



“Gheorghe Asachi” Technical University of Iasi, Romania



MODEL FOR THE UV BIOLOGICALLY EFFECTIVE DOSE AND APPLICATION UNDER FUTURE CLIMATE CONDITIONS

**Nicoleta Stefu^{1*}, Marius Paulescu¹, Paul Gravila¹,
Eugenia Paulescu¹, Nicolina Pop², Remus Boata¹**

¹*West University of Timisoara, Physics Department, V Parvan 4, 300223 Timisoara, Romania*

²*“Politehnica” University of Timisoara, Department of Physical Foundations of Engineering, V Parvan 2,
300223, Timisoara, Romania*

Abstract

A model for parametric atmospheric transmittance in the UV range, embedding a biological action spectrum is reported. The resulting equations may be used straightforwardly for an algebraic calculation of the effective solar irradiance under clear sky and of the biological dose. Following the procedures described in the paper, various action spectra can be encapsulated into the atmospheric transmittance, besides the generalized plant response action spectrum used as example, leading to a collection of tools able to estimate UV radiation effects on ecosystems. As illustration of the model’s usage, three ozone column contents predicted by future climate scenarios are used as input, in order to evaluate their effect on green plants. For a proper distinction between the UV physical radiation and its biological effectiveness, a unit of measurement for the biological effective UV dose is proposed. The unit comprises the biological effect and the normalization wavelength of the action spectrum.

Key words: action spectrum, atmospheric transmittance, effective dose, model, ultraviolet solar radiation

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* Author to whom all correspondence should be addressed: e-mail: nstefu@gmail.com; Fax: +40-256-592383