

GHG-CCI QSR Apr-Jun 2011

1. Overall Progress

The GHG-CCI project has been kicked-off on 1. Sept. 2010. This is the 3rd Quarterly Report of this project. The GHG-CCI project proceeded as planned and significant progress has been made as explained below. No major problems have been encountered so far and the project will proceed as planned. During the reporting period focus was on: (i) Preparation of the Product Validation Plan (PVP), which has been delivered as planned. The PVP is available from the GHG-CCI website (<http://www.esa-ghg-cci.org>, -> documents). (ii) To establish the so-called "Data Base Task 2" (DBT2), which contains primarily validation data, as a (password protected) ftp server and website, (iii) compilation of the "Round Robin Data Package" (RRDP), which will contain primarily the satellite data products generated within GHG-CCI (a first release is planned for month 12, i.e., Aug. 2011), (iv) to further improve the retrieval algorithms, data processing with improved algorithms and data analysis, incl. comparisons with independent ground-based observations, models and inter-comparisons of the various GHG-CCI data products, (v) writing of the Algorithm Theoretical Basis Document (ATBD) (v0 is due end of Aug. 2011), (vi) writing of the Algorithm Inter-comparison and Error Characterization & Analysis Report (AIECAR, v0 is due end of Aug. 2011), (vii) preparation of the 3rd Progress Meeting (which will be held in Paris, LSCE, 6. Oct. 2011), (viii) and a number of other activities such as conference organization and participation (e.g., 7th International Workshop of Greenhouse Gas Observations from Space, IWGGMS-7, Edinburgh, UK, 16-18. May 2011) and preparation of peer-reviewed publications (e.g., Butz et al., Geophys. Res. Lett., 2011, Parker et al., Geophys. Res. Lett., in press, 2011, Noel et al., AMTD, 2011).

2. Data Gathering and Quality

All mandatory required external satellite and non-satellite data products as well as model output needed for the project are available within the GHG-CCI team with the required quality (see Data Access Requirements Document (DARD), available from the GHG-CCI website (see above)). No major problems with respect to external data have been identified so far. For example, all Level 1 data products from SCIAMACHY and GOSAT as well as all ground-based TCCON (Total Carbon Column Observing Network) data needed for validation are available until at least end of 2010. As the focus of GHG-CCI is to produce data products covering 2003-2010 from SCIAMACHY and 2009-2010 from GOSAT this means that all relevant mandatory input and comparison data are available for the GHG-CCI team.

3. Product Specifications

A first version of the Product Specification Document, PSDv1, is available from the GHG-CCI website (see above). Some specific comments on PSDv1 from users have been received as well as general comments (applicable to all CCI sub-projects) from CMUG, which will be considered for future updates. The next major update is planned for month 24, i.e., for the end of the Round Robin phase (see below). The final version of the PSD (due month 36) will contain a description of the final data products generated with the selected best algorithms.

4. Round Robin

The GHG-CCI Round Robin (RR) phase covers the first 2 years of this project. For each of the core data product at least two algorithms are in competition. In total, 9 "ECV Core Algorithms" (ECAs; delivering near-surface sensitive XCO₂ and XCH₄ from SCIAMACHY and GOSAT) are being further developed at 3 institutions and 6 "Additional Constraints Algorithms" (ACAs; providing (typically) above boundary layer CO₂ and CH₄ information from MIPAS, SCIAMACHY, IASI, AIRS, ACE-FTS) from 3 institutions. At the end of this phase a decision will be made which algorithms perform best. The selection will be based on criteria as defined in the Round Robin Evaluation Protocol (RREP, v1 is available on the GHG-CCI web site,

see above). Two key RR documents are in preparation, ATBD and AIECAR (see above). First versions of these documents are due end of August 2011. ATBD will contain a detailed description of all participating algorithms. AIECAR will contain an assessment of the error characterization of all algorithms including first detailed comparisons with (independently measured and modeled) reference data and a first comparison with the user requirements as specified in the User Requirements Document (URD, v1 is also available on the GHG-CCI web site, see above). The comparison also includes non-European data products, most notably the CO₂ and CH₄ data products retrieved from GOSAT at NIES and NASA/ACOS. As the final version of AIECARv0 is not yet available only preliminary conclusions can be drawn at this point. A preliminary conclusion is that some requirements likely have already been met (e.g., single observation precision requirements), but not all. Especially achieving the accuracy requirement for CO₂ remains a challenge. There are differences between the alternative algorithms but clear “winners” have not yet been identified. This requires more studies which will be conducted in the coming months.

5. International Scientific Cooperation

International scientific cooperation during the reporting period was centered around the “7th International Workshop on Greenhouse Gas Observations from Space” (IWGGMS-7), which took place from 16-18 May 2011 in Edinburgh, UK, co-organized by GHG-CCI team members. Several GHG-CCI relevant presentations have been given (available from <https://sites.google.com/site/iwggms7hq>) and intensive discussion have taken place with colleagues from, e.g., NASA (working on GOSAT, OCO-2, TES CO₂ and CH₄ retrievals) and JAXA and NIES (related to GOSAT data products and ongoing and future co-operation). It has for example been agreed to exchange data and information between GHG-CCI and a JPL led project in the US (led by Dr. Susan Kulawik) focusing on error characterization of satellite retrieved CO₂. For GOSAT retrieval and data analysis next steps have been planned with the “SWIR Carbon Observation Retrieval Model Inter-comparison Project” (SCORE-MIP, see <http://sites.google.com/site/scoremip/>), where GHG-CCI members are very active. GHG-CCI members were also very active in contributing to conference organization (e.g., in co-chairing the session CO₂ and CH₄ remote sensing session at EGU, Vienna, 4-8 April 2011, including GHG-CCI related presentations). In parallel, a number of other activities have also been carried out, e.g., related to future planned or potential European GHG missions (e.g., Sentinel-5, CarbonSat). Furthermore the co-operation with the European GMES FP7 project MACC has been strengthened. It is for example planned to combine the next meeting of the MACC GHG group with the 3rd Progress Meetings of GHG-CCI.

6. Next Steps

Focus of the next three months (July-September 2011) will be on finishing the ATBD and AIECAR documents. First versions will be delivered end of August. During September focus will be on preparing the 3rd Progress Meeting which will be held at LSCE in Paris on 6 Oct. 2011. A focus of that meeting will be to review the achievements of the 1st year and to refine the plan for the 2nd year. This plan will be driven by the fact that the Round Robin phase ends in August 2012. This means that at that point in time all data have to be processed using the improved algorithms and the data quality of all data products has to be assessed including validation by the independent validation team. This requires that in spring 2012 all data products have to be available and the time before has to be used for further algorithm improvements and data processing.