CH_4 lidar measurements during the CoMet 2018 airborne field campaign

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Abstract

Active remote sensing techniques using lidar show much promise to provide accurate measurements of methane columns from air- and spaceborne platforms. Such measurements on global and regional scales are urgently required as input for models helping to provide additional information to constrain bottom-up inventories.

Installed onboard the German research aircraft HALO the integrated-path differential-absorption (IPDA) lidar CHARM-F measures weighted vertical columns of the greenhouse gases CH_4 (but also CO_2) below the aircraft and along its flight track aiming at high accuracy and precision.
Results will be shown from the deployment during the CoMet field campaign that was carried out in spring 2018 with its main focus on one of the major European hot spots in methane emissions: the Upper Silesian Coal Basin (USCB) in Poland. First analyses reveal a measurement precision of below 0.5% for 20-km averages and also low bias, which was assessed by comparison with in-situ instruments. The measurements flights were designed to capture individual methane plumes from coal mine venting, but also measure regional gradients from this complex source region. Many other different instruments, both airborne and ground-based, complemented the lidar measurements to provide a comprehensive dataset for model analyses.

CHARM-F also acts as the airborne demonstrator for MERLIN, the “Methane Remote Lidar Mission”, conducted by the German and French space agencies DLR and CNES with launch foreseen in 2024. In this context, the airborne lidar data are likewise important for mission support such as for e.g. algorithm development and improvement.