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# The assessment of UV resources over northern Eurasia

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The objective of this study was to identify the features of spatial and temporal distribution of UV resources over Northern Eurasia using RT modelling with the 1x1 degree grid. For this purpose the dataset of main input geophysical parameters has been prepared which includes total ozone content, radiative characteristics of aerosol properties, surface UV albedo, and effective cloud attenuation. The aerosol parameters necessary for computations were taken from a specially developed aerosol climatology, which has been created on the base of satellite MODIS retrievals (collection 5), ground-based AERONET dataset and Russian national radiative network. A special attention was paid to estimating the uncertainties of MODIS dataset, which has the largest biases in aerosol optical thickness in spring conditions over northern areas and in Siberia. When evaluating cloud attenuation we used an original approach to obtain more accurate UV retrievals in conditions with high surface UV albedo (Chubarova, Zhdanova, 2012, submitted). The proposed method is based on presenting one pixel of TOMS/OMI LER data in a form of two components: the clear and cloudy ones evaluating from weighted coefficients, which are obtained from independent cloud amount dataset.
Since no unified approach has been recently developed for the definition of vitamin D3 radiation threshold, we use, in addition to what was recommended in CIE 2006, a dependence of UV exposure on human open body square area S, which is a function of effective air temperature. A numerical dependence has been obtained between S and effective air temperature, which enable us to calculate the spatial and temporal distribution of vitamin D3 irradiance threshold for different skin types with the 1x1 degree grid. Depending on whether vitamin D irradiance doses do not reach the threshold within an hour near solar noon or during the day, we propose to define two types of UV insufficiency: noon UV insufficiency and 100% UV insufficiency. We also propose to set two types of UV optimum as well as 4 categories of UV excess depending on the thresholds for erythemally weighted irradiance (Chubarova, Zhdanova, 2012).
On the basis of this classification and numerical RT calculations the UV resources were evaluated for clear and cloudy conditions for different months of the year over Northern Eurasia. We discussed the results for different skin types and compared them with other data. In addition, the comparisons have been made with the results of calculations fulfilled within the framework of the European project COST726, as well as direct EW irradiance measurements at the Meteorological Observatory of Moscow State University.

References:
Chubarova N.Ye. Zhdanova Ye. Yu. UV resources over the territory of Russia in clear sky conditions. Vestnik MGU. Series 5. Geography. In press. 2012.