Phase 1 – State of the Art

GERG - Technology Benchmark for site level methane emissions quantification

Introduction

Why this project ?

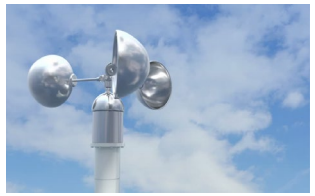
- New challenges about measurement and estimations of methane emissions
- Bottom-up methodologies are commonly used by gas operators.
- Ensuring the reliability of methane emissions is very important for gas operators.
- Increasing interest for so-called “Top-Down” methodologies shared by multiple stakeholders : nongovernmental organization, technologies providers, academic researchers, gas operators…
- The level 5 of the reporting framework OGMP 2.0 includes Top-Down methodologies for global quantification of sites emissions.

Bottom-up

Source level

Sensor
Pont wise measurement or column integrated concentration measurement.

Top - Down



Complementary measurements
Anemometers, GPS, etc.

A mobile platform.

Algorithm
To convert the concentration measurement into a leak rate.

Site level

Introduction

Why this project ?

In this context, a project on methodologies for methane emissions quantification was launched in the GERG association (18 members).

Pilot :

RICE GRTgaz
Research & Innovation Center for Energy

Peer review :

TNO
LSCE

Members :

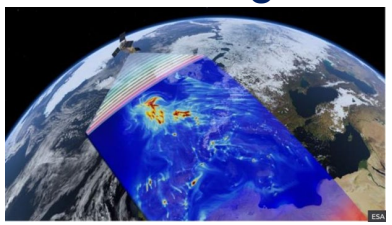
Synergrid
kiwa
snam
Italgas
elengy
uniper
storengy
Thyssengas
gasunie
enagas
DBI
sedigas
GRDF
GAZ RÉSEAU DISTRIBUTION FRANCE
GAZ system
ENERGINET
wintershall dea
ENGIE Lab CRIGEN

Presentation of the project

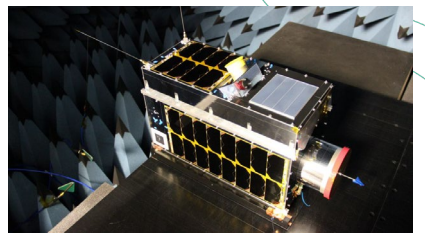
Scope of work

Main objective : Provide a state of the art of different methodologies for Methane Emissions quantification and define the next steps for methodologies implementation.

WP1 - Satellites	• Report and peer review (1) • Presentation
WP2 – Top-Down methodologies	• Report and peer review (1) • Presentation
WP3 – Methodologies for distribution	• Report and peer review (1) • Presentation
WP4 – Definition of next steps	• Organisation of two workshops • Proposal report



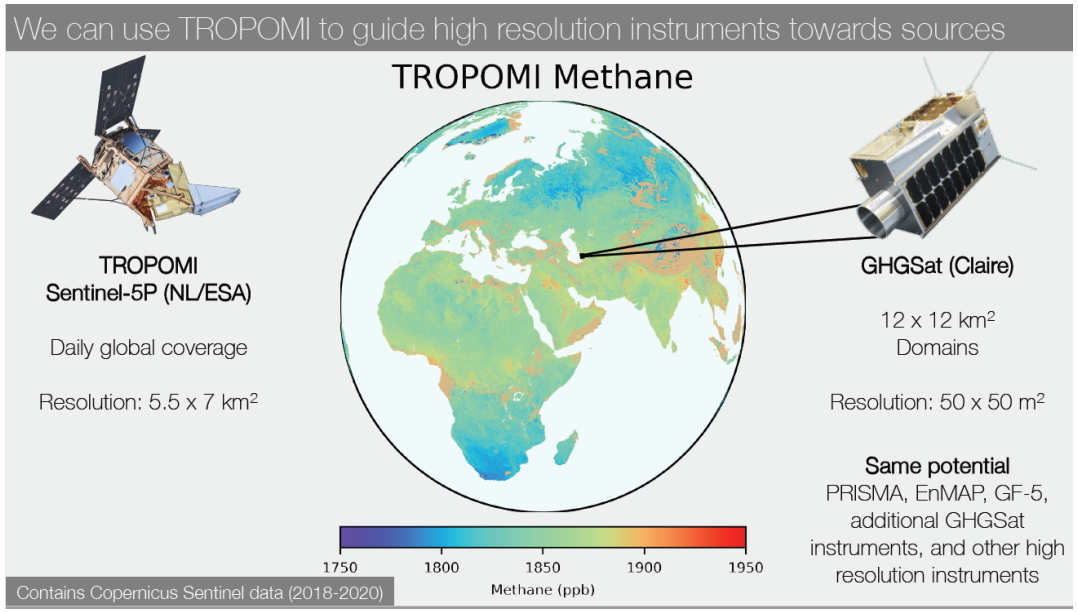
WP1 – State of the art of satellites



A promising and quickly evolving new top-down approach in which detection of methane emissions around the globe can be made monthly, daily or several times a day, is based on satellite observations.

Conclusions :

- Currently satellites are not an independent methodology : they rely on a set of data coming from other instruments/methodologies.
- They are used to spot “super – emiters” (~t/h). Current detection limit : 100 kg/h
- Some satellites as GHGsat have enough spatial resolution (30m) to assign the source of plumes.
- Challenges in retrieval algorithms



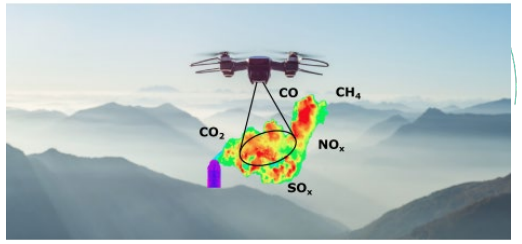
GHGSat KAYRROS Bluefield MethaneSAT

SATLANTIS esa European Space Agency Agence spatiale européenne CARBON MAPPER

GERG 60 YEARS THE EUROPEAN GAS RESEARCH GROUP

WP2 – Top Down

This work package established a state-of-the-art evaluation of the current mobile platforms implementing top-down methodologies with in-situ atmospheric CH_4 measurements.

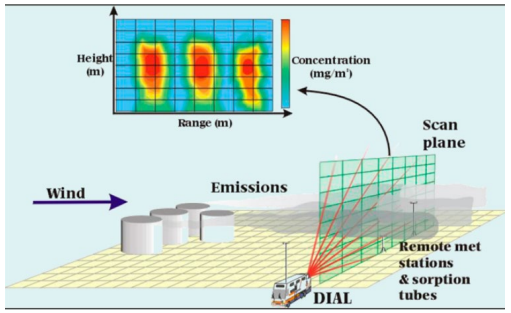


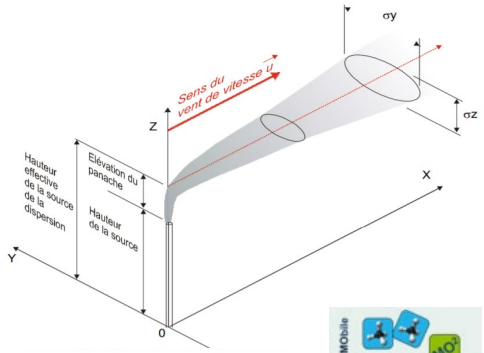
Conclusions :

- Very broad panorama in terms of techniques, degree of Technology Readiness Level (TRL), and typology of actors.
- There is a lack of more comprehensive reliable data and independent performance assessment campaigns.
- The existing measurement campaigns have showed **limitation for accurate quantification.**

~ 1 kg/h

< 1 kg/h





WP3 – Methodologies for distribution network

The study focused on detection with mobile systems and bottom-up methodologies for in situ quantification for gas distribution networks (buried pipelines).

Conclusions :

- Mobile survey : Good to spot supper emitters rapidly, but with limited accuracy.
- Dominance of a small number of large leaks on methane emissions : opportunity for a cost-effective way to reduce methane emissions
- Direct survey : The existing measurement campaigns have shown the suitability of suction method (although time consuming).

Mobile « top down » measurements

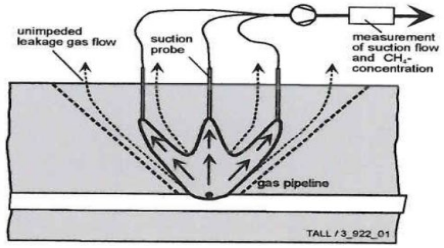


Fig. 1:
Leakage Gas Flow from Damaged Pipeline, Unimpeded and with Suction (Schematic)

Direct campaigns : direct flux measurements

WP4 – Definition of next steps

Based on the findings of the previous work packages, the project team identified additional research needed to enable the effective use of top-down technologies and proposed detailed next steps.

Objective

- Selection of methodologies of interests based on the state of the art from WP2 and WP3
- Gap analysis about uncertainties and performance evaluation,
- Expression of needs of members and definition of objectives for next steps,
- Use cases definition and description of experiments

Conclusions

- Need of tests to quantify the concentration accuracy and uncertainties of such methodologies
- The project produced a proposal to progress on Top-Down methodologies, based on controlled release tests.
- These conclusions led to the launch of the next phase of the project.

Thank you !