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Title: *Modelling of erythemally effective UV radiation in high-latitude locations*

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Recent changes in the polar stratosphere are well documented by a large-scale ozone depletion over the Antarctic and Arctic regions. They have led to an increase in ultraviolet radiation (UV) reaching the polar ecosystems. According to the wavelength, UV radiation is commonly divided into three regions: UVC (100-280 nm), UVB (280-320 nm), and UVA (320-400 nm). Solar UVB radiation plays a very significant role in many biological processes, including harmful effects on DNA, human skin and the overall immune system. The biological effectiveness of UV radiation depends on the wavelength and can be measured or estimated by various theoretical approaches.

In this study, we present a new method for estimation of erythemally effective UV (EUV) radiation based on non-linear regression model with the hyperbolic transmission function. For model parameterization, daily mean values of the selected input parameters such as solar elevation angle, global solar radiation and total ozone content were used. The radiation data were collected at the Czech Johann Gregor Mendel Station, JamesRossIsland, Antarctica(63°48’S, 57°53’W) in the period of 2007-2011. Global solar radiation was measured with a CM11 pyranometer (Kipp&Zonen, The Netherlands). EUV radiation, according to the McKinley and Diffey Erythemal Action Spectrum, was measured with a broadband UV-Biometer Model 501A (Solar Light,USA). The total ozone content for the Mendel Station was obtained from the Ozone Monitoring Instrument (OMI) on board the EOS-Aura spacecraft.

The model predicted 98.6% variability of the EUV radiation measured at the Mendel Station. The residuals between the measured and predicted EUV radiation intensities were evaluated according to total ozone content and surface reflectivity at 360 nm obtained from the OMI. The EUV residuals ranged between –0.21 and +0.28 $kJ.m^{-2}$ in the study period. The quality of the non-linear model was also documented by the normal probability plots and relative frequency distributions of the EUV residuals according to the amount of clouds.

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