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Passive airborne remote sensing and plume model inversion of carbon dioxide (CO2) from coal-fired power plants measured by the MAMAP/CarbonMapper instrument

Thomas Krings (1), Michael Buchwitz (1), Konstantin Gerilowski (1), Heinrich Bovensmann (1), John Burrows (1), Andreas Tretner (2), Torsten Sachs (2), and Jörg Erzinger (2)

(1) Institute of Environmental Physics (IUP), University of Bremen, Germany (thomas.krings@iup.physik.uni-bremen.de), (2) Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Germany

MAMAP/CarbonMapper is an airborne passive remote sensing instrument designed for measuring columns of methane and carbon dioxide (CO2) below the aircraft. Retrieval precision of the measured column relative to background is typically 1% or better. Its ground pixel size is about 25m x 35m for an aircraft altitude of 1000m and a ground speed of 200km/h.
In 2007 measurement campaigns at the coal-fired power plants Jänschwalde and Schwarze Pumpe operated by Vattenfall Europe were performed. The column parameters for CO2 have been retrieved with a modified version of SCIAMACHY's WFM-DOAS algorithm. To invert for the CO2 emission rates of the power plants a gaussian plume model approach has been chosen. The results are compared to a simple Gaussian Integral method approach and to the CO2 emission rates directly derived from power generation as stated by Vattenfall.