



SNOWCARBO: Progress & Preliminary Achievements



PROJECT LOCATION: Helsinki

BUDGET INFO:

Total amount: 2 155 000 €

% EC Co-funding: 1 045 000 €

DURATION: Start: 01/01/09 - End: 31/12/12

PROJECT'S IMPLEMENTORS:

Coordinating Beneficiary: Finnish Meteorological Institute (FMI)

Associated Beneficiary(ies): Finnish Environment Institute (SYKE),

Commissariat à l'énergie atomique – Laboratoire des Sciences du Climat et de l'Environnement (CEA-LSCE)



Introduction

- ❑ In Snowcarbo the climate models together with their land surface schemes (LSS) are used for estimating present day CO₂ balance of Northern area.
- ❑ The goal of the project is to improve the model predictions facilitating a variety of Earth Observation (EO) and in situ data in constraining and calibrating the models.
- ❑ The core region for which the most extensive set of model simulations and evaluations of model performance will be carried out covers Scandinavia and Baltic countries. However, as the available EO data covers northern Eurasia in whole, the ultimate aim of the project is to provide insight into the quality of the CO₂ balance predictions of the Northern Hemisphere.
- ❑ The climate models of Max Planck Institute on meteorology (MPI-M, Hamburg) are used for climate and CO₂ exchange simulations in this project. The present version of general circulation model of MPI-M is ECHAM5 whose LSS is called JSBACH.
- ❑ A Regional climate Model (REM0) of MPI-M in its present form lacks a LSS capable of simulating CO₂ cycle. Thus JSBACH will be used for predicting the terrestrial CO₂ exchange with the regional model as well.

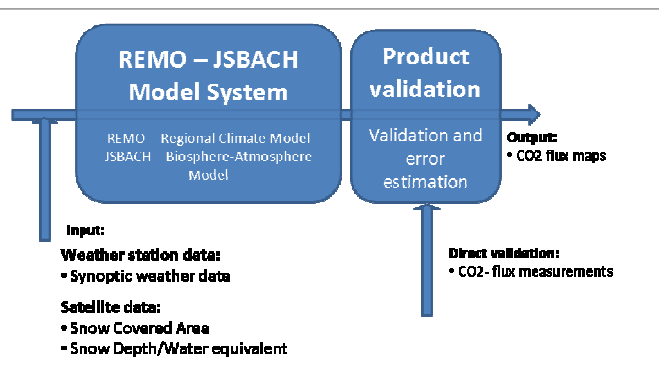
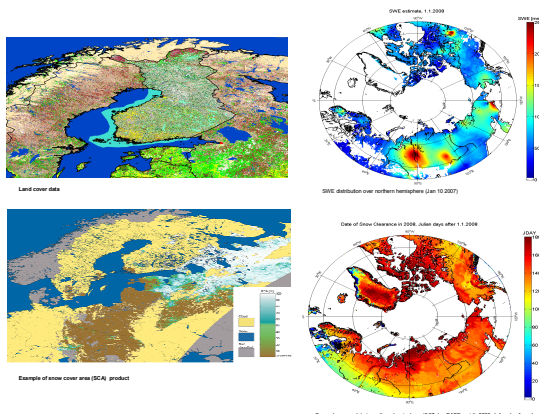
Project Objectives

1. Provide accurate map information on net carbon dioxide 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
2. Provide and demonstrate methodologies to extract anthropogenic influence from natural background CO₂ sources in order to enable the development new legislative means for CO₂ regulation. These methodologies include the use of Earth observation data as a comprehensive data source (together with models and in situ data).
3. Provide information for the future needs of required in situ, Earth observation and land cover data needs of continental scale carbon balance mapping/monitoring (focusing on northern areas)



Data Sets

- Weekly SWE (mm)
- Snow melt onset (date, spring)
- Snow clearance (date, spring)
- Land Cover Data
- MODIS (Moderate Resolution Imaging Spectroradiometer)
- AVHRR (Advanced Very High Resolution Radiometer)
- European Centre for Medium-Range Weather Forecasts (ECMWF) snow depth observations (used as input for SWE product)



Preliminary Achievements

- Establishment of the modeling system to the area of interest
- Generation of satellite datasets (both FMI and SYKE)
- Generation of dedicated land cover datasets in different scales to test the sensitivity of the model and improve the characterization of the land cover
- Finding the correlation between field observations CO₂ flux from the towers and the satellite derived NDVI index
- Field work in both Sodankylä-Pallas in-situ super site and in dedicated field campaigns

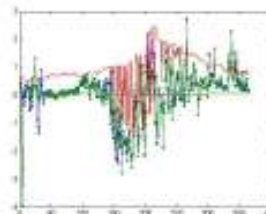


- Spectral measurements from a thin, melting snowpack were carried out near Helsinki, for estimating errors in the SCA- algorithm and for aiding the satellite time-series interpretation
- Land cover data validation
- Forest parameter estimation
- Spectral measurements of vegetation



Field Campaigns

First results from CO₂-flux estimations using JSBACH
EC CO₂ fluxes (dots) and JSBACH flux predictions (lines) for one grid cell 2003



- Temporal pattern from the JSBACH is good considering the following uncertainties:
 - Scaling of the fluxes (systematic shift)
 - Representativeness of the grid cell
 - 'Missing photosynthesis' during summer months

A comparison of SWE-output from REMO and SD-directly from Weather stations was made (partially under progress: different model versions)

