



## **Harmful and favourable ultraviolet conditions for human health over Northern Eurasia**

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We provide the analysis of the spatial and temporal distribution of ultraviolet (UV) radiation over Northern Eurasia taking into account for both its detrimental (erythema and eye-damage effects) and favourable (vitamin D synthesis) influence on human health. The UV effects on six different skin types are considered in order to cover the variety of skin types of European and Asian inhabitants. To better quantifying the vitamin D irradiance threshold we accounted for an open body fraction  $S$  as a function of effective air temperature. The spatial and temporal distribution of UV resources was estimated by radiative transfer (RT) modeling (8 stream DISORT RT code) with 1x 1 degree grid and monthly resolution. For this purpose special datasets of main input geophysical parameters (total ozone content, aerosol characteristics, surface UV albedo, UV cloud modification factor) have been created over the territory of Northern Eurasia, which can be of separate interest for the different multidisciplinary scientific applications over the PEEEX domain. The new approaches were used to retrieve aerosol and cloud transmittance from different satellite and re-analysis datasets for calculating the solar UV irradiance at ground. Using model simulations and some experimental data we provide the altitude parameterization for different types of biologically active irradiance in mountainous area taking into account not only for the effects of molecular scattering but for the altitude dependence of aerosol parameters and surface albedo. Based on the new classification of UV resources (Chubarova, Zhdanova, 2013) we show that the distribution of harmful (UV deficiency and UV excess) and favorable UV conditions is regulated by various geophysical parameters (mainly, total ozone, cloudiness and open body fraction) and can significantly deviate from latitudinal dependence. The interactive tool for providing simulations of biologically active irradiance and its attribution to the different classes of UV resources is demonstrated.

Reference:

Natalia Chubarova, Yekaterina Zhdanova. Ultraviolet resources over Northern Eurasia, *Photochemistry and Photobiology*, Elsevier, 127, 2013, p. 38-51