

**New technology of hydrodynamic ensemble forecast for 45 days and regional estimates of forecast skill for Northern Eurasia.**

Mirvis V.M., Lvova T.Yu., Matyugin V.A. Proceedings of MGO. 2014. Vol. 570. P.5-33.

New technology of 45-day forecasts, based on the using of the atmospheric general circulation model T63L25 is presented. The forecasts are updated once a week on two monthly periods (lead time is a day or two weeks) and include weekly detailization for the first 4 weeks. Product of forecast: global grid of predicted anomalies and probabilistic forecast for three categories (below normal, near normal, above normal) of the five main meteorological elements. Also the forecasts of surface air temperature and precipitation for 70 stations in the North-Eurasian region are calculated. The analysis of forecasts skill are made for this area.

*Keywords:* Monthly Meteorological Forecast, Subseasonal Prediction, Atmospheric General Circulation Model, Calibration of probabilistic forecasts, Air temperature, Precipitation, Northern Eurasia, Estimation of forecasts skill

Tabl.5. Fig.8. Ref.23.

**Regional climatic changes in the major components of the surface radiation budget over Russia.** Khlebnikova E.I., Sall I.A. Proceedings of MGO. 2014. V.570, P. 34-49.

The results of the analysis of tendencies in change of downward shortwave (direct and global) radiation for different time intervals over Russia are given. As a basis of the analysis the actinometric data (1961-2012) and some meteorological data (up to 2010) on cloudiness and surface air temperature are used. These results are discussed in the context of global climate changes in surface solar radiation.

*Keywords:* climate change, direct radiation, global radiation, surface radiation budget

Fig.6 Ref.31

**Climatic variability of hydrometeorological parameters of the seas of Russia in 1979—2011 years.** Kostianoy A.G., Ginzburg A.I., Lebedev S.A. Proceedings of MGO. 2014. V. 570. P. 50-87.

The results of the study of changes in air temperature, precipitation and wind speed (and sea level for the Black Sea, Sea of Azov, Caspian and White Seas in the period 1979-2011 in the water areas of all the seas of the Russian Federation are presented. For the White Sea, data on sea surface temperature, ice cover area and duration of ice period are additionally given. Linear trends and increment/decrease of the magnitudes of the parameters being studied during the period under consideration are calculated.

*Keywords:* seas of Russia, air temperature, precipitation, wind speed, sea level, ice cover, global warming, satellite altimetry.

Tab. 1 Fig. 22, Ref. 46.

**Problems of operational climate information services to economy.** Kobysheva N. V., Emeljanova V. N., Rasova E. N. Proceedings of MGO. 2014. V.570. P.88-94.

Classification of operational climate information services to economy is presented. Service tasks that face National Hydro meteorological Services and MGO employees are discussed.

*Keywords:* operational service, regulatory specialized hydrometeorological information, core indicators.

Fig.1, Ref.6

**Assessment of climate change and variability impact on the hydroelectric potential of the Russia's regions.** Akentyeva E. M., Sidorenko G.I., Tyusov G.A. Proceeding of MGO. 2014. V. 570. P. 95-105.

Issues related to the influence of climate change and variability on the development of hydroelectric power at Russian HPP are discussed. Evaluation of the possible change in the hydropower potential of Russian regions up to the middle of the 21st century is presented. It was obtained using simulation results over the ensemble of 25 CMIP5 climate models and regional climate model created in MGO.

*Keywords:* hydroelectric potential, HPP, climate change, regional climate model, atmosphere-ocean general circulation models, federal districts of Russia.

Tab. 7. Fig.2 . Ref. 18.

**Prospects for the development of renewable energy sources in the Arkhangelsk Region and Nenets Autonomous District.** Grishchenko I.V. Proceedings of MGO. 2014. V. 570. P.106-113.

Considered climatic resources for the development of renewable energy sources (RES) in the Arkhangelsk Region and Nenets Autonomous District. Demonstrated the advantages of using specific RES depending on climatic, economic and social conditions.

*Keywords:* renewable energy, biofuels, wind potential, tidal power

Ref. 7.

**The use of meteorological data obtained by microwave temperature profiler MTP5 for the study of atmospheric boundary layer characteristics in the construction site of the Leningrad NPP.** Psalomschikova L.M., Stadnik V. V., Sall I. A., Mironicheva N.P., Ivashkevich I.V., Aleksandrova G. A. Proceeding of MGO. 2014. V. 570. P. 114-132.

Calculated aeroclimatic characteristics of the lower 1000 - meter layer of the atmosphere necessary to study the conditions of atmospheric diffusion of impurities are discussed (air temperature, vertical gradients and temperature profiles, characteristics of surface-based and elevated inversions, atmospheric stratification, height of the mixing layer, etc). Measurements of temperature profiles have been obtained using the microwave temperature profiler MTP-5, mounted on the specialized weather station, located on the construction site of the Leningrad NPP.

*Keywords:* vertical temperature profiles, vertical gradients, characteristics of surface-based and elevated inversions, atmospheric stratification.

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

**The research of the abnormally hot summer thermic regime in the Central Black Soil region and the factors causing it.** Zadorozhnyay T.N., Zakusilov V.P. Proceedings of MGO. 2014. V. 570. P. 133-148.

The analysis of thermic regime pattern in Central Black Soil regions (Voronezh region in particular) during spring and summer period of the 2010 is presented in the article. Features of concomitant circular processes on the surfaces of 500 and 100 hPa are revealed.

*Keywords:* maximum temperature, tropical zone, polar vortex, thermic regime, southern hemisphere, Voronezh. Central Black soil region, subtropical zone.

Tab. 0 Fig. 8, Ref. 12.

**An assessment of heat flux into the ground under random depth location of ground thermometers.** Rusin I. N. Proceedings of MGO. 2014. V. 570. P. 149-162.

The method is described to obtain current values of the heat flux from the surface into the active layer of the soil, and the thermal diffusivity of this layer. The method enables the use of arbitrary placement of soil thermometers to depth and any intervals of time for data recording. It is suitable for evaluation in terms of stationary observation, and in field conditions. Errors of estimations and recommendations for application of the method are given.

**Key words:** method of obtaining, heat flow in soil, temperature conductivity coefficient.

Fig. 3. Ref. 11

**Distribution of tick *Ixodes ricinus* under climate warming in Russia and neighboring countries in XXI century.** Popov I. O. Proceedings of MGO. 2014. V. 570. P. 163-175.

A contemporary climatic range of the tick *Ixodes ricinus*, one of the most harmful vectors of human diseases (encephalitis and ixodes tick-borne borreliosis), and its climate-driven changes in the XXI century are computed with model means. Along with expected warming the range will expand northward and eastward. By the end of the XXI century, the species may inhabit northern part of the European Russia and most of Western Siberia (up to Baikal lake). Climatic conditions for the establishment of the species in the Far East and Kamchatka will appear. Projected climate change will contribute to substantial expansion of *I. ricinus* climatic range during the XXI century that may cause the establishment of encephalitis and ixodes tick-borne borreliosis seats at the locations where the diseases are not currently observed.

**Keywords:** *Ixodes ricinus*, encephalitis, ixodes tick-borne borreliosis, range, climate change, climatic scenario.

Fig. 3. Ref. 31.

**Comparison of average summer daily precipitation sums in the Asian part of Russia obtained by ground-based and satellite obser-**

**ventions.** Pokrovsky O.M. Proceedings of MGO. 2014. V. 570. P. 176-187.

Discrepancies average daily precipitation sums in the Asian part of Russia ( APR ), obtained at the ground-based network and satellite observations, found no systematic bias. They depended largely on the configuration of the ground network stations, terrain relief and proximity to the ocean. Maximum values of differences in southern APR accounted for approximately 10-20% , which is consistent with the results of similar comparisons made by foreign experts for other regions of the middle latitudes . Region of maximum discrepancies between satellite and ground-based data in an area where there are a sufficient number of stations in the meteorological network, which constitute about a quarter of all the "illuminated" territory, we can say that the average differences are approximately 4-8%.

*Keywords:* average daily precipitation totals, ATP, terrestrial and satellite observation, comparison, maximum and standard measurement discrepancies

Fig. 6, Ref. 17

**Estimation of brine and air content within sea ice.** Bortkovski R.S. Proceedings of MGO. 2014. V. 570. P. 188-196.

High gas permittivity of sea ice is conditioned by relative volume content within ice of the dry  $V_a$  and filled-by-brain  $V_b$  pores. It is shown that these values dependencies on ice temperature  $T$  are smooth and have no discontinuities in natural range of  $T$ . The procedure to estimate values  $V_a$  and  $V_b$  in interval  $0 > T > -2$  °C is developed, it allows to find gas transfer through ice at transition seasons, i.e. spring-fall. It is noticed that ice microstructure formed in ice growing stage ought to remain in the thawing ice depth. Significant microstructure changes under melting ice are probable close to ice upper and bottom surfaces, in layers already affected by thawing only.

*Keywords:* gas permittivity, sea ice, microstructure, ice growing and thawing.

Tab. 3. Fig. 2. Ref. 10.

**Laboratory investigations of the impact of sand and clay particles on water drop crystallization processes.** Sinkevich A.A., Pawar S.D., Kurov A.B., Volkov N.N., Mikhailovskiy V.Yu., Gopalakrishnan. Proceedings of MGO. 2014. V. 570. P. 197-210.

Results of laboratory experiments to investigate the impact of sand and clay particles on the processes of large drops crystallization are presented. An analyses of dispersion content and element composition of the investigated substances was carried out. The carried out investigations have shown that sand and clay particles, immersed in a drop, impact crystallization process significantly, particularly starting temperature of crystallization. Most significant increase of drop crystallization temperature is observed when sand is immersed in a drop, herewith temperature depends on impurity concentration. A range of crystallization temperature for investigated particles was equal to  $-11,5^{\circ}\text{C} \div -1,5^{\circ}\text{C}$ , at the same time mean crystallization temperature of distilled water droplets was equal to  $-14,6^{\circ}\text{C}$ .

*Keywords:* cloud physics, aerosols, crystallization.

Tab. 1, Fig. 6, Ref. 31.

УДК

**Investigation of the Impact of High Atmospheric Pollution by Aerosols on the Development of High Depth Cb with the Help of 3-D Model.** Sinkevich A. A., Krauss T. W., Pawar S. D., Veremey N. E., Dovgaluk Yu. A., Kurov A. B., Gopalakrishnan V. Proceedings of MGO. 2014. V. 570. P.211-236.

An analysis of the development of Cb in the conditions of atmosphere high pollution by natural aerosol in south-western part of Saudi Arabia is carried out in the article. With the help of ground based radar and radiometer, installed on board of Meteosat satellite, Cb characteristics were obtained, Cb top was greater than 14 km and maximum reflectivity reached 58dBZ. Precipitation intensity was obtained with the help of radar data and results of sounding from the satellite.

Numerical simulation of the impact of aerosol on investigated cloud evolution was carried out with the help of numerical time depended 3-D model. Cloud development was simulated for the background aerosol, and also for high aerosol concentration. Two cases were investigated: 1) aerosol has hygroscopic properties; 2) aerosol has ice nucleating properties. It is shown, that in both cases there is an important impact of aerosol on cloud development. Reduction of precipitation takes place, an increase in ice forming

properties of aerosol lead to reduction of precipitation amount and their intensity, but duration of precipitation depends on ice forming properties in complex way.

*Key words:*. aerosol pollution, hygroscopic aerosol, ice-forming aerosol, cumulonimbus cloud, precipitations, microphysics

Tab.1. Fig.5, Ref.63

**Calculation of radar cross section by nonspherical raindrops.**

Veselovska G.B. Proceedings of MGO. 2014. V. 570. P. 237-252.

The comparison of approximate calculations results of backscattering of electromagnetic waves by ellipsoidal drops and Pruppacher-Pitter drops using the dipole scattering and by replacing the spherical drops of an equivalent volume of data rigorous calculations based on the method of moments is performed. The framework of approximate calculations applicability is defined and polynomial approximation of rigorous data solutions for the calculation of scattering by polydisperse media is proposed.

*Keywords:* radar cross section, ellipsoidal drop, Pruppacher-Pitter drop, approximation of dipole scattering, method of moments.

Tab.6. Fig 8. Ref.16.

**Error Assessment of lidar determining of slightly turbid atmosphere transparency.** Sanotskaya N.A. Proceedings of MGO. 2014. V.570. P.253-260.



It is considered the method of interpreting weak lidar signals. The accuracy of the method can be improved using the effective beam-path averaging procedure and the linear approximation of the transmittance in the case of small extinction coefficient.

*Keywords:* lidar, atmosphere transperensy, method, linear approximation

Fig.3 Ref.11

**Physical bases for artificial cloudiness in the upper troposphere.** Kozlov V.N., Mazurov G.I., Doronin A.P., Korchun N.A. Proceedings of MGO. 2014. V. 570. P. 263-271.

The article discusses a possibility of creating artificial cloudiness of the upper tier with the help of a water spray. It is argued that condensation trails regarded as indicators of artificial cloudiness are formed at the critical temperature and air humidity, exceeding saturation above ice. Described are climatic conditions favorable for artificial cloudiness formation. In winter the possibility approaches 100%, in summer - less than 50%. It is suggested to insert water drops of 5 mkm into the atmosphere in order to cause artificial cloudiness formation.

*Key words:* condensation trails, cirrus cloudiness, critical temperature, water spray, ice crystals.

Tab. 1. Fig. 2. Ref.15.