

PEEX - science beyond comparison

Imagine a chain of observational stations reaching from Scandinavia over Siberia to China. The endeavour of the century is headed by Finnish atmospheric scientists.

Approximately 30 years from now; hundreds of millions of euros; thousands of tonnes of wood, iron, steel and electronics; hundreds of physicists, chemists and other scientists all over the world; tens of skillful construction workers and engineers – all this and a lot of luck is needed before some 30 observational stations are established to function in a synchronised way, measuring the complex phenomena of the ecosystem.

Geographically, the area to be covered by the stations encompasses half the globe. A look at the map reveals that the planned route spans almost 8,000km starting from Hyytiälä, Finland, and ending up in Nanjing, southern China.

To put it simply, an observational station is a well-equipped field laboratory. With the help of state-of-the-art technology and professional staff, the station collects data for the purposes of atmospheric research.

“Towards the unknown”

The founding of stations is, however, only the first phase of a giant science effort called PEEX: Pan-European Experiment.

“With the help of versatile measurement data, we can probably find something we do not yet have a clue about,” says Academy Professor Markku Kulmala, the *primus motor* of PEEX. “Despite the many quantum leaps made in atmospheric physics lately, we do not know deeply enough the feedback mechanisms of the atmosphere and the biosphere. This is why we have to drill deeper into the molecular level.”

“In this respect, PEEX is implemented from the point of view of pure basic research. But PEEX will, for sure, support the development of various industrial applications, like climate and Earth system technology.”

Kulmala and his colleagues have extensive experience in running field stations. Finnish atmospheric scientists have set up a total of

five stations in Finland and a few abroad, for example in China. The stations are measuring the energy and material flows of the ecosystem, like radiation and gas exchange. The many scientific breakthroughs made by Kulmala’s research group are largely based on high-quality data delivered by the stations.

The scale of PEEX could well be compared with the establishment of CERN, the European Organization of Nuclear Research.

“An effort like this may only be carried out by co-operating with European, Russian and Chinese governments,” says Kulmala. “PEEX has to be co-designed together with several actors, political institutions, companies, organisations and even private citizens.”

To erect one single observational station requires about €20m, excluding running costs. A network of them raises the total sum up to the next order of magnitude. On the other hand, the yield in the shape of applicable knowledge may exceed all expectations. This is exactly what happened in the case of CERN.

“As a whole, PEEX is not a project. Instead, we aim at generating a permanent science institution.”

In February 2015, dozens of physicists, chemists and other scientists got together in Helsinki, Finland, to define the many details of PEEX. Just this time, scientists would not be concentrating on their equations only: PEEX is by nature a practical challenge, too.

“To break through, we must hang fire,” says Kulmala – optimistically, as he always does.



The PEEX programme covers the Cap of the North



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