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INSTITUTE FOR ATMOSPHERIC AND EARTH SYSTEM RESEARCH

PAN-EURASIAN EXPERIMENT (PEEX) PROGRAM
SCIENCE PLAN & COLLABORATION

Dr. Hanna K. Lappalainen
PEEX / GlobalSMEAR Secretary General
Institute for Atmospheric and Earth Sytem Research (INAR)
University of Helsinki

INEP (Institute of Industrial Ecology Problems in the North, Kola Science Center, RAS) &
UHEL-INAR (University of Helsinki, Institute for Atmospheric and Earth System Research)

Helsinki / Apatity, 12 November 2020, Thursday,
13:00-17:00 (Helsinki time) = 14:00-18:00 pm (Apatity time)

UArctic and ArcticRCN

Pan-Eurasian Experiment PEEX

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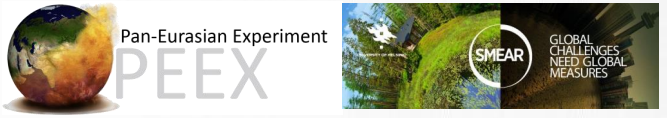
KEY QUESTION

Why understanding of Atmosphere – Earth Surface – Biosphere is important for Climate Change ?

- New feedback mechanism / interactions / processes
- More time to act: Mitigate & Adapt

TOOLS for understanding of Atmosphere – Earth Surface – Biosphere interaction, feedbacks



- Pan-Eurasian Experiment (PEEX) Program for understanding the Atmosphere – Earth Surface – Biosphere in the Arctic – boreal context / Northern Eurasia / Silk Road Region (2012 ->)
- GlobalSMEAR (Stations Measuring Earth Surface Atmosphere Relations) Initiative for Global Earth Observatory for filling the observational gap of the atmospheric – ecosystem in situ data (2015 - >

Academician Markku Kulmala

Academy Professor
Academy of Finland

Director of INAR Institute, University of Helsinki, FI

Foreign Academician
Member of CAS
Member of RAS

Citation over 40000
H-index =104
ISI No. 1 Citation in Geoscience (2011-2018)

Multidisicplinary Research / RI/ Education / Societal impact on the Arctic-boreal & China
INITIATOR OF PEEX PROGRAM

Stations for Measuring Earth Surface - Atmospheric Relations (SMEAR)
DEVELOPER AND FRONTMAN OF SMEAR CONCEPT

Pan-Eurasian Experiment
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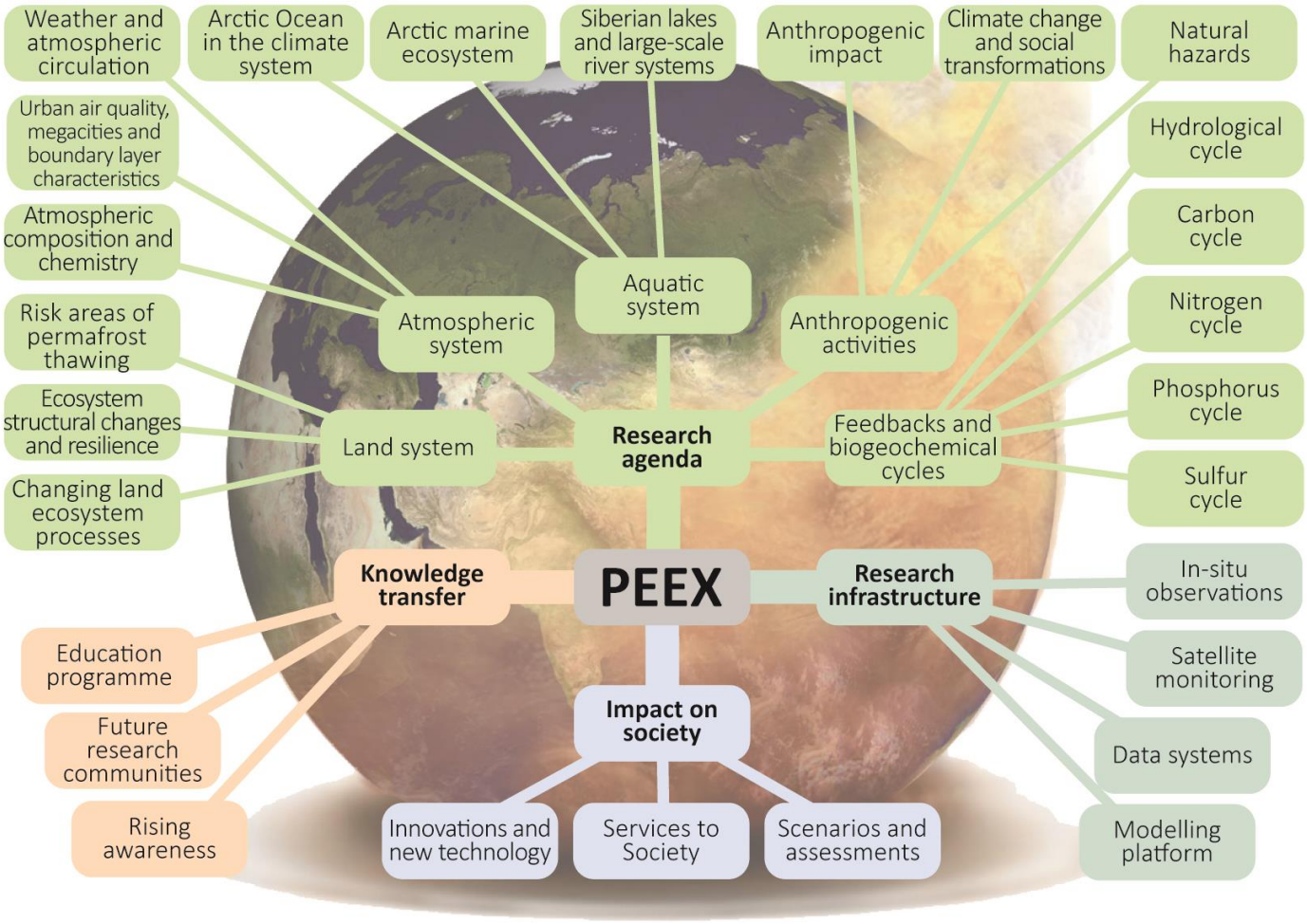
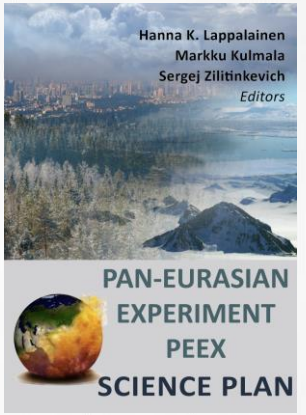
PEEX PROGRAM





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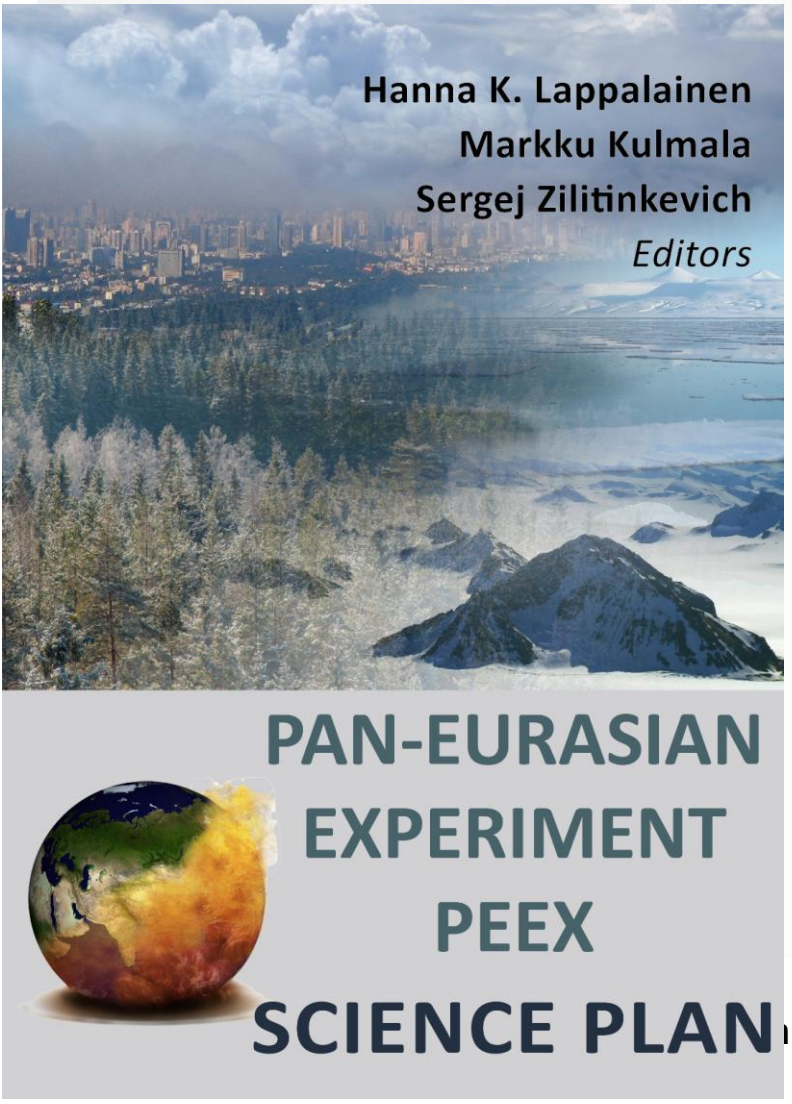

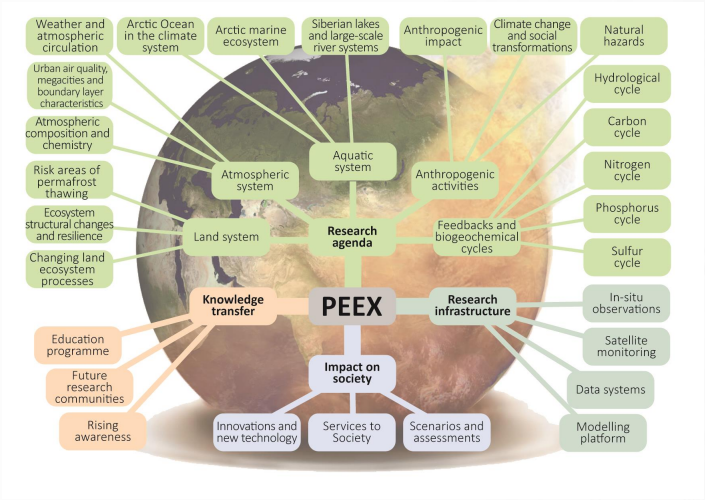

www.atm.helsinki.fi/peex/

- **Petäjä et al.** :Assessment of the potential of the comprehensive observations in the Russian Far East, 2020 Big Earth Data
- **Kukkonen et al.:** Observations and modelling of ground temperature evolution in the discontinuous permafrost zone in Nadym, north-west Siberia, Permafrost and Periglacial Processes, 31(2), 2020, 264-280, https://doi.org/10.1002/ppp.2040
- **Vihma et al.:** Towards the Marine Arctic Component of the Pan-Eurasian Experiment, Atmos. Chem. Phys., 19, 1941-1970, 2019, doi.org/10.5194/acp-2018-524.
- **Bobylev et al.** :Indicators for digitalization of sustainable development goals in PEEX program 2018, Geography, Environment, Sustainability. 11, 1, 145-156, 2018. DOI: 10.24057/2071-9388-2018-11-1-145-156
- **Lappalainen et al.** : The Silk Road agenda of the Pan-Eurasian Experiment (PEEX) program, Big Earth Data, 2:1, 8-35, 2018, doi: 10.1080/20964471.2018.1437704
- **Lappalainen et al.:** Pan-Eurasian Experiment (PEEX): System understanding of the Arctic-boreal regions for constructing scenarios and assessments of the future development of the Northern Pan-Eurasian environments and societies, Atmos. Chem. Phys., 16, 14421-14461, 2016, **doi:10.5194/acp-16-14421-2016**
- **Kulmala et al.:** Pan-Eurasian Experiment (PEEX) Program: Grant Challenges in the Arctic-boreal context, Geography Environment Sustainability, 2, 5–18, 2016.
- **Alekseychik et al.:** Ground-based station network in Arctic and Subarctic Eurasia: an overview, Geography Environment Sustainability, vol 09, No 2, 75-88, 2016, **doi.org/10.24057/2071-9388-2016-9-2-19-35**
- *Lappalainen et al. : PEEX research overview 2015-2019 to be submitted in 2020*

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JOINT PAPERS

PEEX Part-II Special Issue ACP

https://www.atmos-chem-phys.net/special_issue395.html

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Special issue
Pan-Eurasian Experiment (PEEX)
Editor(s): V.-M. Kerminen, M. Heimann, D. Spracklen, T. Laurila, A. Ding, and I. Salma
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03 May 2019
Increased inorganic aerosol fraction contributes to air pollution and haze in China
Yonghong Wang, Yuesi Wang, Lili Wang, Tuukka Petäjä, Qiaozhi Zha, Chongshui Gong, Sixuan Li, Yuepeng Pan, Bo Hu, Jinyuan Xin, and Markku Kulmala
Atmos. Chem. Phys., 19, 5881–5888, https://doi.org/10.5194/acp-19-5881-2019, 2019
Short summary

02 Apr 2019
Vertical profiles of sub-3 nm particles over the boreal forest

REPORT SERIES IN AEROSOL SCIENCE
N:o 201 (2017)

Proceedings of the 3rd Pan-Eurasian Experiment (PEEX) Conference and the 7th PEEX Meeting

Editors: Hanna K. Lappalainen, Päivi Haapanala, Alla Borisova, Sergey Chalov, Nikolay Kasimov, Sergej Zilitinkevich, and Markku Kulmala

FAAR
FINNISH ASSOCIATION FOR AEROSOL RESEARCH

Helsinki 2017

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Special Issue: Pan-Eurasian Experiment (PEEX)

Vol 11, No 1 (2018)

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GEOGRAPHY

PAN-EURASIAN EXPERIMENT (PEEX) PROGRAM: AN OVERVIEW OF THE FIRST 5 YEARS IN OPERATION AND FUTURE PROSPECTS

Hanna K. Lappalainen, Nuria Altimir, Veli-Matti Kerminen, Tuukka Petäjä, Risto Makkonen, Pavel Alekseychik, Nina Zaitseva, Irina Bashmakova, Joni Kujansuu, Antti Lauri, Päivi Haapanala, Stephany B. Mazon, Alla Borisova, Pavel Konstantinov, Sergej Chalov, Tuomas Laurila, Eija Asmi, Heikki Lihavainen, Jaana Bäck, Michael Arshinov, Alexander Mahura, Steven Arnold, Timo Vihma, Petteri Uotila, Gerrit de Leeuw, Ilmo Kukkonen, Svetlana Malkhazova,

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Big Earth data: A new frontier in Earth and information sciences

Huadong Guo

Pages 4-20 | Received 17 Oct 2017, Accepted 07 Nov 2017, Published online: 20 Dec 2017

JOINT PROJECTS

- Medical-geographical analysis of distribution of natural focal diseases in Yamalo-Nenets Autonomous Okrug accounting for climate change / climate – health with *Prof. Svetlana Malkhazova group, Moscow State University*
- Permaforst dynamics & Mechanisms, pathways and patchiness of the Arctic ecosystem responses and adaptation to changing climate (CLIMECO) in collaboration with *Academician Vladimir Melnikov group, University of Tyumen*
- Land – atmosphere feedback loops over Northern Eurasia /New Particle Formation in Siberia in collaboration with *Prof. Boris Belan and Dr. Michael Arshinov, V.E. Zuev Institute of Atmospheric Optics*
- GHG fluxes at the Mukhrino Field Station West Siberia, Prof. Elena Lapshina, Yugra State University (West Siberia)

RESEARCH HIGH LIGHTS RUSSIA

- Medical-geographical analysis of distribution of natural focal diseases in Yamalo-Nenets Autonomous Okrug accounting for climate change / climate – health with *Prof. Svetlana Malkhazova group, Moscow State University*

EKATERINA EZHOVA Univ.Helsinki INAR et al.

Aim: Study climate-health links using existing sets of data:

- ❑ **Anthrax –permafrost link**
- ❑ Opisthorchiasis – hydrology link
- ❑ Tick-borne diseases – meteorology link

➢ West Siberia is a region with the strongest warming trend in Eurasia

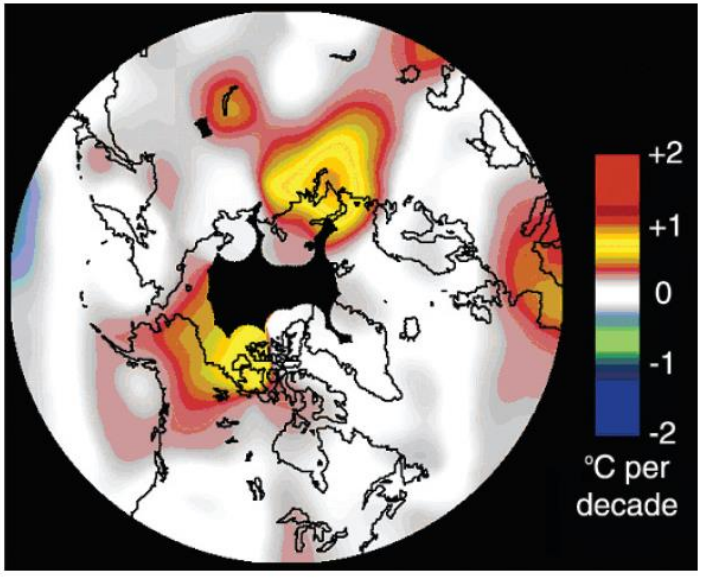


Fig. 1. Trends in summer mean surface air temperature (°C per decade) from 40°N to 90°N for the years 1966–1995 (modified from Serreze et al. 2000; printed with kind permission of Kluwer Academic Publishers, M. Serreze and J. Walsh).

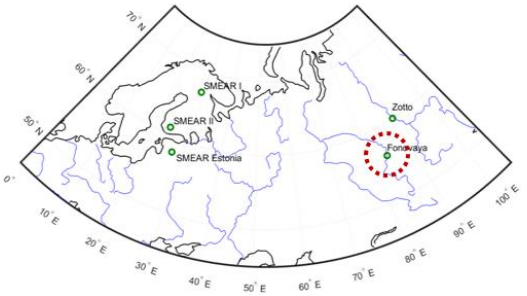
Anthrax =сибирская язва =pernarutto
Opisthorchiasis =трематода = maksamato
Tick = клещ =punkki

RESEARCH HIGH LIGHTS RUSSIA

- Land – atmosphere feedback loops over Northern Eurasia /New Particle Formation in Siberia in collaboration with *Prof. B.Belan and Dr. M.Arshinov V.E. Zuev Institute of Atm. Optics*

NPF project: Stations of IAO SB RAS

Fonovaya (56◦25'N, 84◦04'E):
Measurements of meteorology (T, P, U, RH),
Trace gases (CH_4, CO_2, NO, NO_2, SO_2, CO, O_3)
Aerosol measurements:
Diffusion battery + CPC
Optical Particle Sizer



Fonovaya on the map

➢ We need to improve aerosol measurements and make them comparable to other stations -> a long-term campaign at Fonovaya

Direct effect of aerosols on solar radiation and gross primary production in boreal and hemiboreal forests

Ekaterina Ezhova[1], Ilona Ylivinkka[1], Joel Kuusk[2], Kaupo Komsaare[3], Marko Vana[3], Alisa Krasnova[4], Steffen Noe[4], Mikhail Arshinov[5], Boris Belan[5], Sung-Bin Park[6], Jošt Valentin Lavrič[6], Martin Heimann[1,6], Tuukka Petäjä[1], Timo Vesala[1,7], Ivan Mammarella[1], Pasi Kolari[1], Jaana Bäck[7], Üllar Rannik[1], Veli-Matti Kerminen[1], and Markku Kulmala[1]

Slide by Ezhova

Pan-Eurasian Experiment
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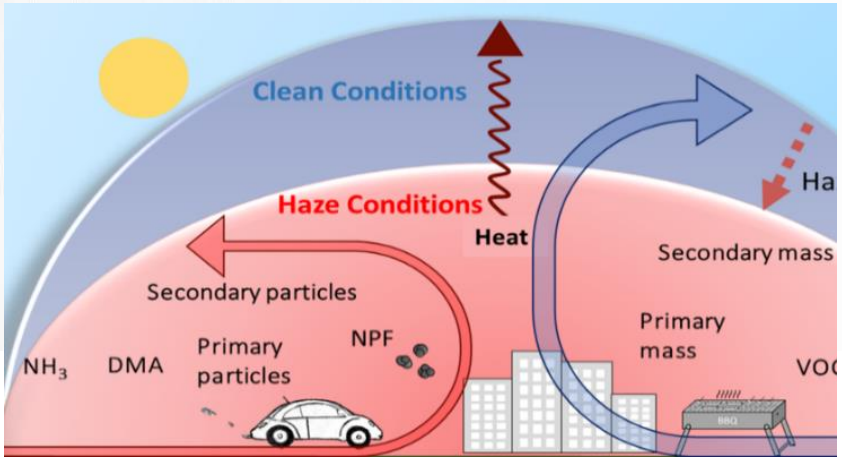
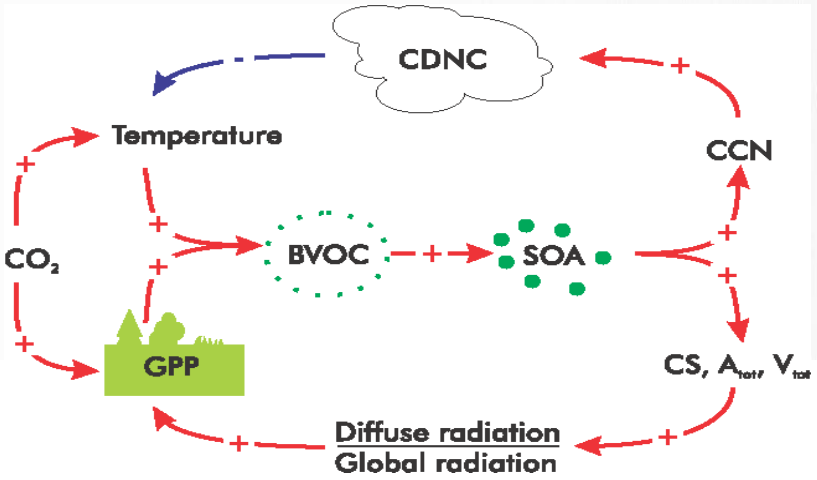
JOINT PROPOSLAS
Acad. M. Kulmala with MSU:
Mega grant application

- to establish super station for continuous comprehensive SMEAR type observations (Kulmala, Petäjä et al.)
- to find out proper feedback loops, to quantify formation and urban heat island – air pollution – boundary layer dynamics interactions and feedbacks





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Pan-Eurasian Experiment
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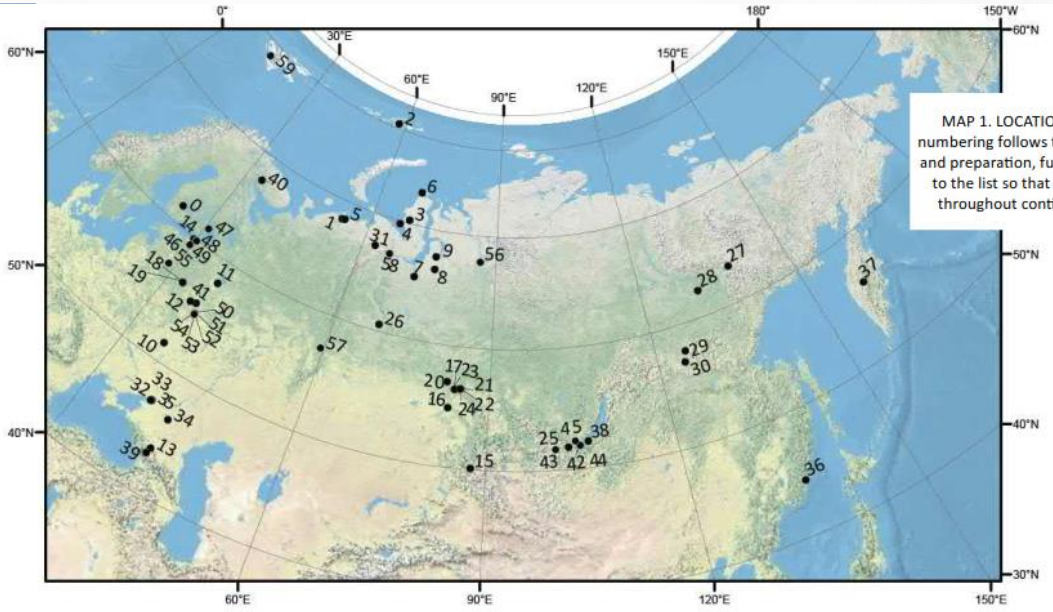
COORDINATION ACTIVITIES

- introducing the existing observation capacity
- enhance rereach collaboration & data exchange



MAP 1. LOCATION AND NUMBERING. The numbering follows the order of material receival and preparation, future additions are appended to the list so that stations retain the number throughout continuous catalogue updates.

0 Hyytiälä
1 Kashin
2 Heiss
3 Vaskiny Dachi
4 Marre-Sale Weather Station
5 Bolvansky
6 Belyy
7 Nadym
8 Urengoy FT
9 Urengoy T
10 Kursk BS
11 Borok GO
12 Zvenigorod SS
13 Kisdlovodsk HMS
14 Peterhof
15 Aktru
16 Novosibirsk MIS
17 Fonovaya
18 Okovskiy forest RyFyo:bog
19 Okovskiy forest RyFyo
20 Vasyuganie
21 IMCES GO
22 Siberian Lidar Station
23 Tomsk, site Kireevsk
24 Tomsk, site Tomsk
25 Tory
26 Mukhrino
27 Lazurnaya
28 Chyappara
29 Tajezhka
30 Lookuchakit
31 Seida-Vorkuta
32 Donskoy
33 Kagalnik
34 Manych
35 Vzmorje
36 Smyichka
37 Bolgyt
38 Istomino
39 Elbrus
40 Khibiny
41 Krasnovidovo
42 Listvyanka
43 Mondy
44 Bolshie Koty
45 Irkutsk Urban Station
46 RSHU-Daimische
47 RSHU-Valaam
48 RSHU-Urban1
49 RSHU-Urban2
50 LTM-Agro
51 LTM-MMF
52 LTM-SDF
53 LTM-CG
54 LTM-UG
55 Pushkinskie Gory
56 Igarka
57 Kourovka
58 Labytnangi
59 Barentsburgh (AARI)

INTEGRATIVE AND COMPREHENSIVE UNDERSTANDING ON POLAR ENVIRONMENTS (2018-2020)

Pan-Eurasian Experiment
PEEX

iCUPE Integrative and Comprehensive Understanding on Polar Environments
ERA-PLANET strand 4

Urban Heat Island Arctic Research Campaign (UHIARC) dataset

Pavel Konstantinov, Lomonosov Moscow State University (MSU)
Mikhail Varentsov, Lomonosov Moscow State University (MSU)
Alexander Baklanov, World Meteorological Organization (WMO)
Igor Ezau, Nansen Environmental & Remote Sensing Centre (NERSC)
E-mail: kostadini@mail.ru

Moscow, 1 September 2018

iCUPE Collaborators Datasets

DS on micro-climatic features and Urban Heat Island Intensity in cities of Arctic region

Document version number: 1

Absence of a dense meteorological network impedes development of urban climatology in the northern polar region where the global warming is rapid and amplified. High quality and density urban temperature datasets are

February 2nd to March 15th of 2017 in the .csv format after registration on the server. Current dataset includes temperature measurement data of pairs of stations (urban and rural) for three cities (Vorkuta, Salekhard and

iCUPE Integrative and Comprehensive Understanding on Polar Environments
ERA-PLANET strand 4

Monitoring, modeling and assessment of potential sources, dynamics and atmospheric transport for low and elevated mercury concentrations in Arctic regions

Fidel Pankratov, Institute of Northern Environmental Problem, Kola Science Centre of the Russian Academy of Sciences (INEP KSC RAS)
fidel_ru@mail.ru

Moscow, 23.04.2018

iCUPE Collaborators Datasets
DS on atmospheric mercury measurements at Amderma station
Document version number: 1

The development of a model for the dynamics of mercury (Hg) in the surface layer of the atmosphere is logical extension of the long-term monitoring of Hg in Russian Arctic. The Hg input from the southern and middle latitudes to the Arctic will be assessed using the long-term high-resolution data (concentrations of elemental Hg in the atmosphere with a resolution of 1 hour from 2001 to the present, as well as the meteorological parameters (temperature, wind direction, humidity) with a resolution of 3 hours). Model of the global mercury transport in atmosphere of the northern hemisphere and especially in the Arctic atmosphere will also be tested. These data will be used to calculate the deposition rates of mercury to the underlying tundra surface, and uptake of the organic forms of mercury through biological chains will be assessed subsequently.

At the polar station Amderma the phenomenon of the atmospheric mercury depletion events (AMDEs) was confirmed using the long-term monitoring data. The unique experiment when the atmospheric mercury collection point during the long-term monitoring was consequently moved from the mainland to the coast line of the Kara Sea fixed the increasing number of the AMDEs. The results obtained will be helpful in better understanding of the mercury behavior in the Arctic region.

The obtained long-term monitoring data at the Amderma station are compared with the results of measurements made at other international Polar Stations. High convergence of the results is shown for all polar stations.

The volcanic eruptions in Iceland are identified as the cause of the unusually high atmospheric mercury concentrations in the background layer at the Amderma Station. These data can be used to identify and evaluate local anthropogenic and natural sources that affect Arctic pollution.

References

Pankratov F.F., Mahura A., Korpusova I.V., Katz O.V. Dynamics of atmospheric mercury in the Russian Arctic depending on the measurement position versus coastline. // Extended abstract and Poster, Atmospheric Sciences, The 1st Pan-Eurasian Experiment (PEEX) Science Conference & The 5th PEEX Meeting, Helsinki, Finland 10-13 February 2015, http://www.atm.helsinki.fi/FAAR/reportseries/rs-163.pdf, No. 324 - 329).
Pankratov F., Mahura A., Popov V., Katz O. Long-term continuous monitoring of mercury in the Russian arctic: winter increase of atmospheric mercury depletion events. // Synopsis and Poster, Atmospheric Sciences, Pan Eurasian Experiment (PEEX). European Geosciences Union, General Assembly 2014, April 27 – 02 May, 2014, Vienna, Austria: Abstract, http://meetingorganizer.copernicus.org/EGU2014/posters/15039
Pankratov F. Dynamic of atmospheric mercury in the Russian Arctic. Thesis, November 2015, DOI: 10.13140/RG.2.1.4255.1767.1

iCUPE Integrative and Comprehensive Understanding on Polar Environments
ERA-PLANET strand 4

Measurements of Elemental and Organic Carbon in Atmospheric Aerosols: Kandalaksha Bay of the White Sea

Vladimir Shevchenko, P.P. Shirshov Institute of Oceanology, Russian Academy of Sciences
vshevch@ocean.ru

Moscow, 1 March 2018

iCUPE Collaborators Datasets

DS on elemental and organic carbon over the northwestern coast of the Kandalaksha Bay of the White Sea

iCUPE Integrative and Comprehensive Understanding on Polar Environments
ERA-PLANET strand 4

Comprehensive monitoring of the atmosphere at Fonovaya Observatory, West Siberia

Boris Belan, V.E. Zuev Institute of Atmospheric Optics, Russian Academy of Sciences, Siberian Branch (IAO SB RAS)
bbd@iao.ru

Tomsk, 26 August 2018

iCUPE Collaborators Datasets

DS on atmospheric composition at Fonovaya Observatory, West Siberia

Document version number: 1

To date, it is evident that for better understanding the current and future state of the climate system, it is necessary to establish as many observation stations as possible all around the world especially in areas currently sparsely covered (Kulmala, 2018). Taking into account possible climate feedback loops involving not only greenhouse gases (GHG) but a number of other trace gas species and atmospheric constituents, observations should be comprehensive (Kulmala, et al., 2014). Russia occupies a significant part of the land surface of the Northern Hemisphere, but its observational infrastructure is still weak.

Taking into account the importance of the existing problem and the absence of background observation stations in West Siberia operating in continuous measurement regime, the IAO SB RAS decided to establish its background monitoring station at the Fonovaya Observatory that is situated on the east bank of the River Ob, 60 km west of Tomsk (56°25'07" N, 84°04'27" E; Figure 1). At the moment, its observational facilities allow the following parameters to be measured: concentration of atmospheric CO_2, CH_4, NO, NO_x, SO_2, O_3; GHG fluxes from soil using static chambers; aerosol size distribution; black carbon (BC) and basic meteorological variables. Near real-time (NRT) visualization is available at http://lop.iao.ru/EN/fon/gas.

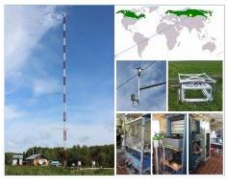


Figure 1. *Fonovaya Observatory (indicated by arrow)*

References

Belan B. et al., 2018: Fonovaya Observatory for comprehensive atmospheric monitoring in West Siberia: current status and future needs, Abstracts of the EGU General Assembly 2018, 8-13 April 2018, Vienna, Austria, https://meetingorganizer.copernicus.org/EGU2018/EGU2018-6183-1.pdf
Kulmala M., 2018: Build a global Earth observatory, Nature 553(7686), 21-23.
Kulmala M. et al., 2014: CO2-induced terrestrial climate feedback mechanism: From carbon sink to aerosol source and back, Boreal Env. Res. 19 (suppl. B) 122-131.

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a. Forest fires during
sources.

apova, A.A. Vinogradova,
Popova, V.V. Sivonen, V.P.
mN Nauk, 2015, Vol. 461,

"www.atm.helsinki.fi/icupe

PI Prof. T. Petäjä INAR Univ.Hel

+ MSU, KolaSC,

IAO SB RAS, ShIO RAS

(as collabor. contribution with own datasets)

Info-teasers for datasets:
www.atm.helsinki.fi/icupe/index.php/datasets/submitted-datasets

Slide by A.Mahura

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Pan-Eurasian Experiment
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EDUCATION

- INAR / PEEX : cources, PhD and MSc programs, Massive Open Online Course (MOOCs), Climate University - project
- **Modernization of Doctoral Education in Science and Improvement Teaching Methodologies** (MODEST, 2018-2021; Erasmus+ Capacity Building in the Field of Higher Education Program)
- **Multilevel Local, Nation- and Regionwide Education and Training in Climate Services, Climate Change Adaptation and Mitigation** (ClimEd, 2020-2023; Erasmus+ Programme)
- **For students:** Follow the course offer and details from PEEX Newsletter and PEEX web site
- **For teachers:** Organize, propose, coordinate education activities with us

PEEX IMPACT ON SCCIETY

- Active in the international frameworks
  - ”Arena for the gap analysis of the existing Arctic Sceince Co-Operations AASCO” 2020, sponsored by Prince Albert Foundation, in collaboration with Universities of Arctic
- Science diplomacy
  - Sofia Earth Forums
  - International Eurasian Academy of Sciences (IEAS) – European Center

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