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A comparison of solar UV induced DNA-damaging effects between southern and central Europe and Arctic high latitudes

A. Bérces (1), S. Chernouss (2), H. Lammer (3), N. K. Belisheva (4), G. Kovacs (1),

Gy. Rontó (1) and H. I. M. Lichtenegger (3)

(1) MTA-SE Research Group for Biophysics, Hungarian Academy of Sciences, Semmelweis University, PO Box 263, H-1444, Budapest, Hungary, (berces@puskin.sote.hu, gkovacs@puskin.sote.hu, ronto@puskin.sote.hu), (2) Polar Geophysical Institute, Russian Academy of Sciences, Kola Science Centre, Apatity, Ru-184209, Russian Federation, (chernouss@ pgi.kolasc.net.ru), (3) Space Research Institute, Austrian Academy of Sciences, Schmiedlstr. 6, A-8042 Graz, Austria, (helmut.lammer@oeaw.ac.at, herbert.lichtenegger@oeaw.ac.at), (3) Polar-Alpine Botanical Garden, Russian Academy of Sciences, Kola Science Centre, Apatity, Ru-184209, Russian Federation, (belisheva@com.mels.ru)

The stratospheric ozone concentration has been investigated by several methods, e.g., determinations of the ozone layer using a network of ground based spectrophotometers, of the Dobson and the Brewer types. These data indicate significant decrease of the ozone layer superimposed by much larger seasonal changes at specific geographical locations. The stratospheric ozone plays an important role in the attenuation of the short-wavelength components of the solar spectrum, thus the consequence of the decreased ozone layer is an increased UVB level. Various pyranometers measuring the biological effect of environmental UV radiation have been constructed with spectral sensitivities close to the erythema action spectrum defined by the CIE. Using these erythemally weighted broad-band instruments to detect the tendency of UVB radiation controversial data have been found. To quantify the biological risk due to environmental UV radiation it is reasonable to weight the solar spectrum by the spectral sensitivity of the DNA damage taking into account the high DNA-sensitivity at the short wavelength range of the solar spectrum. Various solar UV sensitive biological dosimeters have been developed e.g., polycrystalline uracil thin layer. These are

usually simple biological systems or components of them. Their UV sensitivity is a consequence of the DNA-damage. We show that biological dosimeters applied for long-term solar UV monitoring are promising tools for the assessment of the biological hazard. For comparing solar UV induced DNA-damage between high latitudes in Arctic regions with observations in central and southern Europe we started during 2004 measurement campaigns at facilities of the Polar Geophysical Institute of the Russian Academy of Sciences in Barentsburg/Spitsbergen (78 degrees north) and Apatity (68 degrees north). We will present the first preliminary results of these field experiments and discuss planned future experiments, which will be carried out during 2005.