



SNOWCARBO - Monitoring and assessment of carbon balance related phenomena in Finland and northern Eurasia

LIFE07 ENV/FIN/000133



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Project description:

Background

Current knowledge is limited about the size and scope of boreal forests as sources of carbon dioxide and as carbon sinks. Work has been done to understand single locations, but estimates for large regions are very imprecise. Regional and global level information is limited because the distributed ground-based point-wise observations do not cover enough locations. This is a handicap to climate forecasting and hampers the evaluation of the anthropogenic influence on climate change, contributing to high uncertainty about the location and magnitude of carbon sinks. Additionally, the mapping of carbon sinks is a major issue concerning the implementation of Kyoto protocol and concerning possible future international climate treaties.

One aspect of carbon sink mapping is observation of spatial variability and long-term trends in the distribution of snow cover, and related climate patterns. These data feed into climate change prediction models, which forecast changes in the spatial and temporal distribution of snow in boreal and Arctic terrestrial regions. Changes in seasonal snow cover lead to changes in the carbon dioxide balance, because snow cover directly affects carbon dioxide production (respiration) and the increase in forest and other vegetation biomass (the magnitude of carbon sinks).

Objectives

The overall objective of the SNOWCARBO project was to implement and

demonstrate an innovative approach for net carbon balance mapping in Nordic countries and surroundings (i.e. for Northern Europe) combining different information sources describing snow evolution, phenology, land cover, CO<sub>2</sub> fluxes and concentrations. Specific objectives were to:

- Provide accurate map information on net carbon balance in boreal forest zone, in order to assess the real levels of carbon sinks and sources for future climate controlling treaties and policy making;
- Provide and demonstrate methodologies to extract anthropogenic influence from natural background CO<sub>2</sub> sources, in order to enable the development of new legislative means for CO<sub>2</sub> regulation. These methodologies include the use of Earth observation data as a comprehensive data source (together with models and in situ data); and
- Provide information for the future needs required in situ, Earth observation and land cover data needs of continental scale carbon balance mapping/monitoring (focusing on Northern areas).

## Results

A modelling framework predicting present day land ecosystem CO<sub>2</sub> balance for Nordic countries and surroundings (i.e. for Northern Europe) was developed by the SNOWCARBO project. The method combines local in situ observations and global earth observation (satellite) data together with land cover class information in a new way. Dedicated models for different land cover classes were applied to describe carbon uptake (sinks) and respiration (sources). The changes were most pronounced in the areas where the land cover was changed from forest types (evergreen deciduous, which does not really exist in Finland and coniferous) to wetlands. The surface energy balance changes between different land cover types and therefore affects the snow melt rate. The carbon balance calculations showed that the coniferous forests have a significant role in the carbon balance of northern latitudes. The previous classifications and surveys seem to overestimate the amount of coniferous forests and therefore they result in a net-sink status of the annual carbon balance. Using the improved land cover data, Scandinavia and Finland stay close to zero balance, but the Baltic countries, Western-Russia and Belarus, display annual net sources of carbon dioxide.

Further information on the project can be found in the project's layman report and After-LIFE Communication Plan (see "Read more" section).

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Environmental issues addressed:

Themes

Habitats - Forests

Climate change Mitigation - Carbon sequestration

## Keywords

forest ecosystem, greenhouse gas, information system

Natura 2000 sites

Not applicable

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## Beneficiaries:

Coordinator	Ilmatieteen laitos
Type of organisation	Development agency
Description	The Finnish Meteorological Institute (FMI, Ilmatieteen Laitos) is an agency of the Ministry of Transport and Communications that produces high-quality observational data about, and conducts research on, the atmosphere above and around Finland.
Partners	Suomen Ymparistokeskus-Finnish Environment Institute (FYKE), Finland Commissariat à l'Energie atomique-Direction des Sciences de la Matière, France

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## Administrative data:

Project reference	LIFE07 ENV/FIN/000133
Duration	01-JAN-2009 to 31-DEC -2012
Total budget	2,155,627.00 €
EU contribution	1,046,759.00 €
Project location	Uusimaa(Finland Suomi) Lappi(Finland Suomi)

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## Read more:

Project web site	<a href="#">Project's website (EN)</a>
Publication: After-LIFE Communication Plan	Title: After-LIFE Communication Plan Year: 2012 No of pages: 2

Publication: Layman report	Title: Layman report Year: 2012 Editor: Finnish Meteorological Institute (FMI) No of pages: 10
Publication: Technical report	Title: Synthesis report of project results for stakeholders and policy makers Year: 2012 Editor: Finnish Meteorological Institute (FMI) No of pages: 5
Publication: Technical report	Title: Project's Final technical report Year: 2013 Editor: Finnish Meteorological Institute (FMI) No of pages: 64

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