



LIFE Project Number

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3rd summary report of flux data

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LIFE+ PROJECT NAME or Acronym

**Climate change indicators and vulnerability of boreal zone
applying innovative observation and modelling techniques**

Data Project

Project location	Helsinki
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Total budget:	2755288 €
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(%) of eligible costs	49.61

Data Beneficiary

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1 Summary

This report describes the data on CO₂, CH₄ and H₂O exchange between atmosphere and different ecosystems. In MONIMET project, this data is utilized for validating and calibrating the models (Actions B4 to B6) and evaluating the phenological parameters of the EO (earth observation) data (Action B2).

The gas exchange data obtained from the two ecosystem models (JSBACH and PRELES) used in Action B4 may be directly compared to the flux observations of different ecosystems. The flux data provides also means to determine detailed phenological and plant physiological data (e.g. growing season stages, their dynamics and inter-annual variation) which may be used to validate the EO (earth observation) data that is collected in Action B2 and results of webcam exercise in Action B1.

2. Data

2.1 Flux data

The CO₂, CH₄ and H₂O exchange between atmosphere and different ecosystems is measured at various stations in Finland using the eddy covariance flux measurement method (Baldocchi, 2003). The flux data set utilized in MONIMET project is based on the results obtained by the flux measurement programs of Finnish Meteorological Institute and University of Helsinki (Table 1).

Table 1. MONIMET flux measurement stations

Site	Vegetation type	Latitude/Longitude	Data
Hyytiälä	Scots pine forest	61°50.845'N, 24°17.687'E	1997 -
Sodankylä	Scots pine forest	67°21.712'N, 26°38.270'E	2000 -
Kaamanen	Aapa mire	69°08.441'N, 27°16.230'E	1998 -
Kenttäröva	Spruce forest	67°59.234'N, 24°14.583'E	2003 -
Lompolojänkkä	Aapa mire	67°59.832'N, 24°12.551'E	2005 -
Lettosuo	Scots pine on drained peatland	60°38.510'N, 23°57.583'E	2011 -

In addition to the flux data of the MONIMET sites, additional data sets have been obtained from external measurement sites to cover wider variability in terms of climate, vegetation species and structure. These data has been used for the model calibration in B4 (Table 2).

Table 2. Additional flux measurement stations

Site	Vegetation type	Latitude/Longitude	Data
Flakaliden	Norway spruce forest	64.1°N, 19.3°E	1997 – 1998, 2001 – 2002, 2007 – 2009
Norunda	Norway spruce, Scots pine	60.1°, 17.5°E	1996 – 1999, 2003
Kalevansuo	Scots pine forest	60.4°N, 24.2°E	2004 – 2009
Knottåsen	Norway spruce forest	61.0°N, 19.3°E	2007, 2009
Alkkia	Scots pine on drained peatland	62.1°N, 22.5°E	2002 – 2004
Skyttorp	Scots pine forest	60.1°N, 17.5°E	2005
CAge 12yr	Scots pine forest	61.5°N, 24.2°E	2002
CAge 75yr	Scots pine forest	61.5°N, 24.2°E	2002

2.2 Meteorological data

All the flux stations provide also supporting meteorological data which is used to run JSBACH and PRELES as point models at the flux measurements sites for the data assimilation and comparison purposes. For regional estimates these models are run in Action B5 with gridded meteorological data obtained from a climate model. The in-situ meteorological data may also be used for evaluating the representativeness of these gridded meteorological data fields at each flux measurement site.

2.3 Recent activities

The measurements of CO₂, CH₄ and H₂O exchange and supporting meteorological data have continued during the reporting period (1 September 2015 – 31 August 2016) at all the flux measurement stations (Table 1) without any major problems.

Basic set of gap-filled time series have been processed to meet the needs of the models, and the data sets from the Sodankylä and Hyytiälä Scots pine forests and the Kenttäröva spruce forest have earlier been delivered to Actions B4 and B6. During this reporting period, additional data from these sites have been collected for different Actions according to their

requests. Detailed phenological and plant physiological data derived from the CO₂ fluxes (e.g. growing season stages, their dynamics and interannual variation) have been provided for validation of the EO data (Action B2) and the results of webcam exercise (Action B1).

References

Baldocchi, D. (2003) Assessing the eddy covariance technique for evaluating carbon dioxide exchange rates of ecosystems: past, present and future. *Global Change Biology*, 9, 479–492.