

Arctic Regional Climate Centre-Network meeting

St Petersburg, February 25-27, 2019

Integration metadata, data and services as contribution Russia to INTAROS project

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Requirements and strategy of INTAROS project

EC project: INTAROS - Integrated Arctic Observation System (2017-2021),
№ EC - H2020-BG-09-2016

Ministry of Science Russian Federation project: "Development of methods and tools of the Integrated Arctic Observing System» (2018-2020), № RFMEFI61618X0103

Strategies:

- Cooperation with key stakeholders groups in Russia.
- Collaboration in Pan-Arctic Forum on the development of iAOS
- Scientific and methodological basis proposals of Russian contribution to iAOS.

Tasks:

- 1. Interaction with Russian stakeholders, development of requirements of the iAOS using the INTAROS approaches**
- 2. Development of data management plan** taking into account proposals of INTAROS and specifics of existing processes for collecting and exchanging, providing and disseminating data in Arctic zone Russian Federation
- 3. Preparation of the Russian contribution to roadmap for building a future sustainable Arctic observing system**

Participants of Russian project

National Oceanographic Data Centre of **RIHMI-WDC** (Russian Research institute of Hydrometeorological Information – World Data Center, Obninsk) - lead organization, development and IT support of iAOS-RF, metadata for Roshydromet observing networks in Arctic, climate and observation data sets, iAOS applications

AARI (Arctic and Antarctic Research Institute, St.- Petersburg) – support metadata for AARI observing networks, climate, observation and forecast/analysis datasets, iAOS-RF applications

NIERSC (Nansen Environmental and Remote Center, St.-Petersburg) – support metadata for remote sensing networks, snow and ice datasets, iAOS applications

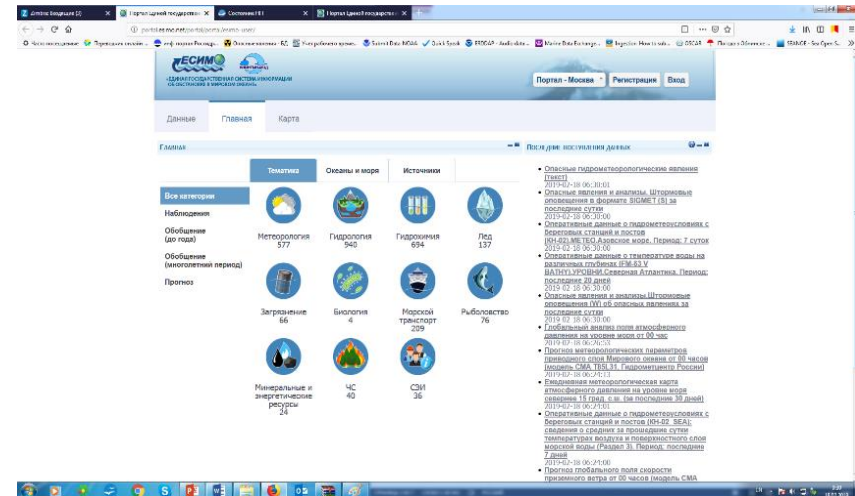
Objectives of Russian project



- **Metadata** - Identify and promote exploitation of **existing Russian observing systems and data sets for Arctic**
- **Integration** - Develop and implement **Russian segment iOAS-RF** for integration, analysis and access to multidisciplinary, heterogeneous and distributed data, products and services

iAOS-RF portal development will be based on technologies of Unified information system for World Ocean (ESIMO, Russian Federation, <http://www.esimo.ru>)

Metadata - nearly 60 000 records, more 3 000 information resources (observation, forecast, climate data); standardized codes, classifies, parameter names; open software



Observing networks and databases

Objectives:

Assessment of existing Russian Arctic observing and data sets, identification of essential gaps. Preparation of data for their integration in iAOS, using experience ESIMO.

Works:

1. Development of **software for metadata management** of the observation networks and data holdings and services to provide access
2. Preparation of **metadata databases** on existing Russian observation networks (in-situ and remote sensing) and data holdings
3. Analysis of metadata and other information, preparation of **assessments of state of Russian observation networks and databases on Arctic**
4. Formation of the **catalog of Russian Arctic data** for integration into iAOS

Observing networks and databases (software), <http://asunp.meteo.ru/portal/intaros>

Observation networks and data bases for Arctic

INTAROS

Словарь параметров Проект INTAROS

ID	Name	Organization name	Run as of ice	Sphere	Owner
45	Voluntary observation ships	RHM-WDC	109		RHM-WDC
69	Coastal stations of North regional office	RHM-WDC	40		Northern-HMS
70	Coastal posts North regional office	RHM-WDC	5		Northern-HMS
97	Space observations of hydrometeorological support	Roscosmos	1		IC-NANSEN
98	Satellite observations - satellite Electro-L 392	Roscosmos	1		IC-NANSEN
99	Satellite observations - Copernicus V satellite No. 1, 3 and 4	Roscosmos	3		IC-NANSEN
100	Satellite observations - Resurs P satellite No1	Roscosmos	1		IC-NANSEN
101	Satellite observations - Resurs P satellite No2	Roscosmos	1		IC-NANSEN
102	Satellite observations - Resurs P satellite No3	Roscosmos	1		IC-NANSEN
103	Satellite observations - satellite EUMETSAT Polar System (EPS) MetOp - A, B and C	ESA	3		IC-NANSEN
104	Satellite observations - satellite Meteosat-3, 9, 10 and 11	ESA	4		IC-NANSEN
105	Joint Polar Satellite System	NOAA	1		IC-NANSEN
106	Joint Polar Satellite System (JPSS) satellite JPSS-1/NOAA-20	NOAA	1		IC-NANSEN
107	Polar Operational Environmental Satellites (POES)	NOAA	3		IC-NANSEN
108	Geostationary weather satellite family - 4th generation	NOAA	2		IC-NANSEN
109	Human geostationary satellites	JMA	1		IC-NANSEN
110	Defense Meteorological Satellite Program	US Air Force	4		IC-NANSEN
111	Earth Observing System	NASA	1		IC-NANSEN

Identification
Content
Geographical area
Security
Contacts
Extra
Service information

Name (en):

 Short name (en):

 Name (ru):

 Short name (ru):

 Array produced country name:

 Creator Organization:

 Array keeping country:

 creator Organization:

 Array access restriction:

 Key problems (en):

 Key problems (ru):

 Network creating Goals (en):

 Network creating Goals (ru):

Observing networks metadata

Atmosphere (6):

meteo surface obs.(259 stations); meteo voluntary ships (35 Russian); meteo coastal obs. (22); aerological obs. (7); air pollution (42)

Ocean (4):

coastal obs. (68 stations/posts); sea level obs.(12); research vessels expeditions (4 ships), “North Pole” drifting expeditions (35 exp.)

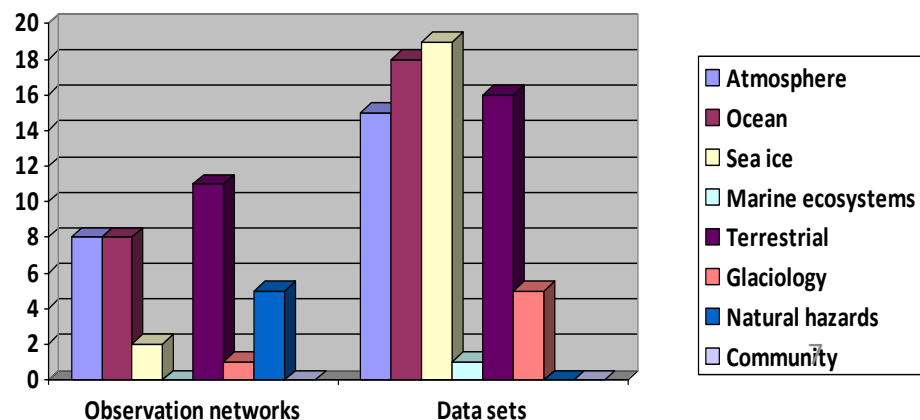
Sea ice (3):

ice coastal obs. (75), ice obs. on river-sea stations (10), ice cover monitoring

Surface and terrestrial cryosphere (10):

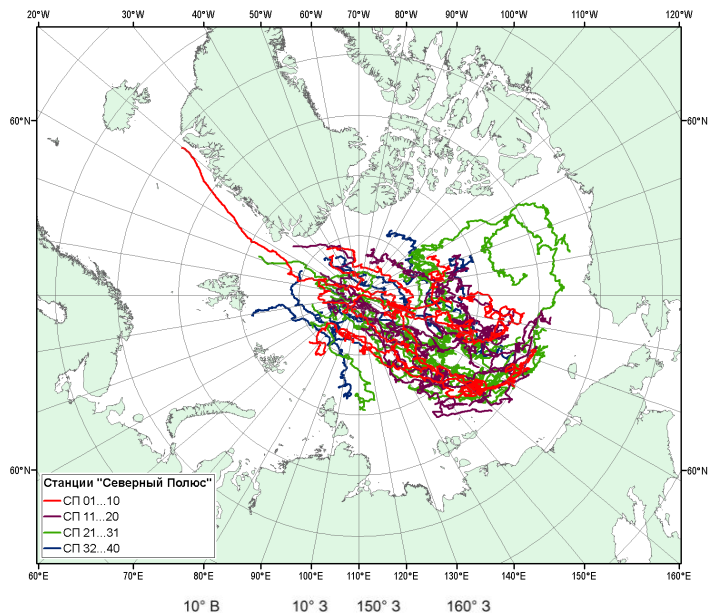
hydrological obs. on river stations (175), actinometric obs. (34), heat balance obs. (17), ozone obs. (9), geophysical obs.(71),

Remote sensing (2) – AARI (Barentsburg), SRC “Planeta” (Moscow)

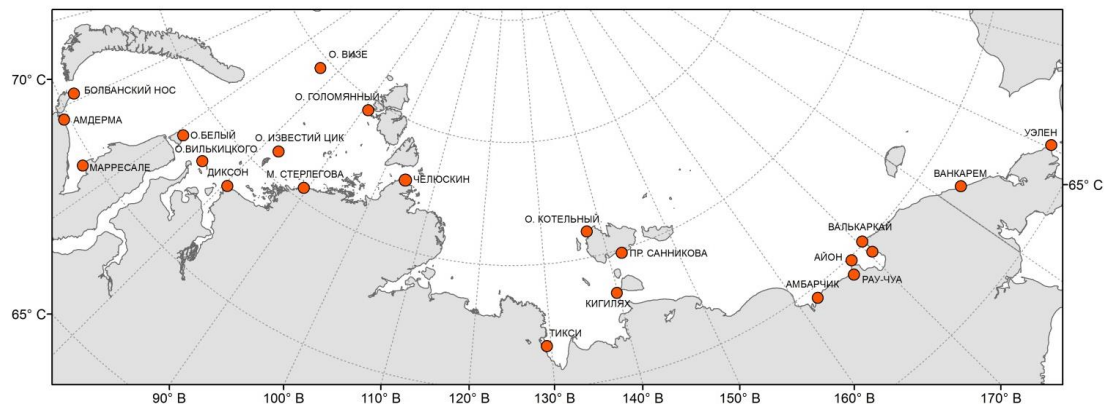


Observing networks metadata base

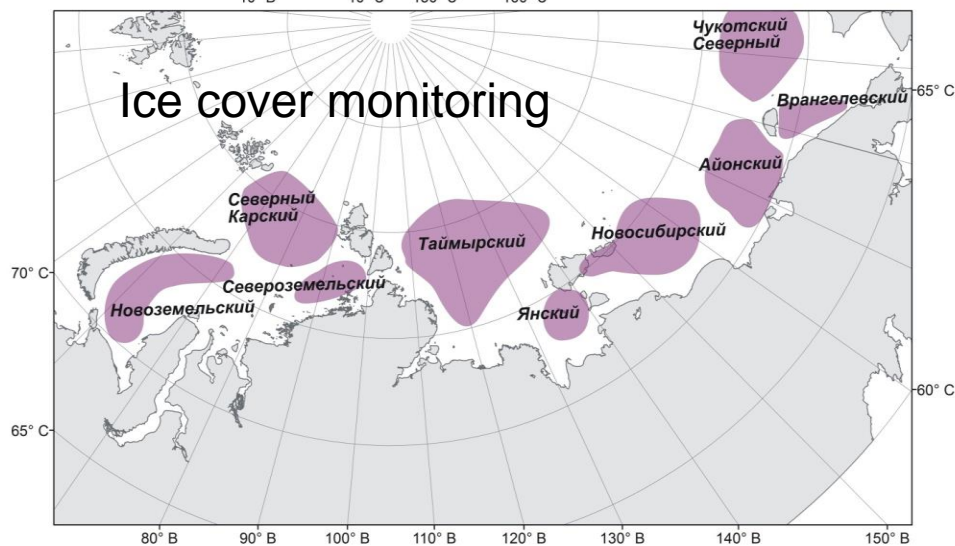
“Nord Pole” expeditions (1937-2013)



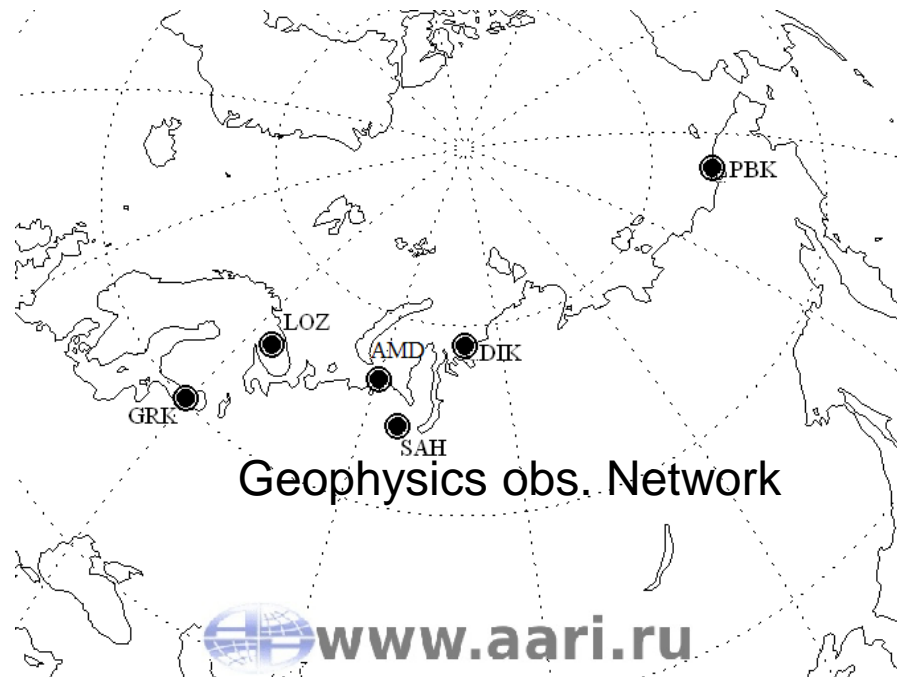
Polar coastal station network



Ice cover monitoring



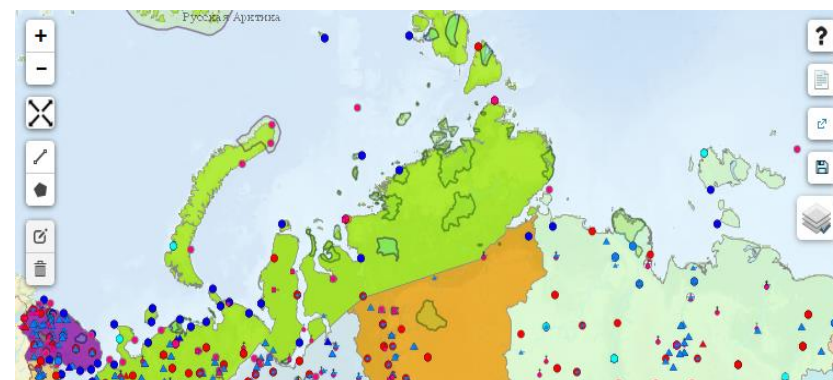
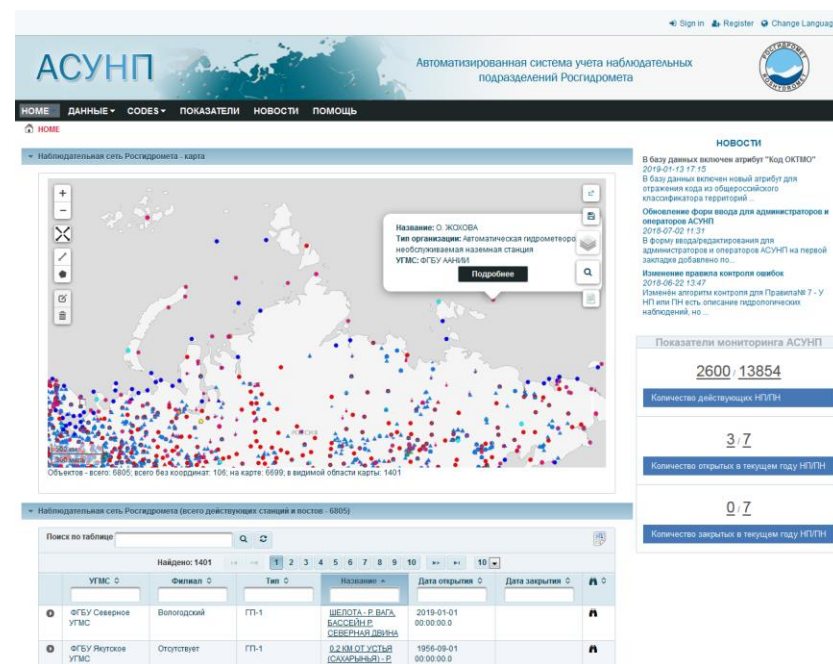
Geophysics obs. Network



Accounting System for keeping record of Observation Units (ASOU), <http://asunp.meteo.ru/portal/asunp/>

Functions:

- ❑ Search of information about observation networks by synoptic index, federal district, subject of RF, AZRF, river basins, network type, platforms types, etc.
- ❑ Data aggregation on Roshydromet, regional offices, types of observations
- ❑ Calculation of the cost of observing programs for different observations types
- ❑ Access to standardized reporting
- ❑ Export information in csv format
- ❑ Interaction (M2M) with ESIMO, OSCAR, INTAROS by WMS, JSON (XML)



Databases metadata

Atmosphere (10):

meteo surface stations (obs., climate); meteo voluntary ships (obs., climate statistic); meteo on coastal stations (obs., climate), airological data (obs., climate), meteo variables - analysis and forecasts.

Ocean (9):

hydro coastal and sea level data (obs., climate); oceanographic data (obs., climate statistic); “North Pole” drifting expeditions (obs.); “North” data base (obs.); ocean variables analysis and forecasts

Sea ice (5):

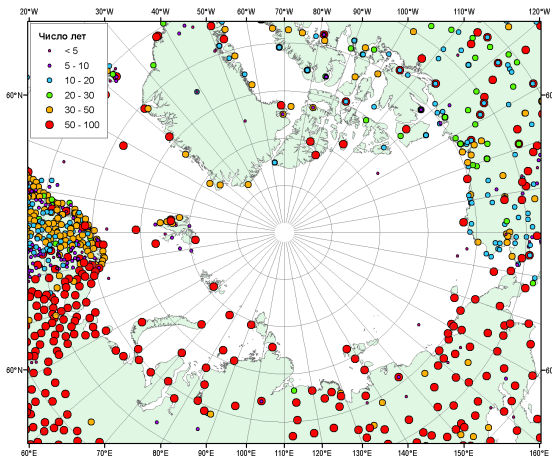
ice coastal (obs., climate); ice river -sea stations (obs., climate), ice cover monitoring (analysis, forecasts)

Surface and terrestrial cryosphere (10):

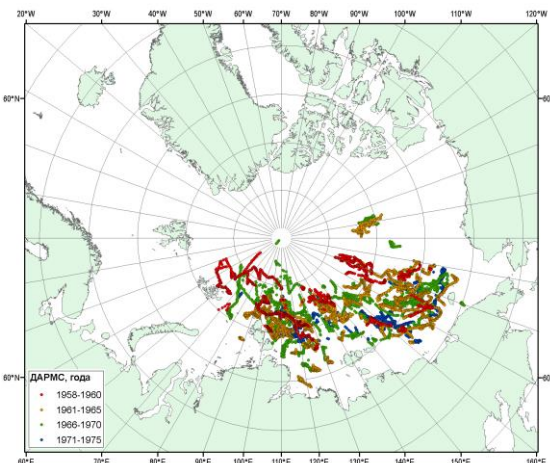
snow variables (obs., climate), ground, glaciers,...

Databases metadata

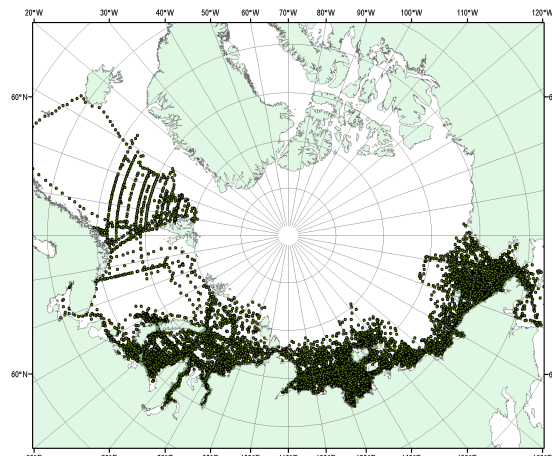
WMO stations



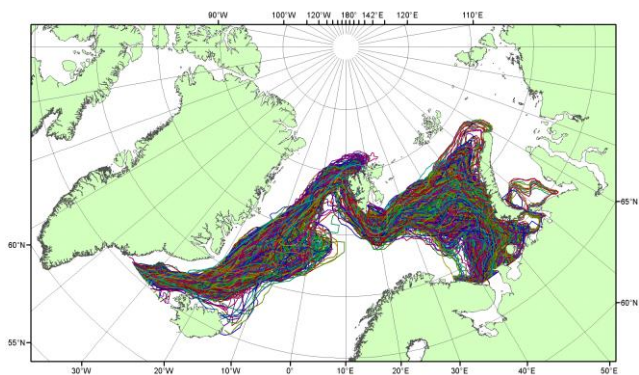
Drifting meteo buoy



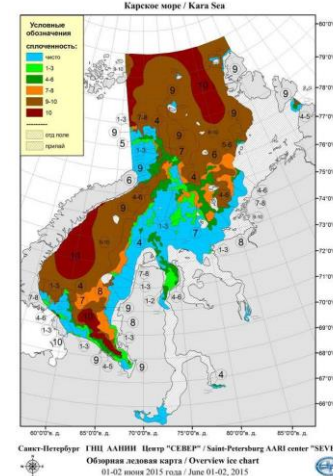
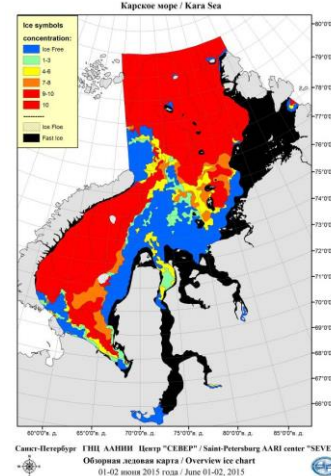
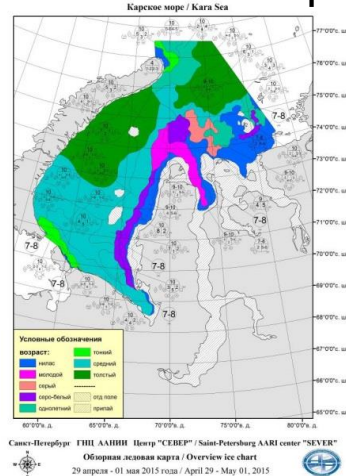
Oceanographic stations



Ice edge position, April



Overview ice maps for the Kara Sea in the summer season



Data integration and access under iAOS

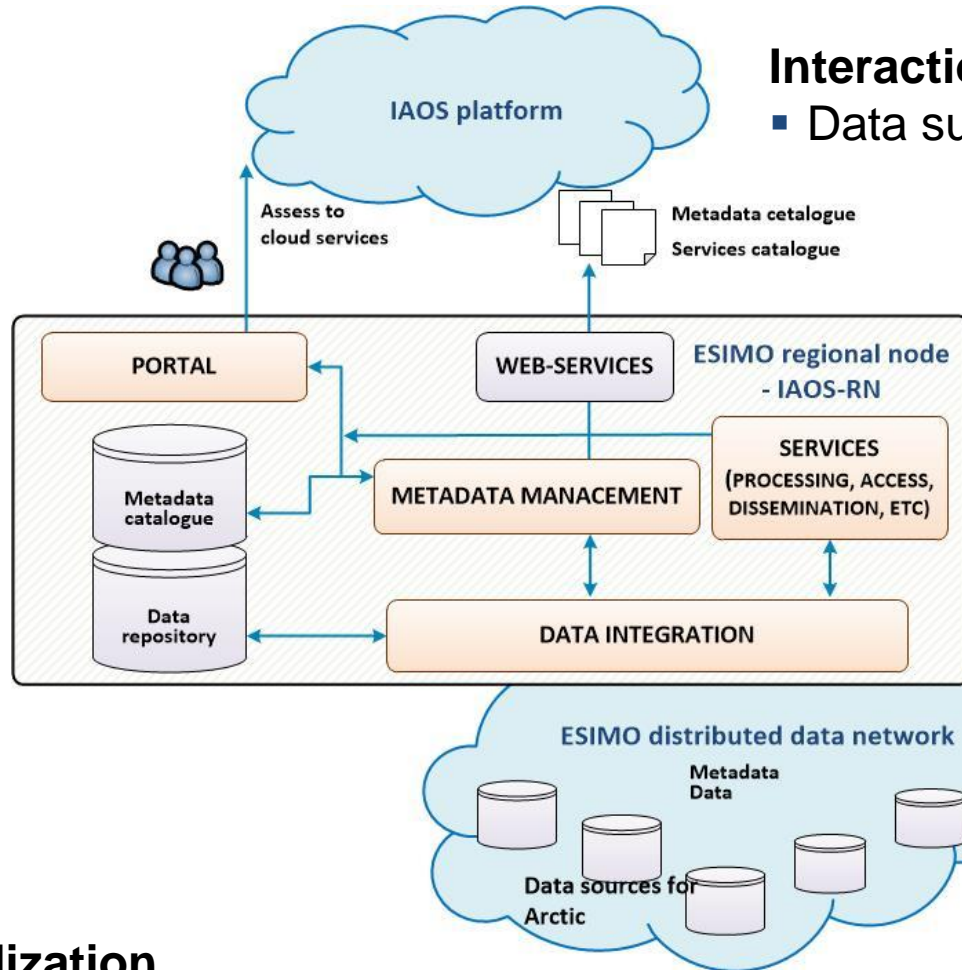
Objectives:

- integration of interdisciplinary and distributed databases under iAOS-RF
- interaction with the European iAOS platform
- access to data observation and product of iAOS-RF repository
- data exchange with iAOS platform

Works:

1. Development of **design solutions of the Russian IAOS-RF**
2. Development of **software of the Russian iAOS-RF**: data integration, data management and iAOS depository support, access to data and services (portal)
3. **Interaction of the Russian iAOS-RF** with iAOS portal
4. **Integration of databases and metadata of the Russian iAOS-RF**
5. **Evaluation, trial operation** of the Russian iAOS-RF

Data integration and access under iAOS



Interaction with iAOS platform

- Data submission and exchange

Data integration

- Metadata and data repository support
- Access to data/services via portal

Data description

- Data/services registration
- Discovery metadata generation
- Data unification and submission

Standardization

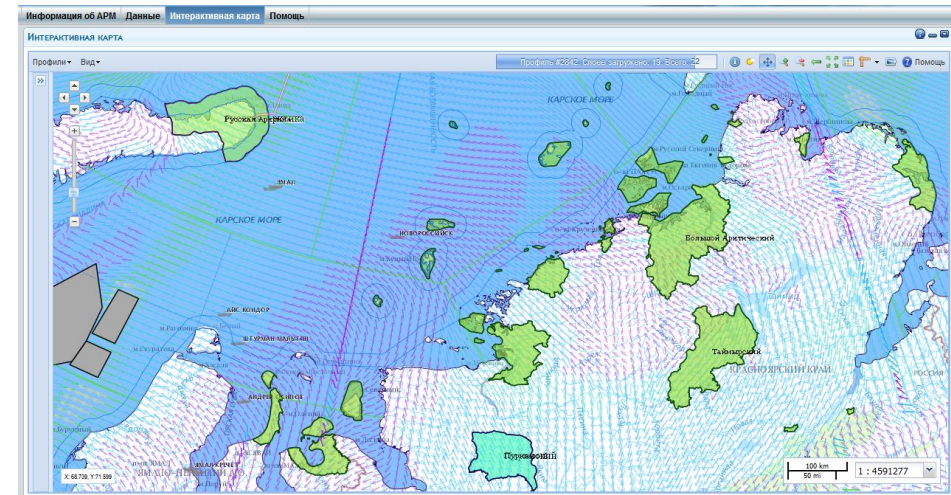
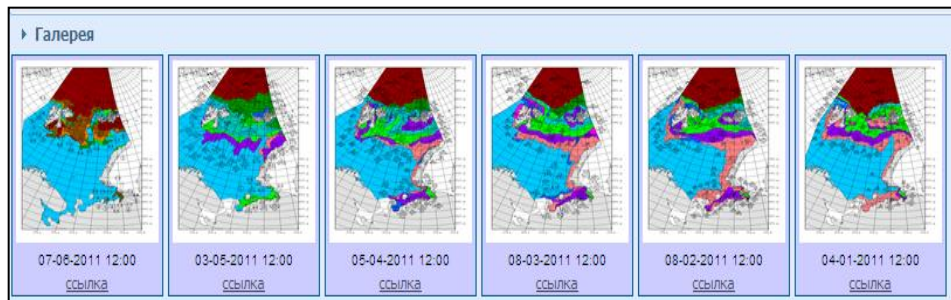
- Metadata and other standards: ISO19115/19139 and OGC
- Parameters Dictionary and Codes/Classifiers
- NetCDF as common data format

iAOS applications

Objective: System applications for support of marine and maritime industry

Works:

1. **Development of iAOS-RF application solutions** for the study and development of the Arctic by the Russian users
2. **Development of iAOS-RF applications** for information support of marine/maritime activities
3. **Providing user access to iAOS - RF**



Typical services for monitoring hydrometeorological and ice situations

Метеослужба в указанной точке

Прогноз метеоусловий

1-10 10 10

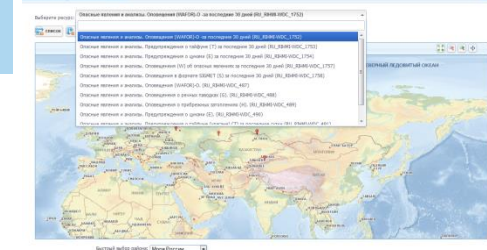
Дата и время	Температура воздуха	Температура воды	Скорость ветра	Направление ветра	Влажность	Облачность	Скорость течения
2018-11-10 00:00:00	-7.8	-1.5	10.6	↻	1018.0	72	0
2018-11-09 00:00:00	-7.5	-1.5	9.3	↻	1013.0	69	0
2018-11-08 12:00:00	-7.9	-1.5	5.0	↻	1011.0	72	0
2018-11-08 00:00:00	-7.2	-1.5	9.4	↻	1009.0	66	0
2018-11-07 12:00:00	-6.5	-1.5	9.0	↻	1007.0	64	0

Monitoring of hydrometeorological situations

- Real time messages: SYNOP, SEA, TESAC, BUOY, ICE, others
- Access to metadata and data
- Subscribing on data delivery

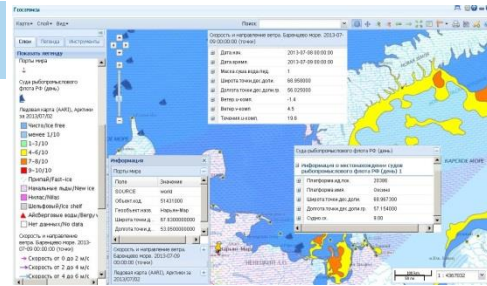
Monitoring Disasters

- Visualization of warnings and alerts (WAREP, SIGMET, real time data) on map
- Analysis of disasters, including emergency's



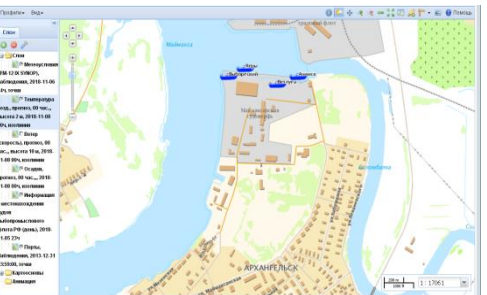
Monitoring of situations for ship course

- Access to observation, analysis, climatic data for wind, wave, ice
- Assessment of extreme parameters values in combination with the location of objects in the sea and information about emergencies



Monitoring of situations for marine ports

- Access to observation, analysis, climatic data for region marine port
- Assessment of extreme parameters values in combination with the location of marine port and information about emergencies





THANK YOU FOR YOUR ATTENTION !

<http://asunp.meteo.ru/portal/intaros>

The presentation was prepared as part of scientific research on the theme "Development of methods and tools of the Integrated Arctic Observing System": the unique identifier for the agreement № RFMEFI61618X0103 Ministry of Science Russian Federation