CGD Seminar Series

Understanding and embracing uncertainties in the remaining carbon budget for the Paris Agreement target

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Time: 11am – 12pm

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CGD Seminar Webpage*

ABSTRACT

Global mean warming is proportional to the total amount of CO_2 emitted. This emergent property of the climate system, known as the transient climate response to cumulative CO_2 emissions (TCRE) provides the basis for the concept of carbon budgets for meeting different temperature target levels, such as the 1.5 °C target. Most of the CO_2 emission pathways that reach the 1.5 °C and 2.0 °C temperature stabilization level in the long term are based on the assumption that emitting CO_2 and removing it later by the implementation of artificial carbon dioxide removal from the atmosphere (CDR) leads to the same state of the climate system. However, a question remains whether the state of the carbon cycle differs among scenarios in which a given temperature level is achieved without overshoot or scenarios where that temperature level is temporarily exceeded and then resorted by CDR.

Remaining carbon budgets are also subject to different sources of uncertainty, such as the uncertainty in Earth System response to non- CO_2 forcing, future non- CO_2 scenario uncertainty, and uncertainties due to additional Earth System feedbacks currently under-represented in the Earth System models.

In this talk, I will present an integrated approach to quantification of uncertainties in the remaining carbon budgets (both geophysical and socio-economic), using observationally-constrained quantities. I will also explain the implications for the remaining carbon budget estimates in the light of the overall uncertainty, while emphasizing that despite those uncertainties, the implications remain the same: we need to reach net-zero emissions to stop warming