During 24-29 June 2019, the Academy of Finland ClimEco project ("*Mechanisms, pathways and patchiness of the Arctic ecosystem responses and adaptation to changing climate*"; www.atm.helsinki.fi/peex/index.php/climeco) research training course on "*Seamless / Online Integrated Meteorology-Chemistry-Aerosols Multi-Scale and –Processes Modelling"* took place in the city of Tyumen (Russia) situated on banks of the beautiful Tura River. The event was organized jointly by the University of Helsinki (UHEL), the Institute for Atmospheric and Earth System Research (INAR), the Finnish Meteorological Institute (FMI), and the University of Tyumen (UTMN); and arranged in premises of the Institute of the Earth Sciences. The training was organized in order to strengthen the collaboration between Finnish and Russian key investigators and corresponding institutes in the frameworks of the ClimEco project and PEEX (Pan-Eurasian EXperiment; www.atm.helsinki.fi/peex) programme; to make a detailed design enabling a longer-term, a top-level research activities in PEEX; and to build direct links and to establish student training and short-term exchange between the institutes. One of the PEEX-Modelling-Platform (PEEX-MP; www.atm.helsinki.fi/peex/index.php/modelling-tools-demonstration) models, the Enviro-HIRLAM (*Environment - HIgh Resolution Limited Area Model*) modelling system was demonstrated and used.

The training included: lecturing with respect to theoretical and practical aspects of the Enviro-HIRLAM modelling system (with focus on research and development). The *theoretical aspects* included: weather modelling in European community; advantages/ shortcomings of on-line vs. off-line approaches; model structure, downscaling, components, schematics; specific features of urban areas and modules/ parameterizations for urbanization; land-cover and land-use classification and datasets; statistics on urban lands; modelling results – meteorology and atmospheric composition - with/without modules implemented; Enviro-HIRLAM in other projects and applications. The *practical aspects* included: introduction into Small-Scale Research Projects, SSRPs (with background discussions); analysis of meteorological situations for selected cases/ dates; technical aspects of modelling and modules implementation; model runs for selected dates/cases; visualization of model output/ results and analysis of impact on meteorology and atmospheric composition; and finally - oral presentations with defence of SSRPs. These needed steps are described in details in a specially designed student booklet, which contains guidelines, references and graphical illustrative material.

A series of skype-presentations focused on shearing experience with the model application was delivered by Iratxe Gonzales-Aparicio (Spain/ The Netherlands) "*Current and future impacts of the urbanization on the atmospheric boundary layer*"; Roman Nuterman (Denmark) "*Online-integrated atmospheric modelling with Enviro-HIRLAM*", Margarita Sedeeva (Russia) "*Modelling and evaluation of aerosols impact vs. atmospheric pollution on regional scale*", Georgii Nerobelov (Russia) "*Modelling of aerosols impact on atmospheric processes on regional and urban scales with focus on metropolitan areas*". All presentations and materials of the course are available at the PEEX internal website.

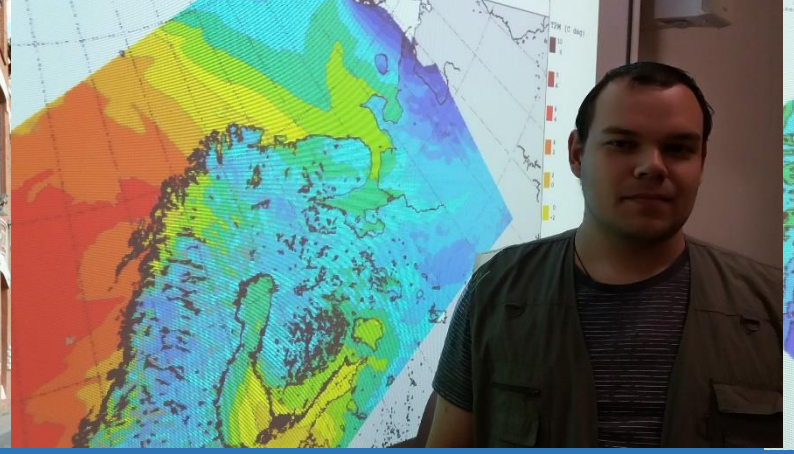
Initial tests with the model runs (at CSC Sisu HPC) and visualization (using Metgraf) were demonstrated based on outcomes of the PEEX-TRAKT-2018 ("*TRAnsferable Knowledge and Technologies for high-resolution environmental impact assessment and management*"; www.atm.helsinki.fi/peex/index.php/trakt-2018) project domain with a focus on the Kola Peninsula and Northern Fennoscandia regions. Two teams of UTMN young researchers realized SSRPs ("*The Influence of Metropolitan Areas on Meteorology and Chemistry. Paris, France*" & "*The Influence of Shanghai Metropolitan Area on Meteorology in March 2018*"), and presented and successfully defended their projects, and were awarded the certificates.

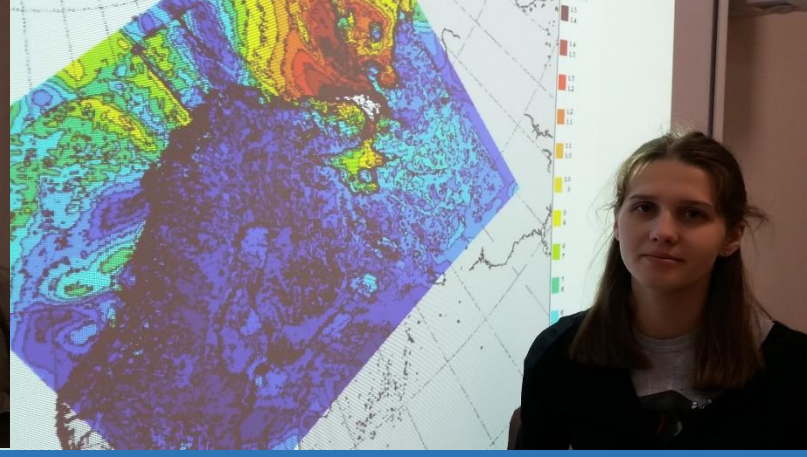
In addition, during the course, UTMN students also learned about existing AoF & FIRST+ Finnish-Russian bi-lateral collaboration for international mobilities of students at various levels and teachers/ researchers. The PEEX programme and PEEX Science Plan were discussed and students were invited to subscribe to PEEX News and to consider with their sci. supervisors on possible contributions to answers on 15 main PEEX science questions. Students interested in modelling with high performance computing (HPC) were invited to join the PEEX-MP and Enviro-PEEX on ECMWF modelling activities for the next Call. Students with awarded certificates on completed research training were also invited to apply for joint ClimEco & MegaCity Young Scientist Summer School, YSSS (27 Jul – 7 Aug 2020, Moscow, Russia).

We would like express our gratitude to colleagues actively involved into organization and informational exchange of the ClimEco research training course, interesting meetings, discussions, and especially, to the hosting University / UTMN professors, researchers, students - Andrei Tolstikov, Alexander Seryakov, Igor Fomin, Andrey Badryzov, Rodion Ganopolskii, Nikita Bakin, Vitaliy Khoroshavin, Alexander Boyko, and others & the INAR-UHEL - Markku Kulmala, Sergej Zilitinkevich, Jaana Back, Tuukka Petäjä, Hanna Lappalainen, Stephany Mazon, Svyatoslav Tyuraykov, Alla Borisova, and others.

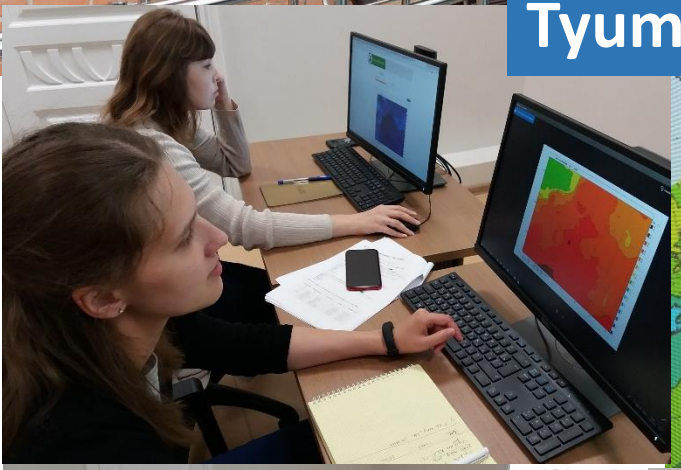
Respectfully, Dmitrii Gabyshev, UTMN and Alexander Mahura, UHEL-INAR.

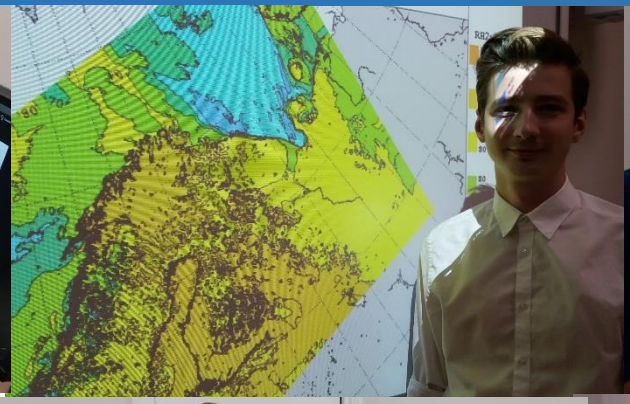

Shanghai Metropolitan Area
China
Microphysics of Clouds and Precipitation
AoF ClimEco Research Training Course
Temperature, °C: 10.4
Dewpoint, °C:
7.5
Relative Humidity, %:
82
Wind, knot:
7
Data: ERA 20th century reanalysis 1.000°
(C) Wetterzentrale
www.wetterzentrale.de
Tyumen, Russia

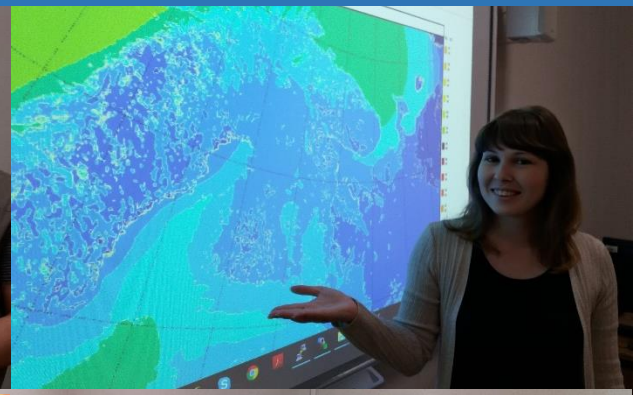


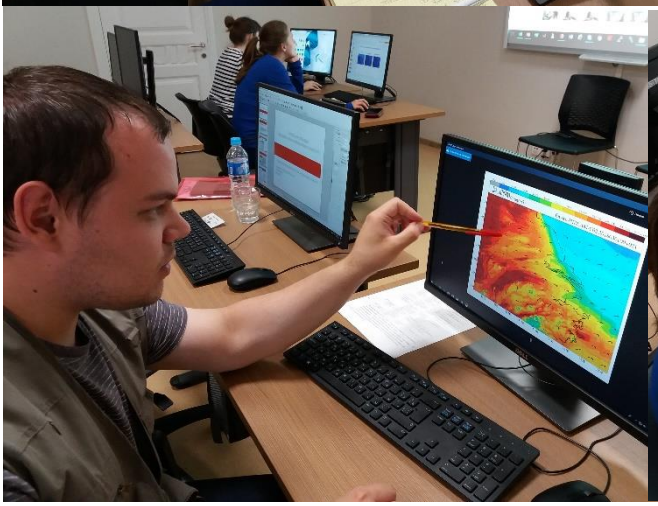


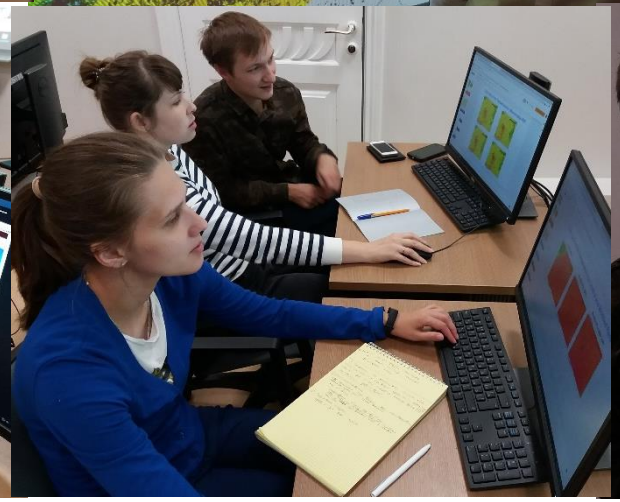
Tyumen, Russia AoF ClimEco Research Training Course

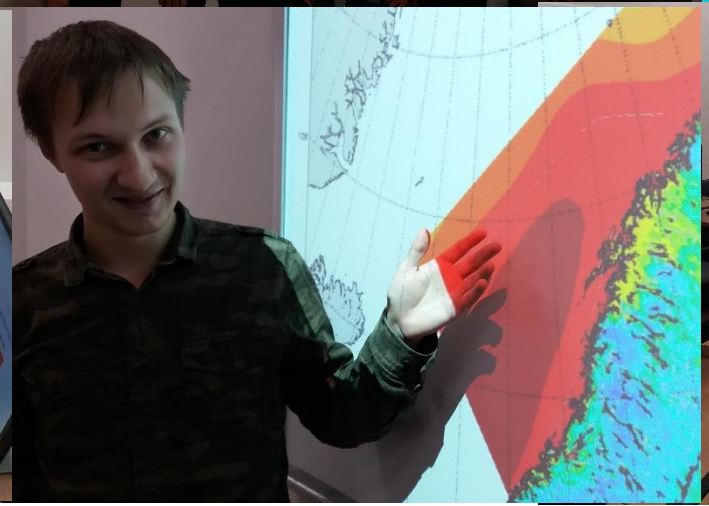













Tyumen, Russia AoF ClimEco Research Training Course - Finals
Daily cycle of Concentration O_3, ppb
Министерство науки и высшего образования Российской Федерации
The Ministry of Science and Higher Education of the Russian Federation
AoF ClimEco Research Training Course
Tyumen Scientific Center
Siberian Branch of the Russian Academy of Sciences
INAR
UTMN
The Influence of Metropolitan Areas on Meteorology and Chemistry. Paris, France
Kuznetsova Anna
Ivanova Anna
Romazanov Artur
Butakov Vladislav
June 2019
Tyumen, Russia
University of Tyumen (UTMN)
THE INFLUENCE OF SHANGHAI METROPOLITAN AREAS ON METEOROLOGY IN MARCH 2018
Fomin Igor
Gabyshev Dmitriy
Smirnov Pavel