

Expected Arctic surface air temperature changes through the 21st century: projections with ensembles of global climate models (CMIP5 and CMIP3). Kattsov V. M., Pavlova T. V. Proceedings MGO. 2015. Vol. 579. P. 7–21.

Projections are analyzed of the surface air temperature in the Arctic through the 21st century using an ensemble of CMIP5 climate models. The projections are shown for 3 new scenarios of radiative forcing of the climate system: RCP2.6, RCP4.5 and RCP8.5. A comparison is undertaken with CMIP3 projections under SRES scenarios.

Key words: climate change, surface air temperature, Arctic, climate model ensemble, CMIP5, CMIP3.

Fig. 8. Ref. 15.

Expected Arctic precipitation and evaporation changes through the 21st century: projections with an ensemble of global climate models (CMIP5). Pavlova T. V., Kattsov V. M. Proceedings MGO. 2015. Vol. 579. P. 22–36.

Projections are analyzed of the precipitation and evaporation in the Arctic and over watersheds of main rivers draining into the Arctic Ocean through the 21st century using an ensemble of CMIP5 climate models. The projections are shown for 3 new scenarios of radiative forcing of the climate system: RCP2.6, RCP4.5 and RCP8.5. A comparison is undertaken with CMIP3 projections under SRES scenarios.

Key words: Arctic climate change, precipitation, difference between precipitation and evaporation, Arctic river watersheds, climate model ensemble, CMIP5, CMIP3.

Fig. 10. Ref. 8.

The possible way to evaluate the subgrid dry deposition in chemical transport model. Ziv A. D. Proceedings MGO. 2015. Vol. 579. P. 37–49.

Over past several years, the World Climate Research Programme (WCRP) basing on numerous consultations and a wide discussion within the international research community formulated a number of so called “Grand Challenges”. A Grand Challenge is a major science problem which presents a specific barrier preventing progress in a critical area of climate science. Arctic is quite visible in the context of most of WCRP Grand Challenges, however, of course, the main for this region is the Grand Challenge “Melting Ice – Global Consequences”.

Key words: climate science, grand challenge, Arctic, climate change, open questions.

Ref. 13.

Possible use of the combined solver for chemical block of chemical transport models. Ziv A. D. Proceedings MGO. 2015. Vol. 579. P. 50–66.

The paper considers the possibility of acceleration of calculations for chemical block in chemical transport models (CTM). The rather old methodology of variable (species) splitting is applied for the development of the set of combined solvers. In accordance with the current, during the CTM run, splitting into the "slow" and “not slow" variables the most suitable solver is then used. which vary focused on the current separation of variables, which can vary during operation XTM. The effective scheme for obtaining and using of this set of solvers is outlined.

As it is useful sometimes to add several new species to the exits chemical solver this question is discussed as well.

Key words: chemical transport model, chemical block, variables splitting, combined solvers.

Fig. 3. Tab. 2. Ref. 9.

Arctic in the context of the climate science “grand challenges”.
Kattsov V. M., Pavlova T. V. Proceedings MGO. 2015. Vol. 579. P. 67–79.

Over past several years, the World Climate Research Programme (WCRP) basing on numerous consultations and a wide discussion within the international research community formulated a number of so called “Grand Challenges”. A Grand Challenge is a major science problem which presents a specific barrier preventing progress in a critical area of climate science. Arctic is quite visible in the context of most of WCRP Grand Challenges, however, of course, the main for this region is the Grand Challenge “Melting Ice – Global Consequences”.

Key words: climate science, grand challenge, Arctic, climate change, open questions.

Ref. 16.

Satellite SAR monitoring of the ice cover parameters of seas closed for navigation of the Russian ships (Bothnia Gulf as example). Melentyev V. V., Melentyev A. V., Zaharikhina N. A., Zaharova T. A., Petterssen L. H. Proceedings MGO. 2015. Vol. 579. P. 80–92.

Study dedicated to further development the technology of satellite trassology by using synthetic aperture radar (SAR) with high space resolution that now successfully functioning onboard satellites Envisat and RADARSAT. 280 satellite SAR images of the Gulf of Bothnia were analyzed as region closed for routing of Russian weather and cargo ships and trassological control of navigation features in stormy weather and presence of ice cover with different age, compactness and origin were investigated. Coordinates of ships, extension of their tracks and complexity of ice routing were documental fixed and assessed with using GIS technology. Parameters of openings in ice, large fractures and polynyas in Gulf of Bothnia directed by icebreakers and convoys that can provide induced ecological catastrophe were investigated. Sub-satellite validation program supposes synchronous ice observations at the NE part of the Gulf with using motor sledge confirmed fidelity of SAR satellite estimates of the ice cover parameters. In situ observations were organized. in March 2007, shortly after launch satellite RADARSAT-1.

Key words: Aerospace remote sensing, satellite trassology, dangerous ice phenomena, SAR technology, thematic trassological interpretation, induced ecological catastrophe.

Fig. 6. Ref. 9.

Satellite SAR monitoring of the ice of the East Siberian sea and sea bordering shores with using non-Russian satellite survey. Melentyev V. V., Melentyev A. V., Petterssen L. H. Proceedings MGO. 2015. Vol. 579. P. 93–115.

The problem of all-the-weather support of ice navigation at the eastern part of the Northern Sea Route (NSR) – most difficult area for ship routing discussed. These difficulties are happened ever in summer season due to influence of the Aionskiy Ice massif that could “close” ship transportation between Barents and Bering seas. The satellite SAR survey are used as instrument for charting ice features of the ice regime of the East-Siberian Sea and surrounding waters including Aionskiy Ice Massif in diffent stages of it development as well the satellite diagnosis of the ice regime of Novosibirskaya recurring polynia that could be recommended for selection the optimal ice route in this region. The presented SAR images show the typical situation of the ice cover arrangement in this part of NSR and could be applied as the Atlas of satellite SAR signature of the ice cover in Russian Arctic.

Key words: Northern Sea Route (NSR), Central Ice Massif, Aionskiy Ice Massif, Novosibirskaya recurring polynia, Remote Sensing ice Regime, Atlas of SAR-signatures of ice.

Fig. 13. Ref. 10.

Representativeness of meteorological stations and its influence on multi-scale characteristics of the climatic mode. Svetlova T. P. Proceedings MGO. 2015. Vol. 579. P. 116–129.

The review of a condition now of a representativeness problem in relation to meteorological (including climatic) is submitted to characteristics of environment and points of observation over them, in the Global System of observation, generally, and in the conditions of the insufficient density of a network, characteristic for the Russian Federation, in particular.

The analysis of the existing approaches to an assessment of a representativeness of real data and measure of their not representativeness, and also influence of a representativeness of points of supervision on accuracy of the observation data used for various generalizations and statistical calculations is made.

It is shown that not accounting of a representativeness of points of observation often leads to absolutely wrong conclusions at further generalizations or interpretation of results of supervision because of not accounting of multiscale of atmospheric processes in formation of the meteorological mode of the territory and (or) the wrong selection of points of the observation suitable for the solution of a specific objective.

The attention to extreme importance of the accounting of the "contribution" of a nerepresentativnost of concrete points of supervision representing the powerful numerical characteristic brought in calculations of "climatic characteristics", climate and especially in monitoring of its changes is paid.

Keywords: representativeness, meteorological data, points of observation, climatic calculations, monitoring of climate.

Ref. 11

Catalogues anomaly winters for Russian territory.
Mescherskaya A. V., Golod M. P. Proceedings of MGO. 2015. Vol. 579. P. 130–162.

During the period from 1936 to 2014 using monthly temperature air for January and February, the series of winter index α are calculated, as the ratio of air temperature anomalies to the standard deviation for the period 1961-1990. The calculations were based on the data of 284 meteorological stations in physico-geographic regions of Russia, divided into northern (to the north of 60° N.L.) and southern (to the south of 60° N.L.) parts (10 regions). For each region, series of the index α were ranged and defined as extremely cold winters, considerably cold winters, extremely warm winters, considerably warm winters and winters, close to the long-term average condition.

For the long-term period the trends of index α were estimated. It is shown, that for the northern parts of the regions trends are not obvious and for the southern parts the index α series had mainly increased from negative values to positive ones. The statistically significant increase of α -index was registered in South of European Russia, in the South of Eastern Siberia, in the Trans-Amur territory and in the Primorye. The examples of the extremely cold and warm winters condition are given, the causes are discussed.

Key words: ranged index series for winter anomalies, extremely cold, extremely warm winter condition in Russia.

Tab. 3. Fig. 4. Ref. 18.

The transparency of the atmosphere in Russia: changes in the last 40 years. Makhotkina E. L., Plahina I. N., Makhotkin A. N. Proceedings MGO. 2015. Vol. 579. P. 162–177.

The data on the spatial and temporal changes in the integrated turbidity (T2) and aerosol optical depth (AOD) on the territory of Russia for the period 1976-2014 are presented.

T2 and AOD trends here in different regions were analyzed. multiyear averages of T2 and here and features of their annual variation are defined.

Key words: atmospheric transparency, atmospheric aerosol, network observations, trends.

Tab. 3. Fig. 3. Ref. 34.

Development of short-term severe weather forecast technology based on observation analysis and the numerical atmospheric model WRF results. Mostamandi S. V., Tarabukin I. A., Dorofeev E. V. Proceedings MGO. 2015. Vol. 579. P. 178–204.

A Short range severe weather forecasting system based on numerical mesoscale atmosphere model has been developed. System for collecting and archiving of primary meteorological data has been managed. Software for visualization and analysis of structured and unstructured meteorological data has been developed The main component of this system is assimilation block. It is obvious that the quality of forecast directly depends on accuracy of analysis. For this was assimilated the radar data (reflectivity and radial velocity) and also in-situ observations, coming from automatic weather stations (AWS). Has been estimated the effect of data assimilation on forecast quality.

Keywords: Forecast, short-term forecast, nowcasting, NWP, Doppler radar, assimilation, convection

Fig. 11 Tabl.1. Ref. 14.

Impact of Soot Particles on Crystallization of Water Drops.

Kurov A. B., Veremey N. E., Volkov N. N., Letenko D. G., Mikhailovskiy V. Yu., Sinkevich A. A. Proceedings of MGO. 2015. Vol. 579. P. 205–213.

Results of laboratory investigation of immersion freezing of water drops containing soot particles are discussed in this paper. Data on the structure of soot samples are presented. Samples of soot particles were collected during burning of wood. Laboratory experiments have shown that soot particles cause increase in freezing temperature by about 2.5°C in comparison with pure distilled water drops. The percentage of soot by weight was varying between 0.005 and 0.5%.

Keywords: soot, forest fires, immersion freezing, supercooled drops, freezing temperature.

Fig. 5, Ref. 5.

On the Method of Atmospheric Electric Field Strength and Aircraft Charge Measurements. Torgunakov R. E., Mikhailovskiy V. Yu., Sinkevich A. A. Proceedings MGO. 2015. Vol. 579. P. 214–231.

This paper describes a method of atmospheric electric field strength and aircraft charge measurements with the help of electric field-mills installed on board of an aircraft. The errors of the existing method were estimated. A method of electric field modeling with the help of computer program was proposed. It allows to develop recommendations for sensors installation and to decrease measurement errors.

Keywords: electric field strength, aircraft, field-mill, electric field modeling, measurement errors.

Fig. 10. Tab. 1. Ref.14.

Сборник научных трудов

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