

Interactive
Comment

Interactive comment on “Eddy covariance methane measurements at a Ponderosa pine plantation in California” by C. J. P. P. Smeets et al.

Anonymous Referee #1

Received and published: 7 April 2009

General comments

This paper evaluates the EC data quality and processing with an emphasis on the frequency dependent response functions for a closed-path Fast Methane analyzer (FMA) from Los Gatos. Special attention is given to the complications that arise when applying Webb-Pearman-Leuning corrections to an EC-system that combines open and closed-path measurements. Besides, the diurnal variations of CH₄ concentration and fluxes at a Ponderosa pine plantation at the Blodgett Forest site in central California are discussed and compared to finding from a recent global inventory and process-based model calculation. All analyzes are based on observations from 11 to 19 August 2007.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Thus, this paper tries to address two topics 1) feasibility of EC measurements at low CH₄ flux levels with a Fast Methane Analyzer and 2) CH₄ emission estimates over the Blodgett Forest site and compare with other studies.

I have doubts about the way that both topics are addressed in this paper. The concentration and fluxes of CH₄ are analyzed over a very short period from 11 to 19 August 2007 (shown only from 14 to 19 August 2007). The period is too short to compare them with results from a process-based model study and recent global inventory and draw any conclusion based on such a comparison. For example: the authors compare this short period with an annual value based on a global inventory study. The authors compare the observations with the process-based model in July. However, the observations are done in August. If a comparison is made, the same period, same meteorological conditions and same ecosystem should be used.

The first topic, the feasibility of EC measurements at low CH₄ flux levels with a Fast Methane Analyzer has partly been addressed before by e.g. Hendriks et al. (2007). The authors have a good knowledge about the needed correction algorithm for derived the real eddy covariance flux. However, I have doubts about the added value of the analyses shown. All correction algorithms have been discussed before in the literature.

Organization of the paper

The authors should define their objectives more clearly. The main focus could be the feasibility of EC flux measurements using Fast Methane Analyzer. If they choose for this topic, then they could use their small data set for evaluating the performance. Besides, they should clearly indicate the added value. For example: What is the difference in applying the correction algorithm between CH₄ flux measurements and CO₂ measurements? If scientists are measuring small fluxes, should they use another calculation method? In that case, the authors could better include the appendixes in the text for example in the methodology. Besides, the authors should check the amount

[Full Screen / Esc](#)[Printer-friendly Version](#)[Interactive Discussion](#)[Discussion Paper](#)

of duplication in the texts. Most topics are now addressed more than twice in the manuscript.

If the authors choose for the second topic, CH₄ emission estimates over a tropical forest, they should include much more data and improve the comparisons with previous studies. Moreover, they should minimize the theoretical aspects of EC measurements of CH₄. They can still use a small appendix.

Below, I will give only some specific and technical notes since the manuscript should first be rewritten by the previous suggested comments.

Specific/Technical comments

Abstract

Line 11 Relatively high noise level. make it quantitative. What is relatively high?

Line 12 A software problem is really vague. What was the real source of the problem? How did you solve this problem? What was the improvement after solving this problem?

Page 5203

Line 14 Higher emissions. make it quantitative.

Page 5204

Line 11 Skip line. in the near future.. basin

Line 15 Typing fault. change t he EC data in the EC data

Line 24 Observation period from 11 to 19 August, however, all Figures include a shorter period, why?

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Page 5205

Line 13 Raw data was sampled at 10 Hz. Why did the authors use a sampling rate of 10 Hz since the FMA analyzer can sample at 20 Hz. (line 13 page 5204)

Line 25 Measurement height of 13.5 m indicated for the second time (also at line 10 page 5205)

In this section (Experimental set-up), it should be indicated which measurements are performed. For example: it is not indicated with which instruments CO are measured. CO observations are shown in Figure 2. Besides, it is not indicated which micrometeorological measurements are done.

Page 5206

In this section (data processing), the outline is not well ordered. Most of the topics are addressed more than once. Besides, this section is not easy to follow because of frequent use of the appendix.

Page 5207

Line 10 How is validated that the damping of temperature fluctuations inside the tube is effective? What is the reason for a different damping effect on temperature fluctuations that on water vapour fluctuations?

Page 5208

Line 8 How was the signal to noise ratio determined?

Line 9 Recently upgraded software. What is the difference between the old software and the new software?

Line 22 Slightly unstable conditions. Could you indicate the stability parameter z/L and

S1332

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



the mean wind velocity?

Page 5209

Line 6 If you filter the frequencies larger than 0.3 Hz, what is the effect of aliasing on the low frequencies.

Page 5210

Line 23 How did they measure CO? Why is it interesting to show CO?

Line 24 How did they measure all the meteorological variables?

Page 5213

Line 13 I do not agree with the sentence the uncertainty of fluxes above the detection limit is on average 26%. There are much more uncertainties involved in EC flux measurements. For example: the uncertainty due to one point measurements as described by Businger et al. (1986).

Page 5215

Line 16 Empiric change into empirical

Page 5216

Line 11 Missing reference by equation

Page 5217

Line 4 Re should be non-italic

Page 5218

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper



Line 4 What is the amount of underestimation?

Figures

In general, the Figures are not very clear. (some examples will be given below)

Figure 1, it is unclear why there is a distance A and B between the (empirical) Kaimal co-spectrum and the measured co-spectrum. Both co-spectra are normalized. Therefore, the area below both curves should be 1. Besides, it is unclear which (empirical) Kaimal co-spectrum is used. The stability and mean wind velocity should be indicated. The symbols of variables should be written in italic. In the Figure caption, the amount of used 30 min EC fluxes should be indicated.

Figure 4, the meaning of T_s , G_t corrected and G_t uncorrected should be explained in the Figure caption.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 5201, 2009.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

