Geophysical Research Abstracts
Vol. 21, EGU2019-5133, 2019
EGU General Assembly 2019

Spectral Sizing and Sensitivity Studies of a Proposed Passive Space-Borne CO_2 Monitoring Mission at High Spatial Resolution

Jonas Wilzewski (1,2), Johan Strandgren (1), Bernhard Mayer (2), André Butz (3), Patrick Jöckel (1), Klaus Gierens (1), Mariano Mertens (1), Carsten Paproth (4), and Anke Roiger (1)

(1) Institute of Atmospheric Physics, German Aerospace Center DLR, Oberpfaffenhofen, Germany, (2) Meteorological Institute Munich, Ludwigs-Maximilians-Universität, Munich, Germany, (3) Institute of Environmental Physics, Ruprecht-Karls-Universität, Heidelberg, Germany, (4) Institute of Optical Sensor Systems, German Aerospace Center DLR, Berlin-Adlershof, Germany

Following the Paris climate agreement from 2015, carbon dioxide emissions have to be significantly reduced if the globally averaged temperature increase shall stay below 2°C. Satellite remote sensing of carbon dioxide with a high spatial resolution allows for the independent monitoring of such carbon dioxide emissions from localized individual sources, including their corresponding increase and decrease with time. Here we present the concept of, and sensitivity studies for, a proposed satellite-borne imaging spectrometer aiming towards atmospheric carbon dioxide column concentration (XCO_2) retrievals at a high spatial resolution of 50 m x 50 m.

The high spatial resolution is compensated with a moderate spectral resolution. XCO_2 retrievals from spectrally degraded GOSAT spectra are used to investigate the impact of the reduced spectral resolution on the XCO_2 retrieval accuracy through comparison with collocated reference retrievals from the Total Carbon Column Observing Network (TCCON). Using CO_2 absorption features near either 2.0 μm or 1.6 μm, XCO_2 retrievals with degraded GOSAT spectra scatter around TCCON measurements by less than 4 ppm. Furthermore, a numerical instrument model is used together with the radiative transfer and retrieval software RemoTeC to simulate synthetic XCO_2 retrievals in order to further characterize the retrieval accuracy and evaluate the carbon dioxide monitoring capabilities with the proposed space-borne high spatial resolution spectrometer.