

Testimony by Roger A. Pielke Sr. November 25, 2013

Roger A. Pielke Sr. is currently a Senior Research Scientist in the Cooperative Institute for Research in Environmental Sciences (CIRES) and a Senior Research Associate at the University of Colorado-Boulder in the Department of Atmospheric and Oceanic Sciences (ATOC) at the University of Colorado in Boulder (November 2005 -present). He is also an Emeritus Professor of Atmospheric Science at Colorado State University. Roger Pielke Sr. was elected a Fellow of the AMS in 1982 and a Fellow of the American Geophysical Union in 2004. He has also served as President of the American Association of State Climatologists and as State Climatologist for Colorado.

Dr. Pielke has published over 370 papers in peer-reviewed journals, 55 chapters in books, co-edited 9 books, and made over 700 presentations during his career to date. A listing of papers can be viewed at the project website: <http://cires.colorado.edu/science/groups/pielke/pubs/>. He is among one of three faculty and one of four members listed by ISI HighlyCited in Geosciences at Colorado State University and the University of Colorado at Boulder, respectively. His h-index is currently at 75. <http://scholar.google.com/citations?user=ZCFFOQcAAAAJ&hl=en&oi=ao>

His complete vita is at <http://pielkeclimatesci.files.wordpress.com/2012/08/pielke-biosketch-2012.pdf>. His weblog [which contains considerable discussion of climate issues is available at <http://pielkeclimatesci.wordpress.com/>.

Among his recent books, articles and testimony that involve climate issues are

Pielke Sr, R.A., Editor in Chief., 2013: [Climate Vulnerability, Understanding and Addressing Threats to Essential Resources](#), 1st Edition. J. Adegoke, F. Hossain, G. Kallos, D. Niyoki, T. Seastedt, K. Suding, C. Wright, Eds., Academic Press, 1570 pp. View [Preface](#)

Cotton, W.R. and R.A. Pielke Sr., 2007: [Human impacts on weather and climate](#), Cambridge University Press, 330 pp.

Pielke Sr, R.A., 2013: [Mesoscale meteorological modeling](#). 3rd Edition, Academic Press, 760 pp.

National Research Council, 2005: [Radiative forcing of climate change: Expanding the concept and addressing uncertainties](#). Committee on Radiative Forcing Effects on Climate Change, Climate Research Committee, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, The National Academies Press, Washington, D.C., 208 pp.

Pielke Sr., R., K. Beven, G. Brasseur, J. Calvert, M. Chahine, R. Dickerson, D. Entekhabi, E. Foufoula-Georgiou, H. Gupta, V. Gupta, W. Krajewski, E. Philip Krider, W. K.M. Lau, J. McDonnell, W. Rossow, J. Schaake, J. Smith, S. Sorooshian, and E. Wood, 2009: Climate change: The need to consider human forcings besides greenhouse gases. *Eos*, Vol. 90, No. 45,

10 November 2009, 413. Copyright (2009) American Geophysical Union

<http://pielkeclimatesci.wordpress.com/files/2009/12/r-354.pdf>

Pielke Sr., Roger A., 2008: A Broader View of the Role of Humans in the Climate System is Required In the Assessment of Costs and Benefits of Effective Climate Policy. Written Testimony for the Subcommittee on Energy and Air Quality of the Committee on Energy and Commerce Hearing “Climate Change: Costs of Inaction” – Honorable Rick Boucher, Chairman. June 26, 2008, Washington, DC., 52 pp <http://pielkeclimatesci.files.wordpress.com/2010/01/testimony-written.pdf> View **PDF** of Oral Summary.

http://pielkeclimatesci.files.wordpress.com/2009/09/pielke_oral_testimony.pdf

Pielke Sr., R.A. 2013: Humanity Has A Significant Effect on Climate – The AGU Community Has The Responsibility To Accurately Communicate The Current Understanding Of What is Certain And What Remains Uncertain [May 10 2013]. Minority Statement in response to AGU Position Statement on Climate Change entitled: “Human-induced Climate Change Requires Urgent Action” released on 8/5/13. <http://pielkeclimatesci.files.wordpress.com/2013/08/rpt-851.pdf>

In my testimony to you, there is a wide range of subjects on climate I could present, which were inadequately or not at all assessed in the 2013 WG1 IPCC Report. I present four themes here. They which are discussed in detail in the articles and books listed under each.

- The IPCC AR5 Physical Science assessment inadequately considered the spectrum of human and natural climate forcings and feedbacks. Changes in climate are not dominated by the human input of greenhouse gases.

Kabat, P., Claussen, M., Dirmeyer, P.A., J.H.C. Gash, L. Bravo de Guenni, M. Meybeck, R.A. Pielke Sr., C.J. Vorosmarty, R.W.A. Hutjes, and S. Lutkemeier, Editors, 2004: [Vegetation, water, humans and the climate: A new perspective on an interactive system](#). Springer, Berlin, Global Change - The IGBP Series, 566 pp.

National Research Council, 2005: [Radiative forcing of climate change: Expanding the concept and addressing uncertainties](#). Committee on Radiative Forcing Effects on Climate Change, Climate Research Committee, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, The National Academies Press, Washington, D.C., 208 pp.

Pielke Sr., R., K. Beven, G. Brasseur, J. Calvert, M. Chahine, R. Dickerson, D. Entekhabi, E. Foufoula-Georgiou, H. Gupta, V. Gupta, W. Krajewski, E. Philip Krider, W. K.M. Lau, J. McDonnell, W. Rossow, J. Schaake, J. Smith, S. Sorooshian, and E. Wood, 2009: Climate change: The need to consider human forcings besides greenhouse gases. Eos, Vol. 90, No. 45, 10 November 2009, 413. Copyright (2009) American Geophysical Union
<http://pielkeclimatesci.wordpress.com/files/2009/12/r-354.pdf>

Pielke Sr., R.A., A. Pitman, D. Niyogi, R. Mahmood, C. McAlpine, F. Hossain, K. Goldewijk, U. Nair, R. Betts, S. Fall, M. Reichstein, P. Kabat, and N. de Noblet-Ducoudré, 2011: Land use/land cover changes and climate: Modeling analysis and observational evidence. WIREs Clim Change 2011, 2:828–850. doi: 10.1002/wcc.144.

<http://pielkeclimatesci.files.wordpress.com/2012/01/r-369.pdf>

Mahmood, R., R.A. Pielke Sr., K. Hubbard, D. Niyogi, P. Dirmeyer, C. McAlpine, A. Carleton, R. Hale, S. Gameda, A. Beltrán-Przekurat, B. Baker, R. McNider, D. Legates, J. Shepherd, J. Du, P. Blanken, O. Frauenfeld, U. Nair, S. Fall, 2013: Land cover changes and their biogeophysical effects on climate. Int. J. Climatol., DOI: 10.1002/joc.3736.

<http://pielkeclimatesci.files.wordpress.com/2013/07/r-374.pdf>

In the Eos article, in which each of the co-authors is an AGU Fellow, we wrote

In addition to greenhouse gas emissions, other first-order human climate forcings are important to understanding the future behavior of Earth's climate. These forcings are spatially heterogeneous and include the effect of aerosols on clouds and associated precipitation [e.g., Rosenfeld et al., 2008], the influence of aerosol deposition (e.g., black carbon (soot) [Flanner et al. 2007] and reactive nitrogen [Galloway et al., 2004]), and the role of changes in land use/land cover [e.g., Takata et al., 2009]. Among their effects is their role in altering atmospheric and ocean circulation features away from what they would be in the natural climate system [NRC, 2005]. As with CO₂, the lengths of time that they affect the climate are estimated to be on multidecadal time scales and longer.

We also wrote (with respect to the 2007 IPCC WG1 report, but their focus was not changed for the 2013 WG1 report)

Unfortunately, the 2007 Intergovernmental Panel on Climate Change (IPCC) assessment did not sufficiently acknowledge the importance of these other human climate forcings in altering regional and global climate and their effects on predictability at the regional scale. It also placed too much emphasis on average global forcing from a limited set of human climate forcings.

- The IPCC AR5 Physical Science assessment failed to report the lack of skill of multi-decadal climate model predictions (projections) to predict changes in regional climate statistics when run in hindcast simulations. Such a test is a requirement in the scientific method if one is to have any confidence in its skill to predict future changes in regional climate.

This is documented in the preface to the set of books

Pielke Sr, R.A., Editor in Chief., 2013: [Climate Vulnerability, Understanding and Addressing Threats to Essential Resources](#), 1st Edition. J. Adegoke, F. Hossain, G. Kallos, D. Niyoki, T.

Seastedt, K. Suding, C. Wright, Eds., Academic Press, 1570 pp.
[<http://pielkeclimatesci.files.wordpress.com/2013/05/b-18preface.pdf>]

In that article, we conclude that

Multidecadal predictions of changes in regional and local climate statistics have not shown skill when run in a hindcast mode for the past several decades.

Such a test, of course, must be a prerequisite to have any confidence in prediction (projection) skill of changes in regional climate in the future.

- The IPCC AR5 Physical Science assessment, written as the first IPCC report in their series of reports, should have been deferred until the real world threats from climate (including changes over time) as well as from other environmental and social risks are determined. It is only with such a bottom-up, resource-based assessment that the climate models should be used as one tool to assess what is actually possible in terms of realizing critical vulnerability thresholds.

Pielke Sr., R.A., R. Wilby, D. Niyogi, F. Hossain, K. Dairaku, J. Adegoke, G. Kallos, T. Seastedt, and K. Suding, 2012: Dealing with complexity and extreme events using a bottom-up, resource-based vulnerability perspective. Extreme Events and Natural Hazards: The Complexity Perspective Geophysical Monograph Series 196 © 2012. American Geophysical Union. All Rights Reserved. 10.1029/2011GM001086. <http://pielkeclimatesci.files.wordpress.com/2012/10/r-3651.pdf>

In that article we

We discuss the adoption of a bottom-up, resource-based vulnerability approach in evaluating the effect of climate and other environmental and societal threats to societally critical resources. This vulnerability concept requires the determination of the major threats to local and regional water, food, energy, human health, and ecosystem function resources from extreme events including those from climate but also from other social and environmental issues. After these threats are identified for each resource, then the relative risks can be compared with other risks in order to adopt optimal preferred mitigation/adaptation strategies. This is a more inclusive way of assessing risks, including from climate variability and climate change, than using the outcome vulnerability approach adopted by the Intergovernmental Panel on Climate Change (IPCC). A contextual vulnerability assessment using the bottom-up, resource-based framework is a more inclusive approach for policy makers to adopt effective mitigation and adaptation methodologies to deal with the complexity of the spectrum of social and environmental extreme events that will occur in the coming decades as the range of threats are

assessed, beyond just the focus on CO2 and a few other greenhouse gases as emphasized in the IPCC assessments.

- The use of the surface temperature to describe global warming (and cooling) is an inadequate measure. Ocean heat content changes are a much more robust metric where changes in climate system heat content are monitored in Joules.

This is discussed in the articles

Pielke Sr., R.A., 2003: Heat storage within the Earth system. Bull. Amer. Meteor. Soc., 84, 331-335. <http://pielkeclimatesci.wordpress.com/files/2009/10/r-247.pdf>

Pielke Sr., R.A., 2008: A broader view of the role of humans in the climate system. Physics Today, 61, Vol. 11, 54-55. <http://pielkeclimatesci.wordpress.com/files/2009/10/r-334.pdf>

In the text of the 2003 article, I wrote

Since the surface temperature is a two-dimensional global field, while heat content involves volume integrals, as shown by Eq. (1), the utilization of surface temperature as a monitor of the earth system climate change is not particularly useful in evaluating the heat storage changes to the earth system. The heat storage changes, rather than surface temperatures, should be used to determine what fraction of the radiative fluxes at the top of the atmosphere are in radiative equilibrium.

I also recommend the weblog post

<http://pielkeclimatesci.wordpress.com/2011/09/20/torpedoing-of-the-use-of-the-global-average-surface-temperature-trend-as-the-diagnostic-for-global-warming/>

In that post I discuss an issue (of deeper ocean sequestration of heat) that provides one (of several) major reasons that the global average surface temperature is an inadequate metric to monitor global warming and cooling.

I would be glad to elaborate on the above issues, as well as provide other examples of the failure of the 2013 IPCC WG1 to properly report on climate science to the public and policymakers.