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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Utilising shade to optimize UV exposure for vitamin D" *by* D. J. Turnbull and A. V. Parisi

Anonymous Referee #2

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This paper starts by describing the health effects for humans of solar ultraviolet radiation - beneficial from vitamin D induced in the skin by small UVB-exposures, and detrimental from acute and chronic skin damages from overexposures of both UVB and UVA. The paper lists references that UVB-irradiation possibly is the main source of vitamin D for many people and cites recommendations of solar exposures in excess of suberythemal doses adequate for vit-D induction but below exposures causing erythema. Unfortunately nutritional vit-D is neglected and its possible impact on such recommendations is not discussed. The authors then go about to describe their measurements of diffuse and global solar UV and how they from these measurements estimate how vit-D optimised exposures vary during changing solar and weather conditions.

The result is partly a description how the shortwave component (UVB) relates to the longwave component (UVA) of the diffuse and the total global solar ultraviolet radiation during changing cloud conditions - facts which have been known in principle during decades in the past and with varying degree of data accuracy. However the authors do prove it again and apply their extensive measurements to calculate optimal exposure times in the shade as well as in the sun.

The novel angle is to optimise these exposure times for suberythemal doses and vit-D - as it can be calculated with CIE´s newly published vit-D action spectrum. A merit of the paper is that it mentions how unsafe shade can be - if there isn´t enough of it. However the shade over the measurements is a shadow band. Values provided in the paper are for an unblocked sky view - with only the direct UV-radiation from the solar disc blocked. This is of course unrealistic. Thus the values merely are of principal interest rather than useful in practice. E.g. the shade of a flagpole is of little use for sun protection - and at present after a couple of decades of sun-sense campaigns and information in many countries of the world this should hopefully be widely understood among the public. The authors do note that real shades usually are different, and that this diminishes the value of the findings, but still the paper would benefit from a more informative discussion of the consequences of shade structures covering more or less large parts of sky. Besides it could be noted that most people are exposed to both direct solar and diffuse global UV (e.g. when walking to and from lunch). Both components contribute to some vit-D induction and starts adding to a possible erythema. In addition people are exposed to some usually unknown fraction of diffuse UV (e.g. while lunching). Without a more informative discussion of realistic shades, or perhaps optimal shades, the novelty part and per se interesting angle of view of the paper boils down to the old saying: The sun is best enjoyed in the shade.

A minor technicality: The authors state: "The synthesis of pre-vitamin D3 is initiated through exposure of human skin to terrestrial UV radiation from 290 to 330 nm". This is not quite right. The CIE-action spectrum for vit-D3 extends to 330 nm. However the

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CIE references find an effect only up to 315 nm. This is stated in the referenced CIE-report - although of little consequence for weighting of solar spectra. The remaining part of the vit.-D action spectrum, up to 330 nm, is by CIE stated to be an extrapolation - i.e. for cosmetic reasons.

Interactive comment on Atmos. Chem. Phys. Discuss., 8, 781, 2008.