Climate extremism in extremis

The authoritative *Monthly CO₂ Report* for April 2010 discusses the panic among the climate-extremist faction as none of their predictions of doom comes to pass. *Editorial Comment: Page 3.*

- **FEATURED:** Testimony before Congress from Christopher Monckton of Brenchley. *Pages 4-7.*
- IPCC assumes CO₂ concentration will reach 836 ppmv by 2100, but, for nine years, CO₂ concentration has headed straight for only 570 ppmv by 2100. This factor alone almost halves all of the IPCC’s temperature projections. *Pages 8-11.*
- Since 1980 global temperature has risen at only 2.9 °F (1.6 °C)/century, not 6 °F (3.4 °C) as IPCC predicts. *Pages 12-14.*
- Sea level rose just 8 inches in the 20th century, and has been rising since 1993 at a very modest 1 ft/century. *Page 15.*
- Hurricane and tropical-cyclone activity is almost at its lowest since satellite measurement began. *Pages 21-24.*
- Sunspot activity is back to normal: but, looking back it was a long – and cool – solar minimum. *Pages 25-26.*
- The (very few) benefits and the (very large) costs of the Waxman/Markey Bill are illustrated at *Pages 27-30.*
- Temperature tampering: This month’s *Science Focus* exposes a false reason for sudden “global warming”. *Page 31.*
- As always, there’s our “global warming” ready reckoner, and our monthly selection of scientific papers. *Pages 32-43.*
- The medieval warm period was real, global, and warmer than the present, as our global map shows. *Page 44.*
- And finally ... it’s a dog’s life when deforestation strikes. *Page 45.*
IT IS all over bar the shouting. Every opinion poll confirms that the tiny band of brave climate scientists who stood firm when the rest of their profession sold out to the climate extremists, or almost as culpably looked the other way, have won the “global warming” argument in the public mind.

The voters – and, increasingly, the politicians – know three important facts that the climate extremists and their media allies had desperately tried to conceal from them:

Fact 1: There is no, repeat no, scientific consensus about how much “global warming” a given increase in CO2 concentration would be likely to cause. A growing number of disturbing papers in the peer-reviewed literature suggests that climate sensitivity – the amount of warming to be expected if we double today’s CO2 concentration later this century – will be less than 1 Celsius degree (well below 2 Fahrenheit degrees), compared with the 3.3 C° (6 F°) predicted by the UN’s climate panel.

Fact 2: Even if the UN’s climate panel and other climate-extremist entities were right that a doubling of atmospheric CO2 concentration would cause as much as 3.3 C° of warming, trying to cut global carbon emissions is not going to make the slightest difference to the evolution of the climate, because we’d have to shut down the entire global economy for almost a quarter of a century just to forestall one Fahrenheit degree of “global warming”. And going back to the Stone Age, without even the right to light a carbon-emitting fire in our caves, would cause massive death, disease, destruction, damage, and distress.

Fact 3: Though the very structure of the UN’s climate panel, with entirely separate working groups considering “mitigation” of “global warming” by carbon-emissions reduction and “adaptation” to it by building sea-walls and the like, militates against identifying the truth, it is blindingly clear to everyone else that adapting to the consequences of “global warming”, if and when it resumes after its nine-year stasis, would be orders of magnitude cheaper and more cost-effective than selectively shutting down the economies of the West in a futile attempt to Save The Planet by emitting less carbon dioxide.

It has also become apparent to just about everyone that the litany of blood-curdling disasters that were until recently so confidently and arrogantly predicted by the usual suspects is not actually happening. These Monthly CO2 Reports continue to startle, because they reveal just how entirely normal is the behavior of today’s climate.

So, Houston, the climate extremists have a problem. Their increasingly vicious personal attacks on anyone who dares publicly to disagree with them show that they know they have a problem. Their problem is that few now believe in “global warming”. Therefore, they will try, tiredly, to run ocean “acidification” as the “twin evil” of “global warming”. But they will fail, as two papers reported by Craig Idso in this month’s selection of papers from the peer-reviewed literature reveal.

Finally, I apologize that there was no March edition of the CO2 Report. I was on several speaking tours and did not have the chance to compile the report. This edition, however, is twice as long as previous editions. Enjoy! Monckton of Brenchley
The correct policy to address the non-problem of ‘global warming’ is to have the courage to do nothing

- Christopher Monckton of Brenchley testified before the “Global Warming” Committee of the US House of Representatives early in May 2010. Here is his testimony: a summary of the reasons why Hon. Ladies and Gentlemen should devote their time and talents to real problems, not the non-problem of climate change.

The Select Committee, in its letter inviting testimony for the present hearing, cites various scientific bodies as having concluded that –

1. The global climate has warmed;
2. Human activities account for most of the warming since the mid-20th century;
3. Climate change is already causing a broad range of impacts in the United States;
4. The impacts of climate change are expected to grow in the coming decades.

The first statement requires heavy qualification and, since the second is wrong, the third and fourth are without foundation and must fall.

The Select Committee has requested answers to the following questions:

1. What are the observed changes to the climate system?

Carbon dioxide concentration: In the Neoproterozoic Era, ~750 million years ago, dolomitic rocks, containing ~40% CO2 bonded not only with calcium ions but also with magnesium, were precipitated from the oceans worldwide by a reaction that could not have occurred unless the atmospheric concentration of CO2 had been ~300,000 parts per million by volume. Yet in that era equatorial glaciers came and went twice at sea level.

Today, the concentration is ~773 times less, at ~388 ppmv: yet there are no equatorial glaciers at sea level. If the warming effect of CO2 were anything like as great as the vested-interest groups now seek to maintain, then, even after allowing for greater surface albedo and 5% less solar radiation, those glaciers could not possibly have existed (personal communication from Professor Ian Plimer, confirmed by on-site inspection of dolomitic and tillite deposits at Arkaroola Northern Flinders Ranges, South Australia).
In the Cambrian Era, ~550 million years ago, limestones, containing some 44% CO$_2$ bonded with calcium ions, were precipitated from the oceans. At that time, atmospheric CO$_2$ concentration was ~7000 ppmv, or ~18 times today's (IPCC, 2001): yet it was at that time that the calcite corals first achieved algal symbiosis. In the Jurassic era, ~175 million years ago, atmospheric CO$_2$ concentration was ~6000 ppmv, or ~15 times today's (IPCC, 2001): yet it was then that the delicate aragonite corals came into being.

Therefore, today's CO$_2$ concentration, though perhaps the highest in 20 million years, is by no means exceptional or damaging. Indeed, it has been argued that trees and plants have been part-starved of CO$_2$ throughout that period (Senate testimony of Professor Will Happer, Princeton University, 2009). It is also known that a doubling of today's CO$_2$ concentration, projected to occur later this century (IPCC, 2007), would increase the yield of some staple crops by up to 40% (lecture by Dr. Leighton Steward, Parliament Chamber, Copenhagen, December 2009).

**Global mean surface temperature:** Throughout most of the past 550 million years, global temperatures were ~7 K (13°F) warmer than the present. In each of the past four interglacial warm periods over the past 650,000 years, temperatures were warmer than the present by several degrees (A.A. Gore, *An Inconvenient Truth*, 2006).

In the current or Holocene warm period, which began 11,400 years ago at the abrupt termination of the Younger Dryas cooling event, some 7500 years were warmer than the present (Cuffey & Clow, 1997), and, in particular, the medieval, Roman, Minoan, and Holocene Climate Optima were warmer than the present (Cuffey & Clow, 1997).

The “global warming” that ceased late in 2001 (since when there has been a global cooling trend for eight full years) had begun in 1695, towards the end of the Maunder Minimum, a period of 70 years from 1645-1715 when the Sun was less active than at any time in the past 11,400 years (Hathaway, 2004). Solar activity increased with a rapidity unprecedented in the Holocene, reaching a Grand Solar Maximum during a period of 70 years from 1925-1995 when the Sun was very nearly as active as it had been at any time in the past 11,400 years (Hathaway, 2004; Usoskin, 2003; Solanki, 2005).

The first instrumental record of global temperatures was kept in Central England from 1659. From 1695-1735, a period of 40 years preceding the onset of the Industrial Revolution in 1750, temperatures in central England, which are a respectable proxy for global temperatures, rose by 2.2 K (4°F). Yet global temperatures have risen by only 0.65 K (1.2°F) since 1950, and 0.7 K (1.3°F) in the whole of the 20th century. Throughout the 21st century, global temperatures have followed a declining trend. Accordingly, neither global mean surface temperature nor its rates of change in recent decades have been exceptional, unusual, inexplicable, or unprecedented.

**Ocean “acidification”:** It has been suggested that the oceans have “acidified” – or, more correctly, become less alkaline – by 0.1 acid-base units in recent decades. However, the fact of a movement towards neutrality in ocean chemistry, if such a movement has occurred, tells us nothing of the cause, which cannot be attributed to increases in CO$_2$ concentration.

There is 70 times as much CO$_2$ dissolved in the oceans as there is in the atmosphere, and some 30% of any CO$_2$ we add to the atmosphere will eventually dissolve into the oceans. Accordingly, a doubling of CO$_2$ concentration, expected later this century, would raise the oceanic partial pressure of CO$_2$ by 30% of one-seventieth of what is already there. And that is an increase of 0.4% at most. Even this minuscule and chemically-irrelevant perturbation is probably overstated, since any “global warming” that resulted from the doubling of CO$_2$ concentration
would warm the oceans and cause them to outgas CO₂, reducing the oceanic partial pressure.

Seawater is a highly buffered solution – it can take up a huge amount of dissolved inorganic carbon without significant effect on pH. There is not the slightest possibility that the oceans could approach the neutral pH of pure water (pH 7.0), even if all the fossil fuel reserves in the world were burned. A change in pH of 0.2 units this century, from its present 8.2 to 8.0, even if it were possible, would leave the sea containing no more than 10% of the “acidic” positively-charged hydrogen ions that occur in pure water. If ocean “acidification” is happening, then CO₂ is not and will not be the culprit.

2. What evidence provides attribution of these changes to human activities?

In the global instrumental record, which commenced in 1850, the three supradecadal periods of most rapid warming were 1860-1880, 1910-1940, and 1975-2001. Warming rates in all three periods were identical at ~0.16 K (0.3 °F) per decade.

During the first two of these three periods, observations were insufficient to establish the causes of the warming; however, the principal cause cannot have been atmospheric CO₂ enrichment, because, on any view, mankind’s emissions of CO₂ had not increased enough to cause any measurable warming on a global scale during those short periods.

In fact, the third period of rapid global warming, 1975-2001, was the only period of warming since 1950. From 1950-1975, and again from 2001-2010, global temperatures fell slightly (HadCRUTv3, cited in IPCC, 2007).

What, then, caused the third period of warming? Most of that third and most recent period of rapid warming fell within the satellite era, and the satellites confirmed measurements from ground stations showing a considerable, and naturally-occurring, global brightening from 1983-2001 (Pinker et al., 2005).

Allowing for the fact that Dr. Pinker’s result depended in part on the datasets of outgoing radiative flux from the ERBE satellite that had not been corrected at that time for orbital decay, it is possible to infer a net increase in surface radiative flux amounting to 0.106 W m⁻² year⁻¹ over the period, compared with the 0.16 W m⁻² year⁻¹ found by Dr. Pinker.

Elementary radiative-transfer calculations demonstrate that a natural surface global brightening amounting to ~1.9 W m⁻² over the 18-year period of study would be expected – using the IPCC’s own methodology – to have caused a transient warming of 1 K (1.8 °F). To put this naturally-occurring global brightening into perspective, the IPCC’s estimated total of all the anthropogenic influences on climate combined in the 256 years 1750-2005 is only 1.6 W m⁻².

Taking into account a further projected warming, using IPCC methods, of ~0.5 K (0.9 °F) from CO₂ and other anthropogenic sources, projected warming of 1.5 K (2.7 °F) should have occurred.

However, only a quarter of this projected warming was observed, suggesting the possibility that the IPCC may have overestimated the warming effect of greenhouse gases fourfold. This result is in line with similar result obtained by other methods: for instance, Lindzen & Choi (2009, 2010 submitted) find that the warming rate to be expected as a result of anthropogenic activities is one-quarter to one-fifth of the IPCC’s central estimate.

There is no consensus on how much warming a given increase in CO₂ will cause.
3. Assuming *ad argumentum* that the IPCC’s projections of future warming are correct, what policy measures should be taken?

Warming at the very much reduced rate that measured (as opposed to merely modeled) results suggest would be 0.7-0.8 K (1.3-1.4 °F) at CO2 doubling. That would be harmless and beneficial – a doubling of CO2 concentration would increase yields of some staple crops by 40%. Therefore, one need not anticipate any significant adverse impact from CO2-induced “global warming”. “Global warming” is a non-problem, and the correct policy response to a non-problem is to have the courage to do nothing.

However, *ad argumentum*, let us assume that the IPCC is correct in finding that a warming of 3.26 ± 0.69 K (5.9 ± 1.2 °F: IPCC, 2007, ch.10, box 10.2) might occur at CO2 doubling. We generalize this central prediction, deriving a simple equation to tell us how much warming the IPCC would predict for any given change in CO2 concentration –

\[ \Delta T_s \approx (8.5 \pm 1.8) \ln(C/Co) \text{ °F} \]

Thus, the change in surface temperature in Fahrenheit degrees, as predicted by the IPCC, would be 6.7 to 10.3 (with a central estimate of 8.5) times the logarithm of the proportionate increase in CO2 concentration. We check the equation by using it to work out the warming the IPCC would predict at CO2 doubling: \[ 8.5 \ln 2 \approx 5.9 \text{ °F} \].

Using this equation, we can determine just how much “global warming” would be forestalled if the entire world were to shut down its economies and emit no carbon dioxide at all for an entire year. The atmospheric concentration of CO2 is 388 parts per million by volume. Our emissions of 30 bn tons of CO2 a year are causing this concentration to rise at 2 ppmv/year, and this ratio of 15 bn tons of emissions to each additional ppmv of CO2 concentration has remained constant for 30 years.

Then the “global warming” that we might forestall if we shut down the entire global carbon economy for a full year would be \[ 8.5 \ln((388+2)/388) = 0.044 \text{ °F} \]. At that rate, almost a quarter of a century of global zero-carbon activity would be needed in order to forestall just 1 °F of “global warming”.

Two conclusions ineluctably follow. First, it would be orders of magnitude more cost-effective to adapt to any “global warming” that might occur than to try to prevent it from occurring by trying to tax or regulate emissions of carbon dioxide in any way.

Secondly, there is no hurry. Even after 23 years doing nothing to address the imagined problem, and even if the IPCC has not exaggerated CO2’s warming effect fourfold, the world will be just 1 °F warmer than it is today. If the IPCC has exaggerated fourfold, the world can do nothing for almost a century before global temperature rises by 1 °F.

There are many urgent priorities that need the attention of Congress, and it is not for me as an invited guest in your country to say what they are. Yet I can say this much: on any view, “global warming” is not one of them.

*Monckton of Brenchley*
Letting the real-world data speak out

BEFORE we began producing the Monthly CO₂ Reports, it was easy for “global warming” profiteers to pretend, and repeatedly to state, that “global warming” is “getting worse”, and that the climate is changing “faster than expected”. Now they are unable to get away with such falsehoods as easily as before.

The centerpieces of our monthly series of graphs showing what is happening in the real world are our CO₂ and temperature graphs, now regarded as the definitive standard worldwide.

**Our CO₂ concentration graphs** show changes in real-world CO₂ concentration as measured by monitoring stations worldwide and compiled by NOAA. We also calculate and display the least-squares linear-regression trend on the real-world data. Because this trend has been very close to a straight line since late 2001, it is the best guide to future CO₂ concentration. We also display the range of UN projections for CO₂ concentration, based on its A2 “business as usual” scenario – the one that comes closest to reality at present. The one difference is that, for clarity, we zero the UN’s projections to the start-point of the linear regression trend on the real-world data.

The UN predicts that, this century, CO₂ concentration will rise exponentially – at an ever-increasing rate – towards 836 [730, 1020] parts per million by volume in 2100. In reality, however, for eight years CO₂ concentration has been trending in a straight line towards just 575 ppmv by 2100. If this linear trend continues, all of the UN’s predictions for 21st-century warming will have to be halved.

**Our global-temperature graphs** show changes in real-world temperature at or near the Earth’s surface. Each temperature graph represents the mean of two satellite datasets: the monthly lower-troposphere anomalies from the satellites of Remote Sensing Systems, Inc., and of the University of Alabama at Huntsville. We do not use the Hadley/CRU or NCDC/GISS datasets: the Climate-gate scandal has shown these to be mere science fiction.

On each graph, the anomalies are zeroed to the least element in the dataset. For clarity, the IPCC’s range of predictions is zeroed to the start-point of the least-squares linear-regression trend on the real-world data. Since late 2001, global temperature has been falling fast.

To preserve consistency with the IPCC’s published formulae for evaluating climate sensitivity to atmospheric CO₂ enrichment, the IPCC’s projections are evaluated directly from its projected exponential growth in CO₂ concentration using the IPCC’s own logarithmic formula for equilibrium temperature change, yielding a net-linear range of projections.

*Equilibrium* change – final temperature response when the climate has settled down after an external perturbation – is greater than the *transient* change predicted by the UN. However, on the A2 scenario that we use, the difference by 2100 is just 0.5 C° (0.9 F°). Therefore, when the UN and other scientists try to maintain that global warming “in the pipeline” will go on for “thousands of years”, just 0.5 C° of additional warming is all that they are talking about.
CO₂ concentration rises, but not at the predicted ever-increasing rate

CO₂ is rising in a near-straight line, well below the IPCC’s projected range (pale blue region). The deseasonalized real-world data are shown as a thick, dark-blue line overlaid on the least-squares linear-regression trend. There is no sign of the exponential (i.e. ever-accelerating) rate of growth the IPCC predicts. Instead, for almost a decade CO₂ has grown in a straight line at just 2 ppmv/year. If anything, the rate of growth is decelerating a little. Data source: NOAA.
IPCC predicts rapid, exponential CO\(_2\) growth that is not occurring

*Observed CO\(_2\) growth is near-linear*, not exponential as predicted by the UN’s climate panel. The trend in CO\(_2\) concentration falls well short of the rapid rate of growth predicted by the panel. **Data source:** NOAA.
Projecting the past decade’s CO₂ trend to 2100 halves IPCC forecasts

The dark-blue line shows CO₂'s actual path, well below the exponential-growth curves (bounding the pale blue region) predicted by the IPCC in its 2007 report. If CO₂ continues on its present path, the IPCC’s central temperature projection for the year 2100 must be halved. **Data source:** NOAA.
The 29-year global warming trend is just 2.9 °F (1.6 °C) per century

Global monthly temperature anomalies, January 1980 to April 2010
IPCC predicts warming at +2.4, +3, +3.9, +4.7, +5.3 C/century
The observed warming trend is equivalent to 1.6 C/century

Global temperature for the past 30 years has been undershooting the IPCC’s currently-predicted warming rates (pink region). The warming trend (thick red line) has been rising at well below half of the IPCC’s central estimate. Data source: SPPI index, compiled from RSS Inc. UAH has not reported data for two months and has been excluded from this graph, but will be relied upon again when data become available. SPPI no longer uses any terrestrial-temperature datasets, because they have become discredited as unreliable.
Since the beginning of 1995, “global warming” has been barely significant, and only because of the current El Nino Southern Oscillation, an ocean warming that is now about to decline. Source: SPPI global temperature index.
Nine full years’ global cooling trend at 0.7 °F (0.4 °C) / century

For almost nine years, the trend in global temperatures has been falling. The IPCC’s predicted equilibrium warming path (pink region) bears no relation to the global cooling that has been observed in the 21st century to date. Note the very sharp peak in global temperature in early 2010, caused by a strong El Niño Southern Oscillation. **Source:** SPPI global temperature index.
Sea level continues to rise more slowly than the UN predicts

Sea level (anomaly in millimetres) is rising at just 1 ft/century: The average rise in sea level over the past 10,000 years was 4 feet/century. During the 20th century it was 8 inches. As recently as 2001, the IPCC had predicted that sea level might rise as much as 3 ft in the 21st century. However, this maximum was cut by more than one-third to less than 2 feet in the IPCC’s 2007 report, with a central estimate of 1 ft 5 in. Mörner (2004) says sea level will rise about 8 inches in the 21st century. Mr. Justice Burton, in the UK High Court, bluntly commented on Al Gore’s predicted 20ft sea-level rise as follows: “The Armageddon scenario that he depicts is not based on any scientific view.” A fortiori, James Hansen’s prediction of a 246ft sea-level rise is mere rodomontade. Source: University of Colorado, 2010, release 2.
Arctic sea-ice extent remains within the 10-year normal range ...

Arctic sea ice extent (millions of square kilometers: left scale): The red curve shows that the extent of sea ice in the Arctic is well within the ten-year normal range for this time of year. In 2005, 2007, and 2008, sea-ice extent during the September low season was below the 30-year minimum. Arctic summer sea ice covered its least extent in 30 years during the late summer of 2007. However, NASA has attributed that sudden decline to unusual poleward movements of heat transported by currents and winds: the Arctic climate has long been known to be volatile. The decline cannot have been caused by “global warming”, because, as the SPPI Global Temperature Index shows, there has been cooling globally during the past eight years – a cooling that applies to the oceans as well as to the atmosphere. At almost the same moment as summer sea-ice extent reached its 30-year minimum in the Arctic, sea-ice extent in the Antarctic reached its 30-year maximum, though the latter event was very much less widely reported in the media than the former. Source: IARC JAXA, Japan, April 2010.
... and the same graph from the Danish Meteorological Institute

*Record sea-ice extent:* The Danish Meteorological Institute’s graph shows a remarkable and sudden growth in the extent (in millions of square kilometers: left scale) of Northern-Hemisphere sea ice at the Spring maximum in 2010 (black curve). One should not read too much into these temporary changes: they are part of natural variability in the climate.
... and summer minimum sea-ice extent has grown 24% in 2 years

Arctic summer sea-ice extent (purple) has increased in each of the past two years, and is very close to the mean for the past decade. Since there has been no statistically-significant “global warming” since 1995, and since the decline in summer sea-ice extent has occurred only in the past five years, the decline that occurred in 2007 cannot be attributed to “global warming”. A paper by NASA in 2008 attributed the 2007 summer sea-ice minimum to unusual poleward winds and currents bringing warm weather up from the tropics. A few weeks after the Arctic sea-ice minimum, there extent of Antarctic sea ice reached a 30-year maximum. The Arctic was in fact 2-3°F warmer in the 1930s and early 1940s than it is today.

A recent paper suggesting that the Arctic is now warmer than at any time for 2000 years is based on the same defective data, and is by the same authors, as the UN’s attempt to abolish the medieval warm period in its 2001 report. In fact, for most of the past 10,000 years the world – and by implication the Arctic – was appreciably warmer than it is today. One of the authors of that report had previously told a fellow-researcher, “We have to abolish the medieval warm period.” However, papers by almost 800 scientists from more than 450 institutions in more than 40 countries over more than 20 years establish that the medieval warm period was real, was global, and was warmer than the present. Source: University of Illinois, 15 September 2009.
Antarctic sea-ice extent has been rising gently for 30 years

Antarctic sea-ice extent (anomaly from 1979-2000 mean, millions of km²: left scale) shows a gentle but definite and persisting uptrend over the past 30 years. The peak extent, which occurred late in 2007, followed shortly after the decline in Arctic sea ice in late summer that year. In the summer of 2009, less Antarctic sea-ice melted than since records began 30 years previously, confirming that whatever warming is occurring is not global. Source: University of Illinois, April 2010.
The regular “heartbeat” of global sea-ice extent: steady for 30 years

Planetary cardiogram showing global sea-ice area (millions of square kilometers: left scale): There has been a very slight decline in the trend (red) of global sea-ice extent over the decades, chiefly attributable to loss of sea ice in the Arctic during the summer, which was well below the mean in 2007, with some recovery in 2008 and a further recovery in 2009. However, the 2008 peak sea-ice extent was exactly on the 1979-2000 mean, and current sea-ice extent is close to the 1979-2000 mean. The decline in summer sea-ice extent in the Arctic, reflected in the global sea-ice anomalies over most of the past eight years, runs counter to the pronounced global atmospheric cooling trend over the same period, suggesting that the cause of the regional sea-ice loss cannot have been “global warming”. Seabed volcanic activity recently reported in the Greenland/Iceland gap, with seabed temperatures of up to 574 °F, may have contributed to the loss of Arctic sea-ice. **Source:** University of Illinois, May 2010.

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**Source:** University of Illinois, May 2010.
Hurricane, typhoon, and tropical-cyclone activity is at a 40-year low

“‘Urricanes ’ardly hever ‘appen”, as Eliza Doolittle sang in “My Fair Lady”. Hurricanes, typhoons, and other tropical cyclones have declined recently. Global activity of intense tropical storms is measured using a two-year running sum, the Accumulated Cyclone Energy Index, now standing at almost its least value in 30 years in the Northern Hemisphere, and also globally. The 2009 hurricane season in the North Atlantic was only half as active as normal. The graph shows the 24-month running sum of tropical-cyclone energy for the entire globe (blue: top) and the Northern Hemisphere only (green). The difference between the two time series is the Southern Hemisphere total. Data are shown from January 1979. Intensity estimates of southern-hemisphere cyclones are often missing before the graph’s start-date. Source: Ryan Maue, April 2010.
Hurricane activity in decline: The 24-month running sum of hurricane days around the globe has been at its lowest level in 30 years during the 2009 season, confirming the findings of hurricane experts such as Dr. Chris Landsea to the effect that a warming world need not expect hurricanes to become more frequent, longer, or more severe. Source: Ryan Maue, Florida State University, April 2010.
Global major hurricane days are almost at their lowest in 30 years

Extreme hurricanes are not common at present: The 24-month running sum of major hurricane days around the globe is not far above its lowest level in the 30-year record, confirming that mere warming of the planet does not necessarily entail more intense hurricanes. **Source:** Ryan Maue, Florida State University, March 2010.
Almost no trend in North Atlantic hurricane activity for 60 years

North Atlantic Accumulated Cyclone Energy Index (ACE: left scale), 1950-2010: The ACE is a 24-month running sum that represents the combined frequency, intensity, and duration of hurricanes and tropical cyclones. Historically, the North Atlantic hurricane activity is usually characterized as a feast or a famine, making definitions of what is normal difficult. In "active" periods (such as 1995-present), a "normal" season sees much hurricane activity compared to inactive periods (such as 1970-1994). In the above figure, the light blue line indicates the linear trend of North Atlantic accumulated cyclone energy from 1950-2009 – a 60-year period of decent records – and the line is almost flat: no trend since 1950. When seasonal forecasters like Gray & Klotzbach at CSU and Tropical Storms Risk announce their upcoming seasonal forecast, they represent an entire season's worth of activity in an integrated sense either by predicting counts/frequency or ACE. However, there is no reason to assume that the entire hurricane season between June and November will experience uniform favorable or unfavorable atmospheric and oceanic conditions for tropical-cyclone formation. Indeed, the North Atlantic tends to spurt activity. For instance, one storm after another may form from African Easterly Waves and trek across the main development region for Atlantic hurricanes during the peak of the season. **Source:** Ryan Maue, Florida State University, April 2010.
Solar activity is heading for what may be a small 2013 maximum

Monthly sunspot numbers (black curve, smoothed in blue, and predicted in red) since January 2000: Sunspot activity had been less than for 100 years, but is now recovering healthily as the new solar cycle gets under way. Note that the currently-predicted solar maximum for 2013-14 is considerably less intense than the previous solar maximum in 2000-01. However, the solar flux reaching the top of the atmosphere typically varies by only 0.15% between the minimum and the maximum of the ~11-year solar cycle. Source: NOAA/SWPC, Boulder, CO, USA, March 2010.
The minima of solar cycles 23 and 24 compared

Number of days without any visible sunspots during the previous solar minimum (blue) and the present solar minimum (red). During the last ~11-year solar minimum, in September/October 1996, the longest period without sunspots was 37 days, compared with 44 days in March/April 2009 and 51 days in July/August 2009. Source: Jan Alvestad, February 2010.
The stupefying cost of the Waxman/Markey Climate Bill

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<th>Waxman/Markey Climate Bill</th>
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<td>CO₂ concentration in 2100 [A2]</td>
<td>836 ppmv</td>
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<td>– CO₂ concentration in 2000</td>
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<td>= 21\textsuperscript{st}-century CO₂ increase</td>
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<td>= Years to stop 100 years’ warming</td>
<td>1360 years</td>
</tr>
<tr>
<td>x $180 billion/year WaxKey cost</td>
<td>$250 trillion</td>
</tr>
</tbody>
</table>

This postcard has all the key figures on the Waxman/Markey climate Bill in one place. Bottom line: to prevent the 3.4 °C warming projected by the UN for this century under the A2 carbon emissions scenario would take 1360 years even if the Bill were fully implemented, and would cost $250 trillion. Source: SPPI calculations.
Why cap-and-trade will not change the global climate one iota

A pointless Bill: The Waxman/Markey Bill will cost billions to implement, but will reduce US carbon emissions hardly at all, unless the numerous exceptions in the Bill are implemented, in which event it will not reduce US carbon emissions at all. Source: www.breakthrough.org.
The Waxman/Markey Climate Bill will scarcely affect temperatures

Temperature change predicted by the UN, and (dotted line) adjusted to reflect the negligible impact of the Waxman/Markey Climate Bill, which might cut temperatures by 0.2-0.02 F by 2100, at a cost of $18 trillion. Source: Chip Knappenberger: cost estimates $180 bn/year from the White House.
The Waxman/Markey Climate Bill will scarcely affect sea level change predicted by the UN, and (dotted line) adjusted to reflect the negligible impact of the Waxman/Markey Climate Bill, which might cut sea-level by less than half an in by 2100, at a cost of $18 trillion. Source: Chip Knappenberger: cost estimates $180 bn/year from the White House.
Fewer temperature stations = faster ‘warming’

*Why SPPI does not use terrestrial temperature measurements:* In 1990, when the Soviet Union collapsed, hundreds of largely rural temperature stations disappeared from the global historical climate network, and, by no coincidence, global mean surface temperatures appeared to rise very sharply.
Your ‘global-warming’ ready reckoner

Here is a step-by-step, do-it-yourself ready-reckoner which will let you use a pocket calculator to make your own instant estimate of global temperature change in response to increases in atmospheric CO2 concentration.

**STEP 1:** Decide how far into the future you want your forecast to go, and estimate how much CO2 will be in the atmosphere at that date. *Example:* Let us do a forecast to 2100. The *Monthly CO2 Report* charts show CO2 rising to \( C = 575 \) parts per million by the end of the century, compared with \( B = 385 \) parts per million in late 2008.

**STEP 2:** Next, work out the proportionate increase \( C/B \) in CO2 concentration. In our example, \( C/B = 575/385 = 1.49 \).

**STEP 3:** Take the natural logarithm \( \ln(C/B) \) of the proportionate increase. If you have a scientific calculator, find the natural logarithm directly using the “ln” button. If not, look up the logarithm in the table below. In our example, \( \ln 1.49 = 0.40 \).

| \( n \) | \( 1.05 \) | \( 1.10 \) | \( 1.15 \) | \( 1.20 \) | \( 1.25 \) | \( 1.30 \) | \( 1.35 \) | \( 1.40 \) | \( 1.45 \) | \( 1.50 \) | \( 1.55 \) | \( 1.60 \) | \( 1.65 \) | \( 1.70 \) | \( 1.75 \) | \( 1.80 \) | \( 1.85 \) | \( 1.90 \) | \( 1.95 \) | \( 2.00 \) |
| \( \ln \) | \( 0.05 \) | \( 0.10 \) | \( 0.14 \) | \( 0.18 \) | \( 0.22 \) | \( 0.26 \) | \( 0.30 \) | \( 0.34 \) | \( 0.37 \) | \( 0.41 \) | \( 0.44 \) | \( 0.47 \) | \( 0.50 \) | \( 0.53 \) | \( 0.56 \) | \( 0.59 \) | \( 0.62 \) | \( 0.64 \) | \( 0.67 \) | \( 0.69 \) |

| \( n \) | \( 2.05 \) | \( 2.10 \) | \( 2.15 \) | \( 2.20 \) | \( 2.25 \) | \( 2.30 \) | \( 2.35 \) | \( 2.40 \) | \( 2.45 \) | \( 2.50 \) | \( 2.55 \) | \( 2.60 \) | \( 2.65 \) | \( 2.70 \) | \( 2.75 \) | \( 2.80 \) | \( 2.85 \) | \( 2.90 \) | \( 2.95 \) | \( 3.00 \) |
| \( \ln \) | \( 0.72 \) | \( 0.74 \) | \( 0.77 \) | \( 0.79 \) | \( 0.81 \) | \( 0.83 \) | \( 0.85 \) | \( 0.88 \) | \( 0.90 \) | \( 0.92 \) | \( 0.94 \) | \( 0.96 \) | \( 0.97 \) | \( 0.99 \) | \( 1.01 \) | \( 1.03 \) | \( 1.05 \) | \( 1.06 \) | \( 1.08 \) | \( 1.10 \) |

**STEP 4:** Choose a climate sensitivity coefficient \( c \) from the table below –

<table>
<thead>
<tr>
<th>Coefficient ( c ) ...</th>
<th>SPPI minimum</th>
<th>SPPI central</th>
<th>SPPI maximum</th>
<th>IPCC minimum</th>
<th>IPCC central</th>
<th>IPCC maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>... for ( C^° )</td>
<td>0.7</td>
<td>1.4</td>
<td>2.1</td>
<td>2.9</td>
<td>4.7</td>
<td>6.5</td>
</tr>
<tr>
<td>... for ( F^° )</td>
<td>1.25</td>
<td>2.50</td>
<td>3.75</td>
<td>5.25</td>
<td>8.5</td>
<td>11.75</td>
</tr>
</tbody>
</table>

**STEP 5:** Find the temperature change \( \Delta T \) by multiplying the natural logarithm of the proportionate increase in CO2 concentration by your climate sensitivity coefficient. In our example, we’ll chose the SPPI central estimate \( c = 2.50 \) \( F \). Then –

\[
\Delta T = c \ln(C/B) = 2.50 \times 0.40 = 1.0 \, F^°,
\]

your predicted manmade warming to 2100. It’s as simple as that!
Why cutting carbon emissions can never be cost-effective

<table>
<thead>
<tr>
<th>Atmospheric CO₂ concentration, 2009</th>
<th>NOAA global CO₂</th>
<th>388 ppmv</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adding 2 ppmv/year causes warming of</td>
<td>UN central est.:</td>
<td>0.024 C°</td>
</tr>
<tr>
<td></td>
<td>4.7 ln(390/388)</td>
<td>40 years</td>
</tr>
<tr>
<td>No. of years to prevent 1 C° warming</td>
<td>UN guess:</td>
<td>160 years</td>
</tr>
<tr>
<td></td>
<td>(0.024)^{-1}</td>
<td></td>
</tr>
<tr>
<td>x UN 4-fold hyping of CO₂ warming</td>
<td>Real world:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41 years x 4</td>
<td></td>
</tr>
</tbody>
</table>

A very simple calculation demonstrates definitively and conclusively that any attempt to address the imagined (and imaginary) “problem” of “global warming” is doomed not to be cost-effective. NOAA’s global CO₂ concentration record shows 388 parts per million by volume in the atmosphere in 2009/10. Throughout this millennium CO₂ concentration has been rising in a straight line at 2ppmv/year, as our CO₂ concentration graphs show every month. How much warming will this 2 ppmv/year increase cause? Using the formula for the UN’s implicit central estimate of CO₂’s warming effect, taken from our Ready Reckoner, we can work this out thus: the warming, in Celsius degrees, is 4.7 times the Naperian logarithm of [(388+2)/388], which works out as 0.024 C° per year, or less than one-fortieth of a Celsius degree. So we should have to shut down the entire global carbon economy for 41 years, without any right to use an auto, train, or plane, to prevent just 1 Celsius degree of warming. However, the UN has exaggerated CO₂’s warming effect at least fourfold, so make that 160 years. Closing the entire carbon economy would in effect close the entire global economy. And all this for the sake of a non-solution to a non-problem.
Every month, the *Monthly CO₂ Report* summarizes key recent scientific papers, selected from those featured weekly at [www.co2science.org](http://www.co2science.org), that significantly add to our understanding of the climate question. This month we review papers demonstrating no uptrend in Antarctic snow and ice melt, an increase in tropical forest growth, the implausibility of blaming “global warming” for shifting ranges of birds' habitats, the healthy response of marine organisms to ocean “acidification”, the likelihood that the expected decline in ocean pH will be half what the models predicted; the absence of harmful effects of rapid ocean warming on a Tasman coral reef, the health benefits of rising Arctic temperatures, and the exaggeration of global temperature increase arising from urban “heat islands”. As usual, our final papers give evidence that the Middle Ages were warmer than today.

**Sixty-Second Summary**

- Snow and ice melt over all of Antarctica has shown no net upward trend over the entire 30-year period of its historical observation.
- Tropical forests are experiencing increased tree growth and accelerating forest dynamism, with forests, on average, getting bigger (increasing biomass and carbon storage).
- There is a "danger of naive attribution of range changes to climate change, even if those range changes accord with the predictions of climate-change models."
- Marine biota are more resistant to ocean acidification than previously thought and "may not be the widespread problem conjured into the 21st century."
- New research suggests that the expected decline in oceanic pH will be only half as large as models have been predicting.
- Warming three times greater than the global mean temperature rise over the past sixty-plus years has had a negligible effect on the health of a Tasmanian coral reef.
- As mean January temperature rose in the Arctic, the desirable metric of life expectancy at birth rose right along with it, while all of the undesirable health metrics (such as mortality and disease incidence) declined.
- Population growth and the clustering of people in cities can lead to localized warming (in areas where temperatures are routinely measured) that is both more rapid and much greater (by as much as an order of magnitude, in fact) than what climate alarmists typically attempt to characterize as the "unprecedented" warming of the 20th century.
- Was there a Medieval Warm Period? YES, according to data published by 821 individual scientists from 488 separate research institutions in 43 different countries in the CO2Science Medieval Warm Period Project database ... and counting! View an interactive map here: [http://www.co2science.org/data/timemap/mwpmap.html](http://www.co2science.org/data/timemap/mwpmap.html).
Ocean ‘acidification’: how bad can it get?


In a special issue of Oceanography published in December of 2009, Feely et al. review what is supposedly known about the current pH status of the world’s oceans, as well as what is expected by the end of the current century. The three researchers write in their abstract that “estimates based on the Intergovernmental Panel on Climate Change business-as-usual emission scenarios suggest that atmospheric CO₂ levels could approach 800 ppm near the end of the century” and that “corresponding biogeochemical models for the ocean indicate that surface water pH will drop from a pre-industrial value of about 8.2 to about 7.8 in the IPCC A2 scenario by the end of this century”. They say that, as a result, “the skeletal growth rates of calcium-secreting organisms will be reduced”, and conclude that “if anthropogenic CO₂ emissions are not dramatically reduced in the coming decades, there is the potential for direct and profound impacts on our living marine ecosystems”.

However, in the very same issue of Oceanography -- in the article that appears just before the Feely et al. paper, in fact -- NOAA’s Pieter Tans presents a very different take on the subject.
Tans begins his analysis by indicating that the effect of CO₂ on climate – and, on its own concentration in the atmosphere – “depends primarily on the total amount emitted, not on the rate of emissions”, and that “unfortunately, the IPCC reports have not helped public understanding of this fact by choosing, somewhat arbitrarily, a rather short time horizon (100 years is most commonly used) for climate forcing by CO₂”. Thus, “instead of adopting the common economic point of view, which, through its emphasis on perpetual growth, implicitly assumes infinite earth resources”, Tans notes that the cumulative extraction of fossil-fuel carbon currently stands at about 345 GtC, and that there appears to be another 640 or so GtC of proven reserves, yielding a total original reserve of about 1000 GtC, from which he proceeds with his analysis.

The figure shows much of the past and projected history of fossil-fuel carbon utilization, together with historical and projected atmospheric CO₂ concentrations out to the year 2500, as calculated by Tans. As can be seen there, his analysis indicates that the air's CO₂ concentration peaks well before 2100 and at only 500 ppm, as compared to the 800 ppm that Feely et al. take from the IPCC. In addition, by 2500 the air's CO₂ concentration actually drops back to about what it is today.

Based on his more modest projections of future atmospheric CO₂ concentrations, Tans also finds the projected pH reduction of ocean waters in the year 2100 (as compared to preindustrial times) to be only one-half of the 0.4 value calculated by Feely et al., with a recovery to a reduction of only a little over 0.1 pH unit by 2500, which is less than the range of pH values that are typical of today's oceans (8.231 in the Arctic Ocean minus 8.068 in the North Indian Ocean equals 0.163, according to Feely et al.).

Thus, things may not be quite as bad as the IPCC and other scientists make them out to be, especially when it comes to the potential effects of anthropogenic CO₂ emissions on the air’s CO₂ content and on oceanic pH values.

**Effects of exceptionally rapid ocean warming on Tasmanian coral reefs**


Stuart-Smith *et al.* write that “despite increasing scientific and public concerns [about] the potential impacts of global ocean warming on marine biodiversity, very few empirical data on community-level responses to rising water temperatures are available”. To fill this important data void, the authors undertook “a study of sub-tidal reef communities over a decadal time scale, comparing data on fishes, macro-invertebrates and macro-algae collected at 136 sites, spanning hundreds of kilometers around the island of Tasmania (south-eastern Australia) in the early to mid 1990s, with data from the same sites in 2006/2007”. This region “has experienced relatively rapid warming during the last century as a consequence of a strengthening of the warm East Australian Current (Ridgway, 2007)”, so that there has been “an increase in sea surface temperature of 2.28 ± 0.35°C per century for the period 1944-2002 (Ridgway, op. cit.), which is considerably more rapid than the global mean of 0.6 ± 0.2°C per century estimated by Smith and Reynolds (2003), and a mean increase in surface air temperature of 0.6-0.8°C (Salinger, 2005; Hansen *et al.*, 2006)”. In fact, the warming around this part of Tasmania has been more than three times the global mean.
Contrary to what the four authors had expected to find, they discovered that “Tasmanian shallow rocky reef communities have been relatively stable over the past decade,” in spite of the "substantial rise in sea surface temperature over this period" and the “continuation of a considerable warming trend in oceanographic conditions over the last 50 years”. They report that “the northeast and southeast bio-regions, which are most influenced by the East Australian Current and hence have experienced the greatest warming over the last century, appeared to have actually changed very little”, adding that “not only were Tasmanian reef communities remarkably similar between 1994 and 2006 in a multivariate sense, but univariate community characteristics such as species richness and total fish abundance were also consistent”. Thus, contrary to many people's expectations, as well as their own initial thoughts on the subject, the Australian scientists found very little evidence to support the “doomsday” scenarios of the IPCC, who foresee continued global warming decimating earth's highly productive coastal marine ecosystems.

Additional References


Health effects of seasonal cold in Arctic regions


The authors write that “Arctic populations, especially indigenous people, could be considered as ‘vulnerable’ because their health status generally shows disparities when compared to the national or more southern populations”. They say, “It is not known if the harsh climate, and especially cold temperatures, could be a contributing or causative factor of the observed health inequalities.” To shed some light on this subject, the authors determined “mean January and July temperatures ... for 27 Arctic regions based on weather station data for the period 1961-1990 and their association with a variety of health outcomes assessed by correlation and multiple linear regression analyses”.

The two researchers report that mean January temperature correlated negatively with several health outcomes, including infant mortality rate, age-standardized mortality rates (all causes, respiratory, cancer, injuries), perinatal mortality rate and tuberculosis incidence rate, but that it correlated positively with life expectancy. That is to say, as mean January temperature rose, the desirable metric of life expectancy at birth
rose right along with it, while all of the undesirable health metrics (such as mortality and disease incidence) declined. For example, they report that “for every 10°C increase in mean January temperature, the life expectancy at birth among males increased by about six years”, while “infant mortality rate decreased by about four deaths per thousand live births”. Young and Kakinen conclude that the cold climate of the Arctic is “significantly associated with higher mortality”, and “should be recognized in public health planning”, noting that “within a generally cold environment, colder climate results in worse health”. For people living in these regions, therefore, a little global warming could go a long way towards improving their quality of life, as well as the length of time they have to enjoy it.

The urban heat island of Mexicali, Mexico


Mexicali City borders the United States at the northern end of Mexico's Baja California. It is an urban settlement founded in the first decade of the 20th century. Then it had an area of approximately 4 km², but by 1980 it covered an area of a little over 40 km², and by 2005 it covered more than 140 km².

Working with daily records of maximum and minimum temperature from six weather stations in Mexicali City and its surroundings from 1950-2000, and with a climatic network of rural and urban weather stations in Mexicali and its valley and the Imperial Valley, California, from 2000-2005, Garcia Cueto et al. characterized the spatial and temporal development of the city's urban heat island from 1950-2005.

Results indicated that Mexicali City “changed from being a cold island (1960-1980) to a heat island with a maximum intensity of 2.3°C in the year 2000, when it was compared with rural weather stations of Imperial, California”. The authors also note that “the replacement of irrigated agricultural land by urban landscapes, anthropogenic activity and population growth appear to be the major factors responsible for the observed changes”. From the “more updated information (2000-2005)”, they found that “the greatest intensity of the urban heat island was in winter with a value of 5.7°C, and the lowest intensity in autumn with 5.0 °C”. Thus, the results demonstrate that population growth and the clustering of people in cities can lead to localized warming (in areas where temperatures are routinely measured) that is both more rapid and much greater (by up to tenfold) than what climate alarmists typically attempt to characterize as the “unprecedented” warming of the 20th century. And that worldwide population-growth-induced warming has contributed, in large part, to what is wrongly construed as CO₂-induced global warming.

Thirty years of Antarctic snow and ice melt


In a new paper examining Antarctic snow and ice melt, Tedesco and Monaghan (2010) reviewed what has been learned across Antarctica since 1979, when melting was first routinely measured via space-borne passive microwave radiometers. Results indicated that the continent-wide snow and ice melting trend over 20 years was “negligible”. During the 2008-2009 austral summer, scientists from the City University of New
York and the U.S. National Center for Atmospheric Research observed that snow and ice melt was “a record low for the 30-year period between 1979 and 2009 … a new historical minimum.” They add that “December 2008 temperature anomalies were cooler than normal around most of the Antarctic margin, and the overall sea ice extent for the same month was more extensive than usual”.

Tedesco and Monaghan conclude that “efforts to understand the relative roles of the natural and anthropogenic mechanisms that influence Antarctic climate variability will be crucial for projecting future melt in Antarctica and subsequent impacts on ice sheet mass balance and sea level”. However, the two researchers say: “The extremely low Antarctic snowmelt in 2008-2009 is likely related to coincident strong positive phases of both the Southern Hemisphere Annular Mode and the Southern Oscillation Index during the austral spring and summer 2008-2009.” They also point out, though that “it is noteworthy that both indices had large negative anomalies during several of the highest melt years”.

Snow and ice melt over all of Antarctica has shown no net upward trend over the entire 30-year period of satellite observation, when atmospheric CO₂ concentration rose by approximately 50 ppmv, or 15%, and the world's climate extremists claim the Earth warmed faster and farther than what had previously been experienced over the past two millennia. Surely such extreme warming would have jump-started the massive melting of ice and snow they claim such warming should produce. But it has not. The climate-alarmist view of the world is out of touch with reality.

**Tropical forests and ‘global warming’: CO₂ and warmer weather are a boon, not a bane**


Although many high-latitude regions may benefit by warming that allows crops and forests to grow where it is currently too cold for them, climate extremists typically worry about Earth's tropical regions, where they say that just a little extra warming may spell disaster for indigenous forests. In a thorough review of the scientific literature on this important question, Lewis *et al.* (2009) evaluated tropical forest inventory data, plant physiology experiments, ecosystem flux observations, earth observations, atmospheric measurements and dynamic global vegetation models, which, taken together, “provide new opportunities to cross-validate results”.

Theory and experiments suggest that over the past several decades “plant photosynthesis should have increased in response to increasing CO₂ concentrations, causing increased plant growth and forest biomass”. The five researchers find that “long-term plot data collectively indicate an increase in carbon storage, as well as significant increases in tree growth, mortality, recruitment, and forest dynamism”. They also say that satellite measurements “indicate increases in productivity and forest dynamism”, and that five Dynamic Global Vegetation Models, incorporating plant physiology, competition, and dynamics, all predict increasing gross primary productivity, net primary productivity, and carbon storage when forced using late-twentieth century climate and atmospheric CO₂ concentration data”. They add that “the predicted increases in carbon storage via the differing methods are all of similar magnitude (0.2% to 0.5% per year)”.
Lewis et al. conclude: “Collectively, these results point toward a widespread shift in the ecology of tropical forests, characterized by increased tree growth and accelerating forest dynamism, with forests, on average, getting bigger (increasing biomass and carbon storage).” Such findings are just the opposite of what the world's climate extremists are trying to make everyone believe about the supposedly deleterious consequences of the “twin evils” of rising air temperatures and CO₂ concentrations. However, rather than being the bane of Earth's tropical forests, 20th-century increases in air temperature and atmospheric CO₂ concentration – which have returned these meteorological parameters to more normal post-Little Ice Age values – have actually proved to have been a great boon to the trees of the tropics.

**Global warming vs. other causes of shifts in bird ranges**


Hockey and Midgley (2009) write that “in the influential fourth assessment report of the Intergovernmental Panel on Climate Change, Rosenzweig et al. (2007) tested several thousand time-series data sets for changes in species behavior and geographic range consistent with climate change, reaching the conclusion that it is very likely that climate change is driving changes in natural biological systems”. However, they say that “the use of such large datasets in meta-analyses may discourage the close inspection of observations and result in naively misattributing observed shifts to climate when other explanations may be more parsimonious”. The authors “collated information about recent range changes in South African birds, specifically indigenous species that have colonized the Cape Peninsula, at the south-western tip of Africa in the Western Cape province, since the 1940s”, where they say there have been “widespread anthropogenic changes of many kinds to the landscape, including urbanization, commercial afforestation and the introduction and spread of invasive alien trees, most of which occurred before climate change accelerated in the 1970s”.

Results indicated that the colonization events “concur with a ‘climate change’ explanation, assuming extrapolation of Northern Hemisphere results and simplistic application of theory”, but they found that, “on individual inspection, all bar one may be more parsimoniously explained by direct anthropogenic changes to the landscape than by the indirect effects of climate change”. They add that “no a priori predictions relating to climate change, such as colonizers being small and/or originating in nearby arid shrub-lands, were upheld”. Their work suggests that either “observed climate changes have not yet been sufficient to trigger extensive shifts in the ranges of indigenous birds in this region, or that a priori assumptions are incorrect”. Either way, “this study highlights the danger of naive attribution of range changes to climate change, even if those range changes accord with the predictions of climate-change models,” because “misattribution could distract conservationists from addressing pressing issues involving other drivers of biodiversity change such as habitat transformation, and obscure important lessons that might be learned from the dynamics that pertain to such changes”.

The real ocean ‘acidification’ story


In the most comprehensive analysis ever conducted of experimental studies that have explored the effects of rising atmospheric CO₂ concentrations on marine biota, Hendriks *et al.* (2010) assembled a database of 372 experimentally-evaluated responses of 44 different marine species to ocean “acidification” that was induced by equilibrating seawater with CO₂-enriched air, because “warnings that ocean acidification is a major threat to marine biodiversity are largely based on the analysis of predicted changes in ocean chemical fields”, which are derived from theoretical models that do not account for numerous biological phenomena and have only “limited experimental support”.

Of the published reports they scrutinized, only 154 assessed the significance of responses relative to controls; and of those reports, 47 reported no significant response, so that “only a minority of studies” demonstrated “significant responses to acidification”. When the results of that minority group of studies were pooled, there was no significant mean effect. Nevertheless, the three researchers found that some types of organisms and certain functional processes did exhibit significant responses to seawater acidification. However, since their analyses to this point had included some acidification treatments that were extremely high, they repeated their analyses for only those acidification conditions that were induced by atmospheric CO₂ concentrations of 2000 ppmv or less, predicted to occur by 2300 in Caldeira and Wickett (2003).

In this second analysis, Hendriks *et al.* once again found that the overall response, including all biological processes and functional groups, was not significantly different from that of the various control treatments, although calcification was reduced by 33 ± 4.5% and fertility by 11 ± 3.5% across groups, while survival and growth showed no significant overall responses. When the upper limiting CO₂ concentrations were in the range 731-759 ppmv, or just below the 790 ppmv predicted by IPCC (2007) for the end of the 21st century, calcification rate reductions of only 25% were observed. What is more, the three researchers say that this decline “is likely to be an upper limit, considering that all experiments involve the abrupt exposure of organisms to elevated pCO₂ values, while the gradual increase in pCO₂ that is occurring in nature may allow adaptive and selective processes to operate”, citing the work of Widdicombe *et al.* (2008) and noting that “these gradual changes take place on the scale of decades, permitting adaptation of organisms, even including genetic selection”.

Yet even this mitigating factor is not the end of the good news, for Hendriks *et al.* write that “most experiments assessed organisms in isolation, rather than [within] whole communities”, and they say that the responses of other entities and processes within the community may well buffer the negative impacts of CO₂-induced “acidification” on Warth’s corals. As an example, they note that “sea-grass photosynthetic rates may increase by 50% with increased CO₂, which may deplete the CO₂ pool, maintaining an elevated pH that may protect associated calcifying organisms from the impacts of ocean acidification”.

In describing another phenomenon that benefits corals, the researchers write that “seasonal changes in pCO₂ are in the range of 236-517 ppmv in the waters of the northern East China Sea (Shim *et al.*, 2007),” and that “metabolically-active coastal ecosystems experience broad diel changes
in pH, such as the diel changes of >0.5 pH units reported for sea-grass ecosystems (Invers et al., 1997)

Hendriks et al. additionally state that the models upon which the ocean acidification threat is based “focus on bulk water chemistry and fall short of addressing conditions actually experienced by [marine] organisms”, which are “separated from the bulk water phase by a diffusive boundary layer”, adding that “photosynthetic activity” – such as that of the zooxanthellae that are hosted by corals – “depletes pCO2 and raises pH (Kuhl et al., 1995) so that the pH actually experienced by organisms may differ greatly from that in the bulk water phase (Sand-Jensen et al., 1985)”.

Last of all, the scientists note that “calcification is an active process where biota can regulate intracellular calcium concentrations”, so that “marine organisms, like calcifying coccolithophores (Brownlee and Taylor, 2004), actively expel Ca2+ through the ATPase pump to maintain low intracellular calcium concentrations (Corstjens et al., 2001; Yates and Robbins, 1999)”. Also, “as one Ca2+ is pumped out of the cell in exchange for 2H+ pumped into the cell, the resulting pH and Ca2+ concentrations increase the CaCO3 saturation state near extracellular membranes and appear to enhance calcification (Pomar and Hallock, 2008)”: so much so that “there is evidence that calcification could even increase in acidified seawater, contradicting the traditional belief that calcification is a critical process impacted by ocean acidification (Findlay et al., 2009)”.

Hendriks et al. conclude that the world's marine biota are “more resistant to ocean acidification than suggested by pessimistic predictions identifying ocean acidification as a major threat to marine biodiversity”, noting that this phenomenon “may not be the widespread problem conjured into the 21st century” by the world's climate extremists. We agree, having reached much the same conclusion back at the turn of the last millennium (Idso et al., 2000). We are happy to endorse Hendriks et al.'s conclusion that “biological processes can provide homeostasis against changes in pH in bulk waters of the range predicted during the 21st century”. Full references at www.co2science.org.

The Middle Ages were warmer than today (1): Eastern Gotland Basin, Baltic Sea


The authors analyzed the organic carbon content (more of which indicates conditions conducive to greater primary productivity) and identified and quantified siliceous microfossil assemblages (certain species of which are indicative of higher temperatures) of a sediment core retrieved in 1997 from a point in the Eastern Gotland Basin (57°16.9772’N, 20°07.1122’E) of the Baltic Sea. This work revealed an increase in organic carbon content that began about 1700 calendar years before present (cal. yr BP) that reached a maximum value about 900-800 cal. yr BP, “pointing to very high primary production at that time”.

In addition, they found that the diatom assemblage of this high productivity event consisted of “up to 90\% Pseudosolenia calcar-avis, a common marine planktonic tropical and subtropical water species which occurs seasonally in temperate waters”, but which they say “cannot be found in the present Baltic Sea”. Therefore, we conclude that the medieval warm period in this region – which Andren et al. assign to approximately AD 900-1300 -- was probably much warmer than in the late 20th century.
The Middle Ages were warmer than today (2): Northern Victoria Island, Nunavut, Canada


Working with two replicate sediment cores extracted from the central point of Lake Wynniatt Bay 02 on Canada's Northern Victoria Island (72.29°N, 109.87°W), the authors developed an 8,000-year history of the area’s mean July air temperature, based upon the modern analogue technique and weighted-averaging partial least squares regression, using chironomid species assemblage data. Their graphical results show that late-Holocene temperatures peaked about 1100 years ago in both reconstructions, at values that were 1-3.8°C warmer than the peak temperature of the current warm period.
The Climategate emails reveal some of the tricks the IPCC’s leading “scientists” used in an attempt falsely to abolish the Medieval Warm Period, so that they could pretend that today’s temperatures are warmer than at any time in the past 1300 years. However, this graph from www.science-skeptical.de, a German website, shows graphs from scientific papers that examined proxy temperature data from all parts of the world. Visit the ScienceSkeptical.de website for an interactive version of the graph.
And finally, deforestation begins to bite ...