Title:
Combining airborne and ground based remote sensing (lidar, spectrometer) as well as in-situ techniques to determine CH4 emissions of a European CH4 emission hot spot area – initial results from COMET

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Abstract
In order to improve our knowledge on emissions of the second most important anthropogenic greenhouse gas Methane (CH4), a coordinated measurement campaign in the Upper Silesian Coal Basin (USCB) in Poland, one of Europe’s anthropogenic CH4 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 CH4 and related gases, another equipped with the CH4 remote sensing instrument MAMAP - will concentrate on characterizing the CH4 distribution in the USCB with great horizontal and vertical detail. The German research aircraft HALO - equipped with the CH4 and CO2 detecting lidar CHARM-F, as well as with in-situ sensors – will provide the larger scale picture about atmospheric CH4 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 CH4. GOSAT and Sentinel-5P CH4 products will be 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 CH4 and steps towards the exploitation of the observations.