

УДК 551.583

**World ocean ice cover as simulated with CMIP5 models.** Pavlova T. V., Kattsov V. M. Proceedings of MGO. 2013. V. 568. P. 7—25.

The analysis by Pavlova et al. (2011) of the World Ocean sea ice extent simulations over the 20<sup>th</sup> and 21<sup>st</sup> centuries using an ensemble of CMIP5 climate models is continued. A comparative assessment is undertaken of the sea ice simulations against the previous generation models — CMIP3. The ability is discussed of the models to reproduce the observed extent of the World Ocean ice cover both in the seasonal cycle and in tendencies over past decades characterized with the observed fast shrink of the Northern Hemisphere ice extent in summer, and small but statistically significant increase in the Southern Hemisphere. Projections are shown of sea ice extent changes in both hemispheres for 3 new scenarios of radiative forcing of the climate system: RCP2.6, RCP4.5 and RCP8.5.

*Keywords:* sea ice extent, World Ocean, CMIP5 and CMIP3 climate model ensembles.

Tab. 1. Fig. 6. Ref. 22.

УДК 551.583

**Performance of CMIP3 and CMIP5 models in simulation of current climate.** Meleshko V. P., Govorkova V. A. Proceedings of MGO. 2013. V. 568. P. 26—50.

The simulation of current climate by CMIP3 and CMIP5 coupled models are compared for global and regional domains of the Northern Hemisphere. The models of two ensembles were rated using composed seasonal RMSE derived from simulation of current climate. Two ensembles with 16 best models were selected for further model evaluation. The chosen metrics showed some reduction of systematic errors and multimodel spread in simulation of current climate by CMIP5. The most essential improvement is obtained in high latitudes of the Northern Hemisphere for surface air temperature and sea level pressure. The improvements in simulation of total precipitation were demonstrated in winter only. In general some progress in model performance was noted in new generation climate models.

*Keywords:* evaluation of current climate, metrics, CMIP5 and CMIP3 climate model ensembles.

Tab. 5. Fig. 6. Ref. 20.

**Temperature changes in Russia according to observations and model simulations with a separate account of anthropogenic and natural external impacts.** Sporyshev P. V., Govorkova V. A. Proceedings of MGO. 2013. V. 568. P. 51—79.

The evolution of the climate in Russia in the 20th — early 21st century according to observations and simulations taking separately into account the influence of external radiation forcings is examined. Model simulations are presented by three ensembles of experiments with global atmosphere—ocean general circulation models participated in the international project CMIP5.

The analysis has shown that the main contribution to the observed increase in temperature on the territory of Russia is made by the impact of changes in the concentration of greenhouse gases. However, the natural effects significantly manifest themselves in interannual variations in temperature. Their influence is especially high in the summer when the impact of aerosols of natural origin on the incoming solar radiation flux at the surface is significant, but the interannual variability of temperature is relatively small.

*Keywords:* observed changes in temperature, climate modeling, the CMIP5 global climate model ensemble.

Tab. 3. Fig. 6. Ref. 13.

УДК 551.583

**Response of atmospheric climate to reduction of sea ice and other external forcings during the recent decades.** Meleshko V. P., Baidin A. V. Proceedings of MGO. 2013. V. 568. P. 80—117.

Response of atmospheric climate to sea ice reduction and other external forcings during recent decades was studied using observation and simulation with atmospheric general circulation model.

An ensemble simulation with atmospheric model was performed using prescribed (taken from observation) sea ice concentration, SST and greenhouse gases. Detectable changes of air temperature, sea level pressure and geopotential height at 500 hPa were found in troposphere for all seasons. If observed SST increase is not considered in the simulation, spatial propagation of detectable temperature change is substantially reduced in the northern troposphere and near the air surface. Changes of circulation characteristics are insignificant in the Northern hemisphere with exception of sea level pressure anomalies in polar basin during autumn and winter.

The study confirmed several others undertaken recently that reduction of sea ice in the Arctic had significant climatic impact on air temperature in lowest layer of the polar region in cold seasons during the recent decades, but it did not have significant impact on atmospheric large-scale circulation.

*Keywords:* Arctic climate, sea ice extent, atmospheric model, variability of atmosphere, ensemble computation

Tab. 3. Fig. 16. Ref. 26.

УДК 551.510

**Modelling variability of the vitamin D UV-radiation for 21<sup>st</sup> century.** Zubov V. A., Rozanov E. V., Karol I. L., Egorova T. A., Kiselev A. A., Ozolin Yu. E. Proceedings of MGO. 2013. V. 568. P. 118—136.

Impact of climate and atmospheric ozone changes for the 21st century on variability of the UV radiation daily dose of the vitamin D human skin production has been evaluated with the chemistry-climate model SOCOL 2.0 and the radiative transfer model FASTRT(UVSPEC). Contributions of the century changes of total column ozone, liquid water content and surface albedo into the surface UV daily dose changes related to vitamin D were obtained.

*Keywords:* climate, atmospheric ozone, chemistry-climate model, UV radiation, vitamin D.

Fig. 3. Ref. 23.

**Comparison of two typifications of circulation processes.** Meshcherskaya A. V., Kononova N. K., Ivanov V. V., Golod M. P. Proceedings of MGO. 2013. V. 568. P. 137—155.

The brief characteristics of two well-known in Russia circulation typifications (by G. Ya. Wangengeim – I.I. Girs and B. L. Dzerdzeevsky) have been presented.

It is shown that the west (W) type of Wangengeim's typifications in winter sufficiently close to the first of coefficient of expansion in empirical orthogonal functions ( $r = -0.68; -0.69$ ) and to a certain extent it is the objectivity characteristic.

In the series of west (W) and east (E) frequency Wangengeim's form circulation two periods are picked out: from 1891 to 1975 and from 1976 to 2012. During the first period frequency of the W circulation form decreased and E circulation form increased. The years of break (1975—1976) coincide with the beginning of intensive warming climate period and the next in turn of rising Caspian Sea level.

During the period of intensive warming the mean air temperature in winter was on 1—2 °C higher, than during the early (first) period. The mean amount of precipitation in winter higher during the warming period and in summer higher during the early period.

It's reveal the negative correlation ( $r = -0.48; r = -0.47$ ) between frequency meridional form circulation of Wangengeim and summer drought indices D and DM over the European part of former USSR (catalogs by Meshcherskaya et al.). Between the drought indices and E form circulation the correlation is weaker, than with form C, but it is positive and statistical significant.

*Keywords:* circulation form, intensive warming climate period, mean air temperature, drought indices.

Tab. 5. Fig. 7. Ref. 18.

УДК 551.583

**Changes in the wind regime over Russia in the last decades.** Bulygina O. N., Korshunova N. N., Razuvaev V. N. Proceedings of MGO. 2013. V. 568. P. 156—172.

The analysis of changes in wind characteristics was made on the basis of point data and series of average characteristics obtained for 18 quasi-homogeneous climatic regions. Statistical characteristics were obtained for all seasons and for the year as a whole. The trend of changes in average and maximum wind speed was assessed with a linear trend coefficient. Data on average and maximum wind speed measured at 1457 stations of Russia were used. The analysis of the results allowed seasonal and regional features of changes in the wind regime on the territory of Russia to be determined.

The outcomes could help to provide specific recommendations to users of hydrometeorological information for making reasonable decisions to minimize losses caused by adverse wind-related weather conditions.

*Keywords:* wind speed, maximum wind speed, climate changes, quasi-homogeneous climatic regions, linear trend coefficient.

Tab. 1. Fig. 7. Ref. 11.

УДК 551.510.534

**Conception of interaction of atmospheric ozone and air mass in the Northern Hemisphere.** Shalamyansky A. M. Proceedings of MGO. 2013. V. 568. P. 173—194.

Analysis of long-term data set of spatial and temporal distribution of atmospheric ozone has shown that the arrangement of the ozone fields is closely connected with troposphere air masses. Since the degree of ozone destruction in the warm troposphere significantly higher than in the cold, so over each air mass is formed its own ozone layer. Over the warm air mass in the lower stratosphere is always observed low level of ozone and low temperature, over cold air mass — high levels of ozone and high temperature. In the gap between warm and cold tropopause it is observed minimal temperature gradients and the largest level of pressure gradients. Accordingly the moving of air mass borders is depend on conditions in the troposphere and lower stratosphere state, i.e. on the state of the ozone layer.

*Keywords:* spatial and temporal distribution of atmospheric ozone, the air masses of the Arctic, temperate and tropical air, the upper troposphere and lower stratosphere.

Fig. 5. Ref. 15.

УДК 551.576

**Analysis of the annual and daily sums of precipitation amounts in Asian part of Russia based on ground gauge stations and satellite measurement data.** Pokrovsky O. M. Proceedings of MGO. 2013. V. 568. P. 195—204.

A description of the CMAP-NOAA data sets has been given. Physical background of the precipitation remote sensing technique and structure of related datasets including the gauge measurement ground station network has been provided. Statistical analysis results of the annual and daily fields in the asian part of Russia for 1979—2011 have been presented. It includes performance not only mean fields, but also variability fields.

Latter permits to calculate informative content of potential sites in the Artic coast and North-East domain of Siberia to locate new automatic stations in rare data areas. Inter comparison of the mean and the variability fields obtained with a reference to the sets of satellite, and gauge station datasets has demonstrated quantitative contribution for each of observing system.

*Keywords:* climatology, regional precipitations, interannual variability, satellite remote sensing, CMAP project, statistical analysis.

Fig. 6. Ref. 14.

УДК 502.330.15

**Perspective and a reas of agro-meteorological observation network modernization.** Dolgij-Trach V. A. Proceedings of MGO. 2013. V. 568. P. 205—230.

The current state of agro-meteorological observation network was analyzed and the results of such analyses were presented. The modernization concept program of agro-meteorological observation network was described. The core of that program was the development of the network mobile component, namely the increasing of automobile trace observation and the creation of the stationary system for automated monitoring of agricultural field water and temperature regime.

*Keywords:* agro-meteorology, observation network, modernization, monitoring.

Tab. 4. Fig. 4. Ref. 11.

УДК 551.58

**Climate Services Capacity Building as part of GFCS.** Ymelyanova V. N., Kobysheva N. V. Proceedings of MGO. 2013. V. 568. P. 231—237.

The problem of advanced training in up-to-date methods of Climate Services is discussed. Revised learning curve and training program developed by authors are presented.

*Keywords:* methods, Climate Services, training program.

Ref. 11.

УДК 551.521.31

**On specificities of direct solar radiation incoming daily to tilted differently orientated surfaces of helioreceivers.** Trofimova O. V. Proceedings of MGO. 2013. V. 568. P. 238—249.

Diurnal cycle of the average long term hourly totals of direct solar radiation, which incomes to the tilted surfaces at real cloudiness terms, is investigated. The data have been received from the Russian actinometrical network. Two types of tilted surfaces were considered: facing the sun, which characterizes maximum of incoming radiation, and at the angle that equals to the place's latitude. Special attention is focused on contribution of direct solar radiation to total. The graphs of the isopleths allow to consider complexly within-day and within-year structure of incoming direct solar radiation to above mentioned titled surfaces in different regions of Russia.

*Keywords:* direct solar radiation, tilted surfaces, diurnal cycle, contribution of direct solar radiation to total, isopleths.

Fig. 4. Ref. 4.

УДК 551.521.31

**Solar resources of Kalmykia.** Stadnik V. V., Shanina I. N. Proceedings of MGO. 2013. V. 568. P. 250—266.

The estimations of the Kalmykia solar energy resources are considered. The division of the territory according to the potential of solar resources is fulfilled. The specific monthly and annual production of electrical energy by a photovoltaic panel and thermal heat by a solar collector are calculated. One of the main conclusion of the work is that Kalmykia has natural solar potential in spite of public opinion that it is unprofitable energetically region of Russia. The available solar potential allows to apply solar technologies and plants of different capacity widely.

*Keywords:* solar radiation, solar energy resources, solar collector.

Tab. 4. Fig. 5. Ref. 11.

УДК 551.510

**Trends of air pollution and the role of climate conditions.** Bezuglaya E. Y., Zavadskaya E. K., Ivleva T. P. Proceedings of MGO. 2013. V. 568. P. 267—279.

The results of comparisons of the components of air pollution potential (PAP) for the two long periods are presented. The trend of levels of air pollution in major cities of Russia has been investigated and the important role of chemical activity of the atmosphere in the formation of pollutants concentration has been demonstrated.

*Keywords:* air pollution, air pollution potential, trend of levels of air pollution, chemical activity of the atmosphere.

Fig. 8. Ref. 8.

УДК 551.510.04

**Relationship between precipitation pH values and weather conditions in Saint-Petersburg over a period of 2005—2009.** Popova E. S., Semenets E. S. Proceedings of MGO. 2013. V. 568. P. 280—286.

Regularity of seasonal changes in the pH of precipitation in St. Petersburg in 2005—2009 is determined. The relations between the pH of the meteorological parameters: temperature, humidity, wind direction are detected.

*Keywords:* acid rains, precipitation composition, weather conditions.

Fig. 2. Tab. 3. Ref. 5.



УДК. 551.326:551.521(268)

**Some results of reseraches of reflectivity of hummokes slopes in the central area of Arctic basin.** Ivanov B. V., Poliakov C. P. Proceedings of MGO. 2013. V. 568. P. 287—296.

Experimental results of reflecting properties of hummocks slopes in the central Arctic area, carried out on the ice base "Barneo" in April 2010, are presented. The spectral measurements of reflective characteristics of the side surfaces of hummocks under different light conditions were carried out in the first time.

*Keywords:* Arctic, hummocks, albedo.

Fig. 2. Tab. 2. Ref. 13.

УДК 551.594

**To assess the effectiveness of detecting thunderstorms active-passive electronic means.** Snegurov A. V., Snegurov V. S. Proceedings of MGO. 2013. V. 568. P. 287—296.

The efficiency of detecting of thunderstorms by radar, lightning location system and visual methods is considered. It is shown that the combined using of weather radar and lightning location system improves detection of thunderstorms to 75 %.

*Keywords:* efficiency of thunderstorms recognition, weather radar, lightning location system, visual observations.

Tab. 2. Ref. 19.