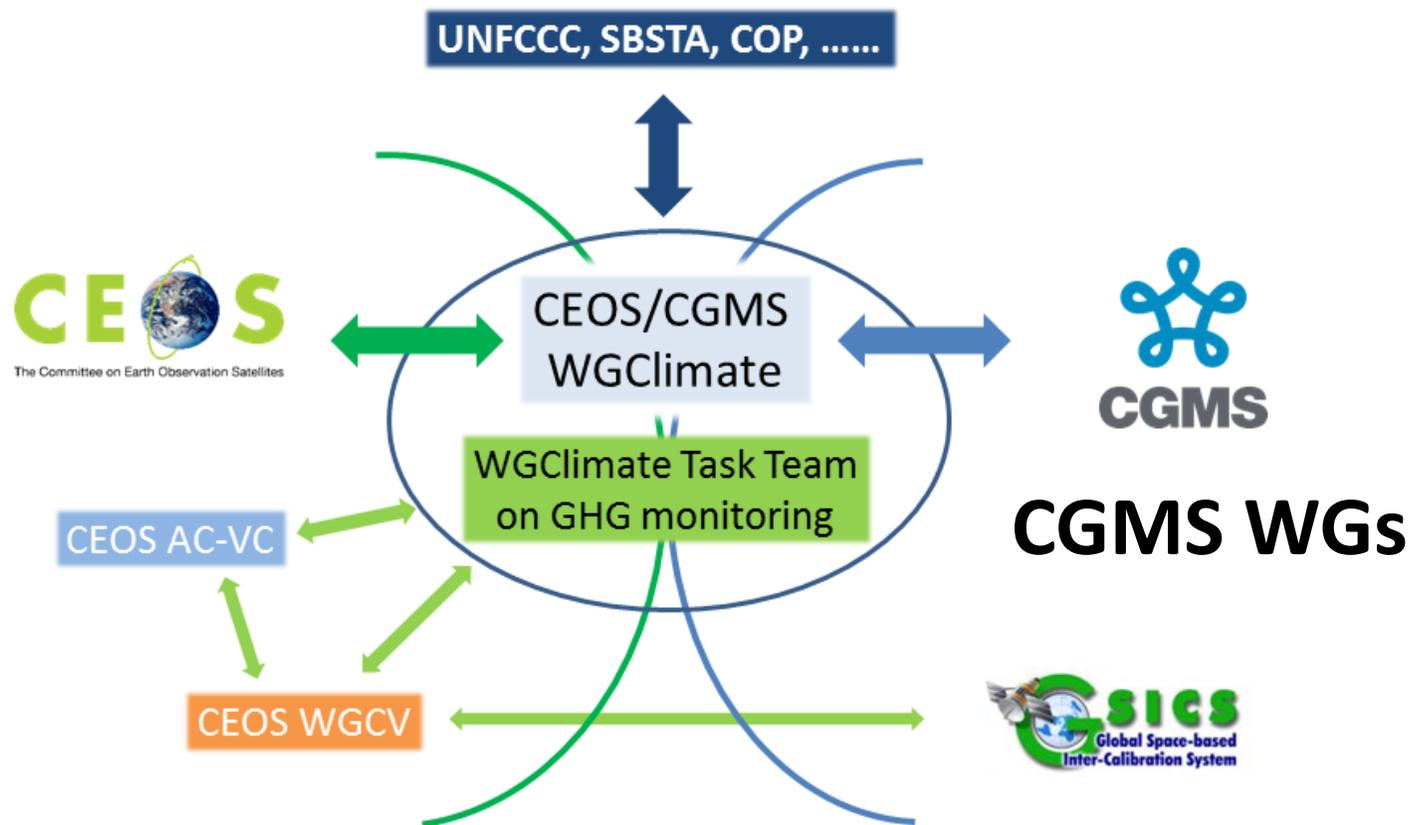


Status of architecture for monitoring carbon dioxide and methane from space and GHG Task Team activities

Mark Dowell, EC & Jeff Privette, NOAA
Joint CEOS/CGMS WGClimate GHG Task Team Leads

CGMS-49 plenary, agenda item 6

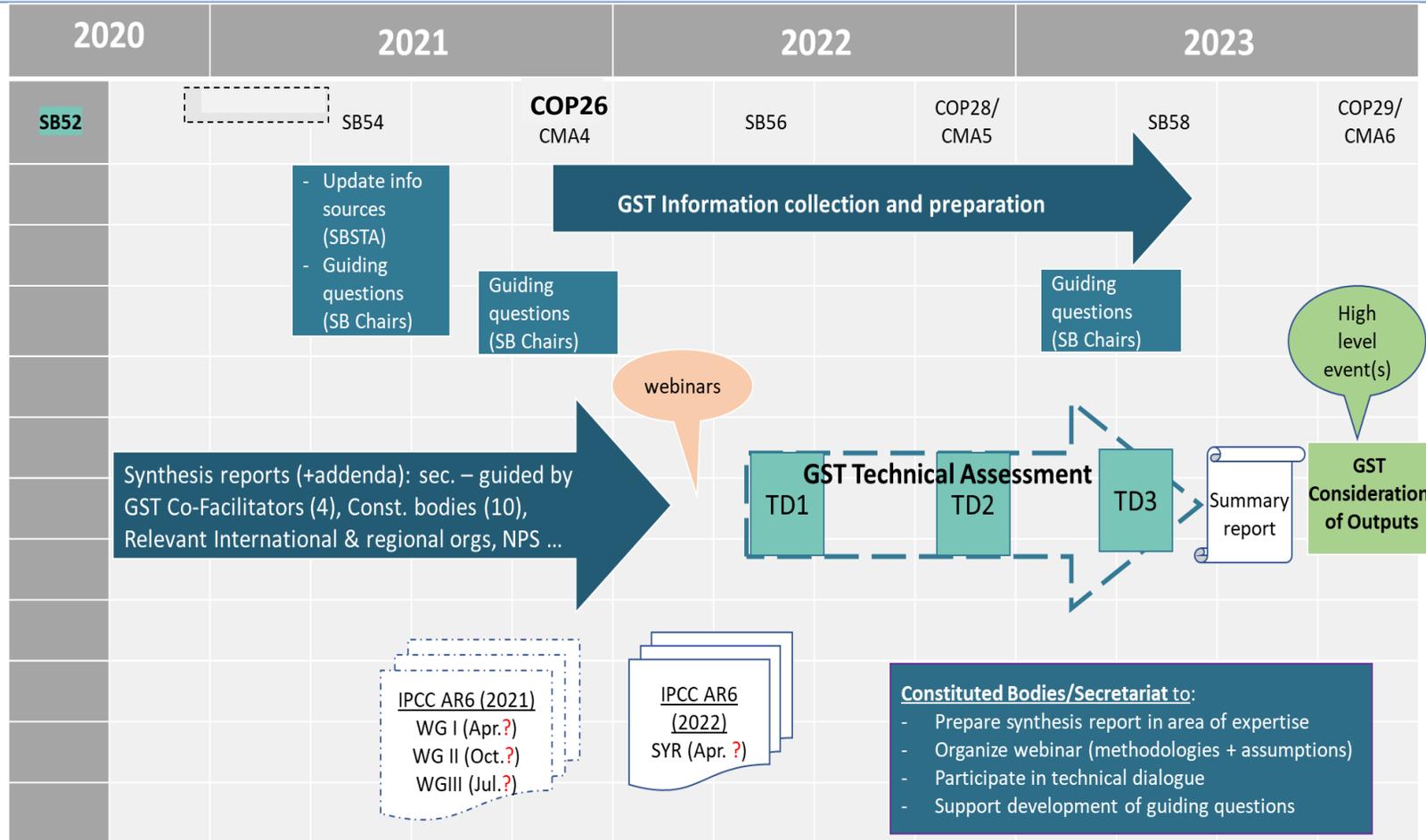


The CEOS/CGMS WGClimate Greenhouse Gas Task Team is coordinating efforts among member agencies to:

1. Work with the atmospheric CO₂ and CH₄ measurement and modeling communities, stakeholders and national inventory compilers to **define requirements** and plans for atmospheric flux inventories;
2. Deliver **pilot atmospheric CO₂ and CH₄ flux inventories** in 2021 to inform the 2023 Global Stocktake (GST);
3. Use lessons learned from these pilot inventory products to refine requirements needed to implement a **purpose-built, operational, atmospheric inventory system** for future Global Stocktakes.

Here, we report progress since the 2020 Plenary on steps 1 and 2.

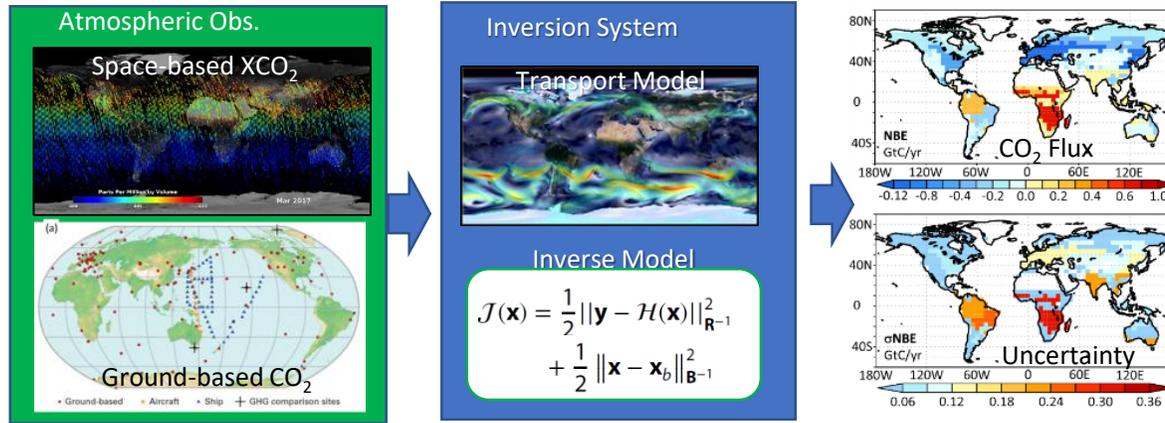
2023 Global Stocktake Timeline



Revised from Joanna Post, Programme Officer UNFCCC secretariat

For the 2023 Global Stocktake, pilot top-down inventories are limited by available space-based measurements and inverse models

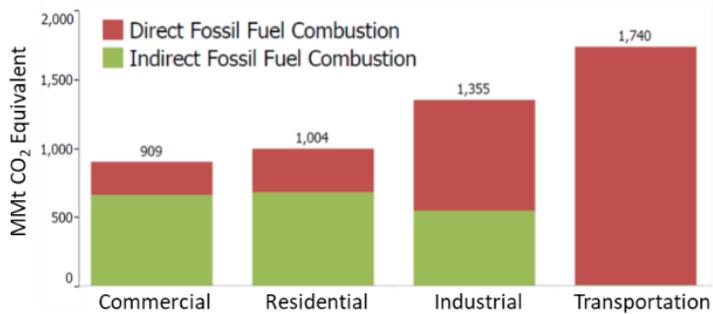
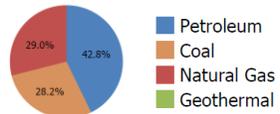
- Pilot top-down CO₂ and CH₄ inventory requirements and products
 - IPCC Verification activities can be performed on national or multi-national spatial scales at annual, bi-annual and 5-year time scales
 - **Product:** CO₂ and CH₄ Flux maps at 4°x5° resolution at monthly intervals
 - National inventory development requires higher spatial resolution
 - **Product:** CO₂ and CH₄ flux maps at 1°x1° resolution at monthly intervals
 - Localized emission hot spots
 - **Product:** CO₂ and CH₄ fluxes from large urban areas or discrete sources
- Inventory quantities derived from flux products
 - **Optimized total emissions:** Total net CO₂ and CH₄ flux and stock change
 - **Fossil fuel emissions:** Input (not optimized) emissions with uncertainties
 - **Non-Fossil Fuel emissions (AFOLU + Natural):** Optimized fluxes and stock changes with uncertainties



Top-Down Inventories

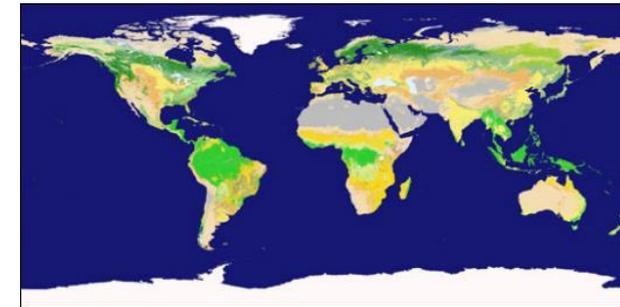
Observations of atmospheric CO₂ provide an integral constraint on emissions

- Can track emission hot spots and rapid changes
- Can detect emission changes from the natural carbon cycle caused by human activities and climate change

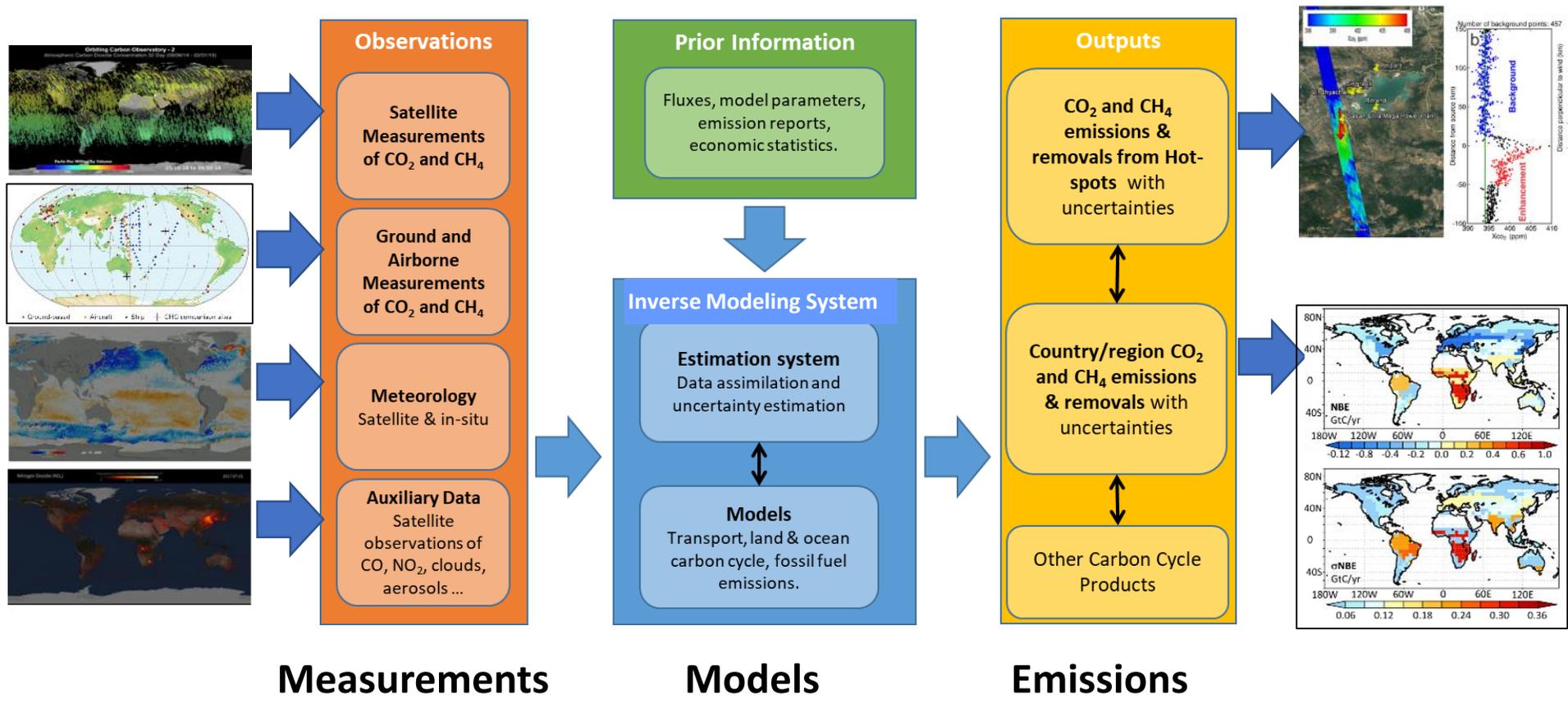


Bottom-Up Inventories

- Provide sector-specific estimates of emissions from known sources.
- Earth Observations play a critical role for tracking land use change.

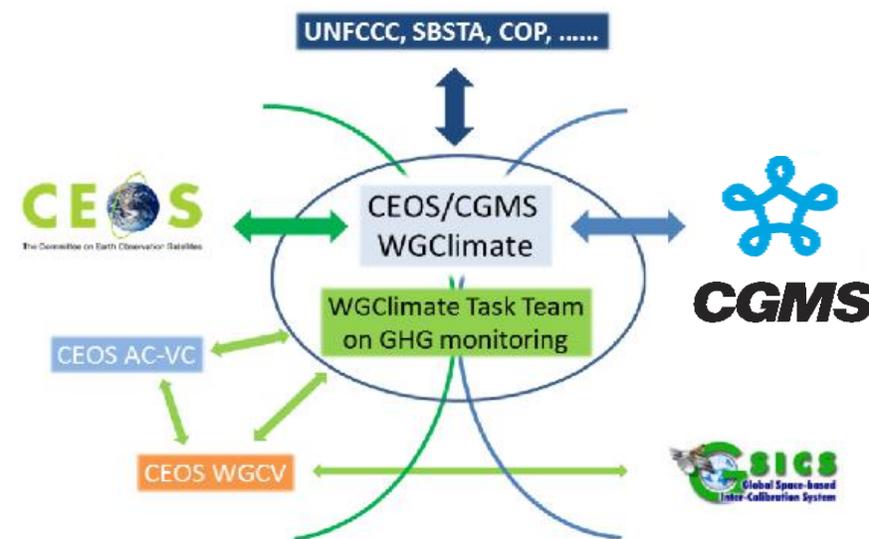


Land Use Map



- Create and maintain roadmap to implement actions proposed in the AC-VC white paper
- Establish primary user interface to Users (Inventory and Policy) and ensure feedback on prototype products
- Provide a whole system overview and track requirements, capabilities, and deliverables
- Identify additional resource needs and relevant CEOS/CGMS Agencies to dedicate appropriate resources

- Mark Dowell (EC, WGClimate, Task Team Lead)
- Jeff Privette (NOAA, WGClimate Vice-chair, deputy Task Team lead ex officio)
- Frederic Chevallier (LSCE/IPSL)
- David Crisp (NASA, CEOS AC-VC)
- Carole Deniel (CNES)
- Albrecht von Bargaen (DLR)
- Richard Engelen (ECMWF)
- Hiroshi Suto (JAXA)
- Akihiko Kuze (JAXA, CEOS WGCV)
- Rüdiger Lang (EUMETSAT)
- Yasjka Meijer (ESA)
- Paul Palmer (UKSA)
- Hiroshi Tanimoto (NIES)
- Alisa Young (NOAA)
- Arlyn Andrews (NOAA) representing in-situ WMO/IG3IS.
- Nominations by CGMS and GSICS



Identify “Sherpas” between CGMS WGs and WGClimate GHG Task Team

Initial contacts to define key areas and competences CGMS WGs can contribute

Focal points of contact from the CGMS WGs:

- WGI – satellite systems and operations - sean.burns@eumetsat.int
- WGII – satellite data and products - jeff.privette@noaa.gov and mitch.goldberg@noaa.gov
- WGIII – operational continuity and contingency planning - ZHANG Peng zhangp@cma.gov.cn
- WGIV – data access and end-user support - sean.burns@eumetsat.int

Also GSICS Rosemary Munro EUMETSAT

- 7-11 June: AC-VC Annual Meeting
 - Opportunity to report progress and review inventory development activities
- 14-17 June: 17th International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-17)
 - Meeting with 200-300 members of the science community, spanning space-based GHG measurement, analysis and flux inversion
- 22-24 June -> Beginning October: Earth Observation contributions on GHG and AFOLU in support of the Paris Agreement: Synergies and Opportunities
 - Opportunity to coordinate GHG and AFOLU inputs across the carbon cycle, national inventory, and stakeholder communities