

Климатическое обслуживание в Арктике в рамках создаваемого АПРКЦ-сеть по РА-II

Climate services within the APRCC-network node for RA-II

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Arctic Polar RCC-Network

Implementation Plan approved by WMO Executive Council in May 2017

North American Node

- Consortium: Canada (Lead), USA

Northern Europe/Greenland Node

- Consortium: Norway (Lead), Denmark, Iceland, Finland, Sweden

Eurasian Node

- Lead: Russian Federation

- Detailed stakeholder consultations
- Demonstration phase to commence in spring 2018
- Norway act as the overall coordinator for 3 first years
- Cross-node operations in LRF, monitoring and data to provide pan-Arctic coverage
- Several institutions within the consortia countries to join forces
- Global Cryosphere Watch (GCW) to be a key contributor
- Implementation Plan to be a living document
- All 8 Arctic Council countries have agreed to be part of the network

Ongoing preparations for implementation

Data portal (Norway) is being established

Developing products for LRF (Long Range Forecasting) to include sea ice information (Canada)

Developing structure for pan-arctic bulletin (Russia)

Preparations for the Pan-Arctic Regional Climate Outlook Forum (PARCOF) spring 2018 (Canada)

Coordination with Global Cryosphere Watch (GCW) on potential shared products

Implementation of proposed national APRCC-RAII (EAACC)

Implementation of the **APRCC-RAII** is planned similar to existing NEARCC as a consortium of 4 Roshydromet institutions:

- ❑ Arctic and Antarctic Research Institute (AARI), St.Petersburg, coordinator
- ❑ Main Geophysical observatory (MGO), St.Petersburg
- ❑ Russian Institute for Hydrometeorological information – World Data Center (RIHMI-WDC), Obninsk
- ❑ Hydrometcenter of Russia (RHMC)



Implementation of APRCC-RAII: AARI

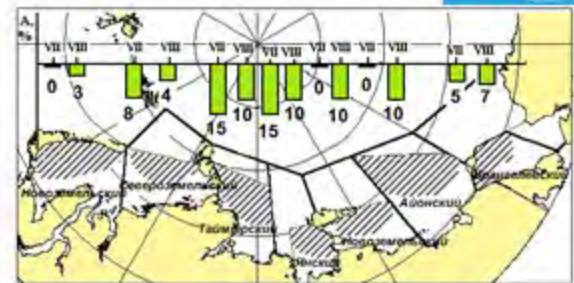
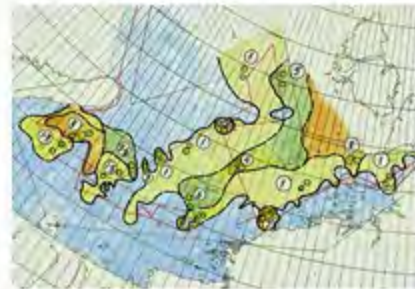
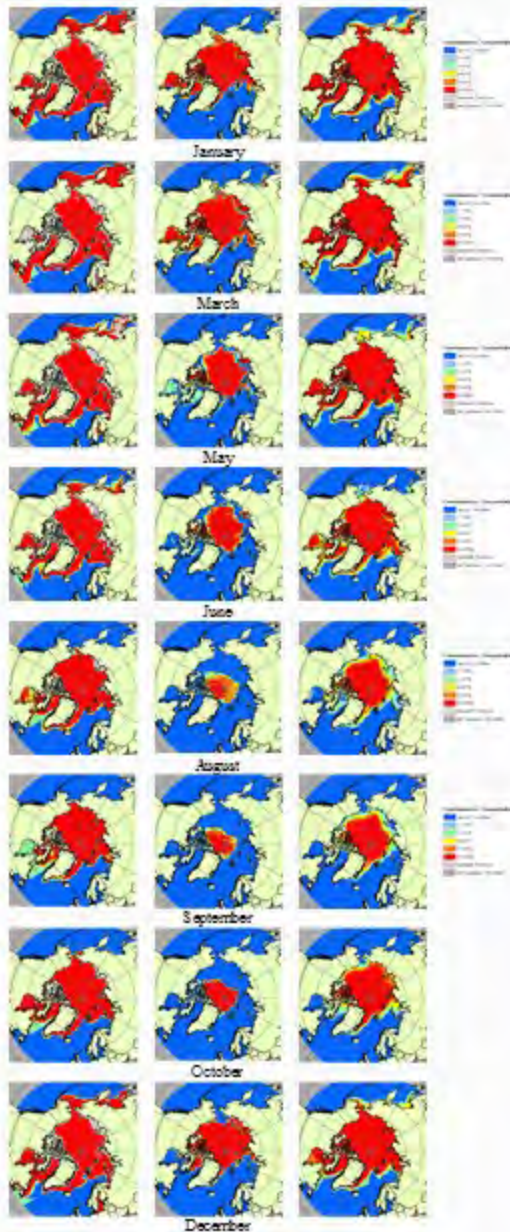
❑ Mandatory functions:

- Operational activities for LRF
 - Forecasting the **Arctic sea ice parameters** (ice extent, ice edge, ice age, ice drift)
- Operational activities for climate monitoring
 - **Ice extent, ice drift schema, old ice, SLP, Tair, polar oceanography**
- Operational data services, to support operational LRF and climate monitoring (**extent, CT, ice edge**)
- Training in the use of operational RCC products and services

❑ Recommended functions

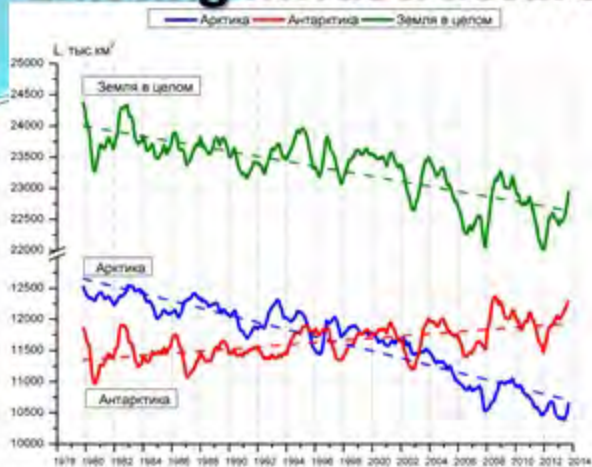
- Non-operational data services
- Coordination of functions
- Scientific research

Existing infrastructure on Polar climate services: AARI

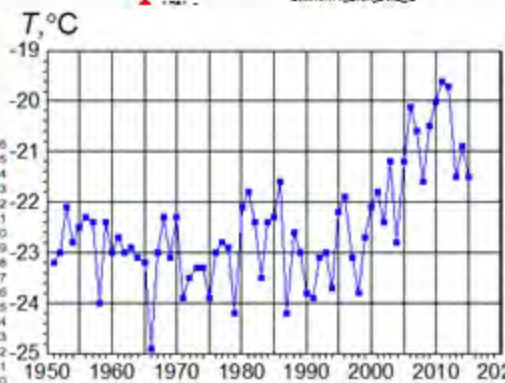
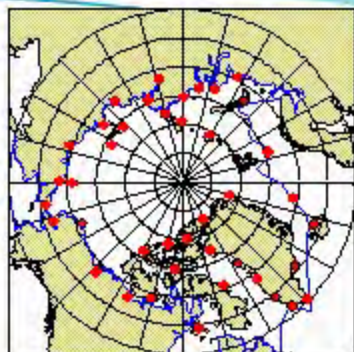


- ❑ Monitoring of the Arctic and Antarctic marine environment, short, medium and long-term forecasting, operational support at sea and are the prime AARI responsibilities since 1920s
- ❑ Several operational and scientific departments are supporting RCC functions
- ❑ AARI is supporting the WMO “Global Digital Sea Ice Data Bank” project integrating together with NSIDC the national ice services sea ice climatology based on ice charting

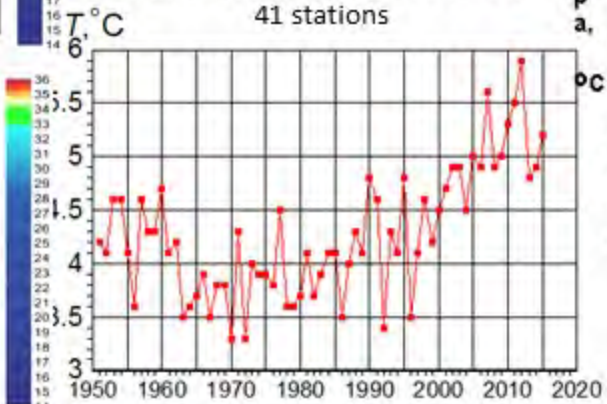
Existing infrastructure on Polar climate services: AARI



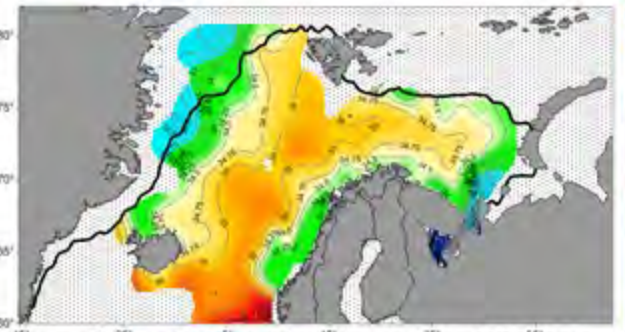
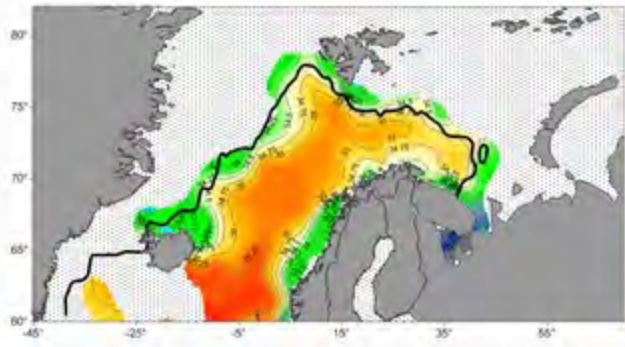
Smoother (365 days) daily ice extent values and linear trends for Arctic and Southern Ocean for 1978-2013



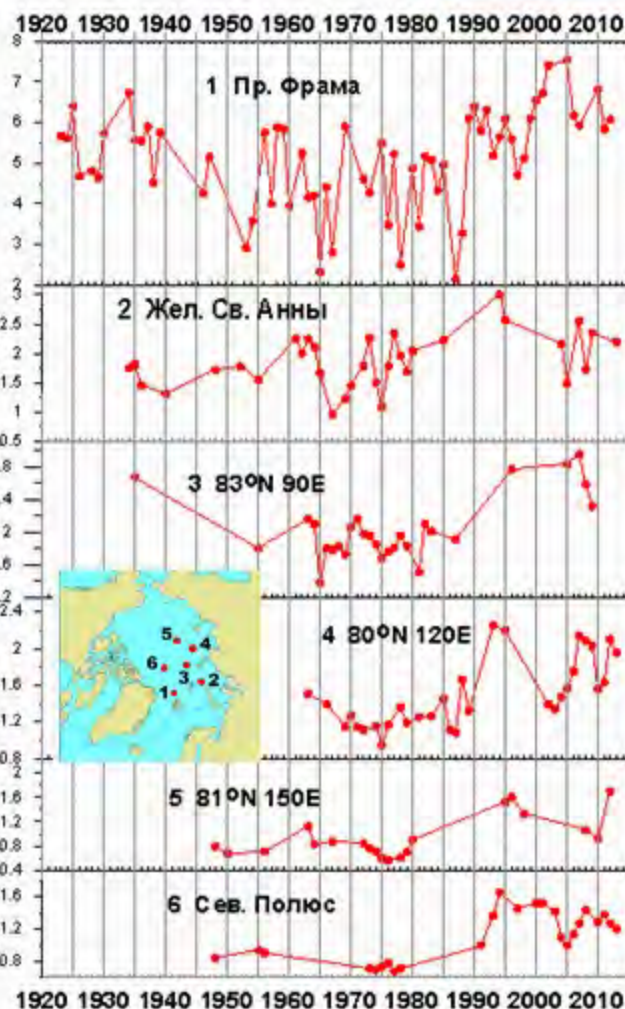
Winter air temperature based on 41 stations



Summer air temperature based on 41 stations



Sea surface salinity and ice edge in June 1969 (top) and 1987 (bottom), Salinity – NOAA NODC, ice edge – HadSST



Maximal T_{AW} in the Arctic Basin

Implementation of APRCC-RAII : MGO

❑ Mandatory functions:

- Operational activities for LRF (**numerical monthly ensemble forecasts in cooperation with HMC Moscow**)
- Operational activities for climate monitoring (elements – **carbon dioxide, methane, ozone, precipitation chemistry**)
- **Registration of MGO data as APRCC-RAII information resources and their updates, their availability to APRCC-RAII**
- Training in the use of operational RCC products and services

❑ Recommended functions

- Perspective estimates of climate change **for different scenarios of external forcing – global and regional assessments for both hemispheres**
- Climate services
- Training and capacity building
- Scientific research

Existing infrastructure on Polar climate services: MGO



VOEIKOV
MAIN
GEOPHYSICAL
OBSERVATORY

Климатический центр Росгидромета

Международная научная конференция «Наше общее будущее при изменении климата»

26-я Генеральная Ассамблея Международного союза по теории и геофизике (IUGG)

XX Петербургский международный экологический форум

А.И.Безрицкому вручен премия ММО

Петтери Таалас избран Генеральным секретарем ВМО

В Женеве начал работу 17-й Всемирный метеорологический конгресс

6-я Ассамблея высокого уровня Коалиции "Климат и чистый воздух"

19-21 мая 2015 г. в Женеве состоялась шестая Ассамблея высокого уровня Коалиции "Климат и чистый воздух"

Приоритеты климатического обслуживания

Транспорт

Мониторинг и прогноз климата

Изменение климата России в 21 веке

Новости

03.07.2015

США и Бразилия анонсировали совместные планы по борьбе с изменением климата

28.06.2015

Опубликован обзор Мирового института ресурсов: "Возобновляемые источники энергии - 2015"

14.06.2015

Военные эксперты утверждают: климатические изменения поставят США в уязвимое положение в Арктике

UN

GFCS

СЕАКЦ
Северо-Евразийский климатический центр

APCC
ARctic CLIMATE CENTER

ipcc
INTERGOVERNMENTAL PANEL ON climate change

- ❑ MGO is coordinating and supporting Roshydromet Climate Center, including support for the national segment of GFCS

<http://cc.voeikovmgo.ru>



Implementation of APRCC-RAII : RIHMI-WDC

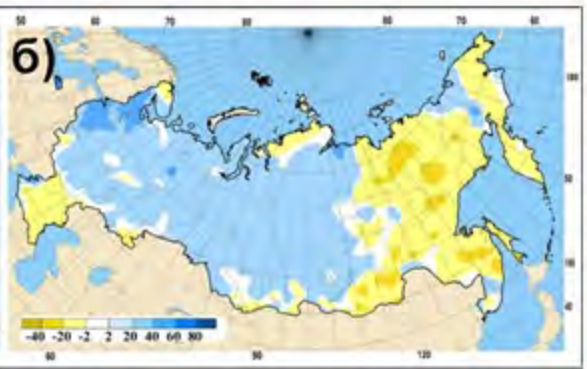
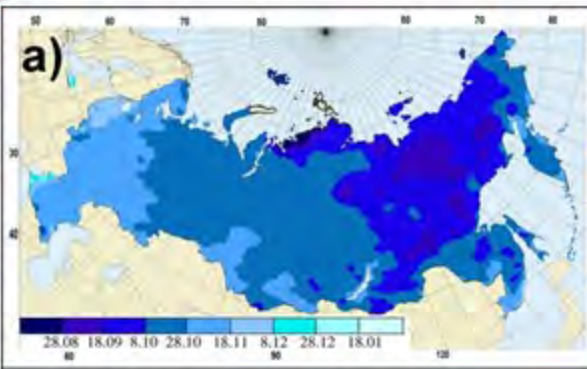
❑ Mandatory functions:

- Operational data services, to support operational LRF and climate monitoring
- integration of APRCC-RAII products and provision of interactive access to data and services via APRCC-RAII portal and user feedback estimation using technical solutions from WMO WIS and Climate Services Information System – CSIS, and national ESIMO
- Registration of RIHMI-WDC data as EAACC information resources and their updates, their availability to APRCC-RAII

❑ Recommended functions

- Non-operational data services (on availability for international exchange, elements – monthly and extreme land and sea surface meteorology including Tsurf, atmospheric pressure, wind speed and wind direction, humidity, marine parameters on T and salinity)
- Management of regulatory material for monitoring of the surface and upper atmosphere climate for area of Russian Federation northward of 60N and non-operational data services for those elements
- Scientific research

Existing infrastructure on Polar climate services: RIHMI-WDC, Obninsk



- Hosting two World Data Centers within WDS of ICSU
- Support by non-operational hydrometeo data products for Arctic seas and territories north to 60N of Eurasia

World Data Center for Oceanography

World Data Center - B "Oceanography" is acting at the National Data Centre RBMS-WDC and provides storage the physical, chemical parameters of the World ocean, as well as publications on oceanographic topics, which are international exchange from other countries, participation in international projects (Programme Research of global program "Tropical ocean - global atmosphere", etc.), or presented for international exchange organizations of the field WDC-B "Oceanography" accumulated international data on the state of the marine environment over a long period for 5 thousand Russian and 20 thousand foreign expeditions. In addition, the WDC-B "Oceanography" gets a Telecommunication System of WMO BATHY, TESAC, SHIP BUOY messages. In cooperation with the transfer centers to the interaction of World data systems WDC-B "Oceanography" on this site presented the opportunity to data sets. These capabilities can be used World Data Centres for Oceanography, National Data Centres in different users.

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Historical research vessels cruise database for 1900 - 2015 (RU_RNODC_100)

Organisation name	archive number	country name	pilot name(mrg)	project name	data begin number	data end number
AARI	64					
AOIMS	2					
Acoustics Institute	8	USSR (Russia)	ALGAMA	Japan Sea, Eastern China Sea (Tung Hai)	1964-02-07 00:00:00	1964-03-04 00:00:00
AralHM-Obn.	1					
Artrachan-JIMO	15	USSR (Russia)	ALGAMA	North-eastern Pacific Ocean	1963-05-30 00:00:00	1963-07-19 00:00:00
ARPIO	103					
AzcherIBO	53	USSR (Russia)	IZUMRUO	Japan Sea	1963-01-31 00:00:00	1963-02-19 00:00:00

- Integration and data access platform based on ESIMO technology

Implementation of APRCC-RAII : RHMC/NEACC

❑ Mandatory functions:

- Operational activities for LRF in collaboration with MGO (**monthly and seasonal forecasts according to RCC requirements**)
- Operational activities for climate monitoring (**hydrophysical ocean data and seasonal sea ice monitoring based on operational analysis**)
- Contribution to RCOF activities in the Arctic region

❑ Recommended functions

- Scientific research

Tight collaboration between NEACC/RHMC and **APRCC-RAII** is critical to improve climate services for continental and marine areas of the Eurasian region, ensure harmonized services on national and international levels

Large-scale atmospheric processes in the Arctic reproduced by SI-AV model and reanalysis data



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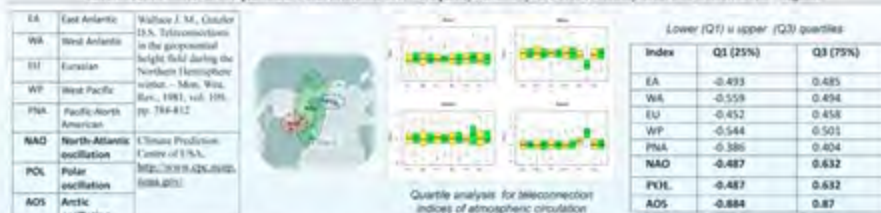


Hydrometeorological Center of Russia, Moscow

Introduction

For the last few years Arctic region attracts increased attention of scientific, political and commercial societies. It is a region where significant climate changes have occurred, but at the same time new possibilities for commercial and industrial interests have been exploring. Addressing these new challenges, there is a necessity to understand better large-scale atmospheric processes variability in the Arctic region and develop improved method of long-range forecasting. Efficiency of long-range forecasting system is determined by its ability to reproduce large-scale atmospheric circulation patterns. The objective of the present study is to estimate the variability of large-scale atmospheric processes characterized by the teleconnection indices, using as daily, monthly and seasonal time scale the NCEP/DOE reanalysis data (1981-2010) and hindcasts from global semi-Lagrangian model (SI-AV), developed in collaboration of Hydrometeorological Centre of Russia with Institute of Numerical Mathematics, and to analyze main meteorological parameters' feedbacks in Arctic region in association with different circulation conditions.

Teleconnection indices as the quantitative characteristics of low-frequency variability are used to identify zonal and meridional flow regimes



Average values of composite maps are accompanied with their statistical significance assessed using the "bootstrap" technique. Main characteristics of field configuration in Arctic region of cited above meteorological parameters corresponding to positive and negative phases of circulation indices are analyzed and discussed.

Composite maps indicating the spatial distribution of anomalies of the main meteorological variables (500 hPa geopotential height, the sea level atmospheric pressure, the temperature at 850 hPa, 2m air temperature, precipitation, zonal and meridional wind component) for positive and negative phases of each index of atmospheric circulation are created.

POL (positive phase), Summer

COMPOSITE MAPS

Anomaly of H500 (dm) air temperature (C) precipitation (mm/day)



AOS (positive phase), Winter

COMPOSITE MAPS

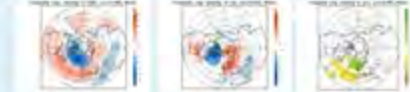
Anomaly of H500 (dm) air temperature (C) precipitation (mm/day)



NAO (positive phase), Winter

COMPOSITE MAPS

Anomaly of H500 (dm) air temperature (C) precipitation (mm/day)



Long-range forecast activities at the North-Eurasian Climate Centre

Main products and formal summary outlook are regularly allocated on the web-site: <http://www.meteo.ru/rsc>



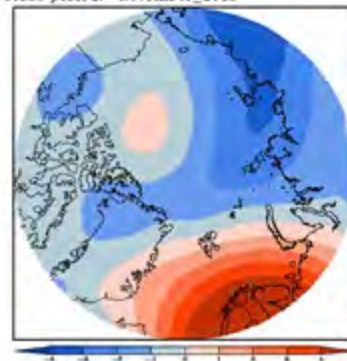
Conclusion

This study discusses the ability of SI-AV model to reproduce large-scale spatial structures and associated atmospheric circulation regimes at monthly and seasonal time scale in the Arctic region. Diagnostic verification between modeled and reanalysis data with using of factor analysis and different skill score criteria has been done. It was shown that model reproduces well the teleconnection indices variation for the first forecast month. There is an overall signal with forecast antecedence of 2-4 months. The skill score of climate indices forecasts are higher for summer season than for winter. Spatial structures of air temperature, precipitation and geopotential height at 500hPa fields associated with different regimes of circulation patterns are discussed. Results of this study are greatly contributed to the operational activity of the North Eurasian Climate Center. Teleconnection indices forecasts have issued at regular regime. Analyzing obtained results, we can conclude that combination of hydrodynamical forecasts and statistical methods help to improve the quality of long-range forecasts.

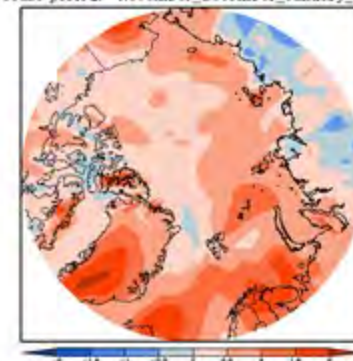
For this study the support has been provided by Russian Science Foundation (NS14-37-00031)

- Research activities focused on Arctic region are underway at Hydrometcenter of Russia within scientific project supported by Russian Science Foundation.
- Laboratory of Forecasting of Hydrometeorological Processes in Arctic region was created at Hydrometcenter of Russia in 2014.

H500 seasonal anomalies (dm). Producer: HMC+MGO
Forecast period: November_2015



2m seasonal anomalies (grad K). Producer: HMC+MGO
re-forecast period: November_December_January_2015





Thank you for attention !
Questions – vms@aari.aq