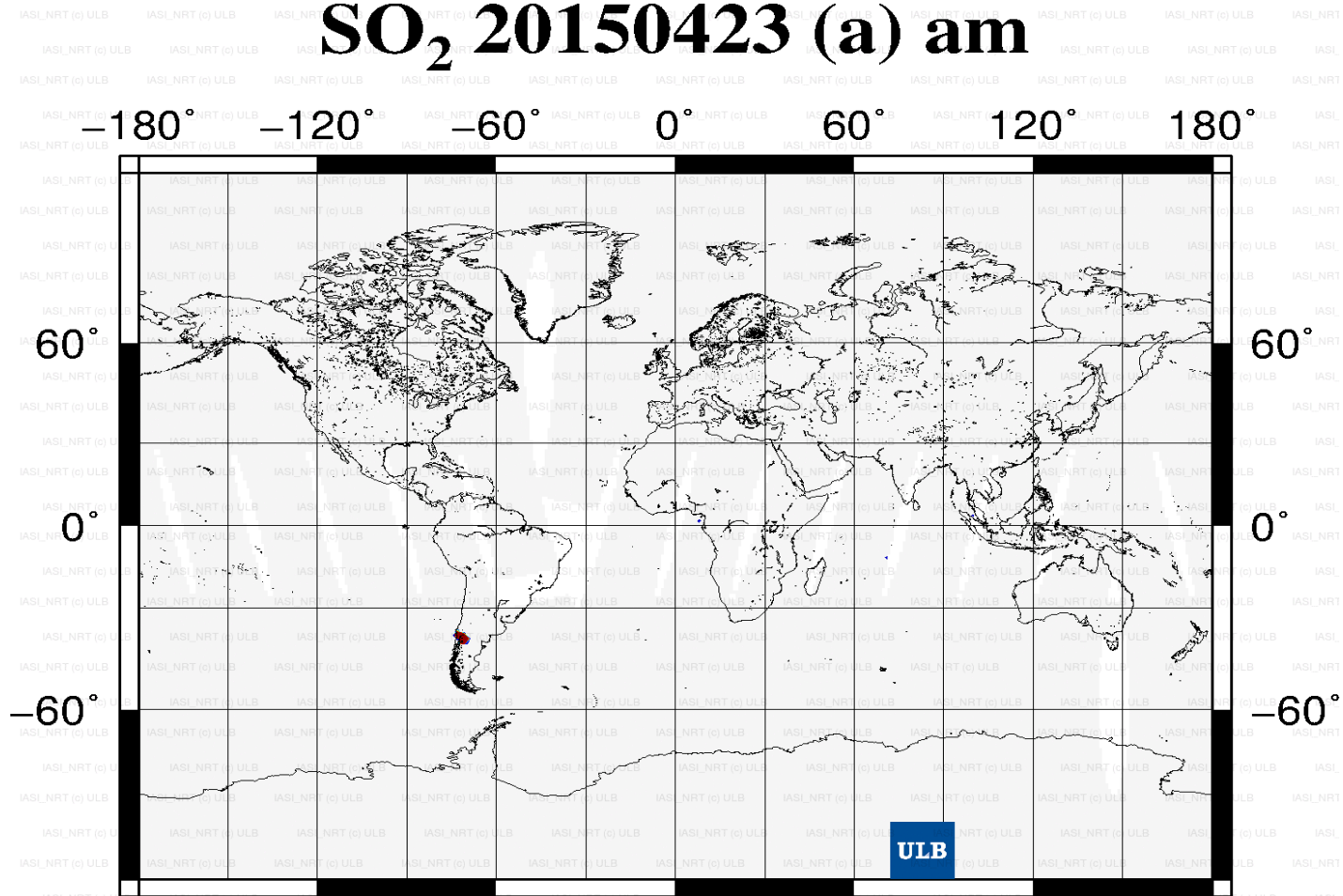
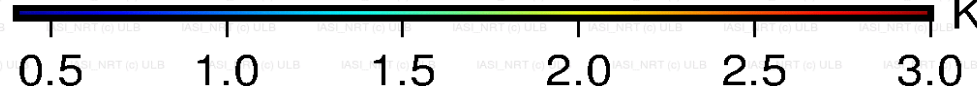


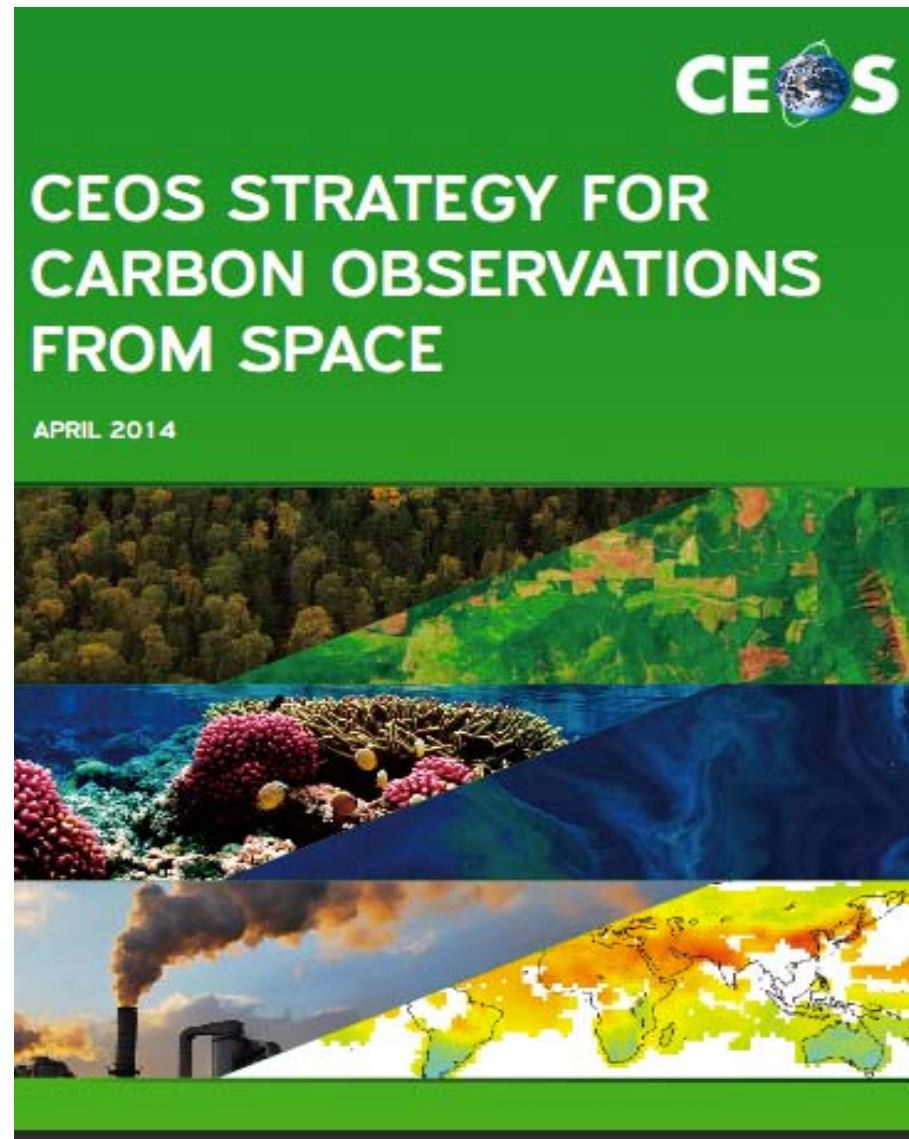
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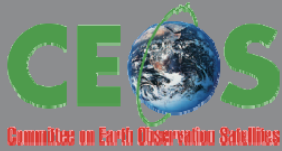


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- Several countries and space agencies have and are currently planning to launch satellites in the 2015-2025 time frame to obtain GHG measurements from space.
- A single satellite (or national constellation) can not fulfill established GHG user requirements (e.g. GCOS – 4 hourly measurements).
- The need for a GHG Constellation is clearly outlined in the CEOS Strategy for Carbon Measurements from Space.





# CEOS Recommendations on a GHG Constellation



[http://ceos.org/document\\_management/Publications/WGClimate\\_CEOS-Strategy-for-Carbon-Observations-from-Space\\_Apr2014.pdf](http://ceos.org/document_management/Publications/WGClimate_CEOS-Strategy-for-Carbon-Observations-from-Space_Apr2014.pdf):

## Carbon-Action-16:

CEOS Member Agencies with interests in CO<sub>2</sub>- and CH<sub>4</sub>-measuring **LEO missions** will sponsor or **co-sponsor one or more workshops** (and require a written report) to refine the scientific and policy requirements for quantitative data on atmospheric CO<sub>2</sub> and CH<sub>4</sub> from low Earth orbit. These meetings should involve the key international science and applications communities in specifying the technical foundation and scientific **requirements** for as well as the societal benefits **of future missions** to quantify atmospheric CO<sub>2</sub> and CH<sub>4</sub> from low earth orbit.

## Carbon-Action-17:

The **CEOS Atmospheric Composition VC** will coordinate the detailed planning and preparation for a **constellation of passive and active remote sensing instruments to measure CO<sub>2</sub> and CH<sub>4</sub> from low Earth** orbit with the higher spatial and temporal resolution and accuracy needed to monitor carbon sources and sinks.

## Carbon-Action-18:

CEOS Member Agencies with interests in CO<sub>2</sub>- and CH<sub>4</sub>-measuring **GEO missions** will sponsor or **co-sponsor one or more workshops** (and require a written report) to refine the scientific and policy requirements for quantitative data on atmospheric CO<sub>2</sub> and CH<sub>4</sub> from geostationary Earth orbit. These meetings should involve the broad, international science and applications communities in advancing the technical foundation and scientific **requirements** for as well as the societal benefits of **future missions** to quantify atmospheric CO<sub>2</sub> and CH<sub>4</sub> from geostationary orbit.

## Carbon-Action-19:

**The CEOS Atmospheric Composition VC will coordinate the detailed planning and preparation for a constellation of passive remote sensing instruments to measure CO<sub>2</sub> and CH<sub>4</sub> from geostationary orbit covering all longitudes with the spatial and temporal resolution and accuracy needed to monitor carbon sources and sinks.**

## Carbon-Action-20:

**The CEOS Atmospheric Composition VC, in cooperation with the CEOS WGCV Atmospheric Composition Subgroup, will provide coordination and support for the cross calibration of all satellite CO<sub>2</sub>- and CH<sub>4</sub>-measuring sensors, coordinate their observations, and cross validate their CO<sub>2</sub> and CH<sub>4</sub> products against accepted international standards, so that they can be integrated into single continuous global climate record.**

Transfer experience gained in the AQ Constellation to the GHG Constellation:

A GHG constellation should evolve from the existing missions by adding sensors making significant steps in the key requirement areas (temporal and spatial sampling/coverage, data accuracy), with the long term vision of a system as sketched in the CEOS strategy for Carbon Observations (ch. 4.8.1). As global aspects are dominating key questions and data needs, exploration of spatially dense sampling (GHG imaging) from LEO would be one next logical step in the evolution of a GHG constellation.

Validation is an essential part of QA. In this context the TCCON network is currently the backbone of satellite based GHG validation activities. This needs to be maintained and expanded. CEOS-ACC should highlight that and help to raise funds to maintain the system (not only on validation campaign basis) and explore new validation approaches towards smaller scales.

There is an international community already working closely together on GHG instrumentation, data retrieval, inverse modelling, validation etc. The community (incl. related space agencies) met yearly within the IWGGMS conference. CEOS-ACC should support and could benefit from IWGGMS.

A GHG constellation should be always seen in the context of ongoing in-situ network activities and activities aiming to better integrate satellite and in-situ data, with the vision of an integrated carbon observing system.

1. ACC (Space Agencies) to support the organisation of the yearly IWGGMS Meetings.
2. Agree on an open data policy for GHG data from space (e.g. TanSat) and ground-based/in-situ data (FTS instruments in China)
3. Share/agree on mission requirements.
4. Support the establishment of a common product format (share specifications, meta data definition etc.)
5. Improve interaction/co-operation among space agencies on GHGs.
6. Close interaction between GHG and AQ measurements.
7. Support the establishment of common cal/val standards (pre-calibration procedures, perform algorithm intercomparisons, provide traceability information, use the same spectroscopy etc. ).
8. Undertake best efforts to add future GHG satellites that overlap with existing GHG satellites missions by at least one year (e.g. improved spatial resolution and temporal coverage).
9. ACC-41, ESA/ESPIN, April 30, 2015. Support the continuation/possible extension of the TCCON network. European Space Agency