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Temperature dependence of the Brewer global UV measurements

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Temperature correction methodology

The corrected irradiance $I(\lambda)$ at each wavelength λ, is derived by dividing the measured signal $I_m(\lambda)$ with the provided correction factor $cf(\lambda)$:

$$I(\lambda)=I_m(\lambda)/cf(\lambda) \quad \text{(S1)}$$

For the three different TRs (TR1, TR2, TR3), different correction factors are used ($cf_1(\lambda)$, $cf_2(\lambda)$ and $cf_3(\lambda)$ respectively). Assuming that the limit that separates TR1 from TR2 is T_{12} and the limit that separates TR2 from TR3 is T_{23}, that the reference temperature T_r is above T_{12} and that the measured temperature is T, the correction factor for each TR is calculated as follows:

If T is in TR3:

$$cf_3(\lambda)=1+c_3(\lambda)\cdot(T- T_r) \quad \text{(S2)}$$

If T is in TR2

$$cf_2(\lambda)=1+c_3(\lambda)\cdot(T_{23}- T_r)+c_2(\lambda)\cdot(T-T_{23}) \quad \text{(S3)}$$

If T is in TR1

$$cf_1(\lambda)=1+c_3(\lambda)\cdot(T_{23}- T_r)+c_2(\lambda)\cdot(T_{12}-T_{23})+c_3(\lambda)\cdot(T-T_{12}) \quad \text{(S4)}$$

The factors c_i represent the slopes of the linear fits that describe the change of the response relative to its mean value at 25°C. For TR1 and TR3 the slopes are considered to be equal, thus $c_1=c_3$. The slopes are calculated using the 2nd degree polynomials of the form:

$$c_i= a_0+a_1\cdot\lambda+ a_2\cdot\lambda^2 \quad \text{(S5)}$$

Where λ is in nm.

For each of the eight Brewers the coefficients a_i are listed in Table S1:

Table S1: Polynomial coefficients for the calculation of the factors c_i

	c_2			c_3		
	a_0	a_1	a_2	a_0	a_1	a_2
B005	$4.4893\cdot10^{-1}$	$-2.9025\cdot10^{-3}$	$4.7435\cdot10^{-6}$	$7.9069\cdot10^{-3}$	$-9.5882\cdot10^{-5}$	$2.3101\cdot10^{-7}$
B030	$3.1543\cdot10^{-2}$	$-1.3833\cdot10^{-4}$	$1.3444\cdot10^{-7}$	$3.6563\cdot10^{-1}$	$-2.4422\cdot10^{-3}$	$4.0561\cdot10^{-6}$
B037	$6.5404\cdot10^{-2}$	$-4.3741\cdot10^{-4}$	$7.6786\cdot10^{-7}$	$-1.1733\cdot10^{-1}$	$6.8329\cdot10^{-4}$	$-1.0034\cdot10^{-6}$
B078	$-1.5890\cdot10^{-1}$	$1.0147\cdot10^{-3}$	$-1.6146\cdot10^{-6}$	$-1.0490\cdot10^{-1}$	$6.2536\cdot10^{-4}$	$-9.4557\cdot10^{-7}$
B086	$5.8431\cdot10^{-4}$	$-4.0802\cdot10^{-6}$	$2.6727\cdot10^{-8}$	$5.0069\cdot10^{-2}$	$-3.3678\cdot10^{-4}$	$5.4584\cdot10^{-7}$
B107	$1.2845\cdot10^{-2}$	$-8.3061\cdot10^{-5}$	$1.6346\cdot10^{-7}$	$8.6595\cdot10^{-3}$	$-9.6526\cdot10^{-5}$	$2.1427\cdot10^{-7}$
B185	$-1.7469\cdot10^{-2}$	$1.1939\cdot10^{-4}$	$-1.9244\cdot10^{-7}$	$-1.8323\cdot10^{-2}$	$1.1823\cdot10^{-4}$	$-1.9286\cdot10^{-7}$
B214	$-1.4689\cdot10^{-2}$	$9.4794\cdot10^{-5}$	$-1.4453\cdot10^{-7}$	$2.7264\cdot10^{-2}$	$-1.8451\cdot10^{-4}$	$2.9582\cdot10^{-7}$