# THE SCIENCE PROGRAM OF THE CENTURY: PEEX

**The "PAN-EURASIAN EXPERIMENT" searches for solutions to Northern climate and environmental issues**

Dozens of European, Russian and Chinese scientific leaders and researchers gathered only recently in Helsinki, Finland for a conference on the Pan-Eurasian Experiment (PEEX).

PEEX is a multi-disciplinary, multi-decadal research program for the Northern and Arctic areas. It mostly involves basic research in the natural sciences, but is also expected to produce concrete and technical solutions for environmental problems.

“Global warming and other comparable ecosystem changes have dramatic effects in the Arctic and Boreal regions. These are also the regions on which we have the least information”, states the primus motor of the PEEX program, academy professor Markku Kulmala. “These are among the fundamental reasons for why, for example, climate models are still in many respects incomplete. PEEX is intended to fill these gaps in our knowledge.”

”In addition”, says Kulmala, ”we want to support the people whose livelihoods and culture are threatened by climate change. Their adaptation can be assisted for example by improving devices and systems for early warning about extreme weather events.”

**A chain of research stations from Scandinavia over Siberia to China**

In order to understand the couplings between the atmosphere, vegetation and the soil, measurement data with high regional coverage are required. The same applies to understanding feedbacks between climate and society. These data can be obtained, for example, from observation stations, or using remote sensing equipment such as satellites.

Therefore, one of the goals of PEEX is to build and equip an extensive chain of observation stations from Scandinavia, over Siberia, to China. In the early stage of this subproject, the plan is to focus on the technical improvement and harmonizing of existing observation stations, like the ones in Tiksi and Tomsk. The compatibility of all the stations of the planned network is of extreme importance.

Hundreds of physicists, chemists and bioscientists have participated in creating the PEEX program. If the planned network of observation stations is realized, engineers, as well as construction and logistics professionals, will be needed as well.

“A multi-disciplinary program such as PEEX can only be carried out with the support of several governments,” says Professor Sergej Zilitinkevich from the Finnish Meteorological Institute. Along with Kulmala, he is one of the driving forces of the PEEX program.

”We hope that also the business community, individual companies and civil society will participate in PEEX”, Zilitinkevich adds.

Until now, several world-wide science organizations like IIASA (International Institute for Applied System Analysis) and IEAS (the International Eurasian Academy of Sciences) have joined PEEX.

**An investment comparable to CERN**

The scale and possible results of the PEEX project are comparable to the founding of the European particle physics research center CERN 60 years ago.

”The total cost of PEEX will be in the hundreds of millions of euros. For example, building a single observation station costs about twenty million euros, not including maintenance and personnel costs. CERN was also once, and still remains, a huge investment, but it has produced more than expected – both in terms of strictly scientific criteria, and in terms of commercial applications”, reminds Kulmala.

"In PEEX, we are truly charting the unknown. We only have an inkling about many atmospheric phenomena on the molecular and atomic scales, and often not even that. We may not, at the moment, even know how to ask the right questions."

The atmospheric science research group lead by Kulmala has already achieved much: Kulmala is the world's most highly cited geoscientist, and many of the results of his group have been published in journals such as Science and Nature. The group has built five observation stations in Finland. The most famous of these is located in Hyytiälä. In addition, one station has been constructed in Järvselja in Estonia, and one in Nanjing in China.

The observation stations are superbly equipped high-technology laboratories placed in the field in order to measure material and energy flows in the environment, such as radiation or the exchange of gases by plants. Building on their basic research, Kulmala’s group has also developed industrial applications such as particle counters.

Kulmala's group includes physicists and chemists, as well as biological and social scientists, from all over the world. Kulmala himself works as a professor of physics at the University of Helsinki.

http://www.atm.helsinki.fi/peex/

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