*Summary of the NAS Study on Climate Modification*

Our planet has entered a period in which its climate is changing more rapidly than ever experienced in recorded human history, primarily caused by the rapid buildup of carbon dioxide (CO2) in the atmosphere from the burning of  fossil fuels. Scientists have identified a number of risks from changing climate, including rising sea level, drought, heat waves, more severe storms, increasing precipitation intensity, and associated disruption of terrestrial and aquatic ecosystems. Additionally, elevated atmospheric CO2 is diffusing into the ocean, measurably acidifying surface waters and affecting marine ecosystems. Natural processes currently remove about half of our emissions from the atmosphere each year. Once emissions cease, it will take thousands of years before those processes eventually return Earth to something like preindustrial levels of atmospheric CO2.

The two main options for responding to the risks of climate change involve mitigation—reducing and eventually eliminating human-caused emissions of CO2 and other greenhouse gases (GHGs)—and adaptation—reducing the vulnerability of human and natural systems to changes in climate. A third potentially viable option, currently under development but not yet widely deployed, is carbon dioxide removal (CDR) from the atmosphere accompanied by reliable sequestration. A fourth, more speculative family of approaches called albedo modification seeks to offset climate warming by greenhouse gases by increasing the amount of sunlight reflected back to space.[[1]](#footnote-1) Albedo modification techniques mask the effects of greenhouse warming; they do not reduce greenhouse gas concentrations (see Box S.1 for definitions of key terms).

The Committee on Geoengineering Climate: Technical Evaluation and Discussion of Impacts was charged with conducting a technical evaluation of a limited number of “geoengineering” (also known as “climate engineering”) techniques that have been proposed so far and commenting generally on the potential impacts of deploying these technologies, including possible environmental, economic, and national security concerns. The committee prefers the term “climate intervention” because “geoengineering” has other meanings in the context of geological engineering. Furthermore, the term “engineering” implies a more precisely tailored and controllable process than might be the case for these climate interventions.

1. Another speculative approach that seeks to make cirrus clouds thinner to increase the infrared thermal energy returned to space is considered alongside albedo modification approaches. [↑](#footnote-ref-1)