

New Projects, Facilities and Opportunities for Upper Atmosphere Investigations by Optical Methods

THE RESULTS OF INVESTIGATING THE TERROGENIC EFFECT IN AURORAS WITH THE HELP OF THE AUTOMATIZED SCANNING PHOTOMETER IN LINES 5577A AND 4278A

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The paper presents the result of the investigations with the help of the automatized optic-electronic complex with the spectrum separation of the auroral radiation of lines in wavelength 4278A and 5577A.

The analysis allowed to come to the following conclusions: the spatial distribution of auroras in Norilsk region of Taimyr has an anomalous character in the registred radiation lines; the anomalies zones are manifested as in auroral occurence frequency as in the intensity change rate; the distributions in lines 4278 and 5577 do not coincide; the contrast range of anomalies in line 5577A is larger than that of the anomalies in line 4278A; the land coordinates of anomalies coincide with the zones of structural disturbance of the Earth's crust (faults, rock outcrops and etc.)

AN INTERNATIONAL PROJECT: S T A R - SOLAR AND TERRESTRIAL ATMOSPHERE RADIATION

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The existing now semi-empirical models for atmospheric ionospheric component distribution, are based on values of (F 10.7, W), derived from ground-based observations. They very unsatisfactorily represent the real energy influx, which is the solar extreme ultraviolet (EUV) radiation. In the past the model parameters such as atmospheric and ionospheric densities and temperatures are primarily collected by point measurements. Since these models are required to solve most of scientific problems of the upper atmosphere, the elaboration of more precise physical models should be the most important goal of the next future. In this context we propose a coordinate measurements of the solar EUV radiation and the atmospheric and ionospheric parameters by sophisticated remote sensing techniques (air glow mapping) from satellite program - Solar-Terrestrial Atmospheric Radiation (STAR). As a result now used models input parameters - F 10.7 and W will be replaced by the parameters of real solar influx. The necessary scientific instruments as solar EUV and UV spectrometers, airglow and aurora UV and visible spectrometers, photometers and mappers of upper atmosphere are preferable for this project. The total mass of STAR satellite will be about 250 kg. 500 km near circular orbit and 3-5 years measurements can give a satisfactory information for renewing the models. Now existing instrumentation, satellite and good experience in space international cooperation give an excellent possibility to international community.

ENVIRONMENTAL FUTURE OF THE NEXT CENTURY AND REQUIREMENTS TO OBSERVATIONAL DATA

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The 20th century is approaching its end under conditions of the intensification of a number of global environmental problems. The most popular of them is climate warming as a result of the increasing concentration in the atmosphere of such "greenhouse" gases as carbon dioxide, methane, nitrous oxide and tropospheric ozone. The problem of the natural variability of the climatic system "atmosphere-ocean-land-ice cover-biosphere" is under consideration in the report. Possibility of antropogenically-induced warming on the base of modelling results is mentioned. Fundamental importance of the problem of biosphere dynamics in global change is shown. The climate forming role of water vapor, interaction between ocean and the atmosphere and impact of various cosmic factors are discussed. Requirements to long-term monitoring of total and spectral extra terrestrial solar radiation are formulated.

A NEW AURORAL IMAGER FOR STARE

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An unmanned automatic low-light-level CCD television camera system coupled to an all-sky lens has been constructed at Skibotn for the purpose of performing correlated studies between the auroral optical emissions and ionospheric electron flow as seen by the STARE radar system. Monochrome optical images will be routinely preprocessed on the recording site and stored digitally to optical disk in a format directly compatible with the STARE radar data. In addition, television recording campaigns may also be undertaken.

THE ANALYSIS OF INTERACTION BETWEEN THE ANOMALIES FIELD
OF AURORES SPATIAL STRUCTURES AND THE EARTH'S CRUST STRUCTURE

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The map of the auroral occurrence frequency anomalies in Taimyr region has been drawn. One should especially distinguish the anomaly of the increased auroral occurrence frequency discovered over Norilsk which has a ring structure. The auroral occurrence frequency in the centre of the anomaly is comparable with the one in the centre of the auroral zone. The anomaly centre coincides with the world largest Norilsk-Talnakh deposits of polymetals. The anomaly discovered has the predicting criterion and can be distinguished into a separate class of anomalies "Norilsk type". The investigations conducted in the North of Siberia allowed to distinguish another anomaly of the "Norilsk type" and consequently predict the doubling of polymetallic ores reserves in Russia.

**DEVELOPMENT OF A LASER REMOTE SENSING SYSTEM (LIDAR) FOR
AEROSOL AND OZONE VERTICAL PROFILE MEASUREMENTS
IN THE LOWER TROPOSPHERE**

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ABSTRACT

The Laser Remote Sensing Technique (LIDAR) presents the means of the real-time vertical profiles measurements of the main air pollution trace gases in the lower troposphere, with high spatio-temporal resolution.

In this paper, we present the development of a multiwavelength LIDAR system, (the first in Greece) for daytime and nighttime vertical profile measurements of ozone and suspended particulates in the lower troposphere (0-6km).

The LIDAR wavelengths used are the 266nm, 289nm, 299nm, 355nm, and 532nm, all derived from a pulsed Nd:YAG laser. Further in this paper, we describe the technical characteristics of the system and report on the expected measurement accuracy of the proposed system.

THE LIDAR MEASUREMENTS OF STRATOSPHERIC AEROSOLS DURING SOLAR PROTON EVENTS.

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The lidar measurements at Verhnetulomski observatory ($\varphi=68.6$ N, $\lambda=31.8$ E) at Murr. region detected the considerable increase of stratospheric aerosol concentration after a Proton Event of GLE (Ground Level Event) type at 16.02.84. This increase at 17 altitude reached 40% at 20.02.1984. This GLE event was accompanied by some ozone total content (OTC) depletion which was detected by ground based filter ozonometer at Murmansk observatory ($A=63.3$). these results seem to support the authors hypothesis, that OTC depletions during Solar Proton Events could hardly be interpreted in frame of ordinary photochemical theory, and should be considered in terms of temperature balance variations and heterogeneous chemical reactions in presence of different kind of aerosol clouds (including Polar Stratospheric Clouds).

THE INVESTIGATIONS RESULTS ON THE PROGRAMME " GLOBAL CHANGE " ON THE TERRITORY OF SIBERIA IN THE OPTICAL, VLW, LW, MW RANGES

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The Tomsk University investigations on the programme "Global Change" have both fundamental and applied character. The fundamental investigations aim at establishing the physical mechanism of solar-terrestrial relations. The applied investigations solve the actual problems of radiophysics - creating the map of the Russia geoelectric division into districts in the electromagnetic waves range 1 kHz - 10 mHz, radiowaves propagation in the zone of high latitudes; of geology - deep geological mapping and ecology.

The constructed physical models, the created apparatus complex, the developed measurements methods, the experimental data processing and the interpretations allow to suggest a proposal of the laboratory's participation in the international technical projects, for example, in setting up the elements of groundbase NASA on the territory of Siberia for information-observation system EOS.

THE INTERRELATION OF ELECTRICAL PROCESSES
IN THE LITOSPHERE, LOWER ATMOSPHERE
AND IONOSPHERE OF THE EARTH

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We have set to a fundamental conclusion that electromagnetic processes in the lithosphere, atmosphere, ionosphere and magnitosphere are interrelated and take place in an entire global electric circuit. The global electric circuit presents a contour open to outer influence and contains the fragments, the properties of which are formed under the influence of physical processes in the magnitosphere, ionosphere, lower and middle atmosphere. This conclusion is proved by the discovered effect of distinction of the degree in the atmospheric and ionospheric electrical fields relation in regions with different geological structure (Taimyr, Yakutya) as well as by the effect of the initiating earthquakes by the atmosphere electric field.