LIFE Project Number

LIFE07 ENV/FIN/000133

1st Monitoring Progress Report

Covering the project activities from 01/01/2009 to 30/09/2009

Reporting Date

27/11/2009

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

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Table of contents

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
CO2	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 Executive summary

1.1 General progress

SnowCarbo project was started on the 1st January 2009. The official kick-off meeting of the project was held at FMI (Finnish Meteorological Institute) on 15 January 2009. The project will run for 48 months ending at the end of December 2012.

The general progress in the project has been very good. The partnership agreements have been signed with all the associated beneficiaries in June 2009. All activities within the Actions have been started on time and the progress is inline with the planned project schedule.

1.2 Assessment as to whether the project objectives and work plan are still viable

The project objectives and the work plan were assessed carefully by the project team during the first weeks of the project. All project objectives were found fully viable. The work plan in the project proposal was also found viable. However, more detailed planning of the activities within the Actions was found necessary. This planning has been carried out by the Action managers and more detailed plans for progress until the next progress report has been outlined in Section 2.3. All Action teams have also prepared lists of intermediate objectives for the full duration of the project for the use of the Action managers and the project management. The close cooperation of Principal Investigator and the Project Manager at FMI together with the Partner coordinators at SYKE (Finnish Environment Institute) and at CEA-LSCE (Commissariat à l'énergie atomique – Laboratoire des Sciences du Climat et de l'Environnement) ensures that the activities between the project partners are fully coordinated and the collaboration runs seamlessly.

1.3 Problems encountered.

The project team has not identified serious problems impacting the project objectives, work plan or schedule.

SnowCarbo project manager has been changed due to previous project manager, Juha-Pekka Luntama, decided to take new roles at ESA as a Space Weather Manager position in the Space Situational Awareness program. Dr. Ali Nadir Arslan has been appointed as a new project manager of SnowCarbo project and the change being effective starting from the beginning of October, 2009. Dr.Arslan has long experience on project management including EC projects. He is also expert in the field of Remote Sensing of Snow. That's why SnowCarbo project schedule, objectives and cost will be not affected by this change.

2 Technical progress

2.1 Actions

2.1.1 Action 1: Project management and monitoring

The activities in Action 1 have included arrangements of the official project meetings, coordination and monitoring of the project progress, preparation of the project deliverables according to the project plan, and monitoring of the project expenses.

The Management Board and the Steering Group meetings have been very successful with good discussions and exchange of opinions between the project managers and the representatives of the stakeholders. Project team meetings and working meetings between project team members have been used to ensure coordination of the project work and clarify any issues related for example to the deliverables between project Actions. At this very early stage of the project, the progress has been measured by discussions between the Principal Investigator, Project Manager, Partner Coordinators and the Action Managers.

The only deliverable from Action 1 during the first six months of the project is this Inception report. Following activities can be listed as main progresses of action1:

- 8 Workgroups (from actions) are established in terms of close cooperation & communication among actions
- 1st Management Board meeting organized on 14.10.2009
- 1st Steering Group meeting scheduled on 13.11.2009
- Activity & Deliverable list updated by 28.10.2009
- SnowCarbo webpages are updated : more info in Action 12

2.1.2 Action 2: Satellite data processing by FMI

The expected outputs of the action contain four distinct satellite data products

a. Weekly Snow Water Equivalent (SWE) grids, in mm
b. Snow melt onset date grids
c. Snow clearance date grids
d. Soil freezing date grids

The grids will be produced for three test areas; Finland in 0.05 degree resolution, Baltic EU and Eurasia in 0.25 degree resolution.

Gridded Weekly SWE (mm): The main program codes for dataset production have been completed. Final parameterization of the assimilation method used (Pulliainen, 2006) is underway using experimental datasets and reference snow cover data for Finland (years 2005-2007) and Eurasia (1995-1998). Production of 30-year dataset will commence once verification is complete**.**

Snow clearance: The methodology and program codes for dataset production have been completed. Consequently, the full 30-year dataset for Eurasia has been produced. The methodology has been published by Takala et al. (2009).

Snow melt onset: Methodology investigations for the product have been completed**.** The product uses the same dataset as the Snow Clearance product, and the methodology employed is highly similar. Modification of Snow Clearance product program codes is underway and production of Snow melt onset will commence once this is completed.

Soil freezing: Methodology investigations are underway. The considered options for the soil freezing product are (1) Physical model inversion from EO scatterometer data according to e.g. Pulliainen et al (1998) (2) threshold algorithms (from time series observations) from scatterometer data and (3) use of existing soil freeze products.

The application of (1) requires C-band scatterometer data. The planned sensor is the ESA ASCAT scatterometer. Data acquisition and preprocessing has been initiated.

The application of threshold algoritms (2) may apply also higher frequency scatterometer observations. For experimental purposes, NASA QuikScat data has been acquired. QuickScat

data preprocessing tools have been created and completed. Investigation into soil freeze detection from QuikScat data is underway.

The use of existing soil freeze products will be investigated in conjunction with (1) and (2).

No significant problems affecting A2 completion have so far been encountered. The estimated completion of A2 objective is as follows:

References:

Pulliainen, J., 2006. Mapping of snow water equivalent and snow depth in boreal and sub-arctic zones by assimilating space-borne microwave radiometer data and ground-based observations. *Remote Sens. Environ.,* 101: 257-269.

Pulliainen, J., Manninen, T., and Hallikainen, M. (1998), Application of ERS-1 Wind Scatterometer data to soil frost and soil moisture monitoring in boreal forest zone. *IEEE Transactions on Geoscience and Remote Sensing*, 36:849-863.

Takala, M., Pulliainen, J., Metsämäki, S., and Koskinen, J. (2009), Detection of snow melt using spaceborne microwave radiometer data in Eurasia from 1979-2007. *IEEE Transactions on Geoscience and Remote Sensing, in press*.

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

The aim of this action is to provide a harmonized dataset for generation of intra-annual time series on snow and vegetation evolvement for years 2001 – 2010. This dataset serves as an input to Action 7 and consists of fractional snow cover (SCA, GSE Polar View product) and green vegetation status (Normalized Difference Vegetation Index NDVI, GSE Land product), complemented by thermal radiation data.

Action 3 utilizes SYKE's operational production chain to process the raw EO data. Used instruments are MODIS (Terra) and NOAA AVHRR 16. Historical data is processed off-line and for 2010 onwards, processing is done in near real time. EO data is received trough ftp, either from NASA LAADS service (off-line MODIS data) or from FMI Sodankylä receiving station (AVHRR and on-line MODIS data)

MODIS data collection and pre-processing of years 2001 – 2008 is ready, as well as the majority of the products. Some revisions to the produced dataset are currently made (summertime cloud mask algorithm etc.) AVHRR-data is currently transferred from the off-line archives to on-line storage and first yearly datasets are being processed.

No constraints can be foreseen for Action 3, data for years 2001 – 2008 will be processed until the end of November 2009 (1st report on existing datasets). Data availability trough FMI for year 2010 is almost certain and the processing system with software is ready.

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

The main objective of Action 4 (In-situ data collection and processing by FMI) is preparing two data sets: the input data and the validation data. The input data set consists of initial and boundary forcing data which is needed by the models (REMO and ECHAM5, see Action 6 for details). The initial data for weather and tracer transport simulations is given in the form of meteorological fields and as maps of surface properties. In addition to the standard meteorological fields such as air temperature, liquid water content and 3D velocity fields, the model also needs the initial atmospheric CO2 concentration fields, fire information, anthropogenic sources and sea ecosystem CO2 balance. The validation data set is based on the

CO2 flux and concentrations measurements of Finnish Meteorological Institute consisting of data from several flux and concentration measurement sites. Longest running flux sites, Kaamanen wetland and Sodankylä Scots pine forest, provide data sets of about 10 years. Shorter multi-year flux data sets are available from a spruce forest and a wetland at Pallas area and several sites in southern Finland on peatlands in different agricultural and forestry use. The background concentration measurements from Pallas-Sodankylä GAW station will be used for evaluating the concentration predictions of the models. The deliverables of the action 4 for the period 1.7.2009-31.12.2010 consists of selecting the initial and boundary data field sources, preparing the data documents for input and validation data and processing the data into a form appropriate for model evaluation. The most of the input data sources have already been selected. The data document is written for the validation data and it will be prepared for the input data by the end of 2009. The processing of data for model evaluation has not started and it will be the main task in 2010.

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

In order to find the satellite driven data valid, ground based observations are used for comparison. It is also important to compare the final out come of the carbon balance modeling to the evolution of the seasonal snow cover and the development of vegetation status during the modelling period. For this purpose an extensive in-situ database is collected from existing archives and few dedicated field campaigns. The data is further processed to a relevant form of time-series and statistical numbers.

Datasets includes an extensive data archive of monthly observations of snow cover from SYKE snow course network with around 120 sites. SYKE has also a large database of spectral measurements of snow and ground to improve the interpretation of optical satellite data. The weather station network from FMI has extensive coverage and on selected sites an observation on the fractional coverage of snow (e-code) has been made during the time-span of interest in this project. Additionally an observations dataset of phenological status of selected tree and ground vegetation species has been purchased from METLA (Forest research institute of Finland). These datasets are reviewed in the 1st data document.

The spring field campaign was performed in March 2009. The spectrum of reflected sunlight was measured together with snow properties to further develop the existing spectrum library. In October the soil moisture and temperature were measured under snow free conditions and after snowfall, and observations on the vegetation characteristics were made. Phenology data from METLA was purchased and the analysis has been started.

After the preliminary analysis of the phenological dataset is it seems that the METLA dataset is currently sufficient to full fill the needs for 2009 phenological in-situ observations. Further analysis will determine the need for additional observations.

The 1st data document on the in-situ data is in progress.

No constraints are seen in the action. Weather conditions during field campaigns can cause difficulties.

2.1.6 Action 6: Methodology development and implementation by FMI

In this project the atmospheric general circulation model ECHAM5 (MPI, Hamburg) coupled with a modular land surface scheme for the ecosystem-vegetation interactions (JSBACH, Jena Scheme for Biosphere-Atmosphere Coupling in Hamburg, MPIs of Jena and Hamburg, Germany), will be used for global CO2 balance predictions that serve both as reference and as optional boundary data for the regional CO2 balance simulations. For specific aim of

determining a detailed map of carbon balance of the Northern Europe a regional model REMO2008 of MPI, Hamburg will be used. As REMO2008 is based on the DWD operational weather forecast model, it has been evaluated for its predictability of the synoptic scale meteorological phenomena in several studies. In this work we evaluate the modelled meteorological variables against data from the reference flux sites and specifically from the Pallas GAW site for predictions of CO2 concentrations. The model will be used in resolution of 0.1667 degrees for a domain covering Finland, Sweden, Norway and Denmark as whole as well as the Baltic countries: Estonia, Latvia and Lithuania; together with areas from most Northern Germany and Western parts of Russia. The simulations will cover the target years of the project 2001-2011.

As technical progress, both climate models are currently running at computing facilities available for FMI personnel. ECHAM5 coupled with JSBACH has been used in FMI since several years and is running on both FMI's computing facilities as well as on those of CSC (IT centre of Science). In addition to the ECHAM5 coupled version, JSBACH is running as a stand alone version in FMI. As a description of terrestrial CO2 balance is missing from the basic REMO framework JSBACH will be coupled with REMO. REMO model was implemented on FMI's system in the beginning of the year 2009 and consequently on CSC's environment in an updated version REMO2008 in April 2009. The version that takes tracer transport into account was installed and debugged on CSC system since August 2009 and was found to run reliably in October 2009. Pre-processing steps that include fixing the domain and creating the surface libraries according to the standard land use maps were taken.

Following working steps on regional modelling will include 1) deciding and defining the variables that will be transferred between REMO2008 and JSBACH, which depends on the degree of coupling among the two models 2) running the first trials with coupled REMO-JSBACH 3) writing the 1st Progress report on methodology 4) initializing the sequence of REMO-JSBACH model runs including the required data flows between the models 5) performing the first trials by using the land cover data (from the Action 11) finally 6) 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.

Regarding the general circulation model ECHAM the next tasks will be 1) to add anthropogenic and ocean sources of CO2 to model boundary data 2) to apply the surface maps modified according to actual classification within the SNOWCARBO target area 3) to determine the sequence of re-starts appropriate for the observed surface conditions.

2.1.7 Action 7: Methodology development and implementation by SYKE

Action 7 provides time series on Snow Covered Area (SCA) during snow melting period and vegetation status as described by a vegetation index. Both, SCA and vegetation index (Normalized Difference Vegetation Index, NDVI) are derived from MODIS satellite data.

The retrieval of information on snow cover and vegetation status using satellite data in the optical domain is impeded by cloud cover leading to gaps in the time series. In addition, sub-pixel cloud contamination, varying atmospheric conditions and bidirectional effects cause noise in the temporal profile. Therefore, action 7 develops and applies filtering and interpolation techniques to minimize these effects.

Furthermore, carbon balance related features will be extracted from filtered and interpolated time series of vegetation indices. These features include i) the beginning of the growing season; ii) seasonal vegetation peak; and iii) the end of seasonal vegetation growth.

Phenological observations, provided by action 5, will be used as reference for estimates from satellite data.

Action 7 is well on schedule regarding deliverables as described in the project plan.

Unfiltered time-series of SCA and NDVI were processed for the years 2001-2007 from MODIS satellite data. Processing for year 2008 will be finalized by end of November according to plan (1st Deliverable 30/11/2009). Work on filtering techniques has started for NDVI time series. Specifically, a literature review has been prepared on the noise reduction techniques for NDVI time series and first filtering tests were conducted in selected test sites near phenological stations and C02 flux measurement sites in Finland.

2.1.8 Action 8: Demonstration and validation by FMI

Activities will be started in 2010.

2.1.9 Action 9: Demonstration and validation of EO services

The climate indicators derived from satellite driven snow and phenology data (created and reported in Action 7) are evaluated, demonstrated and reported. The usage of land cover information (created and reported in Action 11) in carbon balance modeling is evaluated, demonstrated and reported. Most detailed studies will be done in the surroundings of the Sodankylä/Pallas test sites. An FTP – server is arranged for data exchange.

An ftp- service has been opened for the project personnel to be used to exchange latest results and small data files. The basic SYKE dataset, i.e. the satellite image database as a whole, is accessible to the project personnel via external hard drives. More elaborated products, e.g. time-series and related features, are delivered through ftp- server.

The discussions of the contents of the land cover information to be used for carbon balance models are ongoing and new land cover data will be provided accordingly (Action 11). The validation of time-series and land cover data will get active once Actions 5 and 7 progresses further. The document on data exchange methods and implementation is being prepared.

No constraints are seen in the action.

2.1.10 Action 10: Generation of carbon assessment end-products

Activities will be started in 2012.

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

The aim is to study thematic content and spatial accuracy needed for carbon balance modeling and define significant land cover variables in Nordic areas. The work includes both thematic land cover map products and seasonal vegetation parameters (land surface parameters). This is studied within Finnish test areas. Local land cover information is compared with international (Corine Land Cover) and global land cover products (e.g. GlobCover) in order to determine their correspondence and suitability for carbon balance modeling.

Expected results:

- Evaluation of land cover information needs for spatial carbon balance mapping and monitoring.
- Evaluation of the suitability of global land cover products for spatial carbon balance mapping and monitoring.

- Extrapolation of pointwise field information of carbon balance for large areas like Boreal and Subarctic zones of Finland.
- Production of detailed land cover information covering intensive in-situ (carbon fluxes) monitoring areas using novel, new satellite data together with ancillary GIS and in-situ data.

The information needs in carbon balance modelling have been discussed between service providers of land cover information at SYKE and modelling group at FMI. Already available land cover data sets have been demonstrated. The first results of this have been reported and the first deliverable:" Land Cover Data Needs for Carbon Balance Mapping" is delivered late August 2009. These information will be updated during the project according to modelling experiences.

Detailed land cover information covering intensive in-situ (carbon fluxes) monitoring areas using novel, new satellite data together with ancillary GIS and in-situ data is presently under production. Employed methods include estimation of land cover variables using rule-based predictive models. Additionally alternative data sources are evaluated as input to the carbon balance models.

2.1.12 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.

During the first six months of the project, two deliverables have been specified in the Project Plan:

1. Project website (snowcarbo.fmi.fi). This was established by the start of the project on January 1, 2009. The website contains information about the SnowCarbo project background and objectives to the public. The website also includes a password protected sides for project internal use. The project website is continuously under development.
2. 1st Project brochure. The project brochure was prepared to promote the SnowCarbo project and to provide information about the project to the public in a nice, concise form. The project brochure is available as an online version (lower picture resolution ensuring quick page download) and as a downloadable high resolution version. A number of high quality brochures (200) have also been printed for distribution in relevant meeting, seminars and conferences.

The SnowCarbo web pages have been updated. Also some guidelines on uploading files have been set. We will now be using the ftp server. Instructions on how to upload the files to the server are created.

The dissemination plan for the second half of 2009 is provided in Section 2.3. All project deliverables and their due dates are provided in Section 2.3.

2.1.13 Action 13: Auditing

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

2.1.14 Action 14: Project advisory co-operation

The project advisory team has assisted in all teleconferences and communicated with the coordinator as to the set of deliverables and their deadlines for Action 14. Internal meetings at the LSCE have been held to discuss the future work plan of the Climate Scientist

2.1.15 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.

2.2 Availability of appropriate licences and authorisations

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

2.3 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 1.1.2009-31.12.2010

Table 1. SnowCarbo activity list.

Envisaged activities for SnowCarbo Actions for 1.1.2009-31.12.2010 (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%
• 1st Management Board meeting	14/10/2009	100%
• Project meeting	28/10/2009	100%
• 1st Steering Group meeting	13/11/2009	70%
• 1st Monitoring Report of Steering group	27/11/2009	75%
• Project meeting	27/11/2009	0%
• Quarterly meeting	17/12/2009	0%

• First-year progress report	31/12/2009	0%
• Project meeting	27/01/2010	0%
• Project meeting	25/02/2009	0%
• 2nd Management Board meeting	15/03/2010	0%
• Quarterly meeting	31/03/2010	0%
• 2nd Steering Group meeting	15/04/2010	0%
• 2nd 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%
• 3rd Management Board meeting	15/09/2010	0%
• Quarterly meeting	30/09/2010	0%
• 3rd Steering Group meeting	15/10/2010	0%
• 3rd 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%
Action 2: Satellite data processing by FMI		
Activity	**Due date**	**Completion (%)**
• Contribution to the 1st EO- data document (years 2001-2008)	30/11/2009	0%
• The SWE product (see 5.1.2) will be available for all test sites and covering 30 years,	31/12/2010	30%
• The SWE product will be validated (in scientific publication),	31/03/2010	50%
• 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%
• The snow melt / clearance product will be validated in scientific publications,	30/09/2009, 30/09/2010	50%

• Contribution to the 2nd EO- data document (years 2009-2010)	30/11/2010	0%
• The soil freezing product will be available for all test sites covering 10 years.	31/12/2010	20%
Action 3: Acquisition and extension of GMES-services GSE Polar View and GSE Land		
Activity	**Due date**	**Completion (%)**
• MODIS dataset for 2001-2008 will be completed. • Data retrieval trough ftp (7/8) • TOA coverages (5/8) • Products (NDVI, SCA) (0/8)	30/11/2009	90%
• AVHRR dataset for 2001-2008 will be completed • Data retrieval through ftp • Night time brightness temperatures	30/11/2009	50%
• 1st EO- data document (years 2001-2008)	30/11/2009	10%
• MODIS dataset for 2009-2010 will be completed • Data assembled from operative archive • TOA coverages • Products (NDVI, SCA)	30/11/2010	30%
• AVHRR dataset for 2009-2010 will be completed • Date retrieval through ftp • Night time brightness temperatures	30/11/2010	0%
• 2nd EO- data document (years 2009-2010)	30/11/2010	0%
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 will be selected.	28/02/2010	75%
2. 1st Data document will be completed.	31/12/2009	70%
3. Processing of data into a form appropriate for model evaluation.	31/12/2010	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%
• 1st in-situ data document (Field activities 2009 and data from 2001-2009)	30/11/2009	10%
• Field measurement campaign in spring 2010	31/05/2010	0%

• Field measurement campaign in autumn 2010	31/10/2010	0%
• 2nd in-situ data document (Field activities and data from 2010)	30/11/2010	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	25%
• The set of variables which are necessary to transfer in between REMO and JSBACH models will be decided and derived.	28/02/2010	25%
• First trials on running the coupled REMO-.JSBACH model will be made.	31/05/2010	0%
• 1st 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	
• First trials by using the land cover data (from the action 11) will be made	31/10/2010	0%
• 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.	2nd inception report 2010	0%
Action 7: Methodology development and implementation by SYKE		
Activity	**Due date**	**Completion (%)**
• 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	90%
• Filtered time-series with preliminary techniques (years 2001-2008)	31/05/2010	30%
• Progress report on filtered time-series (2001-2008)	31/05/2010	0%
• Features extracted (years 2001-2008)	31/08/2010	0%
• Progress report on extracted features (2001-2008)	31/08/2010	0%
• Filtered time-series with sophisticated techniques (years 2001-2010)	30/11/2010	0%
• Progress report on filtered time-series (2001-2010)	30/11/2010	0%

Action 8: Demonstration and validation by FMI		
Activity	**Due date**	**Completion (%)**
• System functionality validation at Sodankylä-Pallas CAL-VAL site	01/04/2010	10%
• System validation over Finland with different resolutions on selected test years	01/06/2010	10%
• System validation over Baltic test area for selected years	01/08/2010	10%
• Selection of system setup and parametrization from validation results	01/09/2010	0%
• 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%
Action 9: Demonstration and validation of EO services		
Activity	**Due date**	**Completion (%)**
• Implementation of the data exchange method completed	30/11/2009	30%
• Documentation of the data exchange method produced.	30/11/2009	10%
• Preliminary demonstration report	30/11/2010	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	01/04/2010	20%
• 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%
Action 12: Dissemination		

Activity	Due date	Completion (%)
• Project website	01/01/2009	100%
• 1st project brochure	30/03/2009	100%
• Update of the project website layout	31/12/2009	60%
• FTP server for data exchange (performed in Action 9)	30/11/2009	100%
• Presentations in relevant scientific conferences and seminars. ○ *SPIE Europe Remote Sensing 2009*: 31 August - 3 September 2009 Berliner Congress Centre, Berlin, Germany (poster, presentation)	31/08/2009	100%
• Layman's article in Finnish in Helsingin Sanomat (one of the main Finnish newspapers with a weekly Science section).	31/12/2009	10%
• Project poster describing SnowCarbo project, background and objectives.	31/12/2009	10%
• Preparation of an online newsletter presenting first project results.	31/12/2009	0%
• Preparation of the 2nd online newsletter presenting first project results.	31/12/2010	0%
Action 13: Auditing		
• No activity until end of 2012		
Action 14: Project advisory co-operation		
Activity	**Due date**	**Completion (%)**
• Participation to the 1st Management Board meeting	14/10/2009	Not possible
• Telecon to the Project meeting	28/10/2009	Not possible
• Contribution to the 1st Monitoring Report of Steering group	31/10/2009	0%
• Inputs for the 1st Steering Group meeting	31/10/2009	0%
• Climate Scientist will be hired by December 2009.	01/12/2009	30%
• Telecon to the Quarterly meeting	31/12/2009	0%
• Contribution to the First-year progress report	31/12/2009	0%

• Contribution to the 2nd Monitoring Report of Steering group	15/02/2010	0%
• Participation to the 2nd Management Board meeting	15/03/2010	0%
• Telecon to the Quarterly meeting	31/03/2010	0%
• Inputs for the 2nd Steering Group meeting	15/04/2010	0%
• 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 3rd Monitoring Report of Steering group	15/08/2010	0%
• Participation to the 3rd Management Board meeting	15/09/2010	0%
• Telecon to the Quarterly meeting	30/09/2010	0%
• Inputs for the 3rd 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%