Committee on Earth Observation Satellites

Quantifying Emissions from Agriculture, Forestry, and Other Land Use (AFOLU) to support the Global Stocktakes

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IWGGMS-17

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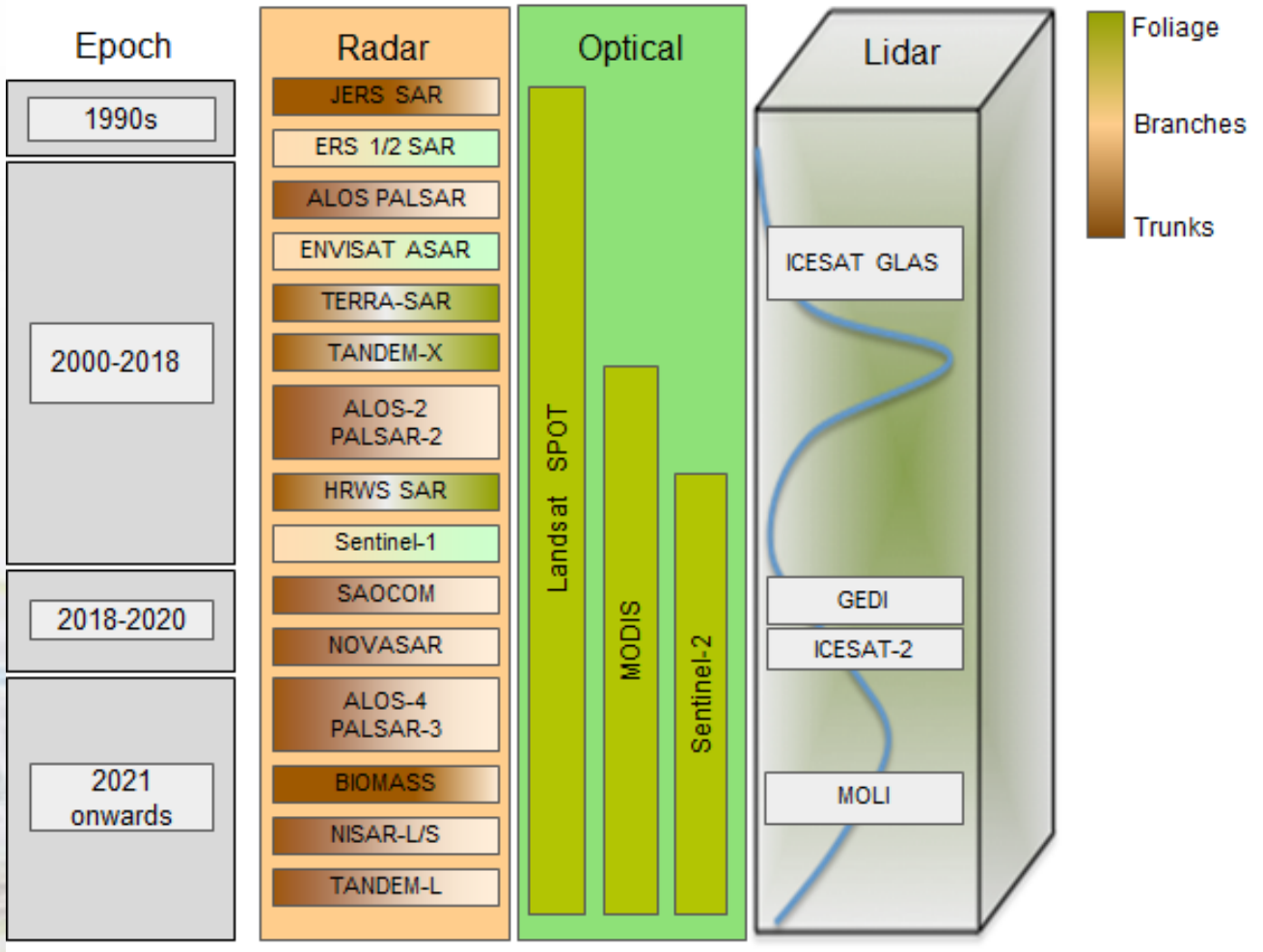
Background of AFOLU activities

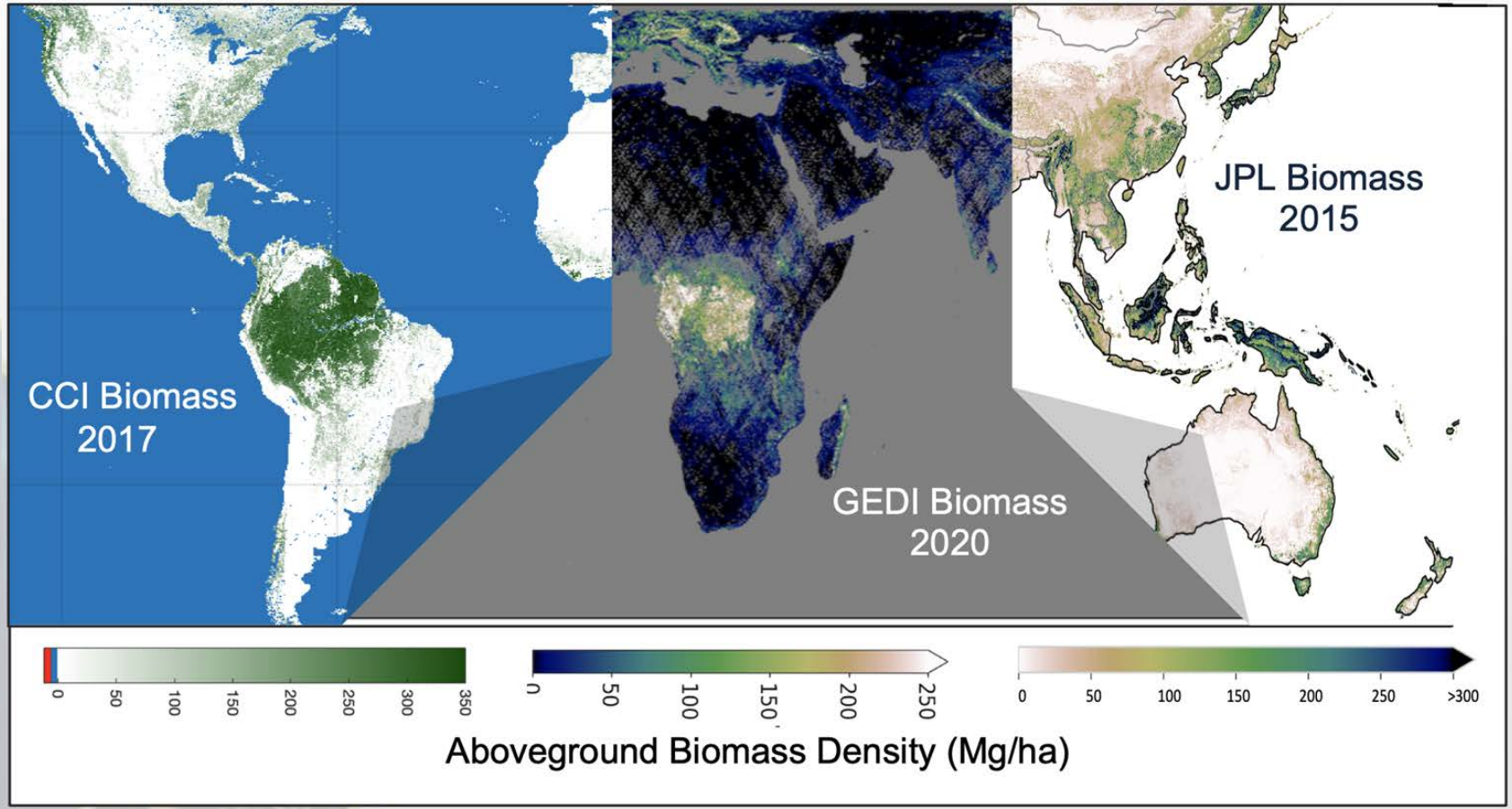
- Recognised for **land sector issues in recent IPCC reports** - substantial capabilities of remote-sensing in this area and needs raised by UNFCCC
- **AFOLU Task Team**, established in CEOS
  - → **A CEOS AFOLU Initiative for the UNFCCC Global Stocktake Process:** to explore the development of a CEOS AFOLU Roadmap
  - → Provide a clear statement of the technical capabilities of CEOS agency EO satellite data and their characteristics - **capabilities and datasets** for inclusion in **the UNFCCC Synthesis Report on Systematic Observations**
  - → Propose a specific way forward for 2021 and **deliverables for GST1** as the critical first deadline

Key satellite missions



GST1 Input – Above Ground Biomass

- Several biomass products will be publicly available in advance of the GST (e.g. NASA's GEDI, ESA's CCI Biomass)
- To bolster uptake of these considerable CEOS agency investments, **a single CEOS-endorsed biomass product is desirable.**



AFOLU Dataset summary

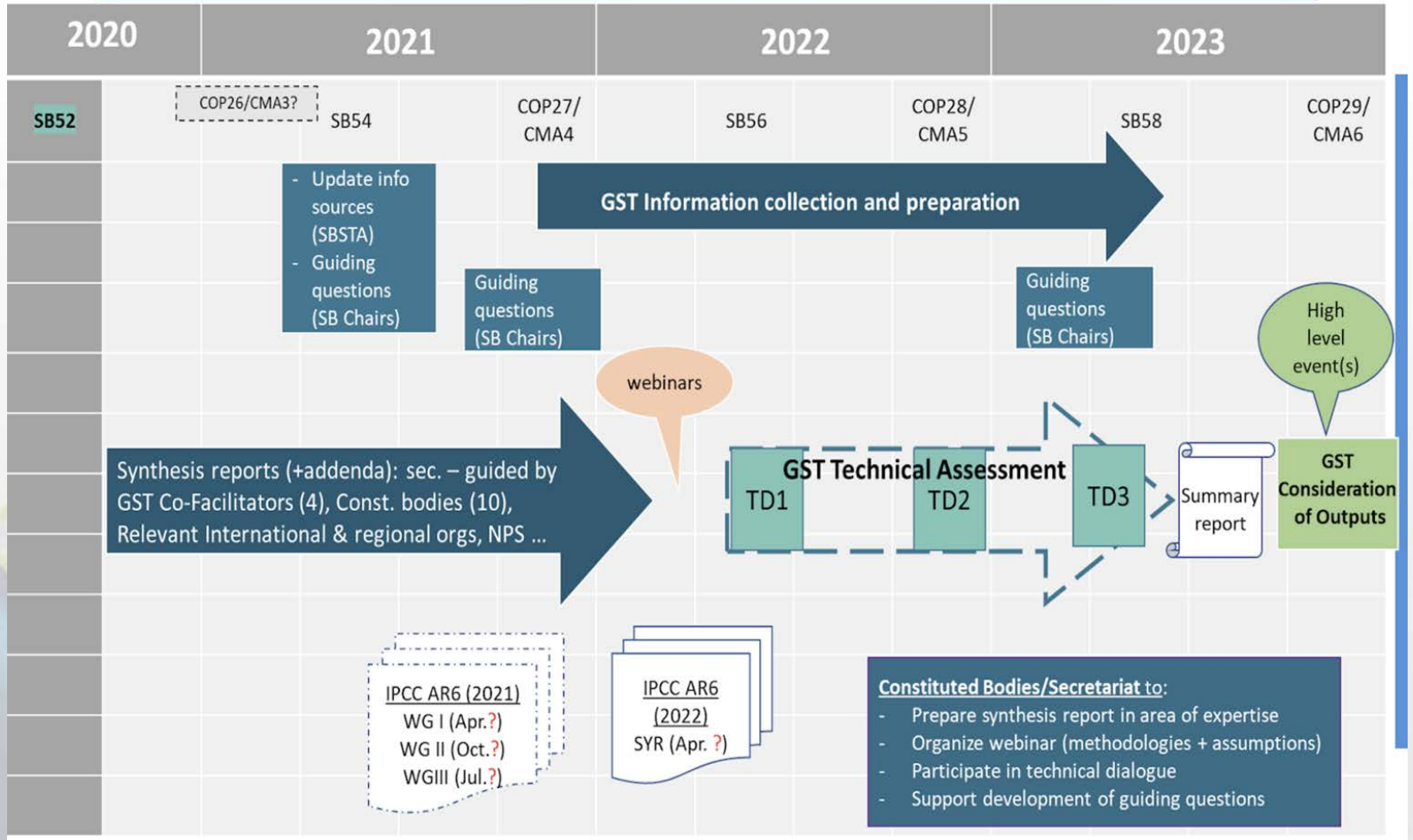
On-going update

	COP-26 (Nov 2021)	GST1 (2021-23?)	Beyond (2024+)	Notes
Forest (Above Ground Biomass)	**Fall back is individual existing datasets** Synthesised biomass product providing estimates at a jurisdictional level globally	Synthesized, jurisdictional level biomass, emission factors (and prototype biomass change)	Synthesized spatially explicit, annual biomass, emission factors and biomass change	Work plan and schedule provided
Land Cover & Forest (area and change)	**- Copernicus annual global land cover** **- C3S/CCI Land Cover** **- WorldCover, HILDA+** **- Global Forest Watch tree cover loss and forest fluxes**	Synthesised map products and estimates of land cover and change at regional, and global levels Global tree cover and forest emissions and removals	Statistically robust activity data estimates (6 IPCC classes) at national and global levels Global annual forest emissions and removals at 30-100 m resolution.	GOFC-GOLD coordination proposed
OLU - Mangroves & Wetlands	**- Global Mangrove Watch cover and change (1996-2016)** **- Global Mangrove biomass (2000)**	Global mangrove cover and change at 25 m (2019+) Global mangrove biomass at 12 m (2015)	Global annual mangrove emissions and removals at 10-25 m resolution.	In coordination with GMW
Agriculture	**Demonstration WorldCereal products for at least 4 countries (Argentina, Spain, Ukraine and Tanzania)**	**Initial WorldCereal map and analytical system.** On-going seasonal analysis products	Continual system improvement and production of seasonal state and change products	In coordination with GEOGLAM

Indicates off the shelf datasets possible. **Indicates additional resources needed.**

Latest UNFCCC SEC Engagement

Global stocktake - timeline



Next Steps

- Next steps towards COP-26 (November 2021):
  - → Work with expert dataset teams and dataset producer agencies to establish viable plans for COP-26 delivery
  - → Engage with UNFCCC Secretariat in contributing to Synthesis Report of the Systematic Observation Community
  - → Longer term AFOLU Roadmap considered when COP-26 deliverables assured
  - → Engage with countries to help develop feedback and other users as to the utility of the CEOS products for their engagement in the GST process

Back up

CEOS and its role to support Climate Change

- CEOS was established in 1984 recognizing the multidisciplinary nature of space-based Earth observations and the value of coordinating international EO efforts to benefit society (34 Space Agencies and 28 Associate Organizations world wide).

AFOLU Team Participation

Co-Lead: Osamu Ochiai, JAXA & GFOI Co-Lead

Co-Lead: Frank Martin Seifert, ESA & GFOI Co-Lead

Members

Shanty Reddy, Australia
Kostas Papathanassiou, DLR
Richard Lucas, ESA/CCI
Shaun Quegan, UK & ESA/CCI
Heather Kay, ESA/CCI
Zoltan Szantoi, EC & LSI VC
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Takeo Tadono, JAXA
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Michael Falkowski, NASA
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SIT Vice Chair Team

Ivan Petiteville, ESA
Stephen Briggs, ESA

GHG Task Team

David Crisp, NASA
Mark Dowell, EC/JRC

WGClimate

Albrecht Von-Bergen, DLR

2021 Activities

- Top priority to the availability of relevant datasets in time for **COP-26 (early Nov 2021)** along with the prototype GHG products
- The AFOLU Team tasked **small expert teams in each key dataset (below)** formed:
  - **Above Ground Biomass (Forest):** Laura Duncanson / Sassan Saatchi (NASA), Martin Herold (GOFC/GOLD & ESA/CCI)
  - **Land Cover & Change - incl. Forests:** Martin Herold (GOFC-GOLD & ESA/CCI), Ben Poulter (NASA), Michael Cherlet (EC), Frank Martin Seifert (ESA)
  - **Mangroves (OLU):** Ake Rosenqvist (JAXA), Richard Lucas (ESA/CCI)
  - **Agriculture:** Ian Jarvis (GEO Sec), Sven Gilliams (VITO) and GEOGLAM
- The expert teams prepared a short report outlining the **CEOS coordinated input to GST1** (initial for COP26) and what may be possible given more time afterwards.

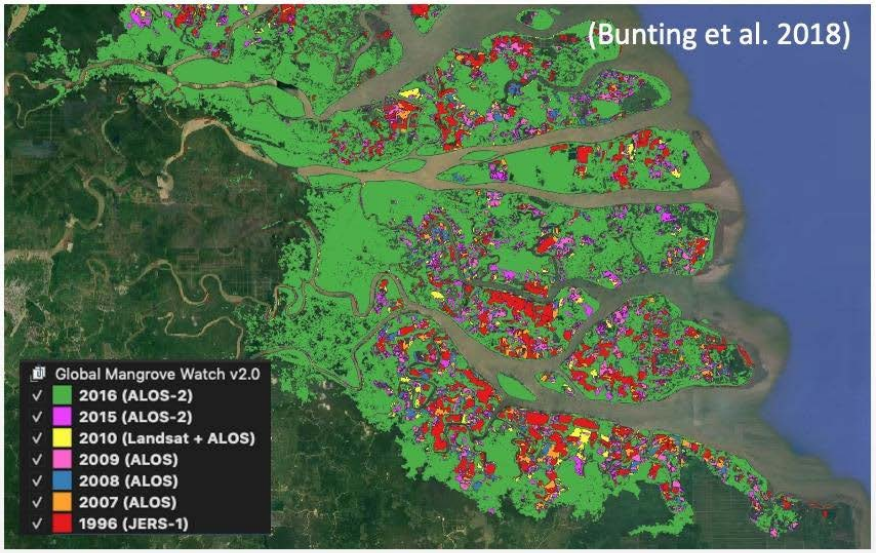
GST1 Input - Land Cover, Forest and Change

The following products are proposed as the most suitable choices to present the dedicated CEOS agency support for the GST by UNFCCC COP26 in Nov. 2021:

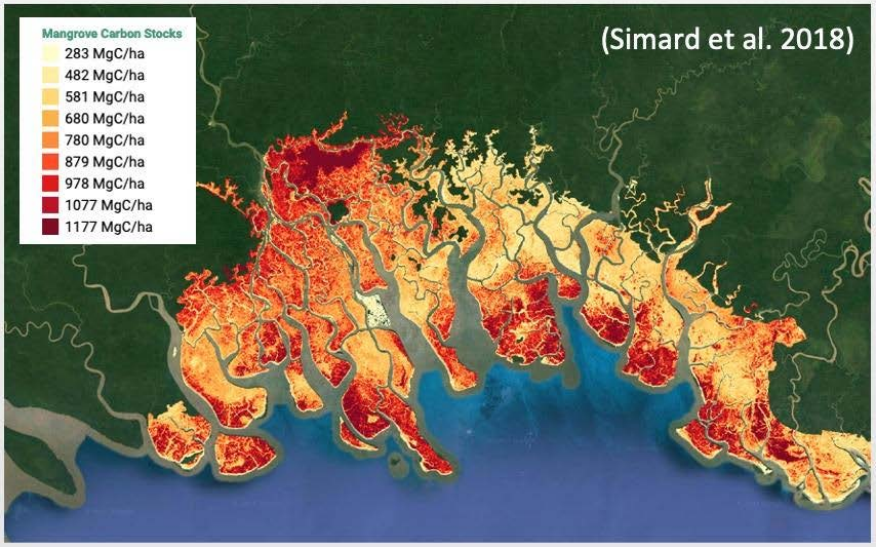
- **Useful for countries and national reporting:**
  - **Copernicus annual global land cover service** (2015-onwards, 100 m, EC)
  - **WorldCover** (2020, 10 m, ESA)
  - **Global Forest Watch tree cover loss** (annual from 2000 onwards, 30 m, NASA)
- **For (longer-term) global modeling and GHG assessments:**
  - **LC CCI annual 1992-2015** (now continued under Copernicus climate service **C3S until today**, 1 km change, ESA/EC)
  - **HILDA+ 1960-2019 g**lobal, annual land cover change harmonized with FAO statistics (synthesis product for modeling community)
- **For linking national reporting with global estimation (in a statistical sense):**
  - **GFW forest fluxes data 2000-2019** (GWF/NASA)
  - **Copernicus annual global land cover service and regional land cover change statistics** (using reference data for estimation, EC/ESA)

GST1 Input – Other Land Use (Mangroves)

- **Activity Data – Global Mangrove Watch (JAXA K&C)**
  - Global maps of mangrove area and annual changes at 25 m derived from L-band SAR and optical data. Open access in public domain.
  - 1996–2018 available for COP-26. 2019-2021 for GST1.
  - Official UNEP SDG 6.6.1 mangrove dataset.



- **Emission Factors - LCLUC Global Mangrove Mapping (NASA JPL/GSFC)**
  - Global maps of mangrove Height, AGB and Total Biomass at 30 m. Open access in public domain.
  - Baseline year 2000 derived from SRTM DEM.
  - New 2015 baseline at 12 m from TanDEM-X DEM available for GST1.



GST1 Input - Agriculture

❑ Baseline targets for GST1

WorldCereal is a consortium effort funded by ESA, led by VITO and supported by the GEOGLAM community

Most important, it is building a system, not just one-off products, that will produce:

- **Cropland Map:** Global, 10 m resolution, accuracies 80% +, on a seasonal basis for 2022
- **Crop Type Map:** Initial 2022 focus on global maize and wheat
- Initiate a global **in-situ reference dataset** for agriculture, transitioning to a GEOGLAM community initiative post 2022
- Developing and testing **classification algorithms and tools (open access)**

❑ Actions required for delivery and guidance

Harmonized global data sets of Landsat 8 and Sentinel 2

➔ WorldCereal: A major step forward, but just a first step …

2021 Activities

- **National Inventory Test User Group** - floated as an idea to help develop feedback from countries and other users as to the utility of the CEOS products for their engagement in the GST process

- **USGS/SilvaCarbon** asked to further develop the concept - building on their 10+ years of experience, including through the GFOI programme
  - → Phase 1: Compile information of country status based on categories of REDD Compass. Completed by March 2021
  - → Phase 2: Participative Process - Online meetings with countries
  - → Phase 3: Country Case Studies in more depth