

Bremen and Berlin scientists investigate Europe's largest source of the greenhouse gas Methane

Methane, (CH₄), and Carbon Dioxide, (CO₂) are the most important greenhouse gases released by man. Researchers from the University of Bremen and the Free University of Berlin are participating in an aircraft research campaign in the Upper Silesia Coal Mine Basin, Poland to measure methane and carbon dioxide emissions and its regional distribution. The coal mining area in the Upper Silesian Basin around the city of Katowice, Poland is the largest sources of methane gas emissions in Europe but not well quantified. This is why scientists from the University of Bremen and the Free University of Berlin are making some unique remote sensing measurements from a research aircraft.

This campaign is part of a larger research campaign being conducted and coordinated by the German Space Agency (DLR – Deutsches Zentrum für Luft- und Raumfahrt), called CoMeT (Carbon dioxide and Methane Mission), and also includes DLR aircraft and a French aircraft from CNRS as well as ground based measurements to determine the distribution of methane gas emissions Europe-wide. Initial results are to be presented and discussed in a workshop in November 2018. CoMeT is not only a collaboration between the Bremen and Berlin universities and the DLR, but is also in close cooperation with the Cracow University of Technology and the Max-Planck-Institute of Chemistry in Jena. The prevailing sunny weather in the month of May was a great advantage for the campaign. "To obtain the best measurements, we need not only our instruments but also plenty of sunshine", says project leader Dr. Heinrich Bovensmann of the Institute of Environmental Physics, University of Bremen. Cloudy skies make the analysis more complicated. The UB instrument flies on board the Cessna aircraft owned by the Free University of Berlin, and research flights will take place for a period of three weeks until 17th of June. The first series of flights have been very successfully conducted during the latter half of May. Already the second day, the research team was already able to achieve a precise and unique set of coordinated overflights involving four participating aircrafts, as well as the mobile ground based measurements.

Testing new methods for monitoring greenhouse gases

A global reduction of greenhouse gas emissions necessitates an effective monitoring of greenhouse gases. One of the scientific objectives of project CoMeT is to test novel methods for determining regional methane emissions such as those being used over the Katowice region. Data gathered by different systems, whether ground-based sensors, airborne instruments or on satellites, are needed to obtain a more detailed picture of the region's methane emissions. Polish scientists are responsible for gathering the ground-based measurements and also establishing contacts with the coal mining companies.

A one-of-a-kind Instrument of the Institute of Environmental Physics in Bremen

The MAMAP (Methane Airborne MAPper), a worldwide one-of-a kind methane, CO₂ sensor, which was developed by the University of Bremen, is installed on board the Cessna aircraft of the Free University of Berlin. "We use the MAMAP to measure the distribution of methane and also CO₂ in the region", says Bremen physicist and MAMAP developer Konstantin Gerilowski. He is assisted during the campaign by two young researchers, Sven Krautwurst and Jakob Borchardt. In order to have successful flights, piloting skills and forecasting expertise are essential. These are provided by the team from the Free University of Berlin. "Under the prevailing cloud conditions, it is particularly challenging to make exact weather forecasts for clouds during the campaign," says Dr. Thomas Ruhtz, a member of the Berlin team. The flight weather forecasts play an important role in coordinating ground-based and airborne measurements. For the past ten years, the University of Bremen and the Free University of Berlin cooperated successfully on airborne measurements of air pollutants and greenhouse gases.

Part of a larger undertaking

The research campaign described above is part of the large CoMeT. From mid-May to mid-June 2018, the DLR (German Space Agency) is coordinating airborne measurements of CO₂ and CH₄ over Europe using state-of-the-art instruments on board the research aircraft HALO (High Altitude and Long Range

Research Aircraft) This part of CoMet is funded by the DFG (Deutsche Forschungsgemeinschaft), the University of Bremen and the Free University of Berlin.

Further information:

<http://www.iup.uni-bremen.de/eng/>

<https://www.uni-bremen.de/de/universitaet/presse/pressemitteilungen/detailansicht/news/detail/News/wissenschaftler-erforschen-gr%C3%B6%C3%9Fte-methanquelle-europas.html>

https://www.dlr.de/dlr/en/desktopdefault.aspx/tabid-10081/151_read-27980/year-all/#/gallery/1725

<https://userpage.fu-berlin.de/geoiss/de/home.html>

Contact:

Dr. Heinrich Bovensmann
Institut für Umweltphysik (IUP)
Fachbereich Physik/Elektrotechnik
Universität Bremen
Tel.: +49 421 218 62102

E-Mail: Heinrich.Bovensmann@uni-bremen.de

Dr. Thomas Ruhtz
Institut für Weltraumwissenschaften
Fachbereich Geowissenschaften
Freie Universität Berlin
E-Mail: ruhtz@zedat.fu-berlin.de

Dr. Andreas Fix
Institut für Physik der Atmosphäre
Deutsches Zentrum für Luft- und Raumfahrt (DLR)
Tel.: +49 81 53282-577
E-Mail: andreas.fix@dlr.de



Bremen and Berlin scientists at Katowice airport after their first successful flight over Upper Silesia. Behind them is the Cessna aircraft of the Free University of Berlin which was carrying the MAMAP-Sensor of the University of Bremen. (Photo: Heinrich Bovensmann, University of Bremen).



Bremen and Berlin scientists while preparing the aircraft at the Katowice airport. (Photo: Heinrich Bovensmann, University of Bremen).