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Lessons learned from GOSAT and toward to GOSAT-2 mission

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Greenhouse gases Observing SATellite (GOSAT) was launched on January 23, 2009, to monitor the global column concentration of carbon dioxide (CO_2) and methane (CH4) from space. Thermal and Near Infrared Sensor for Carbon Observation– Fourier Transform Spectrometer (TANSO-FTS), which is the main instrument of GOSAT, has been continuously measuring CO_2 and CH4 distributions globally every three days, and data distribution to the public started from Feb. 16, 2010. Over three years operational periods, the useful scientific data sets and interesting articles for carbon source/sink evaluation were produced and published, and these results have been supporting to well understanding of carbon cycle. Currently, the importance of space-based carbon observation has been approved and desired the continuous observation in toward. OCO-2, TanSat, MicroCarb and CarbonSat will be planned to launch in up-coming years and follow to observe the global carbon distribution. Through the GOSAT operation, we learned a lot of things on the instrument, software, processing algorithm and operation; what should be improved in the following mission. To elucidate the carbon cycle more precisely, our experiences were summarized and have to be approved on the mission design of GOSAT-2. In parallel, the feasibility studies such as sampling strategy, band expansion, mapping capability were carried out to answer; what should be emphasis and encouragement for a good understanding of CO_2 and CH4 sources and sinks and the underlying carbon cycle. The detail of lessons learned form GOSAT and the mission design of GOSAT-2 will be presented.