

**Climate evolution impacts on sea-air gas exchange in the Barents Sea during the 21st century (numerical simulation).** Bortkovski R.S., Nadyozhina E.D., Sternshtat A.V., Pavlova T.V., Pikaleva A.A., Egorov B.N. Proceedings of MGO. 2015. V. 576. P. 7—26.

The evaluations of air-sea CO<sub>2</sub> and O<sub>2</sub> fluxes are very uncertain. The problem of air-sea gas exchange under the climate change conditions is especially important and the active investigations of gas exchange processes go on. In this paper the temporal and space distributions of gas fluxes are analysed using the new version of gas exchange model. The climatic information of Regional Climatic Model (RCM) MGO and of the Global Climatic Model ECHAM5/MPI-OM was used as the input parameters of gas exchange model. The net annual uptake of CO<sub>2</sub> in the Barents Sea was calculated. The projections of CO<sub>2</sub> and O<sub>2</sub> fluxes variability at the surface of the Barents Sea in the middle of 21<sup>st</sup> century have been analysed.

*Keywords:* Air-sea gas exchange, oxygen, modeling, climate change, Barents Sea.

Tab. 1. Fig. 5. Ref. 27.

**The results of the first chamber CH<sub>4</sub> flux measurements at hydrometeorological observatory “Tiksi”.** Ivakhov V. M., Karol I. L., Kisilev A. A., Zinchenko A. V., Paramonova N. N., Privalov V. I., Laurila T., Aurela M. Proceedings of MGO. 2015. V. 576. P. 27—41.

Methane (CH<sub>4</sub>) is one of the most important greenhouse gas. Estimates of methane emissions up to data have a high degree of uncertainty, especially for wetland areas of the Arctic. The chamber CH<sub>4</sub> flux data obtained during three field campaigns in 2013-2014 years at observatory “Tiksi” are given and analyzed. Methane concentration in air samples was measured by means of gas chromatograph; also *in situ* measurements were conducted with laser spectrometer. The measurements were performed at 13 different microrelief sites. The average values of methane fluxes for moist, dry and rocky tundra accounted to  $2,35 \pm 2,12$  mg / m<sup>2</sup> / hour;  $0,01 \pm 0,06$  mg / m<sup>2</sup> / h and  $-0,07 \pm 0,05$  mg / m<sup>2</sup> / h respectively.

*Keywords:* greenhouse gases, methane flux, observatory “Tiksi”.

Tab. 3. Fig. 3. Ref. 18.

**An impact of natural aerosols on crystallization temperature of water drops.**

Sinkevich A. A., Pawar S. D., Kurov A. B., Volkov N. N., Mikhailovskiy V. Yu., Veremey N. E., Gopalakrishnan V. Proceedings of MGO. 2015. V. 576. P. 42—49.

Laboratory experiments were carried out to investigate the effects of sand, clay and soot (black carbon) particles on the crystallization temperature of water drops. Data on particle habits and composition, obtained with electron microscope and energy-dispersive spectroscope, are presented. The experiments were carried out inside a small cooling chamber. They have shown that particles under study lead to significant increase of the crystallizing temperature of water drops. The relationships between crystallizing temperature and concentration of particles are presented. The research was carried out under the problem of the impact of natural aerosols on cloud microstructure.

*Keywords:* aerosols, water drops, laboratory experiments, crystallization.

Fig. 1, Tab. 3, Ref. 11.

**Research of characteristics of storm clouds and thunderstorm activity according to ground-based observations and numerical modeling (for example, the station of Saint-Petersburg).** Dovgaluk Yu. A., Toropova M. L., Veremey N. E. Proceedings of MGO. 2015. V. 576. P. 50—61.

Describes the numerical experiments to study the parameters of storm clouds over St. Petersburg for the period 2001-2010 by the method developed at the Department of Physics of clouds and atmospheric electricity of Voeikov Main Geophysical Observatory on the basis of complete non-stationary numerical model of convective clouds of small dimension and generalized experimental data on the clouds. The presented results of simulation experiments contain summary data on the cloud base and cloud top height and clouds' vertical thickness, vertical velocity and water content profiles in storm clouds over St. Petersburg. According to the surface weather observations were also obtained climatic characteristics of thunderstorm activity in the region.

*Key words:* thunderstorm, convective (thunderstorm) clouds, parameters of clouds, numerical simulation

Tab.4. Fig. 5. Ref. 36.

**Retrieval of microstructure characteristics of liquid precipitation by active-passive remote sensing.** Linkova A. M., Khlopov G. I. Proceedings of MGO. 2015. V. 576. P. 62—80.

The method for retrieval of rain parameters by active-passive remote sensing is considered in the paper based on double frequency radar and radiometer. The expressions for active-passive sensing of rains are obtained in the form of system of three integral equations and algorithm for solution of inverse problem by numerical methods is proposed. Numerical simulation of active-passive remote sensing of liquid precipitation was performed in the range of intensity up to 25 mm/h and for radar wavelengths 8.2 mm and 3.2 cm, and radiometer – 3.4 cm.

*Keywords:* active-passive remote sensing, Gamma distribution, rain intensity, reflected power, brightness temperature, double frequency radar, radiometer.

Tab.1. Fig. 6. Ref. 8

**Investigation of variations of electric field strength during thunderstorms by methods of wavelet analysis.** Gerasimenko N. I., Zainetdinov B. G., Morozov V. N., Popov I. B. Proceeding of MGO. 2014. V. 576. 81—91.

Problem of data processing of variations of electric field strength received during thunderstorms using wavelet methods is considered. Draws illustrated results processing for different wavelets are presented. Received results are discussed.

*Key words;* variations of electric field strength , thunderstorms, wavelet analysis.

Fig.4. Ref. 9.

**Thunderstorms in the European North. Probable weather and climate threats and risks** Grischenko I. V., Rumina T. N. Proceedings of MGO. 2015. V. 576. P. 92—101.

Considered a number of statistical regularities in the distribution of thunderstorms in the Arkhangelsk region. Calculated linear trends of the average frequency of occurrence of the phenomenon. Showing the probable risks associated with thunderstorm activity and methods of their control.

*Keywords:* Thunderstorms, kvazimeridionalny front, climate change, lightning finder, lightning protection.

Fig. 2. Ref. 9

**Changing the wind in Tomsk in early twenty-first century.** Kizhner L. I., Seraya N. U. Proceedings of MGO. 2015. V. 576. P. 102—113.

The main characteristics of the wind for the ten-year period (2001–2010) according to the weather service stations and the results of observations of special top-station of the Institute of Atmosphere were investigated. Comparison of the obtained characteristics with the climate data of directories, generalized for the earlier period were performed. It is shown that the latter period differs in reducing of the wind speed and of the number of days with strong winds. Changes in wind direction were marked.

Keywords: wind characteristics, climatic changes.

Tab. 6. Fig. 3. Ref. 11

**Features wind during the delayed of space rockets at the cosmodrome «Baikonur».** Zolotukhina O. I., Gorbatenko V. P., Varenik P. A. Proceedings of MGO. 2015. V. 576. P. 114—128.

The parameters of the wind on the Earth's surface and in the free atmosphere have a significant impact on the successful launch of a space rocket and its flight. Presents an analysis of synoptic conditions and characteristics of the wind to a height of 25 km, during days of delayed start of space rockets at the cosmodrome "Baikonur". The focus is on finding the same conditions of formation of winds, dangerous to start space rockets.

Keywords: wind parameters at the earth's surface, wind characteristics in the free atmosphere.

Tab. 1. Fig. 5. Ref. 9

**Contemporary climate regime of precipitation in the Tomsk region.** Barashkova N. K., Volkova M. A., Kuzhevskaya I. V. Proceedings of MGO. 2015. V. 576. P. 129—152.

Structure and dynamics of the regime of precipitation (probability characteristics, continuous duration of periods with and without precipitation and trends) have been investigated for the Tomsk region. Climatic indices and frequency of dangerous weather events associated with precipitation were calculated. The results can be used to estimate climate trends and for drawing up long-term and medium-term forecasts.

Keywords: Tomsk region, precipitation, frequency, variability, continuous duration, climatic indices.

Tab. 8. Fig. 5. Ref. 15

**Methodology of meteodependent geo-ecological assessment of the environment and environmental risk to personnel of state aviation airfield.** Mazurov G. I., Tatarinov V. V., Bazarsky O. V., Tomilov A. A. Proceedings of MGO. 2015. V. 576. P. 153—165.

According to the results of instrumental observations of air pollution and soil analyzes them according to the different weather conditions at the emission of pollutants at the airport of Voronezh. For the first time allocated zones in which high levels of pollution, which require maintenance personnel to work in respirators and limited time.

*Keywords:* pollutants, the spatial emission source, flight service, the state aviation airfield, meteorological conditions

Tab.1. Fig. 5. Ref. 9

**Ground-level ozone in Novosibirsk city.** Selegey T. S., Filonenko N. N., Lenkovskaya T. N. Proceedings of MGO. 2015. V. 576. P. 166—176.

The analysis of the maximum, daily average, monthly average and annual average values of ozone concentrations in Novosibirsk for the period of 2003-2012 was performed. Novosibirsk city air pollution was assessed using the RF, the US, and the WHO European Section ground-level ozone air quality standards. Great variance in ground-level ozone air pollution assessment requires a revision of national ambient air quality standards with the aim of bringing them in line with internationally agreed standards.

*Keywords:* ground-level ozone concentration, air pollution, national ambient air quality standards.

Fig. 1, Tab. 3, Ref. 7.

**Zonal heat fluxes of heat and air temperature fluctuations over the European part of Russia and Western Siberia in the central months of the year seasons.** Lavrov N. A. Proceedings of MGO 2015. V. 576. P. 177—182.

In this article we consider the values of the zonal advective heat fluxes directed to the European part of Russia and adjacent areas in the central months of the seasons, and their relation to fluctuations in air temperature.

*Keywords:* Zonal heat fluxes, air temperature fluctuations, correlation.

Tab.1. Fig. 1. Ref. 6.

**Solar radiation at the top of the atmosphere and the variability of atmospheric processes in the Northern Hemisphere.** Fedorov V. M., Kononova N. K. Proceedings of MGO 2015. V. 576. P. 183—200.

The relation between the duration of the zonal and meridional atmospheric circulation over Northern Hemisphere in classification by BLDzerdzevskii with variations of solar radiation was analyzed. The tendency of increasing the total duration of the meridional circulation (and the southern meridional group) and decreasing the total duration of the zonal circulation (and disturbance of zonal group) in the atmosphere of the Northern Hemisphere during the period from 1850 to 2013 was identified. The calculations allow us to estimate the trend in the duration of the components of atmospheric circulation from 2014 to 2050.

Keywords: solar radiation, circulation processes in the atmosphere, classification, circulation groups, zonal and meridional circulation.

Tab. 1. Fig. 10. Ref. 34.

**A new generation regional climate model for northern Eurasia.** Shkolnik I. M., Efimov S. V. Proceedings of MGO. 2015. V. 576. P. 201—211.

Results of retrospective RCM climate simulation at 25 km resolution over the northern Eurasia are considered. The ERA-Interim reanalysis is used to drive the RCM at lateral boundaries spanning 1990-2009. It has been shown that the model satisfactorily reproduces thermal regime and atmospheric circulation in the region. Precipitation validation aspects in the regions with sparse observations are discussed and modeling skills to reproduce observed precipitation variability are demonstrated

*Key words:* regional climate, modeling, reanalysis.

Fig. 3. Ref. 9.

**Activities of the Main Geophysical Observatory in the Great Patriotic War.**  
Kattsov V. M., Khairulin R. Sh. Proceedings of MGO. 2015. V. 576. P. 212—226.

A review of the activities of MGO in the Great Patriotic War. The article is illustrated with material from the archives of MGO.

*Keywords:* meteorological observations, meteorological services.

Fig. 10. Ref. 12.