# InGOS – Integrated non-CO2 Observing System

Detailed workplan, appendix to the online application. Request for access to an infrastructure (TNA1-TNA2-TNA3). The plan must not exceed 6 pages in 12 pt single line spacing, applications exceeding this limit will not be evaluated. The following information should be included in order to be evaluated:

1. **Project name (acronym), name and contact information of the researcher(s), duration of the project (dates, number of working days), type and name of the infrastructure requested**

Project name: Ecosystem scale methane fluxes from temperate wetland

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Duration of the project: From March 11th to 15th, 2014 (5 working days)

Infrastructure requested: Eddy covariance system located in the Rzecin peatland site (Poland)

1. **Background**
   1. Significance of the research
   2. Previous research relevant to the topic and how the proposed project links to this
   3. Links with current research of the applicant

Wetlands store 25%-30% of the global soil carbon pool (Millennium-Ecosystem-Assessment 2005) and are important CO2 sinks. In addition, wetlands act as sources for greenhouse gases (GHG) by emitting methane (CH4) to the atmosphere. In this context, the function of wetlands in relation to global warming will be the balance between net CO2 assimilation and CH4 emission. With global warming, wetlands have the potential to release stored carbon, because of the high temperature sensitivity of microbial respiration (Davidson and Janssens 2006), and contribute to the increase of atmospheric CO2 concentrations.

Even though the methane emission from wetlands has been studied extensively in plot scale using soil chambers, the ecosystem scale emission studies are by eddy covariance method are much more limited. These studies have the advantage of offering long-term continuous data on methane emission (e.g. Rinne at al., 2007). Some of the results obtained by the eddy covariance method are contrary to the expectations and the result obtained by chamber studies.

No long-term eddy-covariance studies on methane emission from temperate natural wetlands have been conducted. The preliminary study at the Rzecin wetland site (Kowalska et al., 2013) indicates that the emission from this site has very different temporal dynamics compared to e.g. boreal wetlands (Rinne et al., 2007, Jackowicz-Korzynski et al., 2010). Janne Rinne is the site PI for the Siikaneva fen site, located in boreal region of Europe. The proposed project links with the current analysis of methane emission dynamics from Siikaneva.

1. **Objectives**
   1. Hypothesis and research objectives

The objective of the study is to analyze the eddy covariance data collected at Rzecin wetland site during 2012-2014 in order to obtain annual budget and understanding on the temporal dynamics of the emission in different scales. Our hypothesis is that the presence of *Phragmites australis* within one part of the flux footprint strongly affects both the dynamics and total emission from this part. The other parts the footprint is likely to show similar dynamics than the wetlands previously studied by e.g. Rinne et al. (2007).

b. Connection with the InGOS objectives and the ‘fitness’ of the use of the requested infrastructure to the objectives

The project will continue capacity building of the Polish partner by transfer of knowledge on the state-off the art data analysis and scientific writing. The project will also enable future support for the site as more publications using it’s data will be published. The proposed project will lead to more harmonized analysis of the flux data, thus promoting the harmonization of not only the measurement and data processing, but also its analysis. The requested infrastructure of the R*zecin* site is ideal as it provides flux-time series which is more than one year in length and it has a footprint in which one part (west from the measurement tower) is dominated by Phragmites australis and the other parts (east from the tower) is sedge and moss dominated.

1. **Methods and materials (legal and ethical issues)**
   1. Research method, explaining how to reach the objective
   2. Research materials, instrumentation
   3. Governance procedures, safety precautions, permit requirements and procedures

We will analyze the flux data in the harmonized methods, similar to those used in the studies by Rinne et al. (2007) and Jackowicz-Korzynski (2010). Thus we will obtain information on the temporal dynamics and driving parameters that are consistent with these earlier studies. The data to be used has been recorded at the Rzecin wetland site, operated by Poznan University of Life Sciences,PULS, (Poland). There has been previous collaboration between the University of Helsinki and Poznan University of Life Sciences to establish the methane eddy covariance measurements in Rzecin. The materials needed for this project is the data collected at Rzecin site and data analysis tools developed at the University of Helsinki.

No governance procedures or safety precautions are needed for this project.

1. **Implementation: timetable, budget, distribution of work**
   1. Timetable for the research including personnel efforts, favorably table wise

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| --- | --- | --- |
| *Task* | *Date* | *Personal* |
| Seminar by the applicant about theory of methane flux dynamics | 12/3/2014 | Janne Rinne (applicant)  Bogdan H. Chojnicki  Natalia Kowalska  Janusz Olejnik  M. Urbaniak |
| Data analysis | 11-16/10/2014 | Janne Rinne  Bogdan H. Chojnicki  Natalia Kowalska |
| Writing an outline for manuscript based on the data analysis | 15/10/2014  16/10/2014 | Janne Rinne  Bogdan Chojnicki  Natalia Kowalska |
|  |  |  |

* 1. Total budget for travel and logistical support as requested

The total budget requested is 750€

* 1. Plan for specific logistal needs like visa, import/export licenses etc.

Not applicable

1. **Expected results and possible risks**
   1. Expected scientific impact of the research
   2. Applicability and feasibility of the research results
   3. Publication plan
   4. Data access plan

The analysis conducted in the project will prove insight into the methane emission dynamics and will be important for development of methane emission models (e.g. Watts et al., 2013) to be used in Earth System Models. The understanding on the emission dynamics has wide applicability, as Phragmites australis is widespread plant species in wetlands. The data will be also very important for development and evaluation of emission models. The results of the data analysis will be published in suitable open access journal.

1. **Key literature**

Davidson EA, Janssens IA (2006) Temperature sensitivity of soil carbon decomposition and feedbacks to climate change. Nature 440:165-173

Jackowicz‐Korczyński,M., T.R. Christensen, K. Bäckstrand, P. Crill, T. Friborg, M. Mastepanov, and L. Ström, 2010: Annual cycle of methane emission from a subarctic peatland, J. Geophys. Res., 115, G02009, doi:10.1029/2008JG000913.

Kowalska, N., B.H. Chojnicki, J. Rinne, S. Haapanala, P. Siedlecki, M. Urbaniak, R. Juszczak, J. Olejnik, 2013: Measurements of methane emission from a temperate wetland by eddy covariance method. International Agrophysics, 27, 283-290.

Millennium-Ecosystem-Assessment (2005) Ecosystems and Human Well-being: Wetlands and Water Synthesis. , Washington, D. C.

Rinne, J., T. Riutta, M. Pihlatie, M. Aurela, S. Haapanala, J.-P. Tuovinen, E.-S. Tuittila & T. Vesala, 2007: Annual cycle of methane emission from a boreal fen measured by the eddy covariance technique. Tellus, 59B, 449-457.

Watts, J.D., J.S. Kimball, F.-J.W. Parmentier, T. Sachs, J. Rinne, D. Zona, W. Oechel, T. Tagesson, M. Jackowicz-Korczyński, and M. Aurela, 2013: A satellite data driven biophysical modeling approach for estimating northern peatland and tundra CO2 and CH4 fluxes. Biogeosciences Discuss., 10, 16491-16549, 2013