

There are two methods to calculate the UV Index from GUV measurements, a simple and a more advanced method. The UV Index discussed here refers to the action for erythema (sunburn) as defined in the CIE norm by McKinlay and Diffey (1987).

1. Simple method

The simple method is described in the BSI Application Note "[GUV Diffey Dose Calculations.pdf](#)". In brief, the UV Index is calculated from a linear combination of measurements of the GUV channels at 305, 320, and 340 nm:

$$\text{UV Index} = a_1 E_{305} + a_2 E_{320} + a_3 E_{340}$$

where $a_1 = 0.8911$, $a_2 = 0.0818$, and $a_3 = 0.007751$. These coefficients refer to the "2B. Coefficients for 96 UV INDEX" listed in Table 1 of the aforementioned application note.

E_{305} ,
 E_{320} , and
 E_{340}
are spectral irradiances at 305, 320, and 340 nm, which are calculated by applying offsets and scale factors to the GUV's measurements as described in the instrument's calibration certificate.

If a GUV radiometer is equipped with a channel at 313 nm, the UV Index can also be calculated from a linear combination of measurements of four GUV channels, namely 305, 313, 320, and 340 nm:

$$\text{UV Index} = a_1 E_{305} + a_2 E_{313} + a_3 E_{320} + a_4 E_{340}$$

where $a_1 = 0.8058$, $a_2 = 0.0887$, $a_3 = 0.0324$, and $a_4 = 0.0131$. Using measurements of four, rather than three, channels lead to slightly more accurate results, in particular for low-sun conditions.

2. Advanced method

An alternative method of calculating the UV Index from GUV measurements is described by Bernhard et al. (2005). The paper is available at <http://www.biospherical.com/nsf/presentations/OEUV-12.pdf>. This is the method implemented by the NSF UV Monitoring Network. The method requires measurements of the GUV's spectral response functions plus associated calibration factors.

References

Bernhard, G., C.R. Booth, and J.C. Ehramjian. (2005). Real-time ultraviolet and column ozone from multichannel ultraviolet radiometers deployed in the National Science Foundation's ultraviolet monitoring network. *Opt. Eng.*, **44**(4), 041011-1 — 041011-12.

McKinlay, A.F., and B.L. Diffey (Eds.). (1987). A reference action spectrum for ultraviolet induced erythema in human skin, *CIE Res. Note*, **6**(1), 17–22.