Measurement of Circadian Effective Irradiance and Radiant Exposure (Dose)

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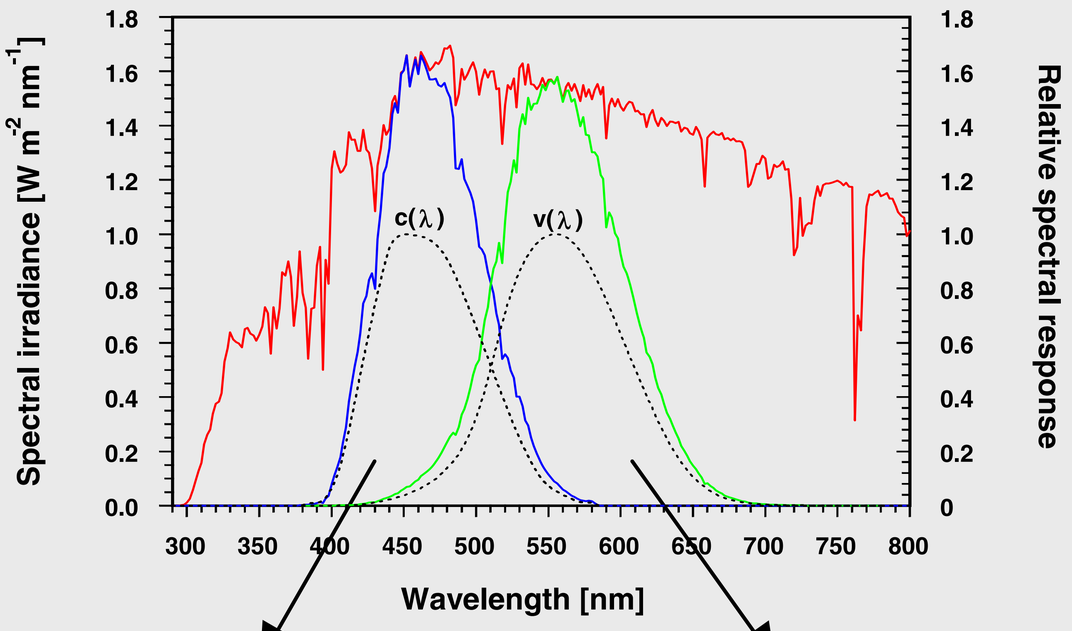
Many biological processes are controlled by optical radiation. Only recently, the responsible circadian photo sensors on the retina have been discovered, and their action spectrum has been measured (1,2). By using these experimental data, the circadian action spectrum c(λ) was defined concerning the melatonin suppression (3) which differs from the action spectrum for visual effects v(λ).

radiation → **eye**

e.g. solar irradiance E(λ)

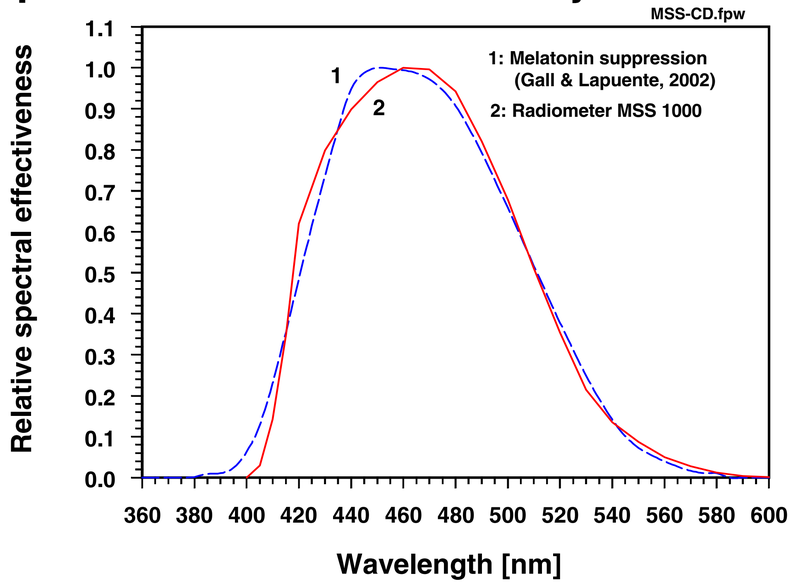
action spectra c(λ) of melatonin suppression and action spectrum v (λ) for visual effects



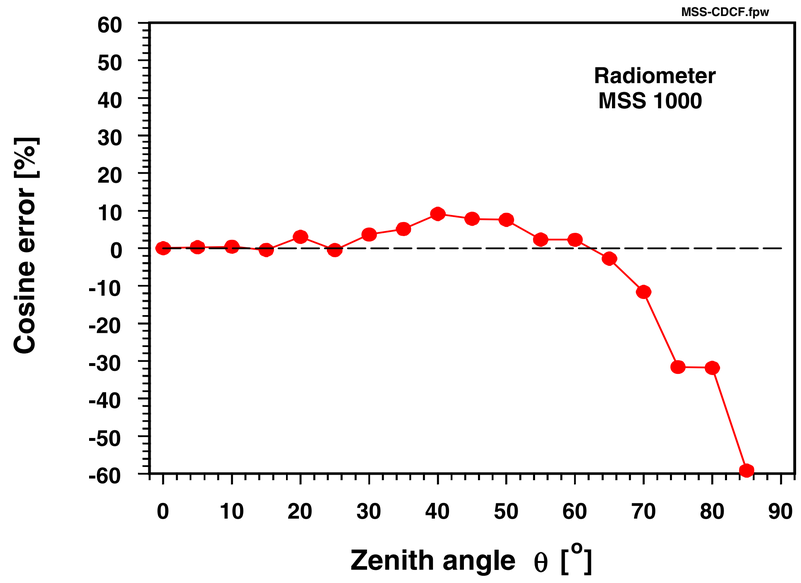
circadian effective irradiance $E_c = \int E(\lambda)\, c(\lambda)\, d\lambda$ **illuminance $E_v = \int E(\lambda)\, v(\lambda)\, d\lambda$**

Properties of the Radiometer MSS 1000

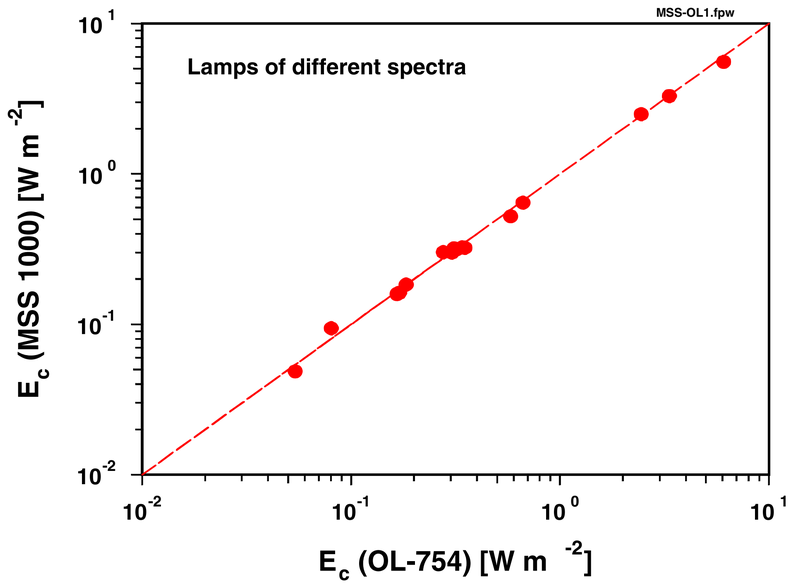
Spectral effectivness well adjusted to c (λ)



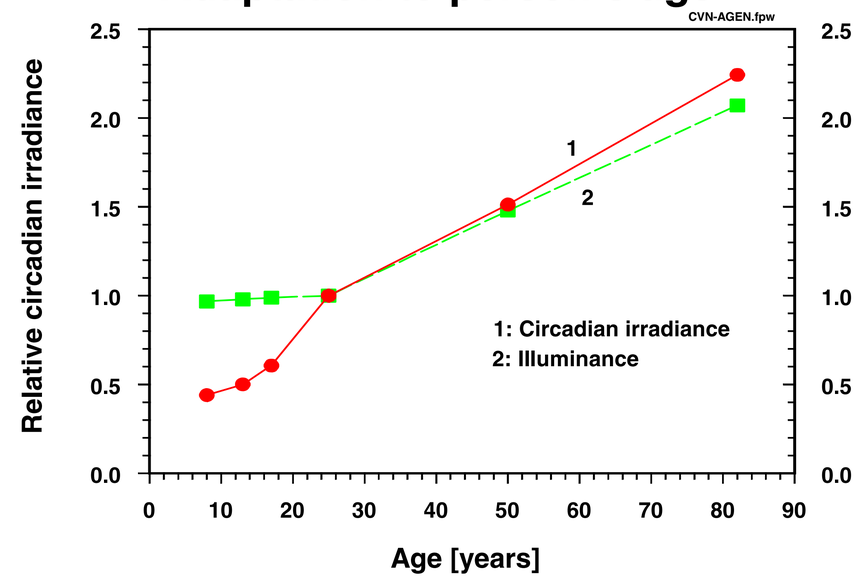
Cosine error +/- 7 % for 0 < Θ < 70



Comparison with spectroradiometer



Adaptation to person‘s age



Conclusion: MSS 1000 is able to measure the circadian effective irradiance E_c the circadian effective radiant exposure (dose) $H_c = \int E_c\, dt$ and in addition optionally the illuminance E_v to correct eye adaption. MSS 1000 is intended for scientific use and basic research as well as for practical application like measurements at workplaces.

References:

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(2) Thapan, K., Arendt, J. and D.J. Skene: An action spectrum for melatonin suppression: evidence for a novel non-rod, non-cone photoreceptor system in humans.- *J. Physiol* 535.1 (2001) 261-267.

(3) Gall, D. und V. Lapuente: Beleuchtungsrelevante Aspekte bei der Auswahl eines förderlichen Lampenspektrums.- *Licht* (Heft 7/8), Mai 2002.