

COMMENTS ON THE TESTIMONY OF DR. RICHARD SOMERVILLE

*Given March 8, 2011 to the Subcommittee on Energy
and Power, U.S. House of Representatives*

by Paul C. Knappenberger



SPPI ORIGINAL PAPER



April 21, 2011

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On March 8, 2011, Dr. Richard Somerville supplied written testimony to the U.S House of Representatives Committee on Energy and Commerce Subcommittee on Energy and Power. Dr. Somerville’s testimony was an eloquently packaged collection of general alarmist talking points that closely follows his 2009 Copenhagen Diagnosis. It consists of a selective presentation of post-AR4 findings on climate change—carefully groomed to forward his point of view that disaster is imminently upon us if large and drastic cuts in greenhouse gases emissions are not immediately undertaken.

However, a more restrained look at the scientific literature, the collection of observations, and model performance evaluation reveals a much less desperate situation—one which, in fact, is suggestive of net gains (environmental, social, economic) rather than losses from the burning of fossil fuels.

In the comments that follow, we point out the most egregious examples of selective presentation of the science within Dr. Somerville’s testimony.

Of note, Dr. Somerville, provides these cautionary words in his testimony:

“Choosing to make selective choices among competing evidence, so as to emphasize those results that support a given position, while ignoring or dismissing any findings that do not support it, is a practice known as “cherry picking” and is a hallmark of poor science or pseudo-science.” – Richard Somerville, *Testimony before the U.S House of Representatives Committee on Energy and Commerce Subcommittee on Energy and Power, March 8, 2011*

Yet, throughout his testimony, Dr. Somerville relies on this very tactic. We illustrate Dr. Somerville’s reliance on “cherry picking” in the following examples in which we highlight passages from his written testimony and then present evidence that shows that the situation is either more complex or, in some cases, completely opposite to that put forward by Dr. Somerville.



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Dr. Somerville:

“In early 2007, at the time of the publication of WG1 of AR4, the mainstream global community of climate scientists already understood from the most recent research that the latest observations of climate change were disquieting. In the words of a research paper published at the same time as the release of AR4 WG1, a paper for which I am a co-author, ‘observational data underscore the concerns about global climate change. Previous projections, as summarized by IPCC, have not exaggerated but may in some respects even have underestimated the change’ (Rahmstorf et al. 2007).”

REALITY:

At the time of the publication of the paper that Dr. Somerville was a co-author on (Rahmstorf et al., 2007) it was already obvious that there was a slowdown occurring in the

The rate of global warming is occurring at a much slower rate than projected. So slow in fact, for the past 15 years, the rate of rise is statistically indistinguishable from zero in some datasets. This fact, developed solely from observations, stands in stark contrast to both Dr. Somerville’s scientific paper as well as his testimony.



Somerville’s “concerns about global climate change” are no longer well-grounded in his research that he cited to substantiate them.

rate of global temperature rise. This slowdown has continued up to the present (including the time of Dr. Somerville’s recent testimony). Instead of global temperatures increasing at a rate that is greater than the average rate projected by the climate models incorporated in the IPCC Fourth Assessment Report (AR4), in fact, the rate of global warming is occurring at a much slower rate than projected. So slow in fact, for the past 15 years, the rate of rise is statistically indistinguishable from zero in some datasets. This fact, developed solely from observations, stands in stark contrast to both Dr. Somerville’s scientific paper as well as his testimony.

And the rate of sea level rise has been slowing as well. While at the time of Somerville’s 2007 paper, the current rate of decadal sea level rise was near the high end of the IPCC projections, since then, the rate of sea level rise has slowed, and at the time of his testimony, the current decadal rate of sea level rise is now very close to the middle of the IPCC projected range.



Thus, based on current global temperature trends and current trends in the rate of global sea level rise, the rate of climate change has not been underestimated as was claimed by Dr. Somerville in his testimony but instead in some cases, has been exaggerated. Thus, Somerville’s “concerns about global climate change” are no longer well-grounded in his research that he cited to substantiate them.

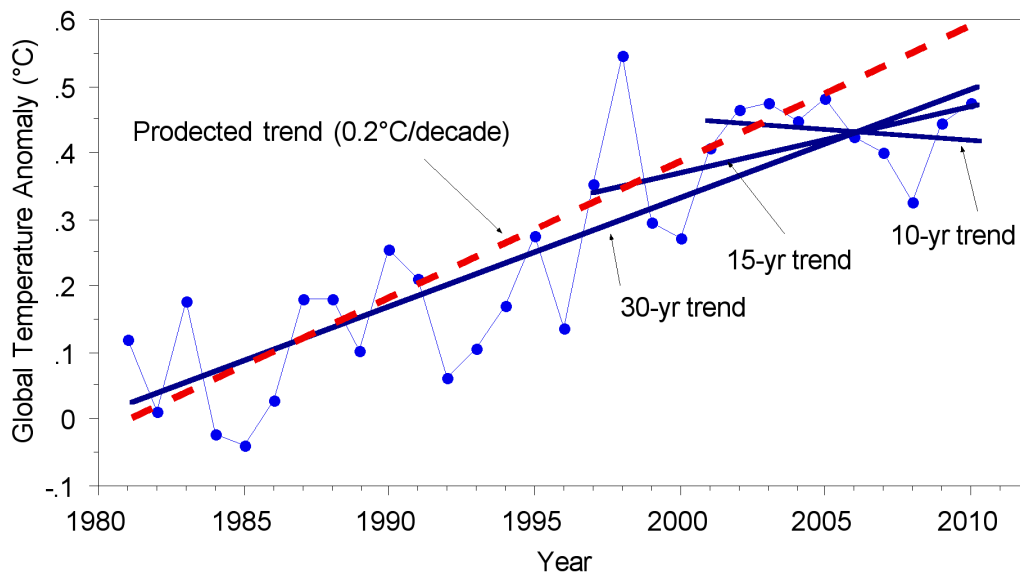
Dr. Somerville:

“The long-term trend is clearly still a warming trend (NASA Goddard Institute for Space Studies, 2009). Its magnitude is about 0.2 degrees Celsius per decade, consistent with IPCC AR4 projections. This is equivalent to about one third of a degree Fahrenheit per decade.”

REALITY:

The long-term trend over the past 30 years in the NASA Goddard record is actually 0.175°C/decade—a value that lies below the IPCC projected temperature trends for that same period. There are also other compilations of the global surface temperatures in common usage including the record compiled by the U.K.’s Hadley Centre. Using that record, the trend over the past 30 years (1981-2010) is 0.165°C/decade—a value even further below the IPCC projections. And that rate of increase has been on the decline. Over the past 15 years, the trend is 0.10°C/decade, over the last 10 years the trend disappears completely (-0.00°C/decade). The consistency of these observations with climate model projections is shaky at best.


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Trends in observed temperatures (as compiled by the U.K. Hadley Center), for a period of 30 years, 15 years, and 10 years, all ending with data from 2010. The model projected trend of 0.2°C/decade is also included for reference.

Reference:

U.K. Met Office Hadley Centre observations datasets, global average temperature, <http://www.metoffice.gov.uk/hadobs/hadcrut3/diagnostics/global/nh+sh/annual>.

Dr. Somerville:

“Our knowledge of the causes of this trend has also improved. IPCC said in 2007, “Most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations.” Science never provides absolute certainty. Here, ‘*very likely*’ is calibrated language used by IPCC to express the degree of scientific uncertainty or the possible range of given scientific findings. In this terminology, used consistently in AR4, ‘*very likely*’ means at least 90% probable.”

REALITY:

There has been a plethora of research published post-AR4 that Dr. Somerville does not include in his testimony which directly impacts the IPCC’s contention that “most of the observed increase in globally averaged temperatures since the mid-20th century is *very likely*

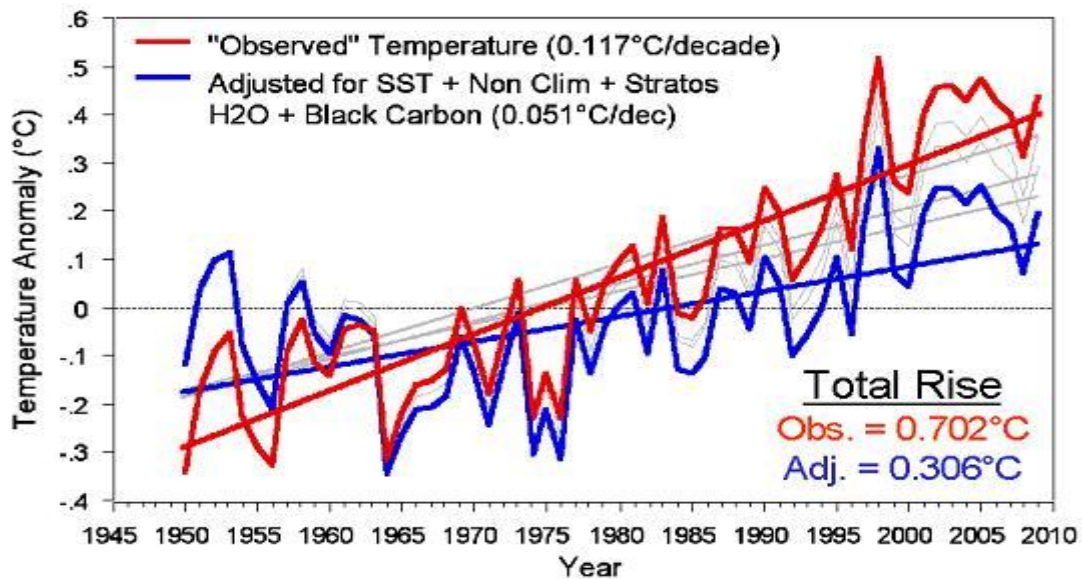


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due to the observed increase in anthropogenic greenhouse gas concentrations.” In fact, the veracity of the IPCC’s statement in light of these recent findings was the central focus of testimony delivered by Dr. Patrick Michaels at a hearing held last fall (November 17, 2010) of the Subcommittee on Energy and Environment of the House Committee on Science and Technology. Dr. Michaels reviewed recent scientific findings of the role of stratospheric water vapor (Solomon et al., 2010), measurement error in the global temperature records (Thompson et al., 2008), non-climatic signals in global temperature records (McKittrick and Michaels, 2007), the warming

impact of black carbon aerosols (Ramanathan and Carmichael, 2009), and potential influence of solar variations (Scafetta, 2009) and concludes that the IPCC statement quoted above “is not supported” when considering this new peer-reviewed scientific research.



Annual global average temperature history from 1950 to 2009 (source: U.K. Hadley Center) and adjusted annual global average temperature to remove SST errors (Thompson et al., 2008), non-climatic influences (McKittrick and Michaels, 2007), the influence of stratospheric water vapor increases (Solomon et al., 2010) and the influence of black carbon aerosols (Ramanathan and Carmichael, 2009) (from testimony delivered by Dr. Patrick Michaels before the Subcommittee on Energy and Environment of the House Committee on Science and Technology, November 17, 2010).

References:

McKittrick, R. R., and P. J. Michaels, 2007. Quantifying the influence of anthropogenic surface processes inhomogeneities on gridded global climate data. *Journal of Geophysical Research*, **112**, D24S09, doi:10.1029/2007JD008465.

Ramanathan V., and G. Carmichael, 2009. Global and regional climate changes due to black carbon. *Nature GeoScience*, **1**, 221-227.

Scafetta, N., 2009. Empirical analysis of the solar contribution to global mean air surface temperature change. *Journal of Atmospheric and Solar-Terrestrial Physics*, **71**, 1916-1923.

Solomon, S., et al. 2010. Contributions of stratospheric water vapor to decadal changes in the rate of global warming. *Science*, published on-line January 28, 2010.

Thompson, D., et al., 2008. A large discontinuity in the mid-twentieth century in observed global-mean surface temperature. *Nature*, **453**, 646-649.

Dr. Somerville:

“Recent research has also clarified our understanding of a warming trend in the atmosphere above the lowest layers near the Earth’s surface. By reducing errors in temperature measurements, a warming in the tropical upper troposphere, 10 to 15 kilometers (roughly 6 to 10 miles) above the surface, is now apparent in observations, thus reconciling different measurement data and model simulations (Thorne, 2008). A new method based on wind observations (Allen and Sherwood, 2008) shows a similar warming trend in the upper troposphere, consistent with model results.”

REALITY:

During the same hearing which Dr. Somerville testified, Dr. John Christy also presented testimony and in Dr. Christy’s testimony he directly commented on the issue of the correspondence (or rather lack thereof) between temperature trends in the tropical troposphere and those at the surface. In Dr. Christy’s testimony, it is clear that the issue is far more complex and in fact, that the evidence is far more supportive of a continued discrepancy between measurement data and model simulations than a reconciliation (as Dr. Somerville characterized the situation).

Here is the relevant portion of Dr. Christy’s testimony (which can be found in full, including References and Appendices cited in the quote below, at this web address, http://science.house.gov/sites/republicans.science.house.gov/files/documents/hearings/ChristyJR_written_110331_all.pdf):

A prominent signature of global warming due to greenhouse gases in climate models is a warming of the tropical upper atmosphere, generally between 8 and 12 km, that is much greater than the warming which models project for the surface. The signature in models is so prominent that it provides a relatively easy test against observations. Several studies have indicated that observations do not show this feature, which in turn casts doubt on climate model theory as representing greenhouse warming properly and on which the EPA Finding relied (e.g. Christy et al. 2007, Douglass et al. 2007).

In the review of the EPA draft, several responders, including me, informed the EPA that the EPA’s statement about agreement between observations and models had been improperly reported. We backed up our claims with published information. However, in their response to us, the EPA’s “authors”



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(themselves part of the establishment) in IPCC-like fashion claimed “when uncertainties in models and observations are properly accounted for, newer observational datasets are in agreement with climate model results.”

As far as we could tell, they did not give any serious consideration to contradictory evidence. This was another example of authors, who were utilized by the EPA, having the authority to ignore evidence that was clearly against their assertions.



Rather than providing the range of views in the Finding, or at a minimum pointing out significant model uncertainty suggested by our results, the EPA authors acted as gatekeepers and misled the readers.



the EPA simply allowed its own hand-picked authors to assert their conclusion. They did not objectively assess the conclusions of these contradictory studies or even acknowledge at a minimum that significant controversy continued on this issue.

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In their response to our reviews, the EPA cited three papers which purportedly offered “new observations” to support their model vs. observations “agreement”, relying mainly on Santer et al. 2008. However, these “new” upper air data sets (RAOBCORE 1.3, 1.4, and Allen and Sherwood (2005) thermal wind derivation) and two of the “new” surface data sets (ERSST v2 and v3) had been shown to contain spurious trends when tested for accuracy and these versions are not used for trend estimation any longer. Santer et al., the EPA’s key citation, had done no testing of the observations as we had done. In my review, I went through the details of why Santer et al. 2008 had been incorrect in both their hypothesis test (where they neglected the pre-condition of surface trend agreement between models and observations – see bracketed note below) and with the data

they used. However, the EPA simply allowed its own hand-picked authors to assert their conclusion. They did not objectively assess the conclusions of these contradictory studies or even acknowledge at a minimum that significant controversy continued on this issue. Further studies support the


original comments of my review (e.g. Sakamoto and Christy, 2009, Klotzbach et al. 2009, Christy et al. 2010, McKittrick et al. 2010).

Dr. Somerville:


“Recent research and new observations have decisively settled the question of whether a warming climate will lead to an atmosphere containing more water vapor, and if so, whether the additional water vapor will add to the greenhouse effect, augmenting the warming. The answers to both these questions are yes. Water vapor does become more plentiful in a warmer atmosphere (Dessler et al., 2008). Satellite data show that atmospheric moisture content over the oceans has increased since 1998, with human causes being responsible (Santer et al., 2007).”

REALITY:

This issue, like the others, is more nuanced and complex than Dr. Somerville presents. Recent scientific work concerning the magnitude of the water vapor/cloud feedbacks in the climate system have been published that are not supportive of feedbacks as large as those posited in Dessler et al. (2008). This includes published papers (as well as on-going work) by Spencer and Braswell (2008) and Lindzen and Choi (2008) as well as Paltridge et al. (2009). These papers conclude that cloud processes which are important in the exchange of heat in the global climate system may act to retard (rather than enhance) warming caused by an increase in greenhouse gas concentrations. While these papers are certainly not the final word, interesting and informative scientific exchanges between the many researchers examining cloud/water vapor feedback processes continues both formally and informally. The issue is far from being as settled as Dr. Somerville makes it appear.



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References:

Lindzen, R.S., and Y. Choi, 2009. On the determination of climate feedbacks from ERBE data. *Geophysical Research Letters*, **36**, L16705, doi:10.1029/2009GL039628.

Paltridge G., et al., 2009. Trends in middle- and upper-level tropospheric humidity from NCEP reanalysis data. *Theoretical and Applied Climatology*, **98**, 351-359.

Spencer, R.W., and W.D. Braswell, 2008. Potential biases in feedback diagnostics from observational data: a simple model demonstration. *Journal of Climate*, **21**, 5624-5628.

Somerville:

“Increased melting of the large polar ice sheets contributes to the observed increase in sea level. Observations of the area of the Greenland ice sheet that has been at the melting point temperature for at least one day during the summer period shows a 50% increase during the period 1979 to 2008. The Greenland region experienced an extremely warm summer in 2007. The whole area of south Greenland reached the melting temperatures during that summer, and the melt season began 10-20 days earlier and lasted up to 60 days longer in south Greenland, compared with Greenland as a whole.”

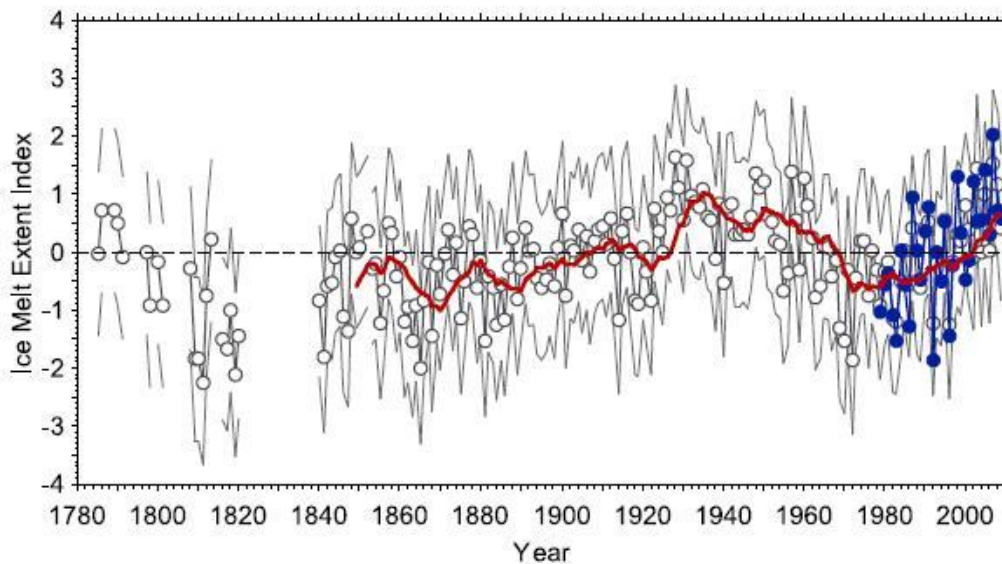
REALITY:

Dr. Somerville leaves out the historical context of the recent increase in surface melt in Greenland. In a recent paper, Frauenfeld et al., (2011) reconstruct the extent of surface melt on Greenland back into the late 18th century. They find two things of note: 1) there was a period of high surface ice melt during the early-to-mid 20th century that was similar in magnitude and longer in duration than the current integrated melt extent, and 2) that the beginning of the satellite record (the record referred to by Dr. Somerville) in the late 1970s was a period of very low (below average) ice melt across Greenland. Thus, a significant portion of the recent increase in ice melt cited by Dr. Somerville is actually a return to the long-term average conditions.



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Reconstructed history of the total ice melt extent index over Greenland, 1784–2009. Observed values of the ice melt index (blue solid circles), reconstructed values of the ice melt index (gray open circles), the 10 year trailing moving average through the reconstructed and fitted values (thick red line), and the 95% upper and lower confidence bounds (thin gray lines) (from Frauenfeld et al., 2011).

Reference:

Frauenfeld, O.W., et al., 2011. A reconstruction of annual Greenland ice melt extent, 1784-2009. *Journal of Geophysical Research*, doi: 10.1029/2010JD014918, in press.

Dr. Somerville:

“In addition to melting, the large polar ice sheets lose mass by ice discharge, which also depends on regional temperature changes. Satellite measurements of very small changes in gravity have revolutionized the ability to estimate loss of mass from these processes. The Greenland ice sheet has been losing mass at a rate of about 179 Gt/yr since 2003. Here Gt is an abbreviation for gigaton, or one billion metric tons.”

REALITY:

The ice melt number that Somerville quotes is based on observations which have been recently found to be in error.

In a paper published last fall (Wu et al., 2010) it was determined that the satellite measured changes in gravity were miscalibrated which was leading to an overestimate of ice loss from Greenland. Using a new, improved calibration scheme, the loss of ice estimates from

The ice melt number that Somerville quotes is based on observations which have been recently found to be in error.



This is another example of where Dr. Somerville made “selective choices among competing evidence, so as to emphasize those results that support a given position, while ignoring or dismissing any findings that do not support it” a practice that he himself described as “a hallmark of poor science or pseudo-science.”

Greenland have been cut nearly in half. According to the calculations of Wu et al. (2010) Greenland is losing ice at a rate of about 104 Gt/yr, which is equivalent to about one-tenth of an inch of global sea level rise per decade.

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Wu, X., et al., 2010. Simultaneous estimation of global present-day water transport and glacial isostatic adjustment. *Nature Geoscience*,

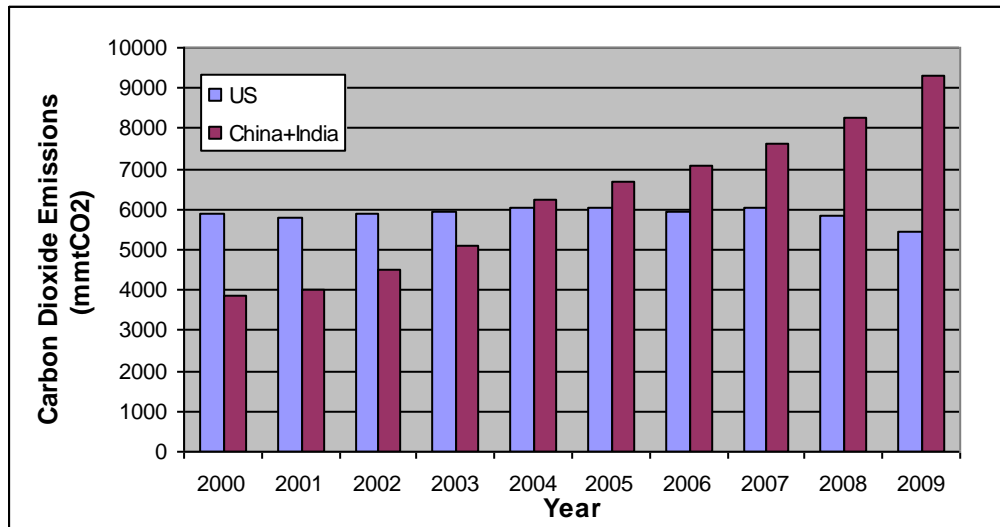
published on-line August 15, 2010, doi: 10.1038/NGE0938.

Dr. Somerville:

“The global carbon cycle is in strong disequilibrium because of the input of CO₂ into the atmosphere from fossil fuel combustion and land use change. Total emissions have grown at about 2% per year since 1800. However, fossil fuel emissions have accelerated since 2000 to grow at about 3.4% per year, an observed growth rate that is at or even somewhat beyond the upper edge of the range of growth rates in IPCC scenarios. Total CO₂ emissions are responsible for about two thirds of the growth of all greenhouse gas radiative forcing. Here radiative forcing is a technical term quantifying the effect on the Earth’s heat balance.”

REALITY:

While it is true that the growth rate of global CO₂ emissions has increased during the 21st century, Somerville failed to mention that almost three-quarters of that increase has come from China and India. During the same time, CO₂ emissions from the United States have declined.



Carbon dioxide emissions from consumption of energy, 2000-2009, from the U.S. and China+India (source, U.S. Energy Information Administration).

Reference:

U.S. Energy Information Administration, 2011. International Energy Statistics, <http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8>.

Dr. Somerville:

“One complex climate model that had been modified to include recent advances in understanding of the carbon cycle, natural climate factors, and other elements, then produced twice as large a global average temperature increase at the end of the 21st century as it had before the model was modified: 5.2 °C in the new model run compared to 2.4 °C for the older version of the model (Sokolov et al. 2009).”

REALITY:

Dr. Somerville failed to mention that another “complex climate model” has recently been modified to include recent advances in understandings of cloud processes (identified by the IPCC as one of the “key uncertainties” in current climate models) and in doing so, it produced 25% less warming than before the model was modified (Watanabe et al., 2010).

This is another example of where Dr. Somerville made “selective choices among competing evidence, so as to emphasize those results that support a given position, while ignoring or dismissing any findings that do not support it” a practice that he himself described as “a hallmark of poor science or pseudo-science.”

Reference:

Watanabe, M., et al., 2010. Improved climate simulation by MIROC5: Mean states, variability, and climate sensitivity. *Journal of Climate*, **23**, 6312-6335.

The above are but some examples of the “selective choices among competing evidence, so as to emphasize those results that support a given position, while ignoring or dismissing any findings that do not support it” that are to be found in Dr. Somerville’s testimony. Dr. Somerville refers to such practices as “a hallmark of poor science or pseudo-science.”



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