# CO2 Ag Good – PFJC

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## Defense

### Warming Not Real

#### Warming’s not real – the Earth has been cooling for decades

**Ferrara 12** [Peter, Director of Entitlement and Budget Policy for the Heartland Institute, and Senior Fellow at the National Center for Policy Analysis. Served in the White House Office of Policy Development, and as Associate Deputy Attorney General of the United States, Graduate of Harvard College and Harvard Law School, 5/23/2012, “Sorry Global Warming Alarmists, The Earth Is Cooling”, http://www.forbes.com/sites/peterferrara/2012/05/31/sorry-global-warming-alarmists-the-earth-is-cooling/] DHirsch

Climate change itself is already in the process of definitively rebutting climate alarmists who think human use of fossil fuels is causing ultimately catastrophic global warming. That is because natural climate cycles have already turned from warming to cooling, global temperatures have already been declining for more than 10 years, and global temperatures will continue to decline for another two decades or more. That is one of the most interesting conclusions to come out of the seventh International Climate Change Conference sponsored by the Heartland Institute, held last week in Chicago. I attended, and served as one of the speakers, talking about The Economic Implications of High Cost Energy. The conference featured serious natural science, contrary to the self-interested *political science* you hear from government financed global warming alarmists seeking to justify widely expanded regulatory and taxation powers for government bodies, or government body wannabees, such as the United Nations. See for yourself, as the conference speeches are [online](http://climateconferences.heartland.org/iccc7/). What you will see are calm, dispassionate presentations by serious, pedigreed scientists discussing and explaining reams of data. In sharp contrast to these climate realists, the climate alarmists have long admitted that they cannot defend their theory that humans are causing catastrophic global warming in public debate. With the conference presentations online, let’s see if the alarmists really do have any response. The Heartland Institute has effectively become the international headquarters of the climate realists, an analog to the UN’s Intergovernmental Panel on Climate Change (IPCC). It has achieved that status through these international climate conferences, and the publication of its *Climate Change Reconsidered* volumes, produced in conjunction with the Nongovernmental International Panel on Climate Change (NIPCC). Those *Climate Change Reconsidered* volumes are an equivalently thorough scientific rebuttal to the irregular Assessment Reports of the UN’s IPCC. You can ask any advocate of human caused catastrophic global warming what their response is to *Climate Change Reconsidered*. If they have none, they are not qualified to discuss the issue intelligently. Check out the 20th century temperature record, and you will find that its up and down pattern does not follow the industrial revolution’s upward march of atmospheric carbon dioxide (CO2), which is the supposed central culprit for man caused global warming (and has been much, much higher in the past). It follows instead the up and down pattern of naturally caused climate cycles. For example, temperatures dropped steadily from the late 1940s to the late 1970s. The popular press was even talking about a coming ice age. Ice ages have cyclically occurred roughly every 10,000 years, with a new one actually due around now. In the late 1970s, the natural cycles turned warm and temperatures rose until the late 1990s, a trend that political and economic interests have tried to milk mercilessly to their advantage. The incorruptible satellite measured global atmospheric temperatures show less warming during this period than the heavily manipulated land surface temperatures.

**The IPCC data is flawed – CO2 doesn’t cause rapid warming, the sun is an alt cause, and the world is cooling – cites more than 800 peer-reviewed sources
Bell ‘12** [Larry, Professor in Architecture at the University of Houston, February 14, 2012. “A Top German Environmentalist Cools On Global Warming”] DHirsch

Hell has finally frozen over! Fritz Vahrenholt, one of the fathers of Germany’s environmental movement who has headed the renewable energy division of RWE, that country’s second largest utility company, has co-authored a new blockbuster book with geologist/paleontologist Sebastian Luning announcing that the climate catastrophe heralded by the U.N.’s Intergovernmental Panel on Climate Change (IPCC) has been called off. Titled “The Cold Sun: Why the Climate Disaster Won’t Happen”, it raises a man-made blizzard of icily numbing challenges to IPCC competence in general, and to their exaggerated attributions of CO2 greenhouse warming influence in particular. Such charges from a prominent socialist and former global warming doctrine apostle have really taken the alarmist community by storm…and their symbolic timing as Germany has been experiencing its worst cold snap in 26 years made the message even more dramatic. Three of Germany’s most widely read news publications, Bild, Der Spiegel, and Die Welt immediately took notice, releasing skeptical climate science articles in their print and on-line editions. The initial Bild article titled “The CO2 Lie” addressed “What the IPCC of the U.N. doesn’t tell you”, and then asks, “…what if the IPCC is wrong? Can we really blindly trust these experts? Are they really independent?” They then conclude, “The phenomenal prognoses of heat from the IPCC are pure fear-mongering.” Part 2 titled “There Hasn’t Been Any Global Warming In 12 Years!” emphasizes that CO2 is not that potent of a gas, and that a doubling would lead to only a 1.1°C temperature increase. Yet the IPCC fudges the models so that they produce a much higher increase because of the assumed water-vapor amplifier. This assumption is really on shaky ground. Bild notes that while soot also is a major contributor and that a recent study shows that it was seriously underestimated just a few years ago, “…the IPCC decision-makers are fighting tooth and nail against accepting the roles of the oceans, sun, and soot.” Accordingly, IPCC models are completely out of whack. “The facts need to be discussed sensibly and scientifically, without first deciding on the results.” Germany’s flagship weekly news magazine Der Spiegel featured a 4-page interview with Vahrenholt, where he repeated book statements that IPCC scientists exaggerated the impact of CO2 on climate. He predicted that taking CO2’s true influence into account and extending past natural cycles into the future would most likely produce a few tenths of a degree of cooling. And although the book authors don’t deny that CO2 has some warming influence, they believe the Sun plays a far greater role in the whole scheme of things. In a full page *Die Welt* interview, Vahrenholt explains why he grew skeptical of the IPCC. One problem was that the IPCC had the habit of filtering out important scientific findings so that they never appear in the summary reports. He also gives three reasons why he expects it to get cooler in the future: 1) we are or soon will be beginning on the downward flank of the Sun’s Gleissberg and Suess cycles, 2) the ocean cycles will be in their negative phases over the next decades, and 3) we currently find ourselves in the weakest phase of solar activity in 80 years, and the next solar cycle could be a very weak one. Dr. Vahrenholt’s lack of trust in the IPCC’s objectivity and veracity took root two years ago when he became an expert reviewer for their report on renewable energy. He recently commented: “I discovered numerous errors and asked myself if the other IPCC reports on climate change were similarly sloppy.” When he pointed out the inaccuracies to IPCC, their officials simply brushed them aside. Stunned by this, he asked himself “Is this the way they approached climate assessment reports?” After carefully studying the matter Vahrenholt decided, “ I couldn’t take it any more. I had to write this book.” He explains that then after digging into the IPCC’s climate report he was horrified by what he found. On top of discovering numerous factual errors there were issues involving 10 years of stagnant temperatures, failed predictions, Climategate e-mails, and informative discussions with dozens of other elite skeptical scientists. The book cites more than 800 sources to back up conclusions, including many peer-reviewed papers that appeared after the IPPC’s 2007 report was released. Vahrenholt and Luning aren’t the only leading German climate scientists to find that IPCC’s global warming projections are exaggerated. In 2001 Hans Joachim Schellnhuber, the director of the Potsdam Institute for Climate Impact Research who serves as the German government’s climate protection advisor, co-authored a paper refuting reliability of Global Climate Models upon which their alarmist projections are based. It stated: “We analyze temperature records of six representative sites around the globe simulated by the models for two scenarios: 1) with greenhouse gas forcing only, and 2) with greenhouse gas plus aerosol forcing. We find that the simulated records for both scenarios fail to reproduce the universal scaling behavior of the observed records and display wide performance differences. The deviations from the scaling behavior are more pronounced in the first scenario, where also the trends are clearly overestimated.”

More recently Schellnhuber admitted in a speech before agricultural experts that “warmer temperatures and high CO2 concentrations in the air could very well lead to higher agricultural yields.”

### Warming Not Real Ext.

#### Claims of fast warming are based on faulty data

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Is there a reason to be alarmed by the prospect of global warming? Consider that the measurement used, the globally averaged temperature anomaly (GATA), is always changing. Sometimes it goes up, sometimes down, and occasionally—such as for the last dozen years or so—it does little that can be discerned. Claims that climate change is accelerating are bizarre. There is general support for the assertion that GATA has increased about 1.5 degrees Fahrenheit since the middle of the 19th century. The quality of the data is poor, though, and because the changes are small, it is easy to nudge such data a few tenths of a degree in any direction. Several of the emails from the University of East Anglia's Climate Research Unit (CRU) that have caused such a public ruckus dealt with how to do this so as to maximize apparent changes. The general support for warming is based not so much on the quality of the data, but rather on the fact that there was a little ice age from about the 15th to the 19th century. Thus it is not surprising that temperatures should increase as we emerged from this episode. At the same time that we were emerging from the little ice age, the industrial era began, and this was accompanied by increasing emissions of greenhouse gases such as CO2, methane and nitrous oxide. CO2 is the most prominent of these, and it is again generally accepted that it has increased by about 30%.

#### Their climate models don’t assume for natural variability

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Yet articles from major modeling centers acknowledged that the failure of these models to anticipate the absence of warming for the past dozen years was due to the failure of these models to account for this natural internal variability. Thus even the basis for the weak IPCC argument for anthropogenic climate change was shown to be false. Of course, none of the articles stressed this. Rather they emphasized that according to models modified to account for the natural internal variability, warming would resume—in 2009, 2013 and 2030, respectively. But even if the IPCC's iconic statement were correct, it still would not be cause for alarm. After all we are still talking about tenths of a degree for over 75% of the climate forcing associated with a doubling of CO2. The potential (and only the potential) for alarm enters with the issue of climate sensitivity—which refers to the change that a doubling of CO2 will produce in GATA. It is generally accepted that a doubling of CO2 will only produce a change of about two degrees Fahrenheit if all else is held constant. This is unlikely to be much to worry about.

### Warming Not Anthropogenic

#### The newest temperature records prove warming isn’t anthropogenic

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The results of the latest, most advanced data collection also suggest that CO2 is not responsible for the modest global warming of the late 20th century. The UN models agree with established science that if human greenhouse gas emissions were causing global warming, there should be a hot spot of higher temperatures in the troposphere above the tropics, where collected concentrations would have the greatest effect, and the warming would show up first. This is known in the literature on climate science as “the fingerprint” for man caused global warming. But data from global weather satellites and more comprehensive weather balloons show no hotspot, and no fingerprint, which means no serious global warming due to human greenhouse gas emissions. QED. Moreover, satellites also have been measuring the energy entering the earth’s atmosphere from the sun, and the energy escaping back out to space. If the theory of man caused global warming is correct, then the energy escaping back out should be less than the energy entering, as the greenhouse gases capture some of the energy in the atmosphere. But the satellite data show negligible difference. The real cutting edge in climate science was publicly exposed recently in a book by one of the long time leaders of the German environmental movement, Fritz Vahrenholt, in his new book, *The Cold Sun*. The book expresses the growing concern among more careful real climate scientists, rather than political scientists, that trends in solar activity portend a return to the cold, limited agricultural output, and widespread disease of the Little Ice Age, or even a more full blown, overdue by historical standards, real ice age. The consolation is that those threatening developments are still centuries away. In an interview with *Spiegel* magazine, titled “I Feel Duped on Climate Change,” Vahrenholt tells readers that the UN’s forecasts on the severity of climate change are exaggerated and supported by weak science. The American version would be Al Gore producing a movie with the title, “The Most Inconvenient Truth:I Was Wrong.” The root of the global warming confusion is that the UN is not a disinterested party that can be trusted to compile and interpret the climate science on which the world’s policymakers can rely. The UN sees the theory of man caused catastrophic global warming as a tremendous opportunity for gaining the regulatory and taxation powers of a world government. It is at least as self-interested on the subject as oil and gas companies. It has used its role as grand overseer of climate science to advance its own agenda. The result has been a great disservice to the scientific community and to policymakers. It fueled a global panic and mass delusion that has cost hundreds of billions or even trillions of dollars, and is likely to cost trillions more before it finally runs its course.

### Warming Not Anthropogenic Ext.

#### Warming’s not anthropogenic – cosmic rays

**Scafetta 12** - ACRIM (Active Cavity Radiometer Solar Irradiance Monitor Lab) & Duke University (Nicole, January 2012, Journal of Atmospheric and Solar-Terrestrial Physics Volume 74, “A shared frequency set between the historical mid-latitude aurora records and the global surface temperature”, SciVerse | JJ)

Nineteen centuries ago, Ptolemy argued that the motions of the aether (that is the oscillations of the heliosphere) alter the uppermost part of the Earth’s atmosphere (which was believed to be made of fire), which then alters the lower atmosphere acting on earth and water, on plants and animals (from Chapter 2 of the Tetrabiblos). Four centuries ago, Kepler explained that the earthly nature could not help but respond to the dictates of heavenly harmonies, and said that nature is affected by an aspect just as a farmer is moved by music to dance (Kemp, 2009). Ptolemy and Kepler clearly shared the common belief of their own times that the climate was influenced by astronomical cycles and understood the subtle phenomenon of collective synchronization, which has been extensively studied in nonlinear complex science since the times of Huygens ( [Pikovsky et al., 2001], [Strogatz, 2009] and [Scafetta, 2010b]). Indeed, climate change records present geometrical characteristics that suggest that the climate is synchronized, probably through the Sun and the heliosphere, to complex astronomical cycles driven by planetary and lunar harmonics. In this paper, we have studied the historical record of mid-latitude auroras from 1700 to 1900, and of the Faroes Islands from 1873 to 1966 to search for a possible physical mechanism linking planetary motion to climate. We have shown that mid-latitude aurora records and the global surface temperature record share a set of oscillations with periods of about 9.1, 10–11, 20–21, 30 and 60–62 years. Other shorter and longer oscillations may be present, but they are not discussed here. In particular, clear quasi-60-year cycles in the aurora records are synchronized to the 60-year cycle observed in the global surface temperature and in multi-secular proxy climate reconstructions of both the Atlantic and Pacific climatic oscillations since 1650 and in Indian summer monsoon records. Charvátová-Jakubcová et al. (1988) found that a large 60-year cycle is present in the mid-latitude aurora record also for the longer period from 1001 to 1900 and other planetary frequencies are present as well in the millennial aurora record. Numerous other studies have found quasi-10, -20 and -60-year cycles in multiple climate records and in astronomical records, as summarized in the Introduction. By taking into account the results of Scafetta (2010b), this synchrony exists also with the global ocean and land global surface temperature records of both hemispheres. The aurora record cycles reveal a direct or indirect planetary influence on the Sun and on the Earth's magnetosphere and ionosphere. Indeed, some proxy reconstructions suggest a 60-year cycle in the total solar irradiance (TSI). In fact, TSI was almost stable or slightly decreased from 1880 to 1910, and it increased from 1910 to 1940. From 1940 to 1970 TSI may have decreased as the TSI reconstruction of Hoyt and Schatten (1997) suggests. Hoyt and Schatten's TSI reconstruction well correlates with the Artic temperature records during the last century (Soon, 2009). Finally, an increase of the solar activity from 1970 to 2000 and a decrease afterward would be supported by the ACRIM TSI satellite composite, which may more faithfully reproduce the satellite observations ( [Willson and Mordvinov, 2003], [Scafetta and Willson, 2009] and [Scafetta, 2011]) but not by the PMOD composite Fröhlich and Lean, 1998, which is the TSI record preferred by the IPCC (Solomon et al., 2007). Thus, solar activity could have been characterized by a quasi-60-year modulation superimposed to other larger secular, bi-secular and millennial cycles ( [Křivský, 1984] and [Ogurtsov et al., 2002]), although this cycle may not appear evident in every total solar irradiance reconstruction ( [Krivova et al., 2007] and [Wang et al., 2005]). It is possible that when Jupiter and Saturn are closer to the Sun, there may be an increased solar activity because of the stronger planetary tides and other mechanisms (Wolff and Patrone, 2010), and a stronger magnetic field within the inner region of the solar system forms, although the patterns may be more complicated because of the presence of other cycles that will be discussed in another paper. A stronger solar or heliospheric magnetic field better screens galactic cosmic ray fluxes. Fewer cosmic rays reaching the Earth imply a weaker ionization of the upper atmosphere. As a side-effect, less auroras form in the middle latitudes because a stronger magnetic field and a less ionized ionosphere mostly constrains the auroras in the polar region. In addition, the level of ionization of the atmosphere has been proposed as an important mechanism that can modulate the low cloud cover formation ( [Tinsley, 2008], [Kirkby, 2007] and [Svensmark et al., 2009]). Essentially, when the ionization is weaker, less clouds form. In conclusion, a solar and heliospheric modulation of the cloud system would greatly contribute to climate change through an albedo modulation (see Eq. (8)). The above sequence of mechanisms would explain why the climate presents oscillations at multiple frequencies that are synchronized with the aurora and the planetary cycles. We have used a phenomenological harmonic model based on five decadal and multidecadal frequencies with periods of 9.1, 10.5, 20, 30 and 60 years that has been detected in the aurora records and that could be associated to evident astronomical and Soli/Lunar tidal cycles. We have shown that it is possible to forecast the climate oscillations occurred from 1950 to 2010 using the dynamic information of the global surface temperature derived from the period 1850–1950 and the frequency information deduced from the mid-latitude aurora before 1900. Analogously, we have shown that it is possible to forecast the climate oscillations that occurred backward from 1850 to 1950 using the information derived from the period 1950–2010. Thus, these findings strongly support the thesis that the climate oscillations can be approximately forecasted by using astronomical cycles. The proposed astronomical harmonic constituent model for climate change based on aurora cycles is conceptually equivalent to the commonly used tide-predicting machines based on planetary harmonic constituent analysis conceived by Lord Kelvin in 1867, which is currently the only methodology that accurately predicts tidal heights. Interestingly, the traditional Chinese, Tamil and Tibetan calendars are arranged in major 60-year cycles (Aslaksen, 1999). Perhaps, these sexagenarian cyclical calendars were inspired by climatic and astronomical observations and were used for timing and regulating human business. For example, even ancient Sanskrit texts report about a 60-year monsoon rainfall cycle (Iyengar, 2009) and associate it to the movement of Jupiter and Saturn, the Brihaspati 60-year cycle, which may explain why Asian populations used sexagesimal calendars. Indeed, a 60-year cycle linked to Jupiter and Saturn was extremely well known to several ancient civilizations (Temple, 1998). The major cycles discussed in this paper are also approximately found in the major business cycles ( [Pustilnik and Din, 2004] and [Korotayev and Tsirel, 2010]). A link between planetary motion, climate and economy (which in the past could be mostly driven by agricultural productivity) would ultimately explain the interest of the ancient civilizations in tracking the position of the planets and their attempts in developing multiscale cyclical calendars ( [Ptolemy, 1940], [Ma‘šar, 1886] and [Swerdlow, 1998]). In conclusion, the results presented here strongly support and reinforce the argument of [Scafetta, 2010a] and [Scafetta, 2010b] that the climate is forced by astronomical oscillations related to the Sun, the Moon and the planets, and, as Fig. 11 shows, a significant component of it can be forecasted within an acceptable uncertainty with appropriate harmonic models.

### Negative Feedback – Iris

#### Cloud’s iris respond to increasing temperatures – create a negative feedback that solves warming

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\*\*\*Note SST = sea-surface temperature

Observations and analyses of water vapor and clouds in the Tropics over the past decade show that the boundary between regions of high and low free-tropospheric relative humidity is sharp, and that upper-level cirrus and high freetropospheric relative humidity tend to coincide. Most current studies of atmospheric climate feedbacks have focused on such quantities as clear sky humidity, average humidity, or differences between regions of high and low humidity, but the data suggest that another possible feedback might consist of changes in the relative areas of high and low humidity and cloudiness. Motivated by the observed relation between cloudiness (above the trade wind boundary layer) and high humidity, cloud data for the eastern part of the western Pacific from the Japanese Geostationary Meteorological Satellite-5 (which provides high spatial and temporal resolution) have been analyzed, and it has been found that the area of cirrus cloud coverage normalized by a measure of the area of cumulus coverage decreases about 22% per degree Celsius increase in the surface temperature of the cloudy region. A number of possible interpretations of this result are examined and a plausible one is found to be that cirrus detrainment from cumulus convection diminishes with increasing temperature. The implications of such an effect for climate are examined using a simple two-dimensional radiative– convective model. The calculations show that such a change in the Tropics could lead to a negative feedback in the global climate, with a feedback factor of about -1.1, which if correct, would more than cancel all the positive feedbacks in the more sensitive current climate models. Even if regions of high humidity were not coupled to cloudiness, the feedback factor due to the clouds alone would still amount to about -0.45, which would cancel model water vapor feedback in almost all models. This new mechanism would, in effect, constitute an adaptive infrared iris that opens and closes in order to control the Outgoing Longwave Radiation in response to changes in surface temperature in a manner similar to the way in which an eye’s iris opens and closes in response to changing light levels. Not surprisingly, for upper-level clouds, their infrared effect dominates their shortwave effect. Preliminary attempts to replicate observations with GCMs suggest that models lack such a negative cloud/moist areal feedback.

#### Cloud’s iris solves warming – cools the Earth

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Figure 10 shows how global mean temperature varies with the area of tropical upper-level cloud. Also shown in Fig. 10 is the variation of global reflectivity. The latter varies fairly little since substantial reflectivity is due to the clouds capping the boundary layer and to the surface reflectivity. However, the global mean radiative–convective surface temperature varies substantially indicating the dominance of the infrared effect of the moist region. Under the interpretation of the observations in section 3, that the changing upper-level cloud area is due to the changing cloud-weighted temperature per se, then the cloud area changes 22% for a 1°C change in cloud-weighted SST (Fig. 5d). Under conditions of global warming, we assume that both global mean temperature and cloudweighted surface temperature increase together. As already explained, the response of T s to this change in cloud area will constitute the feedback factor (G0 F or f ). Roughly speaking, a 22% reduction in this area (from a base of about 0.22) leads to about a 1.1°C reduction in global mean temperature for g = 1, 0.7°C for g = 0.5, and 0.45°C for g = 0, implying feedback factors of -1.1, -0.7, and -0.45. Essentially, the cloudy–moist region appears to act as an infrared adaptive iris that opens up and closes down the regions free of upper-level clouds, which more effectively permit infrared cooling, in such a manner as to resist changes in tropical surface temperature . Moreover, on physical and observational grounds, it appears that the same applies to moist and dry regions. Our model includes the fact that dynamics ties temperatures everywhere together and determines the mean meridional gradient. The feedback factor is for the effect of the Tropics on the global mean. Thus, the response to a doubling of CO2 , which in the absence of feedbacks is expected to be about 1.2°C, would be reduced to between 0.57° and 0.83°C (depending on g) due to the iris effect. In some respects, the iris effect can be considered to be independent of the positive feedbacks found in current models. The response of current climate GCMs to a doubling of CO2 ranges from 1.5° to 4°C. This corresponds to positive feedback factors ranging from 0.2 to 0.7 [with the model water vapor feedback factor typi c a l ly cont r ibut ing 0.4; Lindz en (1993) ; Schneider et al. (1999)]. The inclusion of the iris feedback more than cancels the model positive feedbacks in most cases. This is illustrated in Table 2. (Note that although we retain three significant figures for convenience in computation, nothing in the data suggests this level of accuracy.) The iris effect acts to reduce the sensitivities from the range, 1.5°–4°C, to the range 0.64°–1.6°C. The reduced sensitivity is within the range of many sensitivity estimates including the relatively low estimates obtained from the observed response to a sequence of volcanoes by Lindzen and Giannitsis (1998) and the more conventional estimate of North and Wu (2001). This, however, is not meant to suggest that the range of feedbacks found in present models is necessarily correct. Rather it is meant to show the impact that the iris effect would have on these model results.

#### Pole and temperatures prove there are negative feedbacks

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We are thus left with evidence for a potentially effective negative feedback in the Tropics. In the absence of changes in those processes that have a major effect on the equator-to-pole heat flux, this also inhibits global change. This was the situation assumed in section 4. The existence of global change, whose existence is amply recorded in the paleoclimatic record, would, if the feedback described in this paper proves correct, demand changes in those factors that determine the equator-to-pole temperature difference as noted in Lindzen (1993). Examples are changes in the intensity of the Hadley supply of momentum to the subtropical jet (Lindzen and Pan 1994; Hou 1998) and changes in the differential heating as might be produced by large-scale high-latitude snow cover or changes in the ocean heat transport. In the presence of a strong negative feedback in the Tropics, such changes would also be accompanied by changes in global mean temperature, but the primary characteristic of such climate change would be the change in equator-to-pole temperature difference.

### Negative Feedback – Clouds

#### Water vapor and clouds are a negative feedback – outweighs CO2

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That said, the main greenhouse substances in the earth's atmosphere are water vapor and high clouds. Let's refer to these as major greenhouse substances to distinguish them from the anthropogenic minor substances. Even a doubling of CO2 would only upset the original balance between incoming and outgoing radiation by about 2%. This is essentially what is called "climate forcing." There is general agreement on the above findings. At this point there is no basis for alarm regardless of whether any relation between the observed warming and the observed increase in minor greenhouse gases can be established. Nevertheless, the most publicized claims of the U.N.'s Intergovernmental Panel on Climate Change (IPCC) deal exactly with whether any relation can be discerned. The failure of the attempts to link the two over the past 20 years bespeaks the weakness of any case for concern.

#### Clouds are a negative feedback and CO2 isn’t the cause of warming

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For more than 30 years there have been attempts to resolve the paradox with greenhouse gases. Some have suggested CO2—but the amount needed was thousands of times greater than present levels and incompatible with geological evidence. Methane also proved unlikely. It turns out that increased thin cirrus cloud coverage in the tropics readily resolves the paradox—but only if the clouds constitute a negative feedback. In present terms this means that they would diminish rather than enhance the impact of CO2. There are quite a few papers in the literature that also point to the absence of positive feedbacks. The implied low sensitivity is entirely compatible with the small warming that has been observed. So how do models with high sensitivity manage to simulate the currently small response to a forcing that is almost as large as a doubling of CO2? Jeff Kiehl notes in a 2007 article from the National Center for Atmospheric Research, the models use another quantity that the IPCC lists as poorly known (namely aerosols) to arbitrarily cancel as much greenhouse warming as needed to match the data, with each model choosing a different degree of cancellation according to the sensitivity of that model. What does all this have to do with climate catastrophe? The answer brings us to a scandal that is, in my opinion, considerably greater than that implied in the hacked emails from the Climate Research Unit (though perhaps not as bad as their destruction of raw data): namely the suggestion that the very existence of warming or of the greenhouse effect is tantamount to catastrophe. This is the grossest of "bait and switch" scams. It is only such a scam that lends importance to the machinations in the emails designed to nudge temperatures a few tenths of a degree. The notion that complex climate "catastrophes" are simply a matter of the response of a single number, GATA, to a single forcing, CO2 (or solar forcing for that matter), represents a gigantic step backward in the science of climate. Many disasters associated with warming are simply normal occurrences whose existence is falsely claimed to be evidence of warming. And all these examples involve phenomena that are dependent on the confluence of many factors.

#### Clouds are a strong negative feedback – their models don’t assume this

**Lindzen ‘8** - American atmospheric physicist and Alfred P. Sloan Professor of Meteorology at the Massachusetts Institute of Technology, A.B. in Physics, an S.M. in Applied Mathematics and a Ph.D. in Applied Mathematics from Harvard University (Richard, “Is the global warming alarm founded on fact?” Edited by Ernesto Zedillo. Page 23-24)// DHirsch

Essential to alarm is the fact that most current climate models predict a response to a double of CO2 of about 4°C (which is much larger than what one expects the simple doubling of CO2 to produce: that is, about 1°C). The reason for this is that, in these models, the most important greenhouse substances – water vapor and clouds – act in such a way as to amplify the responses to anthropogenic greenhouse gases alone (that is, they act as what are called large positive feedbacks). However, as all assessments of the Intergovernmental Panel on Climate Change (IPCC) have stated (at least in the main text, although not in the various summaries for policymakers), the models simply fail to get clouds right. We know this because in official comparisons all models fail miserably to replicate observed distributions of cloud cover. Thus the model predictions are critically dependent on features that we know must be wrong. As shown in figure 2-1, the treatment of clouds involves errors on order of magnitude greater than the forcing from a doubling of CO2. While the IPCC allows for the possibility that the model gets water vapor right, the intimate relation between water vapor and clouds makes such a conclusion implausible. Let me summarize the main points thus far: it is not the level of CO2 that is important, but rather the impact of man-made greenhouse gases on climate. Although we are far from the benchmark of doubled CO2, climate forcing is already about three-fourths of what we expect from such a doubling. Even if we attribute all warming over the past century to man-made greenhouse gases (which we have no basis for doing), the observed warming is only about a third to a sixth of what models project. This raises two possibilities: either the models are greatly overestimating the sensitivity of climate to man-made greenhouse gases, or the models are correct, but some unknown process has canceled most of the warming. Calling the unknown process “aerosols” does not change this statement, since aerosols and their impact are unknown to a factor of ten or more; indeed, even the sign is in doubt.

### CO2 Not Anthropogenic

#### Man-made emissions and natural emissions are indistinguishable and yearly CO2 levels are regulated by global temperature

**Joannenova, 11** (Joannenova.com, “Blockbuster: Planetary temperature controls CO2 levels — not humans”, 8/5/11, AD: 6/20/12, <http://joannenova.com.au/2011/08/blockbuster-planetary-temperature-controls-co2-levels-not-humans/> | Sina)
\*\*Cites Prof. Murry Salby, has worked at leading research institutions, including the US National Center for Atmospheric Research, Princeton University, and the University of Colorado, and is the author of Fundamentals of Atmospheric Physics, and Physics of the Atmosphere and Climate.\*\*

Judging by the speech Murry Salby gave at the Sydney Institute, there’s a blockbuster paper coming soon. Professor Murry Salby is Chair of Climate Science at Macquarie University. He’s been a visiting professorships at Paris, Stockholm, Jerusalem, and Kyoto, and he’s spent time at the Bureau of Meterology in Australia. Over the last two years he has been looking at C12 and C13 ratios and CO2 levels around the world, and has come to the conclusion that man-made emissions have only a small effect on global CO2 levels. It’s not just that man-made emissions don’t control the climate, they don’t even control global CO2 levels. The higher levels of CO2 in recent decades appear to be mostly due to natural sources. He presented this research at the [IUGG](http://www.iugg.org/) conference in Melbourne recently, causing great discussion and shocking a few people. Word reached the Sydney Institute, which rushed to arrange for him to speak, given the importance of this work in the current Australian political climate. The ratio of C13 to C12 (two isotopes of carbon) in our atmosphere has been declining, which is usually viewed as a signature of man-made CO2 emissions. C12 makes up 99% of carbon in the atmosphere (nearly all atmospheric carbon is in the form of CO2). C13 is much rarer — about 1%. Plants don’t like the rarer C13 type as much; photosynthesis works best on the C12 -type -of-CO2 and not the C13-type when absorbing CO2 from the air. Prof Salby points out that while fossil fuels are richer in C12 than the atmosphere, so too is plant life on Earth, and there isn’t a lot of difference (just 2.6%) in the ratios of C13 to C12 in plants versus fossil fuels. (Fossil fuels are, after all, made in theory from plants, so it’s not surprising that it’s hard to tell their “signatures” apart). So if the C13 to C12 ratio is falling (as more C12 rich carbon is put into the air by burning fossil fuels) then we can’t know if it’s due to man-made CO2 or natural CO2 from plants. Essentially we can measure man-made emissions reasonably well, but we can’t measure the natural emissions and sequestrations of CO2 at all precisely — the error bars are huge. Humans emits 5Gt or so per annum, but the oceans emit about 90Gt and the land-plants [emit] about 60Gt, for a total of maybe 150Gt. Many scientists have assumed that the net flows of carbon to and from natural sinks and sources of CO2 cancel each other out, but there is no real data to confirm this and it’s just a convenient assumption. The problem is that even small fractional changes in natural emissions or sequestrations swamp the human emissions. “It is often asserted that we can measure the human contribution of CO2 to the air by looking at the ratio of C12 to C13. The theory is that plants absorb more C12 than C13 (by about 2%, not a big signature), so we can look at the air and know which came from plants and which came from volcanos and which came from fossil fuels, via us. Plants are ‘deficient’ in C13, and so, then, ought to be our fossil fuel derived CO2. The implication is that since coal and oil were from plants, that “plant signature” means “human via fossil fuels”. But it just isn’t that simple. Take a look at the above chart. We are 5.5 and plants are putting 121.6 into the air each year (not counting ocean plants). There is a lot of carbon slopping back and forth between sinks and sources. Exactly how closely do we know the rate of soil evolution of CO2, for example?” Chiefio also found some interesting quotes pointing out that corn (a C4 plant) absorbs more C13, and our mass fields of corn might just muck up the stats… (it’s a good post). Suspiciously, when satellites record atmospheric CO2 levels around the globe they find that the sources don’t appear to be concentrated in the places we’d expect — industry or population concentrations like western Europe, the Ohio Valley, or China. Instead the sources appear to be in places like the Amazon Basin, southeast Asia, and tropical Africa — not so much the places with large human emissions of CO2! But CO2 is a well mixed gas so it’s not possible to definitively sort out the sources or sinks with CO2 measurements around the globe. The differences are only of the order of 5%. Instead the way to unravel the puzzle is to look at the one long recording we have (at Mauna Loa, in Hawaii, going back to 1959) and graph the changes in CO2 and in C13 from year to year. Some years from January to January there may be a rise of 0 ppmv (ie no change), some years up to 3 ppmv. If those changes were due to man-made CO2 then we should see more of those rapid increases in recent times as man-made emissions increased faster. The largest increases year-to-year occurred when the world warmed fastest due to El Nino conditions. The smallest increases correlated with volcanoes which pump dust up into the atmosphere and keep the world cooler for a while. In other words, temperature controls CO2 levels on a yearly time-scale, and according to Salby, man-made emissions have little effect. The climate models assume that most of the rise in CO2 (from 280 ppmv in1780 to 392 ppmv today) was due to industrialization and fossil fuel use. But the globe has been warming during that period (in fact since the depths of the Little Ice Age around 1680), so warmer conditions could be the reason that CO2 has been rising. Salby does not dispute that some of the rise in CO2 levels is due to man-made emissions, but found that temperature alone explains about 80% of the variation in CO2 levels. The up and coming paper with all the graphs will be released in about six weeks. It has passed peer review, and sounds like it has been a long time coming. Salby says he sat on the results for six months wondering if there was any other interpretation he could arrive at, and then, when he invited scientists he trusted and admired to comment on the paper, they also sat on it for half a year. His speech created waves at the IUGG conference, and word is spreading.

### AT: Ocean Acidification

#### The impact of ocean acidification is over hyped, and can be beneficial

**Carter et al. 11**

(Dr. Robert M. Carter is a stratigrapher and marine geologist with degrees from the University of Otago (New Zealand) and the University of Cambridge (England). His research publications include papers on taxonomic palaeontology, palaeoecology, New Zealand and Pacific geology, stratigraphic classification, sequence stratigraphy, sedimentology, the Great Barrier Reef, Quaternary geology, and sea level and climate change. He is the author of Climate: The Counter Consensus (2010). Carter’s professional service includes terms as chairman of the Earth Sciences Panel of the Australian Research Council, chairman of the national Marine Science and Technologies Committee, and director of the Australian Office of the Ocean Drilling Program. He is currently an adjunct research fellow at James Cook University (Townsville) and an emeritus fellow of the Institute of Public Affairs (Melbourne) Dr. Craig D. Idso is the founder and chairman of the Center for the Study of Carbon Dioxide and Global Change. Since 1998, he has been the editor and chief contributor to the online magazine CO2 Science. He is the author of several books, including The Many Benefits of Atmospheric CO2 Enrichment (2011) and CO2, Global Warming and Coral Reefs (2009). His writing, which has appeared in peer-reviewed journals, books, and independent reports, has addressed the benefits of atmospheric CO2enrichment on plant and animal life, ocean acidification, world food supplies, plant and animal extinctions, and the seasonal cycle of atmospheric CO2. He has lectured in Meteorology at Arizona State University (ASU), and was a faculty researcher in the Office of Climatology at ASU. Dr. S. Fred Singer is one of the most distinguished atmospheric physicists in the U.S. He established and served as the first director of the U.S. Weather Satellite Service, now part of the National Oceanographic and Atmospheric Administration (NOAA), and earned a U.S. Department of Commerce Gold Medal Award for his technical leadership. He later served as vice chairman of the National Advisory Committee for Oceans and Atmosphere. He is coauthor, with Dennis T. Avery, of Unstoppable Global Warming Every 1,500 Years (2007, second ed. 2008). Since retiring from the University of Virginia and from his last federal position as chief scientist of the Department of Transportation, Singer founded and directs the nonprofit Science and Environmental Policy Project Climate Change Reconsidered 2011 Interim Report <http://www.nipccreport.org/reports/2011/pdf/2011NIPCCinterimreport.pdf>)

Working with naturally fertilized eggs of the common sea star Crossaster papposus, which they collected and transferred to five-liter culture aquariums filled with filtered seawater (a third of which was replaced every four days), Dupont et al. tested this hypothesis by regulating the pH of the tanks to values of either 8.1 or 7.7 by adjusting environmental CO2 levels to either 372 ppm or 930 ppm. During the testing period they documented (1) settlement success as the percentage of initially free swimming larvae that affixed themselves to the aquarium walls, (2) larval length at various time intervals, and (3) degree of calcification. The three researchers report just the opposite of what is often predicted actually happened, as the echinoderm larvae and juveniles were ―positively impacted by ocean acidification.‖ More specifically, they found ―larvae and juveniles raised at low pH grow and develop faster, with no negative effect on survival or skeleton genesis within the time frame of the experiment (38 days).‖ In fact, they state the sea stars‘ growth rates were ―two times higher‖ in the acidified seawater; and they remark, ―C. papposus seem to be not only more than simply resistant to ocean acidification, but are also performing better.‖Given these findings, the Swedish scientists concluded, ―in the future ocean, the direct impact of ocean acidification on growth and development potentially will produce an increase in C. papposus reproductive success‖ and ―a decrease in developmental time will be associated with a shorter pelagic period with a higher proportion of eggs reaching settlement,‖ causing the sea stars to become ―better competitors in an unpredictable environment.‖Not bad for a creature that makes its skeletal rods, plates, test, teeth, and spines from a substance that is 30 times more soluble than normal calcite.Lastly, Rodolfo-Metalpa et al. (2010) worked with bryozoans or ―moss animals‖—a geologically important group of small animals that resemble corals and are major calcifiers, found on rocky shores in cool-water areas of the planet, where they comprise a significant component of the carbonate sediments in shallow sublittoral habitats, and where they form long-lived, three-dimensional structures that provide attachment sites for numerous epifauna and trap sediment and food for a variety of infauna—in what they describe as ―the first coastal transplant experiment designed to investigate the effects of naturally acidified seawater on the rates of net calcification and dissolution of the branched calcitic bryozoan Myriapora truncata.‖ They did this by transplanting colonies of the species to normal (pH 8.1), high (pH 7.66), and extremely high (pH 7.43) CO2 conditions at gas vents located just off Italy‘s Ischia Island in the Tyrrhenian Sea, where they calculated the net calcification rates of live colonies and the dissolution rates of dead colonies by weighing them before and after 45 days of in situ residence in May–June (when seawater temperatures ranged from 19 to 24°C) and after 128 days of in situ residence in July–October (when seawater temperatures ranged from 25–28°C).Throughout the first and cooler observation period, ―dead M. truncata colonies dissolved at high CO2 levels (pH 7.66), whereas live specimens maintained the same net calcification rate as those growing at normal pH,‖ the researchers write. At the extremely high CO2 level, however, the net calcification rate of the live specimens was reduced to only about 20 percent of what it was at normal pH, but life continued. Throughout the second and warmer observation period, on the other hand, calcification ceased in both the normal and high CO2 treatments,and in the extremely high CO2 treatment, the transplants died.Based on these findings the five scientists concluded, ―at moderate temperatures,‖ such as those to which they are currently adapted, ―adult M. truncata are able to up-regulate their calcification rates and survive in areas with higher levels of pCO2 than are predicted to occur due to anthropogenic ocean acidification, although this ability broke down below mean pH 7.4.‖ This latter level, however, is below what even the IPCC predicts will occur in response to continued burning of fossil fuels, and far below what the more realistic analysis of Tans (2009) suggests.

#### Co2 offsets the negative effects of ocean acidification.

**Carter et al. 11**

(Dr. Robert M. Carter is a stratigrapher and marine geologist with degrees from the University of Otago (New Zealand) and the University of Cambridge (England). His research publications include papers on taxonomic palaeontology, palaeoecology, New Zealand and Pacific geology, stratigraphic classification, sequence stratigraphy, sedimentology, the Great Barrier Reef, Quaternary geology, and sea level and climate change. He is the author of Climate: The Counter Consensus (2010). Carter’s professional service includes terms as chairman of the Earth Sciences Panel of the Australian Research Council, chairman of the national Marine Science and Technologies Committee, and director of the Australian Office of the Ocean Drilling Program. He is currently an adjunct research fellow at James Cook University (Townsville) and an emeritus fellow of the Institute of Public Affairs (Melbourne) Dr. Craig D. Idso is the founder and chairman of the Center for the Study of Carbon Dioxide and Global Change. Since 1998, he has been the editor and chief contributor to the online magazine CO2 Science. He is the author of several books, including The Many Benefits of Atmospheric CO2 Enrichment (2011) and CO2, Global Warming and Coral Reefs (2009). His writing, which has appeared in peer-reviewed journals, books, and independent reports, has addressed the benefits of atmospheric CO2enrichment on plant and animal life, ocean acidification, world food supplies, plant and animal extinctions, and the seasonal cycle of atmospheric CO2.  He has lectured in Meteorology at Arizona State University (ASU), and was a faculty researcher in the Office of Climatology at ASU. Dr. S. Fred Singer is one of the most distinguished atmospheric physicists in the U.S. He established and served as the first director of the U.S. Weather Satellite Service, now part of the National Oceanographic and Atmospheric Administration (NOAA), and earned a U.S. Department of Commerce Gold Medal Award for his technical leadership. He later served as vice chairman of the National Advisory Committee for Oceans and Atmosphere. He is coauthor, with Dennis T. Avery, of Unstoppable Global Warming Every 1,500 Years (2007, second ed. 2008). Since retiring from the University of Virginia and from his last federal position as chief scientist of the Department of Transportation, Singer founded and directs the nonprofit Science and Environmental Policy Project Climate Change Reconsidered 2011 Interim Report<http://www.nipccreport.org/reports/2011/pdf/2011NIPCCinterimreport.pdf>)

Based on his more modest projections of future atmospheric CO2 concentrations, Tans also finds theprojected 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.(2009) and Pelejero et al. (2010), with a recovery to a reduction of just over 0.1 pH unit by 2500, which is less than the range of pH values 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.).Another reason to doubt Pelejero et al.‘s forecast of falling pH levels is that high rates of aquatic photosynthesis by marine micro- and macro-algae, which have been shown to be stimulated and maintained by high levels of atmospheric CO2—see, for example, Wu et al. (2008), Fu et al. (2008), and Egge et al. (2009)—can dramatically increase the pH of marine bays, lagoons, and tidal pools (Gnaiger et al., 1978; Santhanam et al., 1994; Macedo et al., 2001; Hansen, 2002; Middelboe and Hansen, 2007) and significantly increase the surface-water pH of areasas large as the North Sea (Brussaard et al., 1996). Thus it is logical to presume anything else that enhances marine photosynthesis, such as nutrient delivery to the waters of the world‘s coastal zones (i.e., eutrophication), may increase pH as well. Thinking along these lines, Borges and Gypens (2010) employed an idealized biogeochemical model of a river system (Billen et al., 2001) and a complex biogeochemical model describing carbon and nutrient cycles in the marine domain (Gypens et al., 2004) ―to investigate the decadal changes of seawater carbonate chemistry variables related to the increase of atmospheric CO2 and of nutrient delivery in the highly eutrophied Belgian coastal zone over the period 1951–1998.‖The findings of the two researchers indicate, as they describe it, that ―the increase of primary production due to eutrophication could counter the effects of ocean acidification on surface water carbonate chemistry in coastal environments,‖ and ―changes in river nutrient delivery due to management regulation policies can lead to stronger changes in carbonate chemistry than ocean acidification,‖ as well as changes that are ―faster than those related solely to ocean acidification.‖ And to make these facts perfectly clear, they add, ―the response of carbonate chemistry to changes of nutrient delivery to the coastal zone is stronger than ocean acidification.‖As more and more pertinent studies have been conducted, the extreme view of ocean acidification has been greatly tempered. In a review of the subject by Doney et al. (2008), for example, it was reported many calcifying species ―exhibit reduced calcification and growth rates in laboratory experiments under high-CO2 conditions,‖ but they also report ―some photosynthetic organisms (both calcifying and noncalcifying) have higher carbon fixation rates under high CO2.‖ And as Idso et al. (2000)have noted in the case of corals, the ―photosynthetic activity of zooxanthellae is the chief source of energy for the energetically-expensive process of calcification,‖ and much evidence suggests, in their words, that ―longterm reef calcification rates generally rise in direct proportion to increases in rates of reef primary production.

### AT: Ice Melting

#### Ice sheets are at record level expansion

**Taylor ‘12** [James, Bachelor from Dartmouth, senior fellow for The Heartland Institute focusing on environmental issues, 5/10/2012. “Media Claims Antarctic Ice Crisis, Yet Ice Continues to Grow“, http://news.heartland.org/newspaper-article/2012/05/10/media-claims-antarctic-ice-crisis-yet-ice-continues-grow] DHirsch

Computer models, programmed by global warming alarmists to assume that carbon dioxide causes substantial global warming, keep predicting rapidly warming Antarctic temperatures and melting ice sheets. In the real world, however, Antarctica is not warming at all and the Antarctic ice sheet is in a long-term expansion. NOAA satellites report that Northern Hemisphere Arctic sea ice extent is currently at the long-term average. In the Southern Hemisphere, Antarctic sea ice is substantially greater than the long-term average. Taken together, the polar ice caps are not melting at all; in fact, they are larger than the long-term average. Given a choice between real-world climate observations and speculative computer models programmed by biased actors, “skeptics” tend to believe the real-world climate observations while alarmists choose to ignore the real-world observations.

## Indicts/Prodicts

### Gleick Indict

#### Gleick’s a hack, climate alarmism is just “Fakegate”

**Ferrara 12 –**  [Peter, Director of Entitlement and Budget Policy for the Heartland Institute, and Senior Fellow at the National Center for Policy Analysis. Served in the White House Office of Policy Development, and as Associate Deputy Attorney General of the United States, Graduate of Harvard College and Harvard Law School, 3/01/2012, “Fakegate: The Obnoxious Fabrication of Global Warming”, http://www.forbes.com/sites/peterferrara/2012/03/01/fakegate-the-obnoxious-fabrication-of-global-warming/3/] DHirsch

In 2009, Heartland published *Climate Change Reconsidered: The Report of the Nongovernmental International Panel on Climate Change* (NIPCC). That 860-page careful, dispassionate, thoroughly scientific volume, produced in conjunction with the Science and Environmental Policy Project (SEPP) and the Center for the Study of Carbon Dioxide and Global Change, explored the full range of alternative views to the UN’s IPCC. Two years later, Heartland published the 418 page *Climate Change Reconsidered: The 2011 Interim Report of the NIPCC*, which updated the research regarding global warming and “climate change” since the 2009 volume. Through these activities and more like them, Heartland has become the international headquarters of the scientific alternative to the UN’s IPCC, now providing full scale rebuttals to the UN’s own massive reports. Any speaker, any authority, any journalist or bureaucrat asserting the catastrophic danger of supposed man-caused global warming needs to be asked for their response to*Climate Change Reconsidered*. If they have none, then they are not qualified to address the subject. This is the essential background to understanding “Fakegate,” the strange and still being written story of the decline and fall of political activist Peter Gleick, who had successfully engineered a long career posing as an objective climate scientist. Gleick, who has announced he is taking a “temporary, short-term leave of absence” as president of the Pacific Institute, also served until recently as chairman of the science integrity task force of the American Geophysical Union. Gleick has publicly confessed that he contacted The Heartland Institute fraudulently pretending to be a member of the Board of Directors. Emails released by The Heartland Institute show that he created an email address similar to that of a board member and used it to convince a staff member to send him confidential board materials. Gleick then forwarded the documents to 15 global warming alarmist advocacy organizations and sympathetic journalists, who immediately posted them online and blogged and wrote about them.

### IPCC Indict

#### The IPCC is biased – they receive funding for their research and fake research

**Ferrara, 12** [Peter, Director of Entitlement and Budget Policy for the Heartland Institute, and Senior Fellow at the National Center for Policy Analysis. Served in the White House Office of Policy Development, and as Associate Deputy Attorney General of the United States, Graduate of Harvard College and Harvard Law School, 3/01/2012, “Fakegate: The Obnoxious Fabrication of Global Warming”, http://www.forbes.com/sites/peterferrara/2012/03/01/fakegate-the-obnoxious-fabrication-of-global-warming/3/] DHirsch

Their expectation apparently was that the documents would be as embarrassing and damaging to the global warming skeptics as were the emails revealed in the “Climategate” scandal to the alarmist side. The Climategate revelations showed scientific leaders of the UN’s IPCC and global warming alarmist movement plotting to falsify climate data and exclude those raising doubts about their theories from scientific publications, while coordinating their message with supposedly objective mainstream journalists. But the stolen Heartland documents exonerated, rather than embarrassed, the skeptic movement. They demonstrate only an interest at Heartland in getting the truth out on the actual objective science. They revealed little funding from oil companies and other self interested commercial enterprises, who actually contribute heavily to global warming alarmists as protection money instead. The documents also show how poorly funded the global warming skeptics at Heartland are, managing on a shoestring to raise a shockingly successful global challenge to the heavily overfunded UN and politicized government science. As the *Wall Street Journal* observed on Feb. 21, while Heartland’s budget for the NIPCC this year totals $388,000, that compares to $6.5 million for the UN’s IPCC, and $2.5 billion that President Obama’s budget commits for research into “the global changes that have resulted primarily from global over-dependence on fossil fuels.” That demonstrates how an ounce of truth can overcome a tidal wave of falsehood. Maybe that is why Gleick or one of his coconspirators felt compelled to go farther and composed a fake memo titled “Confidential Memo: 2012 Heartland Climate Strategy.” Whoever did it understood that a document composed on his computer and distributed online would contain markings demonstrating its source and confirming the forgery, so they printed it out and scanned it to hide its digital trail. The scanned document itself, however, contained evidence that allowed even amateur sleuths to trace it back to the Pacific Institute’s offices, as explained in an article by Megan McCardle, a senior editor for The Atlantic. (McCardle, incidentally, is highly sympathetic to global warming alarmism.) The forged cover memo, not the actual stolen document, contains language mirroring Climategate. It discussed fabricated projects that are not activities of Heartland, and references a $200,000 Koch Foundation contribution for climate change activities that doesn’t exist. The Koch Foundation confirms that it gave Heartland only $25,000 in 2011, earmarked for health care policy projects and not climate change, an amount equal to only 0.5% of Heartland’s 2011 budget. By contrast, as the *Journal* also observed, the budget last year for the Natural Resources Defense Council was $95.4 million, and for the World Wildlife Fund $238.5 million. Heartland President Joe Bast said in a statement on the episode, “The stolen documents were obtained by [a then] unknown person who fraudulently assumed the identity of a Heartland board member….Identity theft and computer fraud are criminal offenses subject to imprisonment. We intend to find this person and see him or her put in prison for these crimes.”

#### The IPCC is biased and distorts facts in their reports

**Spencer 11** Roy Spencer “Climatologist, author, former NASA scientist,” and P.h. D., “ClimateGate 2.0: Bias in Scientific research” November 23 2011 http://www.drroyspencer.com/2011/11/climategate-2-0-bias-in-scientific-research/

Ever since the first Climategate e-mail release, the public has become increasingly aware that scientists are not unbiased. Of course, most scientists with a long enough history in their fields already knew this (I discussed the issue at length in my first book [*Climate Confusion*](http://www.amazon.com/Climate-Confusion-Pandering-Politicians-Misguided/dp/1594033455/ref%3Dsr_1_1?ie=UTF8&qid=1322065740&sr=8-1)), but it took the first round of Climategate e-mails to demonstrate it to the world. The latest release ([Climategate 2.0](http://foia2011.org/)) not only reveals bias, but also some private doubts among the core scientist faithful about the scientific basis for the IPCC’s policy goals. Yet, the IPCC’s “cause” (Michael Mann’s term) appears to trump all else. So, when the science doesn’t support The Cause, the faithful turn toward discussions of how to craft a story which minimizes doubt about the IPCC’s findings. After considerable reflection, I’m going to avoid using the term ‘conspiracy’ to describe this activity, and discuss it in terms of scientific bias. **It’s Impossible to Avoid Bias** We are all familiar with competing experts in a trial who have diametrically opposed opinions on some matter, even given the same evidence. This happens in science all the time. Even if we have perfect measurements of Nature, scientists can still come to different conclusions about what those measurements mean in terms of cause and effect. So, biases on the part of scientists inevitably influence their opinions. The formation of a hypothesis of how nature works is always biased by the scientist’s worldview and limited amount of knowledge, as well as the limited availability of research funding from a government that has biased policy interests to preserve. Admittedly, the existence of bias in scientific research – which is always present — does not mean the research is necessarily wrong. But as I often remind people, it’s much easier to be wrong than right in science. This is because, while the physical world works in only one way, we can dream up a myriad ways by which we think it works. And they can’t all be correct. So, bias ends up being the enemy of the search for scientific truth because it keeps us from entertaining alternative hypotheses for how the physical world works. It increases the likelihood that our conclusions are wrong. **The IPCC’s Bias** In the case of global warming research, the alternative (non-consensus) hypothesis that some or most of the climate change we have observed is natural is the one that the IPCC must avoid at all cost. This is why the Hockey Stick was so prized: it was hailed as evidence that humans, not Nature, rule over climate change. The Climategate 2.0 e-mails show how entrenched this bias has become among the handful of scientists who have been the most willing participants and supporters of The Cause. These scientists only rose to the top because they were willing to actively promote the IPCC’s message with their particular fields of research. Unfortunately, there is no way to “fix” the IPCC, and there never was. The reason is that its formation over 20 years ago was to support political and energy policy goals, not to search for scientific truth. I know this not only because one of the first IPCC directors told me so, but also because it is the way the IPCC leadership behaves. If you disagree with their interpretation of climate change, you are left out of the IPCC process. They ignore or fight against any evidence which does not support their policy-driven mission, even to the point of pressuring scientific journals not to publish papers which might hurt the IPCC’s efforts. I believe that most of the hundreds of scientists supporting the IPCC’s efforts are just playing along, assured of continued funding. In my experience, they are either: (1) true believers in The Cause; (2) think we need to get away from using fossil fuels anyway; or (3) rationalize their involvement based upon the non-zero chance of catastrophic climate change.

### Exts – IPCC Indict

#### The newest subjective temperature records prove the Earth isn’t warming, the IPCC’s models are falsified logic and there is overwhelming evidence that warming isn’t anthropogenic

**Ferrara, 12** – [Peter**,** Director of Entitlement and Budget Policy for the Heartland Institute, and Senior Fellow at the National Center for Policy Analysis. Served in the White House Office of Policy Development, and as Associate Deputy Attorney General of the United States, Graduate of Harvard College and Harvard Law School, **3/01/2012, “**Fakegate: The Obnoxious Fabrication of Global Warming”**,** http://www.forbes.com/sites/peterferrara/2012/03/01/fakegate-the-obnoxious-fabrication-of-global-warming/3/] DHirsch

The bottom line is that the temperature records are not consistent with the theory that human “greenhouse” gas emissions are the primary cause of global warming. Those records do not show temperatures rising in conjunction with such ever rising emissions as the globe increasingly industrializes. Instead, the temperature record shows an up and down pattern that follows the pattern of natural influences on global temperatures, such as cyclical sunspots and solar flares, and cycles of ocean churning from warmer to colder temperatures and back, such as the Pacific Decadal Oscillation (PDO). Moreover, the incorruptible and objective satellite temperature records show only modest warming starting in the late 1970s, which stopped roughly 10 years ago, with more recent declines. That is consistent with temperature proxy records found in nature, such as tree rings and ice cores. But that diverges significantly from the corruptible and subjectively compiled land based records, the repeated manipulation of which has prompted several prominent climate scientists to call for an investigation. Perhaps Gleick’s skills in falsification can be found more broadly among his colleagues. In addition, the work of the UN’s IPCC is based on numerous climate models that attempt to project temperatures decades into the future. Those models are all based on the circular assumption that the theory of man caused global warming is true. As 16 world leading climate scientists recently reported in a letter to the *Wall Street Journal*, *“[A]n important gauge of scientific expertise is the ability to make successful predictions. When predictions fail, we say that the theory is ‘falsified’ and we should look for the reasons for the failure*. Shown in the nearby graph is the measured annual temperature of the earth since *19*89, just before the first report of the *Intergovernmental Panel on Climate Change (*IPCC). *Also shown are the projections of the likely increase of temperature, as published in the Summaries of each of the four IPCC reports, the first in the year 1990 and the last in the year 2007.* “From the graph it appears that the projections [of the models] exaggerate, substantially, the response of the earth’s temperature to CO2 which increased by about 11% from 1989 through 2011*. Furthermore,* when one examines the historical temperature record throughout the 20th century and into the 21st, the data strongly suggest a much lower CO2 effect than almost all models calculate.”Seems like the models have been falsified. The likely reason for that failure is that while the models recognize that increased CO2 itself will not produce a big, catastrophic increase in global temperatures, the models assume that the very small amount of warming caused by increased CO2 will result in much larger temperature increases caused by positive feedbacks. The real, emerging science, as the Heartland publications indicate, is that the feedbacks are more likely to be offset by negative feedbacks, resulting in a much smaller net temperature change. Scientists have pointed out that much higher CO2 concentrations deep in the earth’s history, as shown by proxy records, did not result in catastrophic temperature increases, a very powerful rebuttal to the idea today’s relatively low CO2 levels could trigger catastrophic global warming. The results of the latest, most advanced data collection also suggest that CO2 is not responsible for the modest global warming of the late 20th century. The UN models agree with established science that if human greenhouse gas emissions were causing global warming, there should be a hot spot of higher temperatures in the troposphere above the tropics, where collected concentrations would have the greatest effect, and the warming would show up first. This is known in the literature on climate science as “the fingerprint” for man caused global warming. But data from global weather satellites and more comprehensive weather balloons show no hotspot, and no fingerprint, which means no serious global warming due to human greenhouse gas emissions. QED.

#### The IPCC is biased and distorts facts in their reports

**Spencer 11** Roy Spencer “Climatologist, author, former NASA scientist,” and P.h. D., “ClimateGate 2.0: Bias in Scientific research” November 23 2011 http://www.drroyspencer.com/2011/11/climategate-2-0-bias-in-scientific-research/

Ever since the first Climategate e-mail release, the public has become increasingly aware that scientists are not unbiased. Of course, most scientists with a long enough history in their fields already knew this (I discussed the issue at length in my first book [*Climate Confusion*](http://www.amazon.com/Climate-Confusion-Pandering-Politicians-Misguided/dp/1594033455/ref%3Dsr_1_1?ie=UTF8&qid=1322065740&sr=8-1)), but it took the first round of Climategate e-mails to demonstrate it to the world. The latest release ([Climategate 2.0](http://foia2011.org/)) not only reveals bias, but also some private doubts among the core scientist faithful about the scientific basis for the IPCC’s policy goals. Yet, the IPCC’s “cause” (Michael Mann’s term) appears to trump all else. So, when the science doesn’t support The Cause, the faithful turn toward discussions of how to craft a story which minimizes doubt about the IPCC’s findings. After considerable reflection, I’m going to avoid using the term ‘conspiracy’ to describe this activity, and discuss it in terms of scientific bias. **It’s Impossible to Avoid Bias** We are all familiar with competing experts in a trial who have diametrically opposed opinions on some matter, even given the same evidence. This happens in science all the time. Even if we have perfect measurements of Nature, scientists can still come to different conclusions about what those measurements mean in terms of cause and effect. So, biases on the part of scientists inevitably influence their opinions. The formation of a hypothesis of how nature works is always biased by the scientist’s worldview and limited amount of knowledge, as well as the limited availability of research funding from a government that has biased policy interests to preserve. Admittedly, the existence of bias in scientific research – which is always present — does not mean the research is necessarily wrong. But as I often remind people, it’s much easier to be wrong than right in science. This is because, while the physical world works in only one way, we can dream up a myriad ways by which we think it works. And they can’t all be correct. So, bias ends up being the enemy of the search for scientific truth because it keeps us from entertaining alternative hypotheses for how the physical world works. It increases the likelihood that our conclusions are wrong. **The IPCC’s Bias** In the case of global warming research, the alternative (non-consensus) hypothesis that some or most of the climate change we have observed is natural is the one that the IPCC must avoid at all cost. This is why the Hockey Stick was so prized: it was hailed as evidence that humans, not Nature, rule over climate change.

The Climategate 2.0 e-mails show how entrenched this bias has become among the handful of scientists who have been the most willing participants and supporters of The Cause. These scientists only rose to the top because they were willing to actively promote the IPCC’s message with their particular fields of research. Unfortunately, there is no way to “fix” the IPCC, and there never was. The reason is that its formation over 20 years ago was to support political and energy policy goals, not to search for scientific truth. I know this not only because one of the first IPCC directors told me so, but also because it is the way the IPCC leadership behaves. If you disagree with their interpretation of climate change, you are left out of the IPCC process. They ignore or fight against any evidence which does not support their policy-driven mission, even to the point of pressuring scientific journals not to publish papers which might hurt the IPCC’s efforts. I believe that most of the hundreds of scientists supporting the IPCC’s efforts are just playing along, assured of continued funding. In my experience, they are either: (1) true believers in The Cause; (2) think we need to get away from using fossil fuels anyway; or (3) rationalize their involvement based upon the non-zero chance of catastrophic climate change.

#### **The IPCC exaggerates and distorts information and is based on failed science and incorrect predictions**

**Ball 11** Dr. Tim Ball “Chairman and Chair of the Scientific Advisory Committee of the [Natural Resources Stewardship Project](http://www.sourcewatch.org/index.php?title=Natural_Resources_Stewardship_Project)… a member of the Board of Research Advisors of the [Frontier Centre for Public Policy](http://www.sourcewatch.org/index.php?title=Frontier_Centre_for_Public_Policy), a Canadian free-market [think tank](http://www.sourcewatch.org/index.php?title=Think_tank)” October 4 2011 “IPCC Predictions (scenarios) always wrong therefore science wrong” <http://drtimball.com/2011/ipcc-predictions-scenarios-always-wrong-therefore-science-wrong/3>

A simple but powerful definition of science is the ability to predict. If your predictions are wrong there is clearly something wrong with your science. The failure, or at best imprecision of weather forecasts, indicate it is not a science. Supporters of “official” climate science, produced by the Intergovernmental Panel on Climate Change (IPCC), tried to distance themselves from this problem by saying that they were two different things. The difficulty is climate is an average of the weather; therefore it can only be as precise as the weather.

I started this article before a discussion about climate model prediction began on the web. A follow up on the topic occurred at the web site of Roger Pielke Jr. It’s an arcane discussion that creates confusion between validation of the climate models and their predictive ability. Validation is the process of testing the predictive ability of a model by having it recreate a past known climate condition. It used to be called hindsight predictions. The idea is if they can hindsight predict then their future predictions have validity. Climate model predictions have consistently failed. Yet the IPCC and others claim they are validated. It is a sham. What they did was simply plug in variables apparently randomly until the model appeared to recreate the past condition.

A good example of this process was the failure to hindsight forecast the global cooling from 1940 to 1980. It was a big problem because during that post war period human production of CO2 increased the most. The reason for their errors always has to have a human origin. They argued that human production of sulfates blocked sunlight and caused the cooling. The problems is after 1980 sulfate levels continued to rise but temperatures also began to rise.

Failure of the validation process is proved by failure of the predictions. If the validation process worked then the predictions made by the IPCC models should work, but they haven’t. The reason must be incorrect assumptions and structure.

Official climate science is that produced by the Intergovernmental Panel on Climate Change (IPCC). Evidence of the grossly inadequate science appeared early. All of their predictions were wrong from the very first Report. They did not address the problem as true science would do by realizing there was something wrong with their understandings of weather and climate mechanisms. Instead, they did what all-official climate science has done since the IPCC was formed and simply moved the goalposts. This is usually done with a name change. The classic one was the shift from global warming to climate change. Instead of making predictions, they claimed they were creating scenarios.

These scenarios were more wrong than the previous predictions. They establish a range of temperature increases with climate and economic models. This ties the increase in CO2 and therefore temperature in their models to economic model predictions. They assume business as usual, which means that continued growth of industrial economies will result in continued increase of CO2 in the atmosphere. Each scenario varies the growth rate of the economies, which results in different rates of CO2 increase and different temperature predictions. All of them assume a CO2 increase results in a temperature increase and that CO2 will only increase. This provides the range of temperature increases provided to the public and emphasized in the Summary for Policymakers (SPM).

Economist David Henderson dissected and dissed the IPCC economic models. Richard Lindzen, MIT Professor of Atmospheric Science and past UN IPCC member called them “children’s exercise”. Economic model predictions are as inaccurate as climate model predictions. When you combine the two you compound the error potential.

Another part of the manipulative process put in place by the IPCC was the practice of creating and releasing an SPM in which the serious limitations of the science are downplayed and the outcomes grossly distorted and exaggerated. Media sensationalism requires emphasis on the most extreme scenario, so they focus on the most extreme potential temperature increase. Every actual temperature since the start fell well short of their lowest temperature increase scenario. In fact, since 2001 the temperature trend has declined. This despite attempts to exaggerate the increase by adjusting the older temperature records down. New Zealand is a good example of what was done in national records (Figure 1). What underscores the apparent deliberate attempt to mislead is that the media and most of the public believed the scenarios were predictions. I am unaware of any attempt by the members of the IPCC or the organization itself to correct the misinterpretation.

**IPCC scientists are biased, their reports distorted, and use facts from bad sources**

**Pratt 08** David Pratt, with “university credentials in modern languages, translation, and technical sciences” “Climate Change Controveries” November 2008 http://davidpratt.info/climatecon2.htm#c1

The Intergovernmental Panel on Climate Change (IPCC) was founded in 1988 to assess ‘the scientific, technical and socioeconomic information relevant for the understanding of the risk of human-induced climate change’. Although depicted as an authoritative body that produces balanced reports, the reality is very different. 2500 scientists are said to be involved in the IPCC process, but the vast majority have no direct influence on the conclusions expressed in its reports, which are controlled by a small clique of scientists wedded to the doctrine that human CO2 emissions are causing dangerous global warming. The Summary for Policymakers (SPM) that accompanies each IPCC report is traditionally a simplistic, rather alarmist document designed to persuade politicians and the public that urgent action is needed to curb greenhouse gas emissions. Government-appointed bureaucrats revise the SPM line by line; in the case of the 2007 SPM, just 52 scientists were involved in approving the changes proposed by delegates from 115 countries. SPMs are highly selective summaries of the voluminous science reports, which are typically over 800 pages long. Although the science reports are very informative, they are biased, selective, misleading and unreliable on many subjects. A major problem is that chapter authors are frequently direct participants in the controversies and disputes that they have to summarize. Experience shows that they tend to showcase their own articles and those of their associates. The IPCC’s Third Assessment Report (TAR), which appeared in 2001, was noteworthy for its use of spurious scientific papers to back up its claim of ‘new and stronger evidence’ of anthropogenic global warming. One of these was the infamous ‘hockey stick’ paper, which is now known to contain basic statistical flaws. The IPCC also cited a paper claiming that pre-1940 warming was of human origin and caused by greenhouse gases. This work, too, contained fundamental errors in its statistical analysis (Singer, 2008), and the IPCC now attributes only post-1975 warming mainly to anthropogenic greenhouse gases. The Fourth Assessment Report (AR4) was published in 2007. The Summary for Policymakers was released in February 2007, three months *before* the bulk of the Working Group I (WG I) report *The Physical Science Basis*that it was supposedly summarizing! This was said to be necessary so that the main report could be brought into line with the conclusions in the Summary for Policymakers. This is certainly a novel approach to doing ‘science’! As already illustrated in section 3, AR4 is marred by errors and misrepresentations, and ignores scientific data that would upset its major conclusion – that warming over the past few decades is ‘unprecedented’ and is mainly caused by anthropogenic greenhouse gases. To illustrate the IPCC’s bias, Roger Pielke Sr. & Dallas Staley have listed dozens of peer-reviewed scientific papers whose message conflicts with the one the IPCC wishes to put across and which are ignored in AR4. These include:

*many papers* showing that the surface air temperature records are not as robust as the IPCC would like us to think. Pielke & Staley conclude that ‘policymakers and the public have been given a false (or at best an incomplete) assessment of the multi-decadal global average near-surface air temperature trends’;

*many papers* pointing to the significant impact of regional climate forcings such as land-use and land-cover changes on the climate system; the IPCC prefers to concentrate on ‘global forcings’, and in particular CO2. As a result, the IPCC failed to fulfil its task of providing ‘a comprehensive and rigorous picture of the global present state of knowledge of climate change’.

### Skeptics Prodict

#### Skeptics know more than alarmists – newest study proves

**Taylor, 12** [James, Bachelor from Dartmouth, senior fellow for The Heartland Institute focusing on environmental issues, 6/1/2012. “Climate Change Weekly: Global Warming Skeptics More Knowledgeable than Alarmists“, http://news.heartland.org/newspaper-article/2012/06/01/climate-change-weekly-global-warming-skeptics-more-knowledgeable-alarmi] DHirsch

Global warming alarmists often accuse skeptics of being “anti-science,” but a newly published peer-reviewed study finds skeptics are more scientifically knowledgeable than the alarmist name-callers. The study, published Sunday in *Nature Climate Change*, documented that global warming skeptics scored better on a test of 22 scientific and statistical questions than people who are worried about global warming. A team of researchers, led by a professor at Yale University, tested more than 1,500 U.S. adults on their scientific literacy and technical reasoning capacity, and then asked them to assign a numerical value to how concerned they are about climate change. According to the study, “Members of the public with the highest degrees of scientific literacy and technical reasoning capacity were not the most concerned about climate change.” “As respondents’ science literacy scores increased, their concern with climate change decreased,” observed the study, which was funded by the National Science Foundation. It seems the media needs to reverse who it deems “anti-science” and “science deniers.”

## Warming Good

### Warming Good – Ice Age

#### We are on the cusp of the next ice age – only warming solves

**Science Daily, ’07** [8/30/2007. “Next Ice Age Delayed By Rising Carbon dioxide Levels”, <http://www.sciencedaily.com/releases/2007/08/070829193436.htm>] Dhirsch

Future ice ages may be delayed by up to half a million years by our burning of fossil fuels. That is the implication of recent work by Dr Toby Tyrrell of the University of Southampton's School of Ocean and Earth Science at the National Oceanography Centre, Southampton. Arguably, this work demonstrates the most far-reaching disruption of long-term planetary processes yet suggested for human activity. Dr Tyrrell's team used a mathematical model to study what would happento marine chemistry in a world with ever-increasing supplies of the greenhouse gas, carbon dioxide. The world's oceans are absorbing CO2 from the atmosphere but in doing so they are becoming more acidic. This in turn is dissolving the calcium carbonate in the shells produced by surface-dwelling marine organisms, adding even more carbon to the oceans. The outcome is elevated carbon dioxide for far longer than previously assumed. Computer modeling in 2004 by a then oceanography undergraduate student at the University, Stephanie Castle, first interested Dr Tyrrell and colleague Professor John Shepherd in the problem. They subsequently developed a theoretical analysis to validate the plausibility of the phenomenon. The work, which is part-funded by the Natural Environment Research Council, confirms earlier ideas of David Archer of the University of Chicago, who first estimated the impact rising CO2 levels would have on the timing of the next ice age. Dr Tyrrell said: 'Our research shows why atmospheric CO2 will not return to pre-industrial levels after we stop burning fossil fuels. It shows that it if we use up all known fossil fuels it doesn't matter at what rate we burn them. The result would be the same if we burned them at present rates or at more moderate rates; we would still get the same eventual ice-age-prevention result.' Ice ages occur around every 100,000 years as the pattern of Earth's orbit alters over time. Changes in the way the sun strikes the Earth allows for the growth of ice caps, plunging the Earth into an ice age. But it is not only variations in received sunlight that determine the descent into an ice age; levels of atmospheric CO2 are also important. Humanity has to date burnt about 300 Gt C of fossil fuels. This work suggests that even if only 1000 Gt C (gigatonnes of carbon**)** are eventually burnt (out of total reserves of about 4000 Gt C) then it is likely that the next ice age will be skipped. Burning all recoverable fossil fuels could lead to avoidance of the next five ice ages.

## CO2 Ag

### 1NC

#### Agricultural crises are creating global food shortages – that kills a billion people – increased CO2 is key to solve

Idso’s, 11 [Sherwood PhD and former research physicist for the Department of Agriculture, Keith PhD Botany, Craig PhD Geography, 6/6/2011, “Meeting the Food Needs of a Growing World Population”, http://www.co2science.org/articles/V14/N27/EDIT.php] DHirsch

Parry and Hawkesford (2010) introduce their study of the global problem by noting that "food production needs to increase 50% by 2030 and double by 2050 to meet projected demands," and they note that at the same time the demand for food is increasing, production is progressively being limited by "non-food uses of crops and cropland," such as the production of biofuels, stating that in their homeland of the UK, "by 2015 more than a quarter of wheat grain may be destined for bioenergy production," which surely must strike one as both sad and strange, when they also note that "currently, at least one billion people are chronically malnourished and the situation is deteriorating," with more people "hungrier now than at the start of the millennium." So what to do about it: that is the question the two researchers broach in their review of the sad situation. They begin by describing the all-important process of photosynthesis, by which the earth's plants "convert light energy into chemical energy, which is used in the assimilation of atmospheric CO2 and the formation of sugars that fuel growth and yield," which phenomena make this natural and life-sustaining process, in their words, "a major target for improving crop productivity both via conventional breeding and biotechnology." Next to a plant's need for carbon dioxide comes its need for water, the availability of which, in the words of Parry and Hawkesford, "is the major constraint on world crop productivity." And they state that "since more than 80% of the [world's] available water is used for agricultural production, there is little opportunity to use additional water for crop production, especially because as populations increase, the demand to use water for other activities also increases." Hence, they rightly conclude that "a real and immediate challenge for agriculture is to increase crop production with less available water." Enlarging upon this challenge, they give an example of a *success story*: the Australian wheat variety 'Drysdale', which gained its fame "because it uses water more efficiently." This valued characteristic is achieved "by slightly restricting stomatal aperture and thereby the loss of water from the leaves." They note, however, that this ability "reduces photosynthetic performance slightly under ideal conditions," but they say it enables plants to "have access to water later in the growing season thereby increasing total photosynthesis over the life of the crop." Of course, Drysdale is but one variety of one crop; and the ideal goal would be to get nearly all varieties of all crops to use water more efficiently. And that goal can actually be reached by doing nothing, by merely halting the efforts of radical environmentalists to deny earth's carbon-based life forms -- that's all of us and the rest of the earth's plants and animals -- the extra carbon we and they need to live our lives to the fullest. This is because allowing the air's CO2content to rise in response to the burning of fossil fuels naturally causes the vast majority of earth's plants to progressively reduce the apertures of their stomata and thereby lower the rate at which water escapes through them to the air. And the result is even better than that produced by the breeding of Drysdale, because the extra CO2 in the airmore than overcomes the photosynthetic reduction that results from the partial closure of plant stomatal apertures, allowing even more yield to be produced per unit of water transpired in the process. Yet man can make the situation better still, by breeding and selecting crop varieties that perform better under higher atmospheric CO2 concentrations than the varieties we currently rely upon, or he can employ various technological means of altering them to do so. Truly, we can succeed, even where "the United Nations Millennium Development Goal of substantially reducing the world's hungry by 2015 will not be met," as Parry and Hawkesford accurately inform us. And this truly seems to us the moral thing to do, when "at least one billion people are chronically malnourished and the situation is deteriorating," with more people "hungrier now than at the start of the millennium."

### 2NC Link Run – Co2 K2 Plants

**Co2 helps plants:**

#### Correlations prove – it increases rainfall and lengthens the growing season

**Zubrin 12** (Robert, B.A. in [Mathematics](http://en.wikipedia.org/wiki/Mathematics) from the [University of Rochester](http://en.wikipedia.org/wiki/University_of_Rochester) (1974), and a masters degree in [Aeronautics](http://en.wikipedia.org/wiki/Aeronautics) and [Astronautics](http://en.wikipedia.org/wiki/Astronautics), a masters degree in [Nuclear Engineering](http://en.wikipedia.org/wiki/Nuclear_Engineering), and a Ph.D. in Nuclear Engineering — all from the [University of Washington](http://en.wikipedia.org/wiki/University_of_Washington) Areosace engineer and author, [http://www.nationalreview.com/articles/295098/carbon-emissions-are-good-robert-zubrin //](http://www.nationalreview.com/articles/295098/carbon-emissions-are-good-robert-zubrin%20//) MikeyH)

This has left the EPA’s second premise — that global warming would be a harmful development — largely unchallenged. This is unfortunate, because while it is entirely possible that the earth may be warming — as it has done so many times in the past — there is no rational basis whatsoever to support the contention that carbon-dioxide-driven global warming would be on the whole harmful to life and civilization. Quite the contrary: All available evidence supports the contention that human CO2 emissions offer great benefits to the earth’s community of life. Putting aside for the moment the question of whether human industrial CO2 emissions are having an effect on climate, it is quite clear that they are raising atmospheric CO2 levels. As a result, they are having a strong and markedly positive effect on plant growth worldwide. There is no doubt about this. NASA [satellite observations](http://www.nationalreview.com/articles/295098/carbon-emissions-are-good-robert-zubrin) taken from orbit since 1958 show that, concurrent with the 19 percent increase in atmospheric CO2 over the past half century, the rate of plant growth in the continental United States has increased by 14 percent. Studies done at Oak Ridge National Lab on forest trees have shown that increasing the [carbon dioxide](http://www.nationalreview.com/articles/295098/carbon-emissions-are-good-robert-zubrin) level 50 percent, to the 550 parts per million level projected to prevail at the end of the 21 century, will likely increase photosynthetic productivity by a further 24 percent. This is readily reproducible laboratory science. If CO2 levels are increased, the rate of plant growth will accelerate. Now let us consider the question of warming: If it is occurring — and I believe it is, based not on disputable temperature measurements but on sea levels, which have risen two inches in two decades — is it a good thing or a bad thing? Answer: It is a very good thing. Global warming would increase the rate of evaporation from the oceans. This would increase rainfall worldwide. In addition, global warming would lengthen the growing season, thereby increasing still further the bounty of both agriculture and nature.

#### **A consensus of studies prove**

**Idso’s ’12** [Sherwood PhD and former research physicist for the Department of Agriculture, Keith PhD Botany, Craig PhD Geography, 4/25/2012. “Growth Response to CO2 (Flowers)”, http://www.co2science.org/subject/f/summaries/flowers.php] DHirsch

By 2002, so many authors had weighed in on the subject that [Jablonski *et al*. (2002)](http://www.co2science.org/articles/V5/N42/EDIT.php) conducted a meta-analysis of 159 peer-reviewed scientific journal articles published between 1983 and 2000, dealing with the effects of atmospheric CO2 enrichment on the reproductive growth characteristics of several domesticated and wild plants. In calculating the mean responses reported in those papers, Jablonski *et al*. found that for increases in the air's CO2 concentration ranging from approximately 150 to 450 ppm (rough average of 300 ppm), across all species studied, the extra CO2 supplied to the plants resulted in 19% more flowers, 18% more fruits, 16% more seeds, 4% greater individual seed mass, 25% greater total seed mass (equivalent to yield), and 31% greater total mass.

#### CO2 increases all plant growth by at least 10%

**Hatfield, 11** - Laboratory Director, National Laboratory for Agriculture and the Environment, the Chair of the Management Systems Evaluation Areas (MSEA) and Agricultural Systems for Environmental Quality (ASEQ) programs(J.L., “Climate Impacts on Agriculture: Implications for Crop Production”, American Society of Agronomy, 03/2011, American Society of Agronomy | JJ)

The effects of increasing CO2 concentrations on various crops are summarized in Table 1 Increases in plant growth vary among species. As expected the crops with the so-called C4 photosynthetic pathway, maize, and sorghum [Sorghum bicolor (L.) Moench], have smaller responses than the C3 crops. Cotton (Gossypium hirsutum L.) may be higher because it is a woody species. However, all show a positive response to CO2 increases. In general, doubling CO2 caused approximately a 30% increase in reproductive yield of C3 species and <10% increase for C4 species. Many C3 weed species also show substantial growth benefits and resistance to herbicides at elevated CO2 (Ziska, 2003b; Ziska et al., 1999), a topic which is further expanded in a later section on Projection for Weeds.

#### CO2 key to plants – specifically fruits and flowers

**Idso’s ’12** [Sherwood PhD and former research physicist for the Department of Agriculture, Keith PhD Botany, Craig PhD Geography, 4/25/2012. “Growth Response to CO2 (Flowers)”, http://www.co2science.org/subject/f/summaries/flowers.php] DHirsch

Nearly all of Earth's plant life responds favorably to increases in the air's CO2 content by exhibiting enhanced rates of photosynthesis and biomass production. But what about other plant characteristics? How do they respond to rising atmospheric CO2? The present review investigates what scientists have learned with respect to plant floral features. In one of the earliest papers to address this subject, [Idso *et al*. (1990)](http://www.co2science.org/articles/V1/N4/EDIT.php) grew water lilies in sunken metal stock tanks located out-of-doors and enclosed within clear-plastic-wall open-top chambers through which air of either 350 or 650 ppm CO2 was continuously circulated. Over the course of two growing seasons, he and his colleagues measured a number of plant responses to these two environmental treatments. Their results indicated that the water lilies in the CO2-enriched enclosures grew better than the water lilies in the ambient CO2 enclosures, as the leaves in the CO2-enriched tanks were larger and more substantial, and 75% more of them were produced over the course of the initial five-month growing season. Each of the plants in the CO2-enriched tanks also produced twice as many flowers as the plants growing in normal air; and the flowers that blossomed in the CO2-enriched air were more substantial than those that bloomed in the air of normal CO2 concentration: they had more petals, the petals were longer, they had a greater percent dry matter content, and each flower consequently weighed about 50% more. In addition, the stems that supported the flowers were slightly longer in the CO2-enriched tanks; and the percent dry matter contents of both the flower and leaf stems were greater, so that the total dry matter in the flower and leaf stems in the CO2-enriched tanks exceeded that of the flower and leaf stems in the ambient-air tanks by approximately 60%. Several years later, [Deng and Woodward (1998)](http://www.co2science.org//articles/V2/N11/B1.php) studied the direct and interactive effects of elevated CO2and nitrogen supply by growing strawberries in controlled glasshouses exposed to atmospheric CO2concentrations of 390 and 560 ppm at three levels of nitrogen for nearly three months. The two authors found that strawberries growing at the elevated CO2 concentration contained additional sugar and physical mass to support significantly greater numbers of flowers and fruits than in strawberry plants growing at 390 ppm CO2. This effect consequently led to total fresh fruit weights that were 42 and 17% greater in CO2-enriched plants that received the highest and lowest nitrogen levels, respectively.

### 2NC Turns Warming

#### Nitrogen absorption checks any positive feedbacks in the short term and eventually creates a negative feedback in the long term

**Idso’s, 11 [**Sherwood PhD and former research physicist for the Department of Agriculture, Keith PhD Botany, Craig PhD Geography, 8/10/2011. “Forests Find More Nitrogen in the Soils of a Warming World”, http://www.co2science.org/articles/V14/N32/B2.php] DHirsch

Background The authors write that "soil warming experiments conducted in a variety of ecosystems, including forests, have shown short-term losses of soil carbon as CO2," as well as "acceleration of nitrogen cycling rates, leading to an increase in the availability of nitrogen to the vegetation (Peterjohn *et al*., 1994; Rustad and Fernandez, 1998; Luo et al., 2001; Shaw and Harte, 2001; Melillo et al., 2002; Eliasson et al., 2005)," and they state that "the principles of ecosystem stoichiometry (Melillo and Gosz, 1983; Rastetter et al., 1992; Sterner and Elser, 2002) suggest that, in forest ecosystems, the redistribution of a relatively small amount of this newly available nitrogen from the soil to the trees could result in a substantial increase in carbon storage in woody tissues." What was done In a long-term (seven-year) effort designed to further explore these closely related phenomena, Melillo et al. (2011) measured changes in net carbon storage in both trees and soil in a mixed hardwood forest ecosystem in central Massachusetts (USA) in response to a 5°C increase in soil temperature imposed on a 30 x 30-m tract of land that was heated by a matrix of heating cables buried at a depth of 10 cm and spaced 20 cm apart, comparing the results from that tract of land with those they obtained on a non-heated 30 x 30-m tract of similar land. What was learned The fifteen researchers report that the soil warming of their study resulted in carbon losses from the soil; but they say that it simultaneously stimulated carbon gains in the woody tissues of the trees. Altogether, over the seven years of the experiment, they indicate that "the cumulative warming-induced net flux of carbon has been from the forest to the atmosphere," but they note that "the magnitude of the flux has diminished over time as a result of the increase in tree growth rate in the heated area." And they state that in the seventh year of the study, "warming-induced soil carbon losses were almost totally compensated for by plant carbon gains in response to warming," which phenomenon they attributed to "warming-induced increases in nitrogen availability." What it means Melillo et al. conclude that "although warming has resulted in a net positive feedback to the climate system, the magnitude of the feedback has been substantially dampened by the increase in storage of carbon in vegetation." And if their study were to continue, and if the trend established over its first seven years were to continue, one could expect to see the sign of the feedback change from positive to negative, perhaps as soon as the next year or two, and to grow more negative from that point in time, with the long-term climate feedback ultimately proving to be negative, demonstrating the extreme importance of long-term studies of this nature.

### **Exts – Negative Feedback**

#### Strong plants key to aerosol emissions

**Miyazaki et al, 12** [P. Q. Fu, K. Kawamura, Y. Mizoguchi, and K. Yamanoi, Institute of Low Temperature Science, Hokkaido University, Sapporo, Japan and Institute of Atmospheric Physics, Chinese Academy of Sciences, Beijing, China, 2/3/2012. “Seasonal variations of stable carbon isotopic composition and biogenic tracer compounds of water-soluble organic aerosols in a deciduous forest”, http://www.atmos-chem-phys.net/12/1367/2012/acp-12-1367-2012.pdf] DHirsch

Forest ecosystems act as a major sink of atmospheric CO2 and a source of atmospheric organic aerosols (Kavouras et al., 1998; Kulmala et al., 2004; Tunved et al., 2006). Forest vegetation contributes substantially to emissions of a variety of biogenic volatile organic compounds (BVOCs) via processes that are closely linked to photosynthesis (e.g., Penuelas and Staudt, 2010). In boreal forests, photosynthesis is inhibited in winter and occurs predominantly in sunlight during the growing season. Although forest–atmosphere interactions are potentially important for climate change assessments (Kulmala et al., 2004; Mahowald, 2011), such interactions are complicated and poorly represented in current global models (Bonan, 2008).

### 2NC Wars Impact

#### Food crises escalate into food wars and regional conflictsSmith 98 [Paul J., Asia-Pacific Center for Security Studies, http://www.apcss.org/Publications/Report\_Food\_Security\_98.html]

Food security and political stability are often inextricably linked in many countries. Historically, significant malnutrition and famine have been caused by the disruption of food supplies through wars and civil strife.[**53**](http://www.apcss.org/Publications/food-ftnt-46-64.htm)  Yet, the concepts of food security and political stability are often mutually dependent and reinforcing. Food security, for example, can influence the political stability of countries. Simultaneously, political instability (such as wars or other forms of civil strife) can influence food security, as can be seen recently in the case of Indonesia. One seminar participant noted that the greatest risk for regime stability is the risk of urban riots—riots that are sometimes sparked by food shortages or sudden price increases among food products. Generally, starvation in the countryside does not result in political instability. This is because those who experience the brunt of food shortages tend to be rural and have little political voice. A recent example of this phenomenon occurred in India where rising food prices led to urban riots directed at India’s ruling political party—the Bharatiya Janata Party. Similarly, when the price of rice soared in Indonesia, thereby making it prohibitively expensive for a large segment of the population, food riots erupted in eastern Java. The government deployed military forces around markets to prevent looting. Moreover, China’s sharp rejection of the Lester Brown thesis that China needs to import massive amounts of grain from the world market in the coming century was partially rooted in a persistent fear within the Chinese government that food insecurity could potentially provoke widespread anger against the Communist Party and perhaps lead to civil unrest. Thus, the sensitivity that many Asian governments have about food security may be linked to fears of social instability and perhaps even political revolution. Food security thus becomes an issue of regime survival. Another security concern prominent in many Asian capitals is the prospect for increased economic migration as a result of food shortages. Internal migration is the first concern for many governments, especially as internal migration is often a natural "coping response" in times of famine. When North Korea experienced severe floods in September 1995, South Korea responded by creating refugee camps to deal with the possible flood of people who might have fled toward the south. Similarly, Indonesia’s food crisis in 1997 was partly responsible for the outflow of thousands of Indonesian migrants to Malaysia. As the crisis in Indonesia intensified in early 1998, many neighboring countries feared that many more "hungry Indonesians [would] take to boats in search of a better life."[**54**](http://www.apcss.org/Publications/food-ftnt-46-64.htm)Many countries in East Asia are extremely sensitive and wary about immigration—especially mass migration or illegal migration. The recent surge in labor and economic migration throughout the region has catapulted the immigration issue to the highest levels of government. Immigration disputes, moreover, have broken out between nations—such as the in case of Singapore and the Philippines in 1995—regarding illegal immigration and repatriation policies. Few governments in the region officially desire more immigration. To the extent that food insecurity might spur greater migration, then it may be viewed by many governments in the region as a security concern.

### Exts – Food Shortages = Wars

#### Food shortages lead to escalating conflicts over resources culminating in World War III

**Calvin ’98** [William Calvin, Theoretical Neurophysiologist at the University of Washington, January 1998, Atlantic Monthly, The Great Climate Flip-Flop, Pages 47-64]

The population-crash scenario is surely the most appalling. Plummeting crop yields would cause some powerful countries to try to take over their neighbors or distant lands -- if only because their armies, unpaid and lacking food, would go marauding, both at home and across the borders. The better-organized countries would attempt to use their armies, before they fell apart entirely, to take over countries with significant remaining resources, driving out or starving their inhabitants if not using modern weapons to accomplish the same end: eliminating competitors for the remaining food. This would be a worldwide problem -- and could lead to a Third World War -- but Europe's vulnerability is particularly easy to analyze. The last abrupt cooling, the Younger Dryas, drastically altered Europe's climate as far east as Ukraine. Present-day Europe has more than 650 million people. It has excellent soils, and largely grows its own food. It could no longer do so if it lost the extra warming from the North Atlantic.

### 2NC Cancer Impact

#### CO2 increases Ginger’s cancer prevention properties

**Jaafar et. al ’11** [Hawa and Ali Ghasemzadeh, Department of Crop Science, Faculty of Agriculture, University Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia, 7/18/2011. “Antioxidant potential and anticancer activity of young ginger (Zingiber officinale Roscoe) grown under different CO2 concentration”, http://www.academicjournals.org/jmpr/PDF/pdf2011/18July/Ghasemzadeh%20and%20Jaafar.pdf] DHirsch

The rhizome of Z. officinale is generally used as a culinary spice in Malaysia, and also for the treatment of oral diseases, leucorrhoea, stomachb pain, stomach discomfort, diuretic, inflammation and dysentery. Shukla et al. (2007) reported cancer preventive properties of ginger and showed that this ability is related to [6]-gingerol. Kuokkanen et al. (2001) showed that the concentration of total phenolics was significantly increased in the birch leaves produced in the CO2-enriched air, as has also been observed in the experiments of Lavola and Julkunen (1994), Williams et al. (1994), Kinney et al. (1997) and Ibrahim et al. (2011). Environmental conditions, cultural practice, and management approaches can impact the quality of food by their abilities to promote good health and well being. In fact, new management strategies are emerging that use ecophysiological factors to elevate phytochemical concentrations in food crops. Some ecophysiological conditions that are thought to have significant impact on enhancing the health promoting phytochemicals in a number of plants include environmental conditions and cultural and management practices (Schreiner, 2005).

Thus, there is an increasing interest in using appropriate strategies and management practices to improve the quality of food crops by enhancing their nutritive and health-promoting properties. Information about anticancer and antioxidant activities of enriched ginger by elevated CO2 concentration is scarce. On the other hand, the impacts of cultural conditions and CO2 concentration on biopharmaceutical production in herbs have not been widely investigated and it needs to be understood, especially when the objective is the optimization of the herb chemistry. The aim of this study was to screen antioxidant potential and anticancer activities (in vitro) of two Malaysian young ginger varieties (Z. officinale) grown under different CO2 concentration.

#### Ginger growing in CO2 is key to solve cancer

**Jaafar et. al ’11** [Hawa and Ali Ghasemzadeh, Department of Crop Science, Faculty of Agriculture, University Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia, 7/18/2011. “Antioxidant potential and anticancer activity of young ginger (Zingiber officinale Roscoe) grown under different CO2 concentration”, http://www.academicjournals.org/jmpr/PDF/pdf2011/18July/Ghasemzadeh%20and%20Jaafar.pdf] DHirsch

Cancer is one of the extensive diseases in humans and there is substantial scientific and commercial attention in continuing discovery of new anticancer agents from natural product sources. Currently, about 50% of drugs used in clinical trials for anticancer activity were isolated from natural sources such as herbs and spices or are related to them (Newman and Cragg, 2007). A number of active compounds such as flavonoids, diterpenoids, triterpenoids and alkaloids have been shown to possess anticancer activity. The results showed strong inhibitory activity of Malaysian young ginger varieties on human breast cancer cells (MCF–7 and MDA–MB–231). Our results in this study indicate that some compounds in Malaysian young ginger varieties posses anticancer activities and may contribute to the therapeutic effect of this medicinal herb. According to the report of the American National Cancer Institute (NCI), the criteria of anticancer activity for the crude extracts of herbs is an IC50<30 µg/ml (Itharat et al., 2004). Thus, according to the results from current study seems that enriched ginger varieties by elevated CO2 concentration could be employed in ethno-medicine for the management of breast cancerous diseases. Therefore, more focused clinical studies are necessary to establish whether these varieties can be exploited to reach cancer blocking or remedial effects in human body.

### Exts – Ginger

#### Antioxidants in Ginger are significantly higher under CO2 – studies prove

**Jaafar et. al ’11** [Hawa and Ali Ghasemzadeh, Department of Crop Science, Faculty of Agriculture, University Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia, 7/18/2011. “Antioxidant potential and anticancer activity of young ginger (Zingiber officinale Roscoe) grown under different CO2 concentration”, http://www.academicjournals.org/jmpr/PDF/pdf2011/18July/Ghasemzadeh%20and%20Jaafar.pdf] DHirsch

RESULTS AND DISCUSSION Determination of antioxidant activity of ginger The results obtained from the preliminary analysis of antioxidant activity are shown in Table 1 and Figure 1. According to the data obtained, significant differences were observed among treatments for antioxidant activities. From the result, the antioxidant activity of leaves was higher than rhizomes extracts in both varieties that were grown under ambient CO2 concentration. The results also had indicated that antioxidant activities increased significantly by elevated CO2 concentration. Antioxidant activity was enhanced in rhizomes by elevated CO2 concentration more than in leaves with highest value of TBA (78.73%) obtained from Halia Bara rhizomes. The leaves extract of Halia Bentong and Halia Bara in ambient CO2 condition exhibited strong potential of free radical scavenging activity. According to the results TBA content of the Halia Bara leaves grown in ambient CO2 concentration reached to 70.73%, while at the same extract concentration, that of the rhizomes was 67.88% (Table 1). In ambient CO2 concentration differences between leaves and rhizomes in both varieties for TBA activity was not significant, while in elevated CO2 concentration significant differences was observed between different parts of varieties. The results of the current study showed that TBA activity of the ginger parts extract were less than those of α-tocopherol (82.1%) and quercetin (94.7%), at 45 µg/ml when grown under ambient CO2 (Figure 1). Halia Bara rhizomes grown under elevated CO2 showed higher antioxidant activities compare to α-tocopherol at concentration of 47 µg/ml and above. Methanol extracts may include phenolic and hydroxy-phenolic compounds with acids, alcohols, sugars or glycosides, as reported by Kim et al. (2004). Many researchers had shown that high total flavonoids content increases antioxidant activity and there was a linear correlation between flavonoids content and antioxidant activity (Jung et al., 2007; Ghasemzadeh et al., 2010a, b). Silva et al. (2002) showed myricetin is expected to be the most efficient ﬂavonoid antioxidant followed by quercetin.

### 2NC Pakistan Impact

#### Elevated CO2 lets cotton thrive

**Kakani et al, 4** – Department of Plant and Soil Sciences, Mississippi State University, Department of Plant and Soil Sciences, Mississippi State University, Department of Plant and Soil Sciences, Mississippi State University, and USDA UV-B Monitoring and Research Program, Natural Resource Ecology Laboratory, Colorado State University, Fort Collins (Vijaya Gopal Kakani, Kambham Raja Reddy, Duli Zhao and Wei Gao, 2004, “Senescence and hyperspectral reflectance of cotton leaves exposed to

ultraviolet-B radiation and carbon dioxide”, PHYSIOLOGIA PLANTARUM 121: 250–257. 2004, pubmed.gov | JJ)

Considerable growth and developmental variations occur in plants exposed to UV-B radiation and atmospheric [CO2 ]. Selection of leaves from a plant at different node positions provided us with leaves that differed in age, and the leaves at same node in different treatments enabled us to study the effect of different intensities of UV-B radiation and [CO2 ] on leaves of the same age. In cotton (Gossypium hirsutum L. cv. DES119), Sassenrath-Cole et al. (1996) found that changes in leaf photosynthetic responses to light environment during leaf ageing were solely as a result of physiological changes within the senescing leaf and not the result of photon flux density environment or shading. Decline in photosynthesis and chlorophyll are early symptoms of senescence, with chloroplasts as one of the primary targets for degradation (Thomas and Stoddart 1980, Grove and Mohanty 1992). In cotton, remobilization of leaf N to reproductive organs appears to be the principle component leading to photosynthetic decline (Pettigrew et al. 2000) and the data also suggest that environmental factors can play a role in causing the photosynthetic decline. In our study, atmospheric [CO2 ] did not alter the senescence as indicated by Pn and chlorophyll pigments. Elevated [CO2 ], however, increased Pn by 35% similar to that recorded in earlier studies in well-watered and well fertilized conditions (Reddy et al. 1997, 2000). In this study, at 0 kJ of UV-B and with increase in leafage, a decrease in Pn was recorded with no change in chlorophyll pigments indicating that decline in Pn is a stimulant for leaf senescence in cotton. The photosynthesis activity below a certain threshold level is known to induce leaf senescence (Smart 1994, Dai et al. 1999). Hensel et al. (1993) postulated that a decrease in photosynthesis efficiency reduces sugar levels that may be an early signal for induction of senescence. In the current study, near ambient UV-B radiation (7.7 kJ) reduced the Pn of30day-old leaves by 50% compared with that at 0 kJ UV-B radiation. In detached maize leaves, senescence induced loss of chlorophyll and photosynthesis was significantly enhanced by UV-B radiation (Biswal et al. 1997). Under high UV-B of15.1 kJ, the 12-day-old leaves had Pn on par with the 30-day-old leaves in the control treatment. The 21-day-old leaves exposed to high UV-B were on par with the 30-day-old leaves exposed to ambient and high UV-B, suggesting that these leaves were in a similar senescence phase as a result of their exposure to UV-B radiation. Thus, the UV-B radiation resulted in accelerated leaf ageing.

#### Cotton’s key to the Pakistani economy – we control uniqueness

**Nadeem et al, 10** - Department o f Agronomy, University o f Agriculture, Faisalabad , Pakistan, 1 = University College of Agriculture and Environmental Sciences , Islamia University, Bahawalpur , Pakistan (Muhammad Ather Nadeem, Asghar Ali, Muhammad Tahir , Muhammad Naeem 1 , Asim Raza Chadhar and Sagheer Ahmad, 2010, “Effect of Nitrogen Levels and Plant Spacing on Growth and Yield of Cotton”, Pakistan Journal of Life and Social Sciences, Vol. 8 No. 2, [http://www.pjlss.edu.pk/sites/default/files/121-124%20(dr.%20Athar%202).pdf](http://www.pjlss.edu.pk/sites/default/files/121-124%20%28dr.%20Athar%202%29.pdf) | JJ)

Cotton (Gossypium hirsutum L.) is considered as mainstay of Pakistan’s economy. It is an important cash crop, major source of foreign exchange and plays an important role in agriculture, industry and economic development of the country. In Pakistan cotton is grown on an area is 3.22 million hectares with total production of 12417 thousand bales and average seed cotton yield of 732 kg ha -1 (Anonymous, 2007). Despite of concerted efforts of breeders and agronomists, yield per unit area is still far below from many other cotton producing countries of the world. Low yield of cotton in Pakistan is attributed to some production as well as economic constraints. Poor quality seed, low seed rate, low plant population, poor management or agronomic practices, conventional sowing methods, imbalanced fertilizer application, weed infestation and insect attack are main causes of its low yield. In cotton plant, spacing has effects on the growth and yield characteristics of the plant. Plant population (density) is very important for attaining optimum crop growth and yield under irrigated conditions. Mostly, farmers maintain plant spacing and density according to their traditional methods of planting rather than variety requirement and hence do not obtain the high crop yield. Hussain et al. (2000) reported that 30 cm spacing between cotton plants increased plant height, number of bolls per plant and boll weight as compared to 10 cm and 20 cm. However, plant spacing did not affect ginning out turn or fiber quality. On the other hand Muhammad et al. (2002) found that boll weight decreased by increasing plant population. The field conditions that produce short stature plants can generally tolerate higher plant density without incurring significant yield reduction (Hake et al., 1991). Adequate plant population facilitates the efficient use of applied fertilizers and irrigation (Abbas, 2000). When density is low, fruiting branches are longer and a greater percentage of bolls are produced on outer position of fruiting branches but first position bolls produced by high density are the biggest and best resulting in high yield. Fruit initiation was influenced by plant density in upland cotton (Buxton et al., 1977).

#### Nuclear War

**Guthrie, 2K** (Grant, J.D. candidate, 2000, University of California, Hastings College of the Law., Hastings International and Comparative Law Review “Nuclear Testing Rocks the Sub-Continent: Can International Law Halt the Impending Nuclear Conflict Between India and Pakistan?” Spring/Summer 2000, pg lexis wyo-ef)

Nuclear testing creates political instability because it requires a substantial economic investment. One, small fission device typically costs five million U.S. dollars to manufacture. 84 Pakistan's economy is fragile already. 85 Pakistan's total budget for 1996-1997 was $ 12.5 [\*503] billion, out of which 45 percent was spent on debt service and 24 percent on defense. 86 If Pakistan begins increasing its defense budget there will be nothing left for its people. 87 The spending effects of continued nuclear tests might bankrupt the Pakistani economy. One day, the Pakistani government might be forced to sell nuclear fuel, nuclear weapons or nuclear technology to generate capital. Uncontrollable nuclear proliferation could ensue and the world political regime might become destabilized. There are strong political forces contending for control of Pakistan. 88 Pakistan has been ruled on and off by the military for half of its history. 89 In October of 1999, Pakistan's democratically elected government was overthrown and traded for a military regime. 90 If Pakistan's political climate does not eventually stabilize, Pakistan may become divided and compartmentalized, like a warlord-ridden, nuclear Somalia. Each faction would control nuclear weapons and a nuclear civil war could ensue. The world could be at the mercy of a rogue nuclear state. The effect on the world could be incredibly destabilizing.

### Exts – Pakistan

#### Causes global conflict

Pitt 9, Managing Editor of truthout.org, NYT and internationally bestselling author, 5/8/2009. “Unstable Pakistan Threatens the World,” www.arabamericannews.com/news/index.php?mod=article&cat=commentary&article=2183)

But a suicide bomber in Pakistan rammed a car packed with explosives into a jeep filled with troops today, killing five and wounding as many as 21, including several children who were waiting for a ride to school. Residents of the region where the attack took place are fleeing in terror as gunfire rings out around them, and government forces have been unable to quell the violence. Two regional government officials were beheaded by militants in retaliation for the killing of other militants by government forces. As familiar as this sounds, it did not take place where we have come to expect such terrible events. This, unfortunately, is a whole new ballgame. It is part of another conflict that is brewing, one which puts what is happening in Iraq and Afghanistan in deep shade, and which represents a grave and growing threat to us all. Pakistan is now trembling on the edge of violent chaos, and is doing so with nuclear weapons in its hip pocket, right in the middle of one of the most dangerous neighborhoods in the world. The situation in brief: Pakistan for years has been a nation in turmoil, run by a shaky government supported by a corrupted system, dominated by a blatantly criminal security service, and threatened by a large fundamentalist Islamic population with deep ties to the Taliban in Afghanistan. All this is piled atop an ongoing standoff with neighboring India that has been the center of political gravity in the region for more than half a century. The fact that Pakistan, and India, and Russia, and China all possess nuclear weapons and share the same space means any ongoing or escalating violence over there has the real potential to crack open the very gates of Hell itself. Recently, the Taliban made a military push into the northwest Pakistani region around the Swat Valley. According to a recent Reuters report: The (Pakistani) army deployed troops in Swat in October 2007 and used artillery and gunship helicopters to reassert control. But insecurity mounted after a civilian government came to power last year and tried to reach a negotiated settlement. A peace accord fell apart in May 2008. After that, hundreds — including soldiers, militants and civilians — died in battles. Militants unleashed a reign of terror, killing and beheading politicians, singers, soldiers and opponents. They banned female education and destroyed nearly 200 girls' schools. About 1,200 people were killed since late 2007 and 250,000 to 500,000 fled, leaving the militants in virtual control. Pakistan offered on February 16 to introduce Islamic law in the Swat valley and neighboring areas in a bid to take the steam out of the insurgency. The militants announced an indefinite cease-fire after the army said it was halting operations in the region. President Asif Ali Zardari signed a regulation imposing sharia in the area last month. But the Taliban refused to give up their guns and pushed into Buner and another district adjacent to Swat, intent on spreading their rule. The United States, already embroiled in a war against Taliban forces in Afghanistan, must now face the possibility that Pakistan could collapse under the mounting threat of Taliban forces there. Military and diplomatic advisers to President Obama, uncertain how best to proceed, now face one of the great nightmare scenarios of our time. "Recent militant gains in Pakistan," reported The New York Times on Monday, "have so alarmed the White House that the national security adviser, Gen. James L. Jones, described the situation as 'one of the very most serious problems we face.'" "Security was deteriorating rapidly," reported The Washington Post on Monday, "particularly in the mountains along the Afghan border that harbor al-Qaeda and the Taliban, intelligence chiefs reported, and there were signs that those groups were working with indigenous extremists in Pakistan's populous Punjabi heartland. The Pakistani government was mired in political bickering. The army, still fixated on its historical adversary India, remained ill-equipped and unwilling to throw its full weight into the counterinsurgency fight. But despite the threat the intelligence conveyed, Obama has only limited options for dealing with it. Anti-American feeling in Pakistan is high, and a U.S. combat presence is prohibited. The United States is fighting Pakistan-based extremists by proxy, through an army over which it has little control, in alliance with a government in which it has little confidence." It is believed Pakistan is currently in possession of between 60 and 100 nuclear weapons. Because Pakistan's stability is threatened by the wide swath of its population that shares ethnic, cultural and religious connections to the fundamentalist Islamic populace of Afghanistan, fears over what could happen to those nuclear weapons if the Pakistani government collapses are very real. "As the insurgency of the Taliban and Al Qaeda spreads in Pakistan," reported the Times last week, "senior American officials say they are increasingly concerned about new vulnerabilities for Pakistan's nuclear arsenal, including the potential for militants to snatch a weapon in transport or to insert sympathizers into laboratories or fuel-production facilities. In public, the administration has only hinted at those concerns, repeating the formulation that the Bush administration used: that it has faith in the Pakistani Army. But that cooperation, according to officials who would not speak for attribution because of the sensitivity surrounding the exchanges between Washington and Islamabad, has been sharply limited when the subject has turned to the vulnerabilities in the Pakistani nuclear infrastructure." "The prospect of turmoil in Pakistan sends shivers up the spines of those U.S. officials charged with keeping tabs on foreign nuclear weapons," reported Time Magazine last month. "Pakistan is thought to possess about 100 — the U.S. isn't sure of the total, and may not know where all of them are. Still, if Pakistan collapses, the U.S. military is primed to enter the country and secure as many of those weapons as it can, according to U.S. officials. Pakistani officials insist their personnel safeguards are stringent, but a sleeper cell could cause big trouble, U.S. officials say." In other words, a shaky Pakistan spells trouble for everyone, especially if America loses the footrace to secure those weapons in the event of the worst-case scenario. If Pakistani militants ever succeed in toppling the government, several very dangerous events could happen at once. Nuclear-armed India could be galvanized into military action of some kind, as could nuclear-armed China or nuclear-armed Russia. If the Pakistani government does fall, and all those Pakistani nukes are not immediately accounted for and secured, the specter (or reality) of loose nukes falling into the hands of terrorist organizations could place the entire world on a collision course with unimaginable disaster.

### 2NC Earthworms Impact

#### Elevated CO2 increases earthworm activity

**Yeates et al, 3** – Landcare Research, Private Bag 11-052, Palmerston North, New Zealand, Landcare Research, Private Bag 11-052, Palmerston North, New Zealand, AgResearch Grasslands, Private Bag 11-008, Palmerston North, New Zealand (G. W. Yeates, P. C. D. Newton, D. J. Ross, “Significant changes in soil microfauna in grazed pasture under elevated carbon dioxide”, Biol Fertil Soils (2003) 38:319–326, 2003, SpringerLink | JJ)

Observations indicate an increase of 1.1–1.7x in the abundance and activity of lumbricid earthworms under elevated CO2 (Table 7). These increases suggest a greater partitioning of photosynthate to below-ground processes, which can be related in part to increased root-feeding by Longidorus and increased root turnover (Yeates et al. 2003; V. Allard, personal communication). Previous work in grazed pastures in New Zealand has shown that introduction of lumbricids not only has perceived beneficial effects on soil conditions (Stockdill 1982), but also influences decomposition processes and the composition of the nematode fauna, with relative reduction in the abundance of fungal-feeding nematodes (Yeates 1981). While earthworms increased under elevated CO2, our results show a marked decrease (0.7-fold) in the abundance of enchytraeids that are predominantly microbialfeeding (Didden 1993). In contrast to the impact of lumbricids on nematodes observed by Yeates (1981), the fungal-feeding nematodes here increased 1.57-fold under elevated CO2, with the increase being greater than that of bacterial-feeding nematodes (Table 4). This suggests that changes in soil organic matter quality under elevated CO2 may have outweighed the effect of increased earthworm activity.

#### Earthworms key to humanity

**Tompkin & Bird 99** (Peter, and Christopher, no quals, “secrets of the sol,” taken from Microsoil, http://www.microsoil.com/earthworm.htm wyo -ef)

Only where you find earthworms will you find rich, healthy soil with high amounts of organic matter and vice versa. Earthworms simply cannot proliferate and flourish in areas where chemical fertilizers and pesticides are paramount. Earthworms, actually, act as a barometer for soil health. Many agriculture oriented people still do not understand or appreciate the tremendous enriching value that earthworms have on our soils. It took a French scientist and ecologist, André Voisin, author of the insightful Soil, Grass and Cancer, to point out that the earthworm, and in particular the slippery lumbricid, most common in the United States and Europe, is not only essential to good agriculture but is the very foundation of all civilization. In Better Grassland Sward, Voisin traces man's civilizations in relation to the distribution of active earthworms, of which he lists some three thousand species. Among the most ancient of terrestrial animal groups, several hundred million years old, they come in various colors and sizes: brown, purple, red, pink, blue, green and light tan, the smallest barely an inch long, the largest a ten-foot giant in Australia, though South African newspapers reported a boa-constrictor-sized monster twenty feet long, a yard wide through the middle. The most common European and American earthworm, Lumbricus terrestris, grows barely longer than six inches. Ten thousand years ago, immediately after the last ice age, the lumbricid earthworms were to be found only in certain restricted areas of the planet, such as in the valleys of three great civilizations - the Indus, the Euphrates, and the Nile - where crops grew almost without cultivation in a soil of immensely fruitful richness. As Jerry Minnich points out in The Earthworm Book, other areas of the earth offered ideal climates and rich soils, but produced, with the exception of China, no such civilizations. The Egyptian experience alone, says Minnich, is strong indication that a complex civilization cannot develop until the basic agricultural needs of its people are met, and that requires the earthworm. Not that the point was entirely overlooked by the USDA. an agricultural report on investigations carried out in the valley of the Nile in 1949, before the folly of the Aswan Dam, indicated that the great fertility of the soil was due in large part the work of earthworms. It was estimated that during the six months of active growing season each year the castings of earthworms on these soils amounted to a stunning 120 tons per acre, and in each handful of that soil are more microorganisms than there are humans on the planet. Thirty years before the birth of Darwin, as the American colonists were breaking away from the mother country, an English naturalist, Gilbert White, was writing: Worms seem to be the great promoters of vegetation, perforating and loosening the soil, rendering it pervious to rains and the fibers of plants by drawing straws and stalks of leaves and twigs into it; and, most of all, by throwing up such infinite numbers of lumps of earth called worm-casts, which being their excrement, is a fine manure for grain and grass. . . . The earth without worms would soon become cold, hard-bound, and void of fermentation, and consequently sterile. That the phenomenon was understood before the time of Christ is clear from Cleopatra's decree that the earthworm be revered and protected by all her subjects as a sacred animal. Egyptians were forbidden to remove it from the land, and farmers were not to trouble the worms for fear of stunting the renowned fertility of the Nilotic valley's soil.

### AT: NIPCC Sucks

#### While the IPCC is skewed by politics and false science, the NIPCC cites hundreds of accurate scientific papers and has no political agenda

**Carter 11** Dr. Robert Carter, “palaeontologist, stratigrapher, marine geologist and environmental scientist with over 30 years professional experience, and holds degrees from the University of Otago (New Zealand) and the University of Cambridge (England)”, December 7 2011, “Guest Column: Nongovernmental International Panel on Climate Change a credible source” <http://rockrivertimes.com/2011/12/07/guest-column-nongovernmental-international-panel-on-climate-change-a-credible-source/>

In his Nov. 16 letter to the editor, “Rebuttal to Tom Harris’s letter and the NIPCC,” Nick Poggioli has chosen to question the authority of the independent Nongovernmental International Panel on Climate Change (NIPCC). Second, he asserts that the United Nations’ Intergovernmental Panel on Climate Change (IPCC) is a more credible authority than the NIPCC. This is not a good time to be claiming authority for the IPCC, which now has a 15-year-long history of scientific malfeasance that stretches back to its Second Assessment Report in 1995. On that occasion, recommendations from one of the expert science advisory groups were reworded in alarmist terms by a single scientist charged with preparing the wording for the critical Summary for Policymakers. Along the way since, we have had: (i) the resignation of leading scientists from IPCC because of their dissatisfaction with its procedures; (ii) the domination of the 2001 Third Assessment Report by the statistically invalid “hockey stick” graph of global temperature; and (iii) the discovery of the dysfunctional peer-reviewing of the 2007 Fourth Assessment Report, in which a full 30 percent of the references have proved to represent student theses and reports by environmental activist groups and the like. Meanwhile, November 2009 saw the publication of e-mails leaked from the IPCC’s main advisory group for the global temperature record, located at the Climatic Research Centre (CRU) at the University of East Anglia. As the subsequent “Climategate” affair showed, CRU scientists and their worldwide network of contacts have been abusing basic scientific process for many years, including attempting to manipulate the scientific literature toward their preferred alarmist stance on global warming in support of IPCC intentions. Finally, and just a few weeks ago, Canadian investigative journalist Donna Laframboise published her devastating exposé of the chicanery and corruption that underlie many IPCC processes in a new book titled *The delinquent teenager who was mistaken for the world’s top climate expert*.It has been clear for many years, then — and as is to be expected of a body that is composed of government appointees — that the IPCC is dominantly a political body. As such, the organization gives political advice that, in turn, rests upon politicized and spun views of the basic science (i.e., “Frisbee” science). The IPCC’s reputation as a source of credible and impartial scientific advice is, therefore, now shredded beyond retrieval, and many senior scientists believe that it should be closed down forthwith. In contrast, the authors and contributors to the NIPCC publications represent independent and often senior scientists who are beholden to no one, and have no political agenda to pursue. NIPCC presents the science as it is, not as it can be spun. In particular, NIPCC volumes contain descriptions of hundreds of papers that argue against the occurrence of dangerous human-caused global warming and which have gone unreported or under-reported by the IPCC.

#### **The NIPCC receives almost no funding from self-interest corporations and has a fraction of the IPCC’s budget**

**Ferrara 3/1 –** Peter Ferrara, contributor to Forbes.com, and “General Counsel for the American Civil Rights Union, and Senior Fellow at the National Center for Policy Analysis” 3/1/12 “Fakegate: the obnoxious fabrication of global warming” http://www.forbes.com/sites/peterferrara/2012/03/01/fakegate-the-obnoxious-fabrication-of-global-warming/

This is the essential background to understanding “Fakegate,” the strange and still being written story of the decline and fall of political activist Peter Gleick, who had successfully engineered a long career posing as an objective climate scientist. Gleick, who has announced he is taking a “temporary, short-term leave of absence” as president of the Pacific Institute, also served until recently as chairman of the science integrity task force of the American Geophysical Union. Gleick has publicly confessed that he contacted The Heartland Institute fraudulently pretending to be a member of the Board of Directors. Emails released by The Heartland Institute show that he created an email address similar to that of a board member and used it to convince a staff member to send him confidential board materials. Gleick then forwarded the documents to 15 global warming alarmist advocacy organizations and sympathetic journalists, who immediately posted them online and blogged and wrote about them. Their expectation apparently was that the documents would be as embarrassing and damaging to the global warming skeptics as were the emails revealed in the “Climategate” scandal to the alarmist side. The Climategate revelations showed scientific leaders of the UN’s IPCC and global warming alarmist movement plotting to falsify climate data and exclude those raising doubts about their theories from scientific publications, while coordinating their message with supposedly objective mainstream journalists. But the stolen Heartland documents exonerated, rather than embarrassed, the skeptic movement. They demonstrate only an interest at Heartland in getting the truth out on the actual objective science. They revealed little funding from oil companies and other self interested commercial enterprises, who actually contribute heavily to global warming alarmists as protection money instead. The documents also show how poorly funded the global warming skeptics at Heartland are, managing on a shoestring to raise a shockingly successful global challenge to the heavily overfunded UN and politicized government science. As the *Wall Street Journal* observed on Feb. 21, while Heartland’s budget for the NIPCC this year totals $388,000, that compares to $6.5 million for the UN’s IPCC, and $2.5 billion that President Obama’s budget commits for research into “the global changes that have resulted primarily from global over-dependence on fossil fuels.” That demonstrates how an ounce of truth can overcome a tidal wave of falsehood.

### AT: Idsos Suck

#### The Idso’s work was commissioned by funding from the US government, not ExxonMobil

**Popular Science 11**, Andrew, contributor to popularscience.com, May 10 2011 “Are Skeptical scientists funded by ExxonMobil?” http://www.populartechnology.net/2011/05/are-skeptical-scientists-funded-by.html

Sherwood B. Idso, B.S. Physics *Cum Laude*, University of Minnesota (1964); M.S. Soil Science, University of Minnesota (1966); Ph.D. Soil Science, University of Minnesota (1967); Research Assistant in Physics, University of Minnesota (1962); National Defense Education Act Fellowship (1964-1967); Research Soil Scientist, U.S. Water Conservation Laboratory, Agricultural Research Service, U.S. Department of Agriculture (1967-1974); Editorial Board Member, Agricultural and Forest Meteorology Journal (1972-1993); Secretary, American Meteorological Society, Central Arizona Chapter (1973-1974); Vice-Chair, American Meteorological Society, Central Arizona Chapter (1974-1975); Research Physicist, U.S. Water Conservation Laboratory, Agricultural Research Service, U.S. Department of Agriculture (1974-2001); Chair, American Meteorological Society, Central Arizona Chapter (1975-1976); Arthur S. Flemming Award (1977); Secretary, Sigma Xi - The Research Society, Arizona State University Chapter (1979-1980); President, Sigma Xi - The Research Society, Arizona State University Chapter (1980-1982); Member, Task Force on "Alternative Crops", Council for Agricultural Science and Technology (1983); Adjunct Professor of Geography and Plant Biology, Arizona State University (1984-2007); Editorial Board Member, Environmental and Experimental Botany Journal (1993-Present); Member, Botanical Society of America; Member, American Geophysical Union; Member, American Society of Agronomy; ISI Highly Cited Researcher; President, Center for the Study of Carbon Dioxide and Global Change (2001-Present) Idso: "I presume that all of the original basic scientific research articles of which I am an author that appear on the list were written while I was an employee of the USDA's Agricultural Research Service; and, therefore, the only source of funding would have been the U.S. government. I retired from my position as a Research Physicist at the U.S. Water Conservation Laboratory in late 2001 and have not written any new reports of new original research. Since then, I have concentrated solely on studying new research reports written by others that appear each week in a variety of different scientific journals and writing brief reviews of them for the CO2Science website. In both of these segments of my scientific career, I have always presented -- and continue to present -- what I believe to be the truth. Funding never has had, and never will have, any influence on what I believe, what I say, and what I write." Conclusion: The scientists unjustly attacked in the Carbon Brief article are not "linked to" [funded by] ExxonMobil. The Carbon Brief and any other website perpetuating this smear should issue a retraction.

#### Claiming that our authors are biased because of funding is both false and also on the level of Nazi/Marxist policy

**Reisman 06** George Reisman, contributor to the Ludwig von Mises Institute and “the author of Capitalism: A Treatise on Economics and Pepperdine University Professor Emeritus of Economics” June 29 2006 “CO2 Science’s Finding on Global Warming: A Marxist-Type Response” http://archive.mises.org/5248/co2-sciences-finding-on-global-warming-a-marxist-type-response/

One of the very first replies to my posting of [CO2 Science’s](http://www.co2science.org/scripts/CO2ScienceB2C/Index.jsp) journal review [“A 221-Year Temperature History of the Southwest Coast of Greenland”](http://blog.mises.org/archives/005235.asp) was this: “‘CO2 Science’ is funded by Exxon. Come on, you guys are usually such independent thinkers you can do better than rehash this stuff.” The author of this statement believes that it is sufficient to name the economic affiliation of an individual or organization to be able to dismiss and ignore anything that comes from them. This was a tactic employed for generations by the Marxists. Instead of refuting the criticisms leveled against their doctrines by economists and others, they were content to identify critics as a member of the capitalist class or as having received financial support from capitalists. The Nazis had their own variant of the practice. They were content to identify their critics as Jewish or as somehow supported by Jews or otherwise affiliated with Jews. The devastating criticisms of socialism made by Mises were dismissed on both grounds. Now, today, here is Exxon. I don’t even know that it is the source of funds for CO2 Science, or is the major or only source. But I’m willing to assume that it is. How does it follow from that, that whatever comes from CO2 Science, or from Exxon, on the subject of global warming and CO2 emissions is automatically false? Yes, it is true that Exxon-Mobil is the largest American oil company and wants to be able to remain in that branch of business, while the environmental movement would like to destroy it, and the whole rest of the oil industry, along with the coal and atomic power industries, and is using the alleged connection between global warming and CO2 emissions as its main weapon in its attempt to do so. (This weapon, of course, does not apply in the case of atomic power. But atomic power is regarded by the environmental movement as a terrifying death ray, even more frightening than global warming.) So, yes, Exxon may have a financial self-interest at stake, which depends on whether or not there is a real connection between the CO2 emitted by the consumption of its fuels and global warming. Its financial self-interest may very well lie with the establishment of lack of any connection. As a minor digression, I need to point out that this is not necessarily the case. To the extent that the environmental movement succeeds in making petroleum scarcer and more expensive, the revenues and profits earned by the owners of existing petroleum reserves rise. Major oil companies like Exxon-Mobil have actually gained in this way and have been severely criticized for these gains. In fact, some of their critics seem to imply that oil companies are, or at least should be, actual supporters of the environmental movement, precisely because it makes oil scarcer and more expensive and thus increases their profits to the extent that they already have reserves. I have to say that I believe that the norm of competition within the oil industry, as well as its pride in the products it produces, prevents any such monopolistic, pro-environmentalist mindset. The individual oil company knows that its self-interest lies with an increase in its reserves, because whatever the effect on the overall supply and price of petroleum, its own situation would be worse if others added those reserves instead of it. Because then, it would be faced with the same lower price, but have less to sell. So, granted, the individual oil companies, like Exxon Mobil, have a financial self-interest in the continued and growing production of petroleum and are glad to find any evidence they can that diminishes the threat of the environmentalist agenda. The relevant question is, which better serves their self-interest in accomplishing this? Is it to fabricate the facts or to find the actual facts and present them if they support its case? Or, to say the same thing in different words, which is the better defense of their self-interest: The actual truth if it supports their case? Or simply lies? In the United States, we are fortunate to have both a long-standing tradition and clear Constitutional protection of a defendant’s right in a criminal trial not to testify. What the Marxists and Nazis and those who are following in their path today are seeking is the equivalent of a prohibition of a defendant’s right to testify. Individuals, corporations, industries, are to be subject to attack by those who seek to injure or destroy them, and they are to be prohibited from defending themselves by virtue of people being unwilling listen to what they have to say. They are not to be listened to for no other reason than that their avoidance of injury and their survival matters to them. They have an “interest” in the outcome. Yes, they do. And they have a right to be heard for that very reason! Because their best defense is truth.

### AT: Ozone

#### O3 doesn’t affect plant productivity

**Gray et al. 10 –** 7/19/10. – Sharon B. Gray has a Ph.D. in Plant Biology from the University of Illinois at UrbanaChampaign [Sharon B., Orla Dermoda, and Evan H. DeLucia. "Journal of Experimental Botany." Spectral Reflectance from a Soybean Canopy Exposed to Elevated CO2 and O3. Oxford Journals, 19 July 2010. <http://jxb.oxfordjournals.org/content/61/15/4413.short>.MR

By affecting the physiology and structure of plant canopies, increasing atmospheric CO2 and O3 influence the capacity of agroecosystems to capture light and convert that light energy into biomass, ultimately affecting productivity and yield. The objective of this study was to determine if established remote sensing indices could detect the direct and interactive effects of elevated CO2 and elevated O3 on the leaf area, chlorophyll content, and photosynthetic capacity of a soybean canopy growing under field conditions. Large plots of soybean (*Glycine max*) were exposed to ambient air (∼380 μmol CO2 mol−1), elevated CO2 (∼550 μmol mol−1), elevated O3 (1.2× ambient), and combined elevated CO2plus elevated O3 at the soybean free air gas concentration enrichment (SoyFACE) experiment. Canopy reflectance was measured weekly and the following indices were calculated from reflectance data: near infrared/red (NIR/red), normalized difference vegetation index (NDVI), canopy chlorophyll content index (chl. index), and photochemical reflectance index (PRI). Leaf area index (LAI) also was measured weekly. NIR/red and LAI were linearly correlated throughout the growing season; however, NDVI and LAI were correlated only up to LAI values of ∼3. Season-wide analysis demonstrated that elevated CO2 significantly increased NIR/red, PRI, and chl. index, indicating a stimulation of LAI and photosynthetic carbon assimilation, as well as delayed senescence; however, analysis of individual dates resolved fewer statistically significant effects of elevated CO2. Exposure to elevated O3 decreased LAI throughout the growing season. Although NIR/red showed the same trend, the effect of O3 on NIR/red was not statistically significant. Season-wide analysis showed significant effects of O3 on PRI; however, analysis of individual dates revealed that this effect was only statistically significant on two dates. Elevated O3 had minimal effects on the total canopy chlorophyll index. PRI appeared to be more sensitive to decreased photosynthetic capacity of the canopy as a whole compared with previously published single leaf gas exchange measurements at SoyFACE, possibly because PRI integrates the reflectance signal of older leaves with accumulated O3 damage and healthy young, upper canopy leaves, enabling detection of significant decreases in photosynthetic carbon assimilation which have not been detected in previous studies which measured gas exchange of upper canopy leaves. When the canopy was exposed to elevated CO2 and O3 simultaneously, the deleterious effects of elevated O3 were diminished. Reflectance data, while less sensitive than direct measurements of physiological/structural parameters, corroborate direct measurements of LAI and photosynthetic gas exchange made during the same season, as well as results from previous years at SoyFACE, demonstrating that these indices accurately represent structural and physiological effects of changing tropospheric chemistry on soybean growing in a field setting.

### AT: Can’t Adapt

#### Plants adapt to elevated CO2

**Franks et al, 12** (Peter, professor of biological oceanography at MIT, “Physiological framework for adaptation of stomata to CO2 from glacial to future concentrations”, Philosophical transactions of the Royal Society of London, Series B, Biological sciences Vol. 367, Issue 1588, pg. 538, 2/19/12, AD: 6/23/12 | Sina)

\*\*Note: *c*a = atmospheric CO2 concentration, *g*c(max) = maximum diffusive conductance to CO2, S = size of stomata on the leaf surface, D = density of stomata\*\*

In response to short-term fluctuations in atmospheric CO2 concentration, *c*a, plants adjust leaf diffusive conductance to CO2, *g*c, via feedback regulation of stomatal aperture as part of a mechanism for optimizing CO2 uptake with respect to water loss. The operational range of this elaborate control mechanism is determined by the maximum diffusive conductance to CO2, *g*c(max), which is set by the size (*S*) and density (number per unit area, *D*) of stomata on the leaf surface. Here, we show that, in response to long-term exposure to elevated or subambient *c*a, plants alter *g*c(max) in the direction of the short-term feedback response of *g*c to *c*a via adjustment of *S* and *D*. This adaptive feedback response to *c*a, consistent with long-term optimization of leaf gas exchange, was observed in four species spanning a diverse taxonomic range (the lycophyte *Selaginella uncinata*, the fern *Osmunda regalis* and the angiosperms *Commelina communis* and *Vicia faba*). Furthermore, using direct observation as well as flow cytometry, we observed correlated increases in *S*, guard cell nucleus size and average apparent 1C DNA amount in epidermal cell nuclei with increasing *c*a, suggesting that stomatal and leaf adaptation to *c*a is linked to genome scaling.

### AT: Phospherous Limitation

#### Overcomes Deficiency

**Idso’s, 12** [Sherwood PhD and former research physicist for the Department of Agriculture, Keith PhD Botany, Craig PhD Geography, April 11th, 2012. “Interactive Effects of CO2 and Phosphorus on Plant Growth”, http://www.co2science.org/subject/p/summaries/phosphorus.php] DHirsch

Under current ambient conditions, plant growth and development are typically carbon-limited, which is why plants generally exhibit increased growth and biomass production in response to atmospheric CO2enrichment. Next to carbon, nitrogen is usually the second most limiting nutrient to plant growth, followed by phosphorus. Thus, although it is a less significant component of plant tissues than carbon and nitrogen, phosphorus is still required for successful life-cycle completion in many plant species; and, therefore, it is prudent to investigate aspects of plant phosphorus acquisition and biomass production in response to atmospheric CO2 enrichment when phosphorus concentrations in soils are less than optimal. In an early study of the subject, [Barrett *et al*. (1998)](http://www.co2science.org/articles/V2/N8/B1.php) demonstrated that a doubling of the air's CO2 content under continuous phosphorus deficiency increased wheat root phosphatase activity by 30 to 40%, thus increasing the inorganic phosphorus supply for plant utilization. As phosphatase is the primary enzyme responsible for the mineralization of organic phosphate, which thereby makes phosphorus available for plant use, an increase in its activity with elevated CO2 could facilitate sustained plant growth responses to the ongoing rise in the air's CO2 content, even in areas where growth is currently limited by phosphorous deficiencies. Furthermore, because these increases in phosphatase activity were also observed under sterile growing conditions, this observation indicates that this response can be mediated directly by plant roots without involving soil microorganisms, which are already known to aid in phosphorus mineralization. As the air's CO2 content thus continues to rise, phosphatase activity in wheat roots should increase, thereby converting organic phosphorus into inorganic forms that can be used to support the increased plant growth and development that is stimulated by higher CO2 concentrations. And because a similar increase in phosphatase activity at elevated CO2 has already been reported for a native Australian pasture grass, these results may be applicable to most of Earth's vegetation. If this is indeed the case, then plants that are currently phosphorus limited in their growth might increase their phosphorous acquisition from soil organic supplies as the atmospheric CO2 concentration increases; and this phenomenon, in turn, may allow them to sequester even greater amounts of carbon from the air as the atmosphere's CO2 concentration climbs ever higher.

### AT: Water Limitation

#### CO2 allows crops to retain water – increases efficiency to 110% by 2040

**Hatfield, 11** - Laboratory Director, National Laboratory for Agriculture and the Environment, the Chair of the Management Systems Evaluation Areas (MSEA) and Agricultural Systems for Environmental Quality (ASEQ) programs, (J.L., “Climate Impacts on Agriculture: Implications for Crop Production”, American Society of Agronomy, 03/2011, American Society of Agronomy | JJ)

In the early stages of crop development, increases in leaf area are proportional to growth rate and transpiration increases as leaf area increases (Ritchie, 1972). As plants develop, there is an increase in mutual shading and interference among leaves within a plant canopy which causes plant transpiration to increase at a diminishing rate with increasing leaf area index (LAI) and asymptotically leveling at LAIs > 4 m2 m−2, progressively uncoupling transpiration from changes in LAI (Ritchie, 1972; Villalobos and Fereres, 1990; Sau et al., 2004). Doubling of atmospheric CO2 from present-day levels will increase average C3 species growth on the order of 30% under optimum conditions (e.g., Kimball, 1983, 2007, 2010; Kimball et al., 2002) with the expectation that an increase to 440 μmol mol−1 would increase C3 plant growth on the order of 10%. Since T is most tightly coupled to changes in growth when plants are small and less after canopy closure, the overall impact of changes in CO2 via LAI effect are expected to be small. Of greater importance is the duration of leaf area which will directly affect total seasonal crop water requirements. In determinate cereal crops that are adapted to today's temperature and growing-season length, increasing temperature will hasten plant maturity reducing leaf area duration with an overall reduction in total season water requirement. However, if alternative crops or perennial crops or varieties adapted to the higher temperatures and longer growing season are used, crop water requirements would likely increase. However, a direct effect of increasing atmospheric CO2 is to cause partial stomatal closure. The result decreases conductance for water vapor loss from leaves to the atmosphere. A summary of the information available from chamber-based studies on the effects of elevated CO2 on stomatal conductance have shown, on average, that doubling CO2 reduces stomatal conductance by nearly 34% (e.g., Kimball and Idso, 1983). Morison (1987) found an average reduction of about 40% for both C3 and C4 species. Wand et al. (1999), after a meta-analysis on wild C3 and C4 grass species, grown with no stresses, concluded that elevated CO2 reduced stomatal conductance by 39% in C3 and 29% in C4 species. In soybean, the reduction in conductance was about 40% for a doubling of CO2 (Ainsworth et al., 2002; Ainsworth and Rogers, 2007). Ainsworth and Long (2005) did not observe significant differences in stomatal conductance of two C3 and C4 species when they summarized results from free-air CO2 enrichment experiments where daytime CO2 concentrations were increased from present to 550 to 600 μmol mol−1 They found an average reduction in stomatal conductance of 20%. Thus, increases in atmospheric CO2 concentration to nearly 450 μmol mol−1 as estimated (IPCC, 2007) by 2040 likely will cause reductions of approximately 10% in stomatal conductance. Such a reduction in leaf-level stomatal conductance, when considered with energy balance in the whole canopy, should lead to decreases in transpiration and potential positive impacts on crop WUE.

### AT: Nitrogen Limitation

#### They’re wrong – plants and soil compensate for increased CO2 by naturally increasing nitrogen levels

**The Idsos, 12** (Sherwood, Keith, Craig, founder (Craig)/members of the Center for the Study of Carbon Dioxide and Global Change, “The Progressive Nitrogen Limitation Hypothesis: Notoriously Famous ... but Fading Fast”, 2/8/12, AD: 6/20/12, <http://www.co2science.org/articles/V15/N6/EDIT.php> | Sina)

The progressive nitrogen limitation hypothesis posits that low concentrations of soil nitrogen will gradually curtail the ability of the productivity-enhancing effect of atmospheric CO2 enrichment to maintain increased plant growth and ecosystem carbon sequestration rates as time progresses (Hungate et al., 2003; Luo et al., 2004). In introducing their impressive new study of the subject, however, Hofmockel et al. (2011) report the observational fact that "several free-air CO2 enrichment (FACE) experiments in North America have shown a continual stimulation in forest productivity under elevated CO2 over time scales nearly reaching a decade (Finzi et al., 2006; Norby and Iversen, 2006; Zak et al., 2007; McCarthy et al., 2010)." And in their most recent examination of the effects of elevated CO2 on nitrogen (N) cycling in the Duke Forest - where they indicate that elevated atmospheric CO2 concentrations have "consistently stimulated forest productivity" throughout the decade-long experiment being conducted there - they go on to provide "an integrated understanding" of this phenomenon that serves as "a basis for inferring how C and N cycling in this forest may respond to elevated CO2 beyond the decadal time scale." "Using natural-abundance measures of nitrogen isotopes together with an ecosystem-scale 15N tracer experiment," as the six scientists describe it, they "quantified the cycling of 15N in plant and soil pools under ambient and elevated CO2 over three growing seasons to determine how elevated CO2 changed nitrogen cycling between plants, soil and microorganisms," after having first measured natural-abundances of 15N in plant and soil pools within the two CO2 treatments over the prior year. And as a result of these efforts, they discovered that "at the Duke FACE site, the rate at which N is being sequestered in plant biomass is greater than the rate of atmospheric deposition and heterotrophic N fixation," which has also been established by the work of Finzi et al. (2002), Hofmockel and Schlesinger (2007) and Sparks et al. (2008), all of which findings suggest, in their words, that "soil organic matter decomposition supplies a significant fraction of plant N in both ambient and elevated-CO2 conditions, but that this is greater under elevated CO2." Based on these real-world experimental observations, Hofmockel et al. conclude that "in pine forests of the southeastern United States, rising CO2 may elicit shifts in the mechanisms by which plants acquire nitrogen, allowing a sustained increase in net primary productivity for decades," while further opining that "increased mineralization of nitrogen in the organic and 0-15 cm mineral horizon and deeper rooting are likely sustaining the elevated CO2 enhancement of net primary productivity."

**Experiments disprove the nitrogen limitation hypothesis—forests act as a negative feedback**

**NIPCC 11** – Nongovernmental International Panel on Climate Change, international panel of nongovernment scientists and scholars who have come together to understand the causes and consequences of climate change (“The Progressive Nitrogen Limitation Hypothesis”, 14 June 2011, http://www.nipccreport.org/articles/2011/jun/14jun2011a5.html)//BI

Writing as background for their study, Austin et al. (2009) note that for long-lived organisms such as trees, which are suddenly and continuously exposed to elevated atmospheric CO2 concentrations, sustained CO2-induced increases in vegetative productivity require a steady supply of plant available nitrogen, citing the work of Luo *et al*. (2004), who suggest that as time progresses, this important soil resource will gradually be reduced to where it is no longer sufficient to maintain the initial large increases in tree productivity, according to the dictates of the progressive nitrogen limitation (PNL) hypothesis, which posits that CO2-induced increases in carbon input to an ecosystem's soil will stimulate soil microbial activity and thereby immobilize a greater portion of the soil's nitrogen, rendering it less available to the ecosystem's plants and thus reducing their growth rates. Working at the long-running (ten years) FACE experiment being conducted within an initially eight-year-old sweetgum (*Liquidambar styraciflua* L.) plantation at the Oak Ridge National Experimental Research Park in Roane County, Tennessee (USA), Austin et al. tested the PNL hypothesis by examining "bacterial community structure using culture-independent molecular techniques (16S rRNA gene cloning analysis), microbial community function using extracellular enzyme activity, and nitrogen cycling rates using laboratory incubations." The five researchers report that "elevated CO2 had no detectable effect on microbial community structure using 16S rRNA gene clone libraries, on microbial activity measured with extracellular enzyme activity, or on potential soil mineralization and nitrification rates," noting that "these results support findings at other forested Free Air CO2 Enrichment (FACE) sites." Given such findings, Austin *et al*. conclude that "since no effects (adverse or otherwise) have been observed on bacterial communities and functional activity in this study," as well as in other forest FACE studies, "increased carbon inputs may continue to accumulate within the soil," noting further that "if excess carbon is sequestered in soil carbon pools, forests may act as a negative feedback to increased global carbon emissions," citing the work of Houghton *et al*. (1999) in this regard.

**Elevated CO2 causes microbes to decompose more soil organic matter, increasing nitrogen levels**

**NIPCC 3/7** – Nongovernmental International Panel on Climate Change, international panel of nongovernment scientists and scholars who have come together to understand the causes and consequences of climate change (“The Progressive Nitrogen Limitation Hypothesis”, 7 March 2012, http://www.nipccreport.org/articles/2011/jun/14jun2011a5.html)//BI

De Graaff et al. (2009) introduce their study of the Progressive Nitrogen Limitation or PNL Hypothesis by stating it "posits that in unfertilized ecosystems, nitrogen availability progressively decreases under elevated CO2, because N retention in soil and vegetation is stimulated," and that "this ultimately leads to a decline in plant growth and a concomitant decrease in soil carbon sequestration." In a synthesis of results on plant growth and soil nutrient cycling under elevated CO2 in long-term field experiments, however, they say they showed that "under low N availability elevated CO2 still stimulated plant production by ~10%, even though data suggested that PNL had developed in these ecosystems (de Graaff et al., 2006)." In addition, they note that "plant production and soil C contents continue to increase under elevated CO2 in the Duke [Forest] FACE experiment, despite there being no evidence of increased net N mineralization or nutrient-use efficiency (Finzi et al., 2001; Johnson, 2006; Finzi et al., 2006)," and they say that "this suggests that an unexplained internal source of N can alleviate PNL in unfertilized ecosystems exposed to long-term elevated CO2." So how is it done? Giving others their due, the three researchers write that "Hungate and Chapin (1995) postulated that if mineral nutrients are scarce in soils, microbes utilize rhizodeposits as a carbon-source, and decompose more soil organic matter in order to acquire nutrients," so that "more N is then moved into the active N pool in the soil where, eventually, [it] may be made available to plants." Noting that "this process is referred to as priming, which is defined as the stimulation of soil organic matter decomposition caused by the addition of labile substrates (Jenkinson et al., 1985; Dalenberg and Jager, 1989)," de Graaff et al. (2009) go on to say that "since elevated CO2 frequently stimulates rhizodeposition - an important contributor to labile soil C inputs - and increases decomposition of soil organic matter, priming of more recalcitrant soil organic matter may be the mechanism partially responsible for alleviating PNL under elevated CO2 in low N environments." This concept served as the stimulus for the study of de Graaff et al. (2009), where, as they describe it, various genotypes of two subspecies of spring wheat "were grown for one month in microcosms, exposed to 13C labeling at ambient (392 ppm) and elevated (792 ppm) CO2 concentrations, in soil containing 15N predominantly incorporated into recalcitrant soil organic matter pools," at the conclusion of which period the plants were harvested and numerous plant and soil properties assessed. This work revealed, in their words, that "decomposition of stable soil C increased by 43%, root-derived soil C increased by 59%, and microbial-13C was enhanced by 50% under elevated compared to ambient CO2," and that, concurrently, "plant 15N uptake increased (+7%) under elevated CO2 while 15N contents in the microbial biomass and mineral N pool decreased." As for the implications of these findings, the three researchers say they suggest that "increased rhizodeposition under elevated CO2 can stimulate mineralization of N from recalcitrant soil organic matter pools," thereby "preventing N limitation in ecosystems exposed to long-term elevated atmospheric CO2." And in light of the many items reviewed previously in our Topical Archive under the general heading of Nitrogen (Progressive Limitation Hypothesis) -- which demonstrate the absence of the PNL phenomenon in a wide variety of settings -- de Graaff et al.'s conclusions appear to be pretty much on the mark.

**Multiple studies and the palaeo-record prove increased plant productivity due to elevated CO2 is sustainable**

**NIPCC 5/16** – Nongovernmental International Panel on Climate Change, international panel of nongovernment scientists and scholars who have come together to understand the causes and consequences of climate change (“The Progressive Nitrogen Limitation Hypothesis”, 16 May 2012, http://www.nipccreport.org/articles/2011/jun/14jun2011a5.html)//BI

In the introduction to their insightful study of ecosystem effects of rising atmospheric CO2 concentrations, Prentice and Harrison (2009) bemoan "the relative neglect of CO2 effects in Quaternary palaeoecology" - a problem long ago noted by Idso (1989) - which they suggest "has been encouraged by an influential school of thought in contemporary biogeochemistry [that] questions the relevance of plant-physiological effects of CO2 over the long term and at the ecosystem scale (e.g. Korner, 2000)," based on what they describe as "a much-debated hypothesis" that suggests that "limitations in the supply of nitrogen needed to support increased plant growth should over time reduce or eliminate any effect of atmospheric CO2 concentration on net primary productivity." What is more, the two authors note that "clear evidence in support of this 'progressive nitrogen limitation' (PNL) hypothesis has not emerged to date (see e.g. Moore et al., 2006)," adding that "it is well established that elevated CO2 can increase net primary productivity, even in ecosystems where nitrogen supply is demonstrably limiting to plant growth (e.g. Lloyd and Farquhar, 1996, 2000; Nowak et al., 2004." Consequently, the two researchers set out to once again demonstrate (as has been done multiple times before) the consistent and enduring positive growth response of entire ecosystems to atmospheric CO2 enrichment over prolonged periods of time, which phenomenon is the absolute antithesis of the progressive nitrogen limitation hypothesis. Specifically, what Prentice and Harrison did was to examine various aspects of the palaeorecord to see if they were either consistent or inconsistent with the PNL hypothesis. In doing so, they determined that (1) "reduced terrestrial carbon storage during glacials, indicated by the shift in stable isotope composition of dissolved inorganic carbon in the ocean, cannot be explained by climate or sea-level changes," but that it is "consistent with predictions of current process-based models that propagate known physiological CO2 effects into net primary production at the ecosystem scale," and that (2) "restricted forest cover during glacial periods, indicated by pollen assemblages dominated by non-arboreal taxa, cannot be reproduced accurately by palaeoclimate models unless CO2 effects on C3-C4 plant competition are also modeled." And as a result of these observations, the two scientists say they "do not find support for the opinion (e.g. Korner, 2000)" - which "questions the relevance of plant-physiological effects of CO2 over the long term and at the ecosystem scale" - "that other constraints [such as low soil nitrogen concentrations] effectively eliminate the ecosystem-level effects of changing CO2 concentration on carbon storage over long time scales," further concluding that "the palaeo-record also supports the attribution of increases in the woody component of tropical savannas to physiological effects of rising CO2." These findings, as well as those of many other researchers that are documented in reviews of their work archived under the heading of Nitrogen (Progressive Limitation Hypothesis) in our Topical Archive, totally refute theoretical model studies (see Thornton et al., 2009), that has been touted by climate alarmists as suggesting that the aerial fertilization effect of the ongoing rise in the air's CO2 content will not allow Earth's vegetation to extract as much carbon from the atmosphere as real-world experiments indicate it will. Much to the contrary, the growth-promoting effect of the upward trend in the atmosphere's CO2 concentration is here to stay; and it will only increase in prowess as the air's CO2 content continues to rise.

**Plants in elevated CO2 can use soil nitrogen more effectively and supply is sustainable**

**Idsos 2/8** – Keith E. Idso, Vice President of the Center for the Study of Carbon Dioxide and Global Change, received his B.S. in Agriculture with a major in Plant Sciences from the University of Arizona and his M.S. from the same institution with a major in Agronomy and Plant Genetics, completed his Ph.D. in Botany at Arizona State University; Sherwood B. Idso, President of the Center for the Study of Carbon Dioxide and Global Change, was a Research Physicist with the U.S. Department of Agriculture's Agricultural Research Service at the U.S. Water Conservation Laboratory in Phoenix, Arizona, Bachelor of Physics, Master of Science, and Doctor of Philosophy degrees are all from the University of Minnesota, author or co-author of over 500 scientific publications; and Craig D. Idso, founder and chairman of the board of the Center for the Study of Carbon Dioxide and Global Change, received his B.S. in Geography from Arizona State University, his M.S. in Agronomy from the University of Nebraska - Lincoln, and his Ph.D. in Geography from Arizona State University, where he studied as one of a small group of University Graduate Scholars (“The Progressive Nitrogen Limitation Hypothesis: Notoriously Famous ... but Fading Fast”, CO2 Science, 8 February 2012, http://www.co2science.org/articles/V15/N6/EDIT.php)//BI

The progressive nitrogen limitation hypothesis posits that low concentrations of soil nitrogen will gradually curtail the ability of the productivity-enhancing effect of atmospheric CO2 enrichment to maintain increased plant growth and ecosystem carbon sequestration rates as time progresses (Hungate et al., 2003; Luo et al., 2004). In introducing their impressive new study of the subject, however, Hofmockel et al. (2011) report the observational fact that "several free-air CO2 enrichment (FACE) experiments in North America have shown a continual stimulation in forest productivity under elevated CO2 over time scales nearly reaching a decade (Finzi et al., 2006; Norby and Iversen, 2006; Zak et al., 2007; McCarthy et al., 2010)." And in their most recent examination of the effects of elevated CO2 on nitrogen (N) cycling in the Duke Forest - where they indicate that elevated atmospheric CO2 concentrations have "consistently stimulated forest productivity" throughout the decade-long experiment being conducted there - they go on to provide "an integrated understanding" of this phenomenon that serves as "a basis for inferring how C and N cycling in this forest may respond to elevated CO2 beyond the decadal time scale." "Using natural-abundance measures of nitrogen isotopes together with an ecosystem-scale 15N tracer experiment," as the six scientists describe it, they "quantified the cycling of 15N in plant and soil pools under ambient and elevated CO2 over three growing seasons to determine how elevated CO2 changed nitrogen cycling between plants, soil and microorganisms," after having first measured natural-abundances of 15N in plant and soil pools within the two CO2 treatments over the prior year. And as a result of these efforts, they discovered that "at the Duke FACE site, the rate at which N is being sequestered in plant biomass is greater than the rate of atmospheric deposition and heterotrophic N fixation," which has also been established by the work of Finzi et al. (2002), Hofmockel and Schlesinger (2007) and Sparks et al. (2008), all of which findings suggest, in their words, that "soil organic matter decomposition supplies a significant fraction of plant N in both ambient and elevated-CO2 conditions, but that this is greater under elevated CO2." Based on these real-world experimental observations, Hofmockel et al. conclude that "in pine forests of the southeastern United States, rising CO2 may elicit shifts in the mechanisms by which plants acquire nitrogen, allowing a sustained increase in net primary productivity for decades," while further opining that "increased mineralization of nitrogen in the organic and 0-15 cm mineral horizon and deeper rooting are likely sustaining the elevated CO2 enhancement of net primary productivity."

**New studies prove nitrogen limitation doesn’t occur in elevated CO2**

**Hofmockel et al. 11** – Kirsten S., PhD, Ecology, Biogeochemistry, Global Climate Change, assistant professor in the Ecology, Evolution and Organismal Biology Department at Iowa State University; Anne Gallet-Budynek, Ph.D., Natural Sciences, ETH Zurich (Zurich, Switzerland), previously a Post-doctoral fellow at the Boston University, Biology Department; Heather R. McCarthy, Bachelor of Science degree in Physics from Brown University, a Master of Science in Environmental Sciences from the University of Virginia, and a Ph.D. in Natural Resources from the University of New Hampshire Institute for the Study of Earth, Oceans and Space; William S. Currie, Associate Professor and Associate Dean, School of Natural Resources and Environment, University of Michigan; Robert B. Jackson, Nicholas Professor of Global Environmental Change, Associate Dean for Research and Professor of Biology, Earth & Ocean Sciences; Adrien Finzi, PhD, University of Connecticut, Professor of Biology at Boston University (“Sources of increased N uptake in forest trees growing under elevated CO2: results of a large-scale 15N study”, Global Chance Biology, 7 July 2011, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2011.02465.x/)//BI

A major source of uncertainty in calculating the potential for long-term biological carbon sequestration is the demand and availability of soil nitrogen (N; Field, 1999; Hungate et al., 2003; Matthews, 2007). For example, it has been theorized that an initial increase in plant N uptake and subsequent decrease in soil N availability under elevated CO2 could reduce the enhanced plant growth response over the longer term, thereby decreasing net primary productivity (NPP) and the potential for C sequestration in terrestrial ecosystems (Luo & Reynolds, 1999; Thornton et al., 2007; Zaehle et al., 2010). Immobilization of N in plant biomass and soil organic matter (SOM) can feedback to affect negatively plant growth, and may ultimately lead to progressive N limitation (PNL) of CO2-mediated growth enhancement (Mcguire et al., 1995; Luo & Reynolds, 1999). However, several free-air CO2 enrichment (FACE) experiments in North America have shown a continual stimulation in forest productivity under elevated CO2 over time scales nearly reaching a decade (Finzi et al., 2006a; Norby & Iversen, 2006; Zak et al., 2007; McCarthy et al., 2010); although reduced CO2-mediated growth enhancement has recently been documented at the Oak Ridge, TN experiment (Norby et al., 2010). It is unclear if, and under what conditions, this stimulation will persist for decades to centuries, including whether N cycling in the plant–soil system will be able to support continued high rates of NPP (Norby et al., 2010). If PNL were occurring at the Duke FACE experiment, we would expect the CO2-mediated growth enhancement to diminish. By contrast, after more than a decade of CO2 treatment, there is little evidence that PNL is occurring in the replicated Duke experiment based on evidence from aboveground or total NPP (Finzi et al., 2007).

**Nitrogen is sustainable for decades in elevated CO2**

**Hofmockel et al. 11** – Kirsten S., PhD, Ecology, Biogeochemistry, Global Climate Change, assistant professor in the Ecology, Evolution and Organismal Biology Department at Iowa State University; Anne Gallet-Budynek, Ph.D., Natural Sciences, ETH Zurich (Zurich, Switzerland), previously a Post-doctoral fellow at the Boston University, Biology Department; Heather R. McCarthy, Bachelor of Science degree in Physics from Brown University, a Master of Science in Environmental Sciences from the University of Virginia, and a Ph.D. in Natural Resources from the University of New Hampshire Institute for the Study of Earth, Oceans and Space; William S. Currie, Associate Professor and Associate Dean, School of Natural Resources and Environment, University of Michigan; Robert B. Jackson, Nicholas Professor of Global Environmental Change, Associate Dean for Research and Professor of Biology, Earth & Ocean Sciences; Adrien Finzi, PhD, University of Connecticut, Professor of Biology at Boston University (“Sources of increased N uptake in forest trees growing under elevated CO2: results of a large-scale 15N study”, Global Chance Biology, 7 July 2011, http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2486.2011.02465.x/)//BI

There has been much speculation about the sustainability of high NPP in response to elevated CO2 in N limited ecosystems (Field, 1999; Luo et al., 2004; Finzi et al., 2006b; Hungate et al., 2006; Norby & Iversen, 2006; Zak et al., 2007). Labeling forests with 15N has provided information about the short- and long-term fate of N and has led to insights regarding global C cycling. At the Duke FACE site, the rate at which N is being sequestered in plant biomass is greater than the rate of atmospheric deposition and heterotrophic N fixation (Finzi et al., 2002; Hofmockel & Schlesinger, 2007; Sparks et al., 2008), suggesting that SOM decomposition supplies a significant fraction of plant N in both ambient and elevated-CO2 conditions, but that this is greater under elevated CO2 (Fig. 1j). The results from natural abundance data and this 15N tracer experiment suggest that in pine forests of the southeastern United States, rising CO2 may elicit shifts in the mechanisms by which plants acquire N, allowing a sustained increase in NPP for decades. Our study suggests that increased mineralization of N in the organic and 0–15 cm mineral horizon and deeper rooting are likely sustaining the elevated CO2 enhancement of NPP.

### AT: Less Nutrient Concentration

#### Their evidence is overblown and the root/soil interaction increases general nutrient intake

**Duval et al, 11 –** (1) Department of Biological Sciences, Northern Arizona University, (2) School of Natural Sciences, University of California at Merced, (3) Merriam Powell Center for Environmental Research, Flagstaff, AZ, (4) Present address: Energy Biosciences Institute, University of Illinois at Urbana-Champaign, Urbana, IL (Benjamin D., Paul Dijkstra, Bruce A. Hungate, and Joseph C. Blankinship, “CO2 effects on plant nutrient concentration depend on plant functional group and available nitrogen: a meta-analysis”, Plant Ecol, 11/11/11, SpringerLink | JJ)

Our meta-analysis showed that while elevated CO2 tends to lower the concentration of nutrients in plants, we also observed increased nutrient concentrations. The effects of elevated CO2 on mineral nutrition depend on the speciﬁc element, plant functional group, plant organ, N availability, and, in some cases the level of CO2 enrichment. These results challenge the assumption that plant nutrient concentrations are generally lowered by elevated CO2 strictly on the basis carbohydrate dilution (Loladze 2002). Moreover, most nutrients exhibited dilution under elevated CO2 that was less than expected (Fig. 5), suggesting that mechanisms related to soil/root interactions under elevated CO2 perhaps increase nutrient uptake and mask effects of carbohydrate production

#### Turn – Increased CO2 makes Nitrogen more efficient

**Yu and Gao, 2** - MOE Key Lab of Environmental Change and Natural Disasters, Institute of Resources Science, Beijing Normal University (M. and Q., “Simulating Interactive Effects of Symbiotic Nitrogen Fixation, Carbon Dioxide Elevation, and Climatic Change on Legume Growth”, J. ENVIRON. QUAL., VOL. 31, March/April 2002, <https://www.agronomy.org/publications/jeq/pdfs/31/2/634> | JJ)

Figure 2 illustrates the simulated total and green biomass, with and without nitrogen fixation, under the two levels of CO2. Simulated peak values of total and green biomass are shown in Table 1. It can be seen that both CO2 and symbiotic nitrogen fixation have positive effects on plant growth. The model with nitrogen fixation (C0N1) yielded 20% more total biomass and 13% more green biomass than the model without nitrogen fixation (C0N0) under the present CO2concentration. In comparison, doubling CO2 concentration amplified the effects of symbiotic nitrogen fixation. A 30% increase in maximum total biomass and a 19% increase in maxi mum green biomass with nitrogen fixation were obtained for doubled CO2 concentration. Figure 2 also indicates that symbiotic nitrogen fixation tended to pro mote the responses of plant growth to enrichment of the atmospheric CO2. With nitrogen fixation, the total and green biomass under doubled CO2 concentration were respectively 65 and 44% larger than those under the present CO2 concentration, compared with only 52 and 37% induced increases in these quantities without nitrogen fixation.

### AT: Photosynthesis

#### CO2 allows much more efficient water usage

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WUE = above ground biomass per water use

Corn plants were grown under ambient (400 μmol mol−1) and elevated (800 μmol mol−1) CO2 combined with four different irrigation treatments, to investigate water use and canopy level photosynthesis and to quantify water use efficiency. Fifteen TDR probes per chamber were used to monitor hourly soil water contents. Both at well-watered and at water stressed conditions, higher water contents maintained under the elevated CO2 conditions than under the ambient CO2, even though 20–49% less water was irrigated for the elevated CO2 conditions since 21 DAE than for the ambient CO2 conditions. Approximately 13–20% and 35% less water was used under the elevated CO2 conditions than under the ambient CO2 conditions, for the water stressed conditions and for the well-watered conditions, respectively. These results suggest that under increased CO2 concentrations as generally predicted in the future, less water will be required for corn plants than at present. At the end of the experiment, significant differences in canopy gross photosynthesis between well watered and water stressed treatments within a CO2 treatment were observed, while no significant differences between the CO2 treatments were observed. Daily WUE was defined as daily gross photosynthesis divided by daily water use. Approximately 50% less differences in magnitude of daily WUE was observed under the well-watered condition than under the water stressed conditions. However, daily WUE under the elevated CO2 treatment were mainly higher than under the ambient CO2 treatment. The “breaking points” (changes from high to low rates of soil water uptake) were observed in the bottom of soil bins (between 0.625 and 0.85 m from the soil surface) for water stressed conditions, and the “breaking points” under ambient CO2 appeared 6–9 days earlier than under elevated CO2. This result suggests that it took longer for the easily available water to become depleted for the elevated CO2 treatments than for the ambient.

#### Increased CO2 levels help photosynthesis through additional photosynthase production and efficient water usage

**Agarwald et al, 11** – Governor’s School for Agriculture, Virginia Tech (D. Agarwal, A. Ahmad, A. Chitnis, C. Stancil, C. Tran, 7/3/2011, “The Effects of Elevated Levels of CO2 and Heat on Domestic and Wild Crops“, <http://www.gsa.vt.edu/documents/2011projects/Climate/C3_paper.pdf> | JJ)

Rising CO2 levels and rising temperatures affect a plant’s metabolism. Chemical reactions during photosynthesis are faster at higher temperatures; as the reaction rate doubles every ten degrees Fahrenheit. C4 plants grow faster at higher temperatures when compared to C3 plants. As plants photosynthesize faster, they fixate more carbon, resulting in more plant tissue such as leaves. Photosynthate products of photosynthesis, such as sugars, are created by plants. As the plant photosynthesizes faster, more photosynthate is produced and distributed throughout the plant. At the same time, more nutrients are needed by the plant so more roots are produced; waterefficiency also increases at higher CO2 levels. An increased concentration of CO2 also affects plant transpiration. Stomata in plants are small openings on the underside of plants through which water transpires. In the presence of increased CO2, the opening of the stomata is narrowed. Thus, this lowers the amount of air pollutants that can make their way into plants. In some plants however, the closing of the stomata has an adverse effect on photosynthetic rate because it limits the uptake of CO2.It is also causing a reduction the amount of water that is lost through transpiration. In addition, increased CO2 changes the chemical composition of the leaves and reduces the proportion of nitrogen in the plant.

#### Photosynthesis adapts to gradual temperature rise – no net decrease in photosynthesis rate

**Abrol and Ingram, 96** - Division of Plant Physiology, Indian Agricultural Research Institute, New Delhi, and niversity of Georgia, College of Agricultural and Environmental Sciences, Georgia Agricultural Experiment Station, Griffin, GA (Yash and Keith, 1996, FAO Corporate Document, “Global climate change and agricultural production. Direct and indirect effects of changing hydrological, pedological and plant physiological processes”, <http://www.fao.org/docrep/w5183e/w5183e08.htm#TopOfPage> | JJ)

Variability in leaf photosynthetic rates within or between species is often unrelated to differences in productivity. Similarly, high photosynthetic rates at high temperatures do not necessarily support high rates of crop dry matter accumulation. The temperature optimum for photosynthesis is broad, presumably because crop plants have adapted to a relatively wide range of thermal environments. A 1 to 2°C increase in average temperature is not likely to have a substantial impact on leaf photosynthetic rates. Further, there is a possibility that photosynthesis of crop plants can adapt to a slow increase in global average temperatures. Thus, global warming is not likely to affect photosynthetic rates per unit leaf area gradually or on a closed canopy basis over the next century. While photosynthetic rates were found to be temperature-sensitive in other crops, wheat and rice appear to be different. In wheat, no measurable differences were found in photosynthetic rates per unit flag leaf area or on a whole-plant basis in the temperature range from 15 to 35°C (Bagga and Rawson, 1977). In rice, there is little temperature effect on leaf carbon dioxide assimilation from 20 to 40°C (Egeh et al., 1994). Recent research has shown significant variation among wheat cultivars with respect to reduction in photosynthesis at very high temperature. Photosynthesis of germplasm adapted to higher temperature environments was less sensitive to high temperature than was germplasm from cooler environments (Al-Khatib and Paulsen, 1990). When this germplasm was grown under moderate (22/17°C) and high (32/27°C) temperatures in the seedling stage or from anthesis to maturity, there was a highly significant correlation between photosynthesis rate and either seedling biomass (r=0.943\*\*\*) or grain yield of mature plants (r=0.807\*\*). Genotypes most tolerant to high temperatures had the most stable leaf photosynthetic rates across temperature regimes or they had the longest duration of leaf photosynthetic activity after anthesis and high grain weights. The above relationship was exemplified by 'Ventnor' from the high temperature area of Australia and 'Lancero' from the high altitude area of Chile (Table 6.1). See Al-Khatib and Paulsen (1990). Despite observed negative effects of high temperature on leaf photosynthesis, the temperature optimum for net photosynthesis is likely to increase with elevated levels of atmospheric carbon dioxide. Several studies have concluded that CO2-induced increases in crop yields are much more probable in warm than in cool environments (Idso, 1987; Gifford, 1989; Rawson, 1992, 1995). Thus, global warming may not greatly affect overall net photosynthesis.

### AT: Weeds

#### Increased CO2 inhibits nitrogen assimilation in C3 plants but not C4 plants – means all the weeds die while the crops stay alive

**Bloom et al, 12 -** Department of Plant Sciences, University of California, Biology of Stress and Plant Pathology Department, Centro de Edafología y Biología Aplicada del Segura, Consejo Superior de Investigaciones Cientificas (CEBAS-CSIC), Campus de Espinardo, San Diego Botanic Gardens, The Jacob Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Sede Boqer Campus, School of Biological Sciences, P.O. Box 646340, Washington State University, Pullman (Arnold, Jose Salvador Rubio Asensio, Lesley Randall, Shimon Rachmilevitch, Asaph B. Cousins, and Eli A. Carlisle, “CO2 enrichment inhibits shoot nitrate assimilation in C3 but not C4 plants and slows growth under nitrate in C3 plants”, Ecology Vol. 93, February 2012, Ecological Society of America | JJ)

The results of these gas flux and growth experiments support the hypothesis that atmospheric CO2 enrichment interferes with the ability of C3 species to assimilate NO3− into organic N compounds in their shoots and that this impedes their growth. In a diverse collection of C3 species and C3-C4 intermediates, CO2 enrichment severely decreased photosynthetic O2 evolution associated with NO3− assimilation (Fig. 1a, c). There are obviously alternative mechanisms for NO3− assimilation because plants under CO2 enrichment and NO3− nutrition continued to grow, albeit often at a slower pace (Figs. 2 and 3). One such mechanism is root NO3− assimilation, which may be enhanced under CO2 enrichment (Kruse et al. 2003). Unfortunately, relatively little is known about the extent to which the balance between root and shoot NO3− assimilation varies within and among species (Epstein and Bloom 2005, Nunes-Nesi et al. 2010). In several species measured at ambient CO2 concentration, shoots account for the majority of whole-plant NO3− assimilation over the entire day (Bloom et al. 1992, Cen and Layzell 2003). This study establishes that CO2 enrichment inhibits shoot nitrate assimilation in a wide variety of C3 plants and that this phenomenon influences whole-plant growth; therefore, shoot nitrate assimilation provides an important contribution to the performance of the entire plant. Several physiological mechanisms may be responsible for the relationship between elevated atmospheric CO2 concentrations and shoot NO3 assimilation (Bloom et al. 2010). One involves the ﬁrst biochemical step of NO3 assimilation, the conversion of NO3 to NO2 in the cytoplasm of leaf mesophyll cells. Photorespiration is the biochemical pathway in which the chloroplast enzyme Rubisco catalyzes the oxidation of the highenergy substrate ribulose-1,5-bisphosphate (RuBP) rather than catalyzes the carboxylation of RuBP through the C3 carbon ﬁxation pathway (Foyer et al. 2009). Photorespiration stimulates the export of malic acid from chloroplasts (Backhausen et al. 1998) and increases the availability of nicotinamide adenine dinucleotide hydride (NADH) in the cytoplasm (Igamberdiev et al. 2001) that powers this ﬁrst step of NO3 assimilation (Robinson 1987, Quesada et al. 2000). CO2 enrichment decreases photorespiration and thereby decreases the amount of reductant available to power NO3 reduction. In contrast, the ﬁrst carboxylation reaction in the C4 carbon ﬁxation pathway generates ample amounts of malic acid and NADH in the cytoplasm of mesophyll cells. This may explain why shoot NO3 assimilation is relatively independent of CO2 concentrations in C4 plants (Fig. 1b).

### AT: Sea Level Rise

#### Warming does not cause sea level rise – graphs and models prove

**Michaels, 12** [Patrick, Senior Fellow in Environmental Studies at the Cato Institute, Climatologist, Professor at University of Virginia, 5/30/2012, “The Current Wisdom: No Climate-Related Acceleration in Sea Level Rise”, http://www.cato.org/publications/commentary/current-wisdom-no-climaterelated-acceleration-sea-level-rise] DHirsch

One of the repeating nightmares about global warming is that the current very pokey rate of sea level rise will suddenly accelerate. Now, it turns out that multiple lines of evidence say this has not happened and isn’t likely to, either. Recently, *Science* magazine reported that glacial flow in Greenland has not been accelerating as fast as previously reported (Moon et al., 2012). The major implication is that the contribution of ice loss from Greenland to global sea level rise is not increasing at the rate once expected. Now, *Geophysical Research Letters* (GRL) reports that glacier loss in the Russian high Arctic is contributing about 0.025 mm of sea level rise per year, but that contribution has likely been largely unchanged for at least 30 years (Moholdt et al., 2012). More from GRL (Levitus et al., 2012) is that the rate of increase in the ocean’s heat content—which raises sea level—has recently slowed. And finally, from a soon-to-be-published paper in GRL comes word that the net non-climate contributions of human activity to sea level rise have been speeding up (Wada et al., 2012). Here, I’ll tie them all together and tell you what they mean. I’ll focus on the Wada et al. (2012) paper because from the results presented there, we can derive the global implications of all the others. Wada and colleagues, in a paper titled “Past and future contribution of global groundwater depletion to sea-level rise,” examine how much human removal of water from deep aquifers (for irrigation, etc.), also known as “dewatering” of the continents—water that eventually finds it way into the sea—has contributed to observed sea level rise from 1900 through 2000, as well as how much it may contribute in the future (through 2100). I have discussed previous work from Yoshihide Wada (<http://www.cato-at-liberty.org/the-current-wisdom-2/>) and there has been a complimentary analysis done by Leonard Konikow of the U.S. Geological Survey (see here for details, <http://www.masterresource.org/2011/09/rapid-sea-level-rise-nature-no/> ). The take-home message from those articles was that the “dewatering” was adding a significant, growing, but often overlooked, input of water to the global oceans and was responsible for a non-negligible amount of sea level rise. In fact, between the Wada and Konikow calculations, the contribution was estimated to range from 15 percent to 25 percent of the current rate of sea level rise, which stands at about 2.5 mm/year (a rate which has been declining in recent decades, see here<http://sealevel.colorado.edu/>). You would think that a factor contributing such a substantial proportion to current sea level rise wouldn’t be overlooked, after all, the media hyperventilated last week when a report came out about the potential speedup of glaciers in Antarctica which currently contribute ~0.25 mm/year of sea level rise—a value about half the current groundwater depletion contribution. In what is becoming a depressingly repetitive pattern, “big science” assessments of climate change, like those made by our government, or those of the United Nations, simply ignore legitimate findings that don’t fit with the established (end of the world) meme. According to Wada et al. (2012) “[i]n the IPCC fourth assessment report, the contribution of non-frozen terrestrial waters to sea-level variation is not included due to its perceived uncertainty and assumption that negative contributions such as dam impoundment compensate for positive contributions (mainly from groundwater depletion).” This situation is drastically changing. Wada et al. continue “However, recent work on global groundwater depletion [Wada et al., 2010; Konikow, 2011] suggests a rapid increase of this positive contribution to sea-level rise during the last decade that warrants a re-appraisal of the contribution of terrestrial water and in particular groundwater depletion to projected 21st century sea-level change.” As indicated in the quote above, human activity contributes to changes in sea level in two ways besides any impact from climate change. The first is through the pumping of water from aquifers at a rate greater than is the replenishment rate, and the second is through water impoundment—that is, building dams to hold water than normally would have been in the ocean. The former acts to increase sea level, the latter acts to decrease it. But, the contribution from impoundment is a one-off deal for each dam because once it is built and the reservoir filled, the water then flows through as before. The contribution, however, from deep aquifer pumping is on-going. Wada and colleagues derive a long-term record, extending back to 1900, of both impoundment and dewatering on a global level, and make projections as to the future course of these two processes across the 21st century (Figure 1). The dark blue line which peaks in the 1960s and 1970s is the annual contribution to sea level rise from water impoundments (in Figure 1, the sign is flipped for this process), the light blue area is the annual contribution (including estimate uncertainty) to global sea level from dewatering. The grey line in Figure 1 is the combination of two (plus some other minor elements) which represent the net change in global sea level annually supplied by human activity not associated with significant climate change. Figure 1. History of the estimated and projected annual contribution of terrestrial water storage change to global sea-level over the period 1900-2100 (figure from Wada et al., 2012). Notice in Figure 1 that the grey line (the net contribution) rises above zero in the early 1980s—meaning that since then, human activity has been putting more water in the ocean than we are holding back. Also notice that our net positive contribution to sea level rise has been rapidly rising since then. Consider the above in light of the one of the favorite climate change alarmist talking points—that the rate of sea level rise is accelerating and instead of perhaps a foot of sea level rise by century’s end, we should be expecting 3 feet or more. Let’s look at the data. Figure 2 shows the latest-greatest sea level rise history as assembled by John Church and colleagues (Church and White, 2011; red line) along with the same thing once we remove net human contribution from impoundment and dewatering (blue line). Notice that the shapes of the two curves are a bit different after about 1950 (when the direct human contribution starts to be significant—see Figure 1). The red curve (total sea level) appears to be slightly cupped upwards (that is, accelerating), while the blue curve (sea level less direct human contribution) appears more linear (i.e., constant). Figure 2. Observed change in sea level, 1900-2010. Raw sea level values (red); sea level after removing contribution from impoundments and continental dewatering (blue) (data from Church and White, 2011; Wada et al., 2012). Figure 3 shows the running 10-yr trend through each of the two datasets, beginning with data in 1950. The red curve (which is the raw sea level data) shows an upward trend (again, indicating an acceleration in the rate of sea level rise), with the highest values at the end of the curve. On the other hand, the blue curve (which is the raw sea level less the direct human contribution), shows no such upwards trend (indicating that no acceleration) and the current rate of sea level rise (right-hand end of the curve) is neither the highest, nor far from being unique. Figure 3. 10-yr moving linear trend through the raw sea level values (red), and the sea level after removing the contribution from impoundments and continental dewatering (blue), 1960-2009 (data from Church and White, 2011; Wada et al., 2012). What this means is that the apparent acceleration in the rate of sea level rise has been caused solely by the changes in the direct contribution from human activity (which continues to increase) and not by climate change. This makes perfect sense given the other papers I listed at the beginning of the article, which indicate modest increases from the world’s glacial fields along with a modest decrease in the rate of thermal expansion as the build-up of heat content in the oceans slows, reflecting the hiatus in global temperature rise that began over 15 years ago. So much for another alarmist talking point. This one simply doesn’t hold water.

### AT: Pests

#### High CO2 levels allow for pest control and disinfection of crops

**Hashem et al, 12 -** Department of Economic Entomology and Pesticides, Faculty of Agriculture, Cairo University, Department of Economic Entomology and Pesticides, Faculty of Agriculture, Cairo University, Environment and Bio-agriculture Department, Faculty of Agriculture, Al-Azhar University, Plant Protection Research Institute, ARC, Giza (Mohamed Y. Hashema, Sayeda S. Ahmeda, Mohsen A. El-Mohandesb, Mahrous A. Gharib, Journal of Stored Products Research Volume 48, January 2012, “Susceptibility of different life stages of saw-toothed grain beetle Oryzaephilus surinamensis (L.) (Coleoptera: Silvanidae) to modified atmospheres enriched with carbon dioxide”, SciVerse | JJ)

Modified atmospheres have been used for disinfesting raw or semi-processed food products, such as cereal grains and dried fruits, while still in storage. Treatments based on reduced oxygen (O2) and high carbon dioxide (CO2) or nitrogen (N2) contents are technically suitable alternatives for arthropod pest control in durable commodities ( [Fleurat-Lessard, 1990], [Adler et al., 2000], [Navarro, 2006] and [Riudavets et al., 2010]). Atmospheres rich in CO2, those with over 40% in air, are faster at controlling pests than those with high contents of N2 (Navarro, 2006). Data on the effects of different types of CO2 treatments and dosages on key pests are available for many species and stages of stored-product pests under particular sets of conditions ( [Banks and Annis, 1990], [White et al., 1995] and [Annis and Morton, 1997]). Depending on the temperature, CO2 treatments may take from a few days to several weeks to be effective in gas-tight chambers or silos (Riudavets et al., 2009). CO2 has received considerable attention for the disinfection of stored foodstuffs, particularly durable products ( [Bailey and Banks, 1980], [Annis, 1987] and [Bell and Armitage, 1992]). The toxicity of CO2 to insects is known to vary among species, developmental stages and age groups. Parameters of the physical environment, such as temperature, humidity, and CO2 levels in storage, also influence toxicity. In the majority of studies involving CO2, much attention has been focused on determining the time required to kill insect pests ( [Adler, 1999], [Santos et al., 1999] and [Van Epenhuijsen et al., 2002]).

**It makes pests smaller which allows predators to kill them off**

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Reference Coll, M. and Hughes, L. 2008. Effects of elevated CO2 on an insect omnivore: A test for nutritional effects mediated by host plants and prey. Agriculture, Ecosystems and Environment 123: 271-279. What was done In what they describe as "the first study that measured the effect of global atmospheric change on an omnivorous consumer," the authors explored the impacts of elevated atmospheric CO2 on the behavior and performance of an omnivorous bug (Oechalia schellenbergii, Heteroptera: Pentatomidae) and its prey, a polyphagous chewing herbivorous pest (Helicoverpa armigera; Lepidoptera: Noctuidae), feeding on pea (Pisum sativum) foliage grown in controlled-environment cabinets maintained at atmospheric CO2 concentrations of either 360 or 700 ppm. What was learned Coll and Hughes report that the *H. armigera* pests that fed on the elevated CO2-grown pea plants were significantly smaller than those that fed on the ambient CO2-grown pea plants, and that the bigger *O. schellenbergii* bugs that fed on them "performed best when fed larvae from the elevated-CO2 treatment," because the prey of that treatment "were smaller and thus easier to subdue." In fact, only 13.3% of the predation attempts made on the larvae that were fed ambient-CO2-grown foliage were successful, as compared to 78.2% for the larvae that were fed elevated-CO2-grown foliage. What it means In light of their findings, the two researchers concluded that "elevated CO2 may benefit generalist predators through increased prey vulnerability, which would put pest species under higher risk of predation." Consequently, and "since omnivory is widespread in agroecosystems," they argue that "yield loss to most pest species will be lower under elevated atmospheric CO2 levels, compared to the current condition**,"** which is good news for agriculture and great news for the people who depend upon it for their survival, which is nearly all of us.

### AT: Flood

#### Even a 32% increase in CO2 content won’t cause increased flood rates

**NIPCC, 11**– Nongovernmental International Panel on Climate Change, 11/16/2011, “Global Warming and Extreme Weather Events”, http://www.nipccreport.org/articles/2011/nov/16nov2011a5.html | JJ)

The study was designed to check whether there were any trends in flood magnitude in the U.S. (lower 48 states) and its major regions with the increase in global mean carbon dioxide concentration. Specifically, Hirsch and Ryberg (2011) used stream flow data on annual flood series from 200 stream gauges operated by the US Geological Survey (USGS) which had a minimum of 85 years of data through water year 2008 from basins with little or no reservoir storage or urban development (urban development was defined as at least 150 persons per square kilometer in 2000) to look for trends in the U.S. as a whole, as well as four major U.S. regions: the northeast, northwest, southwest and southeast. The results, as shown in the figure below, indicate that, except for the decreased flood magnitudes observed in the southwest, there is no strong empirical evidence for any trend in flood magnitudes for the entire U.S. or any of the other three regions despite a 32% increase in carbon dioxide concentration over the study period. <<<TABLE AND CAPTION REMOVED BY JJ KIM>>> The results of this study, therefore, throw cold water on claims that CO2-induced global warming is increasing flood magnitudes in the U.S.A.

### AT: Extreme Weather

#### Recent experiments prove extreme weather isn’t caused by warming

**NIPCC, 12** – Nongovernmental International Panel on Climate Change, 2/28/2012, “Global Warming and Extreme Weather Events”, <http://www.nipccreport.org/articles/2012/feb/28feb2012a3.html> | JJ

According to Büntgen et al. (2011), instrumental station measurements, which systematically cover only the last 100-150 years, "hinder any proper assessment of the statistical likelihood of return period, duration and magnitude of climatic extremes," stating that "a palaeoclimatic perspective is therefore indispensable to place modern trends and events in a pre-industrial context (Battipaglia et al., 2010), to disentangle effects of human greenhouse gas emission from natural forcing and internal oscillation (Hegerl et al., 2011), and to constrain climate model simulations and feedbacks of the global carbon cycle back in time (Frank et al., 2010)." To satisfy these requirements and help facilitate the accomplishment of the associated goals, Büntgen et al., as they describe it, "introduce and analyze 11,873 annually resolved and absolutely dated ring width measurement series from living and historical fir (Abies alba Mill.) trees sampled across France, Switzerland, Germany and the Czech Republic, which continuously span the AD 962-2007 period," and which "allow Central European hydroclimatic springtime extremes of the industrial era to be placed against a 1000 year-long backdrop of natural variations." So what did they find? The nine researchers found, in their words, "a fairly uniform distribution of hydroclimatic extremes throughout the Medieval Climate Anomaly, Little Ice Age and Recent Global Warming." This finding, as they astutely state, "may question the common belief that frequency and severity of such events closely relates to climate mean states," which conclusion essentially rebuffs the well-worn climate-alarmist claim that global warming will lead to more frequent and severe floods and droughts. The odds are that if global warming didn't do so over the past thousand or more years, it likely won't do so in the future.

### AT: Hurricanes

#### Their evidence is fear mongering with no scientific basis

**Bell, 10** [Larry, Professor at the University of Houston, 12/27/10. “Hot Sensations Vs. Cold Facts”, <http://www.forbes.com/2010/12/23/media-climate-change-warming-opinions-contributors-larry-bell.html>] DHirsch

Remember all the media brouhaha about global warming causing hurricanes that commenced following the devastating U.S. 2004 season? Opportunities to capitalize on those disasters were certainly not lost on some U.N. Intergovernmental Panel on Climate Change officials. A special press conference called by IPCC spokesman Kevin Trenberth announced "Experts warn global warming likely to continue spurring more outbreaks of intense activity." But there was a problem. Christopher Landsea, a top U.S. expert on the subject, repeatedly notified the IPCC that no research had been conducted to support that claim--not in the Atlantic basin, or in any other basin. After receiving no replies, he publicly resigned from all IPCC activities. And while the press conference received tumultuous global media coverage, Mother Nature didn't pay much attention. Subsequent hurricane seasons returned to average patterns noted historically over the past 150 years, before exhibiting recent record lows with no 2010 U.S. landfalls.

### AT: C3 Overcrowds C4

#### C4 plants have a competitive advantage in warmer conditions

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C3 plants typically respond better to atmospheric CO2 enrichment than do C4 plants in terms of increasing their rates of photosynthesis and biomass production. C3 plants utilize CO2 in their light independent photosynthesis to produce 3-phosphoglycerate. However, due to enzyme activity leading to photorespiration, C4 plants have developed a mechanism to efficiently deliver CO2 to the ribulose-1,5-bisphosphate carboxylase oxygenase (RuBisCo enzyme). The enzyme system can enhance the ability of C4 plants to tolerate high temperature and water stress [12]. Thus, C4 plants may have a competitive advantage over plants possessing the common C3 pathway under conditions of drought and high temperatures that are projected to result from climate change. Many allergenic plants use the C4 system, including 550 out of 1,400 Chenopods, 250 of the 1,000 Amarathaceae species, *Cynodon dactylon* and members of the sedge (Cyperaceae) family, including daisies (Asteraceae).

#### Various studies prove C3 plants don’t outcompete C4 plants in elevated CO2

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C3 plants typically respond better to atmospheric CO2 enrichment than do C4 plants in terms of increasing their rates of photosynthesis and biomass production [see C4 Plants (Biomass and Photosynthesis)]. Hence, it has periodically been suggested that in a world of rising atmospheric CO2 concentration, C3 plants may out-compete C4 plants and displace them, thereby decreasing the biodiversity of certain ecosystems. However, the story is much more complex that what is suggested by this simple scenario. Wilson et al. (1998) grew 36 species of perennial grass common to tallgrass prairie ecosystems with and without arbuscular mycorrhizal fungi, finding that the dry matter production of the C3 species that were colonized by the fungi was the same as that of the non-inoculated C3 species, but that the fungal-colonized C4 species produced, on average, 85% more dry matter than the non-inoculated C4 species. This finding is of pertinence to the relative responsiveness of C3 and C4 plants to atmospheric CO2 enrichment; for elevated levels of atmospheric CO2 tend to enhance the mycorrhizal colonization of plant roots [see Fungi (Grasses and Herbaceous Plants)], which is known to make soil minerals and water more available for plant growth (see Nutrient Acquisition). Hence, this CO2-induced fungal-mediated growth advantage, which from this study appears to be more readily available to C4 plants, could well counter the inherently greater biomass response of C3 plants relative to that of C4 plants, leveling the playing field relative to their competition for space in any given ecosystem. Another advantage that may come to C4 plants as a consequence of the ongoing rise in the air's CO2 content was elucidated by BassiriRad et al. (1998), who found that elevated CO2 enhanced the ability of the perennial C4 grass Bouteloua eriopoda to increase its uptake of NO3- and PO43- considerably more than the perennial C3 shrubs Larrea tridentata and Prosopis glandulosa. Hence, it is not surprising that in an eight-year study of the effects of twice-ambient atmospheric CO2 concentrations on a pristine tallgrass prairie in Kansas, Owensby et al. (1999) found that the elevated CO2 did not affect the basal coverage of its C4 species or their relative contribution to the composition of the ecosystem. Then, of course, there is the well-known antitranspirant effect of atmospheric CO2 enrichment (Pospisilova and Catsky, 1999), which is often more strongly expressed in C4 plants than in C3 plants and that typically allows C4 plants to better cope with water stress. In a study of the C3 dicot Abutilon theophrasti and the C4 dicot Amaranthus retroflexus, for example, Ward et al. (1999) found that Amaranthus retroflexus exhibited a greater relative recovery from drought than did the C3 species, which suggests, in their words, that "the C4 species would continue to be more competitive than the C3 species in regions receiving more frequent and severe droughts," which basically characterizes regions where C4 plants currently exist. Two years later, Morgan et al. (2001) published the results of an open-top chamber study of a native shortgrass steppe ecosystem in Colorado, USA, where they had exposed the enclosed ecosystems to atmospheric CO2 concentrations of 360 and 720 ppm for two six-month growing seasons. In spite of an average air temperature increase of 2.6°C, which was caused by the presence of the open-top chambers, the elevated CO2 increased aboveground biomass production by an average of 38% in both years of the study; and when 50% of the standing green plant biomass was defoliated to simulate grazing halfway through the growing season, atmospheric CO2 enrichment still increased aboveground biomass by 36%. It was also found that the communities enriched with CO2 tended to have greater amounts of moisture in their soils than communities exposed to ambient air; and this phenomenon likely contributed to the less negative and, therefore, less stressful plant water potentials that were measured in the CO2-enriched plants. Last of all, the elevated CO2 did not preferentially stimulate the growth of C3 species over that of C4 species in these communities. Hence, elevated CO2 did not significantly affect the percentage composition of C3 and C4 species in these grasslands; and they maintained their original level of vegetative biodiversity. In light of these several observations, we believe it to be highly unlikely that the ongoing rise in the air's CO2 content will lead to C3 plants replacing C4 plants in the vast majority of earth's ecosystems. This would also appear to be the take-home message of the study of Wand et al. (1999), who in a massive review of the scientific literature published between 1980 and 1997 analyzed nearly 120 individual responses of C3 and C4 grasses to elevated CO2. On average, they found photosynthetic enhancements of 33 and 25%, respectively, for C3 and C4 plants, along with biomass enhancements of 44 and 33%, respectively, for a doubling of the air's CO2 concentration. These larger-than-expected growth responses in the C4 species led them to conclude that "it may be premature to predict that C4 grass species will lose their competitive advantage over C3 grass species in elevated CO2." Further support for this conclusion comes from the study of Campbell et al. (2000), who reviewed research work done between 1994 and 1999 by a worldwide network of 83 scientists associated with the Global Change and Terrestrial Ecosystems (GCTE) Pastures and Rangelands Core Research Project 1, which resulted in the publication of over 165 peer-reviewed scientific journal articles. After analyzing this great body of research, they concluded that the "growth of C4 species is about as responsive to CO2 concentration as [is that of] C3 species when water supply restricts growth, as is usual in grasslands containing C4 species." Hence, the work of this group of scientists also provides no evidence for the suggestion that C3 plants may out-compete C4 plants and thereby replace them in a high-CO2 world of the future.

#### C4 species are more competitive than C3 species in higher temperatures

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C4 species have evolved in a high CO2 environment. This increases both their nitrogen and water use efficiency compared to C3 species. C4 plants have greater rates of CO2 assimilation than C3 species for a given leaf nitrogen when both parameters are expressed either on a mass or an area basis (Ghannoum et al., 2011). Although the range in leaf nitrogen content per unit areas is less in C4 compared to C3 plants, the range in leaf nitrogen concentration per unit dry mass is similar for both C4 and C3 species. Even though leaf nitrogen is invested into photosynthetic components into the same fraction in both C3 and C4 species, C4 plants allocate less nitrogen to Rubisco protein and more to other soluble protein and thylakoids components. In C3 plants, the photosynthetic enzyme Rubisco accounts for up to 30% of the leaf nitrogen content (Lawlor et al., 1989), but accounts for only 4–21% of leaf nitrogen in C4 species (Evans & von Caemmerer, 2000; Sage et al., 1987). The lower nitrogen requirement of C4 plants results from their CO2-concentrating mechanism, which raises the bundle sheath CO2 concentration, saturating Rubisco in normal air and almost eliminating photorespiration. Without this mechanism, Rubisco in the C3 photosynthetic pathway operates at only 25% of its capacity (Sage et al., 1987) and loses ca. 25% of fixed carbon to photorespiration (Ludwig & Canvin, 1971). To attain comparable photosynthetic rates to those in C4 plants, C3 leaves must therefore invest more heavily in Rubisco and have a greater nitrogen requirement. Because the Rubisco specificity for CO2 decreases with increasing temperature (Long, 1991), this difference between the C3 and C4 photosynthetic nitrogen-use efficiency is greatest at high temperatures (Long, 1999). The high photosynthetic nitrogen-use efficiency of C4 plants is partially offset by the nitrogen requirement for CO2-concentrating mechanism enzymes, but the high maximum catalytic rate of PEP-carboxylase means that these account for only ca. 5% of leaf nitrogen (Long, 1999). Improved leaf and plant water use efficiency in C4 plants is due to both higher photosynthetic rates per unit leaf area and lower stomatal conductance, with the greater CO2 assimilation contributing to a major extent (Ghannoum et al., 2011). The advantages of greater nitrogen use efficiency and water use efficiency of C4 relative to C3 photosynthesis are fully realized at high light and temperature, where oxygenase reaction of Rubisco is greatly increased. It is worth noting, although in C4 plants energy loss due to photorespiration is eliminated, and additional energy is required to operate the C4 cycle (2 ATPs per CO2 assimilated). In dim light, when photosynthesis is linearly dependent on the radiative flux, the rate of CO2 assimilation depends entirely on the energy requirements of carbon assimilation (Long, 1999). The additional ATP required for assimilation of one CO2 in C4 photosynthesis, compared with C3 photosynthesis, increases the energy requirement in C4 plants (Hatch, 1987). However, when the temperature of a C3 leaf exceeds ca. 25 ºC, the amount of light energy diverted into photorespiratory metabolism in C3 photosynthesis exceeds the additional energy required for CO2 assimilation in C4 photosynthesis (Hatch, 1992; Long, 1999). This is the reason why at temperatures below ca. 25–28 ºC, C4 photosynthesis is less efficient than C3 photosynthesis under light-limiting conditions. It is interesting to note, that while global distribution of C4 grasses is positively correlated with growing season temperature, the geographic distribution of the different C4 subtypes is strongly correlated with rainfall (Ghannoum et al., 2011). On the contrary, C4 plants are rare to absent in cold environments. Although there are examples of plants with C4 metabolisms that show cold adaptation, they still require warm periods during the day in order to exist in cold habitats (Sage et al., 2011). In consequence, C4 species are poorly competitive against C3 plants in cold climates (Sage & McKown, 2006; Sage & Pearce, 2000). The mechanisms explaining the lower performance of C4 plants under cold conditions have not been clarified (Sage et al., 2011). Among early plausible explanations were the low quantum yield of the C4 relative to the C3 pathway (Ehleringer et al., 1997), and enzyme lability in the C4 cycle, most notably around PEP metabolism (PEPcarboxylase and pyruvate orthophosphate dikinase) (Matsuba et al., 1997). Both hypothesis are insufficient since maximum quantum yield differences do not relate to conditions under which the vast majority of daily carbon is assimilated and there cold-adapted C4 species that have cold stabled forms of PEP-carboxylase and pyruvate orthophosphate dikinase, and synthesize sufficient quantity to overcome any short term limitation (Du et al., 1999; Hamel & Simon, 2000; Sage et al., 2011). The current hypothesis is that C4 photosynthesis is limited by Rubisco capacity at low temperatures. Even in cold-tolerant C4 species, Rubisco capacity becomes limiting at low temperature and imposes a ceiling on photosynthetic rate below 20 ºC (Kubien et al., 2003; Pittermann & Sage, 2000; Sage, 2002).