



Indicators of Global Climate Change

Annual update of key indicators of the state of the climate system and human influence

Submission on views from Parties and relevant organizations on possible themes for the eighteenth meeting of the research dialogue, to be held in conjunction with SBSTA 64

Introduction

This submission by the Indicators of Global Climate Change (IGCC) initiative presents views on possible themes for the 18th meeting of the research dialogue, to be held in conjunction with SB64.

The importance of sharing scientific advances in the understanding of climate change, including updated global climate indicators, was recognised by the 17th meeting of the research dialogues. Here, we reiterate the importance of sharing such information so that global climate policy and action can continue to be informed by the best available, up-to-date scientific findings.

Potential themes

The 17th meeting of the research dialogue recognised that human activities have unequivocally caused global warming, with global non-CO₂ emissions, particularly of CH₄ and N₂O, continuing to rise. Outcomes include 2024 being the warmest year on record (even though multi-decadal estimates of current global warming remain below 1.5°C).

Scientific initiatives including IGCC have contributed to these fundamental findings on the state of the climate system, providing the objective, scientific evidence necessary to set, monitor, and work towards global goals, including those set out in the Paris Agreement.

In essence, the physical state of the climate acts as the "scorecard" for the international efforts taking place under the UNFCCC. We therefore welcome the opportunity for the scientific community to come together with policymakers at the research dialogues to provide clarity and consistent messaging on the state of the climate. We recommend that whatever themes are chosen, the latest understanding of the state of the climate system remains at the forefront of the discussions.

Format for the research dialogue

We welcome the space that the dialogues allocate to discussing the latest scientific findings. In addition to a plenary including presentations from scientific experts and Q&A time, additional activities such as poster sessions, breakouts, or a World Café, are essential in providing opportunities for Parties to engage with scientists and discuss the topics raised in more depth.

We trust that the outcomes of the research dialogue will also be made readily and widely available to inform discussions at SB64, at COP31, and across the UNFCCC system.



Indicators of Global Climate Change

Background

Since 2023, the Indicators of Global Climate Change (IGCC) initiative, published in the journal [Earth System Science Data](#), has provided annual updates of key global climate indicators reported by the Intergovernmental Panel on Climate Change (IPCC).

The most recent edition was produced by an international team of 61 scientists, including IPCC Lead Authors, Contributing Authors, and Chapter Scientists, from 54 institutions across 17 countries. The next edition of IGCC will be published during SB64, providing a further update to that set out below.

IGCC differs from other annual publications in two key ways: by a) estimating the human contribution to long-term global warming; and b) being grounded in methods assessed by the IPCC Sixth Assessment Report (AR6) – applying established IPCC methods to updated datasets.

This ensures that the numbers published by IGCC are traceable back to IPCC AR6 Working Group I (WGI), following the same process chain to estimate the human contribution to global warming from the observed trend in atmospheric greenhouse gas concentrations and surface temperatures, whilst also providing updates to other policy-relevant global climate indicators such as the remaining global carbon budget. Indicators of climate impact drivers such as global land precipitation, temperature extremes and sea level rise are also included. In future we also aim to provide historical and near-future contributions of human-attributable warming by source emission.

In 2026, core aspects of IGCC are being internalised into the Copernicus Climate Change Service (C3S), strengthening their respective abilities to contribute data and information on the physical climate system and key climate indicators to international policy and assessment processes, and facilitating ways to reach a far wider audience than IGCC can achieve working alone.

Headlines from the 2025 IGCC update

- Human activities have resulted in the equivalent of around 53 billion tonnes of carbon dioxide (GtCO₂) being released into the atmosphere on average each year over the last decade. Atmospheric concentrations of all three major greenhouse gases have increased.
- Between 2015 and 2024, the temperature was on average 1.24°C higher than in pre-industrial times. Of this, 1.22°C was caused by human activities. Allowing for small uncertainties, this means essentially all of the global warming was human-induced.
- Human-caused warming has meanwhile increased at a rate of around 0.27°C per decade (2015-2024), and in 2024 reached 1.36°C.
- Surplus heat accumulating in the Earth's system at an accelerating rate is driving changes in every component of the climate system, including sea level rise.
- Between 2019 and 2024, global mean sea level increased by around 26 mm, more than doubling the long-term rate of 1.8 mm per year seen since the turn of the twentieth century.
- The central estimate of the remaining carbon budget for 1.5°C is 130 billion tonnes of carbon dioxide (CO₂) (from the beginning of 2025). This would be exhausted in a little more than three years at current levels of CO₂ emissions.



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Full reference

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