Arctic Vegetation Archive Workshop

14-16 April, 2013, Krakow, Poland

How to use the initiatives of the Russian Government in the field of science for vegetation biodiversity study in the Russian Arctic (propositions of Russian partners)

Mikhail M. Cherosov, *Matveyeva N.V.,*

Elena I. Troeva, *Gogoleva P.A., Telyatnikov M.Yu, and Pestryakova L.A*

Russia is a big country with the arctic region covering vast territories…

and great transport network problems in the North

Financing ?







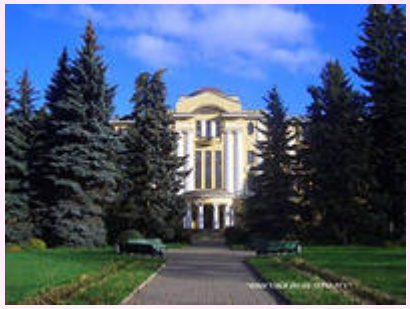









Investigators of vegetation and flora of the Arctic







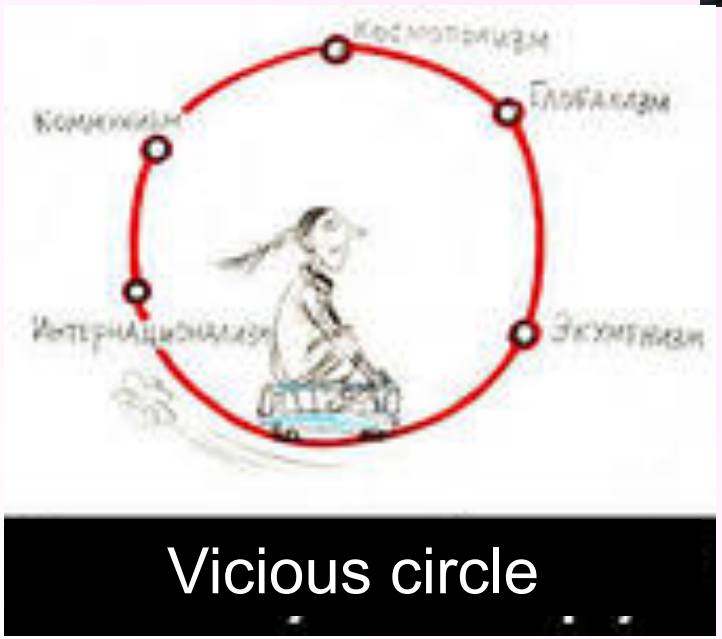


North-Eastern Federal University (Yakutsk)





Ufa Moskau Sankt-Peterburg Tomsk Syktyvkar



Vicious circle

AVA – Russia – Forever !

? How

Russian policy in the sphere of science and technology

- Since 2010, the Government of the Russian Federation has been conducting the policy of attraction of the leading scientists of the world to participate in scientific investigations and establishment of research centres of the world level in the territory of our country.

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ
РОССИЙСКОЙ ФЕДЕРАЦИИ

- The grants, 3-5 millions USD each, have allowed to found a number of laboratories of world level in the leading higher educational institutions.





- A network of federal and research universities have been established all over Russia.
- Each university gets a special-purpose support up to 70 million USD for conducting research works in all scientific fields.

Priority in supporting certain scientific directions in Russia

- Today, the investigations in physical and technical scientific fields are best supported in Russia, as well as remote regional branches (Far East and Siberian). Among natural sciences, the medical-genetic and molecular biology studies are supported as well.

Scientific directions of grant winners in 2011

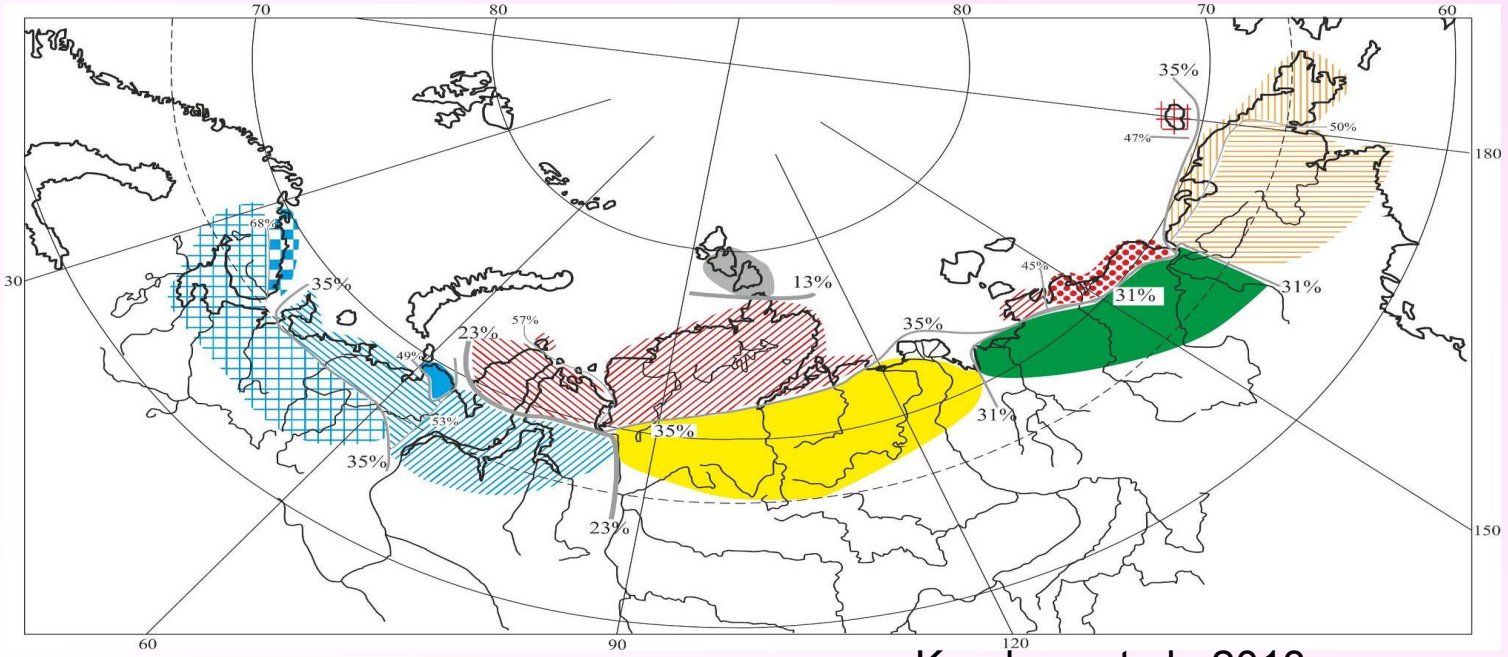
Directions	**Number**
Physics, physical nanotechnologies	18
Genetics, molecular biology, biotechnology, bionanotechnologies, bioinformatics	15
Technical sciences, technical nanotechnologies	11
Math, informatics, telecommunications	11

Priority in supporting certain scientific directions in Russia

- However, there is a possibility to attract attention to important research activities concerning the Arctic.
- And this should be done regardless of possible results in grant competition.

Directions	Number
Earth sciences, geodesy, cartography, GIS, ecology, ecophysiology	8
Medicine	6
Chemistry and chemical nanotechnologies	4
Biology	**2**
Economics	2
Psychology	1

- Russian botanical investigations that covered territory from Kola Peninsula to Chukotka have yielded a net of thoroughly studied local floras and vegetation. A great contribution to this was made by Komarov Botanical Institute, RAS (**Dr. B.A. Yurtsev and Dr. N.V. Matveyeva** headed floristic and geobotanical studies respectively). However, the vast territory of the Russian Arctic (especially its Asian part) is still promising for collaborative investigations.



Koroleva et al., 2013

- Participation of the world's leading specialists in comparative floristics and geobotany will allow:
- to increase the level of knowledge of plant communities and floras of the Russian Arctic,
- to raise financing both for the arrangement of unified database of plant communities and plant conservation issues.

To solve the AVA tasks, the initiative of the Government of the Russian Federation provides great possibilities for additional financial support of investigations, including fields work arrangement in remote areas of the tundra zone in Russia.

OPEN CONTEST FOR THE GRANT OF THE GOVERNMENT OF THE RUSSIAN FEDERATION FOR FEDERAL SUPPORT OF SCIENTIFIC RESEARCHES HEADED BY THE LEADING SCIENTISTS FROM RUSSIAN HIGHER EDUCATIONAL INSTITUTIONS, RESEARCH INSTITUTES OF THE RUSSIAN ACASDEMY OF SCIENCES AND FEDERAL SCIENTIFIC CENTRES OF RUSSIA

МИНИСТЕРСТВО ОБРАЗОВАНИЯ И НАУКИ
РОССИЙСКОЙ ФЕДЕРАЦИИ

Required conditions for participation in the open contest for grants of the Government of the Russian Federation

1. Requirements to contestants.

1.1. Requirements to higher educational institutions and research institutions

1.1.1.The participants of the contest should be:

a) Russian higher educational institutions of any category, including non-governmental;

b) Research institutions of state scientific academies: Russian Academy of sciences, Russian Academy of medicine sciences, Russian Academy of agricultural sciences, Russian academy of architecture and construction, Russian Academy of fine arts, Russian Academy of education;

c) State scientific centres of Russian Federations (47).

Required conditions for participation in the open contest for grants of the Government of the Russian Federation

1.1.3. Higher educational institution or research institution are obliged to:

a) contribute own extra-budgertary funds no less then 25% of grant size provided by the Russian Government;

b) Provide with rooms and equipment to conduct a research work;

c) Conclude permanent or fixed-termed employment agreements with the leading scientists and members of a research team;

d) Pay a salary to the members of a research team for conducted research work considering the qualitative and quantitative equivalents of contribution of each member of a team.

1.2. Requirements to leading scientists

1.2.1. Participants can be both Russian and foreign specialists taking a leading position in a certain scientific field.

Required conditions for participation in the open contest of grants of the Government of the Russian Federation

1.2.5. In 2013-2015, a leading scientist personally (being present at a higher educational or research institution) heads a Laboratory and conducted research work for no less then 4 month (in total) in each calendar year.

2. Requirements to members of a research team

а) A research team working at a higher educational institution should consist of no less then 2 Candidates of Science, 3 post-graduate students and 3 students studying at a higher educational institution where the research work is conducted;

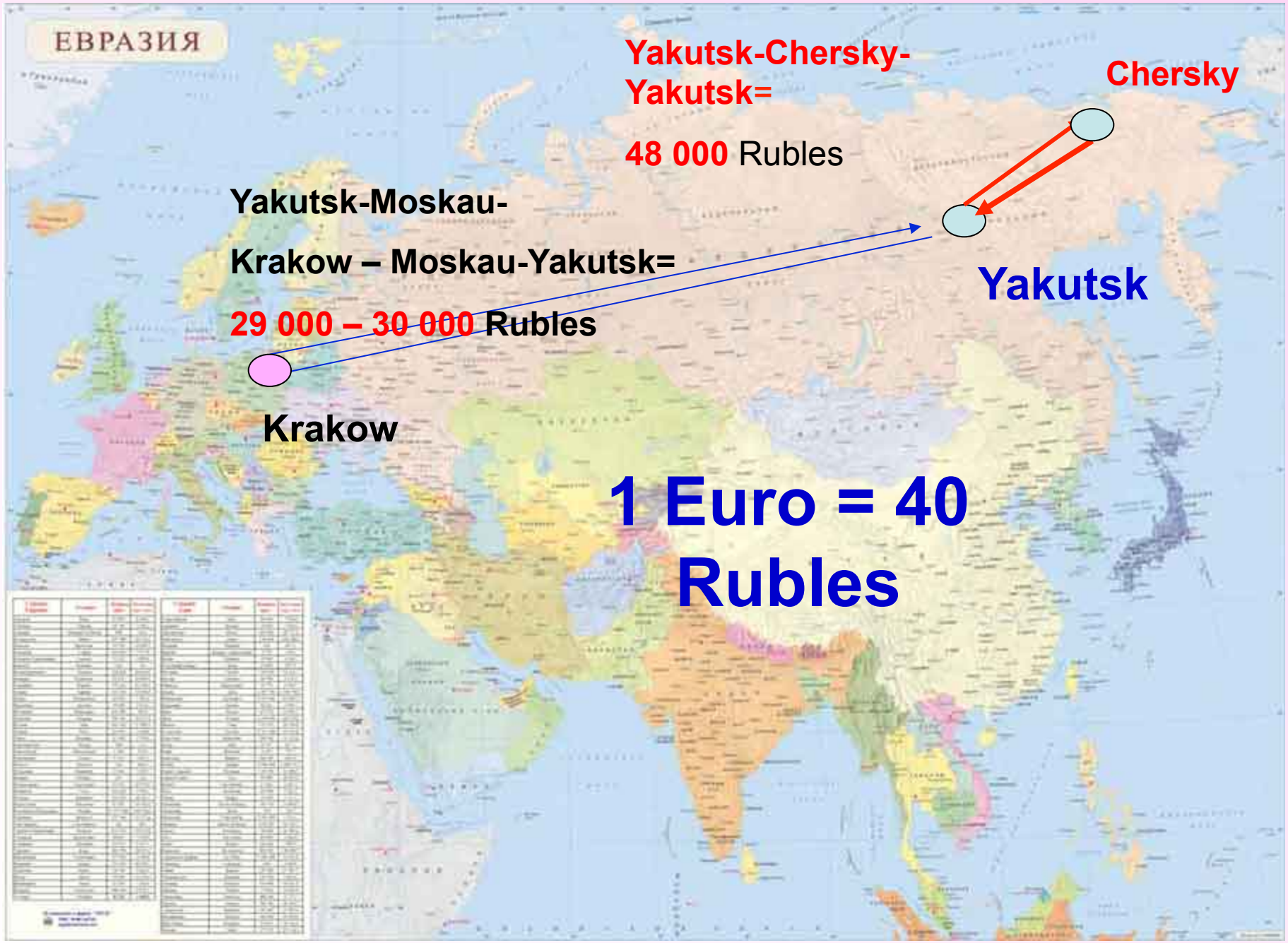
б) A research team working at a scientific institution should consist of no less then 3 Candidates of Sciences and 4 post-graduate students studying at a scientific institution where the research work is conducted

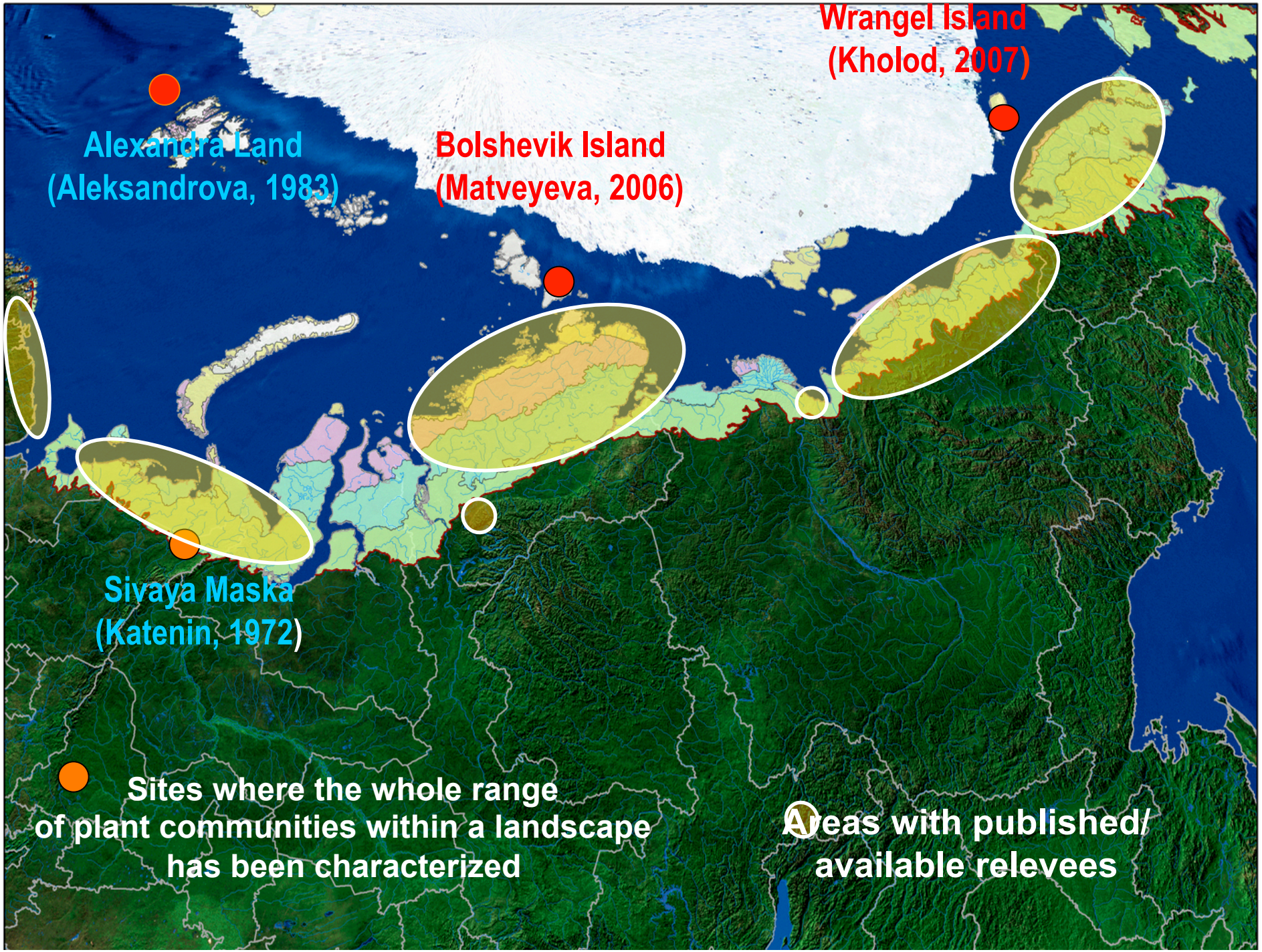
Recommendations to experts who will review the applications for the grants of the Government of the Russian Federation

№	Criteria	Criteria requirements	Conditions (requirements) to get the highest score (5 points)
1. Scientific achievements and working experience of a leading scientist			
1.1	Publication level	Names of magazines (leading, professional) and publishing activity; how this publishing activity answers the level of leading specialists in a certain science; citing level of his papers	The following requirements are obligatory: 1) during the last 3 years, a leading scientists publishes no less then 1-2 papers in leading international magazines annually; 2) the citing index, or H-index, of a leading scientists is no less then 40% of the world leading specialists in a given field of science

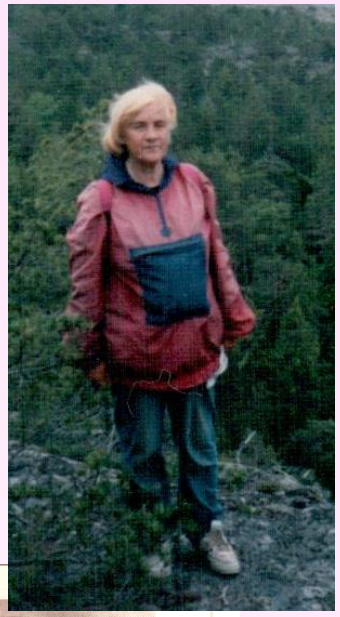
Recommendations to experts who will review the applications for the grants of the Government of the Russian Federation

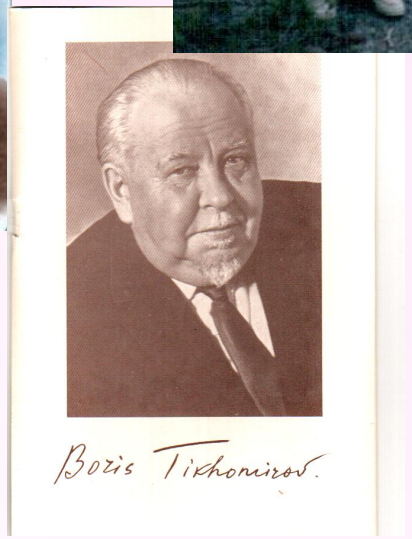
№	Criteria	Criteria requirements	Conditions (requirements) to get the highest score (5 points)
3. State and development dynamics of an organization, expected characteristics of a laboratory to be established within the project's framework			
3.1	Publication activity of the research team, participants of the project	Number of papers, monographs, conference proceedings prepared by the team during the last 3 years, as well as the level of magazines, publishing houses and conferences; number and level of Web-of-Science and Scopus magazines; expected number of papers in Web-of-Science or Scopus magazines to be published during 2 years	At least 3 of 4 requirements are met: 1) For the last 3 years the team published no less then 4-6 papers annually in international magazines; 2) For the last 3 years the team made no less then 3-5 presentations at key international conferences; 3) The team has specialists with citing index or H-index no less then 60% of indices of the leaders in Russian science; 4) During 2 years of the project, the team expects to publish or to submit no less then 4-6 papers in international Web-of-Science or Scopus magazines, including the papers in the leading international magazines

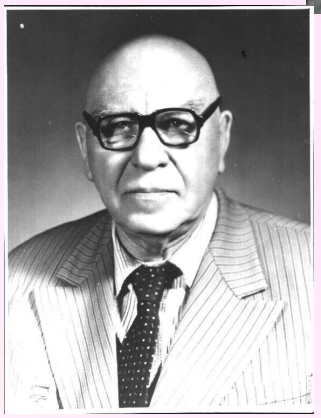

ЕВРАЗИЯ
Yakutsk-Chersky-Yakutsk=
48 000 Rubles
Chersky
Yakutsk-Moskau-
Krakow – Moskau-Yakutsk=
29 000 – 30 000 Rubles
Yakutsk
Krakow
1 Euro = 40 Rubles


Wrangel Island
(Kholod, 2007)
Alexandra Land
(Aleksandrova, 1983)
Bolshevik Island
(Matveyeva, 2006)
Sivaya Maska
(Katenin, 1972)
Sites where the whole range
of plant communities within a landscape
has been characterized
Areas with published/
available relevees

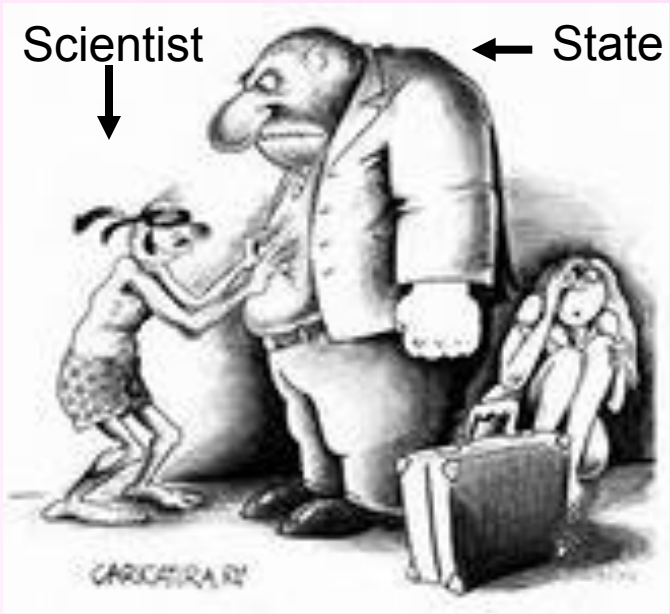
History of the Russian Arctic vegetation studies







1990s: State policy and science



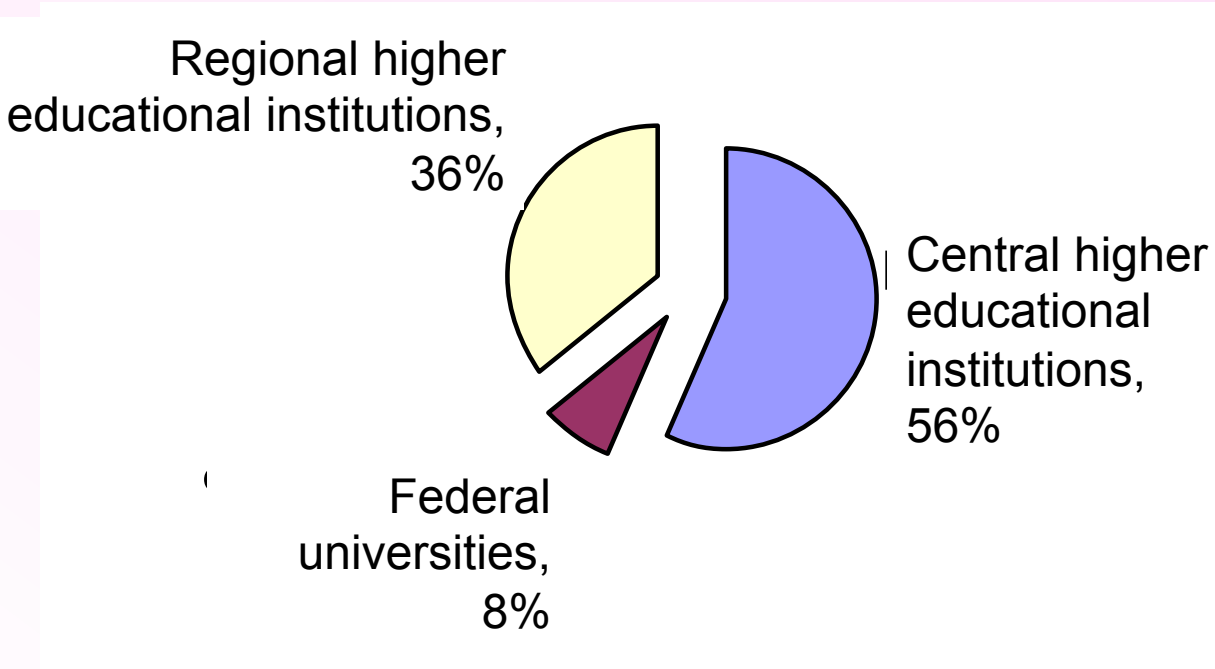
An optimal way to the Arctic for geobotanists

A scientist. Distracted…

… but nice

Grant awardees in 2011

Central higher educational institutions	Federal universities	Regional higher educational institutions
44	6	**28**



Current situation

We have a small but unique chance to help ourselves to solve the problems concerning the study of the Russian Arctic vegetation

Title of proposed project: **Vegetation cover diversity of the Russian Arctic**

- When composing the grant application, focus on large, global-scaled, targets
















Co-financing

- One of the conditions specified by the Government of the Russian Federation is co-financing of investigations from organization's **extra-budget no less then 25%,** as well as the presence of young people (undergraduate and post-graduate students, candidates of sciences) in the research team.
- Most preferable institution that should apply for the grant is the M.K. Ammosov **North-Eastern Federal University (Yakutsk)** which has already agreed to contribute 25% of its extra-budget.

The list of key executants should consists of the leading specialists from higher educational and research institutions that have a great experience and large database for the whole Russian Arctic

- Komarov Botanical Institute RAS (Saint-Petersburg)
- Saint-Petersburg State University
- Institute of Biology of the Komi Scientific Centre, Ural Branch of RAS (Syktyvkar)
- Central Siberian Botanical Garden of Siberian Branch of RAS (Novosibirsk)
- Polar-Alpine Botanical Gardern-Institute of the Kolsky sientific centre of RAS (Apatity)
- Institute for Biological Problems of Cryolithozone, Siberian Branch of RAS, et al.

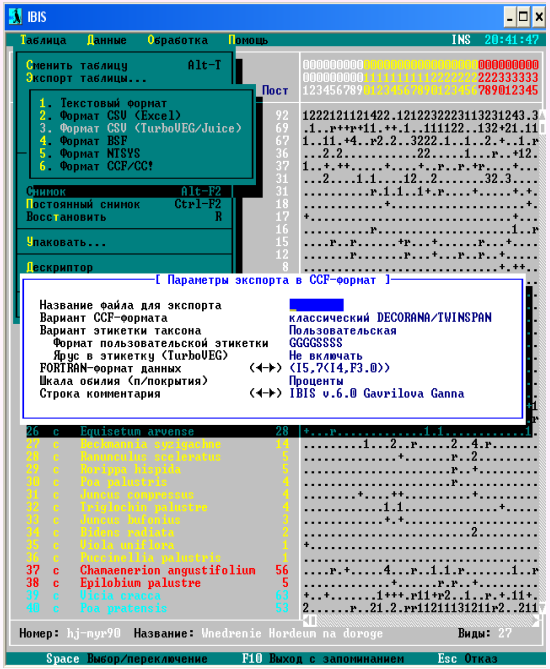




In case we win the mega-grant, what are the profits for AVA?

- Arrangement of the unified database within the AVA project's framework. As a result, thousands of relevés will be accepted internationally, both already published and just collected during field seasons in new regions.

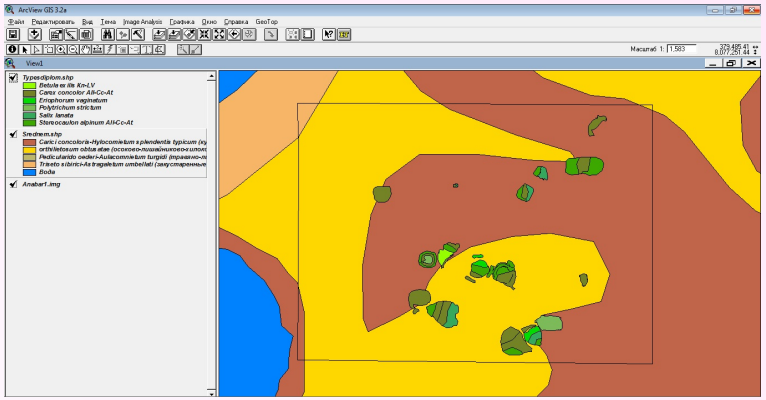
In case we win the mega-grant, what are the profits for AVA?



- The Russian partners plan to establish a Youth database centre where students and young specialists will enter the geobotanical and floristic data.

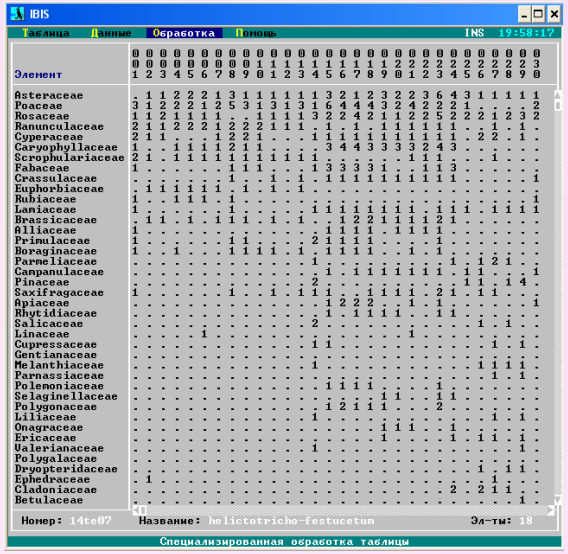
In case we win the mega-grant, what are the profits for AVA?

- The mega-grant supported investigations are expected to summarize the syntaxonomy of the Arctic vegetation including the Russian part.
- GIS projects will be created for mapping given Arctic territories. Approaches of geobotanical regionalization of the Russian Arctic will be elaborated.



In case we win the mega-grant, what are the profits for AVA?

- Published data on plant communities will be in open access to a wide circle of like-minded people. Collected raw field data (non-published) will never be lost.



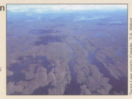
- The studies that have such a long and glorious history and have yielded splendid results will never stop.

Circumpolar Arctic Vegetation

Barrens


Eskimonaesset, North Greenland, C. Bay

B1. Cryptogam, herb barren
Dry to wet barren landscapes with very sparse, very low-growing plant cover. Scattered herbs, lichens, mosses, and liverworts. *Subzone A and B, some C at higher elevations.*


Daring Lake vicinity Canada, D.A. Walker

B2. Cryptogam barren complex (bedrock)
Areas of exposed rock and lichens interspersed with lakes and more vegetated areas, as found on the Canadian Shield. *Subzones C and D.*


Ongertivaq Fjord, SE Greenland, F.J.A. Daniëls

B3. Noncarbonate mountain complex (B3a, B3b, B3c, B3d, B3e, B3n)
Mountain vegetation on noncarbonate bedrock. The variety and size of plants decrease with elevation and latitude. Hatching color and code indicate the bioclimate subzone at the mountain base. B3a through B3e indicate subzones A through E; B3n indicates noncarbonate nunatak areas. For more explanation see reverse side.


Brooks Range, Alaska, D.A. Walker

B4. Carbonate mountain complex (B4b, B4c, B4d, B4e, B4n)
Mountain vegetation on carbonate bedrock. The variety and size of plants decrease with elevation and latitude. Hatching color and code indicate the bioclimate subzone at the mountain base. B4b through B4e indicate subzones B through E; B4n indicates carbonate nunatak areas. For more explanation see reverse side.

Graminoid tundras


Amund Ringnes Island, Canada, D.A. Walker

G1. Rush/grass, forb, cryptogam tundra
Moist tundra with moderate to complete cover of very low-growing plants. Mostly grasses, rushes, forbs, mosses, lichens, and liverworts. *Subzones A and B.*


Eureka vicinity, Ellesmere Island, Canada, D.A. Walker

G2. Graminoid, prostrate dwarf-shrub, forb tundra
Moist to dry tundra, with open to continuous plant cover. Sedges are dominant, along with prostrate shrubs < 5 cm tall. *Subzone C, some B.*


Ambarchik, Yakutia, Russia, D.A. Walker

G3. Nontussock sedge, dwarf-shrub, moss tundra
Moist tundra dominated by sedges and dwarf shrubs < 40 cm tall, with well-developed moss layer. Barren patches due to frost boils and periglacial features are common. *Subzones D and C, some E.*


Imnavait Creek, Alaska, D.A. Walker

G4. Tussock-sedge, dwarf-shrub, moss tundra
Moist tundra, dominated by tussock cottongrass (*Eriophorum vaginatum*) and dwarf shrubs <40 cm tall. Mosses are abundant. *Subzone E, some D.*

Glaciers

Treeline - The northern latitudinal limit beyond which trees do not generally grow. Trees may occur in *Subzone E* as scattered individuals or stands within riparian areas.

Riparian corridors - Complexes with mix of vegetation from bare gravel bars to fully vegetated areas. Characteristic plants range from herbs and cryptogams (*Subzones A and B*) to dense tall shrubs (*Subzone E*).

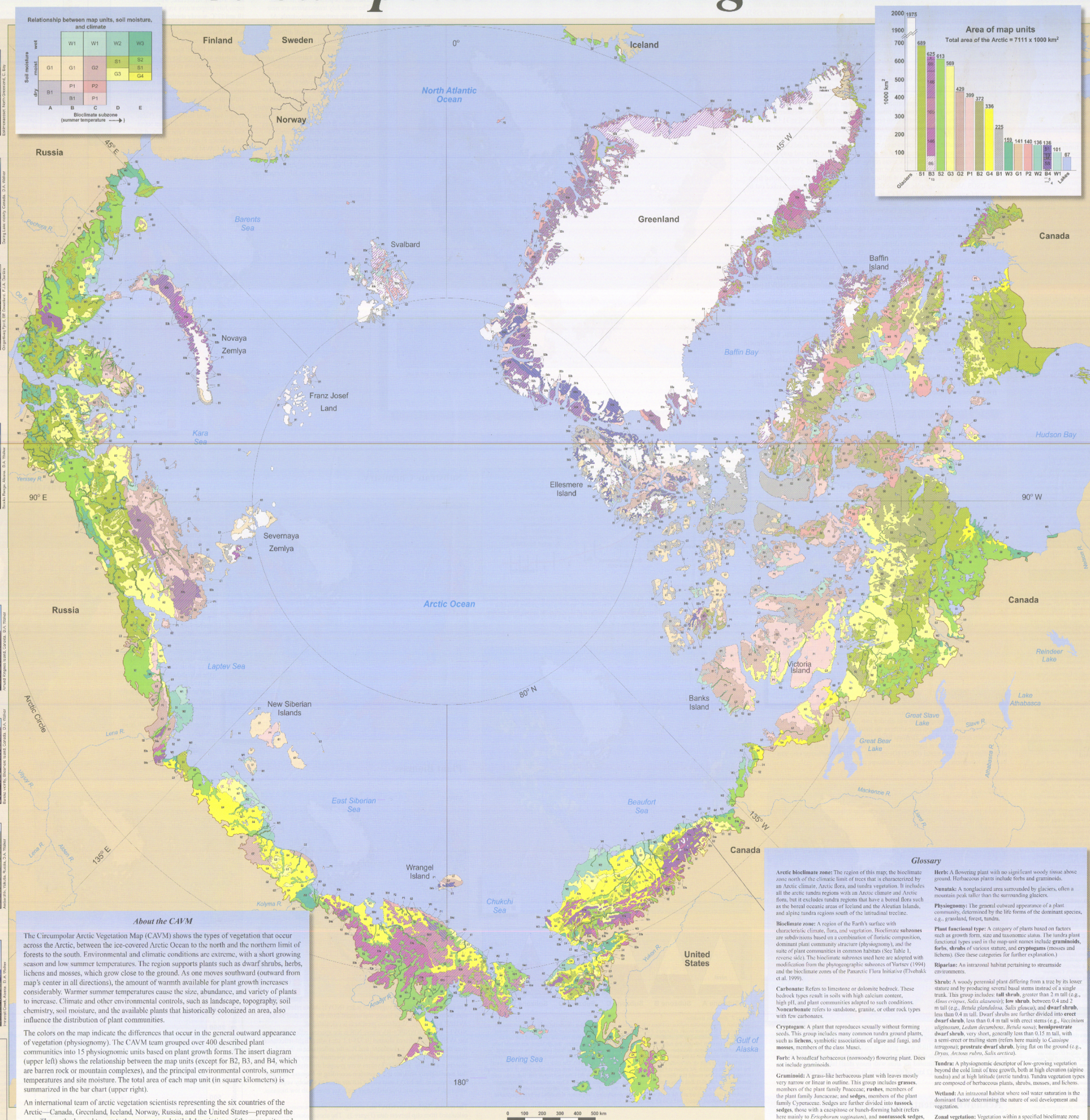
Water

Non-Arctic areas

Relationship between map units, soil moisture, and climate

Soil moisture	A	B	C	D	E
wet		W1	W1	W2	W3
moist	G1	G1	G2	S1 / G3	S2 / S1 / G4
dry	B1	P1 / B1	P2 / P1		

Bioclimate subzone (summer temperature →)



About the CAVM

The Circumpolar Arctic Vegetation Map (CAVM) shows the types of vegetation that occur across the Arctic, between the ice-covered Arctic Ocean to the north and the northern limit of forests to the south. Environmental and climatic conditions are extreme, with a short growing season and low summer temperatures. The region supports plants such as dwarf shrubs, herbs, lichens and mosses, which grow close to the ground. As one moves southward (outward from map's center in all directions), the amount of warmth available for plant growth increases considerably. Warmer summer temperatures cause the size, abundance, and variety of plants to increase. Climate and other environmental controls, such as landscape, topography, soil chemistry, soil moisture, and the available plants that historically colonized an area, also influence the distribution of plant communities.

The colors on the map indicate the differences that occur in the general outward appearance of vegetation (physiognomy). The CAVM team grouped over 400 described plant communities into 15 physiognomic units based on plant growth forms. The insert diagram (upper left) shows the relationship between the map units (except for B2, B3, and B4, which are barren rock or mountain complexes), and the principal environmental controls, summer temperatures and site moisture. The total area of each map unit (in square kilometers) is summarized in the bar chart (upper right).

An international team of arctic vegetation scientists representing the six countries of the Arctic—Canada, Greenland, Iceland, Norway, Russia, and the United States—prepared the map. The methods used to create the map, more detailed descriptions of the map units, and additional maps and information are on the reverse side.

Glossary

Arctic bioclimate zone: The region of this map; the bioclimate zone north of the climatic limit of trees that is characterized by an Arctic climate, Arctic flora, and tundra vegetation. It includes all the arctic tundra regions with an Arctic climate and Arctic flora, but it excludes tundra regions that have a boreal flora such as the boreal oceanic areas of Iceland and the Aleutian Islands, and alpine tundra regions south of the latitudinal treeline.

Bioclimate zone: A region of the Earth's surface with characteristic climate, flora, and vegetation. Bioclimate **subzones** are subdivisions based on a combination of floristic composition, dominant plant community structure (physiognomy), and the suite of plant communities in common habitats (See Table 1, reverse side). The bioclimate subzones used here are adopted with modification from the phytogeographic subzones of Yurtsev (1994) and the bioclimate zones of the Panarctic Flora Initiative (Elvebakk et al. 1999).

Carbonate: Refers to limestone or dolomite bedrock. These bedrock types result in soils with high calcium content, high pH, and plant communities adapted to such conditions. **Noncarbonate** refers to sandstone, granite, or other rock types with few carbonates.

Cryptogam: A plant that reproduces sexually without forming seeds. This group includes many common tundra ground plants, such as **lichens**, symbiotic associations of algae and fungi, and **mosses**, members of the class Musci.

Forb: A broadleaf herbaceous (nonwoody) flowering plant. Does not include graminoids.

Graminoid: A grass-like herbaceous plant with leaves mostly very narrow or linear in outline. This group includes **grasses**, members of the plant family Poaceae; **rushes**, members of the plant family Juncaceae; and **sedges**, members of the plant family Cyperaceae. Sedges are further divided into **tussock sedges**, those with a caespitose or bunch-forming habit (refers here mainly to *Eriophorum vaginatum*), and **nontussock sedges**, those with other growth forms, usually growing from rhizomes, stolons, or singly.

Herb: A flowering plant with no significant woody tissue above ground. Herbaceous plants include forbs and graminoids.

Nunatak: A nonglaciated area surrounded by glaciers, often a mountain peak taller than the surrounding glaciers.

Physiognomy: The general outward appearance of a plant community, determined by the life forms of the dominant species, e.g., grassland, forest, tundra.

Plant functional type: A category of plants based on factors such as growth form, size and taxonomic status. The tundra plant functional types used in the map-unit names include **graminoids**, **forbs**, **shrubs** of various stature, and **cryptogams** (mosses and lichens). (See these categories for further explanation.)

Riparian: An intrazonal habitat pertaining to streamside environments.

Shrub: A woody perennial plant differing from a tree by its lower stature and by producing several basal stems instead of a single trunk. This group includes: **tall shrub**, greater than 2 m tall (e.g., *Alnus crispus*, *Salix alaxensis*); **low shrub**, between 0.4 and 2 m tall (e.g., *Betula glandulosa*, *Salix glauca*); and **dwarf shrub**, less than 0.4 m tall. Dwarf shrubs are further divided into **erect dwarf shrub**, less than 0.4 m tall with erect stems (e.g., *Vaccinium uliginosum*, *Ledum decumbens*, *Betula nana*); **hemiprostrate dwarf shrub**, very short, generally less than 0.15 m tall, with a semi-erect or trailing stem (refers here mainly to *Cassiope tetragona*); **prostrate dwarf shrub**, lying flat on the ground (e.g., *Dryas*, *Arctous rubra*, *Salix arctica*).

Tundra: A physiognomic descriptor of low-growing vegetation beyond the cold limit of tree growth, both at high elevation (alpine tundra) and at high latitude (arctic tundra). Tundra vegetation types are composed of herbaceous plants, shrubs, mosses, and lichens.

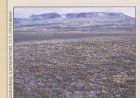
Wetland: An intrazonal habitat where soil water saturation is the dominant factor determining the nature of soil development and vegetation.

Zonal vegetation: Vegetation within a specified bioclimate zone that ultimately develops on sites with moderate slope, soil, snow, site moisture, and disturbance.

Prostrate-shrub tundras


Bunde Fjord, Axel Heiberg Island, Canada, D.A. Walker

P1. Prostrate dwarf-shrub, herb tundra
Dry tundra with patchy vegetation. Prostrate shrubs < 5 cm tall (such as *Dryas* and *Salix arctica*) are dominant, with graminoids and forbs. Lichens are also common. *Subzones B and C.*


Zackenberg, East Greenland, H.H. Christensen

P2. Prostrate/Hemiprostrate dwarf-shrub tundra
Moist to dry tundra dominated by prostrate and hemiprostrate shrubs < 15 cm tall, particularly *Cassiope*. *Subzone C.*

Erect-shrub tundras

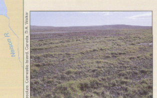

Daring Lake, Canada, D.A. Walker

S1. Erect dwarf-shrub tundra
Tundra dominated by erect dwarf-shrubs, mostly < 40 cm tall. *Subzone D.*


Seward Peninsula, Alaska, D.A. Walker

S2. Low-shrub tundra
Tundra dominated by low shrubs > 40 cm tall. *Subzone E.*

Wetlands


Resolute, Cornwallis Island, Canada, D.A. Walker

W1. Sedge/grass, moss wetland
Wetland complexes in the colder areas of the Arctic, dominated by sedges, grasses, and mosses. *Subzones B and C.*


North Slope coastal plain, Alaska, D.A. Walker

W2. Sedge, moss, dwarf-shrub wetland
Wetland complexes in the milder areas of the Arctic, dominated by sedges, grasses, and mosses, but including dwarf shrubs < 40 cm tall. *Subzone D.*


Yukon Kuskokwim Delta, Alaska, S.S. Talbot

W3. Sedge, moss, low-shrub wetland
Wetland complexes in the warmer areas of the Arctic, dominated by sedges and low shrubs > 40 cm tall. *Subzone E.*

Circumpolar Arctic Vegetation Map

CAVM Mapping Team:
Canada: William A. Gould, Lawrence C. Bliss, Sylvia A. Edlund, Martha K. Raynolds, Stephen C. Zoltai
Greenland: Fred J. A. Daniëls, Christian Bay, Maike Wilhelm
Iceland: Eythór Einarsson, Gudmundur Gudjónsson
Norway/Svalbard: Arve Elvebakk, Bernt E. Johansen
Russia: Galina V. Ananjeva, Dmitry S. Drozdov, Adrian E. Katenin, Sergei S. Kholod, Lyudmila A. Konchenko, Yuri V. Korostelev, Evgeny S. Melnikov, Natalia G. Moskalenko, Alexei N. Polezhaev, Olga E. Ponomareva, Elena B. Pospelova, Irina N. Safronova, Raisa P. Shelkunova, Boris A. Yurtsev
United States/Alaska: Martha K. Raynolds, Michael D. Fleming, Carl J. Markon, David F. Murray, Stephen S. Talbot, Donald A. Walker

Project Director:
Donald A. Walker

Compilation and Cartography by:
Martha K. Raynolds and Hilmar A. Maier
Alaska Geobotany Center
Institute of Arctic Biology
University of Alaska Fairbanks
Fairbanks, Alaska 99775 USA

Produced by:
Natalie G. Trahan (Johnson Controls Inc.), Tammy M. Charron, Beth A. Vairin, Susan M. Lauritzen
USGS National Wetlands Research Center
700 Cajundome Blvd.
Lafayette, Louisiana 70506 USA

Funded by:
U.S. National Science Foundation grant number OPP-9908-829, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Bureau of Land Management.

Suggested Citation:
CAVM Team. 2003. Circumpolar Arctic Vegetation Map. Scale 1:7,500,000. Conservation of Arctic Flora and Fauna (CAFF) Map No. 1. U.S. Fish and Wildlife Service, Anchorage, Alaska.

Web sites: www.geobotany.uaf.edu, www.caff.is

CAVM Circumpolar Arctic Vegetation Map
CAFF Conservation of Arctic Flora and Fauna
USGS

Proposition

- The team of authors of this presentation proposes all the interested partners to discuss the key questions on mega-grant application compilation (for autumn 2013) within the AVA workshop.

- Discussion of this issue is to be continued.

Фото: П.А.Гоголевой

Типичный ландшафт Анабаро-Оленёкской ПП

Alternative

Типичный ландшафт Анабаро-Оленёкской ПП

Фото: П.А.Гоголевой

Thank you for your attention !

Lets go ahead in the study of the Russian Arctic!

On, people, on!!!

Proposition

- The team of authors of this presentation proposes all the interested partners to discuss the key questions on mega-grant application compilation (for autumn 2013) within the AVA workshop.

- Discussion of this issue is to be continued.