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**Title:**

Combining airborne and ground based remote sensing (lidar, spectrometer) as well as in-situ techniques to determine CH<sub>4</sub> emissions of a European CH<sub>4</sub> emission hot spot area – initial results from COMET

**Author list:**

Heinrich Bovensmann, and the CoMet team\*

**Abstract**

In order to improve our knowledge on emissions of the second most important anthropogenic greenhouse gas Methane (CH<sub>4</sub>), a coordinated measurement campaign in the Upper Silesian Coal Basin (USCB) in Poland, one of Europe's anthropogenic CH<sub>4</sub> hot spots, will be executed. The 4 weeks campaign in May/June 2018 will be carried out by a team of scientists deploying in-situ and remote sensing instruments on three aircrafts as well as on ground. Two Cessna aircraft – one equipped with in-situ sensors for CH<sub>4</sub> and related gases, another equipped with the CH<sub>4</sub> remote sensing instrument MAMAP - will concentrate on characterizing the CH<sub>4</sub> distribution in the USCB with great horizontal and vertical detail. The German research aircraft HALO - equipped with the CH<sub>4</sub> and CO<sub>2</sub> detecting lidar CHARM-F, as well as with in-situ sensors – will provide the larger scale picture about atmospheric CH<sub>4</sub> distributions. These aircraft based measurements are complemented by ground based measurements: several ground-based FTIR instruments as well as wind lidars will be deployed. In addition, in-situ measurements from mobile vans and small drones will provide near-surface information of CH<sub>4</sub>. GOSAT and Sentinel-5P CH<sub>4</sub> products will be compared with the ground-based and airborne data. In order to assess regional and local scale fluxes using the data set collected, a hierarchy of modelling approaches (mass balance/Gaussian plume modelling, regional inverse modelling, chemistry-climate modelling with regional refinement) will be used. The paper will present initial findings from the CoMet campaign in the Upper Silesian Coal Basin with a focus on CH<sub>4</sub> and steps towards the exploitation of the observations.

\*The CoMet team: A.Fix, A.Amediek, T.Andersen, J.Borchardt, H.Bovensmann, Ch.Büdenbender, J.P.Burrows, A.Butz, H.Chen, A.Dandocsi, M.Eckl, G.Ehret, D.Ene, A.Fiehn, M.Galkowski, Ch.Gerbig, F.Hase, M.Heimann, K.Gerilowski, Ch.Kiemle, R.Kleinschek, J.Kostinek, S.Krautwurst, M.Kud, A.Kuze, P.Jöckel, J.Landgraf, A.Luther, H.Maazallahi, Ch.Mallaun, J.Marshall, M.Menoud, J.Nęcki, K.Pfeilsticker, M.Quatrevalet, M.Rapp, T.Röckmann, A.Roiger, T. Ruhtz, M.Schmidt, M.Stanisavljevic, J.Swolkień, C.van der Veen, N.Wildmann, M.Wirth, M.Zöger