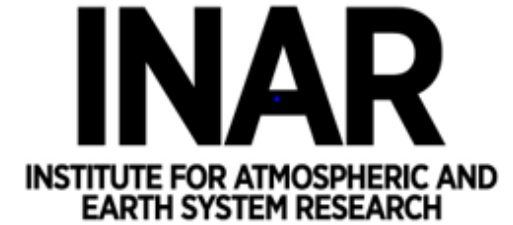




INTERNATIONAL RESEARCH CENTER OF BIG DATA  
FOR SUSTAINABLE DEVELOPMENT GOALS  
可持续发展大数据国际研究中心



# DBAR-International Center of Excellence HELSINKI

Atmospheric-ecosystem (SMEAR) data for the SDGs

Institute for Atmospheric and Earth System Research (INAR) at the University of Helsinki, FINLAND

**Joni KUJANSUU & Hanna LAPPALAINEN**  
**2023. Sep. 4**



Pan-Eurasian Experiment

PEEX

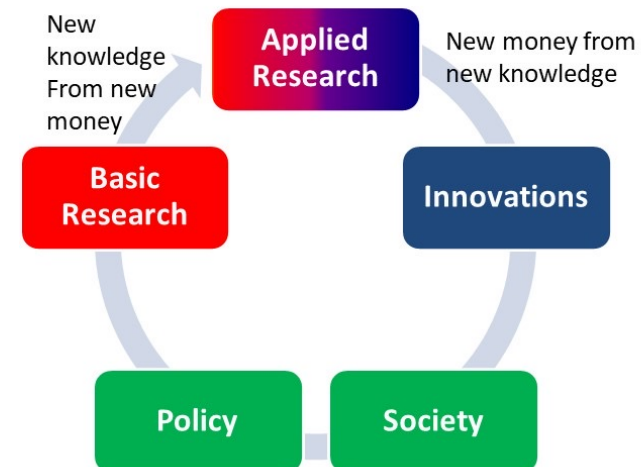
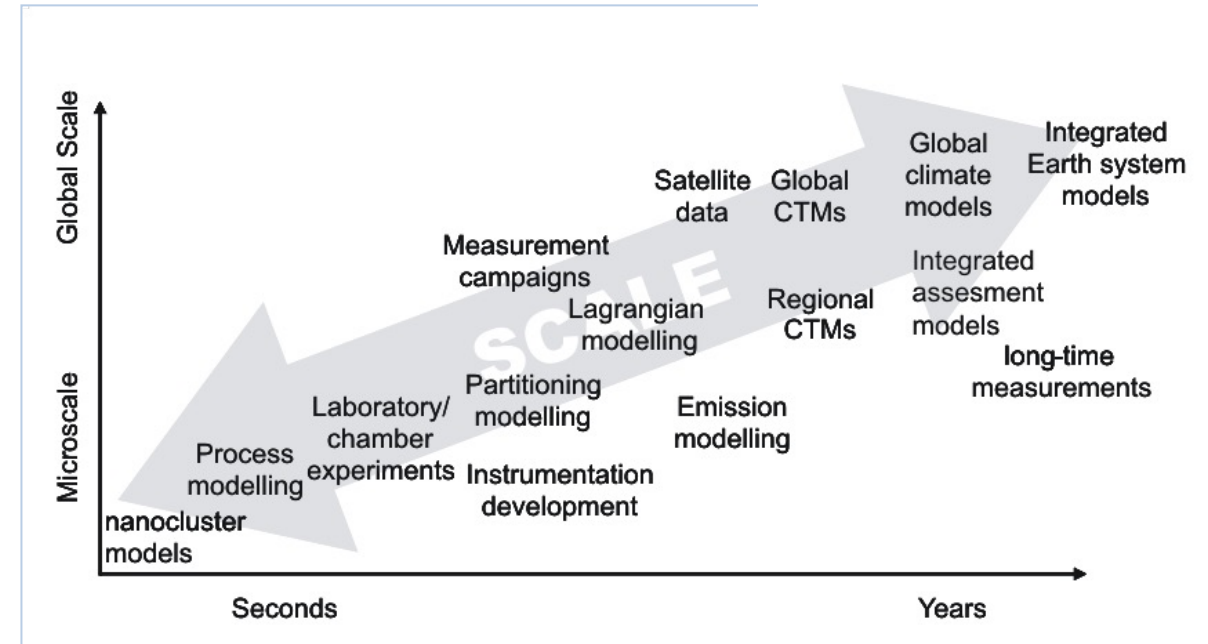
STATION FOR MEASURING  
EARTH SURFACE -  
ATMOSPHERE RELATIONS



GLOBAL  
CHALLENGES  
NEED GLOBAL  
MEASURES

- **Global annual cost of climate change impacts** will reach an estimated hundreds of billions euros by 2030 (UNEP 2016)
- **Practical needs for the mitigation** provide emerging business opportunities for various industries
- European Green Deal Investment will mobilize at least 1 trillion euros of sustainable investments over the next decade (COM 2020).
- **Poor understanding of the atmospheric interactions** may thus lead to unwanted climate impacts and various negative health effects.
- **Information produced by new verification systems is essential for society to design** the economically and socially optimal sustainability strategies and climate-neutrality pathways e.g Paris Agreement, UN SDGs (Kriegler et al. 2018).

- **World-class Research Infrastructure (RIs)** and an integrated network of RIs
- **Excellent science** in terms of quality, critical mass and interdisciplinary research
- Capacity building, **education** and training, knowledge exchange
- **Innovations** in collaboration with stakeholders
- **Continuous dialog** and science diplomacy from **Science-to-Society** e.g. governments, governmental organizations, citizens (NGOs)



## Vision: Global observation network

The answer is a global Earth observatory — 1,000 or more well-equipped ground stations around the world that track environments and key ecosystems fully and continuously

- Researchers could find new mechanisms and feedback loops in this coherent data set
- Policymakers could test policies and their impacts
- Companies could develop environmental services



An enclosure for measuring gas exchange between plants and the atmosphere at a station in Finland.

### Build a global Earth observatory

Markku Kulmala calls for continuous, comprehensive monitoring of interactions between the planet's surface and atmosphere.

**M. Kulmala:**  
**Nature Comment,**  
**Nature 553,**  
**p. 21–23, 2018**

# 2022-2023 activity report



## China collaboration activities:

- CBAS Global SDG Partnership project - “SmartSMEAR data platform development for the accomplishment of UNITED NATIONS’ SUSTAINABLE DEVELOPMENT GOALS (SDGs)”
- Joint institute and educational cooperation in atmospheric sciences between Nanjing University and University of Helsinki – B.Sc, M.Sc and PhD degrees, started at August 2023

## Arctic activities:

- Arena for the gap analysis of the existing Arctic Science Co-Operations - AASCO-2 2024-2026
  - Funded by the Prince Albert Foundation - Prince Albert II of Monaco visited Värriö Research Station (SMEAR I) at June 2023

## GlobalSMEAR activities:

- “Towards Global Earth Observatory workshop” in SMEAR II station on May 2023 together with World Meteorological Organization (WMO)
- <https://www.atm.helsinki.fi/peex/index.php/portfolio-items/toward-global-observatory-workshop-on-8-10-may-2023-at-the-smear-ii-in-hyytiala/>
- Atmosphere and Climate Competence Center (ACCC) Impact Week at April 2023  
<https://www.acccflagship.fi/index.php/2nd-accc-impact-week-2023/>

# CBAS Global SDG Partnership project

## "SmartSMEAR data platform development for the accomplishment of UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOALS (SDGs)"



<https://smear.avaa.csc.fi/>

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- Terms Of Use
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- INAR
- SMEAR IV

### About SmartSMEAR

SmartSMEAR is a data visualization and download tool for the database of continuous atmospheric, flux, soil, tree physiological and water quality measurements at [SMEAR](#) research stations of the University of Helsinki and the University of Eastern Finland. Data with basic metadata can be visualized and downloaded using Preview and Download pages. Application programming interface (API) provides access to additional variables and more complete metadata than the graphical user interface (UI). See use instruction later in this page.

Date Range

2022-09-06

→ 2022-09-08



Plot

CO<sub>2</sub> flux



# ICoE –Helsinki

- The Atmosphere and Climate Competence Center (ACCC) is a [Finnish Flagship](#) constituted by
  - [University of Helsinki](#)
  - [Tampere University](#)
  - [University of Eastern Finland](#)
  - [Finnish Meteorological Institute](#)
- ACCC aims to address two of the most urgent global Grand Challenges: climate change and deteriorating air quality
- The ACCC consortia counts with the expertise of 40 [key stakeholders](#) in the policy-making, private and public sectors to co-create knowledge-based solutions
- Website: [www.acccflagship.fi](http://www.acccflagship.fi)
- X (Twitter): [@ACCC\\_FS](https://twitter.com/ACCC_FS)



ATMOSPHERE AND CLIMATE COMPETENCE CENTER (ACCC) SURVEY AND ROADMAP

Towards Carbon Neutrality and Beyond  
Towards Climate Neutrality

*A broad range of science-based knowledge, methodologies, approaches, best practice and pilots applicable to regulation, plans, towards carbon and climate neutrality / new businesses and innovations / improve general knowledge and awareness*

This document, dated on <NN> September 2022, is the first version of the agreed ACCC SURVEY & ROADMAP. It is the Academy of Finland Flagship project No (s) 337549 (University of Helsinki), 337552 (Finnish Meteorological Institute), 337550 (University of Eastern Finland), 337551 (Tampere University) XXXX deliverable and has been written by research and impact teams of the Institute for Atmospheric and Earth System Research (INAR) at the University of Helsinki, Finnish Meteorological Institute, Faculty of Engineering and Natural Sciences | Physics | Aerosol Physics at the Tampere University and University of Eastern Finland. The content is based on the descriptions from the ACCC teams.

This document is the first version of a living document / interactive document, which will be expanded in a cumulatively manner by the ACCC teams.

