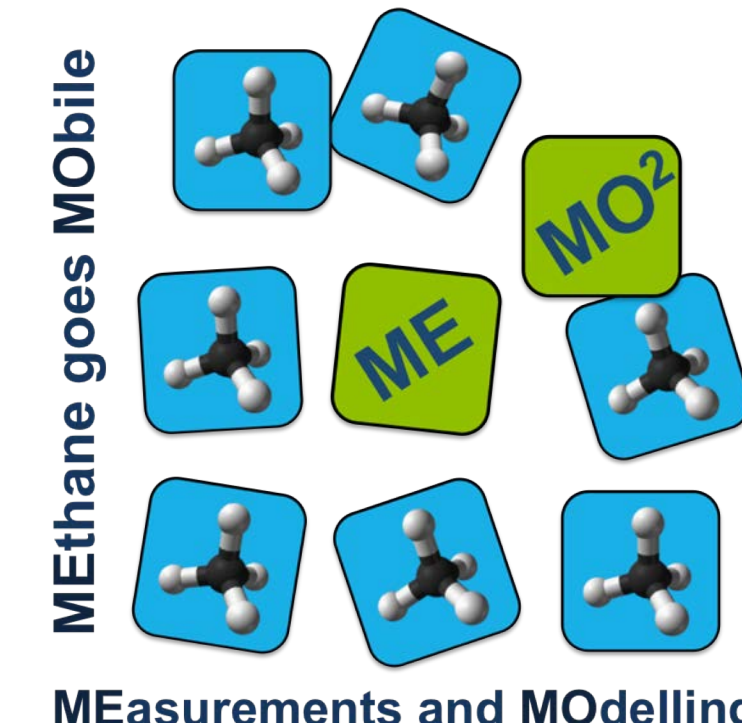


2017 - 2021

MEMO²

MEthane goes MObile – MEasurements and MOdelling



Sylvia Walter, Thomas Röckmann, and the MEMO² team
Utrecht University, The Netherlands

website



Methane

Carbon dioxide

- GWP 20 years [kg]
- Short lifetime
- Important energy source
- High impact feedback loop



MEMO² - a European Training Network

13 Early Stage Researchers
9 beneficiaries - 16 partners - 15 countries

- Develop and implement small-scale mobile CH₄ measurements
- Link bottom-up and top-down approaches
- Identify and evaluate European CH₄ emissions
- support mitigation measures

Scientific Work Packages



WP1

Mobile measurements of CH₄

Map small-scale CH₄ distribution across Europe
Identify and quantify CH₄ emissions at the local scale



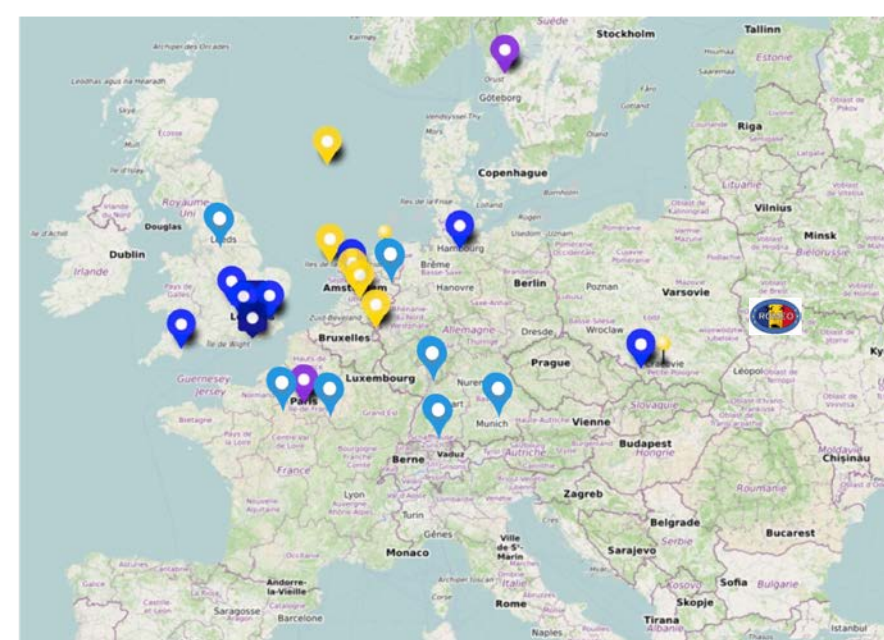
Mobile measurement platforms



Virtual flight visualising
CH₄ in Utrecht and
Hamburg



Measurement campaigns



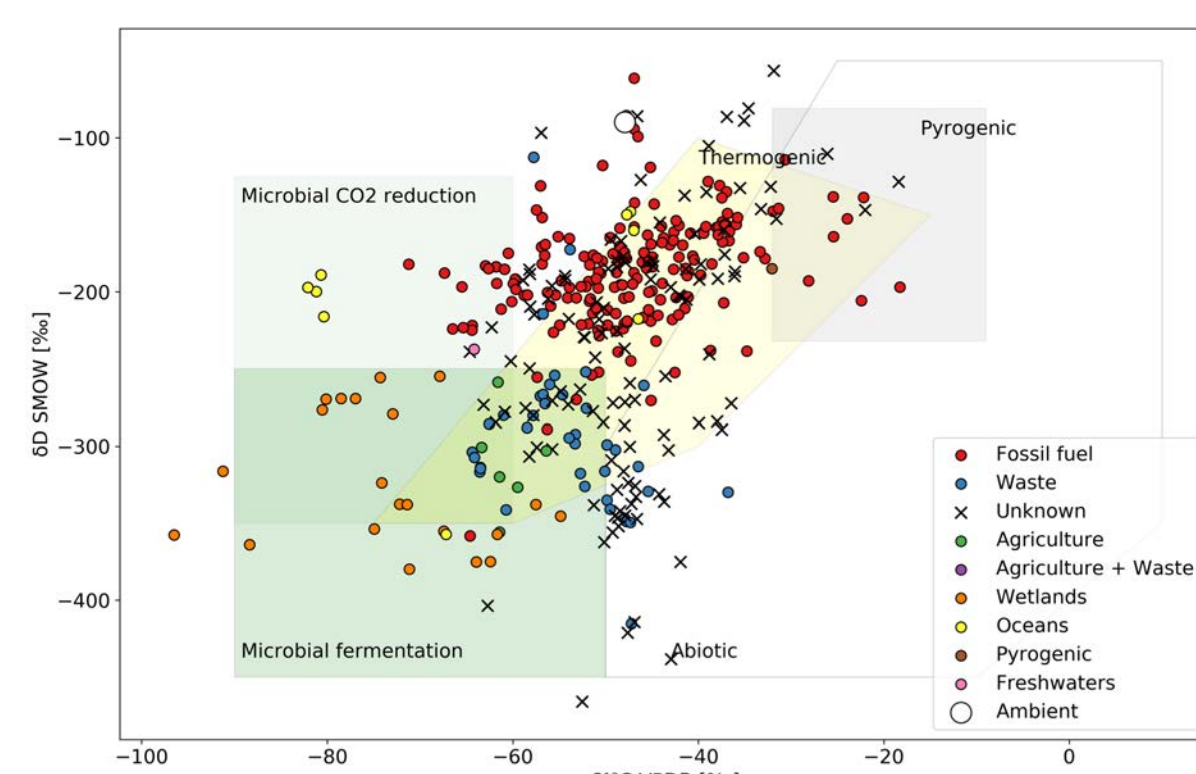
CH₄ concentration measurements
Upper Silesian coal mining region

WP2

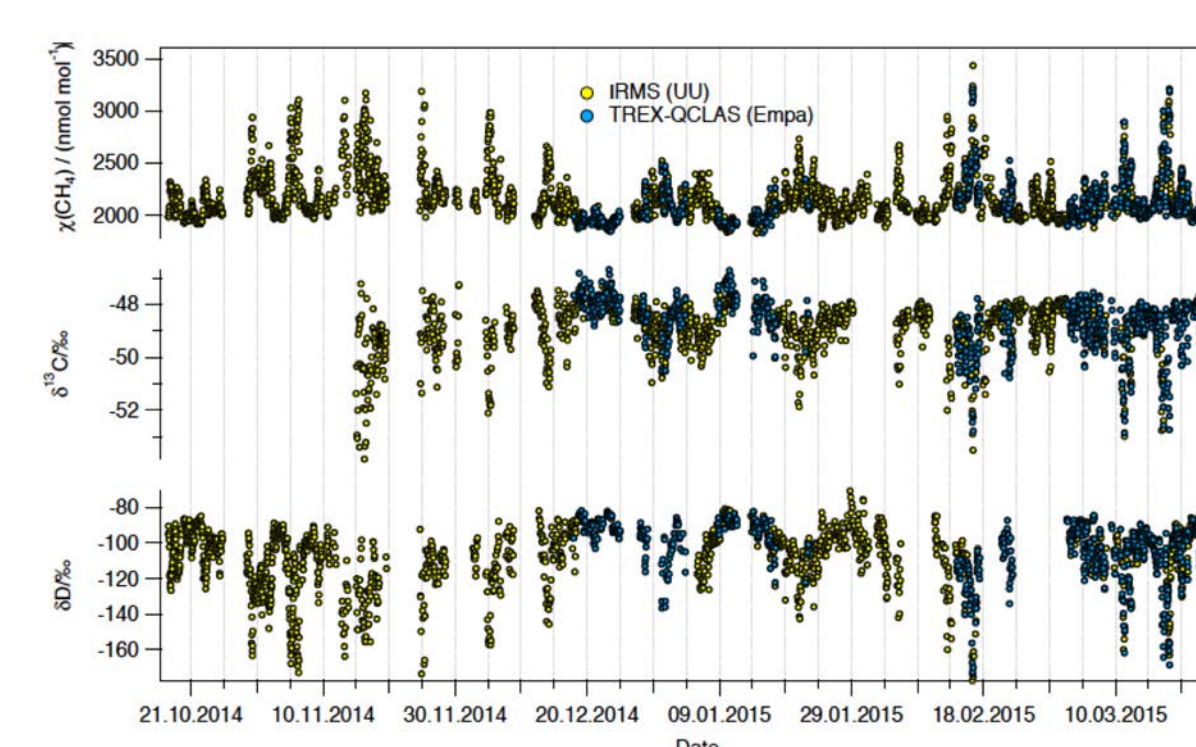
Isotopic measurements of CH₄

Distinguish sources

Provide novel EU-wide isotopic source-signature maps



MKP intercepts of δD vs. $\delta^{13}C$ of different
CH₄ sources



6-month time series
of δD , $\delta^{13}C$, and the
CH₄ mole fraction at
Cabauw

Röckmann et al.
2016



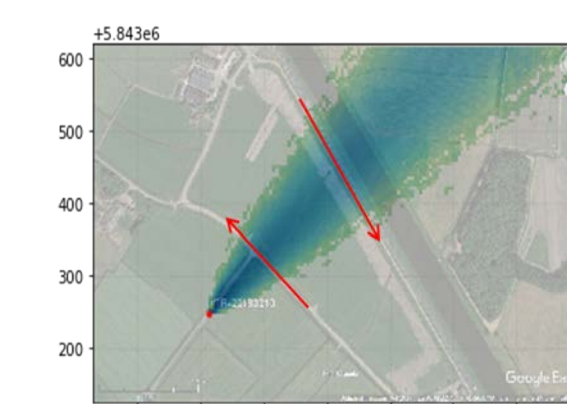
WP3

Modelling framework for CH₄

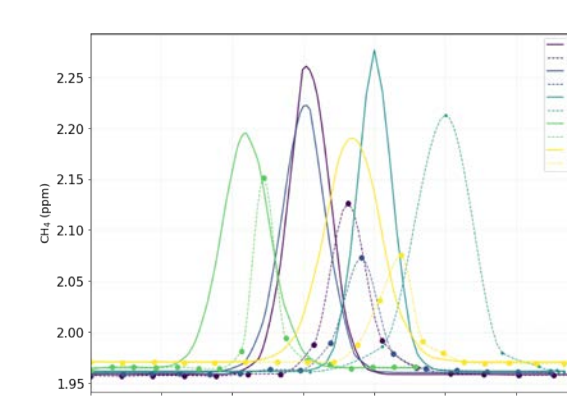
Linking modelling and measurements by joint bottom-up and top-down activities

Qualify and quantify CH₄ emissions

Provide improved CH₄ inventories



GRAL simulated CH₄
concentration during a
tracer release experiment.



Simulated and measured CH₄ mole
fractions. Matching the areas below the
curves allows estimating the strength of
the source.



MicroHH simulated
dispersion from a point
source (arbitrary scales).



Training

Out-of-the-box Thinking

Out-of-the-box Thinking

Daily supervision

MEMO² schools



Conferences

Teaching

Joint campaigns

Secondments

Field measurements

Courses

ESR collaboration

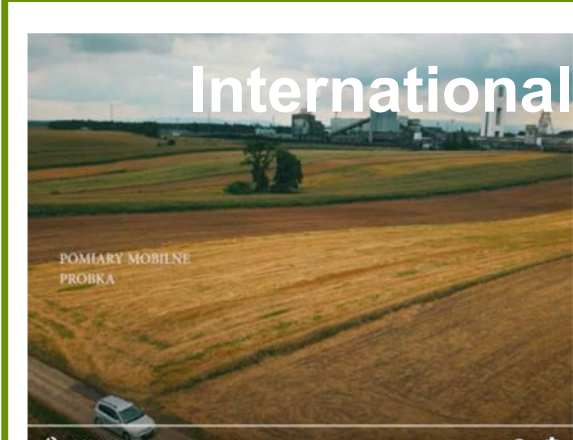
Lab work

International workshops

Publications



Joint activities
and courses to
benefit from each
others experience.



International campaigns
to foster
collaborations and
mutual data use



Secondments &
visits as chance
for cultural
exchange and
knowledge transfer



Scientific networking
to introduce your project and
results, and become part
of the research community.



More results? MEMO² publications

Highlights

- Urban CH₄ emissions: Studies have been carried out in >10 EU cities, and we are now able to detect and quantify CH₄ leaks in cities at the street-level. The method is ready to be rolled out at larger scale, also together with interested network operators.
- Oil and gas production: We carried out a large study in the main oil & gas region in Romania: ROMEO. The video tells the story!
- Coal mining: In collaboration with CoMET we quantified the emissions from the Upper Silesian coal mining area. First publications are available
- Modelling: Micro-scale plume modelling is significantly improved. The two movies show how a plume from a constant point source evolves, using a MicroHH model and a GRAL model.

MEMO² is classified as REA Success Story!



Take-home message

- MEMO² contributed significantly to a better understanding of the global CH₄ budget and to develop mitigation measures
- International scientific networks such as MEMO², incl. data and knowledge exchange are useful & urgently needed.
- Joint measurement campaigns = high mutual benefit.
- Problem solving and developing mitigation strategies needs interdisciplinary & intersectoral collaborations.



Utrecht University



Empa

Materials Science and Technology

TNO innovation
for life



university of
 groningen



ECN



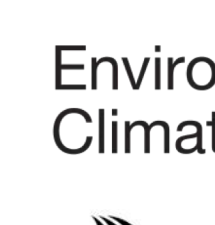
UNIVERSITÄT
HEIDELBERG
ZUKUNFT
SEIT 1386



GEOMAR
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Umwelt
Bundesamt



AGH



Environment and
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