





Submission to the UNFCCC under mandate: FCCC/PA/CMA/2022/L.17, para. 12

Please accept this submission from the University of Exeter on behalf on the Global Carbon Project (GCP) in response to the UNFCCC invitation to submit suggested topics in line with the scope of the work programme for urgently scaling up mitigation ambition and implementation to be discussed under the dialogues, under mandate: FCCC/PA/CMA/2022/L.17, para. 12

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 (CO₂) 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 CO₂ emissions,
- CO₂ emissions from land use and land use change,
- Change in atmospheric CO₂ concentration,
- The ocean CO₂ sink,
- The terrestrial CO₂ sink.

The findings of the report are used widely including by the IPCC where the findings make a very significant contribution to the IPCC analysis around CO₂ sources and sinks.

The latest report, the GCB 2022 is the 17th edition of the annual update. This was published and presented at COP 27. The GCB 2022 had over 105 contributors from 80 organisations and 18 countries. The GCB builds on established methodologies in a fully traceable and transparent manner. The 2022 edition was published in the journal *Earth System Science Data*: <u>https://doi.org/10.5194/essd-14-4811-2022</u>.

More information on the GCB can be found here https://globalcarbonbudget.org/

The Work Programme on Mitigation was established to "urgently scale up mitigation ambition and implementation in this critical decade in a manner that complements the global stocktake". Recognising the importance of the best available science for effective climate action and policymaking, the Global Dialogues provide a timely opportunity for stakeholders to view the best available science on the latest trends in carbon sources and sinks at global and country levels, the remaining global carbon budget and the ramification for the Paris Agreement's Global Climate Goals and First Global Stocktake.

With this in mind, possible topics for Global Dialogues could be:

- 1. **The Global Carbon Budget (GCB).** We would present the latest trends in global carbon sources and sinks, status of CO2 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 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. Indeed, during extreme climate events, forest droughts e.g. those associated with El Nino events, 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, region and global scales. We would highlight recent advances in tropical South America, with a focus on Brazil (the largest CO2 emitter through land-use change at country-scale), and countries in tropical and sub-tropical Africa.

- 3. Natural carbon sinks. Lands and oceans continue to take up around half of the CO₂ emitted in the atmosphere, but climate change is already reducing the strength of these carbon sinks. We would discuss the natural sinks and the role of Carbon Dioxide Removals (CDR) in reaching net zero emissions and stabilising the climate.
- 4. 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 GHG budgets from academia (IPCC/GCB) and national GHG inventories (NGHGIs). In this session we would elaborate on these efforts in reconciling methodologies.

We would welcome the opportunity to discuss how we can further contribute to Work Programme and the Global Dialogues.

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