AMERICAN METEOROLOGICAL SOCIETY
45 BEACON STREET, BOSTON, MA 02108-3693

TEL: 617-227-2425
FAX: 617-742-8718
E-MAIL: amsinfo@ametsoc.org
WEB: www.ametsoc.org

KEITH L. SEITTER, EXECUTIVE DIRECTOR
E-MAIL: kseitter@ametsoc.org

3 April 2017

The Honorable Lamar Smith, chairman
House Committee on Science, Space, and Technology
2321 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Smith:

The American Meteorological Society (AMS) was pleased to read in your opening remarks for the 29 March 2017 hearing "Climate Science: Assumptions, Policy Implications, and the Scientific Method" that you "believe the climate is changing and that humans play a role."[1] This captures, correctly, that people are causing climate to change. Your question on the extent of human influence is one that has been actively addressed by the scientific community on a continuing basis as we extend our knowledge of the climate system.

The scientific community has learned a great deal about Earth's climate system over the past several decades, applying the scientific method rigorously to data analysis and to understanding the physical processes that affect global temperature and other aspects of climate change. Hypotheses have been developed and tested through scientific experiments. The results are then systematically challenged and synthesized through open debate in scientific conferences and the peer-reviewed literature. Critically, independent scientists are rewarded for uncovering flaws or shortcomings in the work of their colleagues, so the scientific process is inherently self-correcting over time. Results that withstand scrutiny, validation, and replication by independent researchers are the basis of our physical understanding of how the climate changes. We can now say with very high levels of confidence, based on literally thousands of independent research efforts and multiple independent lines of evidence, that most of the warming our planet has experienced over the past 50 years is due to human activity. Indeed, to suggest that humans are not responsible for most of the warming we have experienced over the past 50 years indicates a disregard for the scientific process and the vast amount of testable evidence that has been amassed on this subject.

A fundamental aspect of science is prediction. The ability to predict the precise time and location of the swath of totality for a solar eclipse — many years in advance — based on our understanding of celestial physics is just one example of a success story for science. Another, from the AMS community of scientists, is our increasing ability to forecast the weather, and especially highly impactful severe weather, days in advance. This capability is a combination of increased understanding of the physical processes that influence weather; increased observational capabilities that provide the present state of the atmosphere, oceans, land surfaces, etc.; and increased computational power to take advantage of that physical understanding and observational data. It is inconceivable that a human disaster like the Galveston hurricane of 1900 would occur today thanks to the observational and predictive power of the weather enterprise. Having predictive capabilities has been critical in reducing the loss of life and property, as well as reducing economic disruption from severe weather events.

As a reflection of the distribution of weather, climate is influenced by the same physical processes and our increasing understanding of those processes provides an increasing capability to project future changes in climate. While the characteristics of weather that matter to us most have inherent limits of

predictability on the order of weeks, our understanding of the climate system shows us that projections of climate change over many years are possible. As noted in the AMS Statement on Climate Change[2]:

> Climate projections for decades into the future are made using complex numerical models of the climate system that account for changes in the flow of energy into and out of the Earth system on time scales much longer than the predictability limit (of about two weeks) for individual weather systems. The difference between weather and climate is critically important in considering predictability. Climate is potentially predictable for much longer time scales than weather for several reasons. One reason is that climate can be meaningfully characterized by seasonal-to-decadal averages and other statistical measures, and the averaged weather is more predictable than individual weather events. A helpful analogy in this regard is that population averages of human mortality are predictable while life spans of individuals are not. A second reason is that climate involves physical systems and processes with long time scales, including the oceans and snow and ice, while weather largely involves atmospheric phenomena (e.g., thunderstorms, intense snow storms) with short time scales. A third reason is that climate can be affected by slowly changing factors such as human-induced changes in the chemical composition of the atmosphere, which alter the natural greenhouse effect.
>
> Climate models simulate the important aspects of climate and climate change based on fundamental physical laws of motion, thermodynamics, and radiative transfer. These models report on how climate would change in response to several specific "scenarios" for future greenhouse gas emission possibilities. Future climate change projections have uncertainties that occur for several reasons — because of differences among models, because long-term predictions of natural variations (e.g., volcanic eruptions and El Niño events) are not possible, and because it is not known exactly how greenhouse gas emissions will evolve in future decades. Future emissions will depend on global social and economic development, and on the extent and impact of activities designed to reduce greenhouse gas and black carbon emissions.

While the uncertainties inherent in climate projections mean the climate will never be as predictable as a solar eclipse, the basis of those projections on known physical processes allows the scientific process to be applied rigorously, which leads to increasing confidence in the envelope of possible future climate scenarios those projections provide.

The AMS community recognizes the critical importance of developing climate change policy based on the best possible information. We stand ready to assist you and the House Science Committee to ensure that the best available scientific knowledge and understanding on climate and climate change are used in policy issues facing the nation.

Sincerely,

Keith L. Seitter
Executive Director

---

[1] https://science.house.gov/sites/republicans.science.house.gov/files/documents/HHRG-115-SY-WState-S000583-20170329_0.pdf

[2] https://www.ametsoc.org/ams/index.cfm/about-ams/ams-statements/statements-of-the-ams-in-force/climate-change/