

Systematic Observations and Model Development of Japan for Evaluating the Budgets of Greenhouse Gases and Associated Climate Forcers (S-22project)

Kiyoto Tanabe

Institute for Global Environmental Strategies, Japan

Abstract

As extreme weather events and other impacts of climate change continue to intensify, there is an urgent need to drastically reduce emissions of greenhouse gases (GHGs), exemplified by carbon dioxide (CO₂), and to achieve a decarbonized society with net-zero anthropogenic GHG emissions. Despite the Paris Agreement and other ongoing efforts to this end, there are evidences that the GHGs concentrations continuously rise or even accelerate in the most recent decade. Recent analyses point to the continuing unreliability of GHG emission values reported by individual countries and the inadequacy of scientific bases for evaluating emissions reduction efforts as critical challenges.

Nevertheless, our understanding of climate change has advanced, resulting in widespread recognition that emissions of not only CO₂ but all types of GHGs, including methane (CH₄) and nitrous oxide (N₂O), need to be reduced if ambitious goals of Paris Agreement for limiting global surface air temperature increase below 1.5°C is to be achieved. Reducing short-lived climate forcers (SLCFs)—atmospheric constituents related to air quality, such as nitrogen oxides (NO_x); black carbon (soot originating from the burning of biomass); and some hydrofluorocarbons (HFCs), a class of alternative fluorocarbon compounds—must also be accounted in mitigation strategies of climate change.

Comprehensive monitoring and budget analyses of these climate-relevant atmospheric substances is critical to providing scientific underpinnings for wide-ranging measures and policies aimed at mitigation. A new research project was launched to observe/estimate the emissions and removals of climate-relevant substances based on precise monitoring in the atmosphere and the ocean, supported by model-based synthesis. This project will be executed over a five-year period from fiscal year 2024 to 2028 as a high-priority strategic research project (S-22) under the Environment Research and Technology Development Fund (JPMEERF24S12200).

S-22 has four thematic areas that address precise characterization of the current state of the atmosphere based on observations, elucidation of the mechanisms driving climate change using global models, estimation of surface-level emissions and removals, and activities aimed at supporting policy development.

References/ Publications

List of relevant research results and publications can be found at the following website.

<https://www.nies.go.jp/s-22/en/results/>

Access to relevant information

<https://www.nies.go.jp/s-22/en/>