7.3. Amundsen Scott South Pole Station

The Antarctic "ozone hole" in the austral spring of 2004 was considerably smaller than the average size observed during the last decade. According to "ozone bulletins" published by the World Meteorology Organization, meteorological conditions in the stratosphere during mid October limited the depth and size of the ozone hole in 2004. However, stable meteorological conditions that promote the persistence and intensity of the ozone hole replaced the earlier less stable conditions and permitted the gradual growth of the ozone hole into mid November. This lead to comparatively high UV levels during the first two weeks of November.

Figure 7.3.1 shows total column ozone measured by satellites at the South Pole. Ozone columns during October were generally larger than the long-term mean, which was calculated from observations of the years 1991 – 2003. Ozone columns during the first two weeks of November were considerably below the mean. The ozone hole finally started to dissolve around 11/15/04. Figure 7.3.2 shows measurements of the 298.51 - 303.03 nm integral at 00:00 UT. This integral is strongly affected by the total ozone column. Peaks seen in the figure correlate with drops in Figure 7.3.1. Erythemal irradiance (Figure 7.3.3), DNA-weighted daily dose (Figure 7.3.4), and erythemal daily dose (Figure 7.3.5) show a similar pattern but with reduced amplitude due to the lesser dependence of these data products on atmospheric ozone amounts.

Radiation in the visible is only marginally affected by total ozone. As the influence of clouds is small at the South Pole, daily doses measured in the visible during the Volume 14 period should be similar to historic observations. Yet Figure 7.3.6 suggest that measurements from 2004 are somewhat lower than typical. This is caused by the upgrade of the radiometer's collector in January 2000 (see Volume 10 Operations Report). Before the modification, the instrument's angular response exhibited an azimuthal asymmetry, which was substantially reduced by the upgrade. Daily doses in the visible from the years 2000 - 2003 agree to within a few percent (see Section 5.3), and the main bias seen in Figure 7.3.6 is between data sampled before and after the collector modification. We have reprocessed our entire data set to remove the step change. The new data set is called "Version 2" and is available via the website http://www.biospherical.com/nsf/Version2/Version2.asp. Please also check this website for publications related to Version 2.

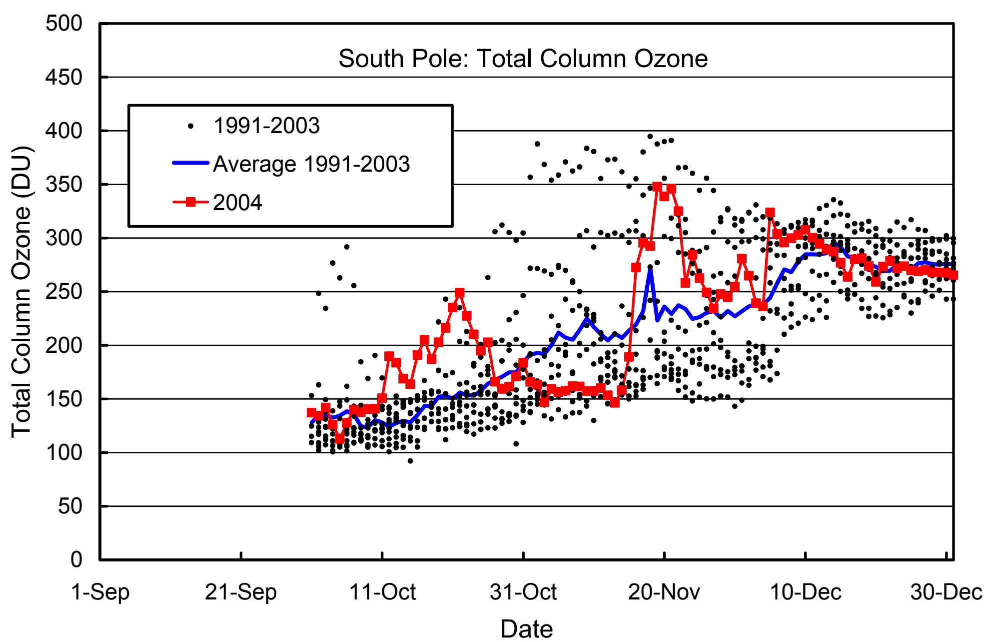

Figure 7.3.1. *Total column ozone at South Pole. TOMS/Earth Probe measurements from 2004 are contrasted with ozone data from TOMS /Nimbus-7 (1992-1993) and TOMS/Earth Probe (1997-2003) satellites. All TOMS data are from the TOMS "Version 8" data set.*

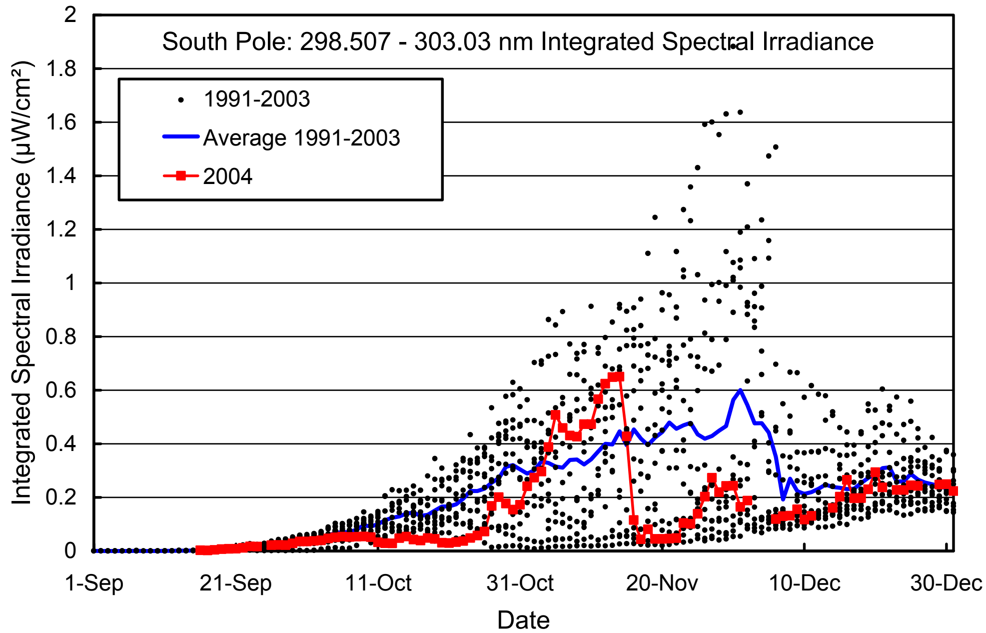

Figure 7.3.2. *Noontime integrated spectral UV irradiance (298.51 - 303.03 nm) at South Pole. Measurements from 2004 (squares) are contrasted with individual data points and the average of measurements taken between 1991 and 2003.*

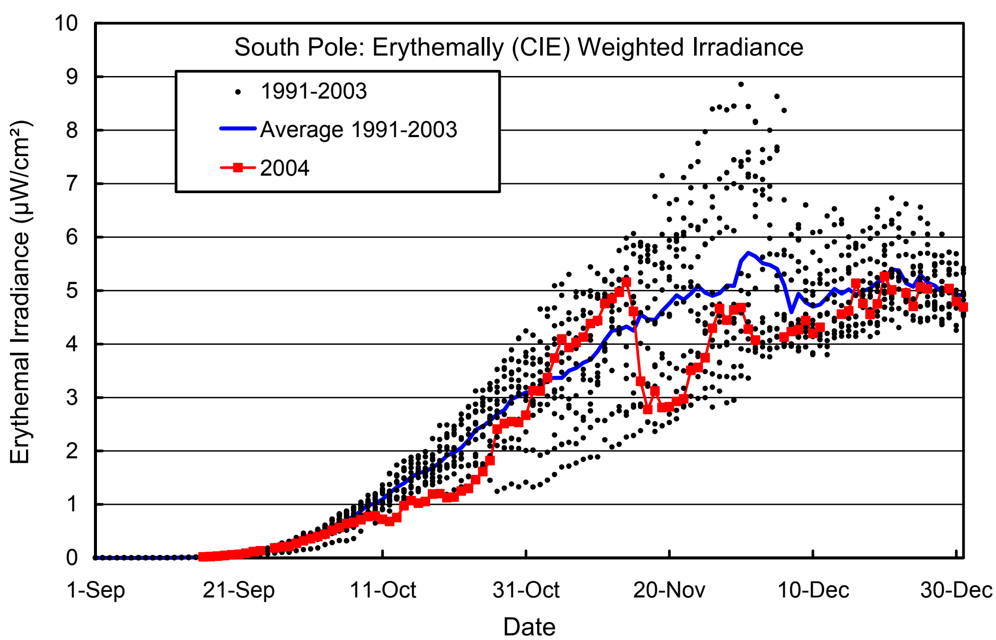

Figure 7.3.3. *Erythemally (CIE) weighted irradiance at South Pole. Measurements from 2004 (squares) are contrasted with individual data points and the average of measurements taken between 1991 and 2003.*

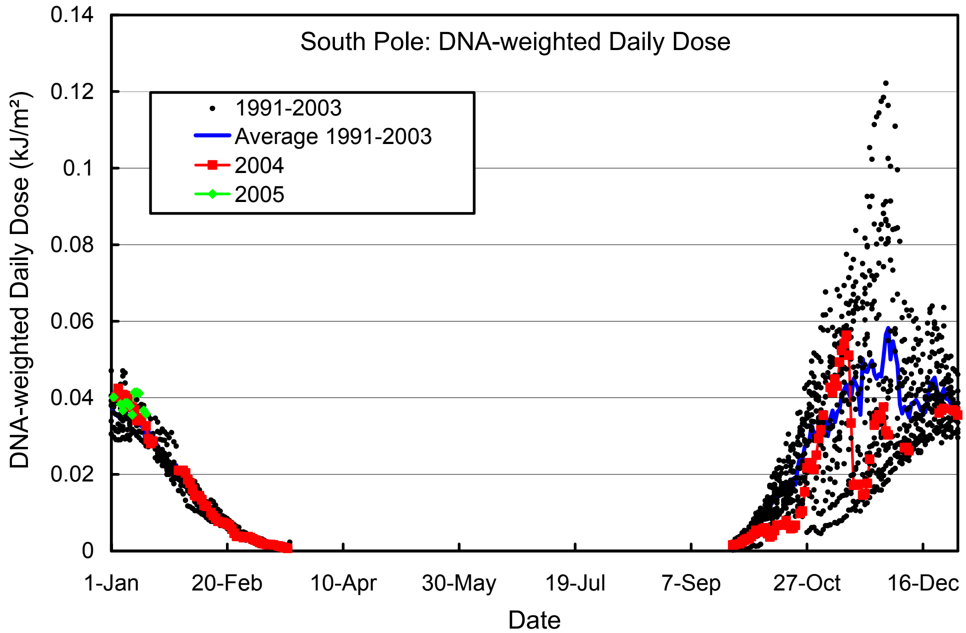

Figure 7.3.4. *Daily DNA-weighted dose at South Pole. Volume 14 measurements from 2004 and 2005 are contrasted with individual data points and the average of measurements taken between 1991 and 2003.*

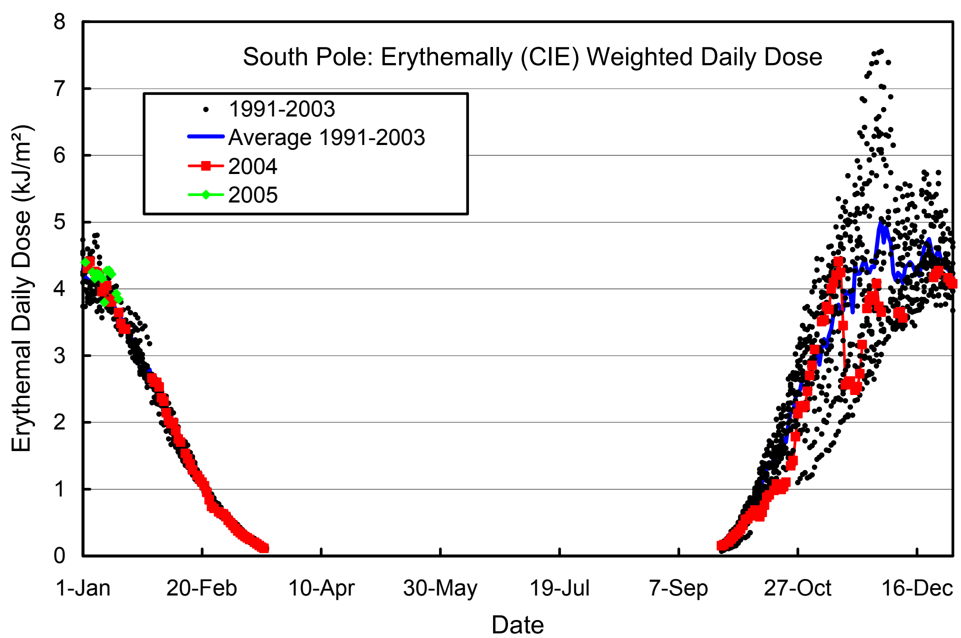

Figure 7.3.5. *Daily erythemal dose at South Pole. Volume 14 measurements from 2004 and 2005 are contrasted with individual data points and the average of measurements taken between 1991 and 2003.*

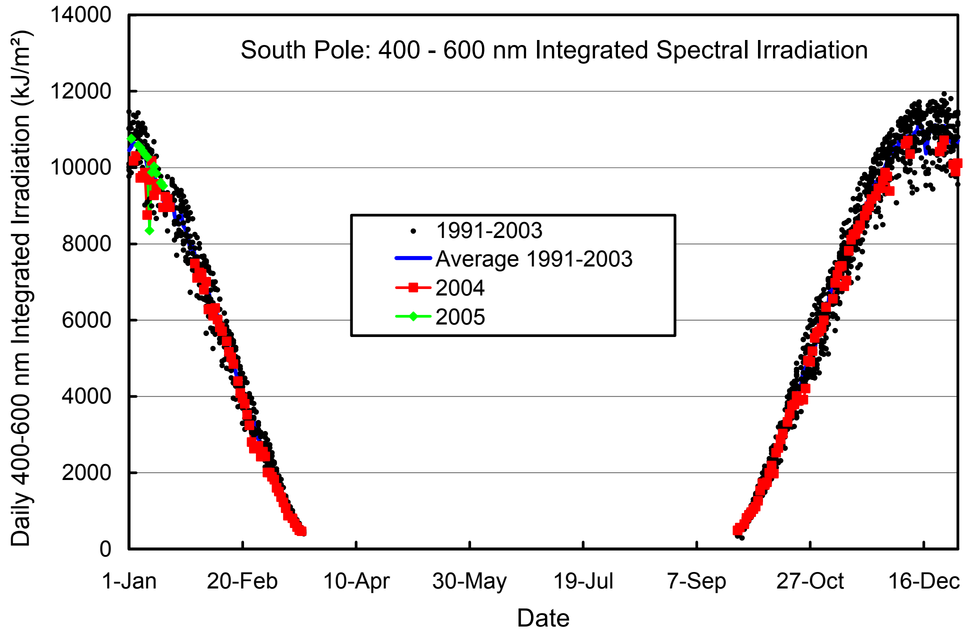

Figure 7.3.6. *Daily irradiation of the 400-600 nm band at South Pole. Measurements from 2004 - 2005 are contrasted with individual data points and the average of measurements taken between 1991 and 2003.*