7.7. Summit, Greenland

The instrument at Summit was installed in August 2004. This is the third volume presenting data from this site. UV measurements from the years 2004-2007 are shown.

Partly due to unusually low temperatures in the Arctic lower stratosphere, stratospheric ozone depletion in January and February 2005 was the second highest ever recorded in the Arctic. Larger losses in ozone were only observed during the winter of 1999/2000. Despite near-record levels of chemical ozone destruction, other atmospheric processes—such as influx of ozone-rich air from mid-latitudes into the polar region—restored ozone amounts to near average levels by March 2005. Total ozone in 2006 dropped to 268 DU on March 19 when ozone poor airmasses were advected from the subtropics.

Total ozone in the summer of 2007 was considerably lower than in the summer of 2006 (the first year with continuous recordings between May and August). UV levels in the summer of 2007 were therefore markedly higher than in the year before. In Figure 7.7.1, satellite total column ozone data from 2005-2007 are compared with ozone records from the years 1991-2004. Total ozone in February 2005 was lower than observations from all previous years. The difference in ozone between 2006 and 2007 can also clearly be seen.

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. Solar elevations remain below 10º in February. UV intensities in February of 2005 were therefore low despite the small ozone concentrations in that year. Measurements in June 2007 were on average 45% larger than measurements in June 2006. Figures 7.7.3 and 7.7.4 show the noon-time UV Index and DNA-weighted irradiance, respectively. Also these quantities indicate larger UV levels in the summer of 2007.

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.

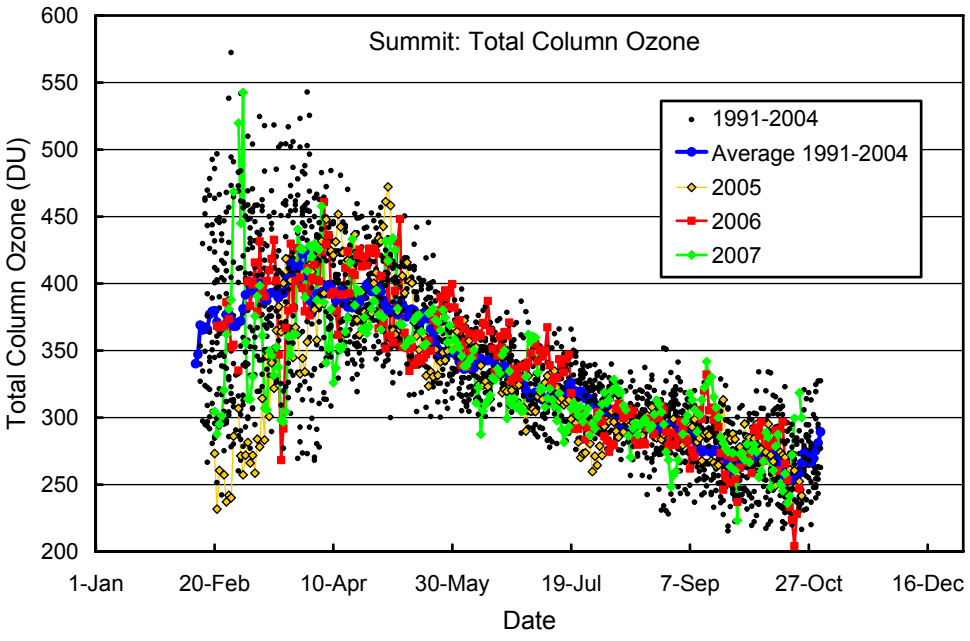

Figure 7.7.1. *Total column ozone at Summit. Data were provided by TOMS/Nimbus7 (1991-1993), TOMS/Earth Probe (1996-2004) and OMI (2005-2007).*

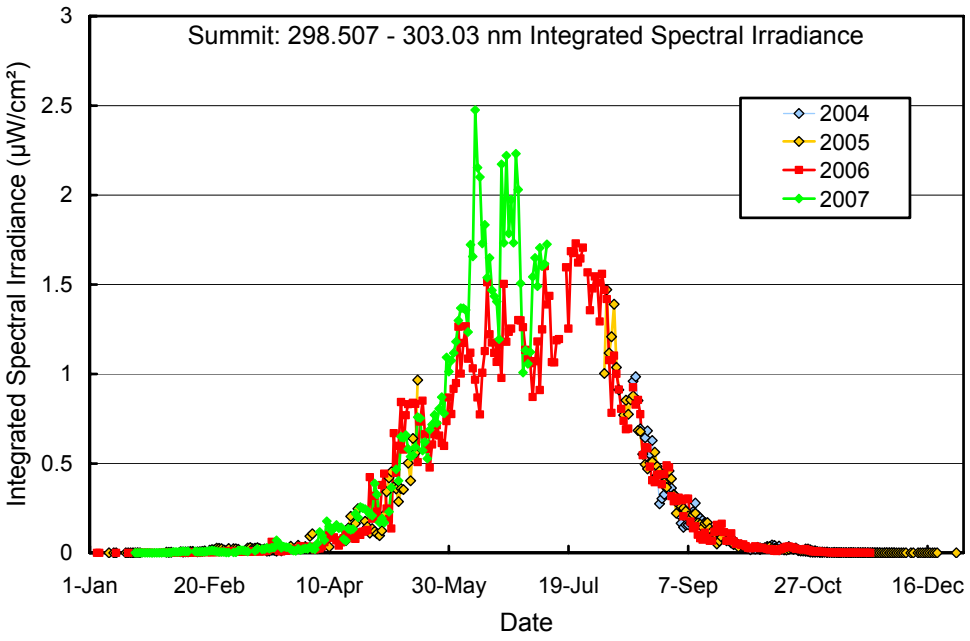

Figure 7.7.2. *Noon-time integrated spectral UV irradiance (298.51 - 303.03 nm) at Summit of the years 2004-2007.*

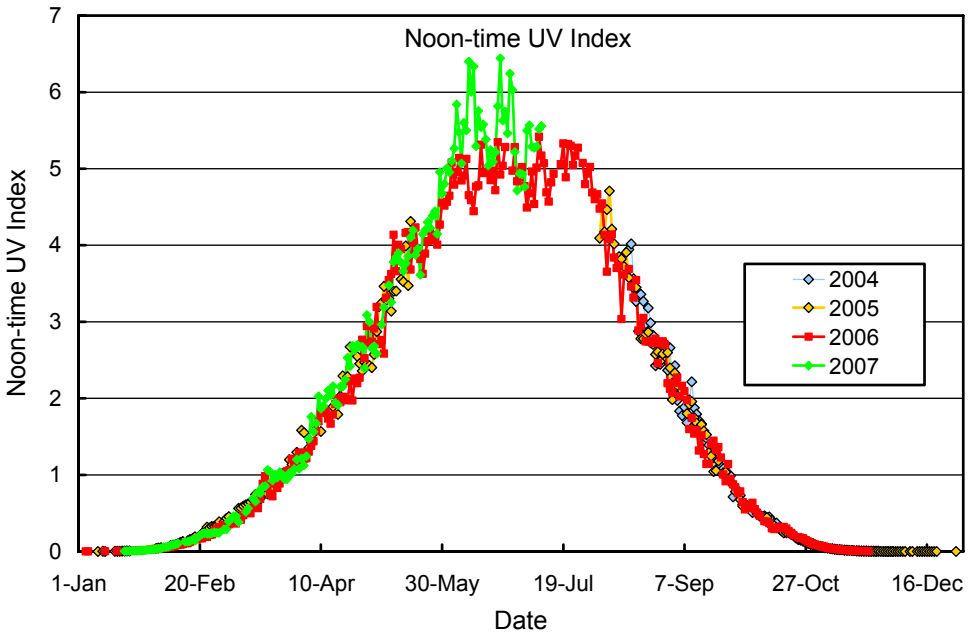

Figure 7.7.3. *Noon-time UV Index at Summit of the years 2004-2007.*

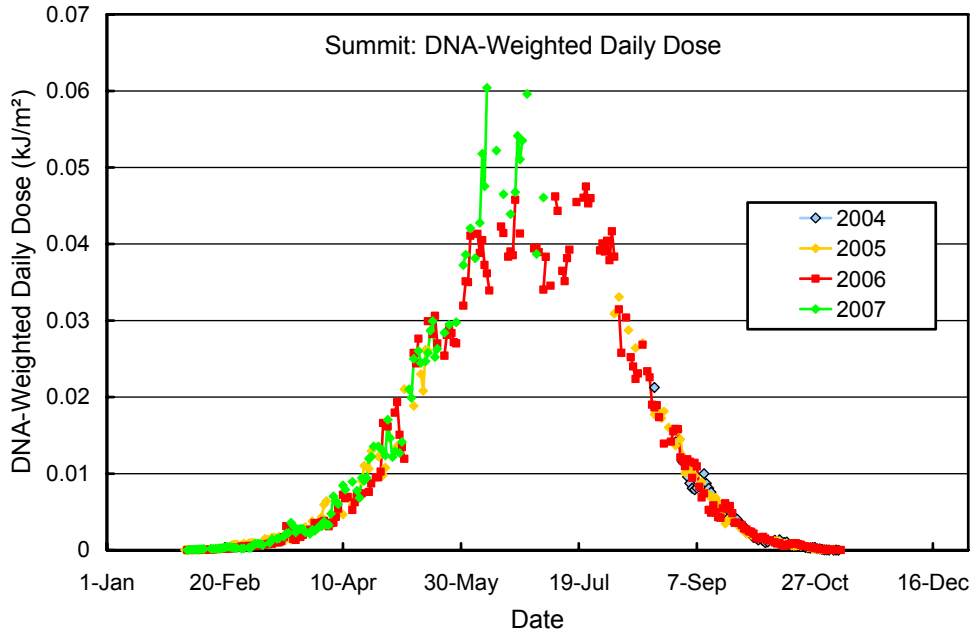

Figure 7.7.4. *DNA-weighted daily dose at Summit of the years 2004-2007.*

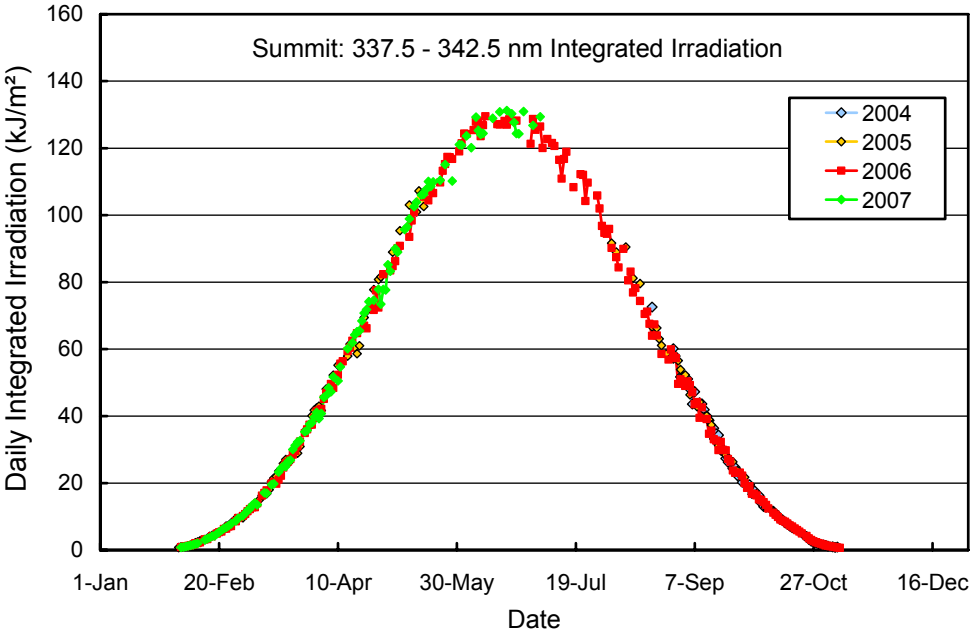

Figure 7.7.5. *Daily irradiation of the 337.5-342.5 nm band for Summit using data of the years 2004-2007.*