



Research Networking Programmes

Short Visit Grant or Exchange Visit Grant

(please tick the relevant box)

Scientific Report

The scientific report (WORD or PDF file – maximum of eight A4 pages) should be submitted online within one month of the event. It will be published on the ESF website.

Proposal Title: Combining short tower and tall tower eddy covariance methane flux measurements in an intensively managed agricultural landscape

Application Reference N°: 6537

1) Purpose of the visit

A measurement campaign was held during July 2012 in the surroundings of CESAR site (<http://www.cesar-observatory.nl/>) during which methane (CH₄) fluxes were measured at three locations with eddy covariance (EC) method. At all three locations the fluxes were measured at 6 m tall towers and at one location, the CESAR site, the CH₄ fluxes were measured also at 20 m and 60 m heights. The three sites were separated by approximately 2-3 km from each other. The motivation for the measurement campaign was to study CH₄ flux variability in the studied landscape (intensively managed agricultural area with peat soils) and to examine how the fluxes at different heights and thus with different footprints agree.

The purpose of this visit was threefold:

1. Joint evaluation of the data measured during the campaign with the host (Dr. Arjan Hensen, ECN) and also with Dr. Luca Belelli Marchesini, VU University Amsterdam.

2. Obtaining auxiliary data needed for properly analysing the CH₄ flux data.

3. Making plans for the future and dividing tasks for further data analysis

2) Description of the work carried out during the visit

The work during the short visit took place at the host institute (ECN). Apart from the host (Dr. Arjan Hensen) also Dr. Luca Belelli Marchesini from VU University Amsterdam joined the discussion for one day.

Modeling the CH₄ fluxes with PEATLAND-VU model was discussed. It is a process-based model of CO₂ and CH₄ emissions from peat soil and it has been developed at the VU University Amsterdam. First Dr. Luca Belelli Marchesini gave a short overview of the model and the needed input parameters for running the model and then it was discussed how the model could be deployed in this study.

The measured flux time series were analysed together with auxiliary meteorological data. Furthermore, it was discussed which environmental variables are still needed for proper analysis of the measured flux data, whether these variables are available and where to acquire them.

3) Description of the main results obtained

The main results were as follows:

1) It was agreed that the PEATLAND-VU model will be run with several different model configurations and the results will be compared with the measured CH₄ fluxes using footprint modeling. The needed input variables for the PEATLAND-VU model were located and will be used in doing the model runs.

2) When comparing the measured CH₄ flux data from the three sites, episodic short term increases in the ecosystems scale CH₄ flux were noticed at one of the three sites. During these episodes significantly higher methane fluxes were measured at one of the sites. After closer inspection two different explanations for the events were identified: ruminants (cows) within the source area or ebullition events in the drainage ditches near the measurement mast. The emission events could be categorized into two categories: peak in CH₄ and CO₂ emissions and peak in CH₄ emission only. It was hypothesized that periods with a peak only in CH₄ emission are caused by ebullition and periods with peaks in both, CO₂ and CH₄ emission, are caused by ruminants.

3) Auxiliary data needed for running PEATLAND-VU model was acquired, in addition to data needed for footprint modelling (boundary layer height) and analysing the measured fluxes (water table level, soil temperature).

4) Future collaboration with host institution (if applicable)

Close collaboration between the three institutes (University of Helsinki, VU University Amsterdam and the host institute ECN) will continue in view of this study. Further auxiliary data is provided by ECN and VU University Amsterdam is responsible for running the PEATLAND-VU model, whereas the applicant, working at University of Helsinki, will deepen the analysis of the measured flux data.

5) Projected publications / articles resulting or to result from the grant (*ESF must be acknowledged in publications resulting from the grantee's work in relation with the grant*)

One article is planned to be published on the results of this study.

6) Other comments (if any)

