

## **Geomagnetism and aeronomy in Croatia, 1999–2002**

*Report to the International Association of Geomagnetism and Aeronomy  
of the International Union of Geodesy and Geophysics.*

The subjects from the field of geomagnetism and aeronomy are taught at the Geophysical Department of the Faculty of Science in Zagreb. Students listen to courses »Terrestrial magnetism« and »Aeronomy« before graduation and to the course »Antropogene changes in the atmosphere« during their postgraduate studies.

In the last period we started a study of relation between the total atmospheric ozone and the ultraviolet radiation, which was measured from summer of 1998 by a biosensor of Scintec make (donation of Neva d.o.o.). Satellite data of total ozone over the geographical position of Zagreb ( $f = 45.83^\circ\text{N}$ ,  $l = 15.99^\circ\text{E}$ ,  $h = 195\text{ m}$ ) were obtained starting from 1978 (satellites NIMBUS, METEOR and EARTH-PROBE). Besides the expected seasonal variation in total ozone, a negative trend of 3.5 % between average values obtained for the two decades, 1978–1988 and 1989–2000 was found (Lisac and Vujnović, 2001). However, in 2001 the ozone level was mostly above the one of 2002. It should be noticed that the solar activity had the maximum in 2001, and that maximum had a double peak, in the relative sunspot number and even more pronounced, in the intensity of 10.7 cm radiation (Vujnović and Lisac, 2002).

In the beginning of December 1999, when total ozone fell below 220 DU, miniozone holes over Zagreb were detected which agrees with findings in the other European countries, as documented in several papers. The relation between interdiurnal differences of erythemal UV and total ozone, categorized into clear and cloudy skies, was also investigated.

In order to prove the quality of the UV data, biosensor was first recalibrated in 2001 (thanking to Prof. M. Blumthaler) by the staff of the Institute of Medical Physics, University of Innsbruck, and then its signals were compared with two empirical models (nowcasts) which relate daily ozone data with the erythemally effective UV radiation. After recalibration, signals came into satisfactory agreement with the nowcasts, being in between the Canadian and the Czech models. This situation lasted until the summer 2001 when discrepancy appeared; it could have been caused by the deterioration of the instrument or of the satellite data, since from this very time, their data were not published any more. Inspection of the quality of data will be continued with new biosensors.

Except for one biosensor in Zagreb, two other monochromatic sensors in Croatia were mounted in the Istria peninsula under the auspices of the State Hydro-Meteorological Department (K. Premec, 2000/1).

One member of the Department of Geophysics, Faculty of Sciences, Zagreb, participated at the IXth IAGA Workshop on Geomagnetic Observatory Instruments, Hurbanovo, Slovakia (12–18 June 2000) and at the International Workshop on »50 Years of the Solar and Ozone Observatory Hradec Kralove«, Hradec Kralove, Czech Republic (23–25 May 2001) with intention to establish the collaboration with colleagues in the other countries. As a result of years-long efforts to re-establish geomagnetic research and measurements in Croatia, a project »Geomagnetism in the region of Croatia« has been granted by the Ministry, offering good prospects for young people who would like to specialize in the field.

Attention was paid to the auroral phenomena in the region of Croatia, but daily values of Kp index were not favourable for our latitudes and aurora was not noticed.

In 2000 and 2001 three B. Sc. theses dealing with problems from this field were defended.

### *List of publications*

- Herceg-Bulić, I. (2000/1): Erythemally effective UV radiation in Zagreb during May 1999., Hrv. meteorološki časopis, **35/36**, 37–44.
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- Lisac, I. (2001): Overview of scientific activities in geomagnetism and aeronomy in Croatia, Acta Geod. Geoph. Hung., **36**(2), 245–255.
- Lisac, I. and Vujnović, V. (2001): Atmosferski ozon i Sunčevo UV zračenje nad područjem Hrvatske (Atmospheric ozone and Solar UV radiation over Croatia), IIInd Croatian Symp. »Aromatherapy and...«, Opatija 26–28.IX.2001., Contributed papers 145–154.
- Vujnović, V. and Lisac, I. (2001): Prostiranje Sunčeva zračenja kroz atmosferu i eritemalno učinkovito ultraljubičasto zračenje u Hrvatskoj (Solar radiation transfer through the atmosphere and erythemally effective ultraviolet radiation in Croatia), Conference on Health tourism, Veli Lošinj 7–9. Sept. 2001, Contributed papers (ed. Ivanišević, G.), Zagreb, 136–46.
- Vujnović, V. and Marić, K. (2001): An overview of measurement activities in geomagnetism in Croatia, Contrib. Geoph. Geod., **31**(1), 29–32.
- Vujnović, V. and Lisac, I. (2001): Usporedba ukupnog atmosferskog ozona nad Zagrebom i mjereno UV zračenja (Comparison of total atmospheric ozone above Zagreb and measured UV radiation), Third Conference of Croatian Physical Society, Zagreb, 5–7. December 2001., Contributed abstracts, Zagreb, 41.
- Vujnović, V. and Lisac, I. (2002): Prilog poznavanju odnosa između ukupnog ozona i Sunčevog UVE zračenja u Hrvatskoj (A contribution to the study of total ozone over Croatia and corresponding UVE radiation), Conference on Health tourism, Veli Lošinj 6–8. Sept. 2002, Contributed papers (ed. Ivanišević, G.), Zagreb, 165–170.

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