# InGOS – Integrated non-CO2 Observing System

1. **Project name (acronym),** Delta 13CH4 measurement and comparison campaign at Cabauw in 2014

**name and contact information of the researcher(s),** Dr Jaroslaw Necki (AGH- University of Science and Technology ; necki@agh.edu.pl)
**duration of the project (dates, number of working days),** 15.11.2014 - 19.12.2014, 20 working days
**type and name of the infrastructure requested** 20 units

1. **Background**
	1. Significance of the research

Stable isotope analysis of methane is an efficient tool for source prescription and methane cycle modeling. Isotopic fractionation of methane (both in carbon and hydrogen isotopes) during the methanogenesis leads to different isotope ration in gas coming from distinct sources. E.g. methane from coal mining in Poland have delta 13C of methane at the range -46 to – 48 per mill while biogenic methane from swamps usually covers the range -50 to -60. Proper calibration and test of measurement equipment is essential for good accuracy of measurements and in obtaining consistent and valuable results of methane fluxes and their contribution in carbon budget.

* 1. Previous research relevant to the topic and how the proposed project links to this

Environmental Physics Group at AGH University investigates isotopic signature of methane released from city gas network as well as from mines and municipal landfills and water reservoirs since year 1994. Different techniques were used for isotope composition determination, methane conversion to CO2 and subsequent IRMS analysis, direct analysis by GC-IRMS and finally CRDS.

Cooperation with other institutes in Poland has been established for purpose to balance methane sources accompanying coal excavation as well as future shale gas fracking installations. International intercomparisons are essential for proper link of the measured isotopic composition to international scale and evaluation of applied technique for environmental analyses.

* 1. Links with current research of the applicant

Although there is no officially accepted project in Poland according to isotope measurement of atmospheric methane, a close collaboration between AGH-University and PIG-Polish Geological Institute was establish for measurement and monitoring of basic greenhouse gases in atmosphere. One of the main cooperation field is the investigation of methane sources budget over the territory of Silesian Coal Basin. The second area of interest lies in carbon dioxide sequestration efficiency and environmental impact. In both cases stable isotope analysis plays key role in the investigations.

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

The main purpose of the project is to compare the CRDS instrument results with other applicable techniques currently available at Cabauw during the InGOS Project Test Phase of WP16. Atmospheric methane isotopic composition measurement variability, instrument stability and quality of the results under different calibration strategy is a research objective of this project.

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

CRDS is relatively new technique applied for direct analysis of atmospheric methane isotopic composition, thus the comparison lies in the specific task of the WP16.

1. **Methods and materials (legal and ethical issues)**
	1. Research method, explaining how to reach the objective

CRDS instrument – Picarro G2201-i will be transported from PIG Warsaw to Cabauw station for one month of measurement. AGH will prepare the set of calibration mixtures according to possessed reference material and deliver to the Cabauw station together with modified valve inlet system suitable for automatic calibration of CRDS analyser. The instrument will be taken back after a month and data will be evaluated and compared with other working simultaneously systems.

* 1. Research materials, instrumentation

Picarro G2201-i, 3 cylinders with working standards

* 1. Governance procedures, safety precautions, permit requirements and procedures

No special requirements are necessary, all the cylinders have valid legislation marks.

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

	17.11.2014 – Arrival of the equipment

15 – 19.11.2014 – Installation of the CRDS analyzer at the station, test measurements, calibration protocol launch.

20-22.11.2014 – first evaluated results calculation

22.11.2014 – 18.12.2014 – operational phase, continuous measurements
18 – 19.12.2014 – Disconnection of instrument from the station infrastructure, packing of the materials, preliminary calculation of the results.

Through whole the period 15.11 – 19.12.2014 close contact with UU members are required as well as discussions concerning quality control, troubleshooting and its solution on the daily basis.

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

2 times travel by car (Poland – Netherlands-Poland) = 2\*500Eur = 1000Eur

10 days subsistence for 2 persons (one person from PIG and one from AGH) = 50 Eur \* 20 = 1000Eur

Total requested cost = 2000Eur

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

No logistical needs are necessary. Transport will be conducted according to a EU road transportation regulations.

1. **Expected results and possible risks**
	1. Expected scientific impact of the research

	The results of the project will help in further cooperation between PIG and AGH to establish future monitoring project at shale gas and coalbed methane.
	2. Applicability and feasibility of the research results
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	3. Publication plan
	4. -
	5. Data access plan

	Data from measurement campaign will be available for InGOS project as well as for any scientific purpose.
2. **Key literature**
	1. List of references used in the working plan

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