



THE SELECT COMMITTEE ON  
ENERGY INDEPENDENCE AND GLOBAL WARMING

December 23, 2009

Dear Dr. John Holdren:

Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 3 weeks. Responses may be submitted in electronic form, at [aliya.brodsky@mail.house.gov](mailto:aliya.brodsky@mail.house.gov). Please call with any questions or concerns.

Thank you,  
Ali Brodsky

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- 1) *Given that EPA's Endangerment Finding is largely based on the IPCC's finding and those findings were based on data that is now subject to questions of scientific integrity, do you believe that EPA should have delayed its Endangerment Finding?*
  - *Should EPA regulate while significant questions of scientific integrity are outstanding?*

Before finalizing its endangerment finding last month, EPA considered the East Anglia CRU e-mails and appropriately concluded that they do not alter the core findings of climate science underpinning its endangerment finding. EPA discussed these issues in its response to comments, which can be found at <http://www.epa.gov/climatechange/endangerment.html>. See also <http://www.epa.gov/climatechange/endangerment/downloads/RTC%20Volume%2011.pdf>. This conclusion was echoed by twenty-five prominent U.S. scientists in a recent letter to Congress: "The body of evidence that human activity is the dominant cause of global warming is overwhelming. The content of the stolen emails has no impact whatsoever on our overall understanding that human activity is driving dangerous levels of global warming." (See [http://www.ucsusa.org/assets/documents/global\\_warming/scientists-statement-on.pdf](http://www.ucsusa.org/assets/documents/global_warming/scientists-statement-on.pdf).)

It can be added that reviews of climate-change science by other qualified bodies, such as expert committees of the U.S. National Academy of Sciences and the national science academies of other countries, have reached substantially the same conclusions about climate change as the IPCC has reached: namely, that the global climate is now changing in ways that are unusual in comparison to natural variations; that emissions of heat-trapping pollutants from human activities are largely responsible for these unusual changes; that the changes are already doing harm to human health, property, and ecosystems; and that much larger harm is likely to ensue if the offending emissions are not greatly reduced.

2) *On March 19 of this year, Ben Santer wrote that, “If the RMS is going to require authors to make ALL data available - raw data PLUS results from all intermediate calculations - I will not submit any further papers to RMS journals.”*

- *Do you believe that raw data supporting journal articles should be available? Isn't the availability of data an important element of transparency?*
- *Would you support legislation that required journals publishing federally-funded research to make their raw data available to the public?*

On his first full day in office, President Obama issued the Memorandum on Transparency and Open Government, deeming government information a “national asset” and calling for greater transparency, participation, and collaboration in government. These principles apply to scientific information gathered by or on behalf of the federal government. Accordingly, the March 2009 Executive Order on Scientific Integrity directed that “[e]xcept for information that is properly restricted from disclosure . . . each agency should make available to the public the scientific or technological findings or conclusions considered or relied on in policy decisions.”

The Open Government Directive recently issued by the Office of Management and Budget implements these Presidential directives. First, it directs that “with respect to information, the presumption shall be in favor of openness to the extent permitted by law and subject to valid privacy, confidentiality, security, or other restrictions.” Second, it directs each agency to create a strategic plan for transparency that “identifies high value information not yet available and establishes a reasonable timeline for publication online in open formats with specific target dates.” Data.gov currently has more than 114,000 data sets in its catalogs, and the majority of these are geosciences-related data which are relevant to climate research.

I believe that the goal of increasing access to data produced with Federal support can be achieved without new legislation. In fact, several agencies have already taken the initiative to put data-sharing policies into practice. For example, the NIH requires that any applicants for grants over \$500,000 to include data-sharing proposals in their applications; DOE and NSF explicitly state that they expects investigators to share data with other scientists; and the NOAA has stated its commitment to making all raw physical climate data available in as timely a manner as possible.

In January 2009, the National Science and Technology Council released the report “Harnessing the Power of Digital Data for Science and Society.” An explicit goal in this report is to maximize digital scientific data access and utility. Two recommendations in this report are key to realizing this goal. First, the report recommends that all Federal agencies develop and publish policies for data preservation and access. Second, proposals and projects that will generate scientific data should include a data-management plan that describes provisions for protection, access, and preservation.

Leading journals (e.g., *Science*) that publish earth and climate science articles have policies that already strongly mandate data access and sharing. All data necessary to understand, assess, and extend the conclusions of a manuscript submitted to *Science* must be available to any reader of *Science*. After publication, all reasonable requests for materials must be fulfilled. *Science* also supports the efforts of databases that aggregate published data for the use of the scientific community. For example, climate data, published in *Science*, should be archived in the NOAA climate repository or other accessible public databases.

3) *Do the newly released e-mails raise any concerns for you? Specifically, do they raise concerns about the integrity of the scientific process?*

While some of the e-mails may reveal poor judgment and careless formulations by their authors, there is no basis for doubting the core findings of climate change science. With respect to the scientific process, moreover, the fact is that the great majority of the data on which important conclusions in climate science rest have been made available, and the papers and arguments disparaged by some of the e-mail writers were considered by the IPCC and discussed and cited in its reports.

4) *Notwithstanding your skepticism and dismissal of the contents of the released e-mails, they have raised a great deal of concern and questions by scientists, policymakers and American taxpayers.*

- *Before proceeding with any climate change legislation in Congress that establishes a cap-and-tax system - which is widely acknowledged to have a drastic economic impact on the lives of Americans - would you support an independent and exhaustive investigation into the e-mails?*
- *Who do you recommend conduct this investigation and why?*

A number of independent and reputable groups of scientists and journalists have already studied the e-mails and have announced conclusions along the lines I have outlined here: some human frailties are on display in these e-mails, but nothing of a character that calls into question the methods or the conclusions of the IPCC and the climate-science community more broadly (see, e.g., <http://www.factcheck.org/2009/12/climategate/>, [http://www.ucsusa.org/assets/documents/global\\_warming/scientists-statement-on.pdf](http://www.ucsusa.org/assets/documents/global_warming/scientists-statement-on.pdf), <http://www.ametsoc.org/policy/climatechangeclarify.html>, [http://www.climatewatch.org/index.php/csw/details/setting\\_the\\_record\\_straight\\_ap-factcheck/](http://www.climatewatch.org/index.php/csw/details/setting_the_record_straight_ap-factcheck/)).

The principal scientific controversy to which most of these e-mails related, moreover, was exhaustively reviewed the U.S. National Academy of Sciences in a report released in 2006 (National Research Council, *Surface Temperature Reconstructions for the Last 2,000 Years*, National Academy Press, 2006, 156 pp), which concluded that the methods of analysis used by the “hockey stick” authors were scientifically respectable; that their key conclusion that the last 50 years have been the warmest in many centuries is likely to be correct; and that this conclusion is not, in any case, a major part of the evidence on which current scientific understanding of global climate change is based.

Given, then, that the e-mails do not call into question our fundamental scientific understanding of the climate challenge, I do not see a need for further investigation of the e-mails before Congress acts to address that challenge.

5) *In an August 2006 interview with BBC News, you said that if the current pace of change continued, a catastrophic sea level rise of 4 meters (13 feet) was within the realm of possibility. However, the IPCC's 2007 report projects that sea level rise between now and 2100 will range between 7 and 23 inches.<sup>[1]</sup>*

- *Your projection of sea level rise was over 11 feet higher than even the worst case scenario projected by the IPCC. Do you now accept the IPCC's much lower projection?*

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[1] (References: <http://news.bbc.co.uk/2/hi/science/nature/5303574.stm> ; [http://www.iop.org/EJ/article/1748-9326/2/2/024002/er17\\_2\\_024002.html](http://www.iop.org/EJ/article/1748-9326/2/2/024002/er17_2_024002.html) ).

- *If so, why do you think you were wrong? Are you at all concerned about misrepresentation of the state of the science with respect to global warming?*

The sea-level-rise projections cited here from the 2007 IPCC report were explicitly labeled in that report as incomplete, as they did not include any contributions that might be made to future sea-level rise by rapid loss of ice from the Greenland and Antarctic ice sheets. (The relevant column in the table summarizing sea-level rise figures is prominently labeled “Model-based range excluding future rapid dynamical changes in ice flow”; see, e.g., Table TS.6 in *Technical Summary, Report of Working Group I of the Intergovernmental Panel on Climate Change*, Intergovernmental Panel on Climate Change, 2007, p 70.) The text explains that these “dynamical changes” were not included because the published literature at the time provided insufficient basis for modeling such phenomena quantitatively. Most of the potential for rapid sea-level rise in the 21<sup>st</sup> century, however, resides precisely in these hard-to-model phenomena.

My comments to the BBC in 2006 were based on two scientific papers from 2005 that developed estimates of the possible rate of sea-level rise in the 21<sup>st</sup> century not by modeling of the physical phenomena involved but by study of paleoclimatological records bearing on how rapidly sea level increased in two periods of natural warming that occurred over the course of the last 20,000 years (R. Alley, P. Clark, P. Huybrechts, and I. Joughin, “Ice Sheet and Sea-Level Changes”, *Science*, vol. 310, pp 456-460, 2005; J. Hansen, “A Slippery Slope: How Much Global Warming Constitutes ‘Dangerous Anthropogenic Interference’?”, *Climatic Change*, vol. 68, pp 269-279, 2005). These analyses concluded that rates of sea-level rise due to slippage and disintegration of the Greenland and Antarctic ice sheets – the “dynamical changes” the IPCC did not consider in their numerical estimates – in these two past periods of rapid warming ranged from 2 to 5 meters (6.6 to 16.5 feet) per century; and they concluded as well that rates of increase in this range cannot be ruled out for the 21<sup>st</sup> century under continuation of the rates of warming now being experienced. My comments for the BBC were based on dropping the extremes of this range and saying that 3 to 4 meters (9.9 to 13.2 feet) could not be ruled out.

Subsequent and more detailed analyses in the peer-reviewed scientific literature (see, e.g., S. Rahmstorf, “A Semi-Empirical Approach to Projecting Sea-Level Rise”, *Science*, vol. 315, pp 365-370, 2007; W. Pfeffer, J. Harper, and S. O’Neel, “Kinematic Constraints on Glacier Contributions to 21<sup>st</sup>-Century Sea-Level Rise”, *Science*, vol. 321, pp 1340-1343, 2008; U.S. Climate Change Science Program, *Abrupt Climate Change*, U.S. Geological Survey, Reston, VA, 2008, 459 pp) have indicated that the upper limits of sea-level rise in the 21<sup>st</sup> century are more likely to be in the range of 1 to 2 meters (3.3 to 6.6 feet), and this is the range I have been quoting in my publications and presentations on climate change since these new analyses appeared.

- 6) *As science advisor to the Obama Administration, will you guarantee Congress that you will provide the public with access to all documents prepared with government funding relating to climate change?*

To assist the government and society as a whole with understanding, mitigating, and adapting to climate change, the agencies of the federal government deploy a wide range of powerful science and technology resources. The U.S. Global Change Research Program (USGCRP) brings together into a single interagency program the essential capacities for research and observations that are widely distributed across these government agencies. On behalf of these agencies, the USGCRP maintains a U.S. Global Change Research Information Office (GCRI) that provides open access to data, information, and all reports on climate change

research, adaptation/mitigation strategies and technologies, and global change-related educational materials. These reports are freely accessible on the USGCRP website at <http://www.globalchange.gov>.

The USGCRP's position on public access to data related to global change research is clear: the USGCRP requires complete and open sharing of the full suite of data sets; preservation and documentation of all data; and a clearinghouse process to prevent the purging and loss of important data sets. The USGCRP's guiding principle is that as soon as data might be useful to others, the data are released, along with their appropriate documentation.

7) *Can you assure the Committee that you won't support claims by some scientists that research obtained with taxpayers' dollars on climate change is not subject to disclosure because the IPCC is an "international body?"*

The Data Distribution Centre (DDC) of the IPCC provides access to data and model results used in IPCC analyses. The DDC is overseen by the IPCC Task Group on Data and Scenario Support for Impact and Climate Analysis, currently co-chaired by scientists from the United States and Brazil, and jointly managed by the British Atmospheric Data Centre in the United Kingdom, the World Data Center for Climate in Germany, and the Center for International Earth Science Information Network at Columbia University in the United States. Data are provided to the DDC by these and other centers, including those of NOAA and NASA, as well as collected from the published literature. The DDC provides open web access to four types of data: observed climate data sets; global climate model data; socio-economic data and scenarios; and data and scenarios for other environmental changes. For example, anyone can go to the DDC site (<http://www.ipcc-data.org/index.html>) and directly download annual globally averaged temperature data from the year 1850 to 2009.

Although I would want to defer to the Department of State for an authoritative reading on legalities relating to data developed under international agreements, the situation with respect to IPCC data as just described would seem to take care of any concerns about the availability of data from the IPCC system.

8) *As the president's chief science advisor, will you support my efforts to make public all relevant data, codes and documentation regarding major temperature data at NASA and NOAA?*

As noted in my answer to question (2), above, the March 2009 Executive Order on Scientific Integrity directed that "[e]xcept for information that is properly restricted from disclosure . . . each agency should make available to the public the scientific or technological findings or conclusions considered or relied on in policy decisions"; and the subsequent Open Government Directive issued by OMB directs that "with respect to information, the presumption shall be in favor of openness to the extent permitted by law and subject to valid privacy, confidentiality, security, or other restrictions", as well as directing each agency to create a strategic plan for transparency that "identifies high value information not yet available and establishes a reasonable timeline for publication online in open formats with specific target dates." I fully support these goals and directives, as does the leadership of NASA and NOAA.

NASA and NOAA both already provide open access to their standard climate products as long as they are not classified, privileged, exempt, or otherwise protected under Federal law.

- NASA provides full and open sharing of Earth science data obtained from their Earth observing satellites, sub-orbital platforms, and field campaigns as soon as such data become available. There is no period of exclusive access to NASA Earth science data and, following a post-launch check-out period, all data are made available to the user community. This open access also applies to all of NASA-generated standard products, their source codes for algorithm software, coefficients, and ancillary data used to generate these products.
- At NOAA, all raw physical climate data available from their various climate observing systems and the output data from their climate models are openly available in as timely a manner as possible. The timeliness of such data depends on how quickly the data are received and the complexity of the associated quality-control procedures that ensure data are valid. The latest versions of all derived data sets are made available to the public. NOAA also provides access to all of its major climate-related model simulations.

Both NASA and NOAA are also participating in international and national groups whose goal is to increase the accessibility of data worldwide, such as the Global Earth Observation System of Systems, Global Climate Observing System, World Meteorological Organization, Intergovernmental Oceanographic Commission, and International Council of Science (ICSU). In 1958, ICSU created the World Data Center (WDC) for archiving and distributing data collected from the observational programs of the 1957-1958 International Geophysical Year. Originally established in the United States, the WDC system has since expanded to other countries and to new scientific disciplines, including the climate sciences. The WDC now comprises 50 centers in 12 countries. NOAA hosts five WDC centers and NASA hosts one. Also, to better help scientific users and the public access data more readily, NOAA recently established the Global Observing Systems Information Center (GOSIC). GOSIC (see <http://gosic.org>) provides access to international climate-related datasets as easily and readily as possible.

- 9) *In an October 13, 2003 email, you defend Dr. Michael Mann's hockey stick theory and aggressively attack Dr. Willie Soon and Dr. Sallie Baliunas for questioning his work.*
- *Do you stand by this criticism now that the "hockey stick theory" has been discredited?*
  - *Why did you so aggressively attack Drs. Soon and Baliunas?*
  - *Do you still support Dr. Mann in light of the recently disclosed emails, knowing of his efforts to hide his data and encourage his colleagues to shut out journals like Climate Research for publishing works contrary to his bias?*

The "hockey stick theory" has not been discredited. To the contrary, the exhaustive review of this issue released in 2006 by the U.S. National Academy of Sciences (cited above in my answer to question 4) provided authoritative support for the basic approach and core findings of the "hockey stick" authors. I criticized Soon and Baliunas not because they were questioning Mann's work but because the analyses they provided in support of their position were deeply and obviously flawed. I based that judgment on having studied in detail their papers and those of Mann *et al.* myself.

My judgment was shared, as it turned out, by a great many fellow scientists who also took the trouble to read these papers, including the authors of the 2006 National Academy of Sciences review; the members of IPCC's Working Group I (on the science of climate change) who considered the Soon-Baliunas analysis but found it unconvincing; and the editor-in-chief

and half of the editorial board of the journal *Climate Research*, who resigned in embarrassment over that journal's having published a paper as obviously flawed as that of Soon and Baliunas.

10) During the hearing, you testified that, "I would point out, for example, that the term 'trick' is often used in science to describe a clever way to get around a difficulty that is perfectly legitimate. The use of the word 'trick' does not, in itself, in science demonstrate that there was manipulation."

- In the email exchange, the word 'trick' is not used on its own. Dr. Phil Jones wrote: "I've just completed Mike's *Nature* trick of adding in the real temps to each series for the last 20 years (i.e. from 1981 onwards) and from 1961 for Keith's to hide the decline." Given the full sentence quote, do you believe that Dr. Jones' email raises any concerns?
- Please provide examples of correspondence prior to November 1, 2009, by climate change scientists where the word 'trick' is used in the manner you described during your testimony.

I cannot speak for the authors of emails other than my own as to what was intended by particular formulations. Dr. Jones has offered his own explanation of his statement and its context (<http://www.uea.ac.uk/mac/comm/media/press/2009/nov/CRUupdate>), and his contention that there was nothing inappropriate in what he did has been supported by a number of others who work in the applicable field of research (see, e.g., <http://www.csmonitor.com/Environment/Bright-Green/2009/1215/Climategate-global-warming-and-the-tree-rings-divergence-problem>). I trust this will be looked at carefully in the independent review of the whole matter that is being conducted by the University of East Anglia. In any case (and as noted above), whether or not some of the stolen emails reveal poor judgment or careless formulations, the key findings of climate science, as reflected in the reports of expert committees and in thousands of peer-reviewed publications, are robust.

I also note that the editors of the journal *Nature* on December 3 made the same point about the term "trick" that I had made in the hearing the day before: that in science it is "slang for a clever (and legitimate) technique" (*Nature*, vol. 462, 545, 3 December 2009). Here are some examples from climate-science blogs and peer-reviewed articles:

"Now for the important trick. To do the sort of analysis that I wish to do, we have to create a nested factor for each 12 months for each station....." Steven McIntyre (a statistician who has been one of the foremost critics of the "hockey stick" analysis), at <http://climateaudit.org/2008/06/28/hansens-reference-method-in-a-statistical-context/>

"Note that CETA (Peck and Teisberg, 1991, 1999) also uses this trick to speed up computations (Peck, personal communication, 1998)." Richard Tol, "Climate coalitions in an integrated-assessment model", *Computational Economics* vol. 18: 159–172, 2001.

"The computational MRA 'trick', leading to algorithms with  $O(N)$  complexity<sup>2</sup>, is based on the remark that  $WH(X)$  in Eq. (7) can be rewritten as..." A. Davis et al., "Anisotropic multi-resolution analysis in 2D: Application to long-range correlations in cloud mm-radar fields", *SPIE*, vol. 372, - 0277 786/99, 1999, pp 194-207.