

Daily Variation of UV-A and UV-B Solar Radiation on the Adriatic Sea

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ABSTRACT

During the summer months, from June thru September, in Opatija and island of Rab area, we conducted UVA and UVB measurements using a professional detector: Solar Light Co., Inc. USA. Ordering: PMA2110 UV-A and PMA2101 UV-B detector. We conducted global UVA and UVB measurements in the 2006 to 2011 period. Results of the measurements show June to September daily, 10 am to 3 pm, UVA and UVB variations to be above allowed values especially in the maritime area. The measurements were performed in cooperation with »Dr. B. Vojniković« Daily eye clinic and the University of Applied Sciences Velika Gorica, Velika Gorica, Croatia.

Key words: Solar insolation, UV-A, UV-B

Introduction

Variations in daily insolation in the Adriatic Sea are known to exist and are specifically studied by Penzar and Vojniković¹ in the island of Rab. A correlation between global sun radiation and UV index 1 are also proven to exist. The familiarity with UV radiation daily variations is extremely important in order to correctly advise the population of necessary skin and eye protection. Possible retina damage, in terms of macular degeneration progression – AMD, are especially expressed in patients recovering from cataract operation, when the eye is not sufficiently protected by the implanted intraocular lens and grave eye damage can occur^{2,3,4}. What it means to be sufficiently protected from increased daily insolation is best confirmed in certain papers⁵ in which the author confirms the hypothesis that there is no AMD development without increased optical radiation exposure. Namely, the author investigated the Benedictine monastery nuns in the island of Rab, living in mostly closed areas without the usual UV light exposure and concluded that none of the nuns, regardless of age and diabetes, have fundus damage and show the fundi to be equivalent to ones in child age.

Materials and Methods

During the five year period we conducted measurements in solar radiation, daily walking, UVA and UVB. The measurements were made by a professional detector: Solar Light Co., Inc. USA. Ordering: PMA2110 UV-A and PMA2101 UV-B detector (Fig. 2 and Fig. 3). The measurements were made during day time, from June to September, by measuring global radiation as well as direct isolated solar radiation via special tube.

Results

From Fig. 3 we see that the UVA and UVB daily variations (10 am to 3 pm) are above the allowed values for the month of July while the August measurement shows a 20% value increase. Also noticeable, are higher UVA values when compared to UVB which is relevant because, in his experiments, Vojniković shows that subliminal UVB values combined with increased UVA doses can have a harmful effect. It is an especially important warning to those »healing« themselves by staring at the rising or setting sun⁶ as superposed cumulative UVA and UVB values can lead to permanent eyesight damage.



Fig 1. Professional UV-A and UV-B measuring equipment.



Fig 2. Professional UV-A and UV-B measuring equipment.

Conclusion

Earlier work from the author^{1,4,5,6} prove that direct exposure to increased solar light leads to irreversible eye-sight damage. It is exceptionally important to notice that, beside increases UVB values, UVA values need to be measured because the author show the cumulative damaging effect of both types of radiation even with subliminal UVB values when irradiated with increased UVA doses. The conclusion is that extra attention should be applied to solar radiation protection from June to September in times from 10 am to 3 pm. Instead of staring to the sun, there are medical filters that function in the 565 to 580 nm range and have healing effect as well as macular degeneration eye protection. Special care should taken to necessary eye protection following cataract surgery because sun light transmission trough the intra-ocular lens is much different then trough a natural lens.

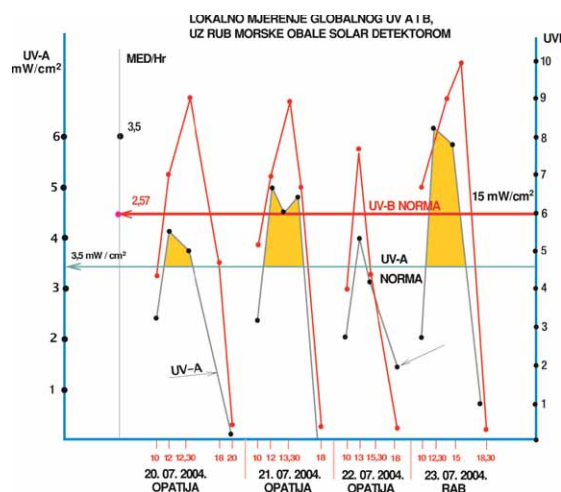


Fig 3. Global UV-A and UV-B local measurement using a coastline solar detector.

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DNEVNE VARIJACIJE UV-A I UV-B SUNČEVE RADIJACIJE NA JADRANSKOM MORU

S A Ž E T A K

U toku ljetnih mjeseci, od lipnja do rujna, na području od Opatije do otoka Raba, vršena su mjerenja UVA i UVB, sa profesionalnim detektorom: Solar Light Co., Inc. USA. Ordering: PMA2110 UV-A detector i PMA2101 UV-B detector. Vršena su globalna mjerenja UVA i UVB, kroz period od 2006 do 2011. Rezultati mjerenja pokazuju da su dnevne varijacije u lipnju do rujna, u vremenu od 10 do 15 sati, i UVA i UVB iznad dozvoljenih vrijednosti. To je tim više naglašeno, kada se radi o području uz morsku obalu. Mjerenja su rađena u suradnji Daily Eye Clinic »Dr B.Vojniković« i University of Applied Sciences Velika Gorica, Velika Gorica, Croatia.