IWGGMS-20 - Documenting Two Decades of Greenhouse Gas Measurements from Space

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In 2004, a small group assembled at JAXA headquarters in Tokyo for the first International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-1). At that time, there were no dedicated greenhouse gas (GHG) missions in flight, but OCO and GOSAT had just been approved. Perhaps, the most important outcome of that first meeting was an agreement to collaborate closely to maximize the accuracy and coverage of the combined data products from these pioneering missions and to accelerate their acceptance by the scientific community.

During its first half decade, IWGGMS focused on development and testing of instruments for space-based GHG measurements and fostering a science community that could use their data for carbon cycle science and policy applications. As the OCO and GOSAT implementation progressed, the IWGGMS focus shifted from instrument design to the development of retrieval and flux inversion algorithms, calibration methods and validation approaches that would yield space-based atmospheric measurements with unprecedented precision and accuracy.

Finally, 5 years after the first IWGGMS, the GOSAT and OCO missions were ready to launch. Only GOSAT made it to orbit. The GOSAT team enlisted the OCO science team, and the collaboration continued and flourished. The GOSAT and OCO science teams had made dramatic progress during their mission implementation phases, but it soon became evident that they were not prepared to analyze the GOSAT data. Both the accuracy and the speed of the level 2 algorithms needed substantial improvements and more rigorous on-orbit cal/val methods were needed. Close collaboration between the GOSAT and OCO teams and the growing participation in IWGGMS by the international carbon cycle community accelerated the progress toward these goals. It also highlighted the value of a truly international space-based GHG infrastructure. OCO-2 finally launched in 2014, just after IWGGMS-10. By that time, the calibration, validation and retrieval algorithms were more mature, but it still took more than a year for OCO-2 to deliver its first data products. Since that

time, continuing improvements in the GOSAT and OCO-2 products have been reported annually at the IWGGMS meetings, along with their use in addressing increasingly complex carbon cycle and policy questions. GOSAT and OCO-2 have since been joined by GOSAT-2, S5p TROPOMI and OCO-3. More recently, these global CO2 and CH4 mappers have been joined by increasing numbers of high-spatial-resolution sensors, optimized for detecting intense plumes of CO2 and CH4. This fleet of sensors is now providing key insights into carbon cycle science and supporting ongoing international efforts to reduce GHG emissions. IWGGMS is continuing to provide the primary forum for the coordination of these missions and the analysis their data. This presentation will summarize our progress so far and look to the future, as both the capabilities and demand for transparent, global GHG measurements grows.

Presentation file

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Meeting homepage

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