

The Integrated Land Ecosystem-Atmosphere Processes Study (iLEAPS), a global research project of Future Earth, will hold its 5th Science Conference in Oxford, United Kingdom.

The event which will run from the 11th - 14th September 2017

### **ORAL-0113: FINDING SOLUTIONS TO ENVIRONMENTAL CHALLENGES RELEVANT TO ARCTIC-BOREAL REGIONS**

Hanna Lappalainen<sup>1, 2</sup>, Tuukka Petaja<sup>1</sup>, Veli-Matti Kerminen<sup>1</sup>, Timo Vihma<sup>2</sup>, Alexander Baklanov<sup>3</sup>, Nikolay Kasimov<sup>4</sup>, Valery Bondur<sup>5</sup>, Vladimir Melnikov<sup>6</sup>, Sergej Zilitinkevich<sup>7</sup>, Markku Kulmala<sup>1</sup>

*<sup>1</sup>University of Helsinki, Helsinki, Finland <sup>2</sup>Finnish Meteorological Institute, Helsinki, Finland <sup>3</sup>World Meteorological Organization, Geneva, Switzerland <sup>4</sup>Moscow State University, Moscow, The Russian Federation <sup>5</sup>AEROCOSMOS, Moscow, The Russian Federation <sup>6</sup>Tyumen State University, Tyumen, The Russian Federation <sup>7</sup>Finnish Meteorological Institute, Helsinki, Finland*

We need to perform a holistic research approach and establish coordinated comprehensive measurements in order to solve still open scientific questions that are specifically important for the Arctic-boreal region in the coming years. The open science questions in the context of global climate change and its consequences to nature and to the Northern societies are related to net effects of various feedback mechanisms connecting the biosphere, atmosphere and human activities. Such feedbacks stem from higher temperature and increased concentration of greenhouse gases in the future that lead to further permafrost thawing, land cover changes, increased dissolved organic carbon content in freshwaters, acidification of the Arctic Ocean, increased photosynthetic activity, elevated GHG uptake by terrestrial ecosystems and increased Biogenic Volatile Organic Compound emissions leading to aerosol and cloud formation affecting the radiation budget. These feedbacks either hinder or speed up the climate change. The latest review of the current in situ observations over the Northern Eurasian region demonstrates the urgent need for the comprehensive, coordinated in situ observation system detecting the Earth surface and atmosphere processes. Also the marine observations from the ocean, sea ice, and atmosphere are needed to obtain a better understanding on the state and change of the marine Arctic climate system. New concepts, methods including analysis of big data and coordinated research activity are needed to find solutions to these challenges. It is also important to establish education program and create processes where research outcomes are effectively used for the policy making and for the benefit of the Northern societies.