

7.7. Summit, Greenland

The instrument at Summit was installed in August 2004. UV measurements from the years 2004-2009 are compared in the following.

On 1 August 2008, a partial solar eclipse was visible at Summit. The moon started to block the Sun at 08:16 UT. The time of maximum eclipse was 09:17 UT; the end of the eclipse was at 10:13 UT. The period was mostly cloud-free. Figure 7.7.1 shows the UV Index measured by GUV-511 and SUV-100 during the time of the eclipse.

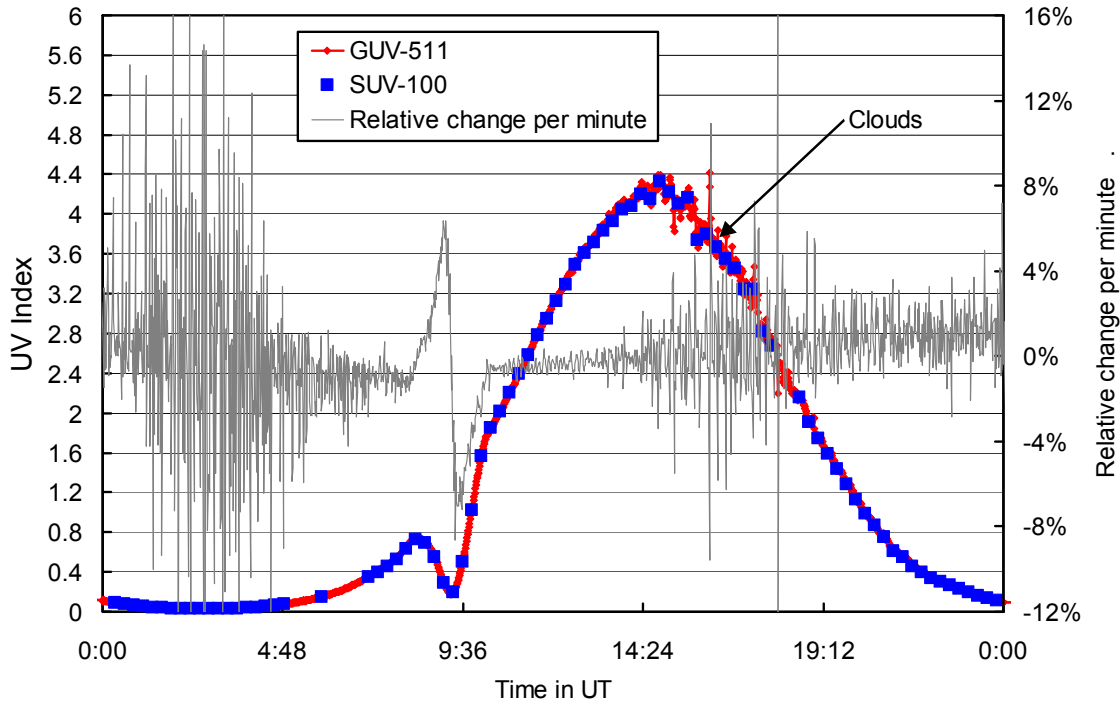


Figure 7.7.1. UV Index measured by SUV-100 and GUV-511 radiometers during the time of the solar eclipse on 7 February 2008. The minute-by-minute change (right axis) was calculated from GUV-511 data.

Figure 7.7.2 shows total ozone measured by satellites between 1991 and 2009. Total ozone in February and March of 2007 was substantially below the long-term average, while value in 2008 and 2009 were above average. However, there were several short periods in April, May and June of 2008 and 2009 when total ozone was well below the average. Most notable is 6 April 2008 when total ozone was almost 100 DU below the mean.

Figure 7.7.3 shows UV irradiance integrated over the wavelength range of 298.51 - 303.03 nm. UV levels depend strongly on the height of the Sun above the horizon. UV intensities on 6 April 2008 spiked but remained low. Variability is considerably larger in spring than fall due to the higher ozone variations earlier in the year.

Figure 7.7.4 and Figure 7.7.5 show the noon-time UV Index and DNA-weighted daily dose, respectively. Variability is smaller compared to the short-wavelength integral depicted in Figure 7.7.3 due to the smaller ozone-sensitivity of those quantities.

Figure 7.7.6 shows measurements in the 337.5-342.5 nm band, integrated over 24 hours. This band is not affected by the atmospheric ozone content. Data show remarkable little day-to-day variation and change

from one year to the next. On one hand, this is a confirmation of the consistency of calibrations applied during the four years of operation. On the other hand, the low level of variability is also a consequence of constant, high surface albedo at Summit, which mitigates attenuation of UV radiation by clouds.

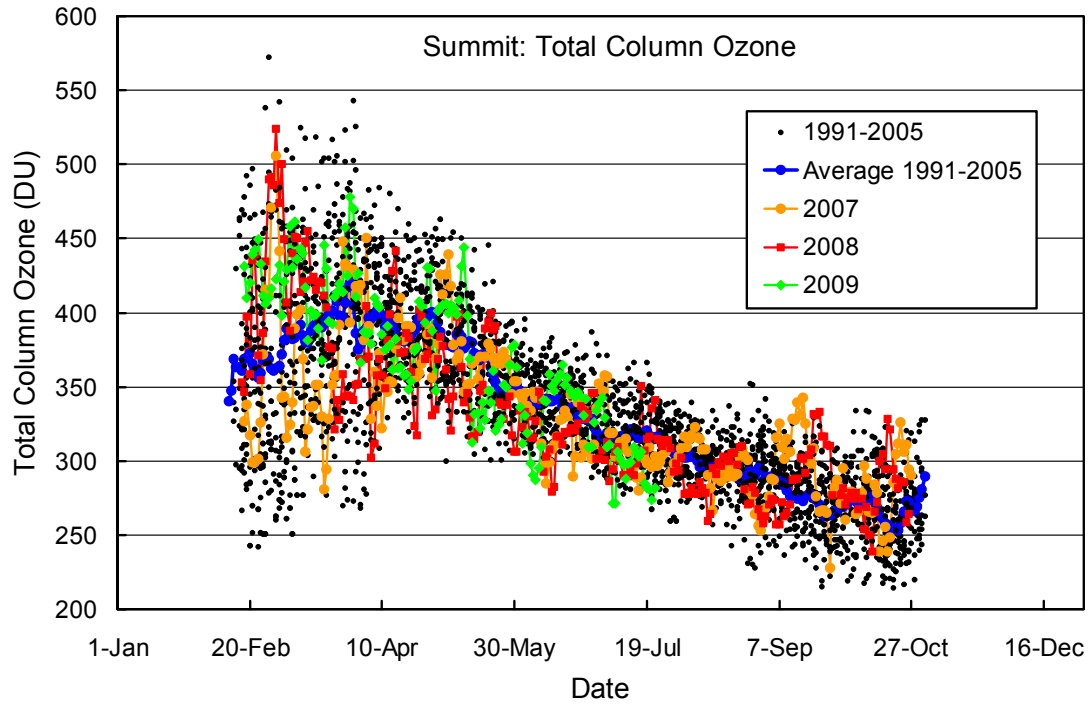


Figure 7.7.2. Total column ozone at Summit. Data were provided by TOMS/Nimbus7 (1991-1993), TOMS/Earth Probe (1996-2004) and OMI (2005-2009).

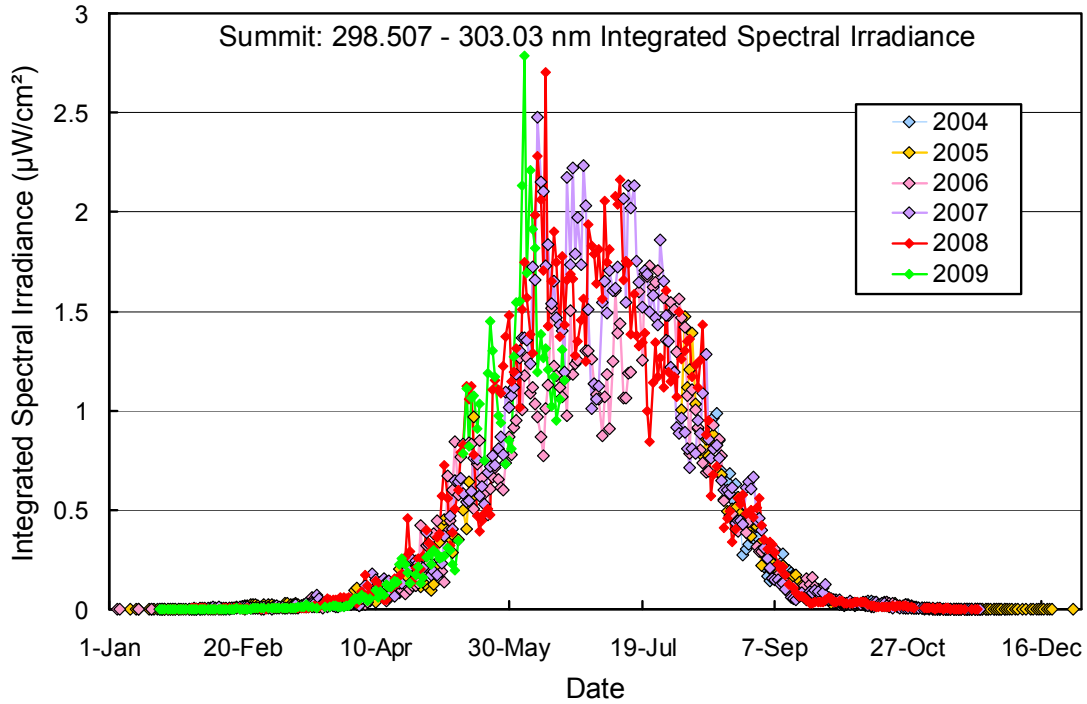


Figure 7.7.3. Noon-time integrated spectral UV irradiance (298.51 - 303.03 nm) at Summit of the years 2004-2009.

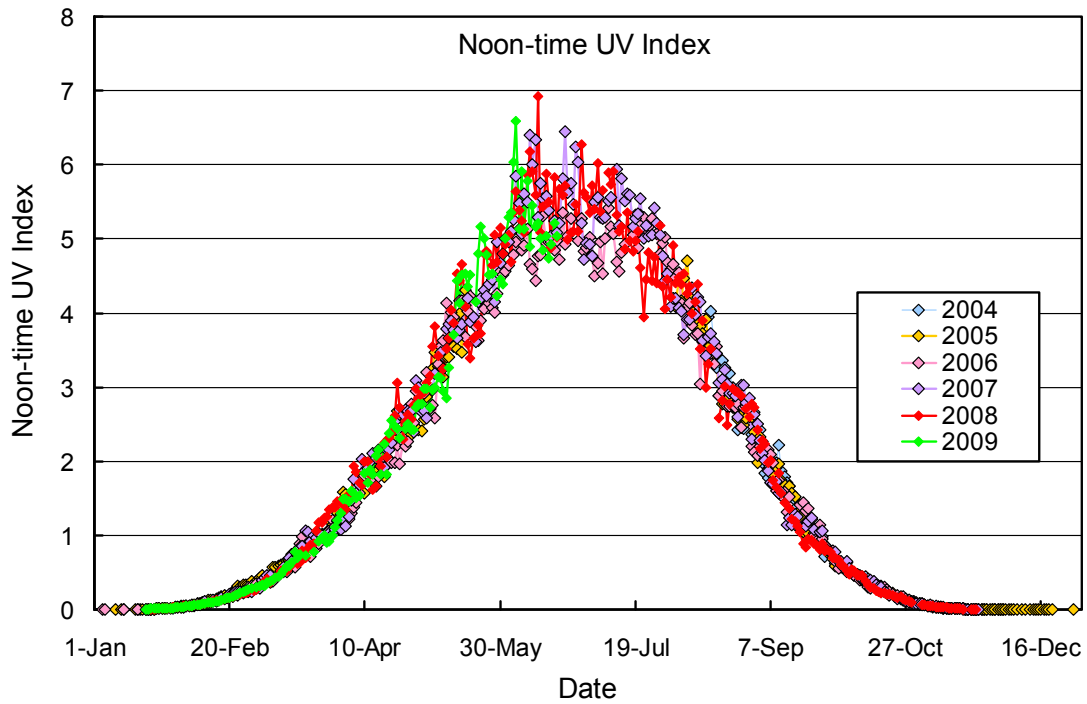


Figure 7.7.4. Noon-time UV Index at Summit of the years 2004-2009.

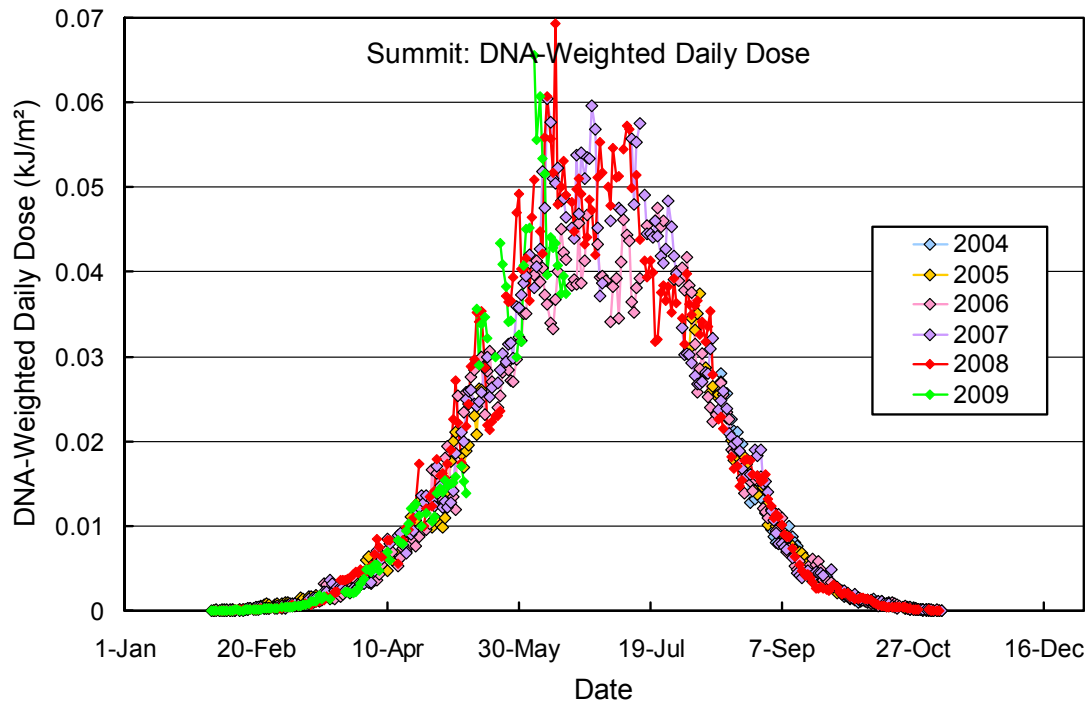


Figure 7.7.5. DNA-weighted daily dose at Summit of the years 2004-2009.

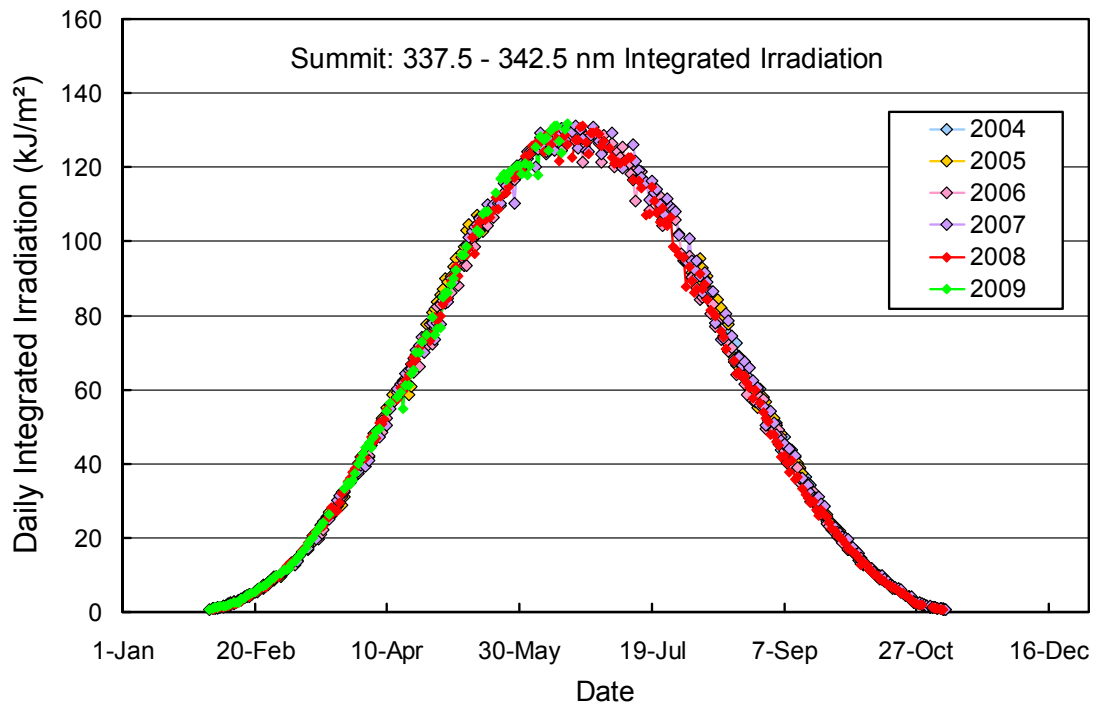


Figure 7.7.6. Daily irradiation of the 337.5-342.5 nm band for Summit using data of the years 2004-2009.