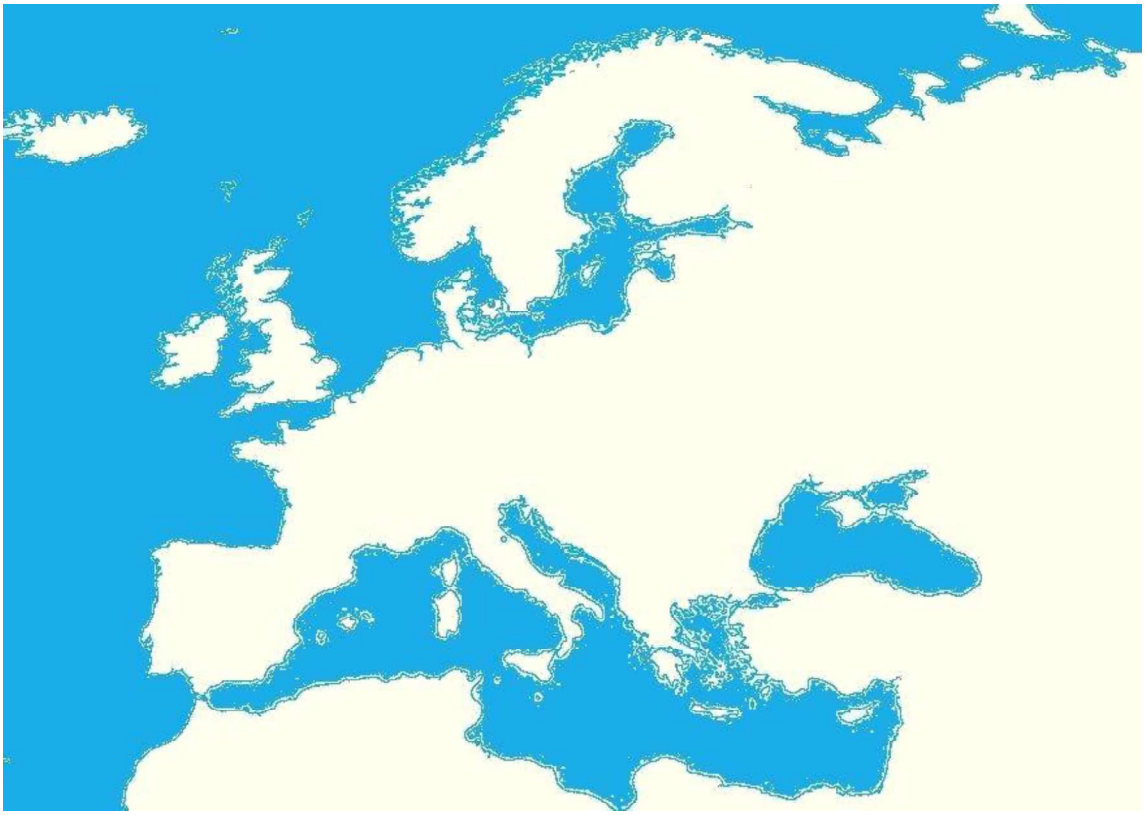

European Conference on Solar UV Monitoring

“UV Monitoring in the European Countries - Personal UV Exposure”

14. - 16. September 2022

Vienna, Austria

ABSTRACTS

(Draft Version)

Aim and Scope:

The conference will provide a forum for presentations on solar UV Monitoring activities of the past, the present and for the future. This conference will also provide a forum for exchange, interrelated support and joint activities to link resources and retrieve additional value. As a significant topic of discussion, a joint visualisation of measured UV-Index values in Europe is aspired. This discussion is an item of the conference agenda.

Scientific committee:

Dr. Sebastian Lorenz, BfS (Federal Office for Radiation Protection), Germany

Dr. Michael Higlett, PHE/UKHSA (Public Health England/UK Health Security Agency), United Kingdom

Dr. Julian Gröbner, PMOD/WRC (Physikalisch-Meteorologisches Observatorium Davios / World Radiation Center), Switzerland

Dr. Alois W. Schmalwieser, University of Veterinary Medicine, Vienna, Austria

Location:
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www.uv-index.org

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Klotz B.(1), Schwarzmann M.(1), Kreuter A.(1), Blumthaler M.(1), Schreder J.(2)

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Abstract: Since over 20 years data of erythemally weighted UV radiation is gathered in the framework of the Austrian UV monitoring network. The sheer amount of data from 13 measurement sites distributed over Austria is valuable for scientific analysis but even more so if thoroughly checked in respect of quality. In order to assure a high quality of the data proper maintenance of the detectors is required as well as elaborated data processing followed by quality control measures. Some key points of the whole process are coordinated maintenance and annually calibration of the detectors, comparison of the gathered data to a clear sky model to eliminate outliers and analysis of timelines of the measured data as well as the calibration data to see current problems early and also to improve data quality retrospectively.

UV-monitoring network of Masaryk University, Czech Republic: data processing and evaluation

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Abstract: The UV-monitoring network of Masaryk University is operational since 2012 and consists of 3 measurement sites located in the Czech Republic (Brno, Jeseniky Mountains) and Antarctica (Mendel station). The sites are equipped with broadband UV radiometers to measure UVA and UVB irradiances, and erythemally weighted ultraviolet (EUV) irradiance that are recorded continuously at 10-minute intervals. EUV monitoring is made with UV Biometer 501A version 3 manufactured by Solar Light (USA) and UV-S-E-T radiometer from Kipp & Zonen, the Netherlands. In addition, the GUVis-3511 multi-channel filter radiometer from Biospherical Instruments (USA) is operated in Brno, allowing total ozone content and column water vapor calculation. The total ozone content is estimated using the libRadtran radiative transfer model with the GUVis-3511 radiometric data and compared with the Ozone Monitoring Instrument (OMI) satellite observations retrieved for geographical coordinates of Brno station. The daily and seasonal variation of UV irradiances as well as differences in the transmittance characteristics of the atmosphere and clouds are evaluated using cloud modification factor, nonlinear regression and radiative transfer models.

U V M o n i t o r i n g

UV radiation in Novi Sad (Serbia): UV Index monitoring and variability of high erythemal UV radiation doses

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Abstract: The UV monitoring in Novi Sad has been in operation by broadband Yankee UVB-1 biometer at the campus of the University of Novi Sad (45.33° N, 19.85° E, 84 m above sea level) since 2003. Data of UV index are taken every 30 s, averaged over 10 min intervals, and automatically saved in the database. The time series were reconstructed using an improved reconstruction technique that is based on parametric numerical model NEOPLANTA calculations of erythemal radiation and the empirical relationship between the erythemal doses and sunshine duration. In this study, we presented the maximum daily UV index values over the period 2003-2018 and the variability of reconstructed high erythemal UV doses ($_{h}UV_{ery}$) over the period 1971-2018. Additionally, the influence of low total ozone

column (TOC), low cloud cover conditions, and high surface albedo on $_{h}UV_{ery}$ was analyzed on a seasonal basis. Analyzing the measurements we concluded that maximum daily values are almost the same in the period of sixteen years, in the summer months maximum values are about 9. Based on the 90th percentile of each month we assessed a set of 1691 days with $_{h}UV_{ery}$ (10.65 %). The fraction of $_{h}UV_{ery}$ days in the last two decades was considerably larger (12.29%) than in the period before (6.97%) and during (8.68%) TOC depletion. We observed a statistically significant increase in the annual number of days with $_{h}UV_{ery}$ of +6.26 days/decade ($p<0.01$). The increase was statistically significant in all seasons, except winter, while it was the most pronounced in summer (+2.44 days/decade, $p<0.01$). However, the increase was not uniform over the entire observation period. Over the period of TOC depletion (1971-1980), the number of days with $_{h}UV_{ery}$ decreased, followed by a steep significant increase over the period of TOC depletion (1981-1996) of +16.75 days per decade ($p<0.05$). After 1996 $_{h}UV_{ery}$ increased slowly (+3.19 days/decade), but the trend was not statistically significant. Considering the influence of each UV affecting factor separately, the analysis showed that low cloud cover had slightly more influence on the occurrence of $_{h}UV_{ery}$ days than TOC in all seasons except winter. Of the total number of $_{h}UV_{ery}$ days, 89.47% were recorded when the cloud cover was low, while 80.65% of $_{h}UV_{ery}$ were recorded when the TOC was low. However, the most frequent reason for $_{h}UV_{ery}$ is the combination of these two factors (75% of all $_{h}UV_{ery}$ days). In the winter season-high surface albedo influenced the appearance of 18.26% of $_{h}UV_{ery}$ days. It is important to emphasize that we analyzed the reconstructed erythemal doses, not the measured data. Reconstructed data (implying the quality of the reconstruction) provide valuable resources for insight into UV variability in the past although cannot replace measurements. The results indicate even if the TOC recovers in the 21st century as expected, the appearance of days with high erythemal doses will still be significantly affected by future changes in the cloud cover.

Monitoring of spectral UV radiation at Marambio Base, Antarctic Peninsula Region

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Abstract: UV radiation is an important component of the environment, which has both beneficial and harmful effects on organisms. Due to the recent changes in ozone layer and weather patterns, its monitoring continues to be an important task. One of the main advantages of spectral UV observations lies in the fact that they can be fitted with any action spectral curve, whether it focuses on the erythema creation, DNA damage, or vitamin D synthesis. Also, UV spectra, unlike broadband measurements, enable detailed analyses of individual parts of the spectrum, and therefore a better understanding of the solar UV radiation variability. The Czech Hydrometeorological Institute, in cooperation with the National Meteorological Service of Argentina, contributed by spectral UV radiation measurements at Marambio Base. In the period between February 2010 and January 2020, over 45 000 UV radiation spectra were collected by the B199 double monochromator Brewer spectrophotometer. More than 23 000 observations could be paired with explanatory variables, i.e. with total ozone column measured independently by the B199, cloudiness from the ERA5 reanalysis, and surface albedo at 360 nm from OMI/Aura satellite instrument. The ten years long time series allowed for assessing UV radiation variability in the individual years and months. We also studied the effects of selected explanatory variables on UV radiation at different wavelengths, and an analysis of trends was also performed. Over the 10-years period, statistically significant trends were only found in March. They could likely be explained mainly by the changes in surface albedo.

Long-term changes in erythemal UV irradiance and UV 300-380 nm in Moscow since 1968: main tendencies and their causes

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Abstract: Ozone depletion and current climate change significantly influence the solar UV radiation levels at the Earth's surface relevant for human health. There is a wide program of UV measurements at the Meteorological Observatory of Moscow State University since 1968 till nowadays. The UV