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The 3rd Pan-Eurasian Experiment (PEEX) Science Conference Overview

The Conference is part of the series of CRAICC-PEEX Workshops funded by Nordforsk and continuation of the series of PEEX meetings being the 7th PEEX Meeting

Fig 1. The 3rd PEEX Conference Group Photo. More information about PEEX is available: ***https://www.atm.helsinki.fi/peex/***

Fig.2 The 3rd PEEX Conference was held at the Moscow State University on 19-22.Sep.2017.

1. GENERAL OVERVIEW

The 3rd PEEX conference was held on 19-21th September.2017 in Moscow State University, Moscow, Russia. The conference was hosted by the Moscow State University, Russia. The conference gathered altogether ca 159 registered participants from 12 countries. The conference program included a high level panel discussion on the key topics relevant to the environment and sustainable development and future collaboration between Europe, Russia and China. The conference opening talk was given by the Mr.Andrey A. Fursenko (Associate to President of Russian Federation), Alexander V. Khlunov, Director General of Russian Science Foundation (RSF) and Victor Sadovnichiy, Rector of Moscow State University (MSU). A PEEX IIASA Arctic Initiative (AFI) workshop was organized as a part of the conference on 22.Sep.2017. The conference was supported by the Nordfrosk (CRAICC PEEX / CRUCIAL projects) and Russian Geographical Society.

Fig.3 Fellow honorary title was given to Prof. Alexander Baklanov (WMO-GAW) as tribute for his 60th anniversary and his significant contributions to the PEEX Program.

The 3rd PEEX conference sessions covered themes on global scale feedbacks and interactions, air quality issues, anthropogenic emissions, natural hazards, remote sensing, environmental changes and health, permafrost thawing and Arctic greening. Altogether 22 session were organized, part of them in collaboration with international initiatives or organizational bodies like WMO-Global Atmospheric Watch (GAW), Digital Belt and Road (DBAR) and International Arctic Systems for Observing the Atmosphere (IASOA).

Fig. 4 Several side meetings, such as the PEEX – DBAR meeting and the International Academy of Sciences (IEAS) meeting, took place during the conference. Left: Academicians M. Kulmala and H. Guo are signing the PEEX – DBAR MoU. Right: President of IEAS V. Bondur and President of IEAS-Europe Center M. Kulmala and their colleagues.

Altogether 182 conference abstracts were submitted of which 123 were represented as orals. All the submitted abstracts were published in Report Series of the Finnish Association for Aerosol Research (FAAR): 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 and Markku Kulmala (2017) (www.atm.helsinki.fi/FAAR/index.php?page=series).

In order to expand the impact of the scientific results introduced during the PEEX conference we recommend the participants to submit **full papers in the PEEX Special Issue in Atmospheric Chemistry and Physics (ACP) journal** (*www.atmos-chem-phys.net/special_issue395.html,* impact factor 5.5, no fixed dl for PEEX special issue). It was also announced that **the J. Geography, Environment and Sustainability will open, tentatively scheduled for December 2017) a special issue for the PEEX conference**. If not published in ACP-PEEX Special issue or J.GES it would be important to indicate acknowledgements PEEX-Program (for example; "*This work contributes to the Pan-Eurasian Experiment (PEEX) Program research agenda* ") and send a pdf copy of the published paper to the PEEX-HQ-Helsinki (*peex-hq@Helsinki.fi and/or hanna.k.lappalainen@helsinki.fi*). It is also noted that the same paper can be linked to several special issues, which maximizes the visibility of the scientific results.

Best Poster Award was given to Yuro Shtabkin on Regional sources of near-surface ozone in the Northern Eurasia. As an award one free of charge paper to be published in ACP – PEEX special issue was granted to Dr. Y. Shtabkin. The conference presentations are available from the PEEX intranet (https://www.atm.helsinki.fi/peex/index.php)

2. NEXT PEEX CONFERENCE AND MEETING

The next, the 8th PEEX Meeting will take place in October 2018 in Helsinki, tentative dates 29-31.October and the 4th PEEX Science Conference in Helsinki in spring 2019.

3.THE PEEX WORKING GROUPS

Specific session on relevant to PEEX implementation plans we organized on the following topics: (1) In situ observations & land-atmospheric systems (rapporteurs T. Petäjä, H.K. Lappalainen), (2) In situ observations & water systems (rapporteurs P. Uotila, Y. Troitskaya), (3) remote sensing (rapporteurs G. de Leeuw, V. Bondur), (4) PEEX Modelling Platfrom (rapporteurs A. Mahura, A. Baklanov), (5) Education (rapporteurs A. Lauri, I. Fedorova) and (6) Environment & epidemics (rapporteurs S. Malkhazova, I. Bashmakova). The idea of these specific sessions were also to initiate, continue and facilitate the work of the PEEX Working Groups. Different working groups are at different phases. The PEEX-MP (4) has an active community of 100 modelers and is currently discussing the PEEX – MP format (Baklanov et la. paper), PEEX in situ (1) has a smaller group of active persons coordinating the PEEX Russia collaboration network and station metadata collection. The WGs 2 (in situ marine, Vihma et al paper in preparation on the PEEX marine concept) are 3 (remote sensing) are planning their activities and the WG 6 (environment and epidemics) is just initiated and gathered for

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the first time. The future challenge is to facilitate the work of different WGs and WG approach integration to the PEEX implementation at a large scale and take care the information flows between different WGs. All the WG are welcoming new participants to join in by contacting and e-mailing the WP rapporteurs listed above.

APPENDIX I: Short reports of the WGs

(i)   In situ observations & land-atmospheric systems

- 8 presentations: 5 introducing research infrastructures and concepts, 3 introducing scientific results on their infrastructure
- The main strategic challenge of the program is to initiate a comprehensive and coordinated research infrastructure (in situ observation network) in collaboration with European and Russian and Chinese institutes and universities
  - based on SMEAR-concept (Bäck, Noe, Tabakova)
  - PEEX collaboration
    - INTAROS (Sandven), European ESFRIs: ICOS (Sörensen), ACTRIS, LTER standards, Nordic stations (Skov, Uttal), iCUPE (Petäjä), Southern most PEEX regions (Vazavea), DBAR (Session on Digital Silk Road & Belt)
- Recent work: coordination & collaboration of existing in situ station activities in Russia (I.Bashmakova, A.Borisova, P. Alekseychik, H.K. Lappalainen, T.Petäjä, A. Mahura, N. Altimir, S. Chalov, P. Kontantinov, Nina Zaitseva + several active stations
- New project supporting PEEX RI framework
  - ERAPLANET (The European network for observing our changing planet) project (the strand-4) called "Integrative and Comprehensive Understanding on Polar Environments (iCUPE) lead by University of Helsinki. (Petäjä)

(ii)   In-situ observations and water bodies

- 7 presentations, 4 oceanography, 3 hydrology
- The draft implementation plan of PEEX marine component led by Timo Vihma/FMI is circulated among the co-authors, the paper on:
  - Answers to questions why active PEEX marine is important /Processes to be addressed in atmosphere, sea ice and ocean / Highlights close linkages with the terrestrial PEEX / Provides an implementation plan / To be submitted to the PEEX special issue of ACP / Marine aerosols already an active component in PEEX / How to define the marine PEEX domain? / Could produce a PEEX atlas including all domains: terrestrial, water bodies, ...
- Seasonal tidal characteristics to generate maps for every season
  - lack of observations limits the validity of maps: need more sites, wind, air pressure.
- CO_2 fluxes through atmosphere-ocean
  - large uncertainties, knowledge of wind velocity at high latitudes is particularly important, perhaps high resolution Arctic reanalysis could provide better winds
- Global eddy-resolving ocean model
  - Has large impact in the Southern Ocean which propagates to the North Atlantic sub-polar gyre and potentially to the Arctic Ocean; Hence it is relevant to have a eddy-resolving ocean model for boundary conditions of the PEEX marine domain.
- Freeze-up and melt times of Siberian lakes
  - Very relevant for PEEX; from remote sensing; is used to build a map of trends for PEEX
- River catchments provide long-term time series of climatic variability
  - Runoff data are needed to estimate transports of carbon and chemical fluxes, for instance.
  - Effects of river regulation may affect the quality of time series.

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- o Long rivers run through many climatic zones.
- Methane emissions of tundra lakes have high uncertainties and are not well studied
  - o Need to maintain measurements
  - o Climate change affects the fluxes
  - o Could include wetlands and peats
  - o Short targeted field campaigns would be good, and could be linked to PEEX education.
  - o Combination with remote sensing measurements to provide extended spatial coverage.

(iii)   Modelling Platform

- 11 oral presentations followed by discussions; 19 attended participants

Topics of the PEEX-MP session presentations included: seamless multi-dimensional environmental prediction with research and operational applications; aerosol climatologies in uncertainties of shortwave radiation computing; socio-economic data vs. pollution and emissions; opportunities-needs-challenges for high resolution meteorological information for end-users; global-regional-subregional scale atmospheric modelling; high-resolution modelling for oceanography; Earth system modelling; numerical algorithms for global-regional environmental inverse modelling; case studies on impact evaluation.

MP has almost 100 members from European, Russian, and Chinese institutions including international organizations (ECMWF, WMO) covering different multi-scales and types of models (in total more than 30 models). MP webpages at: https://www.atm.helsinki.fi/peex/index.php/modelling-platform have the modelling platform overview, list of modelling tools and demonstrations, information on past meetings and sessions. The PEEX seamless approach considers several dimensions of the coupling: temporal and spatial scales, processes, Earth system components, types of observations and modelling tools, user-oriented integrated systems and impact based forecasts and services.

Key issues for modelling framework in the PEEX domain were considered: anthropogenic emissions; permafrost effects; carbon dioxide and methane; ecosystem carbon cycle; short lived pollutants and climate forcers – ecosystem feedbacks; BVOC emissions; forest fires and their effects; aerosol formation in Arctic and Siberia; aerosol radiative forcing; air pollution; dynamics of ocean and sea-ice; high impact events.

Further discussions were continued (& continuing) through the peex-modelling@helsinki.fi e-mail list with comments on: current status and further steps (where we are now - current status; on-going projects where teams/ models are involved); making communication in MP better and more efficient; new members; PEEX-MP webpages; requirements/ wishes from MP to observations; new proposals and contributions from teams; proposed and planned activities; special issue contributions (overview paper on PEEX-MP research tools; individual contributions with results from modelling studies for PEEX region in focus); expanding contacts with core groups for PEEX observational, assessment, and educational "platforms"; MP needs - input from observations for validation and verification of model results; MP provides - input for assessments/ risks/ consequences/ etc. studies; MP contributes - for sci.education with research trainings on models, schools for young researchers, adds to teaching courses, etc.). Next MP meeting can be planned, as a side event, at EGU (Spr 2018) and at 8th PEEX Meeting (Fal 2018). It was suggested to arrange a joint working meeting between the MP and observation/RS platform teams for closer linkage between observation and modelling efforts within PEEX.

(iv)   Education

o   5 presentations, 5-10 participants

Activities discussed:

- Sectoral courses (ECOIMPACT)
- New pedagogical and learning tools (ECOIMPACT, ABS, research-intensive summer and winter schools, …)
- Young Scientist Summer Schools (YSSS)
- Other summer and winter schools and field courses
- International master programmes
  - POMOR, MSc programme for applied and marine sciences at SPBU
  - CORELIS, Cold Regions Environmental Landscapes Integrated Science
  - Nor-Rus Environment
  - Russian-Chinese MSc programme in hazard hydrological events
  - Nordic ABS master's programme
- Scholarships for students
- Joint online courses?
  - Experiences from the Baltic University; Polar University?

Funding opportunities discussed:

- Erasmus+ (earlier Tempus): COMBAT-METEO, QUALIMET, ECOIMPACT
- Horizon 2020: Marie Skłodowska-Curie Actions
- NordForsk: CRUCIAL
- Nordic Council of Ministers → Nordic-Russian networking and collaboration
- Bilateral projects

Concrete actions:

- Improving exchange of knowledge!
- Sharing good practices
- Dedicated PEEX-labeled education programmes (MSc, PhD)
- Looking for funding opportunities, proposing calls
- Let's continue planning this together!

→ PEEX Education Workshop, Helsinki December 2017

(v)   Environment & Health

- 9 presentations –from Moscow, Vladimir, Vladivostok, Arkhangelsk (Russian Federation), about 35 participants of Session.
- The main idea of presentations – assessment of climatic factor influence on human health.
- Main directions:
  - climatic factor and epidemics in the context of regional and global environmental changes
  - climate and allergy plants flowering
  - global warming and possible change of medical-geographical situation
  - bioclimatic conditions and comfort for living in different regions

APPENDIX II: CONFERENCE COMMITTEES

SCIENTIFIC COMMITTEE

Chair Prof. Nikolay Kasimov, Lomonosov Moscow State University (MSU)

Co-Chairs Prof. Valery Bondur, AEROCOSMOS, Prof. Markku Kulmala, University of Helsinki , Prof. Sergey Dobrolyubov, Moscow State University, Prof. Guo Huadong, RADI

Members <u>Prof. Alexander Baklanov</u>, WMO, <u>Prof Kirill V. Chistyakov</u>, St. Petersburg State University, <u>Prof. Aijun Ding</u>, Nanjing Univ., <u>Prof. Alexey Gvishiani</u>, RAS, <u>Prof. Georgy Golitsyn</u>, A.M.Obukhov Institute of Atmospheric Physics RAS, <u>Prof. Hans C Hansson</u>, Stockholm Univ. <u>Prof Vladimir Kolosov</u>, MSU, <u>Prof. Pavel Kabat</u>, IIASA, <u>Prof. Vladimir Kotlyakov</u>, Inst. Geography RAS, <u>Dr. Hanna Lappalainen</u>, Univ. Helsinki, <u>Prof. Gennady Matvienko</u>, V.E. Zuev Inst. Atmospheric Optics SB RAS, <u>Prof. Vladimir Melnikov</u> Inst. Earth Cryosphere SB RAS, <u>Prof. Tuukka Petäjä</u>, Univ. Helsinki , <u>Dr. Anni Reissell</u>, IIASA, <u>Prof. Olga Solomina</u>, Inst. Geography RAS, <u>Prof. Yrjö Viisanen</u>, FMI, <u>Prof. Sergej Zilitinkevich</u>, FMI

CONFERENCE ORGANIZING COMMITTEE

Chair Sergey Chalov, Lomonosov Moscow State University

Members: Dr. Pavel Konstantinov, Dr. Natalia Chubarova, Dr. Olga Popovicheva (MSU); Dr. Marina Tsidilina, Ms. Aleksandra Tushnova, Ms. Elena Cherepanova (AEROCOSMOS) Ms. Alla Borisova, Dr. Päivi Haapanala, Dr. Joni Kujansuu, Ms. Stephany Mazon (Univ. Helsinki), Dr. Anastasia Emelyanova, Mr. Sergey Sizov, Ms. Katica De Pascale (IIASA); Ms. Jie Liu (RADI) and Dr. Andrei Skorokhod (IAP)