

INHERENCY ANSWERS- CLIMATE DATA

NEW US SATELLITE WILL PROVIDE CLIMATE DATA

Environment 360 October 31, 2011

[http://e360.yale.edu/digest/new_us_satellite_to_monitor_global_climate_change/3192/]

U.S. scientists say NPOESS Preparatory Project (NPP) satellite, launched on October 28, will orbit the planet at an altitude of 512 miles, traveling from the North Pole to the South Pole 14 times daily. While technically a NASA mission, the \$1.5 billion satellite will provide key data for a series of National Oceanic and Atmospheric Administration (NOAA) projects, marking a key step in the creation of a U.S. climate monitoring system. The project's key objectives include creation of long-term global environmental data, daily measurements of the ozone layer, monitoring of changes to the planet's sea ice and glaciers, and collection of data on air pollution. Officials hope the satellite will serve as a bridge between NOAA's current polar orbiting satellites and the next generation of satellites, the Joint Polar Satellite System (JPSS).

INHERENCY ANSWERS – CLIMATE DATA

CLIMATE MODELS EXPECTED TO BE THE LARGEST CLIMATE DATA SOURCE – SATELLITES AREN'T KEY

Jonathan Overpeck, Institute of the Environment, University of Arizona, February 2011
[Science Magazine, February 11, 2011, vol 331, no 6018, pp. 700-02]

Finally, there has been an explosion in data from numerical climate model simulations, which have increased greatly in complexity and size. Data from these models are expected to become the largest and the fastest-growing segment of the global archive. The archiving and sharing of output from climate models, particularly those run with a common experimental framework, began in the mid-1990s, starting with output from the early global coupled atmosphere-ocean general circulation models (AOGCMs) used for making future climate change projections. This led to the Coupled Model Intercomparison Project (CMIP), organized by the World Climate Research Program (WCRP), inviting all the modeling groups to make increasingly realistic simulations of 20th-century and possible future 21st-century climates. Recently, CMIP3 involved 16 international modeling groups from 11 countries, using 23 models and submitting 36 terabytes of model data, all archived by the Program for Climate Model Diagnosis and Intercomparison (PCMDI), signaling a “new era in climate change research”. This activity has made it possible for anyone to openly access these state-of-the-art climate model outputs for analysis and research.

CLIMATE MODELS INFORM POLICY MAKERS – SATELLITES NOT NECESSARY

Jonathan Overpeck, Institute of the Environment, University of Arizona, February 2011
[Science Magazine, February 11, 2011, vol 331, no 6018, pp. 700-02]

Now climate models are beginning to be used for much more than climate research. In particular, they are expected to inform decisions that society must take at global to local scales to adapt to natural climate variations as well as to anthropogenic climate change, and to guide the implementation of possible mitigation measures. This puts new demands on the variety, scale, and availability of observational data needed for model evaluation and development, and expands, yet again, the volume of climate data that must be shared openly and efficiently.

INHERENCY ANSWERS – RENEWABLE ENERGY

RENEWABLE ENERGY INVESTMENT SURPASSING FOSSIL FUELS

Los Angeles Times November 25, 2011

[<http://www.latimes.com/business/la-fi-renewables-20111125,0,2421278.story>]

Renewable energy is surpassing fossil fuels for the first time in new power-plant investments, shaking off setbacks from the financial crisis and an impasse at the United Nations global warming talks. Electricity from the wind, sun, waves and biomass drew \$187 billion last year compared with \$157 billion for natural gas, oil and coal, according to calculations by Bloomberg New Energy Finance using the latest data. Accelerating installations of solar- and wind-power plants led to lower equipment prices, making clean energy more competitive with coal. "The progress of renewables has been nothing short of remarkable," United Nations Environment Program Executive Secretary Achim Steiner said in an interview. "You have record investment in the midst of an economic and financial crisis." The findings indicate the world is shifting toward consuming more renewable energy even without a global agreement on limiting greenhouse gases. Delegates from more than 190 nations converge in Durban, South Africa, on Nov. 28 to discuss new measures for limiting emissions damaging the climate.

GLOBALLY, RENEWABLE ENERGY IS QUICKLY COMING TO MARKET

The Telegraph November 25, 2011

[<http://www.telegraph.co.uk/sponsored/earth/the-age-of-energy/8915886/global-views-low-carbon-future.html>]

Fast-forwarding a worldwide transition to a low-carbon, resource-efficient green economy will be brought into sharp focus in the next seven months: at the UN climate convention meeting in Durban this month and at Rio+20 in Brazil in June 2012. Countries, companies and communities are already making significant strides: in 2010 more than \$211bn (£132bn) was invested in new renewable energies, more than in new fossil fuels. In solar energy, 17.5 gigawatts (GW) was installed in 2010, up 130 per cent from 2009: photovoltaic (PV) installations are forecast to rise further this year, by perhaps 20.5GW, taking global capacity to about 50GW, the equivalent of about 15 nuclear reactors. It's not happening only in developed economies such as Germany, Spain and the United States, but in countries including Bangladesh, Brazil, China, India, Mexico and Morocco. Driving the process is climate change, energy security, concern about increasingly unpredictable oil prices and the need to provide electricity to the 1.4bn people without it. Other opportunities are also being glimpsed. A nuclear power plant can take 10 to 15 years to build, and a coal-fired power station five years. Mid-sized solar plants of five to 10 megawatts (MW), however, are now taking only about three months from planning to construction.

INHERENCY ANSWERS – RENEWABLE ENERGY

GLOBAL RENEWABLE ENERGY TO GROW RAPIDLY

International Business Times October 10, 2011

[<http://www.ibtimes.com/articles/227916/20111010/global-renewable-energy-to-grow-through-2035.htm>]

Renewable energy is poised to grow faster than other electric generating alternatives, accounting for nearly one-third of the world's electric generating capacity by the end of 2035, with China and India projected to consume one-half of that energy growth. The burgeoning prices of crude oil and populist concerns over climate change are also seen to boost the shift to use cheaper and cleaner fuels.

RENEWABLE ENERGY USE IS RISING GLOBALLY AND FIFTY PERCENT OF NEW ELECTRICITY CAPACITY

Triple Pundit August 5, 2011

[<http://www.triplepundit.com/2011/08/renewable-energy-2010-16-global-energy-11/>]

REN21's "Renewables 2011" Global Status Report is a remarkable one, particularly in light of the lasting effects of the "Great Recession" and all that took place in 2010. The REN21 report shows that renewable energy growth was strong last year. Renewable resources wound up supplying 16% of global final energy consumption and showed strong growth in all three sectors tracked – power, heat and transport. When it comes to electricity, renewable resources supplied an estimated 20% of global annual demand. Renewable power accounted for approximately 50% of new electric capacity globally and delivered nearly 20% of the global electricity supply. By early 2011, fully 25% of global power capacity from all sources came from renewables. Particularly noteworthy, China and emerging market countries now account for more than 50% of renewable energy resources, while renewable energy rose 5.6% in the US, to account for about 10.9% of domestic primary energy production. Design and process improvements, manufacturing cost reductions and improved efficiency, particularly in solar, but across the board in wind turbines and biofuel and biomass processing technology all contributed to growth. Support for renewable energy in terms of government policy continued to improve as well.

INHERENCY ANSWERS – EUROPEAN SATELLITES

NEW EUROPE SATELLITE SERVICES WILL FILL EXISTING DATA GAPS

Julian Wilson, Institute for Environment and Sustainability, 2010

[European Capacity for Monitoring and Assimilating Space Based Climate Change Observations – Status and Prospects, 2010 p. 25]

The GMES Services are arranged on the basis of earth components, namely land, ocean (“marine”) and atmosphere. Climate is a cross-cutting theme for these services: Currently, ECVs are included in the scope of the marine and atmosphere services and will be addressed in the course of a global service development for the land monitoring service. The atmosphere service addresses the themes climate forcing, air quality and UV radiation and will inter alia provide for the delivery of data services related to greenhouse gases, reactive gases and aerosols based on a global and a European ensemble model. A primary focus will be to provide information in areas where little or none is available today, e.g., gridded fields of atmospheric composition. This encompasses providing the atmospheric composition ECVs from a modelling system, based on satellite input.

EUROPE CAN DO CLIMATE MONITORING AND PREDICTION

Julian Wilson, Institute for Environment and Sustainability, 2010

[European Capacity for Monitoring and Assimilating Space Based Climate Change Observations – Status and Prospects, 2010 p. 4]

Europe’s scientific community, in conjunction with the EC, EEA, ESA, EUMETSAT, ECMWF, EUMETNET and Member States Institutions have proven capacity for climate monitoring to determine the prevailing climate of any given region and to measure rates at which variables such as temperature and rainfall change. Europe has the capacity for climate prediction to determine the future state of the climate system years and decades ahead. Our monitoring and prediction work is supported by climate research to assure continued developments in the collection, archiving, analysis and application of climate data and information.

NO HUMAN-CAUSED CLIMATE CHANGE

WE HAVE NO RELIABLE WAY TO PREDICT CLIMATE CHANGE – MODELS ARE TERRIBLE AT PREDICTION

CO2 Science Online Magazine, October 26, 2011

[Center for the Study of Carbon Dioxide and Global Change,
<http://www.co2science.org/articles/V14/N43/C2.php>]

In summing up their findings, which include those noted above and a whole lot more, Latif and Keenlyside state that "a sufficient understanding of the mechanisms of decadal-to-multidecadal variability is lacking," that "state-of-the-art climate models suffer from large biases," that "they are incomplete and do not incorporate potentially important physics," that various mechanisms "differ strongly from model to model," that "the poor observational database does not allow a distinction between 'realistic' and 'unrealistic' simulations," and that many models "still fail to simulate a realistic El Niño/Southern Oscillation." Therefore, they conclude that "it cannot be assumed that current climate models are well suited to realize the full decadal predictability potential," which is a somewhat-obscure but kinder-and-gentler way of stating that current state-of-the-art climate models are simply not good enough to make reasonably accurate simulations of climate change over a period of time (either in the past or the future) that is measured in mere decades. [Latif, M. and Keenlyside, N.S. 2011. A perspective on decadal climate variability and predictability. *Deep-Sea Research II* **58**: 1880-1894.]

THE LINK BETWEEN CO2 AND WARMING HAS MANY UNCERTAINTIES

Dr. JingYun Fang, Dept. Ecology, Peking University, October 2011

[http://scienceandpublicpolicy.org/reprint/human_induced.html]

Based on the physical foundation of the greenhouse effect and projections of climate models, the IPCC AR4 (2007) concludes that global warming is very likely caused by the increase in CO2 and other greenhouse gas concentrations. This conclusion has generated considerable controversy, and the debates have focused on the following four points: 1) it remains unclear how the human and natural factors, especially the aerosols, affect the global temperature change; 2) over the past century, the temperature change has not always been consistent with the change of CO2 concentration. For several periods, global temperatures decreased or were stable while the atmospheric CO2 concentration continuously increased; 3) there is no significant correlation between the annual increment of the atmospheric CO2 concentration and the annual anomaly of annual mean temperature; and 4) the observed significant increase of the atmospheric CO2 concentration may not be totally attributable to anthropogenic emissions because there are great uncertainties in the sources of CO2 concentration in atmosphere.

NO HUMAN-CAUSED CLIMATE CHANGE – EMPIRICAL MEASURES

LOTS OF EVIDENCE SHOWS THERE IS NO GLOBAL WARMING

Fred Singer, prof, U. Va, Dir, Science & Environmental Policy Project, Nov. 4, 2011

[http://online.wsj.com/article/SB10001424052970204394804577012014136900828.html?mod=googlenews_wsj]

Contrary to both global-warming theory and climate models, data from weather satellites show no atmospheric temperature increase over this period, and neither do the entirely independent radiosondes carried in weather balloons. The Berkeley study confined its findings to land temperatures as recorded by weather stations. Yet oceans cover 71% of the earth's surface, and the marine atmosphere shows no warming trend. The absence of warming is in accord with the theory that climate is heavily impacted by solar variability, and agrees with the solar data presented in a 2007 paper by Danish physicist Henrik Svensmark in the journal Proceedings of the Royal Society A.

MANY NATURAL MEASUREMENTS SHOW NO WARMING

Fred Singer, prof, U. Va, Dir, Science & Environmental Policy Project, Nov. 4, 2011

[<http://online.wsj.com/article/SB10001424052970204394804577012014136900828.html>]

Moreover, independent data using temperature proxies—various non-thermometer sources such as tree rings, ocean and lake sediments, ice cores, stalagmites, and so on—also support an absence of warming between 1978 and 1997. Coral data also show no pronounced warming trend of the sea surface, and there are good reasons to believe that reported sea-surface warming is an artifact of thermometer measurements.

NO HUMAN-CAUSED CLIMATE CHANGE – BAD DATA

EMAILS REVEAL CLIMATE DATA IS MANIPULATED

Larry Bell, Professor, University of Houston, January 3, 2011

[<http://www.forbes.com/2011/01/03/climate-change-hoax-opinions-contributors-larry-bell.html>]

Other fraud is evident through public exposure of e-mail files retrieved from the Climate Research Unit (CRU) at Britain's University of East Anglia. Scandalous exchanges among prominent researchers who have fomented global warming hysteria confirm long-standing and broadly suspected manipulations of climate data. The communications also reveal conspiracies to falsify and withhold information, to suppress contrary findings in scholarly publications, and to exaggerate the existence and threats of man-made global warming. Many of these individuals have had major influence over summary report findings issued by the IPCC. Still other evidence comes from mouths of government officials, international climate summit organizers and leading science spokespeople recorded in candid public admissions.

GLOBAL WARMING IS BASED ON CONTRIVED DATA

Larry Bell, Professor, University of Houston, January 3, 2011

[<http://www.forbes.com/2011/01/03/climate-change-hoax-opinions-contributors-larry-bell.html>]

The central lie is that we are experiencing a known human-caused climate crisis, a claim based on speculative theories, contrived data and totally unproven modeling predictions. And the evidence? Much is revealed by politically corrupted processes and agenda-driven report conclusions rendered by the United Nations Intergovernmental Panel on Climate Change (IPCC), which are trumpeted in the media as authoritative gospel.

NO HUMAN-CAUSED CLIMATE CHANGE – NO CONSENSUS

THE CONSENSUS CLAIM ABOUT GLOBAL WARMING IS FALSE

Larry Bell, Professor, University of Houston, January 3, 2011

[<http://www.forbes.com/2011/01/03/climate-change-hoax-opinions-contributors-larry-bell.html>]

Another lie claims that there is a consensus among climate scientists that a known man-made global warming crisis exists. Official statements to the contrary presented by more than 650 international climate-related experts who presented contrary official testimony recorded in a 2008 U.S. Senate minority report suggest otherwise. So do petitions signed by more than 30,000 scientists that have challenged IPCC's 1995 procedures and report representations. Those circumstances prompted Dr. Frederick Seitz, former president of the U.S. Academy of Sciences, the American Physical Society, and Rockefeller University to write in *The Wall Street Journal*: "I have never witnessed a more disturbing corruption of the peer review process than events that led to this IPCC report."

NO HUMAN-CAUSED CLIMATE CHANGE – URBAN HEAT ISLANDS

TEMPERATURE MEASUREMENTS ARE TAKEN NEAR CITIES, WHICH ARE HEAT ISLANDS, AND THIS EXAGGERATES WARMING

Fred Singer, prof, U. Va, Dir, Science & Environmental Policy Project, Nov. 4, 2011

[<http://online.wsj.com/article/SB10001424052970204394804577012014136900828.html>]

Mr. Muller has been brutally frank about the poor quality of the weather-station data, noting that 70% of U.S. stations involve uncertainties of between two and five degrees Celsius. One could interpret the Berkeley study's results as confirmation of earlier studies and of the IPCC's conclusions, despite the poor quality of the stations used. But perhaps the issue is that the Berkeley study and the ones that came before suffer from common errors. I suspect that the temperature records still are affected by the urban heat-island effect—a term given to any local warming, whatever its cause—despite efforts to correct for this. The urban heat-island effect could include heat produced not only in urban areas, but also due to changes in land use or poor station siting.

AT: FOOD SHORTAGE

NEW CROPS ARE BEING DEVELOPED TO RESIST THE THREATS OF EXTREME WEATHER AND CLIMATE CHANGE

New York Times June 4, 2011

[www.nytimes.com/2011/06/05/science/earth/05harvest.html?pagewanted=1&_r=3]

The miracle was the product not of divine intervention but of technology — an illustration of how far scientists may be able to go in helping farmers adapt to the problems that bedevil them. “It’s the best example in agriculture,” said Julia Bailey-Serres, a researcher at the University of California, Riverside, who has done genetic work on the rice variety that Mr. Singh used. “The submergence-tolerant rice essentially sits and waits out the flood.” In the heyday of the Green Revolution, the 1960s, leaders like Dr. Borlaug founded an international network of research centers to focus on the world’s major crops. The corn and wheat center in Mexico is one. The new rice variety that is exciting farmers in India is the product of another, the International Rice Research Institute in the Philippines. Leading researchers say it is possible to create crop varieties that are more resistant to drought and flooding and that respond especially well to rising carbon dioxide. The scientists are less certain that crops can be made to withstand withering heat, though genetic engineering may eventually do the trick.

CURRENT EXAMPLES PROVE AGRICULTURE CAN BE RESILIENT TO CLIMATE CHANGE

New York Times June 4, 2011

[www.nytimes.com/2011/06/05/science/earth/05harvest.html?pagewanted=1&_r=3]

Agronomists emphasize that the situation is far from hopeless. Examples are already available, from the deserts of Mexico to the rice paddies of India, to show that it may be possible to make agriculture more productive and more resilient in the face of climate change. Farmers have achieved huge gains in output in the past, and rising prices are a powerful incentive to do so again.

AT: FOOD SHORTAGE

SCIENTIFIC ADVANCES ARE IMPROVING AGRICULTURE SUPPLY

Joyce Tait, Guy Barker, Genomics Research Center, July 15, 2011

[<http://www.nature.com/embor/journal/v12/n8/full/embor2011135a.html>]

Available technologies, particularly GM, are making a large contribution to global food production. Outside the EU, the cultivation of transgenic crops is expanding rapidly. The increase from 1.7 million hectares in 1996 to 148 million in 2010 makes biotech crops the fastest-adopted crop technology in the history of modern agriculture, now covering 10% of land that is used for crops on Earth. Depending on the crop and the farming system, GM crops are already contributing to increased yields, greater ease and predictability of crop management, a reduction in pesticide use and fewer post-harvest crop losses.

FUTURE SCIENTIFIC ADVANCES WILL INCREASE FOOD PRODUCTION

Joyce Tait, Guy Barker, Genomics Research Center, July 15, 2011

[<http://www.nature.com/embor/journal/v12/n8/full/embor2011135a.html>]

Nevertheless, more research is needed to generate a broader variety of crops to address future changes in farming systems. Current developments promise many improvements related to food security, including yield increases, better nitrogen-uptake efficiency, improved heat, salt and drought tolerance, improved root growth, cold germination and timing of flowering. More knowledge and better genetic modifications can benefit agriculture, as exemplified by Jiao *et al* (2010) who have developed a new rice variety by mutating a gene that affects plant architecture, increasing yield by 10%. Another example is submergence-resistant rice, which could benefit many developing countries.

AT: FOOD SHORTAGE

GENETIC ENGINEERING FOR CROPS IS SUCCESSFUL

David Ervin, Portland State University, National Research Council 2010

[The Impact of Genetically Engineered Crops, www.nap.edu/catalog.php?record_id=12804]

The most commonly introduced genetically engineered (GE) traits allow plants either to produce their own insecticide, reducing crop losses to insect damage, or to resist herbicides, so that herbicides can be used to kill many types of weeds without harming crops. Those traits have been incorporated into most varieties of soybean, corn, and cotton grown in the United States. Since their introduction in 1996, the use of GE crops has grown rapidly and accounted for over 80 percent of soybean, corn, and cotton acreage in the United States in 2009.

GE CROPS ALSO BENEFIT THE ENVIRONMENT BY REDUCING THE NEED FOR CHEMICALS

David Ervin, Portland State University, National Research Council 2010

[The Impact of Genetically Engineered Crops, www.nap.edu/catalog.php?record_id=12804]

Studies show that when best management practices are implemented, GE crops have been effective at reducing pest problems with economic and environmental benefits to farmers. Genetic engineering could potentially be used in more crops, in novel ways beyond herbicide and insect resistance, and for a greater diversity of purposes. For example, GE crops could help address global food insecurity through the development of plants with improved nutritional qualities or resilience to a changing climate.

AT: FOOD SHORTAGE

GE CROPS IMPROVE SOIL AND WATER QUALITY

David Ervin, Portland State University, National Research Council 2010

[The Impact of Genetically Engineered Crops, www.nap.edu/catalog.php?record_id=12804

Farmers have traditionally tilled fields to disrupt weeds, but tilling can erode and compact soil, reducing its ability to absorb water and leading to runoff that can pollute rivers with sediments and chemicals. The use of herbicide-resistant crops allows farmers to apply herbicides to the field to remove weeds after crops emerge from the soil, reducing the need to till and benefiting soil and water quality. Given that runoff from agriculture is the largest source of surface water pollution in the United States, this could represent the largest single environmental benefit of GE crops, but the infrastructure to track and analyze these effects is not in place.

AT: FOOD SHORTAGE

GLOBAL WARMING WILL REDUCE EXTREME WEATHER EVENTS

Dennis Avery, senior fellow, Hudson Institute, February 14, 2011

[<http://www.cgfi.org/2011/02/krugman-flunks-food%E2%80%94and-history-by-dennis-t-avery/>]

The peer-reviewed journal *Natural Hazards* in June, 2005, published a special issue on extreme weather events over the last century. It found there is *less* severe weather as the world warms, with no increase in thunderstorms, hailstorms, tornados, blizzards, Asian monsoons, heat waves or floods. Blogger Jo Nova reports that a recent re-examination of global tropical storms and hurricanes found no trend in the past 30 years.

CO2 BOOSTS FOOD PRODUCTION

CURBING CO2 EMISSIONS WILL LEAD TO THE DEATH OF MILLIONS FROM STARVATION

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

If proposed regulations anthropogenic CO2 emissions (which are designed to remedy the potential global warming problem) are enacted, they will greatly exacerbate future food problems by reducing the CO2-induced yield enhancements that are needed to supplement increases provided by advances in agricultural technology and expertise. And as a result of such CO2 emissions regulations, hundreds of millions of the world's population will be subjected to hunger and malnutrition. Even more troubling is the fact that thousands would die daily as a result of health problems they likely would have survived had they received adequate food and nutrition. About the only option for avoiding the food crisis, and its negative ramifications for humanity and nature alike, is to allow the atmospheric CO2 concentration to continue to rise as predicted (no CO2 emission restrictions), and then to learn to maximize those benefits through the growing of CO2-loving cultivars.

RISING CO2 WILL MEAN THE DIFFERENCE BETWEEN LIFE AND DEATH FOR HUNDREDS OF MILLIONS OF PEOPLE

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

As indicated in the material above, a very real and devastating food crisis is looming on the horizon, and continuing advancements in agricultural technology and expertise will most likely not be able to bridge the gap between global food supply and global food demand just a few short years from now. However, the positive impact of Earth's rising atmospheric CO2 concentration on crop yields will considerably lessen the severity of the coming food shortage. In some regions and countries it will mean the difference between being food secure or food insecure; and it will aid in lifting untold hundreds of millions out of a state of hunger and malnutrition, preventing starvation and premature death.

CO2 BOOSTS FOOD PRODUCTION

WE SHOULD NOT ACT ON CLIMATE UNTIL THERE IS CONCLUSIVE PROOF

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

In light of the host of real-world research findings discussed in the body of this report, it should be evident to all that the looming food shortage facing humanity mere years to decades from now is far more significant than the theoretical and largely unproven catastrophic climate- and weather-related projections of the world's climate alarmists. And it should also be clear that the factor that figures most prominently in both scenarios is the air's CO₂ content. Climate alarmists totally misuse the precautionary principle when they ignore the reality of the approaching lack-of-food-induced crisis that would decimate the entire biosphere, and when they claim instead that the catastrophic projections of their climate models are so horrendous that anthropogenic CO₂ emissions must be reduced at all costs. Such actions should not even be contemplated without first acknowledging the fact that none of the catastrophic consequences of rising global temperatures have yet been conclusively documented, as well as the much greater likelihood of the horrendous global food crisis that would follow such actions.

CO2 BOOSTS FOOD PRODUCTION

INCREASED CO2 HELPS CROPS OVERCOME DROUGHTS

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

Lastly, in the case of drought, we again have the nearly universal bettering of plant water use efficiency that is induced by atmospheric CO₂ enrichment. Fleisher et al. (2008), for example, grew potato plants (*Solanum tuberosum* cv. Kennebec) from “seed tubers” in soil-plant-atmosphere research chambers maintained at daytime atmospheric CO₂ concentrations of either 370 or 740 ppm under well-watered and progressively water-stressed conditions. And in doing so, they found that “total biomass, yield and water use efficiency increased under elevated CO₂, with the largest percent increases occurring at irrigations that induced the most water stress.”

INCREASED CO2 IN THE ATMOSPHERE INCREASES THE PLANT’S ABILITY TO PROCESS WATER, HELPING IT OVERCOME WATER SHORTAGES

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

In a test of this hypothesis, Cunniff et al. designed “a controlled environment experiment using five modern-day representatives of wild C₄ crop progenitors, all ‘founder crops’ from a variety of independent centers,” which were grown individually in growth chambers maintained at atmospheric CO₂ concentrations of 180, 280 and 380 ppm, characteristic of glacial, post-glacial and modern times, respectively. The results revealed that the 100-ppm increase in CO₂ from glacial to postglacial levels (180 to 280 ppm) “caused a significant gain in vegetative biomass of up to 40%,” together with “a reduction in the transpiration rate via decreases in stomatal conductance of ~35%,” which led to “a 70% increase in water use efficiency, and a much greater productivity potential in water-limited conditions.”

CO2 BOOSTS FOOD PRODUCTION

HUNDREDS OF STUDIES SHOW THE BENEFITS OF CO2 ON FOOD PRODUCTION

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

Fast forwarding to the present, studies conducted on hundreds of different plant species testify to the very real and measurable growth-enhancing and water-saving advantages that elevated atmospheric CO₂ concentrations bestow upon Earth's plants (Idso and Singer, 2009; Idso and Idso, 2011). And in commenting on these and many other CO₂-related benefits, Wittwer (1982) wrote that "the 'green revolution' has coincided with the period of recorded rapid increase in concentration of atmospheric carbon dioxide, and it seems likely that some credit for the improved [crop] yields should be laid at the door of the CO₂ buildup." Similarly, Allen et al. (1987) concluded that yields of soybeans may have been rising since at least 1800 "due to global carbon dioxide increases," while more recently, Cunniff et al. (2008) hypothesized that the rise in atmospheric CO₂ following deglaciation of the most recent planetary ice age, was the trigger that launched the global agricultural enterprise.

THOUSANDS OF STUDIES SHOW BENEFITS OF CO2 ON AGRICULTURE

Leighton Steward, environmentalist, frm Chair of the Audubon Nature Institute, 2011

[<http://plantsneedco2.org/default.aspx?menuitemid=225&menugroup=BenefitsToPlants>]

Literally thousands of laboratory and field experiments have *conclusively demonstrated* that enriching the air with carbon dioxide stimulates the growth and development of nearly all plants. They have also revealed that higher-than-normal CO₂ concentrations dramatically enhance the efficiency with which plants utilize water, sometimes as much as doubling it in response to a doubling of the air's CO₂ content. These CO₂-induced improvements typically lead to the development of more extensive and active root systems, enabling plants to more thoroughly explore larger volumes of soil in search of the things they need. Consequently, even in soils lacking sufficient water and nutrients for good growth at today's CO₂ concentrations, plants exposed to the elevated atmospheric CO₂ levels expected in the future generally show remarkable increases in vegetative productivity, which should enable them to successfully colonize low-rainfall areas that are presently too dry to support more than isolated patches of desert vegetation.

CO2 BOOSTS FOOD PRODUCTION

ELEVATED CO2 NECESSARY FOR PLANTS TO OVERCOME A WIDE VARIETY OF ENVIRONMENTAL STRESSES THAT OTHERWISE WOULD DESTROY PRODUCTION

Leighton Steward, environmentalist, fmr Chair of the Audubon Nature Institute, 2011
[<http://plantsneedco2.org/default.aspx?menuitemid=225&menugroup=BenefitsToPlants>]

Elevated levels of atmospheric CO₂ also enable plants to better withstand the growth-retarding effects of various environmental stresses, including soil salinity, air pollution, high and low air temperatures, and air-borne and soil-borne plant pathogens. In fact, atmospheric CO₂ enrichment can actually mean the difference between life and death for vegetation growing in extremely stressful circumstances. In light of these facts, it is not surprising that Earth's natural and managed ecosystems have *already* benefited immensely from the increase in atmospheric CO₂ that has accompanied the progression of the Industrial Revolution; and they will *further* prosper from *future* CO₂ increases.

INCREASED ATMOSPHERIC CO2 HELPS PLANTS COPE WITH ENVIRONMENTAL PRESSURES

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011
[Global Food Production Estimates,
<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

Atmospheric CO₂ enrichment also tends to enhance growth and improve plant functions in the face of environmental constraints. Conway and Toenniessen (2003), for example, describe how ameliorating four such impediments to plant productivity – soil infertility, weeds, insects and diseases, and drought – significantly boosts crop yields. Therefore, reducing the negative consequences of each of these yield-reducing factors via human ingenuity should boost crop productivity in an additive manner. And a continuation of the historical increase in the air's CO₂ content should boost crop productivity even more.

CO2 BOOSTS FOOD PRODUCTION

INCREASED CO2 HELPS CROPS COPE WITH WEEDS

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

In the case of weeds, Conway and Toenniessen speak of one of Africa's staple crops, maize, being "attacked by the parasitic weed *Striga* (*Striga hermonthica*), which sucks nutrients from roots." This weed also infects many other C4 crops of the semi-arid tropics, such as sorghum, sugar cane and millet, as well as the C3 crop rice, particularly throughout much of Africa, where it is currently one of the region's most economically important parasitic weeds. Here, too, studies have shown that atmospheric CO2 enrichment greatly reduces the damage done by this devastating weed (Watling and Press, 1997; Watling and Press, 2000).

INCREASED CO2 HELPS PLANTS COPE WITH LOSSES TO INSECTS

Craig Idso, Center for the Study of Carbon Dioxide and Global Change, June 15, 2011

[Global Food Production Estimates,

<http://www.co2science.org/education/reports/foodsecurity/foodsecurity.php>]

In the case of insects and plant diseases, atmospheric CO2 enrichment also helps prevent crop losses. In a study of diseased tomato plants infected with the fungal pathogen *Phytophthora parasitica*, which attacks plant roots inducing water stress that decreases yields, for example, the growth-promoting effect of a doubling of the air's CO2 content completely counterbalanced the yield-reducing effect of the pathogen (Jwa and Walling, 2001). Likewise, in a review of impacts and responses of herbivorous insects maintained for relatively long periods of time in CO2-enriched environments, as described in some 30- plus different studies, Whittaker (1999) noted that insect populations, on average, have been unaffected by the extra CO2. And since plant growth is nearly universally stimulated in air of elevated CO2 concentration, Earth's crops should therefore gain a relative advantage over herbivorous insects in a high-CO2 world of the future.

CO2 BOOSTS FOOD PRODUCTION - BIODIVERSITY

HIGH LEVELS OF CO2 BOOST SPECIES BIODIVERSITY AND ECOSYSTEM HEALTH

Leighton Steward, environmentalist, frm Chair of the Audubon Nature Institute, 2011

[<http://plantsneedco2.org/default.aspx?menuitemid=225&menugroup=BenefitsToPlants>]

A CO₂-induced increase in vegetative productivity may well be one of the best allies we will ever have in our battle to preserve the planet's *biodiversity*. In a worldwide study of the vascular plants of 94 terrestrial ecosystems, for example, it was found that ecosystem *species richness* is more positively correlated with ecosystem productivity than it is with anything else (Scheiner and Rey-Benayas, 1994). In addition, a major review of plant-animal interactions in 51 terrestrial ecosystems has found that the biomass of plant-eating animals or *herbivores* is also a strongly increasing function of aboveground primary production (McNaughton et al., 1989); while a review of 22 aquatic ecosystems has found that the herbivore biomass of watery habitats increases in response to a rise in *underwater* vegetative productivity (Cyr and Pace, 1993). In light of these facts, it is likely that Earth's animal life - both terrestrial and aquatic - will experience population responses to rising levels of atmospheric CO₂ that will parallel those of the plant kingdom; for the greater the plant food base, the greater the superstructure of animal life that can be supported. And with greater populations of individual organisms, greater biodiversity will likely abound, as each species of plant and animal must maintain a certain "critical biomass" to sustain its unique identity and insure its long-term viability.

GLOBAL WARMING INCREASES SPECIES RANGE, HELPING IT SURVIVE

Leighton Steward, environmentalist, frm Chair of the Audubon Nature Institute, 2011

[<http://plantsneedco2.org/default.aspx?menuitemid=225&menugroup=BenefitsToPlants>]

When air temperatures and atmospheric CO₂ concentrations rise concurrently, there is another CO₂-induced phenomenon that also tends to increase ecosystem *species richness*. Driven by the unique ability of atmospheric CO₂ enrichment to increase the ability of plants to withstand higher temperatures, this phenomenon leads to a stabilization of the low-latitude boundaries of the ranges of most plant species, even in the face of significant regional or global warming, while allowing them the opportunity to expand their high-latitude boundaries and thereby increase the sizes of their ranges. Herbivores that feed upon plants, and carnivores that eat herbivores and other animals, then have the opportunity to likewise increase the sizes of their ranges. And the increased overlapping of plant and animal habitats provided by this phenomenon tends to increase ecosystem biodiversity the world over, as is currently being observed in studies specifically designed to explore these phenomena.

SOLVENCY ANSWERS – PUBLIC SKEPTICISM

BETTER CLIMATE INFORMATION WON'T CAUSE BETTER POLICY – IT'S HUMAN NATURE TO RESIST CHANGE

Bryan Walsh, Time Magazine, October 4, 2011

[<http://www.time.com/time/health/article/0,8599,2096055,00.html>]

So would it make a difference if the conservative denial machine were to collapse tomorrow? Sadly, I'm not sure. Even in places like Western Europe, where belief in climate science tends to be much stronger, it's hard to build support for the actual steps to reduce carbon emissions. Human beings have a hard time dealing not just with pain, but also with long-term problems, especially ones that don't necessarily show immediate effects. Whether it's planning for retirement or losing weight, we find it too easy to disregard very clear science — and disregard our long-term health — in order to satiate our immediate desires. There's no excuse for the sort of half-fictions and outright lies that too often make up the climate-change-denial machine, but it's human psychology — as much as politics — that's preventing us from dealing with one of the greatest threats the species faces. The most powerful denial machine of all may be the one inside our heads.

PUBLIC OPPOSITION TO CLIMATE CHANGE POLICY HAS GROWN EVEN THOUGH SCIENTIFIC EVIDENCE HAS INCREASED

Hendrik Van Den Berg, Professor Economics, University of Nebraska, 2010

[<http://nebraskansforpeace.org/change-public-attitudes>]

Environmentalists like us are oftentimes surprised by the public's lack of interest in climate change. Recent polls even show that public opposition to climate legislation has increased over the past several years even as the scientific evidence of global warming mounts. The evidence on climate change is now overwhelmingly clear: anything over a 2 degree-centigrade rise in temperatures (3.6 degrees Fahrenheit) — an event that is highly likely before the end of this century if no countermeasures are taken — will almost certainly have very costly and dangerous consequences.

SOLVENCY ANSWERS – PUBLIC SKEPTICISM

AMERICAN CULTURE OF INDIVIDUALISM AND CONSUMPTION OVERWHELMS SCIENTIFIC DATA IN FAVOR OF CLIMATE CHANGE POLICY

Hendrik Van Den Berg, Professor Economics, University of Nebraska, 2010

<http://nebraskansforpeace.org/change-public-attitudes>

American culture is so tightly wrapped around consumption and individualism that we refuse to grasp, much less accept, that our individual striving for larger houses, bigger automobiles, 16-oz. steaks, and frequent weekend flights to Las Vegas constitute a collective irresponsibility of earth-shattering proportions. The economist Deepak Lal (*Unintended Consequences: The Impact of Factor Endowments, Culture, and Politics on Long-Run Economic Development*, MIT Press, 1998) argues that culture inevitably lags behind the ever-changing realities of our natural, social and economic environments, and this weakens political systems' ability to deal with complex issues. In the case of global warming, American culture lags behind our scientific *knowledge and understanding* of our environment.

CLIMATE CHANGE IS SO GRADUAL THAT PUBLIC OPINION WON'T FORM IN FAVOR OF TAKING ACTION

Hendrik Van Den Berg, Professor Economics, University of Nebraska, 2010

<http://nebraskansforpeace.org/change-public-attitudes>

Our biological ability to deal with a phenomenon like global warming — where the changes are occurring so gradually — is thus exceptionally weak. The climate disruption driven by our carbon emissions is not as yet highly visible, and it should not be surprising, therefore, that Americans' habitus of high consumption and doxa of individualism continues to shape the reality of our jobs and professions, our entertainment, and our politics. Since our culture provides few incentives to act on global warming, we vote for whichever political party best identifies itself with consumption and individualism.

SOLVENCY ANSWERS – PUBLIC SKEPTICISM

THE PUBLIC DOESN'T BASE OPINIONS ON RESEARCH, THEY FORM BELIEFS

Hendrik Van Den Berg, Professor Economics, University of Nebraska, 2010

<http://nebraskansforpeace.org/change-public-attitudes>

As the head of climate change research at the United Kingdom's Meteorological Office recently lamented: "I don't understand the psychology here. It should be about evidence but it's actually about beliefs." This dominance of belief over scientific evidence that so concerned the U.K. climate official seems to be strongest in the U.S. Is this because our lobbyists are more active in reinforcing the doxa and habitus components of culture through advertising, misinformation and fear? Or is it because Americans already have a habitus, or a disposition, to favor beliefs over scientific reasoning? Author Thomas Frank, of *What's the Matter with Kansas?* fame, suggests that the U.S. has a long cultural tradition of anti-intellectualism. Bourdieu would conclude that this anti-intellectual habitus, perhaps based on a strong doxa of fundamentalist religious orthodoxy, makes it difficult for American political culture to generate sound environmental policies.

NEW SCIENCE AND FACTS DON'T AFFECT THE PUBLIC DEBATE – PEOPLE PROCESS EVIDENCE THROUGH PRE-ESTABLISHED FILTERS

Adam Corner, research associate, Cardiff University, November 23, 2011

[<http://www.guardian.co.uk/environment/blog/2010/nov/23/climate-change-scepticism-not-about-science>]

But the premise underlying the initiative – that climate change scepticism will be reduced through a clearer presentation of the facts – is problematic. Why? Because climate change scepticism is only superficially about science. The basic question of human impact on the climate is no longer seriously debated in the scientific literature. Science being science, there will always be uncertainties. But if the credibility of a scientific conclusion can be judged from the weight of evidence that supports it, then climate change is a fact. The problem is that seemingly objective facts are surprisingly malleable – especially when they are perceived to have implications for policy or behaviour. Several decades of social psychological research have shown that on any number of topics – from capital punishment, to gun control, to nanotechnologies – people squeeze new evidence through powerful social and cultural filters. Pouring facts into this filter system does not necessarily produce consensus – and it can even cause attitudes to polarise.

SOLVENCY ANSWERS – PUBLIC SKEPTICISM

PUBLIC OPINION ABOUT CLIMATE CHANGE DOESN'T DEPEND ON SCIENCE, IT DEPENDS ON VALUES, THE VIEW OF GOVERNMENT AND REGULATION

Adam Corner, research associate, Cardiff University, November 23, 2011

[<http://www.guardian.co.uk/environment/blog/2010/nov/23/climate-change-scepticism-not-about-science>]

As Mike Hulme showed in his book *Why We Disagree About Climate Change*, many of the arguments that rage around climate science are not really about climate change at all: they are disputes about personal values, regulation, economic growth or the acceptable level of government intervention in our lives. Climate change just happens to cut to the heart of these red hot issues – and so it is used as a vehicle for thrashing out ancient disputes. The gap between scientific knowledge on climate change and public attitudes is unlikely to be closed by opening up a new front of climate science dissemination. Previous experience with scientific topics such as GM crops suggests that turning up the volume on the science will not necessarily lead to greater public acceptance of climate change.

IT WILL BE DIFFICULT TO SWAY PUBLIC OPINION WITH SATELLITE DATA

Hendrik Van Den Berg, Professor Economics, University of Nebraska, 2010

<http://nebraskansforpeace.org/change-public-attitudes>

The world may have to wait a long time before America's culture finally catches up with the reality of global warming. Add to this equation the strength of special interest lobbyists the world over determined to impede a new climate accord, and it is clear that it is going to be very difficult to stop the coming train wreck.

SOLVENCY ANSWERS – DATA INADEQUATE

SATELLITE DATA IS MORE DIFFICULT TO USE IN DEVELOPING CLIMATE DATA

Jonathan Overpeck, Institute of the Environment, University of Arizona, February 2011

[Science Magazine, February 11, 2011, vol 331, no 6018, pp. 700-02]

Another key source of climate data is space-borne instruments. The development of long-term, high-quality climate observations from satellites is more difficult than from surface-based instrumental data, because individual satellites and their instruments have short life spans (typically a few years), over which their orbits and sensitivities can change. These problems require the use of advanced data-processing techniques, and the resulting data are prone to being reprocessed as previously unknown problems are discovered over time. In addition, gaps in the records and systematic errors between satellites (or a lack of overlapping calibration periods) make the increasingly important construction of coherent climate data records more of a challenge.

SOLVENCY ANSWERS – LOBBIES BLOCK POLICY MAKERS

DESPITE SCIENTIFIC CONSENSUS SUPPORTING CLIMATE CHANGE POLICY, LOBBY GROUPS ARE EFFECTIVELY BLOCKING IT

Kumi Naidoo, Executive Director, Greenpeace, November 2011

[Who's Holding Us Back?, November 2011,

<http://www.greenpeace.org/international/en/publications/reports/Whos-holding-us-back>]

Given the compelling scientific and political consensus that climate change is an increasing global problem, you may wonder why we aren't seeing progress sooner. Why is political action so out of step with the urgency of the situation: what is holding us back? One of the answers lies in the largely invisible network of lobbyists, representing the interests of the world's major polluting corporations. But while their actions may be invisible, their outcomes are anything but. Collectively they spend the equivalent of the GDP of entire nations, to block progress on climate legislation, and ensure that fossil fuel and nuclear subsidies continue to give unfair advantages to dirty energy, above the safe, clean renewable energy future the public demands. This report shows beyond a shadow of a doubt that a handful of carbon-intensive companies who stand to benefit from inaction have been holding us back, and the politicians who choose to act on their behalf.

SPECIAL INTEREST LOBBYING BLOCKS EFFECTIVE POLICY GLOBALLY

The Center for Public Integrity, November 5, 2009

[www.publicintegrity.org/investigations/global_climate_change_lobby/key-findings/]

Starting in July 2009, the International Consortium of Investigative Journalists fielded an eight-country team of reporters to uncover the special interests attempting to influence negotiations on a global climate change treaty. Relying on more than 200 interviews, lobbying and campaign contribution records in a half-dozen countries, and on-the-ground reporting from Beijing to Brussels, our team pieced together the story of a far-reaching, multinational backlash by fossil fuel industries and other heavy carbon emitters aimed at slowing progress on control of greenhouse gas emissions. Employing thousands of lobbyists, millions in political contributions, and widespread fear tactics, entrenched interests worldwide are thwarting the steps that scientists say are needed to stave off a looming environmental calamity, the investigation found.

SOLVENCY ANSWERS – LOBBIES BLOCK POLICY MAKERS

MASSIVE EXPENDITURES ON LOBBYING AND CAMPAIGN CONTRIBUTIONS SUPPORT CLIMATE DENIAL POLICIES

Kumi Naidoo, Executive Director, Greenpeace, November 2011

[Who's Holding Us Back?, November 2011,

<http://www.greenpeace.org/international/en/publications/reports/Whos-holding-us-back>]

In the US alone, approximately \$3.5 bn is invested annually in lobbying activities at the federal level. The US Chamber of Commerce tops the list of lobbyists. In recent years, Royal Dutch Shell, the US Chamber of Commerce, Edison Electric Institute, PG&E, Southern Company, ExxonMobil, Chevron, BP and ConocoPhillips all made the top 20 list of lobbyists. The climate campaign organisation 350.org estimates that 94% of US Chamber of Commerce contributions went to climate denier candidates.

CARBON-INTENSIVE COMPANIES BLOCK EFFECTIVE LEGISLATION

Kumi Naidoo, Executive Director, Greenpeace, November 2011

[Who's Holding Us Back?, November 2011,

<http://www.greenpeace.org/international/en/publications/reports/Whos-holding-us-back>]

This report will show that carbon-intensive companies are acting to block key governments from tackling climate change through international and domestic policies. Without good renewable energy policies, a commitment to zero deforestation, promotion of green and decent jobs and legally binding regulation to control greenhouse gas emissions, the transition to green economies powered by clean and safe energy will not happen fast enough to avoid catastrophic climate change.