



TRAnserable Knowledge and Technologies: Measuring Ecosystem-Atmosphere Relations and Multi-Scale Modelling for Assessment and Management of Environmental Impact

Alexander Mahura (1), Risto Makkonen (2,1), Pyry Poutanen (1), Hanna K. Lappalainen (1,2), Tuukka Petäjä (1), Michael Boy (1), Markku Kulmala (1), Sergej Zilitinkevich (1,2)

(1) University of Helsinki, Institute for Atmospheric and Earth System Research (INAR), Faculty of Science, Department of Physics, Helsinki, Finland (alexander.mahura@helsinki.fi), (2) Finnish Meteorological Institute (FMI), Helsinki, Finland

The TRAKT (TRAnserable Knowledge and Technologies for high-resolution environmental impact assessment and management; www.nersc.no/project/trakt-2018) project is focused on implementation of a novel advanced technology for high-resolution environmental impact assessments. The technology consists of modern observations and satellite remote sensing, data fusion, and downscaling towards high resolution modelling. The purpose of such technology is to support sustainable city development and planning with quantitative analysis, environmental assessment and scenario modelling. The University of Helsinki team's focus and contribution in this project was placed on demonstration of capabilities of the measuring ecosystem-atmosphere relations (SMEAR stations) concept, climate (EC-Earth) and seamless/ online integrated (Enviro-HIRLAM) modelling approaches.

In this project, the SMEAR concept was demonstrated on example of the station measuring ecosystem-atmosphere relations (SMEAR-I; 67°46'N, 29°36'E, Lapland, Finland) by analysis of observations for meteorology and atmospheric composition for selected winter period of December 2017. The multi-scale (from global-regional-subregional- to urban) modelling approach employing the EC-Earth climate and Enviro-HIRLAM online integrated models was also demonstrated. In addition, transboundary atmospheric pollution (with focus on sulphates), based on atmospheric transport, dispersion and deposition patterns, was estimated on population over the Northern Scandinavia and Kola Peninsula and demonstrated through web-based atlas.

Note that results of such studies are applicable for evaluation of risks, vulnerability, and consequences due to atmospheric; impact assessments on population and environment; supporting decision-makers, adjustment of legislation at regional and city levels; planning measures, mitigation scenarios, etc.

The TRAKT project was well linked with the Pan-Eurasian EXperiment (PEEX; www.atm.helsinki.fi/peex) programme and tasks of the PEEX Science Plan as well as it was promoted to larger research, decision-making, stakeholders and end-users communities.