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The Carbon dioxide and Methane mission (CoMet) – Initial results

Limitations of simple mass balance approaches

**S. Krautwurst, K. Gerilowski, J. Borchardt, T. Ruhtz, J. Gordon, J.
P. Burrows, and H. Bovensmann, and the CoMet-Team
(IUP)**

Abstract

Methane (CH₄) is, after carbon dioxide (CO₂), the second most important anthropogenic greenhouse gas in our atmosphere. However, reliably estimating CH₄ emissions, as emitted by point sources like coal mining shafts, is still a major challenge. In 2018, an attempt was made to measure and subsequently quantify emissions of one of the largest CH₄ emitting areas in Europe. This area is known as the Upper Silesian Coal Basin (USCB, Poland) and emits around 500 ktCH₄/yr from various mining shafts distributed over around 50 x 50 km². This talk will give an overview of the recently (May/June 2018) executed CoMet campaign, which had the goal to quantify emissions from single shafts to the entire basin. During the campaign various platforms (aircraft, car, stationary) and instruments (active and passive remote sensing, in-situ, wind lidar, FTIR) were used to achieve that goal, whereas also observations over power plants were acquired for testing the instruments, methods, and also the coordination of different aircraft. Here, we will focus on results based on the acquired airborne remote sensing and in-situ data and how they are used during the flux inversion. Moreover, limitations of the observations and of simple mass balance approaches are outlined.