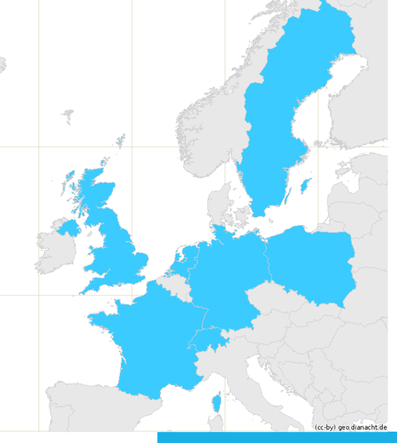


MEMO²
MEthane goes MObile – MEasurements and MOdelling

MEthane goes MObile
MEasurements and MOdelling

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

AIM of MEMO² as an H2020 ITN-ETN:

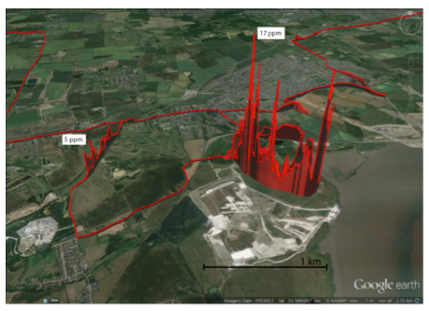
MEMO² will develop and implement unique small–scale mobile measurement and modelling systems for policy-relevant emission estimates through EU-wide research and training collaboration between academic and non-academic partners.
MEMO² will help to identify and evaluate CH_4 emissions and support mitigation measures by:
I) Developing novel measurement and modelling tools *and*
II) Educating qualified scientists in the use and implementation of interdisciplinary knowledge and techniques

Scientific Work Packages

WP1

Mobile measurements of CH_4

- Key measurement components are fast and accurate analysers on mobile platforms
- Aim: **map the small-scale distribution of CH_4 across Europe**, which will allow identifying and quantifying CH_4 emissions at the local scale
- Assigned on „focus source types“ as wetlands, landfills, emissions of cities/ agriculture/mining, lakes, gas leaks



Detection of CH_4 plumes during mobile CH_4 measurements around the Mucking landfill site near London, UK (Zazzeri et al. 2015)

MEMO² will cover CH_4 emissions on a European scale.

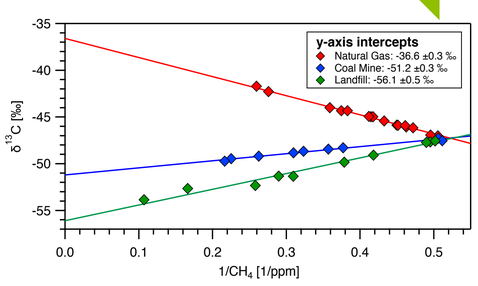
take samples for isotopic analyses
Provide source information

WP2

Isotopic measurements of CH_4

- Measurements of the isotopic composition of CH_4 will identify responsible sources for atmospheric CH_4 observations
- Aim: provide a **novel EU-wide “isotopic source signature maps”** of the most important CH_4 sources, which provides important input for the use of isotope information in atmospheric models

We can distinguish between over-lapping sources for better quantification.



“Keeling plot” for identification of different CH_4 sources with isotope measurements. In a plot of δ versus inverse mole fraction, the y-axis intercept of the linear fit to the data returns the isotopic composition of the source (Zazzeri et al. 2015)

Provide CH_4 concentrations and emission factors for the modelling activities in WP3
Provide campaign support and information on CH_4 inventories

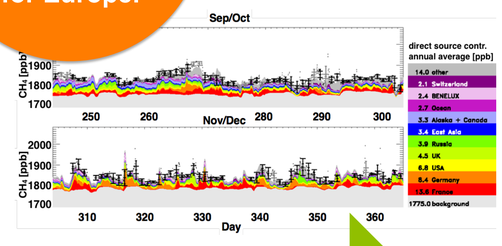
WP3

Modelling – A multi–scale interpretation framework for mobile CH_4 observations

- Linking modelling and measurement WPs by joint bottom-up and top-down activities
- Aim: **qualify and quantify CH_4 emissions** by developing / using innovative modelling tools, **provide improved CH_4 inventories**
- Modelling tools are complementary and applicable on various scales
  - LES at local scales
  - Flow patterns including mixed sources at regional scales
  - Forward simulations of CH_4 concentrations and top-down emissions at European scales

Provide source information

MEMO² will deliver improved CH_4 emission maps for Europe.



Inverse modelling attribution of measured CH_4 mixing ratios (end 2011) at Schauinsland to source regions in and outside Europe, as indicated by the colors (Bergamaschi et al. 2005)

Training and administrative Work Packages

Focus on **intersectoral training** including several second-ments to non-academic and industrial partners

Synergistic use of competencies within the network to ensure high quality of supervision

WP4

Training

- 13 PhD students will follow a interdisciplinary training on different levels
- Aim: educate “cross-thinking” scientists
- Training will focus on

Target competencies

- Effective and interactive use of tools, e.g. technologies, knowledge, and language
- Act autonomously within the “big picture”
- Function and interact synergistically
- Responsibly conduct and manage research

Holistic approach on imparting key competencies to tackle scientifically complex and societally relevant issues

International
conferences, collaborations

Network
schools, campaigns, meetings, secondments

Local
courses, teaching, publications, supervision, secondments

Out-of-the-box Thinking | Out-of-the-box Thinking

WP5

Management

- Includes scientific and administrative management
- Aim: **ensure high quality, efficiency, and visibility of the project** by implementing a coherent and effective work plan

= TEAM work

WP6

Ethics

- Aim: ensure application of ethical standards and guidelines
- Includes objective and transparent procedures, data handling and publication

= TEAM work

website

TEAM

Utrecht University · Empa Materials Science and Technology · TNO innovation for life · university of groningen · UNIVERSITÄT HEIDELBERG ZUKUNFT SEIT 1386 · GEOMAR Helmholtz Centre for Ocean Research Kiel · WAGENINGEN UNIVERSITY & RESEARCH · UNIVERSITÉ DE VERSAILLES ST-QUENTIN-EN-YVELINES · ECN · Umwelt Bundesamt · AGH · LUNDS UNIVERSITET · PICARRO · ROYAL HOLLOWAY UNIVERSITY OF LONDON · université PARIS-SACLAY · AVFALL SVERIGE · Environment and Climate Change Canada

Further project partners: National Physical Laboratories (GB), SHELL (NL), Isoprime (GB), OonKAY(NL), Afvalzorg Deponie (NL), Viridor (GB), Whiffle Weather Finecasting (NL)