

## Optical Methods in Ecology and Atmospheric Pollution problem

### THE EVALUATION OF ENVIRONMENTAL RADIATIONAL CONSEQUENCES FOR KIROVSK & APATITY AREAS AFTER HYPOTETICAL ACCIDENT ON KOLA NUCLEAR POWER PLANT

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Large accidents for last years, especially the Chernobyl accident, stimulated the development of projects on elaboration of the Automatized System of Control for Radiational Situation (ASCRO). Such system is created in Murmansk region from 1992; the first stage of ASCRO is tested for Kola Nuclear Power Plant (KNPP).

The aims of this system are followed:

- the radiation situation control in the site of energo-blocks of KNPP;
- the temporary disclosure and registration of exceeding the permissible levels of radiation;
- identification of sources of radiational wastes emission;
- operative modelling
- elaboration of recommendations for measures on security ensuring of regional population.

This work is performed by arrange institutes and organization from Russia, as well as from other countries, in particular DEC-corporation.

This problem in an international and reflect our neighbour countries interest in ensuring the population security, because of the transfer of accident products at as large distances as possible.

The work on elaboration and preparing to application for ASCRO of several levels of the models for prediction of radiational state in accordance with IAIA'demands is carried out now in INEP, KSC RAS:

1. A complex of numerical 3-D models of dynamics of atmosphere and diffusion of radioactive cloud into atmosphere after a hypothetical accident under complex orography, which is characteristic for KNPP, has been prepared. The models have been included into the prepared State normative document on the methods of estimation of radiational pollution.
2. The trajectory model of operative forecast of radiational situation for ASCRO KNPP.
3. The programme of preliminary estimations of radiational situation on the base of Pascvil-Gifford models for local scale.
4. The regional Dracsler model for North Fennoskandia and Arctic.
5. The model MACCS (USA) for the estimation of ecological risk of radiational pollution for the case of a hypothetical accident on KNPP. The work is carried out with Norwegian scientists in common for the territory of Kola Peninsula and Norway.

On the base of these models the calculations for KNPP were carried out and the computer atlas (for 30-km and 80-km zones) of possible cosequences after hypothetical accident on KNPP was prepared.

High level of radioactive pollution was revealed for Kirovsk & Apatity towns as a result of an accident. This risk is conditioned by the physico-geographical features of the territory.

## SOLAR UV-B MEASUREMENTS AT HIGH LATITUDES WITH A DOUBLE MONOCHROMATOR BREWER SPECTROPHOTOMETER

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Recently a new Brewer instrument was developed equipped with a double monochromator spectrometer in order to further improve the spectral measurements of solar ultraviolet radiation, especially at wavelengths lower than 300 nm. The operational range of this instrument is from 285 to 365 nm in steps of 0.5 nm, and its absolute calibration is maintained by comparison to 1000 Watt sources of absolute spectral irradiance.

The instrument has been in operation for a period of about four months, during which various test procedures were applied to determine its level of performance and reliability. In addition, the Double Monochromator Brewer participated to a small intercomparison experiment, during which synchronous spectra with other high quality spectroradiometers were obtained in the real atmosphere.

In this work we present some preliminary results from the first observations obtained with this instrument, comprising spectra of both global and direct solar radiation in the UV-B region, which were obtained under various atmospheric conditions. Finally, some results from the intercomparison measurements are also discussed.

## SISTEM OF A CONTROL OF ATMOSPHERIC POLLUTION IN SETTLEMENTS

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System is proposed to consist of the optical transmitter with broad band emission spectra and the optical receiver builded on the base of a selective photosensor. Pollution concentration of different sort gases can be determined by measurements of absorption coefficients in optical absorption bands of exhaust products. The advantages of proposed system is connect with using of impulsive emitting sources. The light source is He impulse lamp usually used in lazer technique. Thus we have a possibility to upgrade emission power with simultaneous degradation of utilized power.

## ON A CONNECTION OF THE ATMOSPHERIC TRANSPARENCY WITH THE GEOMAGNETIC ACTIVITY

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The variations of the atmospheric transparency at 344 and 627 nm have been investigated for time intervals from 5 days before to 10 days after geomagnetic disturbances by the superposed epoch method on the data of Murmansk, Leningrad and Theodosia. In Murmansk two days before the disturbances the 5% decrease of the transparency occurs, what coincides in time with the X-rays flashes on the Sun, and 5 days after the disturbance the transparency has a maximum. In Leningrad the minimum transparency occurs in the day of beginning of the geomagnetic disturbance, and in Theodosia it happens after 1-2 days. The amplitude of the transparency differences reduces with the latitude lowering. The change of the falling on the Earth's surface energy is estimated as  $10^{+27}$  erg/day.

## UV SPECTRA FROM THE SUN AND THE MOON AND GEOPHYSICAL AND BIOLOGICAL APPLICATIONS

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Quantitative spectral, solar UV measurements are introduced together with lunar spectral measurements in arbitrary units. Meteorological factors have a more pronounced effect on the UV irradiance than the ozone layer, and the ozone layer has an increasing attenuation effect towards higher latitudes. Coordinated biological and spectral lunar observations are outlined.