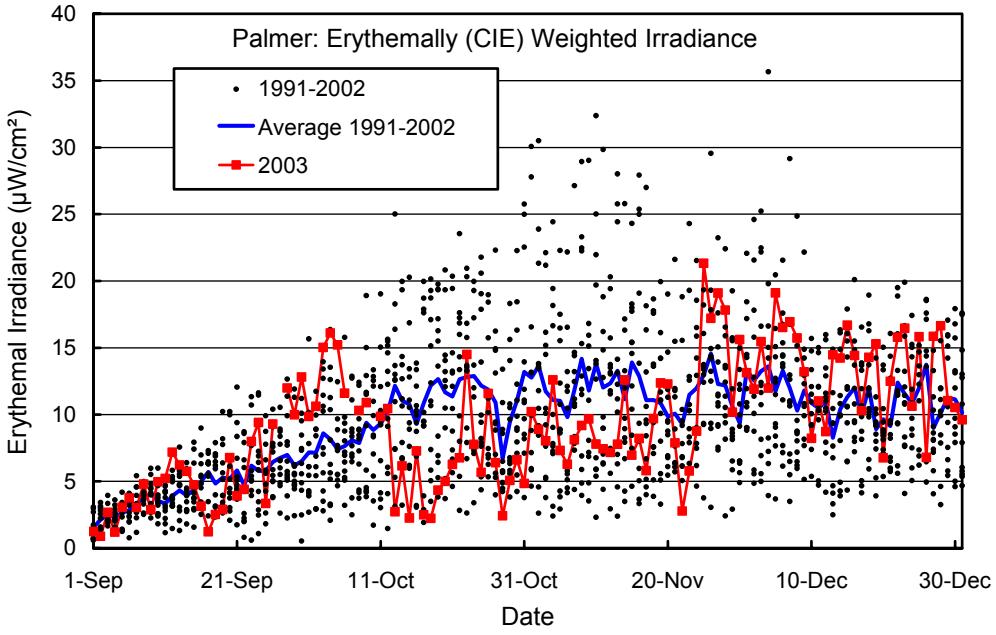

Figure 7.2.3. *Erythemally (CIE) weighted irradiance at Palmer. Measurements from 2003 (squares) are contrasted with individual data points and the average of measurements taken between 1991 and 2002.*

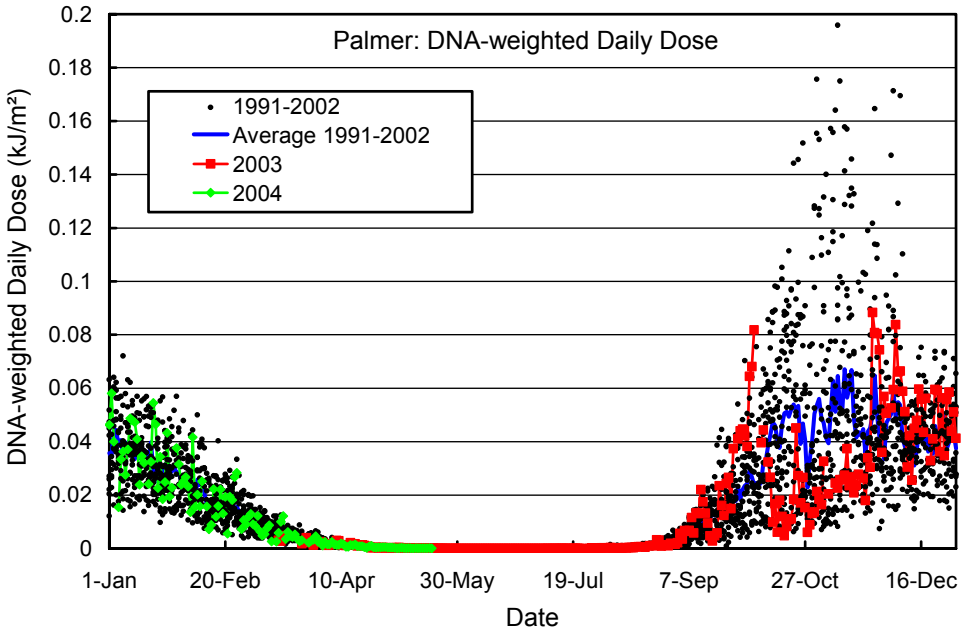

Figure 7.2.4. *Daily DNA-weighted dose for Palmer. Volume 13 measurements from 2003 and 2004 are contrasted with individual data points and the average of measurements taken between 1991 and 2002.*

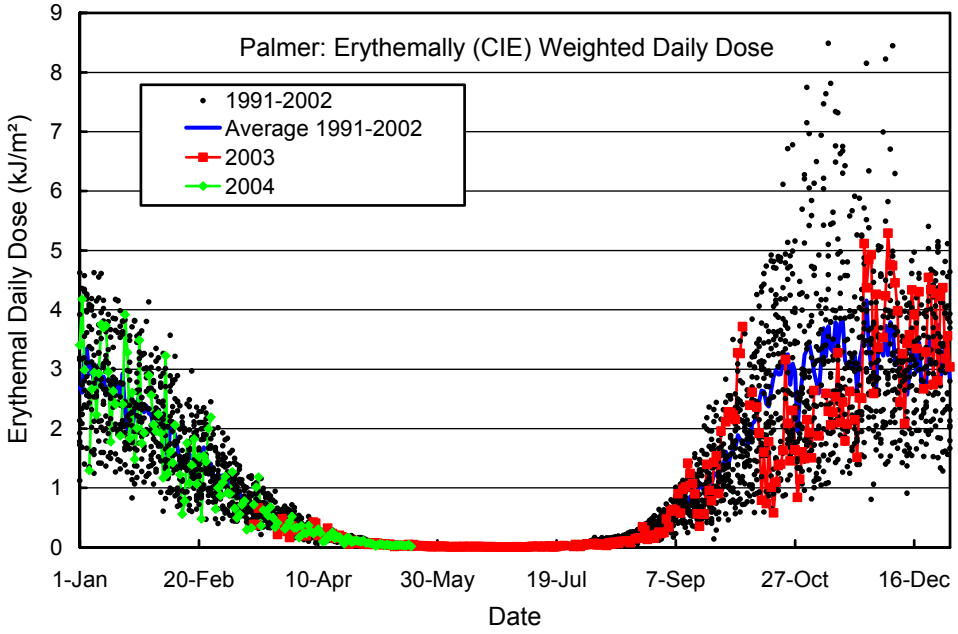

Figure 7.2.5. *Daily erythemal dose for Palmer. Volume 13 measurements from 2003 and 2004 are contrasted with individual data points and the average of measurements taken between 1991 and 2002.*

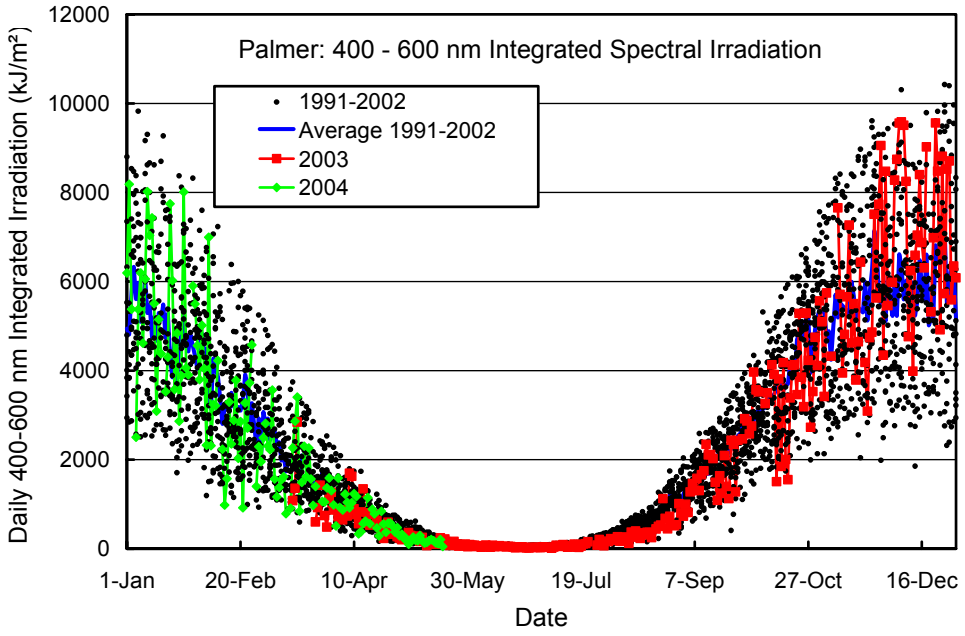

Figure 7.2.6. *Daily irradiation of the 400-600 nm band for Palmer. Volume 13 measurements from 2003 and 2004 are contrasted with individual data points and the average of measurements taken between 1991 and 2002.*