## 7.3. Amundsen Scott South Pole Station

The size of Antarctic ozone hole in the austral fall of 2007 was slightly above the 10-year average, both in depth and overall area. The ozone hole area reached a maximum of approximately 25 million $km^2$ in mid-September, according to data of the Ozone Monitoring Instrument (OMI) onboard NASA's AURA satellite. The minimum total ozone column within the vortex was 107 DU and was observed by OMI on 30 September 2007. While the 2007 ozone hole was not as deep and large as the ozone hole of 2006, it lasted exceptionally long. Small areas with ozone columns below 230 DU were still present even at the end of December, according to OMI. The late break-up led to record-high UV levels during the first half of December at the South Pole.

Figure 7.3.1 shows total column ozone measured by satellites at the South Pole. For 2007, ozone values derived from SUV-100 spectra are also shown. These data are from the Version 2 edition. Record-low ozone column were observed between 10 and 18 December and between 25 and 30 December. These low values occurred close to the solstice when the Sun is highest in the sky. Comparatively low ozone columns were also observed between 12 and 24 of November.

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. Values peak on 17 November and 11 December when total ozone was exceptionally low. The value on 11 December is about 4.7 times of that the climatological average for this day. The daily maximum UV Index on 11 December was 3.2 (Figure 7.3.3). This is also a comparatively high value for the South Pole. UV Indices larger than 3.5 were observed in 1998 only, when the break-up of the ozone hole was also unusually late. DNA-weighted daily dose (Figure 7.3.4), and erythemal daily dose (Figure 7.3.5) show similar patterns than instantaneous measurements at 00:00 UT.

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 17 period should be similar to historic observations. Figure 7.3.6 suggests that measurements from 2007 are somewhat lower than in the past. 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 2000-2007 agree to within a few percent, 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 "Version 2" data set is available via the website http://www.biospherical.com/nsf/Version2/Version2.asp.

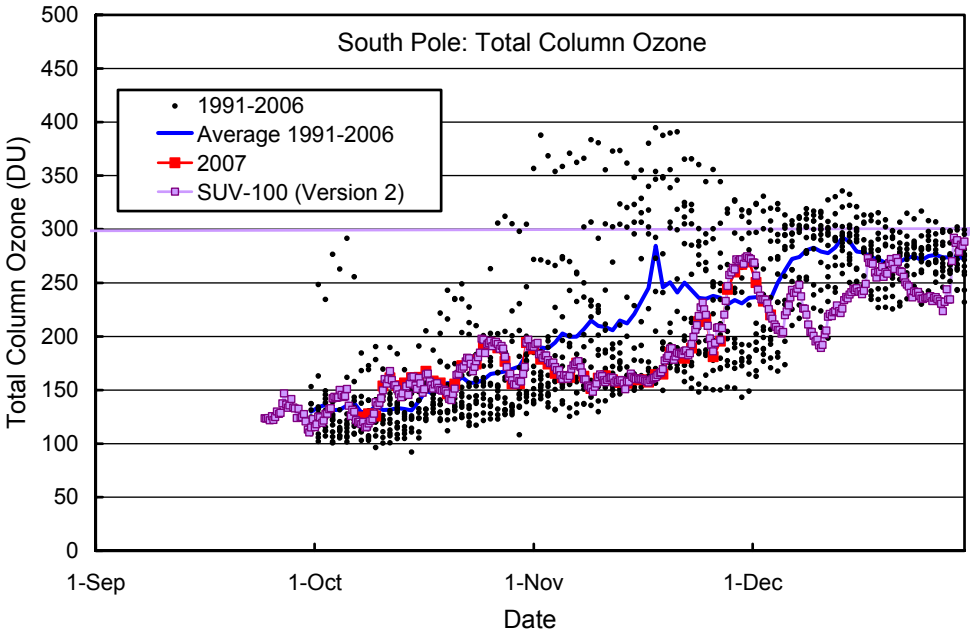


**Figure 7.3.1.** *Total column ozone at South Pole. OMI measurements from 2007 are contrasted with ozone data from the years 1991-2005 recorded by TOMS /Nimbus-7(1991-1993), TOMS/Earth Probe (1996-2004), and OMI (2005-2006). TOMS data are from the "TOMS Version 8" data edition. OMI data from 5-31 December 2007 have not been available as of this writing. SUV-100 ozone measurements from 2007 are also shown and are available up to the end of December.*

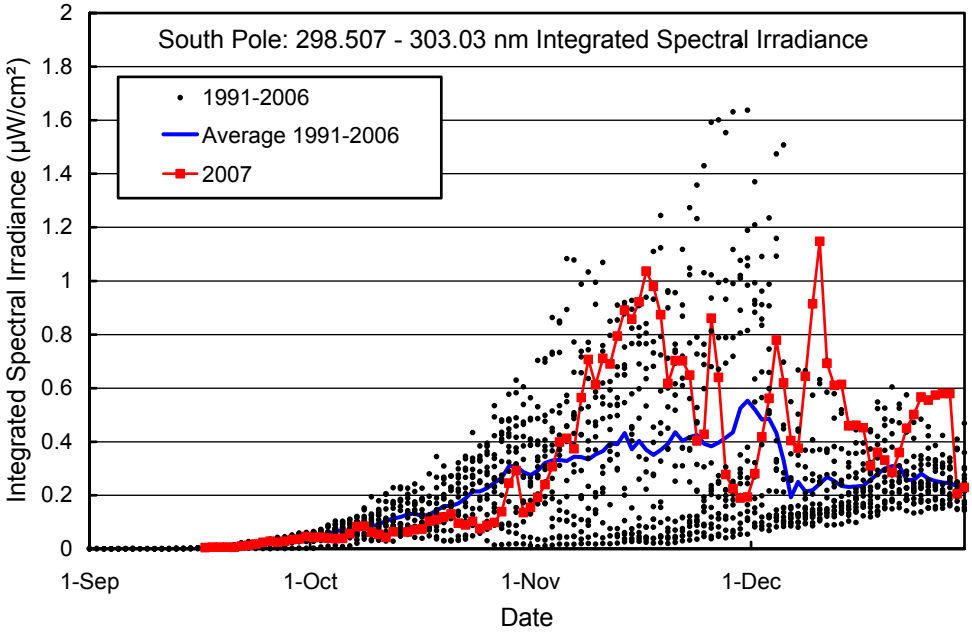


**Figure 7.3.2.** *Noontime integrated spectral UV irradiance (298.51 - 303.03 nm) at South Pole. Measurements from 2007 are contrasted with individual data points and the average of measurements taken between 1991 and 2006.*

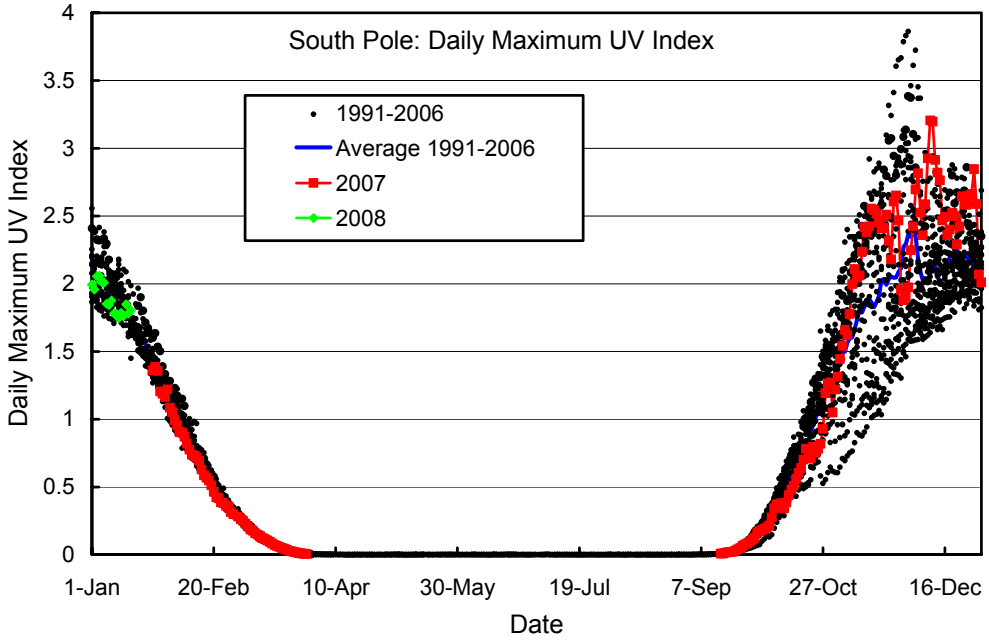


**Figure 7.3.3.** *Daily maximum UV Index at South Pole. Measurements from 2007 and 2008 are contrasted with individual data points and the average of measurements taken between 1991 and 2006.*

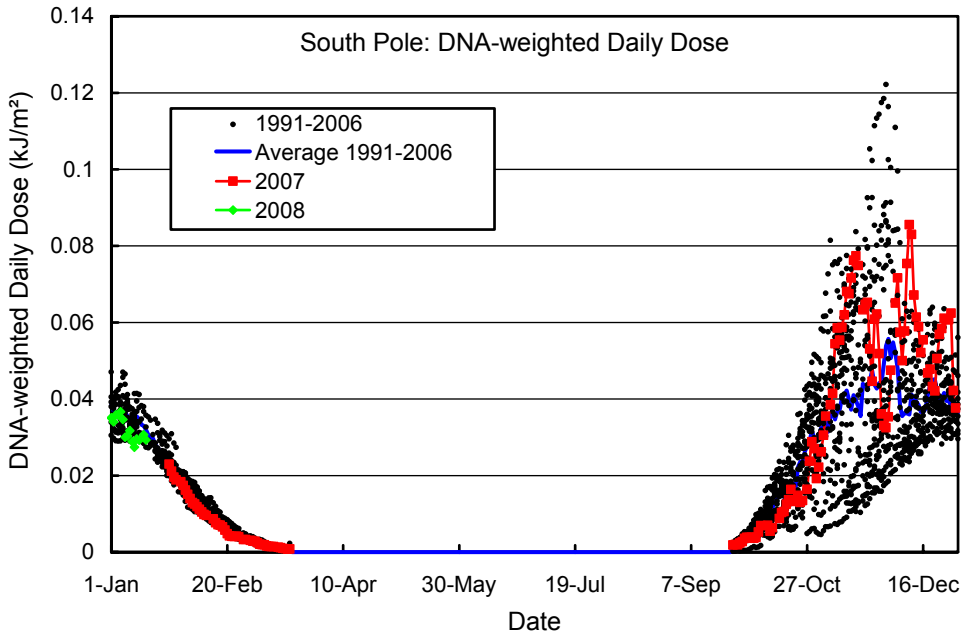


**Figure 7.3.4.** *Daily DNA-weighted dose at South Pole. Volume 17 measurements from 2007 and 2008 are contrasted with individual data points and the average of measurements taken between 1991 and 2006.*

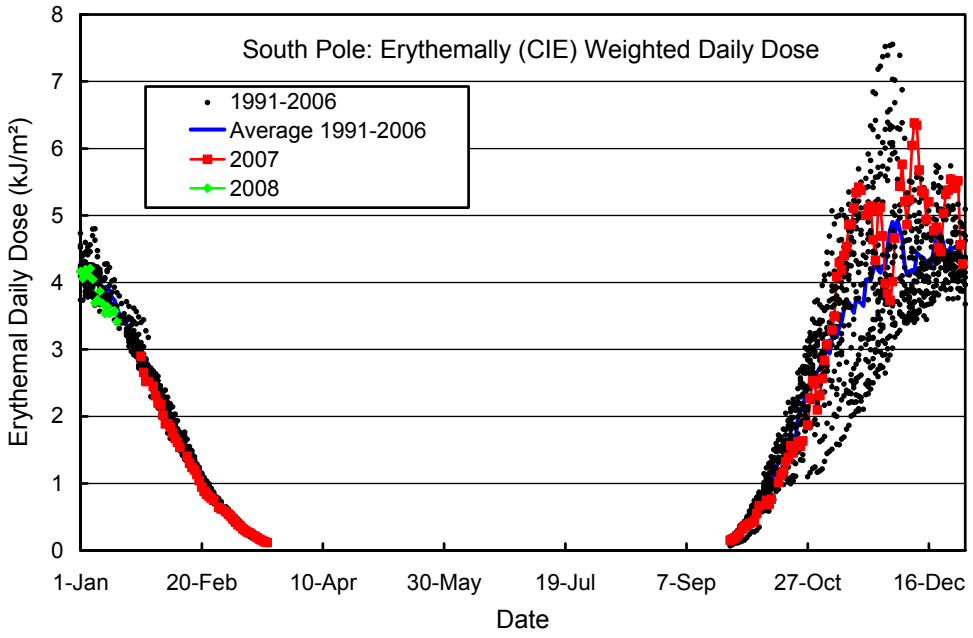


**Figure 7.3.5.** *Daily erythemal dose at South Pole. Volume 17 measurements from 2007 and 2008 are contrasted with individual data points and the average of measurements taken between 1991 and 2006.*

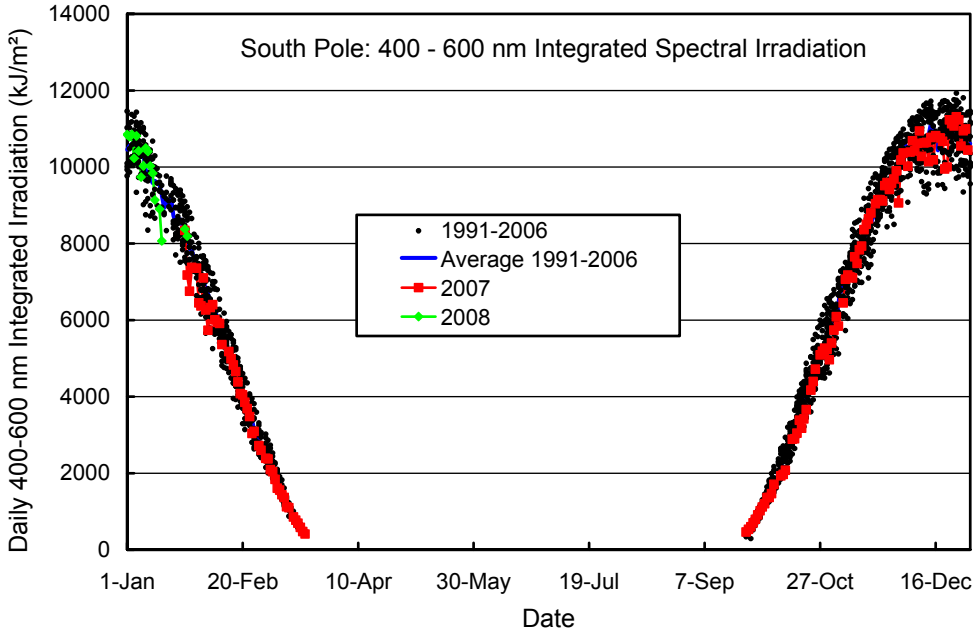


**Figure 7.3.6.** *Daily irradiation of the 400-600 nm band at South Pole. Measurements from 2007 and 2008 are contrasted with individual data points and the average of measurements taken between 1991 and 2006.*