



LIFE Project Number

LIFE12 ENV/FIN/000409

2nd summary report of flux data

Reporting Date

31/03/2015

LIFE+ PROJECT NAME or Acronym

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

Data Project

Project location	Helsinki
Project start date:	02/09/2013
Project end date:	01/09/2017
Total budget:	2755288 €
EC contribution:	1366952 €
(%) of eligible costs	49.61

Data Beneficiary

Name Beneficiary	Ilmatieteen laitos
Contact person	Mika Aurela
Postal address	Erik Palménin aukio 1, FI-00101, Helsinki, Finland
Telephone	+358-50-377 9722
Fax:	+358-9-323 2970
E-mail	mika.aurela@fmi.fi
Project Website	monimet.fmi.fi

1 Summary

This report describes the data on CO₂, CH₄ and H₂O exchange between atmosphere and different ecosystems. Such flux data have routinely been measured for several years at various stations maintained by FMI and UHEL. In MONIMET project, this data will be exploited in assessing the functionality of the models and calibrating them by means of data assimilation (Actions B4 to B6) and to evaluate the phenological parameters of the EO (earth observation) data (Action B2).

The gas exchange data obtained from the two ecosystem models (JSBACH and PRELES) utilized in Action B4 may be directly compared to these flux observations from different ecosystems. The flux data provides also means to determine detailed phenological and plant physiological data (e.g. growing season stages, their dynamics and interannual 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. The characteristics of the measurement sites and systems together with the data availability will be given in this report.

2. Data

2.1 Flux data

The validation data set is based on the eddy covariance flux measurements (Baldocchi, 2003) obtained within the flux measurement programs of Finnish Meteorological Institute and University of Helsinki (Table 1). Longest running flux sites, Hyytiälä Scots pine forest, Sodankylä Scots pine forest and Kaamanen wetland, provide data sets of over 10 years each. Shorter multi-year flux data sets are available from a spruce forest and a wetland at Pallas area and Lettosuo Scots pine forest on drained peatland in southern Finland. All these measurements continue running and the data will be prepared in the form needed by different Actions during the duration of the project.

Table 1. Flux measurement stations

Site	Vegetation type	Latitude/Longitude	Data	Measurement/ vegetation height (m)
Hyytiälä	Scots pine forest	61°50.845'N, 24°17.687'E	1997 -	23 / 18
Sodankylä	Scots pine forest	67°21.712'N, 26°38.270'E	2000 -	23.5 / 18
Kaamanen	Aapa mire	69°08.441'N, 27°16.230'E	1998 -	5 / 0.5
Kenttäröva	Spruce forest	67°59.234'N, 24°14.583'E	2003 -	23/ 13
Lompolojätkkä	Aapa mire	67°59.832'N, 24°12.551'E	2005 -	3 / 0.5
Lettosuo	Scots pine on drained peatland	60°38.510'N, 23°57.583'E	2011 -	25 / 18

2.2 Meteorological data

In addition to the actual CO₂ exchange data the flux stations provide supporting meteorological data which will be 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 and H₂O exchange and supporting meteorological data have continued during the reporting period at all the flux measurement stations (Table 1) without any significant problems. A new flux data set with gap-filled meteorological data from Kenttäröva was finalized and submitted to the modellers for utilization in the JSBACH model (Actions B4 and B5) (Fig. 1). A similar data set has been produced and distributed earlier for the Hyytiälä and Sodankylä sites. An extended soil moisture data set for Sodankylä and Kenttäröva was collected and provided as required for validation of the soil moisture parameters of JSBACH.

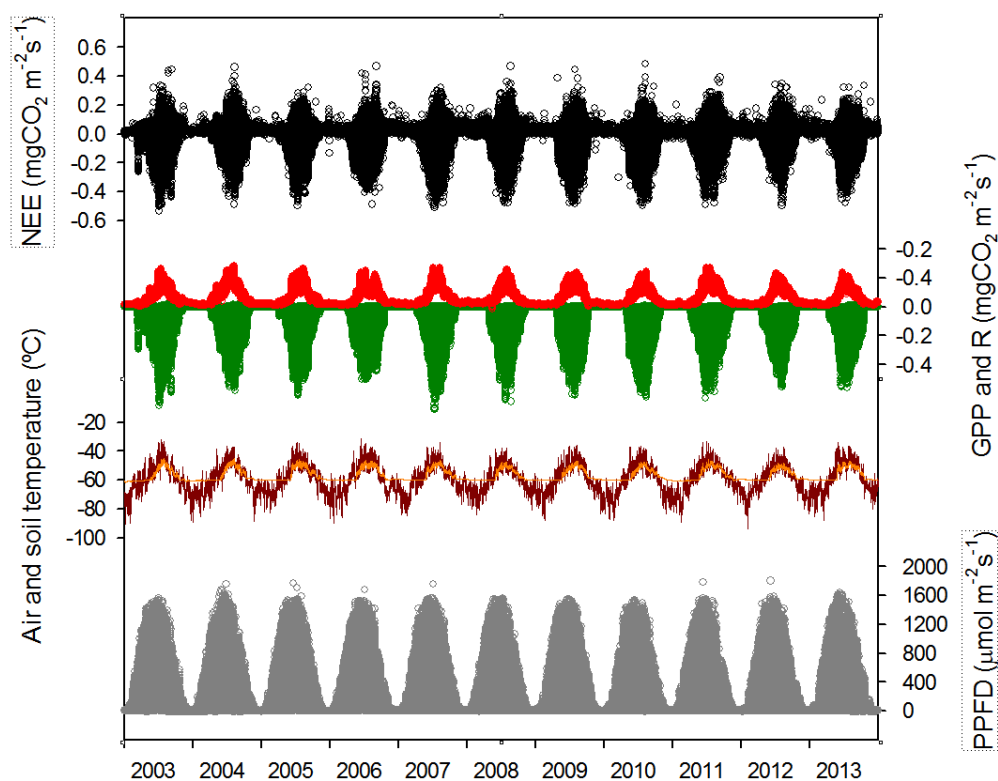


Fig.1. Gap-filled time series of net ecosystems CO₂ exchange (NEE), gross primary production (GPP), respiration R, air and soil temperatures and photosynthetic photon flux density (PPFD) at Kenttäröva spruce forest.

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.