

THE STATE OF CLIMATE SCIENCE: OCTOBER 2003

A LETTER FROM U.S. SCIENTISTS

October 1, 2003

United States Senate
Washington, DC 20510

Dear Senators Frist and Daschle:

Two years have elapsed since the publication of the most recent reports by the Intergovernmental Panel on Climate Change (IPCC) and the National Research Council (NRC) on the state of the science of climate change and its impacts on the United States and the rest of the world. As scientists engaged in research on these subjects, we are writing to confirm that the main findings of these documents continue to represent the consensus opinion of the scientific community. Indeed, these findings have been reinforced rather than weakened by research reported since the documents were released.

In brief, the findings are that:

- 1) Anthropogenic climate change, driven by emissions of greenhouse gases, is already underway and likely responsible for most of the observed warming over the last 50 years—warming that has produced the highest temperatures in the Northern Hemisphere during at least the past 1000 years;
- 2) Over the course of this century the Earth is expected to warm an additional 2.5 to 10.5 °F, depending on future emissions levels and on the climate sensitivity—a sustained global rate of change exceeding any in the last 10,000 years;
- 3) Temperature increases in most areas of the United States are expected to be considerably higher than these global means because of our nation's northerly location and large average distance from the oceans;
- 4) Even under mid-range emissions assumptions, the projected warming could cause substantial impacts in different regions of the U.S., including an increased likelihood of heavy and extreme precipitation events, exacerbated drought, and sea level rise;
- 5) Almost all plausible emissions scenarios result in projected temperatures that continue to increase well beyond the end of this century; and,
- 6) Due to the long lifetimes of greenhouse gases in the atmosphere, the longer emissions increase, the faster they will ultimately have to be decreased in order to avoid dangerous interference with the climate system.

Evidence that climate change is already underway includes the instrumental record, which shows a surface temperature rise of approximately 1°F over the 20th century, the accelerated sea level rise during that century relative to the last few thousand years, global retreat of mountain glaciers, reduction in snow cover extent, earlier thawing of lake and river ice, the

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increase in upper air water vapor over most regions in the past several decades, and the 0.09°F warming of the world's deep oceans since the 1950's.

Evidence that the warmth of the Northern Hemisphere during the second half of the last century was unprecedented in the last 1000 years comes from three major reconstructions of past surface temperatures, which used indicators such as tree rings, corals, ice cores, and lake sediments for years prior to 1860, and instrumental records for the interval between 1865 and the present.

On the subject of human causation of this warmth, the NRC report stated that, "The IPCC's conclusion that most of the observed warming of the last 50 years is likely to have been due to the increase in greenhouse gas concentrations accurately reflects the current thinking of the scientific community on this issue." Indeed, computer simulations do not reproduce the late 20th century warmth if they include only natural climate forcings such as emissions from volcanoes and solar activity. The warmth is only captured when the simulations include forcings from human-emitted greenhouse gases present in the atmosphere.

In summary, the main conclusions of the IPCC and NRC reports remain robust consensus positions supported by the vast majority of researchers in the fields of climate change and its impacts. The body of research carried out since the reports were issued tends to strengthen their conclusions.

Sincerely,

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