

**Questions for the Record**  
**“Opportunity Denied: How Overregulation Harms**  
**Minorities” Tuesday, October 6, 2015**  
**Senator Sheldon**  
**Whitehouse**

**Mr. Aaron Mair:**

**(1) Your testimony asserts that the science behind climate change is clear and there is overwhelming consensus about its human causes. Does recent satellite data invalidate the consensus views of climate change, its human causes, or future risks?**

No, satellite data on temperature definitely does not invalidate the consensus views about climate science, including global warming and its primary cause by human-caused greenhouse gas emissions. The hiatus does not render global models invalid for predicting future risks due to long-term average climate change and sea level rise.

Available satellite measurements of temperatures of the upper atmosphere, such as data from the microwave sounding instruments, have limitations and uncertainties, such as varying methods for correcting errors in instrument calibration and satellite orbits and piecing together short-term records from many different satellites to identify long-term trends. They are not necessarily fully representative of warming of the atmosphere as a whole, especially during short-term variations of climate. The 2013 IPCC report stated that:

“New advances since AR4 have highlighted the substantial degree of uncertainty in both satellite and balloon-borne radiosonde records and led to some revisions and improvements in existing products and the creation of a number of new data products.”(p. 194), and “These various data sets and analyses have served to highlight the degree of uncertainty in the data and derived products. ” (p. 195)[1]

However, satellite and other data of tropospheric temperatures generally have shown an overall warming trend over the past 35 years, qualitatively similar to surface data, but varying substantially in the trend rate among different data reduction methods of the raw satellite measurements. Satellite and other measurements of stratospheric temperatures show a marked cooling of that layer, which tends to confirm the expected (from basic physics) effect of increased greenhouse gases as a major cause of warming of the lower atmosphere (and of the whole climate system) rather than other proposed causes.

The major causes of the recent so-called *pause* or *hiatus* in the rate of increase of atmospheric temperatures after 1998 until about 2013 also are now understood in terms of short-term effects. Essentially, the pause was mainly due to a shift of heat from the atmosphere to the oceans associated with the Pacific Decadal Oscillation, plus smaller

effects due to decadal variability in the Atlantic ocean, to an increase in aerosols from volcanic eruptions, and to slightly weaker solar radiation.[2] Irrespective of any issues about differences among data sets on atmospheric temperature, ocean temperatures and the overall climate system continued to warm, even during the hiatus. The latest IPCC report captures two of the relevant consensus scientific positions:

“Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia. The atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased”, and the further statement that:

“Ocean warming dominates the increase in energy stored in the climate system, accounting for more than 90% of the energy accumulated between 1971 and 2010 (*high confidence*). It is *virtually certain* that the upper ocean (0–700 m) warmed from 1971 to 2010 (see Figure SPM.3), and it *likely* warmed between the 1870s and 1971.”[3]

Other recent data on ocean temperature increases at depths down to 2000 meters add even stronger evidence of ocean warming.[4] Most current global models are not yet designed to predict all the shorter-term internal oscillations of the climate system, and of course they cannot predict unpredictable natural events; however, they are reasonably good at predicting the longer-term average changes in climate due to major persistent factors such as greenhouse gas emissions and thus can be used to predict future average climate change with some degree of confidence. The IPCC 2013 report concluded, in part that: “There continues to be *very high confidence* that models reproduce observed large-scale mean surface temperature patterns ...” [5]

Global atmospheric surface temperature already began increasing more rapidly again in 2014, and 2015 is on track to become the hottest year in historical records by far. As expected, El Niño conditions are resuming and the hiatus appears to have been a short-term fluctuation from the general upward trend in atmospheric warming.

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[1] Hartmann, D.L., et al, 2013: Observations: Atmosphere and Surface. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[2] Trenberth, K., “Has there been a hiatus?: Internal climate variability masks climate-warming trends”, *Science*, **349**, 691-692, 14 August 2015.

[3] IPCC, 2013: Summary for Policymakers. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*

[4] Levitus et al., “World ocean heat content and thermosteric sea level change (0-2000 m), 1955-2010”, *GEOPHYSICAL RESEARCH LETTERS*, VOL. 39, L10603, doi:10.1029/2012GL051106, 2012.

[5] Flato, G., J. et al., 2013: Evaluation of Climate Models. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*.

**(2) Your testimony claims that minority and low-income populations bear disproportionate risks from the effects of climate change. What evidence supports this claim?**

We know climate change will put vulnerable populations at greater risk – including the elderly, communities of color, children, and people already suffering from burdensome allergies, asthma, and other illnesses. Pre-existing health conditions make older adults susceptible to the cardiac and respiratory impacts of air pollution. Higher rates of diabetes, obesity, or asthma in some communities place them at greater risk of climate-related health impacts. Children, who breathe more air relative to their size than adults, are also at higher risk of worsened asthma and respiratory symptoms from air pollution. More than 8 percent of Americans are living with asthma, including more than 9 percent of children. In fact, asthma is the third leading cause of hospitalizations for children. African American children are twice as likely to be hospitalized for asthma as whites, and are more likely to die from asthma. Latino children are 40 percent more likely to die from asthma than white children. Asthma is not just making people sick, it is costing taxpayers.

According to the Centers for Disease Control, the U.S. is spending billions of dollars in Medicaid expenses related to asthma each year. Ozone pollution is directly linked to temperature, thus climate change could likely lead to increased ozone levels. Our analysis found that, within the next ten years, climate change-induced ozone increases in the United States could result in 2.8 million additional respiratory illnesses, 5,100 more infants and seniors hospitalized with serious breathing problems, and 944,000 extra missed school days (Perera, Sanford 2011). All told, these and other health-related impacts could cost approximately \$5.4 billion in 2020 alone. And if global warming pollution continues unabated, the impacts and costs could rise significantly higher.

In addition, climate change also increases the number and severity of heat waves. Older individuals who have a higher risk of dying during extreme heat events will bear a disproportionate share of the impacts. Heat waves and other extreme weather events can also disproportionately affect low-income communities and some communities of color, raising environmental justice concerns. We would like to submit the following reports for the record that detail these impacts to minority and low-income populations:

1. Union of Concerned Scientist Climate Change and Your Health Report Series:
  - a. Perera, Sanford, White-Newsome, Heat in the Heartland: 60 Years of Warming in the Midwest  
[http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/impacts/global-warming-and-heat-waves.html#.VjJ7MLerTIU](http://www.ucsusa.org/global_warming/science_and_impacts/impacts/global-warming-and-heat-waves.html#.VjJ7MLerTIU)
  - b. Perera, White-Newsome, Sanford, Rising Temperatures, Worsening Ozone Pollution  
(2011)[http://www.ucsusa.org/global\\_warming/science\\_and\\_impacts/impacts/climate-change-and-ozone-pollution.html#.VjJ7\\_berTIU](http://www.ucsusa.org/global_warming/science_and_impacts/impacts/climate-change-and-ozone-pollution.html#.VjJ7_berTIU)

- c. Perera, White-Newsome, Sanford, After the Storm: The Hidden Health Risks of Flooding in a Warming World,  
[http://www.ucsus.org/global\\_warming/science\\_and\\_impacts/impacts/global-warming-and-flooding.html#.VjJ8PberTIU](http://www.ucsus.org/global_warming/science_and_impacts/impacts/global-warming-and-flooding.html#.VjJ8PberTIU)
- 2. EPA'S CLEAN POWER PLAN RESOURCES FOR COMMUNITIES  
<http://www3.epa.gov/airquality/cppcommunity/fs-cpp-resources-communities.pdf>
- 3. Social Vulnerability and Climate Change: Synthesis of Literature, Kathy Lynn, Katharine MacKendrick, and Ellen M. Donoghue, 2011  
[http://www.fs.fed.us/pnw/pubs/pnw\\_gtr838.pdf](http://www.fs.fed.us/pnw/pubs/pnw_gtr838.pdf)
- 4. Environment and health risks: a review of the influence and effects of social inequalities, World Health Organization, 2010  
[http://www.euro.who.int/\\_data/assets/pdf\\_file/0003/78069/E93670.pdf](http://www.euro.who.int/_data/assets/pdf_file/0003/78069/E93670.pdf)
- 5. The Health Impacts of Climate Change on Americans, The Whitehouse, 2014,  
[https://www.whitehouse.gov/sites/default/files/docs/the\\_health\\_impacts\\_of\\_climate\\_change\\_on\\_americans\\_final.pdf](https://www.whitehouse.gov/sites/default/files/docs/the_health_impacts_of_climate_change_on_americans_final.pdf)
- 6. ASSESSING THE VULNERABILITY OF COASTAL COMMUNITIES TO EXTREME STORMS: THE CASE OF REVERE, MA., USA  
<http://foehn.colorado.edu/nome/HARC/Readings/Clark.pdf>
- 7. Masozera, Distribution of impacts of natural disasters across income groups: A case study of New Orleans, 2007  
<http://www.d.umn.edu/~pfarrell/Natural%20Hazards/Readings/Katrina%20article.pdf>
- 8. Harlan, Sharon L. Neighborhood microclimates and vulnerability to heat stress, 2006  
[http://www.climateknowledge.org/heat\\_waves/Doc4002\\_Harlan\\_Microclimates\\_Vulnerability\\_Heat\\_SocSciMed\\_2006.pdf](http://www.climateknowledge.org/heat_waves/Doc4002_Harlan_Microclimates_Vulnerability_Heat_SocSciMed_2006.pdf)

**(3) Are people with preexisting respiratory diseases, such as Asthma, at increased risk of worse symptoms, acute attacks, or need for medication as a result of ozone pollution?**

The science is clear that exposure to ozone pollution can be dangerous for even healthy adults, but sensitive populations – including children, the elderly, people with pre-existing respiratory and cardiovascular diseases, low-income families, outdoor workers, and communities of color – are at particular risk. EPA's updated ozone standard took into account thousands of peer-reviewed studies documenting harm to public health. Beyond the well-documented and more obvious relationship between exposure and decreased respiratory function and disease, studies also indicate broader epidemiological harm, including threats to cardiovascular health, reproductive and developmental harm, central nervous system effects, and even premature mortality.

Informing our advocacy for the strongest possible protections from ozone pollution are the recommendations and guidance of this country's top medical experts. Attached is a letter from 13 leading health organizations – including the American Lung Association, the American Medical Association, the American Academy of Pediatrics, and the Asthma and Allergy Foundation of America – to EPA Administrator Gina McCarthy supporting a standard of 60ppb that specifically cites respiratory health effects, and in particular harm to vulnerable populations, as justification for a much stronger standard.

We would also point to the American Thoracic Society's letter to Administrator McCarthy from September of 2015, the Children's Health Protection Advisory Committee letter to the Chair of the Clean Air Scientific Advisory Committee from May of 2014, and the Clean Air Scientific Advisory Committee's letter to Administrator McCarthy from June of 2014 – all attached – that clearly demonstrate scientific consensus that ozone pollution is harmful to public health, particularly to people with preexisting respiratory diseases like asthma.

**(4) Can you provide an example of how well clean air regulations, like the Clean Air Act, have protected peoples' health?**

The Clean Air Act has been one of the most successful pieces of legislation ever enacted by Congress. It has saved hundreds of thousands of lives and prevented millions of asthma attacks, all while growing our economy by driving innovation, creating good American jobs, and saving taxpayers billions in healthcare costs. We submit for the record EPA's 2011 report entitled "The Benefits and Costs of the Clean Air Act from 1990 to 2020" that clearly demonstrates how well the Clean Air Act has worked to protect public health.