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Developments of global greenhouse gas retrieval algorithm using Aerosol information from GOSAT-CAI

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Human activities have resulted in increasing atmospheric CO_2 concentration since the beginning of Industrial Revolution to reaching CO_2 concentration over 400 ppm at Mauna Loa observatory for the first time. (IPCC, 2007). However, our current knowledge of carbon cycle is still insufficient due to lack of observations. Satellite measurement is one of the most effective approaches to improve the accuracy of carbon source and sink estimates by monitoring the global CO_2 distributions with high spatio-temporal resolutions (Rayner and O'Brien, 2001; Houweling et al., 2004). Currently, GOSAT has provided valuable information to observe global CO_2 trend, enables our extended understanding of CO_2 and preparation for future satellite plan. However, due to its physical limitation, GOSAT CO_2 retrieval results have low spatial resolution and cannot cover wide area. Another obstruction of GOSAT CO_2 retrieval is low data availability mainly due to contamination by clouds and aerosols. Especially, in East Asia, one of the most important aerosol source areas, it is hard to have successful retrieval result due to high aerosol concentration. The main purpose of this study is to improve data availability of GOSAT CO_2 retrieval. In this study, current state of CO_2 retrieval algorithm development is introduced and preliminary results are shown. This algorithm is based on optimal estimation method and utilized VLIDORT the vector discrete ordinate radiative transfer model. This proto type algorithm, developed from various combinations of state vectors to find accurate CO_2 concentration, shows reasonable result. Especially the aerosol retrieval algorithm using GOSAT-CAI measurements, which provide aerosol information for the same area with GOSAT-FTS measurements, are utilized as input data of CO_2 retrieval. Other CO_2 retrieval algorithms use chemical transport model result or climatologically expected values as aerosol information which is the main reason of low data availability. With more accurate aerosol information, it is expected to improve the accuracy of CO_2 retrieval algorithm and data availability.