

**Submission to SBSTA under mandate: FCCC/SBSTA/2021/L.5**

Please accept this submission from the University of Exeter on behalf on the Global Carbon Project (GCP) in response to SBSTA's invitation to submit views on possible themes for the Earth Information Day to be held in conjunction with SBSTA 57 (November 2022) under mandate: FCCC/SBSTA/2021/L.5

The GCP is a large international research project within the Future Earth research initiative on global sustainability, and a research partner of the World Climate Research Programme.

We have developed a complete picture of the global carbon cycle, including both its biophysical and human dimensions together with the interactions and feedbacks between them.

Since 2006, we have produced the annual Global Carbon Budget (GCB). The report is an accurate assessment of anthropogenic carbon dioxide (CO<sub>2</sub>) emissions and their redistribution among the atmosphere, ocean, and terrestrial biosphere.

In the report we quantify the five major components of the global carbon budget and their uncertainties.

- Fossil CO<sub>2</sub> emissions,
- CO<sub>2</sub> emissions from land use and land use change,
- Change in atmospheric CO<sub>2</sub> concentration,
- The ocean CO<sub>2</sub> sink,
- The terrestrial CO<sub>2</sub> sink.

The findings of the report are used widely including by the IPCC where the Global Carbon Budget makes a very significant contribution to the IPCC analysis around CO<sub>2</sub> sources and sinks.

The latest report, the GCB 2021 is the 16th edition of the annual update. This edition includes contributions from 94 people across 70 organisations and 18 countries, constituting a large fraction of the carbon cycle research community. The GCB builds on established methodologies in a fully traceable and transparent manner. To ensure that it is built with the most robust data and science, each annual budget has been published in peer review journals. The 2021 edition has undergone an open peer review in the journal *Earth System Science Data* (<https://doi.org/10.5194/essd-2021-386>). The 2020 edition was published in *Earth System Science Data* (<https://doi.org/10.5194/essd-12-3269-2020>).

The next edition of the report will be published in November 2022 at the UNFCCC COP 27.

Earth Information Day (EID) provides an opportunity for the UNFCCC to see the latest data and information about the state of the Earth's climate system including the latest trends in global carbon sources and sinks. Given that the technical assessment component of the first Global Stocktake of the Paris Assessment is currently being carried out, the opportunity to look at the most up to date, scientifically robust analysis of CO<sub>2</sub> emissions, the remaining global carbon budget, and the ramifications for Global Climate Goals is particularly timely.

With this in mind, possible topics for Earth Information Day could be:



1. **The Global Carbon Budget (GCB).** Latest trends in global carbon sources and sinks, status of CO<sub>2</sub> emissions, estimates of the remaining carbon budget to keep global temperatures below the climate targets of the Paris Agreement; and scale of international action required to reach Net Zero emissions by 2050.
2. **Land-use and land-use change in the Global South and the implications for the carbon cycle.** Land-use emissions contribute significantly to annual carbon dioxide emissions to the atmosphere. Net emissions are predominantly from tropical countries and associated with tropical forest deforestation. Less emphasis has been on the growing and negative effects of forest degradation on the tropical land carbon balance. During extreme climate events, forest droughts e.g. those associated with El Nino events and forest degradation through fire can lead to emissions similar to those from deforestation. Recent emphasis in GCB has been on land-use change in the global south and implications for the carbon cycle at country, regional and global scales. It will be important to highlight recent advances in tropical South America, with a focus on Brazil (the largest CO<sub>2</sub> emitter through land-use change at country-scale), and countries in tropical and sub-tropical Africa.
3. **Understanding and reconciling Green House Gas (GHG) budgets.** The GCB synthesises the components of the carbon budgets, i.e. carbon sources: emissions from fossil fuel combustion and its fate, in the atmosphere, and carbon sinks in land and oceans. GCB is moving towards provision of regional and country-level information. This information can provide useful complementary information to national GHG inventories and stocktake efforts. Recent effort has been devoted to understanding and reconciling the methodologies applied to GHG budgets from academia (IPCC/GCB) and national GHG inventories (NGHGs).

We would welcome the opportunity to discuss how we can further contribute to Earth Information Day, SBSTA 57 and COP27.

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