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Scientific Critique of IPCC's 2013 "Summary for Policymakers"

by Craig D. Idso, Robert M. Carter, S. Fred Singer, and Willie Soon*

Introduction

The United Nations' Intergovernmental Panel on Climate Change (IPCC) released a final version of the Summary for Policymakers (SPM) of its Fifth Assessment Report on September 27, 2013. It differs in important ways from a draft SPM dated June 2013 that circulated widely in the preceding months.

As discussed below, the new SPM reveals the IPCC has retreated from at least 11 alarmist claims promulgated in its previous reports or by scientists prominently associated with the IPCC. The SPM also contains at least 13 misleading or untrue statements, and 11 further statements that are phrased in such a way that they mislead readers or misrepresent important aspects of the science.

Two weeks before the IPCC released its report, an alternative perspective was presented by a different group of scientists, the Nongovernmental International Panel on Climate Change (NIPCC) (Idso *et al.*, 2013). Unlike the IPCC, NIPCC's charter is to investigate the causes and consequences of climate change "in the round," or from all perspectives, rather than to search only for evidence of a human impact on climate. The NIPCC report, titled *Climate Change Reconsidered II: Physical Science* contradicts many of the IPCC's findings.

In the discussion that follows, IPCC quotations are identified by their page number in the SPM using the same numbering method (e.g., SPM-3) used in the SPM itself. Chapters in the NIPCC

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* Drs. Craig Idso, Robert Carter, S. Fred Singer, and Willie Soon are scientists and lead authors or chapter lead authors of *Climate Change Reconsidered II: Physical Science*, a comprehensive review of the peer-reviewed literature on climate change released in September 2013 by the Nongovernmental International Panel on Climate Change (NIPCC). Their biographies appear on pages 16-17.

report providing evidence contrary to the IPCC's claims are referenced as "NIPCC, Chapter X." The NIPCC report and its Summary for Policymakers are available online at www.climatechangereconsidered.org.

1. IPCC Retreats

Eleven statements made in the 2013 SPM apparently retreat from more alarmist positions struck in earlier Assessment Reports or in related research literature. These repositionings are to be welcomed when they move the IPCC's commentary closer to scientific reality.

1. *"The rate of warming over the past 15 years (1998-2012; 0.05 deg. C/decade) is smaller than the trend since 1951 (1951-2012; 0.12 deg. C/decade)"* (SPM-3).

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The IPCC concedes for the first time that a 15 year-long period of no significant warming occurred since 1998 despite a 7% rise in carbon dioxide (CO₂). It also acknowledges that on a longer (more climatic) time scale the rate of global warming has decelerated since 1951, despite an accompanying 80 ppm or 26% increase in

carbon dioxide (312 to 392 ppm).

The statement represents a significant revision in IPCC thinking, because their concern about dangerous warming rests upon the assumption that temperature increases will proceed in parallel fashion with CO₂ increases, and not just sometimes or in a stepped fashion. NIPCC, in contrast, has documented that temperatures in the geologic time scale, the twentieth century, and the early twenty-first centuries have not changed in parallel with CO₂ levels (NIPCC, Chapter 4).

2. *"Continental-scale surface temperature reconstructions show, with high confidence, multi-decadal intervals during the Medieval Climate Anomaly (950-1250) that were in some regions as warm as in the late 20th century"* (SPM-4).

IPCC-related scientists have previously argued that the magnitude of the late twentieth century global warming exceeded that of the Medieval Warm Period (MWP). The notorious "hockey stick" featured in the IPCC's Third Assessment Report, and still visible in the Fourth Assessment Report, appeared to erase the MWP from the historical temperature record by showing little temperature change for thousands of years followed by a sharp rise in the twentieth century.

From an independent survey of paleoclimatic data records, NIPCC found the MWP to have been of near-global extent, and that the magnitude of warming was often similar to or exceeded that observed for the twentieth century from thermometer data (NIPCC, Chapter 4).

3. *"It is very likely that the annual mean Antarctic sea ice extent increased ... (by) 1.2-1.8% per decade between 1979 and 2012"* (SPM-6).

IPCC-related scientists have repeatedly argued that greenhouse gas forcing would cause surface warming and ice melting in both north and south polar regions. There is no *a priori* reason to suggest that increasing atmospheric CO₂ would cause Antarctic sea ice extent to increase, and in fact, this circumstance contradicts the IPCC's climate model projections. It is a welcome advance that the IPCC now acknowledges the facts relevant to this matter (NIPCC, Chapter 5).

4. *The June draft of the SPM contained the statement that “Models do not generally reproduce the observed reduction in surface warming trend over the last 10-15 years” (Section D-1, Draft SPM-10).*

Though this statement was removed from the final, published version of the SPM, it remains patently true, as does the fact that IPCC's climate models have failed to project the lack of warming over the last 15 (now 17) years.

The termination of the late-twentieth century warming phase has two alternative explanations, both of which are referred to on page SPM-10. These are that the now prolonged period of temperature stasis reflects a statistical fluctuation; or, alternatively, that the cessation of warming has been caused by the accumulation of heat in the deep ocean. The IPCC clearly remains ambivalent about which, if either, of these two explanations is correct, and fails to explain how heat can be transferred to the deep ocean without first passing through the shallow ocean, which has not warmed since at least 2003 (Pielke, 2008).

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These confusions aside, IPCC-related scientists have hitherto argued consistently that their computer models provide realistic estimates of future temperature with a reliability that is adequate for use in policy formulation. This is clearly not the case (NIPCC, Chapter 1).

5. *“There are ... differences between simulated and observed trends over periods as short as 10 to 15 years (e.g., 1998 to 2012)” (SPM-10); “there remains low confidence in the representation and quantification of [cloud and aerosol] processes in models” (SPM-11); and “most models simulate a small downward trend in Antarctic sea ice extent, albeit with larger inter-model spread, in contrast to the small upward trend in observations” (SPM-11).*

These statements, which appear in the published version of the SPM, indirectly point to the same conclusion reached under 4 above, i.e., that the IPCC's models are inadequate to simulate many aspects of the climate system, not just temperature. The IPCC relies heavily on modeling to lend theoretical support to its hypothesis of dangerous CO₂-forced warming. The statements listed above represent a significant reduction in confidence of IPCC model projections.

In contrast, NIPCC scientists have consistently been critical of the presumption that climate models are adequate for use in serious forecasting exercises, while at the same time recognizing their undoubted heuristic value.

6. “The reduced trend in radiative forcing (between 1998 and 2012) is primarily due to volcanic eruptions and the timing of the downward phase of the 11-year solar cycle” (SPM-10).

This statement marks the first time the IPCC has acknowledged that solar factors may play a determinative role in short-term climate variability.

This is a critically important concession to the views of the many independent scientists who have concluded that solar effects play a bigger role in controlling climate than does CO₂ (NIPCC, Chapter 3).

7. “Equilibrium climate sensitivity** is likely in the range 1.5 deg. C to 4.5 deg. C ...” (SPM-11) and “No best estimate for equilibrium climate sensitivity can now be given because of a lack of agreement on values across assessed lines of evidence and studies” (SPM-11, fn 16).

The IPCC’s Fourth Assessment Report allocated a range of 2.0 deg. C to 4.5 deg. C for ECS. By now reducing the ECS lower limit to 1.5 deg. C, the IPCC has conceded that less certainty exists than in 2007. Indeed, the climate sensitivity of atmospheric CO₂ is now as uncertain as it was in 1979 when a National Academy of Sciences report first established the same range of 1.5 to 4.5 deg. C (Charney *et al.*, 1979). In other words, no refinement has been made in 34 years in determining how much warming is likely to result from a doubling of atmospheric CO₂.

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The decision not to designate a “best estimate” for ECS is unique in IPCC’s history, and a further indication of growing uncertainty. It probably reflects the publication of a number of recent papers (e.g., Aldrin *et al.*, 2012; Ring *et al.*, 2012; Lewis, 2013) in which sensitivity has been estimated

from observations to be between 1.2 and 2.0 deg. C, a range that extends below IPCC’s newest estimates.

8. “The transient climate response*** is likely in the range of 1.0 deg. C to 2.5 deg. C ... and extremely unlikely greater than 3 deg. C” (SPM-12).

By reducing the bottom of the range of TCR to 1.0 deg. C, the IPCC’s estimate of human-caused warming for the rest of the twenty-first century now overlaps with those many independent scientists who put the response in the range of 0.3 to 1.2 deg. C. (NIPCC, Chapter 1, Section 1.1.5). In setting the top of the range at 3.0 deg. C, the IPCC’s estimate now falls within the range of natural climate variation over the last 6 million years. Because it falls within the warm natural temperature limit that planet Earth has attained recently, any such change (should it actually happen) is unlikely to be “dangerous” (NIPCC, Chapter 1).

** Equilibrium climate sensitivity (ECS) is the amount of warming expected to result from a doubling of atmospheric CO₂ as the climate system tends towards equilibrium (>1,000 years).

*** Transient climate response (TCR) is the amount of warming expected to result from a doubling of atmospheric CO₂ after 70 years, given a rate of CO₂ increase of 1% per year.

9. *“It is very unlikely the Atlantic Meridional Overturning Circulation will undergo an abrupt transition or collapse in the 21st century for the scenarios considered”* (SPM-17).

The IPCC also indicated in its 2007 report that it was unlikely that the AMOC would collapse because of fresh water input to the ocean from melting ice. However, this did not prevent IPCC-related scientists and environmental lobbyists from arguing in the interim that increasing greenhouse gases might cause major and deleterious changes in ocean circulation. The reiteration of IPCC’s view of low risk, and its agreement in that regard with NIPCC (NIPCC, Chapter 9), is therefore both welcome and important.

10. *“Global mean sea level rise for 2081-2100 will likely be in the ranges of 0.26 to 0.55 m for RCP2.6, 0.32 to 0.63 m for RCP4.5, 0.33 to 0.63 m for RCP6.0 and 0.45-0.82 m for RCP8.5”* (SPM-18).

The lowest estimate of a 26 cm rise by 2100 is significantly above the 18 cm rise suggested by many independent scientists (based upon an extrapolation of the last century rate of increase as measured by tide gauges). However, the highest estimate of 82 cm by 2100 falls well below the 1.4 m promulgated by IPCC-related scientists like Rahmstorf (2007) and others.

By admitting it has “low confidence” in predictions of more frequent or more extreme droughts and tropical cyclones, IPCC is specifically revoking its previous more alarmist claims.

Overall, these sea-level projections are still high when compared to currently observed trends and the best estimates reported by NIPCC (NIPCC, Chapter 6); at the same time, they are lower than the alarmist forecasts often cited by reporters and environmental advocacy groups.

11. *“Low confidence” that damaging increases will occur in either drought or tropical cyclone activity* (SPM-23, Table SPM.1).

Many papers by IPCC-related scientists, and also previous Assessment Reports, argued that carbon dioxide forcing would result in dangerous increases in the magnitude or frequency of extreme climatic events including cyclones and droughts. By admitting it has “low confidence” in predictions of more frequent or more extreme droughts and tropical cyclones, IPCC is specifically revoking its previous more alarmist claims.

NIPCC presents extensive evidence that extreme weather events have not become more frequent or intense in the late twentieth and early twenty-first centuries, and also summarizes the theoretical reasons as to why dangerous weather events should actually be less frequent or intense in a modestly warmer world (NIPCC, Chapter 7).

2. Misleading or Untrue Statements

The following 13 statements by the IPCC are written in such a way that although they may be technically true, or nearly true, they are misleading of the actual state of affairs.

1. *“Probabilistic estimates of quantified measures of uncertainty in a finding are based on statistical analysis of observations or model results, or both, and expert judgment”* (SPM-2).

The IPCC’s use of numeric percentage confidence limits has been widely criticized, as outlined further below. Regarding the “statistical analysis of ... model results” we make the following comments.

Weather forecasting methods make successful use of probabilistic ensemble averaging to provide a numerical range of uncertainties for individual forecasts. IPCC’s climate models, however, are not run in this mode, and their ensemble averages are based upon a statistically inadequate and inconsistent number of runs, generally less than five. As discussed by Singer (2013), the chaoticity of modeling can only be overcome by using a large number of runs.

It is obvious also that different climate models in CMIP5 use different parameterizations and adopted forcings in calculating both the present and future climate. No meaningful statistical probability can be derived by averaging such an inhomogeneous set of model outputs, not only in a statistical sampling sense but also from the structural and methodological point of view.

2. *“Warming of the climate system is unequivocal, and since the 1950s many of the observed changes are unprecedented”* (SPM-3).

This statement is doubly untrue.

The post-1950 warming shown by the Hadley record is of about the same magnitude and rate as the known natural warming between 1910 and 1940, and is therefore not unprecedented.

Though the IPCC’s favored temperature record (HadCRUT) depicts a rise of 0.4 deg. C since 1950, other temperature records show little or no warming at all in the second half of the twentieth century. These records include the US GISS land surface record, Hadley NMAT SST, sea surface temperature, Hadley radiosonde, satellite MSU and land surface temperature proxies (NIPCC SPM, Figure 4, and NIPCC, Chapter 4).

It is likely that the HadCRUT temperature record underestimates the impact of urban heat islands on surface temperature records, so no other human component (or specifically, greenhouse gas emissions) can be isolated as a cause of this warming. The post-1950 warming shown by the Hadley record is of about the same magnitude and rate as the known natural warming between 1910 and 1940, and is therefore not unprecedented.

3. *“It is virtually certain that the upper ocean (0-700m) has warmed from 1971-2010”* (SPM-4) and *“It is very likely that anthropogenic forcings have made a substantial contribution to global upper ocean heat content (above 700m) observed since the 1970s”* (SPM-13).

Published estimates of ocean temperature or ocean heat through the twentieth century are based upon biased data, two major reasons being inadequate geographic coverage and instrumental inaccuracy. The claimed average ocean temperature rise of 0.15 deg. C is therefore actually

below our ability to measure over that period.

Accurate measures of ocean heat have only been available since the deployment of the Argo buoy network in 2003. For the 10 years 2003-2012, the Argo-measured upper ocean heat curve shows no statistically significant trend, remaining flat despite a 5% rise in atmospheric CO₂.

Importantly, the uptake of ocean heat assumed by the IPCC is model driven, not measured. Real measurement would require that changes in ocean surface radiation, sensible heat and latent energy exchanges all be known with a high degree of precision, which is not the case with current instrumentation (NIPCC, Chapter 6).

4. *“Emissions of carbon monoxide are virtually certain to have induced a positive radiative forcing”* (SPM-9).

Carbon monoxide is a highly reactive gas without significant radiative trapping properties. It has fast chemical interactions with the hydroxyl radical which also oxidizes methane within about two months of its appearance in the atmosphere. It is therefore responsible for only a negligible amount of direct and sustainable heat forcing.

Claiming a significant radiative forcing for carbon monoxide on the global climate system is contradicted by comments made by IPCC authors themselves: “Emissions of highly reactive, non-greenhouse species (i.e., SO₂, NH₃, NO_x, CO, NMVOC) control much of the atmospheric chemistry, viz., tropospheric O₃, aerosols, global air quality, and indirectly the abundances of CH₄ and HFCs. *The emissions are difficult to quantify or project ...*” (Chapter 11 of AR5 WG I Second Order Draft, emphasis added).

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5. *“Satellite observation of total solar radiation changes from 1978-2011 indicate that the last solar minimum was lower than the previous two. This results in a RF of -0.04 W/m²”* (SPM-9).

This particular outcome derives from a paper by Frohlich (2009) from the World Radiation Center, whereas two other surveys by ACRIM (Active Cavity Radiometer Irradiance Monitor) and RMIB (Royal Meteorological Institute of Belgium) that were based upon similar measurements but different data reduction techniques, do not find this decrease.

The NIPCC report devotes considerable attention to solar effects on climate and extensively summarizes the latest research available on the mechanisms that affect solar forcing of climate (NIPCC, Chapter 3).

6. *“The reduced trend in radiative forcing (1998-2012) is primarily due to volcanic eruptions”* (SPM-10).

No volcanic eruptions with significant global impact occurred during the period 1998-2012.

7. *“The net radiative feedback due to all cloud types combined is likely positive. Uncertainty in the sign and magnitude of the cloud feedback is due primarily to continuing uncertainty in the impact of warming on low clouds”* (SPM-11).

These two sentences are contradictory.

If the sign and amplitude of low cloud feedback are uncertain, then it is impossible to be sure that the net radiative feedback due to all clouds is positive.

If the sign and amplitude of low cloud feedback are uncertain, then it is impossible to be sure that the net radiative feedback due to all clouds is positive. This is especially so because of the very dominant effects of low clouds in controlling the near-surface energy imbalances between the ocean and atmosphere.

8. *“Greenhouse gases contributed a global mean surface warming likely to be in the range of 0.5-1.3 deg. C over the period 1951-2010 with the contribution from other anthropogenic forcing, including the cooling effect of aerosols, likely to be in the range of -0.6 to +0.1 deg. C. ... Together these assessed contributions are consistent with the observed warming of approximately 0.6 to 0.7 deg. C over this period”* (SPM-12).

The estimated range of 0.5-1.3 deg. C of warming from greenhouse gases well exceeds the 0.6 deg. C report by HadCRUT, presumably because too much forcing is being assumed in the models. The reduction in that warming by 0.6 deg. C is an arbitrary outcome based upon a subjective choice of estimates of aerosol counter-forcing. This approaches “tweaking” models in order to fit their output to a predetermined conclusion.

The effects of aerosols should be considered in both a temporal and spatial framework, which current generation models do not provide. Overall, the effects of aerosols are highly complex and uncertain, and IPCC only considers a few out of a total of more than 50 types of aerosols (NIPCC, Chapter 2).

9. *“It is extremely likely that human influence on climate caused more than half of the observed increase in global average surface temperature from 1951-2010. The best estimate of the human-induced contribution to warming is similar to the observed warming over this period”* (SPM-12) and *“Human influence has been detected in warming of the atmosphere and the ocean, in changes in the global water cycle, in reductions in snow and ice, in global mean sea level rise, and in changes in some climate extremes. This evidence for human influence has grown since AR4. It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century”* (SPM-12, boxed text).

There is fundamental confusion in the first two quoted sentences, which conflict with each other. Is the human influence “more than half” or does it comprise the total “observed warming”?

Second, these assertions are based upon Fig. SPM.6, which presents a comparison of empirical data and model projections for the named factors, and also for a global average. It is claimed that only if human greenhouse gas forcing is included do the computer projections match the

empirical data. The underlying assumption is that the models contain a perfect representation of the physics of the climate system and so can account accurately for all different forcings. This is a false assumption because our knowledge is much less than complete. For example, models fail to account for known and important natural forcings like solar magnetic activity, and individual models differ from each other in their choice of parametric values, particularly those related to cloud microphysics (CR-II, Chapter 1).

10. *“For surface temperature, the blue shaded band is based on 52 simulations from 17 climate models using only natural forcing, while the red shaded band is based on 147 simulations from 44 climate models using natural and anthropogenic forcings. For ocean heat content, 10 simulations from 10 models, and 10 simulations from 13 models were used respectively. For sea ice extent, a subset of models are considered that simulate the mean and seasonal cycle of the sea ice extent within 20% of the observed sea-ice climatology for the period 1981-2005 (Arctic: 24 simulations from 11 models for both red and blue shaded bands, Antarctic: 21 simulations from 6 models for both red and blue shaded bands)”* (Draft SPM, June 2013, Fig. SPM.6 caption).

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Though removed from the final SPM, this paragraph was provided in the June draft as an explanation of the procedures followed in preparing Figure SPM.6, which is retained in the published SPM.

The explanation does not describe a rigorous averaging process. Such a process requires the consideration of a homogeneous set of samples and an unbiased presentation of all model output simulations, not a comparison of selectively assembled model projections from which a desired outcome is then favored. In essence, rigorous averaging should not involve cherry picking (NIPCC, Chapter 1).

11. *“Human influence on the climate system is clear. This is evident from the increasing greenhouse gas concentrations in the atmosphere, positive radiation forcing, observed warming, and understanding of the climate system (SPM-10).*

This claim is a strong overstatement.

The increasing greenhouse gas concentrations will indeed produce *prima facie* warming, but depending upon the climate sensitivity of the gases involved (itself a highly disputed matter), and the nature and magnitude of various feedback loops, whether any human-related warming will be of measurable magnitude remains an open question. Furthermore, the comment about radiative forcing is redundant, because obviously that is what greenhouse gases do.

How much warming has occurred since the mid-20th century is also a strongly disputed matter in itself, depending upon the data set used and the corrections made or not for the urban heat island

effect (NIPCC, Chapter 4, Section 4.2.2, and see also point 2 above).

12. *“It is very likely that there is a substantial anthropogenic contribution to the global mean sea level rise since the 1970s. This is based on the high confidence in an anthropogenic influence on the two largest contributions to sea level rise, that is thermal expansion and glacier mass loss”* (SPM-13).

Since sea level rise has been occurring since long before the human era, and at rates higher than those observed in human history, there is no observational basis for this claim.

No empirical evidence exists in support of this statement. The references to an anthropogenic influence on sea level via thermal expansion and ice loss are assertions or claims based only on unproven assumptions and outputs of climate models. Since sea level rise has been occurring since long before the human era, and at rates higher than those observed in human history,

there is no observational basis for this claim (NIPCC, Chapter 6).

13. *“For RCP8.5, the (sea level) rise by the year 2100 is 0.52 to 0.98 m, with a rate during 2081-2100 of 8 to 16 mm/yr”* (SPM-18).

This is not a fact but a projection based on one highly unrealistic scenario.

The scenario chosen (RCP8.5) is the most extreme of four (i.e., has the strongest greenhouse gas forcing), and sets the total greenhouse gas forcing as 8.5 W/m² or the equivalent of a 1313 ppm CO₂ concentration by the year 2100. Very few scientists believe this to be a realistic scenario. These extremely rapid rates of sea level rise do not apply under the other three scenarios considered in the Fifth Assessment Report.

3. Deceptive Language that Misrepresents the Science

The following 11 statements by the IPCC create an unjustifiable impression of either scientific certainty or false alarm, or appear to have been chosen to evade conclusions that run counter to the IPCC’s belief in dangerous human-caused warming.

1. *“... the following terms have been used to indicate the assessed likelihood of an outcome or a result: virtually certain 99-100% probability, very likely 90-100%, likely 66-100%, about as likely as not 33-66%, unlikely 0-33%, very unlikely 0-10%, exceptionally unlikely 0-1%. Additional terms (extremely likely: 95-100%, more likely than not >50-100%, and extremely unlikely 0-5%) may also be used when appropriate”* (SPM-2).

This terminology is unscientific. It has been used improperly to create a false impression of increasing statistical certainty through the most recent IPCC assessment reports.

Use of the listed terms is not based on rigorous statistical trials or numerical analysis, as

normally used to derive statistically meaningful confidence intervals. Instead, IPCC's quasi-numeric confidence statements represent considered "expert opinion," reflecting a process not very different from a show of hands around a discussion table. The terminology confers an impression of scientific rectitude onto a process that is inescapably subjective and has been widely criticized as misleading (e.g., Interacademy Council, 2010, Chapter 3).

2. *"Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850"* (SPM-3).

The statement is trivially true but meaningless as an analysis of climate change. In context, this warming represents recovery from the Little Ice Age, and there is no evidence that it was forced by CO₂. One might as well write of the Northern Hemisphere summer that "each of the three months April, May and June has been warmer than all preceding months since November, and July was the warmest".

All climate records are non-stationary and contain rhythmic fluctuations on scales that include several years, multi-decades, centennial and millennial. No assessment can be made of the significance of a short term cooling or warming trend over a few decades except within the framework and understanding of all longer scales of rhythmicity.

3. *"The globally averaged combined land and ocean surface temperature data as calculated by a linear trend, show a warming of 0.85 deg. C, over the period 1880-2012 ..."* (SPM-3).

The period 1880-2012 has no particular significance from the viewpoint of testing the hypothesis of dangerous global warming, for it was only during the second half of the twentieth century that human greenhouse emissions became voluminous enough to possibly exert a measurable effect on climate.

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4. *"In the Northern Hemisphere, 1983-2012 was likely the warmest 30-year period of the last 1400 years"* (SPM-3).

The subject under discussion is global climate, not Northern Hemisphere climate. If hemispheric climate change is to be discussed, then it should also have been noted that satellite measurements reveal that little or no warming has occurred in the Southern Hemisphere since 1979; and also that in the US temperature record the conspicuous warming and heat waves of the 1930s exceeded the warmth of the late twentieth century.

In any case, the same objections apply to this statement as to the second statement in this section. For the statement to have significance, even were it to be both global and true, it must be considered within longer-term climatic context.

5. *“It is virtually certain that globally the troposphere has warmed since the mid-20th century”* (SPM-4).

The statement fails to acknowledge that there has been effectively no warming in the tropical troposphere as universally projected by models (the “missing hotspot”).

This is another scientifically trivial statement, which fails to reflect the fact that the temperature increase was too small to justify concern and just as likely as not to have been the result of natural causes. Furthermore, the statement fails to acknowledge that there has been effectively no warming in the tropical troposphere as universally projected by models (the “missing hotspot”). The

contextual implication of human causation is unjustified.

6. *“Continental-scale surface temperature reconstructions show, with high confidence, multi-decadal periods during the Medieval Climate Anomaly ...”* (SPM-4).

The “Medieval Climate Anomaly” is a new phrase coined a few years ago and now deployed by the IPCC in order to avoid acknowledging that temperatures at that time were likely warmer than during the late twentieth century.

The term Medieval Warm Period has historical scholarly precedence, and is also a more accurate descriptor. Thousands of peer-reviewed publications concerned with the MWP fail to provide any evidence that the warmer temperatures and weather during that period were “anomalous,” as opposed to being of natural causation (NIPCC, Chapter 4).

7. *“There is very high confidence that these losses (of ice) are mainly from the northern Antarctic Peninsula and the Amundsen Sea sector of West Antarctica”* (SPM-5).

This is deception by omission. Left unsaid is that it is *only* the Antarctic Peninsula region, which contains just 11% of Antarctic ice volume, that is undergoing warming and melting of ice, and that this is due to regional factors and not rising CO₂ concentrations.

Also to the point is that temperatures have fallen since 1950 in the interior of the dominant East Antarctic Ice Sheet, the volume of which is either stable or growing slightly, as is the extent of peripheral Antarctic sea ice (NIPCC, Chapters 4 and 5).

8. *The June draft of the SPM contained the statement “It is virtually certain that the rate of global mean sea level rise has accelerated during the last two centuries”* (Draft SPM-5). This statement was removed from the final published version.

The period “last two centuries” is a range that carefully evades the embarrassing fact that over the last 50 years of increasing human-related CO₂ emissions, the rate of average global sea-level rise appears to have decelerated (NIPCC, Section 6.2.1.5, p. 787; e.g., Watson, 2011).

9. *“There is very high confidence that the maximum global mean sea level during the last interglacial period ... was at least 5 m higher than present.....”* (SPM-7).

The obvious intent of this statement is to imply that warmer temperatures in the current era could lead to a similarly large increase in sea level.

Sea-level was indeed higher during the Eemian interglacial than it was during the Holocene. The major reason for this is that orbital eccentricity then was much greater than in the Holocene, causing large semi-annual insolation changes and more

summer insolation in the high northern latitudes at which major ice sheets melt and grow. The amplitude of Eemian seasonal solar radiation was about 230 W/m² compared to 90 W/m² at the present Earth-Sun orbital configuration (e.g., Laskar *et al.*, 2011). Accordingly, drawing a comparison between sea level during the Eemian and the Holocene is misleading.

Drawing a comparison between sea level during the Eemian and the Holocene is misleading.

10. *“The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification”* (SPM-7).

This is alarmist and scientifically pernicious terminology. What is being described is actually the uncertain occurrence of a small decrease in the average alkalinity of the ocean.

The IPCC assesses the likelihood of future pH change using unvalidated computer modeling that is known to be unreliable. Second, and should the modeled change occur despite the massive buffering capabilities of the ocean, it would still only result in a slight lessening of alkalinity by 0.1-0.2 pH units under, for example, the CO₂ scenario of RCP2.6. Such a change, should it occur, is not necessarily harmful to life in the oceans.

11. *“The total natural RF from solar irradiance changes and stratospheric volcanic aerosols made only a small contribution to the net radiative forcing throughout the last century, except for brief periods after large volcanic eruptions”* (SPM-10).

Another statement that is trivially true and at the same time profoundly misleading.

The Sun’s effect on Earth’s climate extends far beyond simple variations in total solar insolation (TSI), and importantly includes magnetic and solar wind particle streams and their modulating effect on galactic cosmic rays. These effects are largely ignored by the IPCC.

Regarding the climatic effect of recent volcanic eruptions, the pattern of eruptions through time is both spasmodic and unpredictable on many scales. Therefore, any volcanic forcing observed over a short and arbitrary period cannot be taken as “typical” or “predictive” of what will occur over the next similar length period.

4. Advice for Policymakers

Between 1988 and 2001 (the span of preparation of its first three Assessment Reports), the United Nation's IPCC was the sole international body able to provide advice to governments on the global warming issue. With the formation of the Nongovernmental Panel on Climate Change (NIPCC) in 2003, a second and independent team of scientific assessors began to emerge.

NIPCC scientists find no hard evidence for a dangerous human-caused warming.

Now, with the release of new 2013 reports by both the IPCC and NIPCC, due-diligence analysis, such as that contained in this briefing paper, is finally possible. The IPCC's "Green Team" scientific advice can now be weighed against the views of a "Red Team" of independent scholars.

With the same set of peer-reviewed scientific papers available to them, the scientists of the IPCC and NIPCC have come to diametrically opposing conclusions. IPCC scientists remain alarmist about the threat of human-caused global warming, even while they admit observations increasingly invalidate their model-based predictions. They are reluctant to acknowledge past errors and new research that challenge their hypothesis of human-caused dangerous climate change.

In stark contrast, NIPCC scientists find no hard evidence for a dangerous human-caused warming. They find the null hypothesis – that observed changes in climate are due to natural causes only – cannot be rejected. NIPCC scientists remain open to new discoveries and further debate.

In 2013, any engaged policymaker or commentator has a responsibility to be fully familiar with the arguments and conclusions adduced by both of these teams of climate advisors. Towards this end, we present the primary conclusions of NIPCC's latest report as they are stated in its Summary for Policymakers:

1. We conclude neither the rate nor the magnitude of the reported late twentieth century surface warming (1979-2000) lay outside normal natural variability, nor was it in any way unusual compared to earlier episodes in Earth's climatic history. Furthermore, solar forcings of temperature change are likely more important than is currently recognized, and evidence is lacking that a 2° C increase in temperature (of whatever cause) would be globally harmful.
2. We conclude no unambiguous evidence exists for adverse changes to the global environment caused by human-related CO₂ emissions. In particular, the cryosphere is not melting at an enhanced rate; sea-level rise is not accelerating; no systematic changes have been documented in evaporation or rainfall or in the magnitude or intensity of extreme meteorological events; and an increased release of methane into the atmosphere from permafrost or sub-seabed gas hydrates is unlikely.
3. We conclude the current generation of global climate models are unable to make accurate projections of climate even 10 years ahead, let alone the 100 year period that has been adopted by policy planners. The output of such models should therefore not be used to guide public policy formulation until they have been validated and shown to have predictive value.

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About the Authors

Dr. Craig D. Idso, a climatologist and agronomist, is the founder, former president, and currently chairman of the Center for the Study of Carbon Dioxide and Global Change. The Center was founded in 1998 as a non-profit public charity dedicated to discovering and disseminating scientific information pertaining to the effects of atmospheric carbon dioxide enrichment on climate and the biosphere. The Center produces a weekly online newsletter, *CO₂ Science*, and maintains a massive online collection of editorials on and reviews of peer-reviewed scientific journal articles relating to global climate change.

Dr. Idso's research has appeared many times in peer-reviewed journals, including *Geophysical Research Letters*, *Energy & Environment*, *Atmospheric Environment*, *Technology*, *The Quarterly Review of Biology*, *Journal of Climate*, *Environmental and Experimental Botany*, *Physical Geography*, and the *Journal of the Arizona-Nevada Academy of Science*.

Dr. Idso received a B.S. in Geography from Arizona State University, an M.S. in Agronomy from the University of Nebraska - Lincoln, and a Ph.D. in Geography from Arizona State University, where he also studied as one of a small group of University Graduate Scholars. He was a faculty researcher in the Office of Climatology at Arizona State University and has lectured in Meteorology at Arizona State University.

Robert M. Carter, Ph.D., is a palaeontologist, stratigrapher, marine geologist and environmental scientist with more than 30 years professional experience, and holds degrees from the University of Otago (New Zealand) and the University of Cambridge (England). He has held tenured academic staff positions at the University of Otago (Dunedin) and James Cook University (Townsville), where he was Professor and Head of School of Earth Sciences between 1981 and 1999.

Dr. Carter has served as Chair of the Earth Sciences Discipline Panel of the Australian Research Council, Chair of the national Marine Science and Technologies Committee, Director of the Australian Office of the Ocean Drilling Program, and Co-Chief Scientist on ODP Leg 181 (Southwest Pacific Gateways).

Dr. Carter contributes regularly to public education and debate on scientific issues which relate to his areas of knowledge. His public commentaries draw on his knowledge of the scientific literature and a personal publication list of more than 100 papers in international science journals. His current research on climate change, sea-level change and stratigraphy is based on field studies of Cenozoic sediments (last 65 million years) from the Southwest Pacific region, especially the Great Barrier Reef and New Zealand.

S. Fred Singer, Ph.D., an atmospheric and space physicist, is one of the world's most respected and widely published experts on climate. He is professor emeritus of environmental sciences at the University of Virginia. He directs the nonprofit Science and Environmental Policy Project, which he founded in 1990 and incorporated in 1992.

Dr. Singer served as professor of environmental sciences at the University of Virginia,

Charlottesville, VA (1971-94); distinguished research professor at the Institute for Space Science and Technology, Gainesville, FL, where he was principal investigator for the Cosmic Dust/Orbital Debris Project (1989-94); chief scientist, U.S. Department of Transportation (1987-89); vice chairman of the National Advisory Committee for Oceans and Atmosphere (NACOA) (1981-86); deputy assistant administrator for policy, U.S. Environmental Protection Agency (1970-71); deputy assistant secretary for water quality and research, U.S. Department of the Interior (1967-70); founding dean of the School of Environmental and Planetary Sciences, University of Miami (1964-67); first director of the National Weather Satellite Service (1962-64); and director of the Center for Atmospheric and Space Physics, University of Maryland (1953-62).

Dr. Singer did his undergraduate work in electrical engineering at Ohio State University and holds a Ph.D. in physics from Princeton University.

Willie H. Soon, Ph.D., is an astrophysicist and geoscientist. Since 1992, Dr. Soon has been an astronomer at the Mount Wilson Observatory. He is also receiving editor in the area of solar and stellar physics for *New Astronomy*. He writes and lectures both professionally and publicly on important issues related to the sun, other stars, and the Earth, as well as general science topics in astronomy and physics.

Dr. Soon's honors include a 1989 IEEE Nuclear and Plasma Sciences Society Graduate Scholastic Award and a Rockwell Dennis Hunt Scholastic Award from the University of Southern California for "the most representative Ph.D. research thesis" of 1991. In 2003, he was invited to testify to the U.S. Senate.

Dr. Soon is the author of *The Maunder Minimum and the Variable Sun-Earth Connection* (World Scientific Publishing Company 2004). His research has appeared many times in peer-reviewed journals, including *Climate Research*, *Geophysical Research Letters*, *Energy & Environment*, *Eos*, and *Journal of Climate*.

Dr. Soon earned his bachelor's and master's degrees in science from the University of Southern California and his Ph.D. in aerospace engineering from the University of Southern California.

About NIPCC

The Nongovernmental International Panel on Climate Change, or NIPCC, is an international panel of scientists and scholars who came together to understand the causes and consequences of climate change. NIPCC has no formal attachment to or sponsorship from any government or governmental agency. It is wholly independent of political pressures and influences and therefore is not predisposed to produce politically motivated conclusions or policy recommendations.

NIPCC traces its beginnings to an informal meeting held in Milan, Italy in 2003 organized by Dr. S. Fred Singer and the Science & Environmental Policy Project (SEPP). The purpose was to produce an independent evaluation of the available scientific evidence on the subject of carbon

dioxide-induced global warming in anticipation of the release of the IPCC's Fourth Assessment Report (AR4). NIPCC scientists concluded the IPCC was biased with respect to making future projections of climate change, discerning a significant human-induced influence on current and past climatic trends, and evaluating the impacts of potential carbon dioxide-induced environmental changes on Earth's biosphere.

To highlight such deficiencies in the IPCC's AR4, in 2008 SEPP partnered with The Heartland Institute to produce *Nature, Not Human Activity, Rules the Climate*, a summary of research for policymakers that has been widely distributed and translated into six languages. In 2009, the Center for the Study of Carbon Dioxide and Global Change joined the original two sponsors to help produce *Climate Change Reconsidered: The 2009 Report of the Nongovernmental International Panel on Climate Change (NIPCC)*, the first comprehensive alternative to the alarmist reports of the IPCC.

In 2010, a Web site (www.nipccreport.org) was created to highlight scientific studies NIPCC scientists believed would likely be downplayed or ignored by the IPCC during preparation of its next assessment report. In 2011, the three sponsoring organizations produced *Climate Change Reconsidered: The 2011 Interim Report of the Nongovernmental International Panel on Climate Change (NIPCC)*, a review and analysis of new research released since the 2009 report or overlooked by the authors of that report.

In 2013, the Information Center for Global Change Studies, a division of the Chinese Academy of Sciences, translated and published an abridged edition of the 2009 and 2011 NIPCC reports in a single volume. On June 15, the Chinese Academy of Sciences organized a NIPCC Workshop in Beijing to allow the NIPCC principal authors to present summaries of their conclusions.

In September 2013, NIPCC released *Climate Change Reconsidered II: Physical Science*, the first of two volumes bringing the original 2009 report up-to-date with research from the *2011 Interim Report* plus research as current as the third quarter of 2013. A new Web site was created (www.ClimateChangeReconsidered.org) to feature the new report and news about its release. A second volume, *Climate Change Reconsidered II : Impacts, Adaptation, and Vulnerability*, is planned for release in 2014.

For more information about NIPCC, visit www.climatechangereconsidered.org or www.nipccreport.org.

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