

7.7. Summit, Greenland

The instrument at Summit was installed in August 2004. UV measurements from the years 2004-2010 are compared in the following.

Figure 7.7.1 shows total ozone measured by satellites between 1991 and 2010. Total ozone in February and early March of 2010 was substantially above the long-term average while ozone values measured during other times of 2009 and 2010 were generally varying about the long-term average. However, there were several short periods in 2009 and 2010 when total ozone was well below the average. Most notable is the period of 19-22 August 2010 when total ozone was about 60 DU below the mean.

Figure 7.7.2 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. There is a spike in UV intensities on 20 August, which is coinciding with the period of low ozone. Variability is considerably larger in spring than fall due to the higher ozone variations earlier in the year. The low ozone values of February and March 2010 occurred during a time when the solar elevation was smaller than 15° . For these elevation angles, UV irradiances in the 298.51 - 303.03 nm interval are very small and the effect of the low ozone values is therefore not obvious in Figure 7.7.2.

Figure 7.7.3 and Figure 7.7.4 show the daily maximum UV Index and the DNA-weighted daily dose, respectively. Variability is smaller compared to the short-wavelength integral depicted in Figure 7.7.2 due to the smaller ozone-sensitivity of those quantities.

Figure 7.7.5 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.

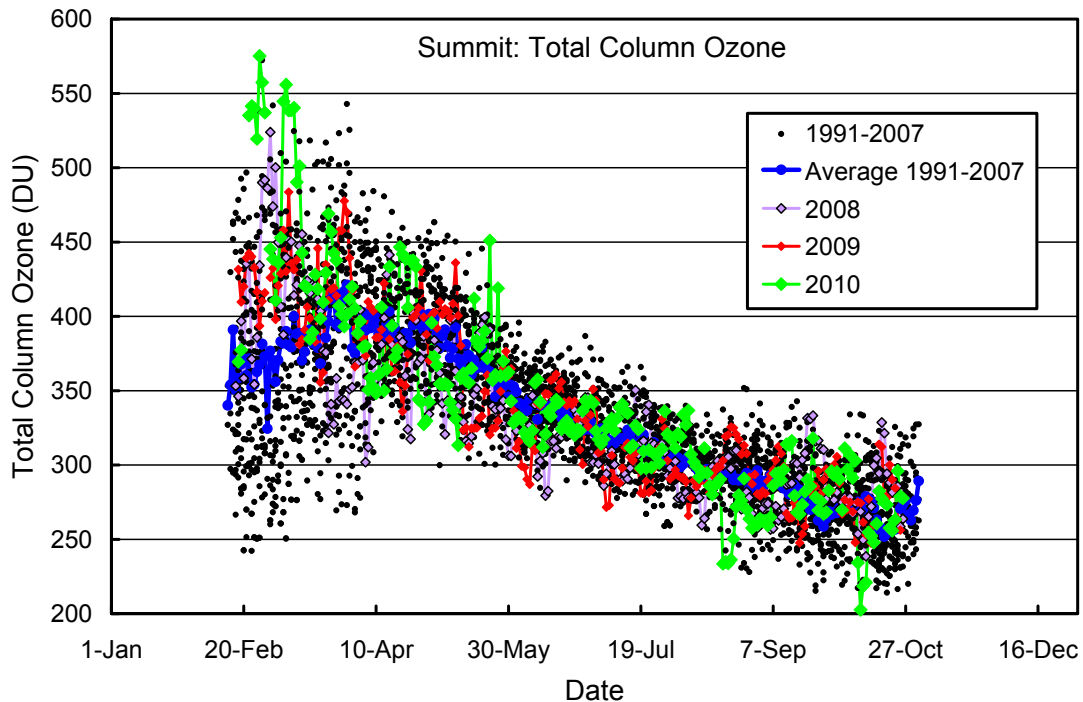


Figure 7.7.1. Total column ozone at Summit. Data were provided by TOMS/Nimbus7 (1991-1993), TOMS/Earth Probe (1996-2004) and OMI (2005-2010).

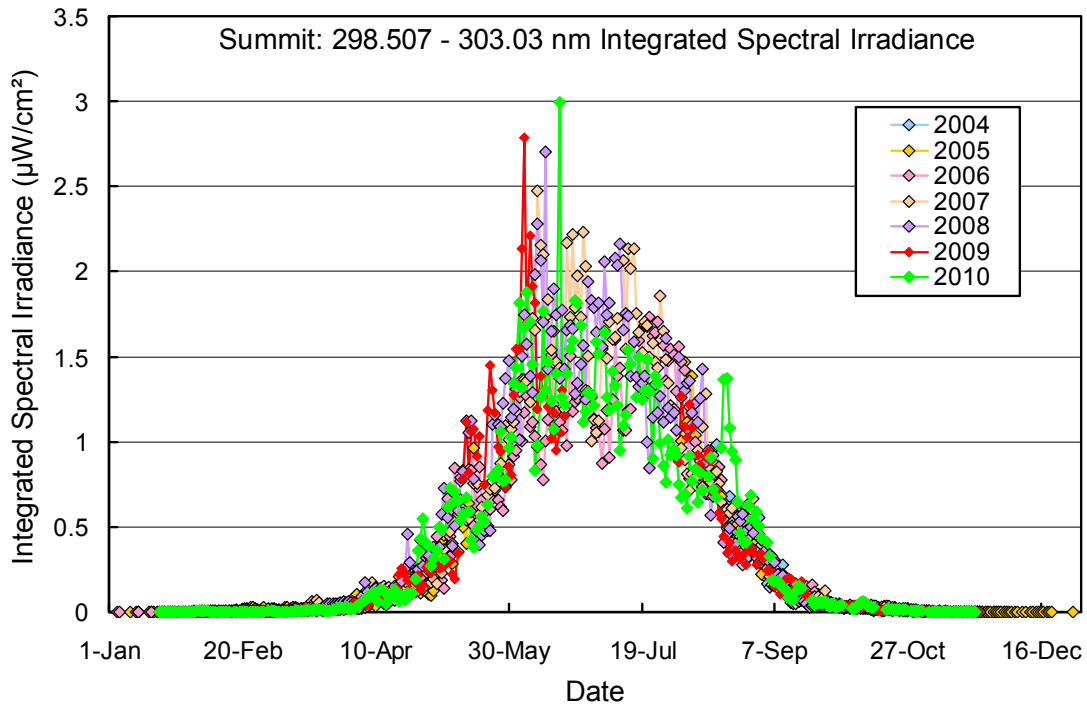


Figure 7.7.2. Noon-time integrated spectral UV irradiance (298.51 - 303.03 nm) at Summit of the years 2004-2010.

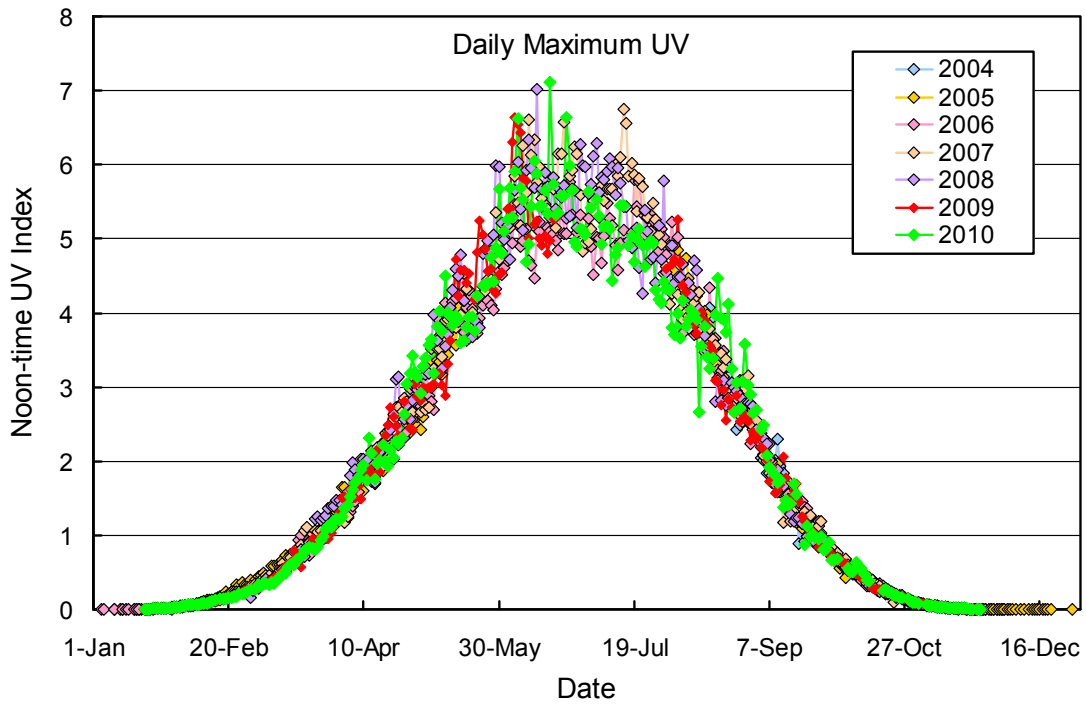


Figure 7.7.3. Daily maximum UV Index at Summit of the years 2004-2010.

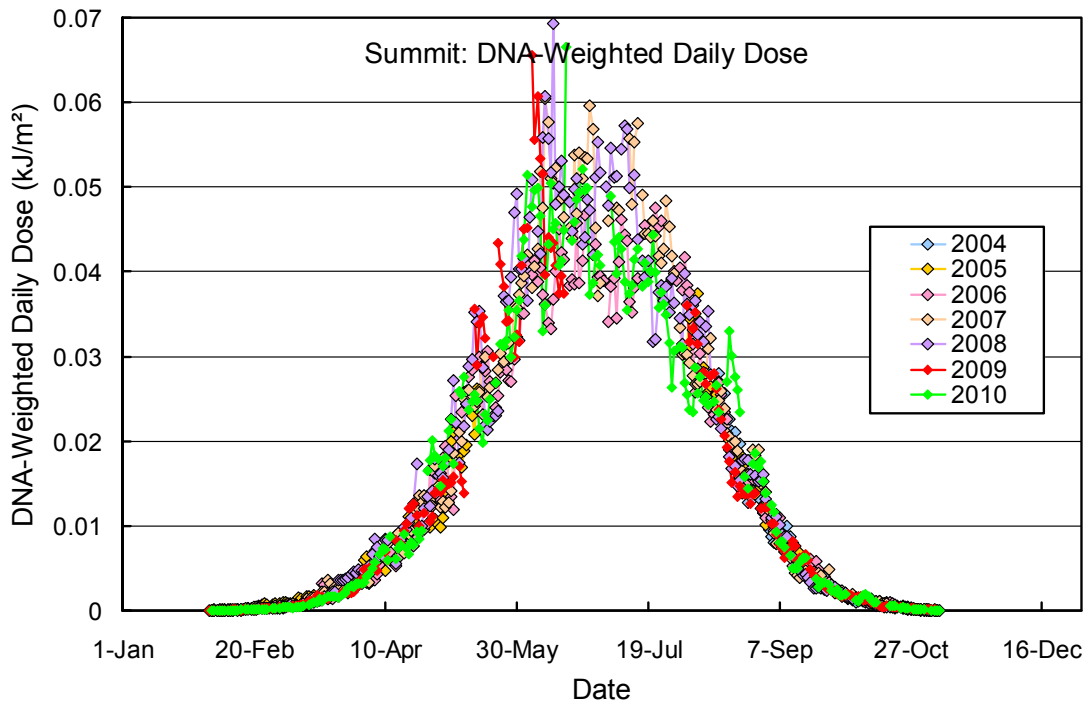


Figure 7.7.4. DNA-weighted daily dose at Summit of the years 2004-2010.

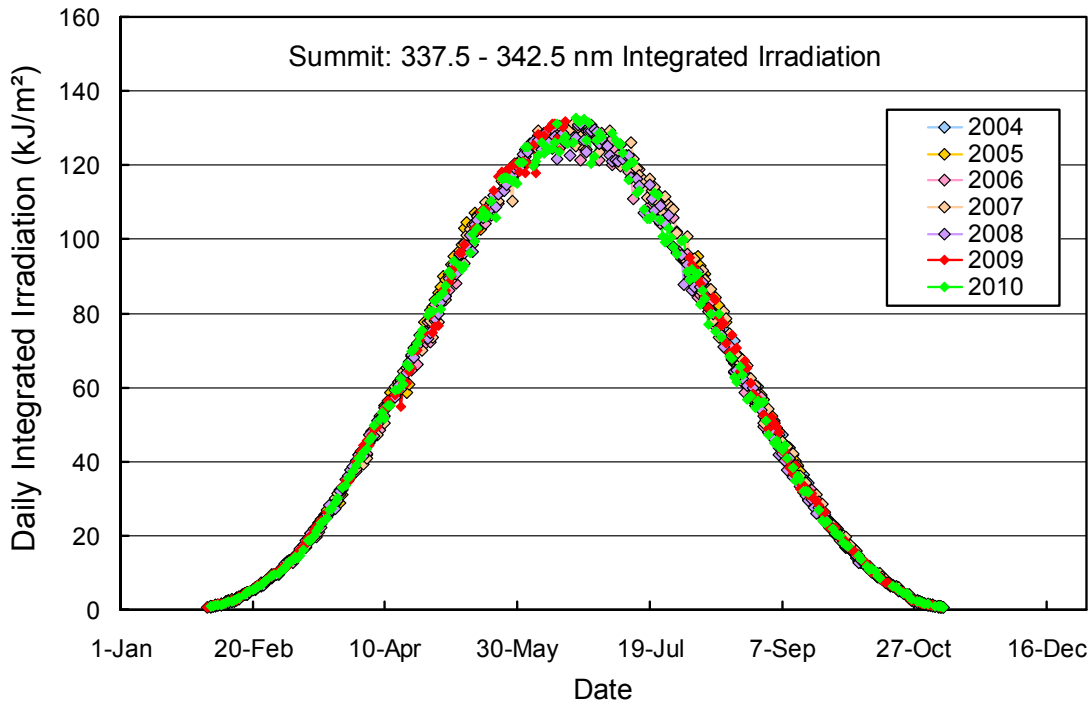


Figure 7.7.5. Daily irradiation of the 337.5-342.5 nm band for Summit using data of the years 2004-2010.