

# **Global warming: the scientific context of the policy debate**

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The science of global warming is at the same time relatively simple and very complex. The simplicity exists in the elemental science that is taught in introductory earth science and meteorology courses at universities around the globe. The complexity lies in the integration of the many and diverse processes involved in climate change, some of which are poorly understood or even remain unknown, thus necessitating the use of speculative computer models to attempt to achieve further understanding.

Those scientists who support the alarmist agenda of human-caused global warming tend to stress the intricacies of climate change, an approach that implies the need for “experts” and highly complex computer models to adjudicate on the matter. In contrast, independent scientists tend to stress the importance of the broader facts that provide the context against which the threat of a dangerous human influence on climate should be judged.

In this essay I select and describe four basic scientific facts that provide an essential context for intelligent discussion of the global warming issue. Thereafter, I contrast and attempt to explain briefly the reasons for the differing advice to governments that is provided by the International Panel on Climate Change (IPCC) and the Nongovernmental International Panel on Climate Change (NIPCC) – basing my analysis upon the comprehensive climate research literature surveys that are undertaken by each organisation. Fuller discussion of these and related issues is provided by Carter (2010).

## **The context of contemporary climate change**

### *Context 1 – Error bounds on reconstructing the global average temperature from thermometer data*

The main record used by the IPCC for analysing contemporary “climate change” is compiled by averaging individual temperature records of varying quality and length from around the globe. This, the HadCRUT record of the Climatic Research Unit (CRU) at the University of East Anglia, has a number of known deficiencies. These include that it is far too short to be treated as a serious climate record (being equivalent to just 5 *climate* data points), is probably inadequately corrected for the urban heat island effect and is subject to other large errors.

For example, amongst the papers released in the 2009 Climategate scandal was a previously unpublished CRU contractual report (Brohan et al., 2005) which contained a careful analysis of the likely error bounds for the HadCRUT3 record. These authors considered January 1969 temperature data for measurement and sampling error, temperature bias effects, and the effect

of limited observational coverage on large-scale averages. The analysis revealed worldwide errors in the range of 1-5<sup>0</sup> C for individual sampled area-boxes, i.e. errors that far exceed the total claimed twentieth century warming of ~0.7<sup>0</sup> C. Clearly, errors for records collected earlier in the 20<sup>th</sup> century are likely to be higher still than the already large 1969 errors.

Despite the claim otherwise by Brohan et al. (2006), these results indicate that no statistically significant modern warming will be able to be inferred on the basis of HadCRUT or similar thermometer-based records until the current temperature rises over 1°C above that computed for 1969.

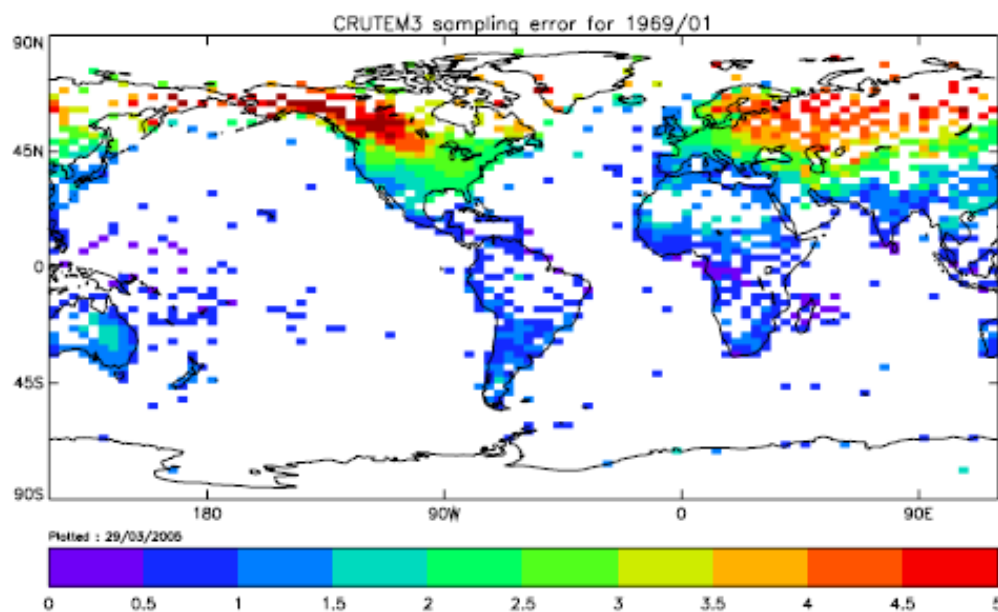


Figure 1. Estimated worldwide sampling errors for the HadCRUT temperature database for January 1969 (after Brohan et al., 2005).

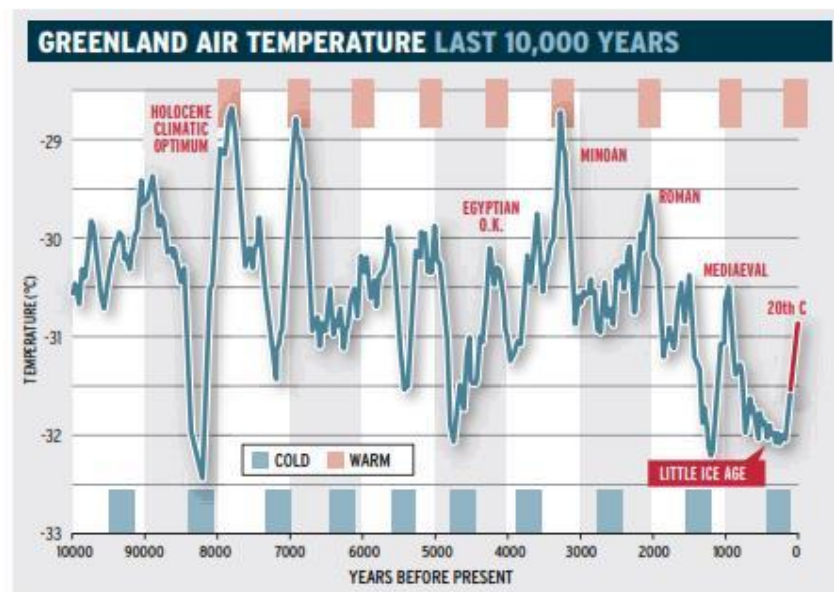
### *Conclusion*

Though global average temperature may have warmed during the 20<sup>th</sup> century, no direct instrumental records exist that demonstrate any such warming within an acceptable degree of probability.

### *Context 2 – Natural temperature variations over geological time*

It is a scientific truism that climate persistently changes through time, one manifestation of which is the changing global average temperature manifest in many geological data sets. These data sets are collected, for example, from high latitude ice cores or oceanic seabed cores. Though in the first instance they yield local or regional temperature data, the strong commonality that exists between different palaeoclimate records from widely different geographical regions nonetheless often reflects an underlying global signal.

Because short thermometer temperature records such as HadCRUT manifestly do not comprise an adequate climate record, it is to these geological datasets that we must turn to provide the proper climatic context against which to assess modern temperature changes.

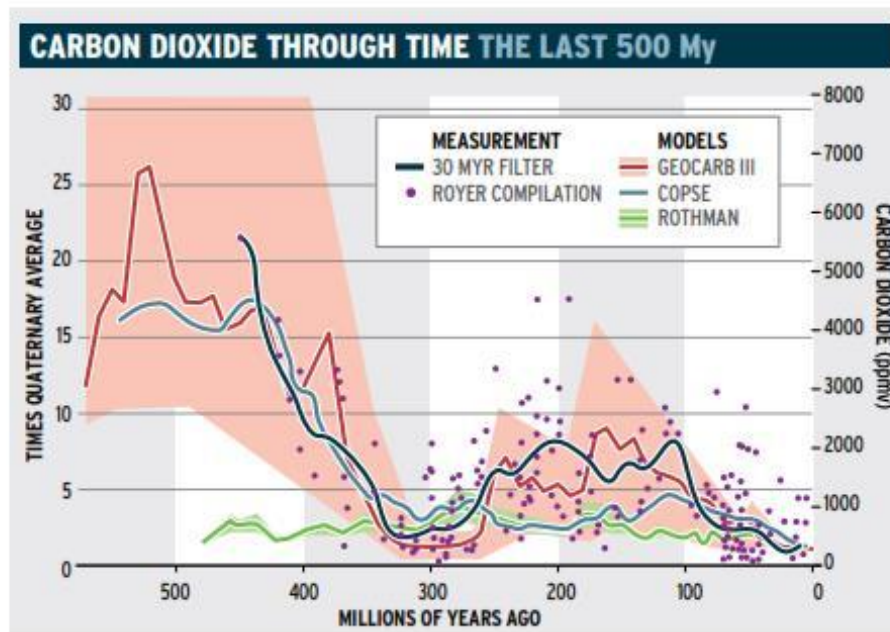


**Fig. 5.** Greenland surface air proxy-temperatures for the last 10,000 years (Holocene) as reflected in palaeo-temperatures derived from changes in oxygen isotope ratio in the GISP2 ice core (Alley, 2000). Short warm periods, like the Medieval Warm Period and Late 20th Century Warming, occur about every 1,000 years (pink bars, top), separated by cool periods such as the Little Ice Age (blue bars, bottom). This pattern, called the Bond Cycle and probably of solar origin, is superimposed on a cooling trend of about 0.25°C/thousand years since the Holocene Climatic Optimum (HCO). Note that the Minoan, Roman and Medieval Warm Periods, and the HCO, were all significantly warmer than the 20th century warming.

A case in point is the high-quality inferred air temperature above the Greenland ice cap for the last 10,000 years (Fig. 2; data after Alley, 2000). This record shows (i) that temperatures were up to a full 2 degrees warmer than today during the Holocene Climatic Optimum, c.8,000 years BP; (ii) the presence of a persistent millennial cycle of warmings and coolings (cf. Avery & Singer, 2008), with all pre-modern peaks of this cycle, including the Mediaeval Warm Period, being warmer than the late 20<sup>th</sup> century peak; and (iii) an overall *cooling* of temperature since 8,000 years BP which took place against the background of an *increase* of atmospheric carbon dioxide of 20 ppm (of natural origin, and as recorded in Antarctic ice cores).

### Conclusion

Although the Greenland average temperature has warmed by about 1<sup>o</sup> C since the Little Ice Age, such warming cannot be shown to have resulted from increases in human-related carbon dioxide emissions. The warming was also entirely unalarming in rate and magnitude when compared with other similar natural warmings that occurred over the preceding 10,000 years.



**Fig.19.** Reconstructed proxies for atmospheric carbon dioxide levels over the last 550 years, the period during which multi-cellular organisms originated and diversified. The overall trend is one of diminishing carbon dioxide, with a steep drop starting about 450 million years ago at the time of origin of photosynthesizing land plants. Dark blue line, average from 372 measurements of palaeo-atmospheric proxies; orange-red line and shaded pink error zone, projections from the GEOCARB III model.

### *Context 3 - Carbon dioxide variations over geological time*

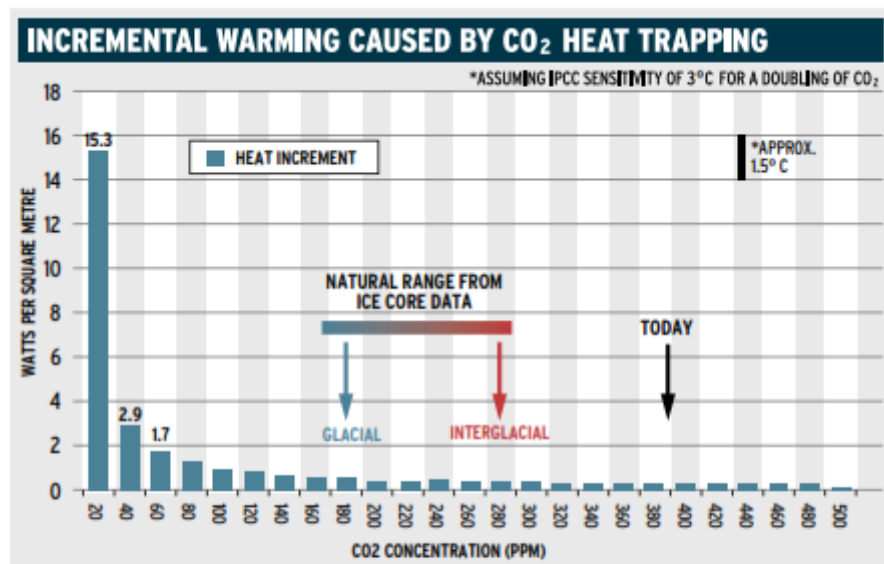
It is widely misrepresented in the public domain that Earth's current levels of atmospheric carbon dioxide are dangerously and atypically high. Such claims are false, because modern carbon dioxide levels lie near to an all-time low as assessed against the geological record (Fig. 3)

500 million years ago, before land-plant photosynthesis was operating, atmospheric carbon dioxide attained about 15 times present day levels, built by cumulative volcanic exhalations during 4 billion years of pre-Cambrian time. Between about 450 and 320 million years ago, levels declined steadily from >4,000 ppm to around 500 ppm, concomitant with the evolution and diversification of land plants, and thereafter varied between about 500 and 2000 ppm. In effect, since about 450 million years ago plant photosynthesis has removed carbon dioxide from the atmosphere, after which normal sedimentary burial processes led to the conversion of original vegetation to coal and thus the storage of former carbon dioxide underground.

Utilising coal as an energy resource simply returns the carbon dioxide to the atmosphere whence it came in the first place, yielding the twin benefits of generation of cheap electricity and the greening of the planet. Why radical environmentalists view this as a problem has never been explained adequately, and remains mysterious to this day. For at 280 ppm (pre-industrial), 400 ppm (today), 560 ppm (2 x pre-industrial) or even 1120 ppm (4 x pre-industrial), planet Earth's atmosphere would still remain in a carbon-dioxide-starved state.

### *Conclusion*

Carbon dioxide is an essential trace-gas for plant photosynthesis, and therefore vital for biodiversity and the sustenance of most planetary food chains. Adding carbon dioxide to the atmosphere is beneficial for the growth of many plants (Idso & Idso, 2011), especially cereals, and by comparison with the last 550 million years of geological history, Earth currently exists in a state of carbon dioxide starvation.



**Fig. 16.** Model projection of the incremental increases in radiative heat trapped in the lower atmosphere (rather than lost to space) by injections of carbon dioxide in 20 ppm increments (MODTRAN atmospheric model, University of Chicago). Calculations are in terms of watts/m<sup>2</sup> of radiant heat increase (left hand axis scale). Translating each increment of heat trapped in the atmosphere into degrees Celsius depends upon the assumed sensitivity of the climate system, which remains controversial (see Fig. 17, p.105). The approximate temperature bar (top right) is based upon the IPCC's estimated sensitivity of 3.3° C for a doubling of carbon dioxide. Note that this temperature increase, whatever its precise value, is a constant that applies to all doublings of carbon dioxide, for example from 140 to 280 ppm, 280 to 560 ppm and 560 to 1120 ppm.

### *Context 4 – Efficacy of warming caused by extra carbon dioxide*

Carbon dioxide is a potent greenhouse gas for intercepting space-bound (and hence cooling) radiation emitted from Earth's surface at wavelengths around 14.8 μ and 9 μ within the electromagnetic spectrum.

Initially, at low atmospheric concentrations, the gas therefore has a strong greenhouse effect as it blocks outgoing radiation at these wavelengths (Fig. 3, left-hand side). However, the narrowness of the spectral intervals across which carbon dioxide intercepts radiation results in a rapid saturation of its effect, such that every doubling in the concentration of carbon dioxide enhances the greenhouse effect by a constant amount. This is reflected as the negative logarithmic relationship that exists between extra carbon dioxide and the warming that it causes (Fig. 3, full figure).

Because of this logarithmic relationship, the amount of warming caused by increasing quanta of carbon dioxide (i) depends upon the level of carbon dioxide already in the atmosphere, and (ii) diminishes steadily in a “less-temperature-bang-for-every-incremental-carbon-dioxide-buck” pattern. Given the pre-industrial starting point of 280 ppm of atmospheric carbon dioxide, and as Fig. 3 shows, only minor additional warming will occur in response to the much-feared doubling of carbon dioxide to 560 ppm.

While scientists generally agree that this *prima facie* warming will cumulate to about 1° C for a doubling, IPCC scientists allege that the positive feedback effect from more water vapour, itself generated by the initial carbon dioxide-forced warming, will result in about 3-6 degrees of total warming. However, this speculation conflicts with other empirical data and is therefore strongly controversial.

### *Conclusion*

Though carbon dioxide is a greenhouse gas, its warming efficacy rapidly diminishes (in logarithmic fashion) as atmospheric concentrations rise.

When both positive (e.g., enhanced water vapour) and negative (e.g., enhanced low level cloud) feedback effects, and geological climate records, are taken into consideration, little likelihood exists that conceivable levels of human emissions will cause dangerous future warming.

### *Common ground amongst global warming protagonists*

The four contextual scientific matters discussed above all point to a lack of alarm regarding dangerous global warming caused by human-related greenhouse gas emissions, despite which a vigorous public debate about the matter continues. This debate is strongly antagonistic, belying the fact that a large measure of scientific agreement exists between the debating protagonists about most of the facts of the matter

The common scientific ground and the main matters that remain in dispute are summarised in Table 1.

**TABLE 1 - THE ESSENCE OF THE SCIENTIFIC DEBATE**

**The common ground includes:**

- That climate has always changed and always will.
- That carbon dioxide is a greenhouse gas, the accumulation of which results in warming of the lower atmosphere.
- That post-industrial human-related emissions comprise a new source of atmospheric carbon dioxide.
- That a global warming of around 0.7°C may have occurred in the 20<sup>th</sup> century.
- That global warming has ceased over the last 17 years.

**The three key science issues remaining in dispute are:**

- The amount of net warming that is, or will be, produced by the “extra” human-related emissions.\*
- Whether any actual evidence exists for dangerous warming of human causation over the last 50 years.
- Whether the IPCC’s computer models can provide accurate climate predictions 100 years into the future.

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\*Usually termed the “climate sensitivity” issue, which equates in turn with the amount of warming that will be produced by a doubling of carbon dioxide over its pre-industrial level.

***Why is this common ground not more generally understood?***

The answer to this question is simple, and it is that since the formation of the IPCC in 1988 a wide-ranging and worldwide propaganda campaign has been conducted to raise public alarm about global warming (cf., Carter, 2010, chapters 7-9). Though initially promulgated by environmental organisations, commercial lobbyists (e.g., the wind power industry) and the financial markets, the global warming bandwagon soon attracted the attention of politicians because of the electoral advancement that it promised, and has all the while been egged-on by a ceaselessly alarmist press corps.

All the classic tools of propaganda and spin have been deployed for the advancement of public alarm about global warming, including scientific malfeasance, noble cause corruption, the makeover of formerly independent expert groups such as academies of science, the indoctrination of school children from kindergarten onwards and the *ad hominem* demonization of scientists who fail to conform to the orthodox IPCC view. The many hundreds of risible claimed negative effects of global warming (many of which are actually beyond parody) are summarised by the hilarious list of claimed warming misadventures compiled by UK engineering Professor, John Brignell (2014).

During the 1990s and the first few years of the present century public opinion was visibly affected by this barrage of pseudo-scientific propaganda, as reflected by a clear majority of the citizens of OECD countries regularly expressing their concern in opinion polls. Over the last ten years, however, and thanks not a little to the assiduous efforts of independent scientists and organisations such as the NIPCC, public opinion has swung away from the global warming scare and other similarly over-hyped environmental causes. At the same time, many cartoonists and comedians have started to lampoon the more ridiculous claims of the global warming alarmists: as one expressed it (Spooner, in Carter, Spooner et al., 2013, p.9):

*“So just when the those supporting climate alarm thought that they had everything settled and nailed down, a gale of discontent started to blow. Cartoonist heaven really. We love the spectacle of powerful people preparing their policy against strong winds and rough seas, frantically rigging up fragile, flapping sails of spin and blather. If you’re going to spend over \$15 billion of taxpayer’s money on desalinated water, or manage a potentially ruinous carbon dioxide trading scheme ... then you certainly don’t want to be questioned too closely, let alone lampooned, about the scientific details that you misunderstood or got wrong.”*

### ***Three reasons that the main debate has come to be about politics and not science***

Science should not be about emotion or politics, yet it is uncomfortably true that public discussion of the global warming issue has for many years been conducted far more in accordance with those criteria than it has been concerned with science *per se*. There are three prime reasons for this.

First, as a branch of the United Nations, the IPCC is itself an intensely political and not a scientific body. As its chairman, Dr Rajendra Pachauri observed in a recent interview with the Guardian newspaper (Goldenburg, 2013):

*“We are an intergovernmental body and we do what the governments of the world want us to do. If the governments decide we should do things differently and come up with a vastly different set of products we would be at their beck and call.”*

To boot, the IPCC charter requires that the organisation investigates not climate change in the round, but solely global warming caused by human greenhouse emissions, a blinkered approach that consistently damages all IPCC pronouncements.

Second, from local green activist groups up to behemoth NGOs like Greenpeace and WWF, over the last 20 years the environmental movement has espoused saving the planet from global warming as its *leit motif*. This has had two devastating results. One is that radical environmentalists have worked relentlessly to sow misinformation about global warming in both the public domain and the education system. And the other is that, faced with this widespread propagandization of public opinion and young persons, and also by strong lobbying from powerful self-interested groups like government research scientists, alternative energy providers and financial marketeers, politicians have had no choice but to fall into line. Whatever their primary political philosophy, all active politicians are daily mindful of the



need to assuage the green intimidation and bullying to which they and their country's industries and citizens are incessantly subjected – and to which no western country has yet devised a feasible counter.

Third, and perhaps most influential of all, with very few exceptions major media outlets have provided unceasing support for measures to “stop global warming”. This behaviour appears to be driven by a combination of the left-wing (“liberal” in the US sense) and green personal beliefs of most reporters, and the commercial nose of experienced editors who understand that alarmist environmental reporting sells both product and advertising space. As one experienced editor has written (Cribb, 2002):

*“The publication of ‘bad news’ is not a journalistic vice. It’s a clear instruction from the market. It’s what consumers, on average, demand... As a newspaper editor I knew, as most editors know, that if you print a lot of good news, people stop buying your paper. Conversely, if you publish the correct mix of doom, gloom and disaster, your circulation swells. I have done the experiment.”*

### **Where to from here - the IPCC and NIPCC reports**

And thus we arrive at the present impasse, in which the IPCC and its attached covey of special interest groups continue to argue vehemently in favour of taking costly action to limit industrial carbon dioxide emissions at the same time that many thousands of qualified independent scientists assert that government policy should be concerned with adaptation to natural climate hazard rather than targeting chimerical human-caused warming. Faced with this conflicting advice, some western governments are continuing to respond to IPCC alarmism by taking penal financial measures against carbon dioxide emissions (e.g., USA, UK) whereas others have already signalled firmly that they are not prepared to enter into new Kyoto-style anti-emissions agreements (e.g., Canada, Japan, Australia).

To attain a fuller and mature understanding of the topic, and to move the matter forward, requires that policymakers consult and compare the two compendious and up-to-date summaries of climate-related research that are produced respectively by the Intergovernmental Panel on Climate Change (IPCC, 2013, 2014a, b) and the Non-governmental International Panel on Climate Change (NIPCC 2013, 2014a, b). Both teams of authors provide similar scholarly analysis and summary of recent scientific papers, but with the key difference that whereas IPCC scientists are effectively government-appointed and work in close co-operation with environmental lobbying agencies (Laframboise, 2011, 2013), NIPCC scientists are fully independent of political, financial and lobby group influences.

Given this difference, and despite the fact that the corpus of scientific papers they consider is similar, it is perhaps unsurprising that the scientists of the IPCC and NIPCC have reached diametrically opposing conclusions about the hazard posed by human-related carbon dioxide emissions, as summarised in accompanying Tables 2 and 3.

**TABLE 2 - SELECTED PRIMARY SCIENCE CONCLUSIONS – IPCC 2013**

- 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.
- 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. It is virtually certain\* that the upper ocean (0-700 m) warmed from 1971 to 2010, and it likely warmed between the 1870s and 1971.
- Over the last two decades, the Greenland and Antarctic ice sheets have been losing mass, glaciers have continued to shrink almost worldwide, and Arctic sea ice and Northern Hemisphere spring snow cover have continued to decrease in extent.
- The rate of sea level rise since the mid-19th century has been larger than the mean rate during the previous two millennia. Over the period 1901–2010, global mean sea level rose by 0.19 [0.17 to 0.21] m.
- The atmospheric concentrations of carbon dioxide (CO<sub>2</sub>), methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years. CO<sub>2</sub> concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondarily from net land use change emissions. The ocean has absorbed about 30% of the emitted anthropogenic carbon dioxide, causing ocean acidification.
- Human influence on the climate system is clear. This is evident from the increasing greenhouse gas concentrations in the atmosphere, positive radiative forcing, observed warming, and understanding of the climate system.
- 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.
- Global surface temperature change for the end of the 21st century is likely to exceed 1.5°C relative to 1850 to 1900 for all RCP\*\* scenarios except RCP2.6. It is likely to exceed 2°C for RCP6.0 and RCP8.5, and more likely than not to exceed 2°C for RCP4.5. Warming will continue beyond 2100 under all RCP scenarios except RCP2.6. Warming will continue to exhibit interannual-to-decadal variability and will not be regionally uniform.
- Cumulative emissions of CO<sub>2</sub> largely determine global mean surface warming by the late 21<sup>st</sup> century and beyond. Most aspects of climate change will persist for many centuries even if emissions of CO<sub>2</sub> are stopped. This represents a substantial multi-century climate change commitment created by past, present and future emissions of CO<sub>2</sub>.

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*\*Probability terms such as “likely”, “extremely likely” are italicized in the original IPCC report, to imply statistical significance. Because the phrases are actually devoid of statistical or scientific meaning such italics have not been reproduced in this summary table.*

*\*\* RCP = Representative Concentration Pathways, being IPCC model-simulated projections regarding alternative future scenarios of atmospheric greenhouse gas increases.*

**TABLE 3 - PRIMARY SCIENCE CONCLUSIONS – NIPCC 2013, 2014**

**Physical Science**

- 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.
- No unambiguous evidence exists for adverse changes to the global environment caused by human-related CO<sub>2</sub> 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.
- The current generation of GCMs 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.

**Biological Impacts**

- Atmospheric carbon dioxide is not a pollutant. It is a non-toxic, non-irritating, and natural component of the atmosphere. Long-term CO<sub>2</sub> enrichment studies confirm the findings of shorter-term experiments, demonstrating numerous growth-enhancing, water-conserving, and stress-alleviating effects of elevated atmospheric CO<sub>2</sub> on plants growing in both terrestrial and aquatic ecosystems.
- The ongoing rise in the air’s CO<sub>2</sub> content is causing a great greening of the Earth. All across the planet, the historical increase in the atmosphere’s CO<sub>2</sub> concentration has stimulated vegetative productivity. This observed stimulation, or greening of the Earth, has occurred in spite of many real and imagined assaults on Earth’s vegetation, including fires, disease, pest outbreaks, deforestation, and climatic change.
- There is little or no risk of increasing food insecurity due to global warming or rising levels. Farmers and others who depend on rural livelihoods for income are benefitting from rising agricultural productivity throughout the world, including in parts of Asia and Africa where the need for increased food supplies is most critical. Rising temperatures and atmospheric CO<sub>2</sub> levels play a key role in the realization of such benefits.
- Terrestrial ecosystems have thrived throughout the world as a result of warming temperatures and rising levels of atmospheric CO<sub>2</sub>. Empirical data pertaining to numerous animal species, including amphibians, birds, butterflies, other insects, reptiles, and mammals, indicate global warming and its myriad ecological effects tend to foster the expansion and proliferation of animal habitats, ranges, and populations, or otherwise have no observable impacts one way or the other. Multiple lines of evidence indicate animal species are adapting, and in some cases evolving, to cope with climate change of the modern era.
- Rising temperatures and atmospheric CO<sub>2</sub> levels do not pose a significant threat to aquatic life. Many aquatic species have shown considerable tolerance to temperatures and CO<sub>2</sub> values predicted for the next few centuries, and many have demonstrated a likelihood of positive responses in empirical studies. Any projected adverse impacts of rising temperatures or declining seawater and freshwater pH levels (“acidification”) will be largely mitigated through phenotypic adaptation or evolution during the many decades to centuries it is expected to take for pH levels to fall.
- A modest warming of the planet will result in a net reduction of human mortality from temperature-related events. More lives are saved by global warming via the amelioration of cold-related deaths than those lost under excessive heat. Global warming will have a negligible influence on human morbidity and the spread of infectious diseases, a phenomenon observed in virtually all parts of the world.

### ***If the science remains contested, shouldn't we give Earth the benefit of the doubt?***

Thoughtful analysis of the IPCC and NIPCC summaries of the scientific literature (Tables 2, 3) reveals (i) a lack of empirical evidence for human-caused global warming, (ii) that the temperature fluctuations that occurred in the 20<sup>th</sup> century fell well within previous natural bounds, and reinforces the fact (iii) that IPCC's advice about future dangerous warming is entirely predicated upon the accuracy of their speculative computer models. In addition to which, the four contextual tests outlined in the earlier part of this article also provide strong evidence against alarm.

Some will say, nonetheless, that given that the science lacks certainty (whatever that might mean) we should give Earth the "benefit of the doubt", by which they mean taking precautionary action against human-related carbon dioxide emissions, just in case they should cause dangerous warming. However, this catchy phrase reveals a profound misunderstanding of the real climatic risks faced by our societies, because it assumes that global warming is more dangerous, or more to be feared, than is the equally likely occurrence of global cooling; in reality, the converse is more likely to be true (cf., Carter, Spooner et al., 2013, p. 228).

### ***The way forward***

It needs to be recognized that the theoretical hazard of dangerous human-caused warming is but one small part of a much wider climate hazard that all scientists agree upon, which is the dangerous weather and climatic events that Nature intermittently presents us with – and always will. It is clear from the many and continuing climate-related disasters that occur around the world that the governments of even advanced, wealthy countries are often inadequately prepared for such disasters. We need to do better, and squandering money to give Earth the benefit of the doubt based upon an unjustifiable assumption that dangerous warming will shortly resume is exactly the wrong type of "picking winners" approach.

Many scientists, including leading solar physicists, currently argue that solar cycling implies that the most likely climatic trend over the next several decades is one of significant cooling rather than warming. Meanwhile, the IPCC's computer modellers assure us with all the authority at their command that global warming will shortly resume – just you wait and see.

The reality is that no scientist on the planet can tell you with credible probability whether the climate in 2030 will be cooler or warmer than today. In such circumstances the only rational conclusion to draw is that we need to be prepared to react to either warming or cooling over the next several decades, and also to severe weather events, depending upon what Nature chooses to serve up to us. A primary government duty of care is to protect the citizenry and the environment from the ravages of natural climate-related events. What is needed is not unnecessary and penal measures against carbon dioxide emissions, but instead a prudent and cost-effective policy of preparation for, and adaptive response to, all climatic events and hazards.

The appropriate response to climate hazard, then, is for national policies to be based on preparing for and adapting to all climate-related events as and when they happen, and irrespective of their presumed cause. Every country needs to develop its own understanding of, and plans to cope with, the unique combination of climate hazards that apply within its particular boundaries. The planned responses should be based upon adaptation, with later mitigation where appropriate to cushion citizens who are affected in an undesirable way.

The idea that there can be a one-size-fits-all global solution to deal with just one possible aspect of future climate change, as recommended by the IPCC and still favoured by green

activists and most media commentators, fails entirely to deal with the real climate and climate-related hazards to which we are all exposed every day.

### ***Acknowledgements***

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