



LIFE Project Number

LIFE07 ENV/FIN/000133

2nd Monitoring Progress Report

Covering the project activities from 01/11/2009 to 08/04/2010

Reporting Date

29/04/2010

LIFE+ PROJECT NAME or Acronym

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

Data Project

Project location	Helsinki
Project start date:	01/01/2009
Project end date:	31/12/2012
Total budget:	2155627 €
EC contribution:	1046759 €
(%) of eligible costs	49.09

Data Beneficiary

Name Beneficiary	Ilmatieteen laitos
Contact person	Dr. Ali Nadir Arslan
Postal address	Erik Palménin aukio 1, FI-00101, Helsinki, Finland
Telephone	+358-50-320 3386
Fax:	+358-9-1929 4603
E-mail	ali.nadir.arslan@fmi.fi
Project Website	snowcarbo.fmi.fi

Table of contents

List of abbreviations.....	3
1 Progress	4
1.1 Actions	4
1.1.1 Action 1: Project management and monitoring.....	4
1.1.2 Action 2: Satellite data processing by FMI.....	4
1.1.3 Action 3: Acquisition and extension of GMES-services GSE Polar View and GSE Land	5
1.1.4 Action 4: In-situ data collection and processing by FMI.....	5
1.1.5 Action 5: In-situ data collection and processing by SYKE.....	6
1.1.6 Action 6: Methodology development and implementation by FMI.....	6
1.1.7 Action 7: Methodology development and implementation by SYKE	7
1.1.8 Action 8: Demonstration and validation by FMI	8
1.1.9 Action 9: Demonstration and validation of EO services.....	8
1.1.10 Action 10: Generation of carbon assessment end-products	8
1.1.11 Action 11: Evaluation of required Northern-Eurasian land cover information .	8
1.1.12 Action 12: Dissemination.....	9
1.1.13 Action 13: Auditing.....	9
1.1.14 Action 14: Project advisory co-operation.....	9
1.1.15 Action 15: After Life+ Communication plan.....	11
1.2 Availability of appropriate licences and authorisations	11
1.3 Envisaged progress until next report.....	11

List of abbreviations

AMSR-E	Advanced Microwave Scanning Radiometer – Earth Observing System
ASCAT	Advanced Scatterometer
ASD	Analytical Spectral Device
AVHRR	Advanced Very High Resolution Radiometer
CEA-LSCE	Commissariat à l'énergie atomique – Laboratoire des Sciences du Climat et de l'Environnement
CO ₂	Carbon dioxide
CORINE	Coordination of information on the environment
EC	European Commission
ECMWF	European Centre for Medium-Range Weather Forecasts
ENVISAT	Environmental Satellite
EO	Earth Observation
ESA	European Space Agency
EU	European Union
FMI	Finnish Meteorological Institute
GAW	Global Atmospheric Watch
GMES	Global Monitoring of Environment and Security
GSE	GMES Services Element
JSBACH	Jena Scheme for Biosphere-Atmosphere Coupling in Hamburg
MERIS	Medium Range Imaging Spectroradiometer (onboard ENVISAT satellite, ESA)
mmu	minimum mapping unit
MODIS	Moderate Resolution Imaging Spectroradiometer (onboard Terra and Aqua Satellites, NASA)
NDVI	Normalized Difference Vegetation Index
QuikSCAT	Quick Scatterometer
SCA	Snow Covered Area
SMMR	Scanning Multichannel Microwave Radiometer
SSM/I	Special Sensor Microwave Imager
SWE	Snow Water Equivalent
SYKE	Suomen ympäristökeskus (Finnish Environmental Institute)

1 Progress

1.1 Actions

1.1.1 Action 1: Project management and monitoring

Following activities can be listed as main progresses of action1:

- Management board meetings
- Steering group meetings
- Project meetings
- Quarterly meetings
- 1st Monitoring report of steering group
- 2nd Monitoring report of steering group
- First –year progress report
- Summary of project activities 1.1.2009-12.31.2009-External Review
- Update: Envisaged activities for SnowCarbo Actions for 1.1.2009-31.12.2011
- Update: SnowCarbo web-pages
- Dissemination

1.1.2 Action 2: Satellite data processing by FMI

Status during 1st steering group meeting in November, 2009:

Gridded Weekly SWE (mm)

- Main program codes completed
- Experimental datasets produced
- Final parameterization and verification underway
- Production of 30-year dataset once verification is complete
- Validation publication in progress

Snow clearance

- Methodology and program codes completed
- 30 year dataset completed
- Publication on methodology in TGRS, Sept. 2009

Snow melt onset from same data (date, spring)

- Methodology completed
- Modification of program codes underway

Soil freezing (date, autumn)

- Choice of methodology under investigation
- Physical model inversion using Pulliainen et al 1998
- Thresholding algorithm (from time series observations)
- Use of existing products
- Data acquisition and processing codes completed for QuikScat
- Use of ASCAT (C-band) data for model inversion follows

Performed tasks since 1st steering group meeting:

Gridded Weekly SWE (mm)

The final parametrization and validation of program codes for the SWE product has been completed, after extensive debugging. A first run of the 30 year SWE dataset is underway. Verification and validation using the complete dataset will follow. Once completed, the full dataset will be made available through the project web pages.

Soil freezing

A timeseries –based investigation of backscatter changes due to freezing events has been completed for Finland using QuikScat data. An analysis of several years was conducted in locations where in situ data on soil freezing is available. The analysis shows that a clear freeze event is detectable in the backscatter as a drop in the σ_0 value after a stable unfrozen period in summer, and before a rise in backscatter due to snow cover. However, the following conditions should be met: (1) the snow cover during freezing is dry and/or very shallow, (2) vegetation cover is sparse. Condition (1) implies the method may fail occasionally if wet snow conditions mask the freezing event. Condition (2) results from vegetation masking the relatively weak response of freezing soil; a method to compensate for vegetation cover will be studied in the next phase, but it is probable a timeseries investigation will be unable to detect soil freezing for areas with dense forestation.

1.1.3 Action 3: Acquisition and extension of GMES-services GSE Polar View and GSE Land

Status during 1st steering group meeting in November, 2009:

MODIS data collection and pre-processing of years 2001 – 2008 was ready, as well as the majority of the products. AVHRR-data was transferred from the off-line archives to on-line storage and first yearly datasets were being processed.

Performed tasks since 1st steering group meeting:

Datasets for years 2001-2008 were completed and "1st EO-data document (years 2001-2008)" was prepared and delivered on schedule. MODIS and AVHRR data from year 2009 is collected to internal archives but has not yet been processed.

1.1.4 Action 4: In-situ data collection and processing by FMI

The tasks of Action 4 have progressed as planned. The initial and boundary data field sources for the models have been selected and the 1st data document has been completed during the reporting period 1 November 2009 – 1 April 2010. The measurements of the validation data has continued at the flux and concentration measurement stations of Finnish Meteorological Institute. The longest flux data sites have been running over 10 years and there have been

slight changes in the flux calculation programs. The data from these sites, Sodankylä and Kaamanen, will be recalculated according to the latest procedures in order to ensure homogeneous datasets. This recalculation is ongoing at present and will be finalized during the first half of 2010. The processing of the data into a form appropriate for model evaluation will be conducted during the latter half of 2010. No major problems are foreseen in these tasks.

1.1.5 Action 5: In-situ data collection and processing by SYKE

Status during 1st steering group meeting in November, 2009:

Phenological dataset was purchased and first data-analysis was conducted. Spring and autumn field campaigns in 2009 were performed and the data included in the existing datasets.

Performed tasks since 1st steering group meeting:

The 1st In-situ data document was completed by 30/11/2009, where the in-situ data sources used in the SNOWCARBO- project are described and the field campaigns of 2009 reported. Statistics on the spectral dataset of snow cover were calculated and deficiencies in the data determined, based on the analysis the measurement targets were defined. Preparation for the next field campaign was started. An in-situ campaign was performed in Sodankylä between 12/03-23/03/2010. The measurements included the reflected spectrum of sunlight under clear sky and characterization of snow conditions during the measurements. The data from the field campaign is currently being checked, processed and included in the existing datasets.

1.1.6 Action 6: Methodology development and implementation by FMI

Status during 1st steering group meeting in November, 2009:

The regional model – REMO - and the land-use scheme of a earth system model ECHAM5 – JSBACH – of MPI Hamburg were running on FMI facilities. Additionally, REMO2008 in climate and tracer transport versions run in CSC supercomputer. Pre-processing steps for REMO2008 that include fixing the domain and creating the surface libraries according to the standard land use maps were taken.

Performed tasks since 1st steering group meeting:

Degree of coupling between the climate model REMO and the land surface model JSBACH was decided. The approach of intended offline coupling (i.e. one-way coupling) requires 1) as the first step a REMO2008 run to determine fine scale regional climatic variables such as air temperature, surface pressure, radiation and precipitation; 2) as the second step the JSBACH model is forced with the climatic variables to produce the land vegetation CO₂ exchange rate; and finally 3) the exchange rate together with mapped data for anthropogenic and ocean CO₂ sources the REMO2008 is driven in a version distributing the tracers to the atmosphere inside the model domain. Furthermore, since last meeting the required boundary data pre-processing codes in order to create boundary fields for regional domain are collected, their use learned and the required steps are taken for a trial set of data for year 2002. The REMO2008 tracer model is subsequently run with the relevant boundaries and its performance assured. JSBACH model domain was also restricted to that of REMO and it calculates the CO₂ balance for relevant land points. However, the JSBACH derived fluxes are not yet processed into the form appropriate for subsequent tracer-REMO2008 runs, neither were the meteorological drivers derived from REMO2008 climate data.

Consequently the following working steps include 1) modifying the JSBACH output into form suitable for subsequent REMO-tracer runs 2) running the first trials with coupled

REMO-JSBACH with the existing JSBACH standalone model 3) modifying the JSBACH output into more frequent output timestep from the daily standard 4) writing the 1st Progress report on methodology 5) initializing the sequence of REMO-JSBACH model runs including the required data flows between the models 6) performing the first trials by using the land cover data (from the Action 11) finally 7) utilizing the data from the Actions 3, 4, 5 and 11 will be reviewed according to the status of the models and the results of the initial runs.

Possible obstacles include inability to modify the time step in which case the daily time step will be chosen. On the other hand, a breakthrough in the work done in MPI Hamburg on two-way coupling of the two models may bypass the work steps related to time steps and sequence of one-way coupled runs.

1.1.7 Action 7: Methodology development and implementation by SYKE

Status during 1st steering group meeting in November, 2009:

Unfiltered time-series of SCA and NDVI, in a gridded form, were processed for the years 2001-2007 from MODIS satellite data.

Performed tasks since 1st steering group meeting:

Unfiltered time-series of SCA and NDVI from MODIS satellite data were completed for the year 2008. The deliverable was finalised according to project plan by 30/11/2009.

Multiple NDVI and SCA products per day were combined to one daily estimate after the masking of clouds. In addition, weekly NDVI composites were produced using the maximum composite technique.

Further filtering and gap-filling of NDVI and SCA time series is in progress. In order to facilitate the generation of time-series for homogenous sites of selected land cover types (deciduous forest, coniferous forest, open bogs and agricultural areas), the fraction of each land cover class within a MODIS pixel was calculated from CORINE Land Cover 2000 for Finland.

The software TIMESAT version 2.3 (Jönsson & Eklund 2004), developed for seasonality extraction and noise removal by function fitting, was used for filtering of NDVI time-series from homogenous sites near CO₂ flux measurement stations and for a small spatial subset of the data around the phenological station in Kevo. Function fitting methods, such as Gaussian function and logistic function fitting, which are implemented in TIMESAT, were recognized as suitable for noise removal in vegetation index time series, especially for boreal ecosystems (Jönsson & Eklund 2002, Beck et al. 2006).

However, the use of TIMESAT for our current NDVI time-series requires some additional pre-processing, e.g. the software requires equal time steps for processing and longer gaps due to clouds need to be pre-filled. Further works concentrate on the handling of snow cover information and the definition of threshold values for the extraction of start and end of growing season.

Scientific cooperation on time series analysis has been established between the SNOWCARBO project and Lars Eklund from Lund University (Department of Physical Geography and Ecosystems Analysis)..

1.1.8 Action 8: Demonstration and validation by FMI

This action was officially started on 1st of January 2010. However, since this action is dependent on methodology developed in Action 6, no actual validation work is possible until the carbon balance model from Action 6 is available.

Performed tasks since 1st steering group meeting:

Detailed planning of system functionality validation at Sodankylä-Pallas site has been started. The CO₂ flux data and CO₂ concentration data are available for functionality validation. CO₂ concentration data measured at the Pallas GAW site is combined with trajectory information up to year 2008. All the flux and concentration data is processed and checked for quality according to standards developed in the international measurement networks sites.

1.1.9 Action 9: Demonstration and validation of EO services

Status during 1st steering group meeting in November, 2009:

During the first year of the project the project data exchange method was to be implemented together with FMI. An FTP- server was opened for exchange of selected datasets and external hard drives purchased for archiving the large satellite imagery datasets. The external hard drives could also be transported if an unlikely need of the full pre-processed dataset would arise.

Performed tasks since 1st steering group meeting:

The Document on data exchange method was completed by 30/11/2009, where the exchange methods for different datasets are presented and metadata related to the satellite data introduced. The Action depends on the modeling results as well as the results from Actions 7 and 11, where time-series of the satellite driven environmental variables and land cover datasets are produced. The demonstration will start with straight forward comparison (correlation) of time-series from in-situ measurements, satellite driven data and modeling results. Tools are being prepared for comparisons to be used with modeling data as soon as it becomes available.

1.1.10 Action 10: Generation of carbon assessment end-products

Activities will be started in 2012.

1.1.11 Action 11: Evaluation of required Northern-Eurasian land cover information

Status during 1st steering group meeting in November, 2009:

The information needs of land cover data was evaluated with modelling group at FMI. Already available land cover data sets were demonstrated. The results of this are reported and the first deliverable: "Land Cover Data Needs for Carbon Balance Mapping" was available late August 2009.

Performed tasks since 1st steering group meeting:

Detailed land cover information covering intensive in-situ monitoring areas using satellite data (IRS P6 LISSIII, SPOT 4 XS, LANDSAT 5 TM) together with ancillary GIS and in-situ data is produced. This includes

- CORINE land covers compatible data covering Finland (national lc)

- Tailored land covers data sets covering Sodankylä and its surroundings (Local lc)
- Regional land cover information for the whole of modelling area is under production.

Challenges:

- Revision of land covers data in eastern and south-eastern part of working window (Russia etc.)
- Assignment of surface parameters for revised land covers data

1.1.12 Action 12: Dissemination

Dissemination in the framework of SnowCarbo primarily means the distribution of the end products from Action 10. This will start during the last year of the project in 2012.

Status during 1st steering group meeting in November, 2009:

- SPIE Europe Remote Sensing Conference. 31 August - 3 September 2009, Berlin, Germany. Törmä, M., Aalto, T., Hatunen S., Härmä P., Markkanen T. and Pullainen, J. Spatial Data Requirements of Carbon Balance Modelling. (conference paper)
- Takala, M., Pulliainen, J., Metsämäki, S., and Koskinen, J. (2009). Detection of Snowmelt Using Spaceborne Microwave Radiometer Data in Eurasia From 1979 to 2007. IEEE Trans. Geosci. and Remote Sensing, 47:2996-3007.
- METIER - Final Conference. 4-6 November 2009, Brussels, Belgium. Mattila, O-P and Böttcher K. SNOWCARBO - Monitoring and Assessment of Carbon Balance related Phenomena in Fin-land and Northern Eurasia. poster presentation)

Since 1st steering group meeting:

- SnowCarbo presentation at the life + climate change seminar which was held on the 18-19 January, 2010 in Helsinki
- Kari Luojus, Jouni Pulliainen, Chris Derksen, Helmut Rott, Thomas Nagler, Rune Solberg, Andreas Wiesmann, Sari Metsämäki, Eirik Malnes and Bojan Bojkov, "Investigating the feasibility of the globsnow snow water equivalent data for climate research purposes" IGARSS 2010, July 25-30, 2010, Hawaii-USA (accepted).
- Törmä, Härmä, Markkanen, Hatunen, Arslan: "Revising the land cover and use classification of northern areas for climate modeling", SPIE European Remote Sensing Symposium, September 2010 Toulouse (submitted)
- The SnowCarbo web pages have been updated.
- Project poster describing SnowCarbo project, background and objectives.
- Online Newsletter no.1

1.1.13 Action 13: Auditing

This action is only performed at the end of the project.

1.1.14 Action 14: Project advisory co-operation

Within the Action 14 of the project, a post-doctoral researcher (Martin Ménégot) has been recruited since November, 2009. The main goal of its work consists in evaluating the direct

and indirect (via soil carbon fluxes) effects of black carbon deposition on Arctic snow during the 20th and 21st centuries. He is currently working simultaneously on two axes: the first one concerns the representation of the effect of black-carbon deposition on the snow cover in a General Circulation Model (GCM), and the second one concerns the evaluation of black-carbon budget in the Arctic atmosphere.

The land surface model ORCHIDEE (Krinner et al., 2005), component of the coupled climate-aerosol-chemistry model LMDZ-INCA, is used here to achieve the objectives of the first axis. The parameterization of Krinner et al. (2006), describing the mineral dust impact on snow-cover over Northern Asia is currently adapted to assess the impact of black-carbon aerosol on snow albedo and therefore on snow depth, snow-cover extent and snow-cover duration. This parameterization is based on the work of Wiscombe and Warren (1980) for pure snow and Warren and Wiscombe (1980) for snow containing aerosols. Concerning this first axis, validation of ORCHIDEE snow representation is planned, comparing simulations with both local in-situ data (snow albedo, snow depth, snow grain size, snow temperature, Action 5 of the project) and regional satellite data (snow cover extent and snow depth, Action 2 of the project). These comparisons will be performed within cooperation between LSCE-LGGE, FMI and SYKE scientists, opening the opportunity to discuss and interpret some of the data which are recorded within the SNOWCARBO project. In this context, Gerhard Krinner and Martin Menegoz (LGGE, Grenoble, France) went to the FMI (Helsinki, Finland) to take note of the data which has been or will be recorded during the SNOWCARBO campaigns.

Concerning the second axis, an evaluation of the actual black-carbon sinks and sources in the Arctic atmosphere has been made, and has been presented during the last project meeting (March, 10th, 2010). This work is based on simulations performed with the chemical-transport global model simulations MOCAGE (Météo-France, see Ménégoz et al., 2009). It has been shown that except during the winter, the black-carbon atmospheric concentration is high in the Arctic region: During the summer, local biomass burning emission – especially concentrated in Northern Eurasia – strongly affects the Arctic black-carbon budget. During the spring and the fall, this is the transport of aerosols from the polluted Northern hemisphere area which represents the main source of black-carbon in the Arctic region. Due to its relative high latitude, Europe is the main polluted region which affects the Arctic atmosphere, followed by East-Asian polluted areas. The Northern-American emissions do not affect much the Arctic atmosphere. Concerning the estimation of the future black-carbon budget of the Arctic atmosphere, we plan to use the LMDZ-INCA simulations which will be performed in the context of the next IPCC exercise. These simulations will take into account the evolutions of black-carbon emissions during the next century.

References:

- Krinner, G. N. Viovy, N. de Noblet-Ducoudré, J. Ogé, J. Polcher, P. Friedlingstein, P. Ciais, S. Sitch, and I. C. Prentice, 2005: A dynamic global vegetation model for studies of the coupled atmosphere-biosphere system. *Glob. Biogeochem. Cyc.*, 19, GB1015.
- KRINNER, G., O. BOUCHER, AND Y. BALKANSKI, 2006: ICE-FREE GLACIAL NORTHERN ASIA DUE TO DUST DEPOSITION ON SNOW. *CLIM. DYN.*, 27, 613-625.
- Ménégoz, M., D. Salas y Melia, M. Legrand, H. Teyssède, M. Michou, V-H. Peuch, M. Martet, B. Josse, and I. Dombrowski-Etchevers, 2009: Equilibrium of sinks and sources of sulphate over Europe: comparison between a six-year simulation and EMEP observations, *Atmos. Chem. Phys.*, 9, 4505-4519.

Wiscombe, W.J. and Warren, S.G., 1980: A Model for the Spectral Albedo of Snow. I: Pure Snow, Jour. of the Atmosph. Sci., Vol 37, 2711-2733.

Warren, S.G. and Wiscombe, W.J. , 1980: A Model for the Spectral Albedo of Snow. I: Snow Containing Atmospheric Aerosols, Jour. of the Atmosph. Sci., Vol 37, 2734-2745.

1.1.15 Action 15: After Life+ Communication plan

The detailed plan for communications and actions after the end of the Life+ project will be made during the last project year in 2012.

1.2 Availability of appropriate licences and authorisations

All necessary software licences and authorisations to use observation data and models are available for the project team.

1.3 Envisaged progress until next report

This section provides an overview of the SnowCarbo project progress. Table 1 provides a detailed list of the envisaged activities for SnowCarbo Actions for 1.1.2009-31.12.2011

Table 1. SnowCarbo activity list.

Envisaged activities for SnowCarbo Actions for 1.1.2009-31.12.2011		
(Deliverable items marked with red text color)		
Action 1: Project management and monitoring		
Activity	Due date	Completion (%)
• 1st Project brochure	30/03/2009	100%
• Inception report	30/06/2009	100%
• Answers to EC comments on Inception Report	15/09/2009	100%
• Project meeting	18/09/2009	100%
• 1 st Management Board meeting	14/10/2009	100%
• Project meeting	28/10/2009	100%
• 1 st Steering Group meeting	13/11/2009	100%
• 1 st Monitoring Report of Steering group	27/11/2009	100%
• Project meeting	27/11/2009	100%
• Quarterly meeting	18/12/2009	100%
• First-year progress report	31/12/2009	100%
• Project meeting	25/01/2010	100%

• Project meeting	10/03/2010	100%
• 2 nd Management Board meeting	10/03/2010	100%
• Quarterly meeting	08/04/2010	100%
• 2 nd Steering Group meeting	22/04/2010	0%
• 2 nd Monitoring Report of Steering group	29/04/2010	0%
• Project meeting	30/04/2010	0%
• Quarterly meeting	30/06/2010	0%
• 18 month progress report	30/06/2010	0%
• 3 rd Management Board meeting	15/09/2010	0%
• Quarterly meeting	30/09/2010	0%
• 3 rd Steering Group meeting	15/10/2010	0%
• 3 rd Monitoring Report of Steering group	29/10/2010	0%
• Project meeting	31/10/2010	0%
• Quarterly meeting	31/12/2010	0%
• Second year progress report	31/12/2010	0%
• Carbon footprint report (first contributions)	31/12/2010	0%
• Midterm end-user/stakeholder consultation workshop	15/01/2011	0%
• Report on end-user/stakeholder consultation workshop	31/01/2011	0%
• 4 th Management Board Meeting	15/03/2011	0%
• 4 th Steering Group meeting	15/04/2011	0%
• 4 th Monitoring Report of Steering group	28/04/2011	0%
• 5 th Management Board Meeting	15/09/2011	0%
• 5 th Steering Group meeting	15/10/2011	0%
• 5 th Monitoring Report of Steering group	28/10/2011	0%
• 36 month progress report	30/06/2011	0%
• Third year progress report	31/12/2011	0%
Action 2: Satellite data processing by FMI		

Activity	Due date	Completion (%)
<ul style="list-style-type: none"> Contribution to the 1st EO- data document (years 2001-2008) 	30/11/2009	100%
<ul style="list-style-type: none"> The SWE product (see 5.1.2) will be available for all test sites and covering 30 years, 	31/12/2010	30%
<ul style="list-style-type: none"> The SWE product will be validated (in scientific publication), 	31/03/2010	100%
<ul style="list-style-type: none"> The onset of snow melt and snow clearance product will be available for all test sites covering 30 years, 	30/09/2009, 30/09/2010	50%
<ul style="list-style-type: none"> The snow melt / clearance product will be validated in scientific publications, 	30/09/2010	100%
<ul style="list-style-type: none"> Contribution to the 2nd EO- data document (years 2009-2010) 	30/11/2010	0%
<ul style="list-style-type: none"> The soil freezing product will be available for all test sites covering 10 years. 	31/12/2010	20%
<ul style="list-style-type: none"> All (2001-2010) EO data processed, seasonal features extracted and data delivered 	31/09/2011	0%
Action 3: Acquisition and extension of GMES-services GSE Polar View and GSE Land		
Activity	Due date	Completion (%)
<ul style="list-style-type: none"> MODIS dataset for 2001-2008 will be completed. <ul style="list-style-type: none"> Data retrieval through ftp (7/8) TOA coverages (5/8) Products (NDVI, SCA) (0/8) 	30/11/2009	100%
<ul style="list-style-type: none"> AVHRR dataset for 2001-2008 will be completed <ul style="list-style-type: none"> Data retrieval through ftp Night time brightness temperatures 	30/11/2009	100%
<ul style="list-style-type: none"> 1st EO- data document (years 2001-2008) 	30/11/2009	100%
<ul style="list-style-type: none"> MODIS dataset for 2009-2010 will be completed <ul style="list-style-type: none"> Data assembled from operative archive TOA coverages Products (NDVI, SCA) 	30/11/2010	30%
<ul style="list-style-type: none"> AVHRR dataset for 2009-2010 will be completed <ul style="list-style-type: none"> Data retrieval through ftp Night time brightness temperatures 	30/11/2010	0%
<ul style="list-style-type: none"> 2nd EO- data document (years 2009-2010) 	30/11/2010	0%
<ul style="list-style-type: none"> All (2001-2010) EO data processed 	31/09/2011	80%
Action 4: In situ data collection and processing by FMI		

Activity	Due date	Completion (%)
1. The initial and boundary data field sources for the models are selected.	28/02/2010	100 %
2. 1 st Data document is completed.	31/12/2009	100%
3. 2nd Data document (year 2010)	31/12/2010	0%
4. 3 rd Data document (year 2011)	30/11/2011	0%
Action 5: In-situ data collection and processing by SYKE		
Activity	Due date	Completion (%)
• Field measurement campaign in spring 2009	31/05/2009	100%
• Field measurement campaign in autumn 2009	31/10/2009	100%
• 1 st in-situ data document (Field activities 2009 and data from 2001-2009)	30/11/2009	100%
• Field measurement campaign in spring 2010	31/05/2010	100%
• Field measurement campaign in autumn 2010	31/10/2010	0%
• 2 nd in-situ data document (Field activities and data from 2010)	30/11/2010	0%
5. 3 rd Data document (year 2011)	30/11/2011	0%
Action 6: Methodology development and implementation by FMI		
Activity	Due date	Completion (%)
• REMO2008 model taking into account the tracer transport, will be running reliably on at least one of the computational facilities available for FMI personnel.	31/12/2009	100%
• The set of variables which are necessary to transfer in between REMO and JSBACH models will be decided and derived.	28/02/2010	100%
• First trials on running the coupled REMO-.JSBACH model will be made.	31/05/2010	0%
• 1 st Progress report on methodology	31/05/2010	0%
• The sequence of REMO-JSBACH model runs including the required data flows between the models will be initialized.	31/07/2010	0%
• First trials by using the land cover data (from the action 11) will be made	31/10/2010	0%

<ul style="list-style-type: none"> Data utilization from the Actions 3, 4, 5 and 11 will be reviewed according to the status of the models and the results of the initial runs. 	31/12/2010	0%
<ul style="list-style-type: none"> All (2001-2010) EO data processed, seasonal features extracted and data delivered 	31/09/2011	0%
<ul style="list-style-type: none"> 2nd Progress report on methodology 	31/08/2011	0%
Action 7: Methodology development and implementation by SYKE		
Activity	Due date	Completion (%)
<ul style="list-style-type: none"> The unfiltered time-series, in the gridded form, of snow covered area (SCA) and normalized difference vegetation index (NDVI), years 2001-2008 	30/11/2009	100%
<ul style="list-style-type: none"> Filtered time-series with preliminary techniques and progress report on filtered time-series (years 2001-2008) 	31/05/2010	50%
<ul style="list-style-type: none"> Features extracted (years 2001-2008) 	31/08/2010	20%
<ul style="list-style-type: none"> Progress report on extracted features (2001-2008) 	31/08/2010	0%
<ul style="list-style-type: none"> Filtered time-series with sophisticated techniques and progress report on filtered time-series (years 2001-2008) 	30/11/2010	0%
<ul style="list-style-type: none"> Time series of years 2009-2010 	31/03/2011	0%
<ul style="list-style-type: none"> Features extracted (years 2001-2010), final phase progress report 	31/09/2011	0%
<ul style="list-style-type: none"> Time series for 2001 -2010 processed, seasonal features extracted and data delivered 	31/09/2011	0%
Action 8: Demonstration and validation by FMI		
Activity	Due date	Completion (%)
<ul style="list-style-type: none"> System functionality validation at Sodankylä-Pallas CAL-VAL site 	01/09/2010	10%
<ul style="list-style-type: none"> System validation over Finland with different resolutions on selected test years 	01/09/2010	10%
<ul style="list-style-type: none"> System validation over Baltic test area for selected years 	01/09/2010	10%
<ul style="list-style-type: none"> Selection of system setup and parametrization from validation results 	01/10/2010	0%
<ul style="list-style-type: none"> Estimation of carbon balance for Baltic EU area with selected setup 	30/11/2010	0%

• Production of preliminary demonstration report	30/11/2010	0%
• Preliminary demonstration report by FMI	31/12/2010	0%
• Demonstration report	31/12/2011	0%
Action 9: Demonstration and validation of EO services		
Activity	Due date	Completion (%)
• Implementation of the data exchange method completed	30/11/2009	100%
• Documentation of the data exchange method produced.	30/11/2009	100%
• Preliminary demonstration report	30/11/2010	0%
• Demonstration report	31/12/2011	0%
Action 10: Generation of carbon assessment end-products		
• No activity until 2012		
Action 11: Evaluation of required Northern-Eurasian land cover information		
Activity	Due date	Completion (%)
• Analysis on land cover data needs for carbon balance mapping	31/08/2009	100%
• Report on land cover data needs	31/08/2009	100%
• Production of land cover dataset	01/06/2010	50%
• Report on data production and accuracy	31/10/2010	0%
• Report on suitability of global land cover datasets for carbon balance modeling quarter of 2010	31/10/2010	0%
• Evaluation of continental and regional land cover data completed	30/06/2011	0%
Action 12: Dissemination		
Activity	Due date	Completion (%)
• Project website	01/01/2009	100%
• 1 st project brochure	30/03/2009	100%
• Update of the project website layout	31/12/2009	100%
• FTP server for data exchange (performed in Action 9)	30/11/2009	100%

<ul style="list-style-type: none"> • Presentations in relevant scientific conferences and seminars. <ul style="list-style-type: none"> ◦ <i>SPIE Europe Remote Sensing 2009</i>: 31 August - 3 September 2009 Berliner Congress Centre, Berlin, Germany (poster, presentation) 	31/08/2009	100%
<ul style="list-style-type: none"> • Project poster describing SnowCarbo project, background and objectives. 	31/12/2009	100%
<ul style="list-style-type: none"> • Preparation of an online newsletter presenting first project results. 	16/04/2010	100%
<ul style="list-style-type: none"> • Preparation of the 2nd online newsletter presenting first project results. 	31/12/2010	0%
<ul style="list-style-type: none"> • 1st project brochure (updated) 	30/06/2011	0%
<ul style="list-style-type: none"> • Layman's article in Finnish in Helsingin Sanomat (one of the main Finnish newspapers with a weekly Science section). 	31/12/2011	10%
<ul style="list-style-type: none"> • 1st project brochure (final) 	31/12/2012	0%
Action 13: Auditing		
<ul style="list-style-type: none"> • No activity until end of 2012 		
Action 14: Project advisory co-operation		
Activity	Due date	Completion (%)
<ul style="list-style-type: none"> • Participation to the 1st Management Board meeting 	14/10/2009	Not possible
<ul style="list-style-type: none"> • Telecon to the Project meeting 	28/10/2009	Not possible
<ul style="list-style-type: none"> • Contribution to the 1st Monitoring Report of Steering group 	31/10/2009	100%
<ul style="list-style-type: none"> • Inputs for the 1st Steering Group meeting 	31/10/2009	100%
<ul style="list-style-type: none"> • Climate Scientist will be hired by December 2009. 	01/12/2009	100%
<ul style="list-style-type: none"> • Telecon to the Quarterly meeting 	18/12/2009	100%
<ul style="list-style-type: none"> • Contribution to the First-year progress report 	31/12/2009	100%
<ul style="list-style-type: none"> • Participation to the 2nd Management Board meeting 	10/03/2010	100%
<ul style="list-style-type: none"> • Telecon to the Quarterly meeting 	08/04/2010	100%
<ul style="list-style-type: none"> • Inputs for the 2nd Steering Group meeting 	15/04/2010	100%

• Telecon to the Project meeting	30/04/2010	0%
• Telecon to the Quarterly meeting	30/06/2010	0%
• Contribution to the 18 month progress report	30/06/2010	0%
• Contribution to the 3 rd Monitoring Report of Steering group	15/08/2010	0%
• Participation to the 3 rd Management Board meeting	15/09/2010	0%
• Telecon to the Quarterly meeting	30/09/2010	0%
• Inputs for the 3 rd Steering Group meeting	15/10/2010	0%
• Telecon to the Project meeting	31/10/2010	0%
• Telecon to the Quarterly meeting	31/12/2010	0%
• Contribution to the Second year progress report	31/12/2010	0%
• Contribution to the Carbon footprint report (first contributions)	31/12/2010	0%
• Adaptation and use of the Orchidee land surface model to support the objectives of the SnowCarbo project	31/12/2010	30%
• Advice, comments and inputs for the activities in Action 2	31/12/2010	25%
• Advice, comments and inputs for the activities in Action 3	31/12/2010	25%