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Eddy covariance measurements of CH_4 and N_2O using quantum cascade laser spectrometry on peat lands

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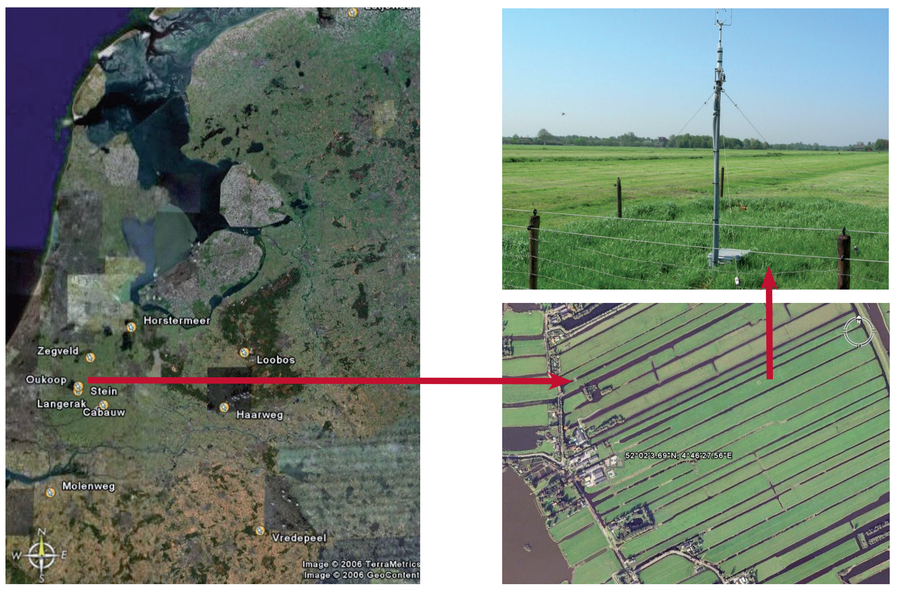
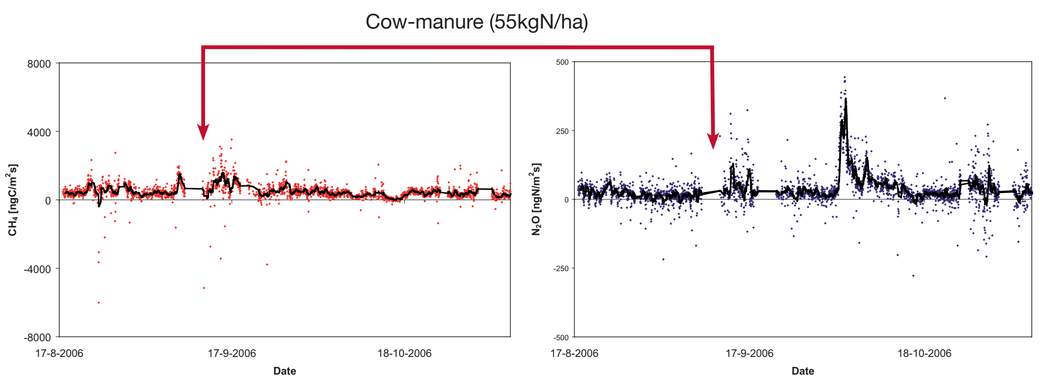
Introduction

- A quantum cascade laser spectrometer (Aerodyne Research Inc.) is used for eddy covariance measurements of CH_4 and N_2O exchange over an intensively managed peat grassland at Reeuwijk in the Netherlands (N 52°01'15", E 4°01'17"). This system runs continuously since August 2006 (coverage 87%). Results are shown from the first EC-measurements. (Sampling frequency of 10 Hz, calibrated, running mean of 120 s, averaged over 30-minutes, fetch and steady state criteria checked)



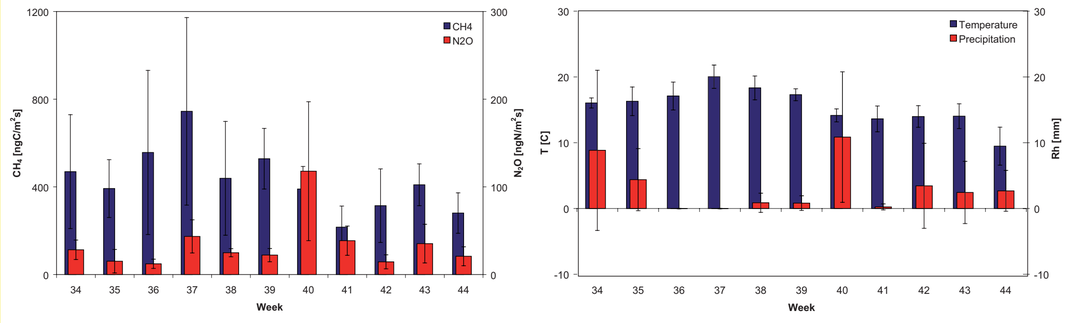
CH_4 and N_2O exchange (30-min)



Average emission:

- 464±485 ngC/m²s (2.23±2.33 mg/m²hr)
- 38±64 ngN/m²s (0.21±0.36 mg/m²hr)

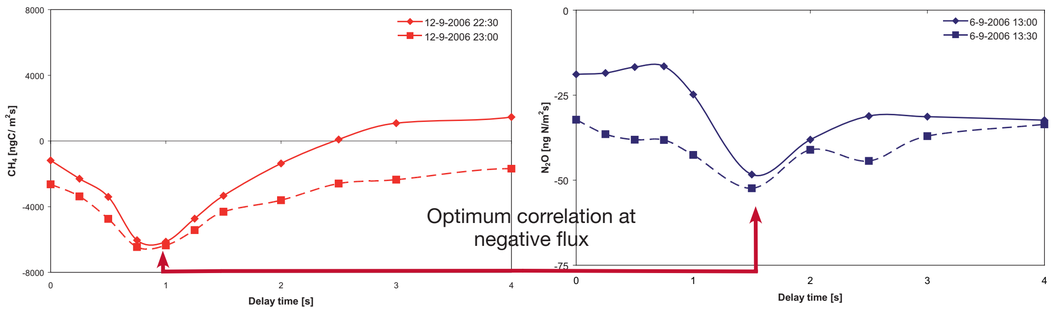
CH_4 and N_2O exchange (weekly)



Management:

- 55 kgN/ha cow-manure in week 37
- N_2O peak in week 40 with rain event

CH_4 and N_2O uptake



Percentage uptake (none-Webbcorrection):

- 5% negative CH_4 fluxes
- 12% negative N_2O fluxes

Conclusions and acknowledgments

- N_2O and CH_4 emissions can be measured continuously using a quantum cascade laser.
- Average fluxes over August to November 2006 were 464 ngC/m²s and 38 ngN/m²s.
- Uptake of CH_4 and N_2O occurred.
- The help of Mark Zahniser (Aerodyne Research Inc.) and the farmer Theo van Eyk is gratefully acknowledged.
- The project is carried out in the framework of the Dutch BSIK program in cooperation with Wageningen University and VU Amsterdam.

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