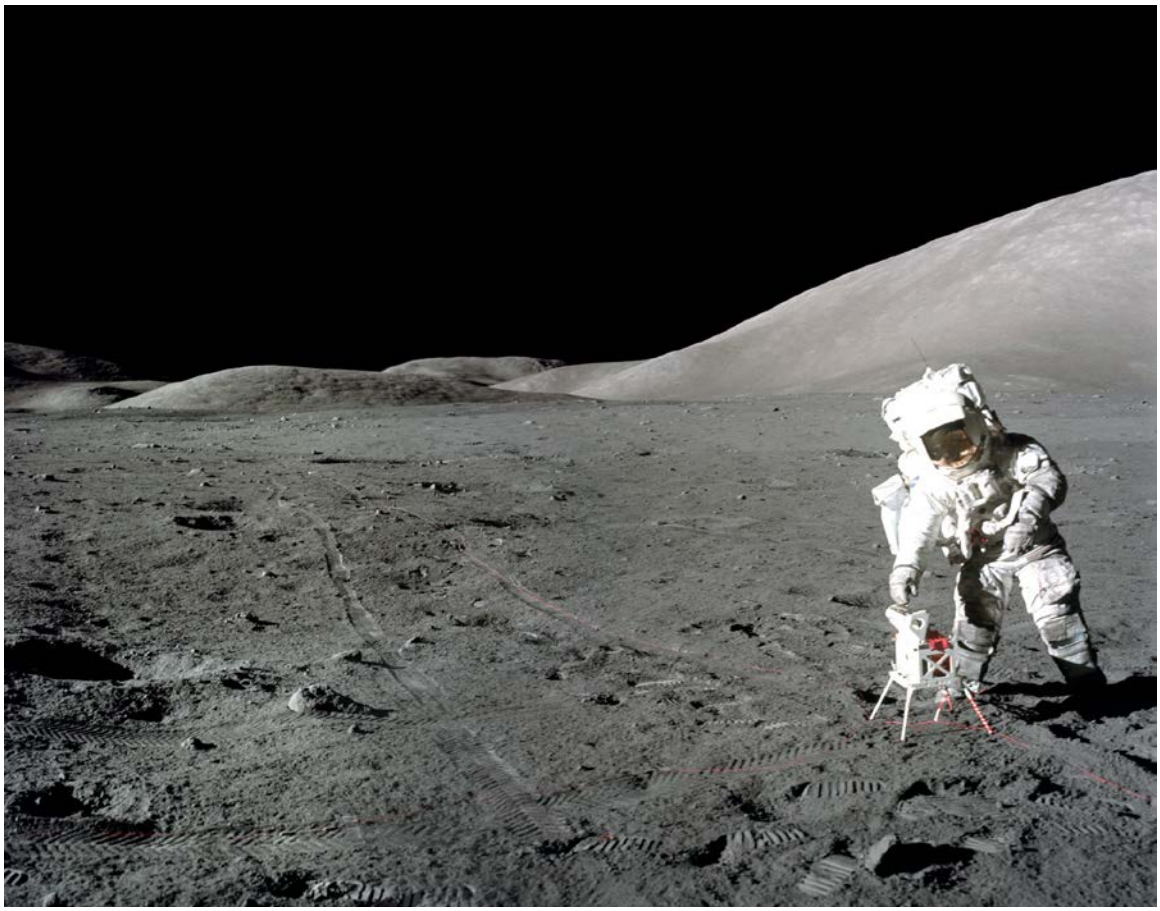
Climate and the

Constitution

Dr. Harrison H. Schmitt

Foreword by
Dr. Robert M. (Bob) Carter



Frontispiece:

Apollo 17 Astronaut Harrison H. (Jack) Schmitt setting up the Surface Electrical Properties experiment shortly after landing in the lunar Valley of Taurus-Littrow on December 11, 1972. He has placed crossed red antenna wires in the tracks left by the Lunar Rover Vehicle. Schmitt named the small hill in the left background ***Bear Mountain*** after a mountain near his hometown of Silver City, NM (NASA photo AS17-134-20438).

Cover Photo by the Author:

Apollo 17 astronaut Harrison H. (Jack) Schmitt took the photo about 5 hrs, 6 min into the mission, some 26 minutes after the Command and Service Module had linked with the Lunar Module and the crew were on their way to the Moon. The translunar trajectory had swung far enough to the south that the continent of Antarctica was plainly visible. Similar photos from other missions do not show much of Antarctica, if at all. Schmitt maintained a running deep space commentary on the clouds and weather patterns like those seen in the cover photo throughout the translunar coast, the first synoptic weather observations of the entire Earth ever reported. The National Oceanic and Atmospheric Association (NOAA) presented Schmitt with a special meteorological award for those historic global observations after the mission. It would not be until the GOES geostationary satellites were launched a few years after the Apollo 17 mission that full disk coverage of the Earth's weather patterns would become available on a synoptic basis. (NASA photo AS-17-148-22726)

Climate and the Constitution

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AND THE
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Using naturally warming climate as a false crisis, Government desires to regulate and tax the American economy without constitutional authority. In doing so, Government's inherently arbitrary and capricious actions will reduce individual and collective liberty by raising the cost of living of all citizens and be in clear violation of the natural, intensive rights guaranteed by the 9th Amendment— Harrison H. Schmitt.

NOTE:

Most of these chapters were originally published as individual essays on the author's website, http://americasuncommonsense.com/. All have since been revised in light of subsequent events. The original essays also formed part of the compendium, ***America's Uncommon Sense: The Founders' View Today***, an ongoing collection of the author's reflections on current political events and the U.S. Constitution. The compendium can be downloaded in whole or in parts in PDF and Kindle formats or read online at http://americasuncommonsense.com/blog/downloads/.

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Foreword: Provided by Dr. Robert M. Carter

Prologue: Provided by the author.

Climate Science Divider: A cumulonimbus cloud over White Canyon, Utah. Public domain photo by Rafikimambo.

Chapter 1: Vigorous lava activity in Halemaumau Crater located within the Kilauea caldera on the big island of Hawaii. Public domain photo by the U.S. Geological Survey.

Chapter 2: (*left*) – A CO_2 hazard sign located at Horseshoe Lake, CA. (*right*) – Lava spattering from the Kamoamoa fissure near Kilauea, HI. Public domain photo by the U.S. Geological Survey.

Chapter 3: Blue ice covering Lake Fryxell in the Transantarctic Mountains. Public domain photo by Joe Mastroianni, National Science Foundation.

Chapter 4: Sunset along a Pacific coast beach near La Jolla, CA. Public domain photo by Guy DeMeo, U.S. Geological Survey.

Chapter 5: An exploding Coronal Mass Ejection (CME) captured by the SOHO LASCO C2 coronagraph superimposed by a 304 Å SOHO EIT image. Public domain photo composite by the SOHO-EIT-LASCO Consortium: SOHO is an ESA/NASA project of international cooperation.

Chapter 6: The "Hand of God" X-ray nebula captured by the orbiting Chandra X-ray Observatory. The pulsar PSR B1509-58, a rapidly spinning neutron star, is emitting energy as it spins which interacts with surrounding gases. The lowest energy X-rays detected are red, medium energy green, and the highest energy blue. B1509 is about 17,000 light years from the Earth. A NASA/Chandra public domain photo.

The Constitution Divider: The East front of the U.S. Capitol building at nighttime in the winter. Public domain photo provided by the *Architect of the Capitol*, Washington D.C., 20515 at http://www.aoc.gov/ cc/art/sign_constitution.cfm.

Chapter 7: Aerial view of the U. S. Capitol complex, seat of the U.S. government seen from the northwest. Public domain photo provided by the *Architect of the Capitol*, Washington D.C., 20515 at http://www.aoc.gov/cc/capitol/cc_aerial_nw.cfm.

Chapter 8: The Rotunda of the University of Virginia in Charlottesville, Thomas Jefferson's academic center of learning founded in 1819, designed by him and built between 1822-26. Public domain photo by Uris.

Chapter 9: An oil donkey managed by the Hollister, CA field office of the Bureau of Land Management, Department of the Interior. http://www.blm.gov/ca/st/en/fo/hollister/minerals.html. Public domain photo by E. Zaborsky, BLM.

Chapter 10: The Aurora Borealis seen above Bear Lake, Eielson Air Force Base, Alaska. U.S. Air Force public domain photo 050118-F-3488S-003 by Staff Sgt. Joshua Strang.

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FOREWORD

Former Apollo astronaut, and Senator, Harrison (Jack) Schmitt is one of a select group of trained scientists who have observed Earth's climate system from both the inside out, and the outside in. In the process, Jack has made passage both ways through the atmosphere that sustains the system. He has also had the unusual experience of being able to experience directly the relative climatic quietude of the atmosphere-less moon with the Earth's much more dynamic system. Jack therefore understands climate well— in the round, as it were. He also understands the principles of radiative physics that govern the need to wear a protective space suit on the moon, and which also form an integral part, but only part, of the Earth's climatic system.

This brief comment perhaps explains, then, the "Climate" part of the present book's title, but what of the "and the Constitution" rider? A reading of chapters 7-10 of the book reveals that Jack has a deep fealty to the Constitution as a means of protecting and advancing the historical success of the libertarian United States republic. His interest in this matter became sharpened and deepened, of course, by the term that he served in Washington as a Senator for New Mexico during 1977-1983.

The third point that requires addressing is to ponder what link there might be between two such (at first sight unlikely) bed partners as "climate" and "Constitution", for therein must lie the nub of the book. That link can be explained as follows.

Today's greatest environmental issue, as iconic at the start of the 21st century as the panda was in the late 20th, is allegedly dangerous anthropogenic global warming (DAGW), in turn allegedly caused by human-sourced carbon dioxide emissions. Media, blog and other internet coverage of this complex scientific and political issue over the last ten years has been notable for the volume of comment and for its extreme and divisive nature: civil discourse has often been jettisoned as persons on the two perceived sides of the issue have shouted at each other in a classic dialogue of the deaf.

To a scientist and geologist like Jack Schmitt, who is familiar with the factual evidence regarding climate change, the public belief that a global warming crisis is upon us is somewhat puzzling. For three key things are known. The first is that climate is always changing: change is what climate does. The second is that the rates and magnitudes of warming during the late 20th century fell well within the limits of earlier natural climate change; and that they had a measurable human origin cannot be demonstrated. And the third is there has been no increase in average global temperature over the 10 years since 2001, despite an increase in atmospheric carbon dioxide of about 5% over the same period.

Jack explains these simple facts, and many other related matters, in chapters 1-6 of his book, dealing *inter alia* with the history of global temperature and atmospheric carbon dioxide, especially as known from polar ice cores that cover the last 500,000 years. Unusually, in comparison with many other accounts that focus on carbon dioxide as the dominant or only temperature control of climate, close attention is given to the dominant roles that the sun (the chief provider of energy to Earth's climate system, at the top of the atmosphere), the oceans (the natural capacitor, or "flywheel" of the system, which store more than 3,000 times as much heat as the atmosphere) and perhaps cosmic radiation (in interplay with the sun's fluctuating magnetic fields) play in influencing climate and climate change. Jack takes us through these and other related topics in six easily read and fascinating chapters, and thereby establishes the scientific background against which matters of DAGW must be assessed.

As an experienced scientist himself, Jack could have provided this account on his own authority, but instead, and with meticulous attention to detail, every major fact or assertion in the book is supported by reference to a peer-reviewed paper in the scientific literature. The resulting list of references is an extremely valuable source for further study by interested readers.

The simple facts that Jack Schmitt relates are common ground amongst all independent scientists, but many citizens — influenced, no doubt, by the clever, pervasive and incessant pseudo-scientific propaganda that emanates from both environmentalists and the United Nations Intergovernmental Panel on Climate Change (IPCC) — have nonetheless become strongly and genuinely committed to the view that DAGW is a severe problem, and poses a terrible danger to the future of planet Earth.

Over the last 25 years this mounting but unsubstantiated public alarm has led, first, to the ineffectual and grossly wasteful Kyoto Protocol. And, second, to the introduction of penal carbon dioxide taxation or trading schemes in the European Union, and in one or two other isolated places such as Australia and New Zealand.

The kernel of the matter, and of Jack Schmitt's concern in writing his book, is to understand that the public mania about DAGW has been fostered by three of the most powerful groups in modern society. Namely, *scientists* who advise the IPCC ("expert", of course, by definition, and in continual need of research funds); *media organisations* that thrive off reporting scenarios of environmental doom and gloom (many of whose reporters self-evidently wish to be seen as politically correct, read "green", on such issues); and self-interested *financial and commercial organisation*s whose raison d'étre is to make money in any legal way that is possible — and what better way than by clipping a piece of passing paper that represents a wholly contrived market in an odourless, tasteless, colourless, invisible (and, as it ironically turns out, environmentally beneficial) trace gas; no commodity changes hands, just an intrinsically valueless piece of paper, but if instituted as international practice, as intended by those rampant alarmists who support the IPCC, this pseudo-market would run to trillions of dollars of unproductive spending each and every year.

It's not as if US citizens weren't warned of the danger that such a state of affairs might come about. For in his now famous valedictory address on January 17, 1961, President Dwight Eisenhower made the percipient remark that:

> *The prospect of domination of the nation's scholars by Federal employment, project allocations, and the power of money is ever present and is gravely to be regarded.*
>
> *Yet, in holding scientific research and discovery in respect, as we should, we must also be alert to the equal and opposite danger that public policy could itself become the captive of a scientific-technological elite.*

The capture and politicisation of climate science that did indeed occur in the late 20th century has caused western science systems to become prone to the disease of "spin". Political parties and politicians, government regulatory agencies, government science providers, University research centres, and NGO and industry lobby groups have all become expert at the art of using modern communication and advertising techniques to influence public opinion on the one hand, and to capture research or program funding on the other. Further, for the issue of climate change, a small, internationally-networked, IPCC-related cabal of activist scientists has for many years exercised undue influence over the research funding and journal publication processes; they do this by proclaiming themselves as "the experts" on the matter in hand, and systematically giving refereeing and professional support only to other members of the same group.

Thus has the elite-group control that Eisenhower predicted come to be exercised over research directions and outcomes in climate science, thus has frisbee-science been propagated and thus has a claimed public "consensus" been fashioned for the demonization of the environmentally beneficial trace gas carbon dioxide. The credibility of the scientific method as a values-free and objective procedure for analysing and solving societal problems is dangerously undermined by this, and by the parallel, widespread use of spin-doctoring to disseminate scientific results in a way that maximises the chance of continuing research funding. This mishmash of science, pseudo-science, social science, environmental crusading and politics has well been termed the "post-modern science" approach, and the exemplar of the approach in action is the activity of the United Nations IPCC.

It doesn't have to, and shouldn't, continue to be like this. For the application of objective, value free and disinterested science and engineering has been the foundation for the success of western civilization ever since the basic principles were established during the Enlightenment. As Jack Schmitt says in Chapter 7, Americans now need to:

> *think long and hard about their children's future before giving up liberties and incomes to politicians in Washington and at the United Nations in the name of "doing something" about climate change.*

In pursuit of undoing the already serious and costly damage, and of minimizing the damage of future environmental alarms, Americans might consider resurrecting an idea

of Arthur Kantrowitz, a former Professor of Engineering at Dartmouth College. In 1967, Kantrowitz (*Science*, 1967, **156**:763-64) proposed the creation of a U.S. Science Court as a mechanism to "*subject public alarms claiming a scientific basis to the most probing questions (that) scientists can devise*". Kantrowitz suggested that such a Science Court should:

- not be involved in funding research;
- recognize that conjectures that have implications for public policy are as strongly influenced by ideologies when advanced by scientists as when they are advanced by non-scientists;
- seek expert scientists with opposing ideologies to formulate probing questions about the matter before the Court in ways that distinguish conjecture from knowledge;
- enforce a new norm whereby any person claiming scientific credentials and appearing as a witness before the Court be required to answer factual questions from both the public and from expert adversaries; and
- determine issues using juries comprised of scientists of distinction drawn from disciplines OTHER than the main discipline area of the subject under dispute.

The chief advantage of a science court to resolve matters of public scientific controversy, such as the global warming issue, is that it can provide a genuinely independent, objective and contested assessment of alternative policies for environmental protection. In other words, just what the IPCC was intended to be for climate change matters, but of course isn't.

In any event, Kantrowitz' suggestions were taken seriously to the point that a Presidential Task Force laid out detailed suggestions for procedures for such an institution. In the end, however, "*whisperings around Washington in that small circle called the science policy community*" successfully undermined this invasion of bureaucratic turf (P. Boffey, *Science*, 1976, **193**: 129). Given the high costs of running such a court, and the huge areas of agency turf that would be threatened by its creation today, a vigorous anti-Court lobby would surely emerge the instant any contemporary political leader plucked up the courage to float this or a similar idea.

Which brings us right back to where we started, science and the Constitution.

This book is written by a supremely well informed, well qualified and thoughtful scientist, and formerly active senior politician. Jack Schmitt has identified accurately the need for corrective action now, and careful future vigilance, against the undue influence that is being exerted on our political systems by post-modern modes of scientific thinking and policy formulation.

Read this book you must, for anyone concerned at the direction in which America is headed today can only profit from understanding the devastating picture that it portrays of the corruption of both politics and science in the pursuit of the supposed DAGW (but actually anti-carbon fuels) environmental agenda.

If a Science Court is not the answer, then some other similar solution most certainly must be found, for "business as usual" in environmental politics has now become simply unacceptable. The modern professional environmental movement is attacking the very foundations of the world economy (including America), and at most turns the policies that are espoused end up harming rather than helping our natural environment, not to mention diminishing the common wealth. Citizens who want to don their thinking hats to help provide a constructive solution to modern environmental dilemmas will benefit greatly from reading this compelling and thoughtful book.

Thank you, Jack Schmitt, for providing us with the wise scientific guidance and political leadership that is today so sadly lacking in Washington and other western national capitals.

☆☆☆☆☆

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March 16, 2012

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PROLOGUE

Two competing hypotheses define the science in the global debate about the causes of climate change. On the one hand, most government scientists — and the scientific establishment of academies, associations and societies — have concluded that human activities have caused the recent continuation of 350 years of slow global warming. On the other hand, a significant number of scientists, who are largely independent of government-funded research, have concluded that natural variations account for most, if not all, of the current warming. The professional side of the conflict between the advocates of these two hypotheses generally comes down to a debate between scientists attempting to predict future climate change through complex computer models, and scientists who observe the history and recent variations in those complexities.

Unfortunately, the proponents of human-caused climate change too often engage in unfounded attacks and character assassination rather than reasoned disagreement. Most advocates of human-caused warming have repeatedly refused invitations to enter into organized scientific debate. Moreover, they frequently use the logically impossible epithets "climate denier" or "climate skeptic" in an attempt to label and discredit those who question their arguments in support of human-caused global warming. Notwithstanding these attacks, no clear evidence exists that human consumption of fossil fuels influences current climate change to a measurable degree, indicating that both emotional belief and hard politics are at work.

Climate and the Constitution summarizes the major components of the nature-caused climate change hypothesis, citing extensive observational evidence in its support. Much of this evidence has been gathered by those who argue for the human-caused change hypothesis; however, their observational data is nonetheless consistent with the alternative explanation that nature is in control. The publications of governments and the scientific establishment, such as NASA and NOAA reports and papers in ***Science*** and ***Nature***, amply argue for the human-caused climate change hypothesis. These publications also routinely advocate for the regulatory and taxation "imperatives" that their hypothesis allegedly demands.

A number of fine authors have documented the science behind the nature-caused climate change hypothesis more extensively than done here; and the reader is referred to those references for even greater detail and analysis. These include the following:

- **Idso, C., and S. F. Singer**, 2009, ***Climate Change Reconsidered****: Report,* Heartland Institute, Chicago; **Idso, C., and S. F. Singer**, 2011, ***Climate Change Reconsidered****: Interim Report,* Heartland Institute, Chicago

- **Carter, R. M.**, 2010, ***Climate: The Counter-Consensus – a Scientist Speaks***, Stacey International, London.
- **Landscheidt, T.**, ~2004, ***Solar Activity: A dominant Factor in Climate Dynamics***, Schroeter Institute of Research in Cycles of Solar Activity, Nova Scotia, Canada http://www.john-daly.com/solar/solar.htm.
- **Singer, S. F., and D. T. Avery**, 2007, ***Unstoppable Global Warming***, Rowman and Littlefield, 278p.
- **Spencer, R. W.**, 2008, ***Climate Confusion***, Encounter Books, New York, 191p.
- **Spencer, R. W.**, 2010, ***The Great Global Warming Blunder***, Encounter Books, New York, 176p.

The more political side of the climate debate is well covered by several web sites and by the following books:

- **Bell, L.**, 2010, ***Climate of Corruption***, Greenleaf, Austin, 298p.
- **Pielke, R., Jr.**, 2010, ***The Climate Fix***, Basic Books, New York, 276p.
- **Solomon, L.**, 2008, ***The Deniers***, Richard Vigilante Books, New York, 239p.
- **Spencer, R. W.**, 2008, ***Climate Confusion***, Encounter Books, New York, 191p.

Although there are many facets to this debate on causes of climate change, the primary difficulties faced by those that advocate human causation are six fold.

> ***First***, the most recent trend in global climate has been warming that has occurred at a rate of about one degree Fahrenheit per 100 years since about 350 years ago; but through most of that period, human use of fossil fuels was very small. Although change has been erratic over decadal periods, this overall warming trend has occurred since the minimum temperatures of the last major cold period of the Little Ice Age.
>
> ***Second***, nature's primary control of atmospheric carbon dioxide and decadal climate change lies in the oceans' immense capacity to absorb, transport and release or fix carbon and their comparable capacity to store, transport and release heat.
>
> ***Third***, analysis of the contribution of light isotopes of carbon from the burning of fossil fuels to the current amount of carbon dioxide in the atmosphere shows that contribution to be only about four percent. Carbon dioxide released from the warming of deep-ocean water and from increasingly productive biological processes appears to account for the vast majority of the recent steady increase in the atmospheric concentration of that gas.
>
> ***Fourth***, detailed analysis of ice cores indicates that natural increases in atmospheric carbon dioxide lag natural global climate warming by several hundred to a thousand years. The modern increase in atmospheric carbon

dioxide is not as constant as commonly portrayed and can be better correlated with natural warming since the Little Ice Age rather than human use of fossil fuels.

Fifth, global circulation models, on which the human-caused climate change hypothesis depends for much of its support, have failed to make correct predictions of the temperature of the lower atmosphere (troposphere) over the last 32 years of direct satellite-based observations.

Sixth, scientists on both sides of this debate recognize that the interaction of the Earth with variations in received solar energy and that variations in solar activity have been the primary prehistoric and historic drivers of global climate.

I hope that ***Climate and the Constitution*** will help non-scientists, as well as scientists outside the fields of geology and climate, to better understand the various elements of the debate between climate change hypotheses. Unlike a collection of normal scientific papers, however, ***Climate and the Constitution*** puts this debate into the context of public policy issues as they relate to the constitutionally enumerated powers of the United States Government. In particular, Chapter 10 summarizes specific examples of constitutional provisions that impose severe limits on Federal authority related to climate and energy, except as directly related to national security. In so doing, I also hope that the reader will understand the consequences to "life, liberty and the pursuit of happiness" for Americans, as well as people the world over, if our elected and appointed officials make decisions based on bad or uncertain information.

☆☆☆☆☆

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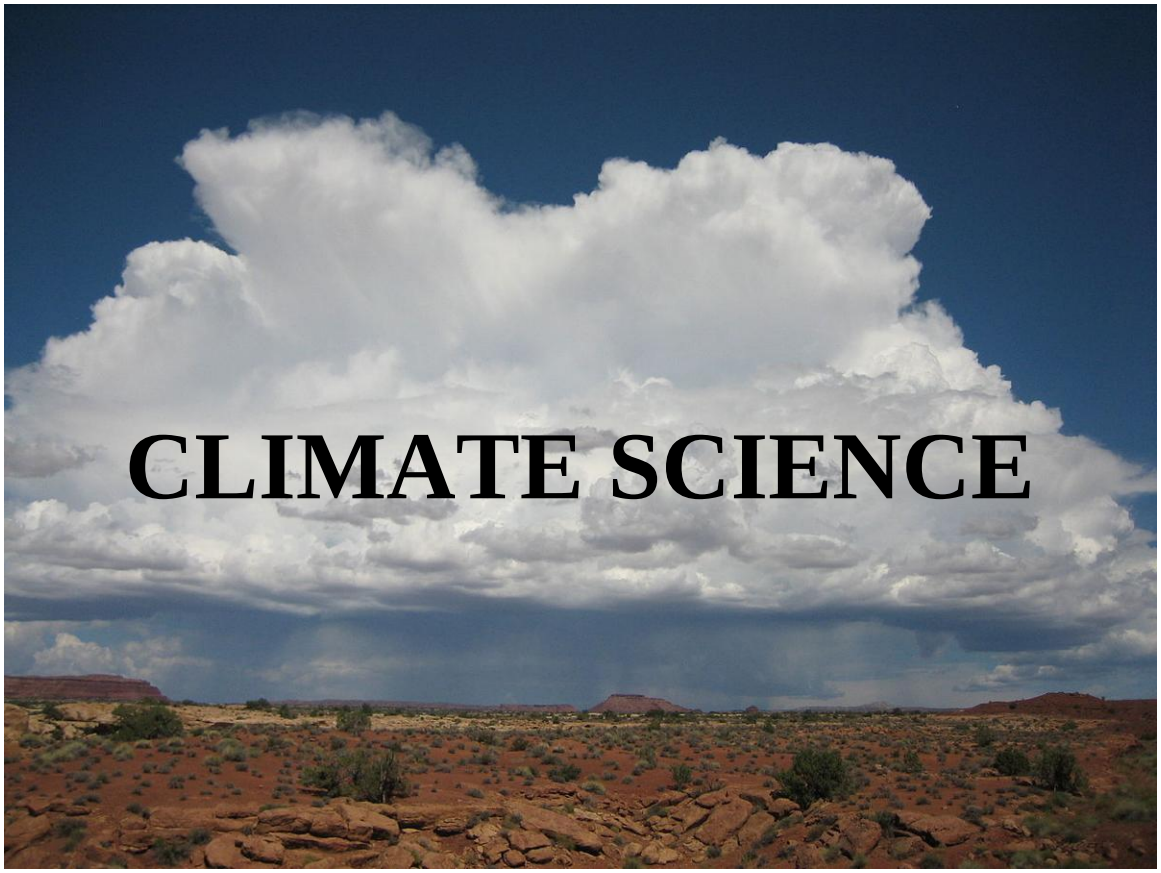
Albuquerque, New Mexico
March 16, 2012

Dr. Harrison H. Schmitt is a former United States Senator from New Mexico as well as a Geologist and Apollo 17 Lunar Astronaut— the last American to set foot on the Moon on December 11, 1972.


CLIMATE SCIENCE

Chapter 1

Lava activity in the Halemaumau Crater of Kilauea Caldera, Hawaii

TEMPERATURE

History of Global Temperature and Climate

Ten thousand years of natural, post-Ice Age climate variability should give pause to those who maintain that current slow global warming and increases in atmospheric carbon dioxide result largely from human use of fossil fuels. Observational data and interpretations related to global temperature and atmospheric carbon dioxide deserve close examination before taking irrevocable and dangerous regulatory actions. If there were no other factors affecting temperature at the Earth's surface, the balance between heat from the sun and heat re-radiated from the Earth to space would give an average surface temperature of about 0 °F (-18 °C) **[1]**. Not good. Fortunately, the trapping of heat in the atmosphere by water, carbon dioxide, and other gases, generally referred to as the "greenhouse effect," makes the planet habitable rather than being a ball of ice covered rock and water with occasional volcanic eruptions. Weather and ocean processes moderate this atmospheric heating. Natural greenhouse heat trapping effects of atmospheric water and to a lesser extent carbon dioxide and methane, add about 146

thermal watts per square meter (versus the Sun's irradiance at the top of Earth's atmosphere of 1366 watts per square meter). With just the greenhouse effect of water and carbon dioxide, the average temperature at the Earth's surface would be about 140 °F (60 C). Fortunately, weather phenomena have a significant overall cooling effect so that the average surface temperature of the Earth becomes about 59°F (15 °C) [2].

Geological investigations indicate that over the last 600 million years average global surface temperature appears to have been buffered roughly at a maximum of about 72 °F (22 °C) [3]. During these 600 million years, major cold perturbations to about 54 °F (12 °C) occurred about every 150 million years [4]. Over that period, carbon dioxide decreased from an estimated maximum of about 7000 ppm 550 million years ago to minimum of about 300 ppm around 300 million years ago [5] (current level at 385 ppm) without changing the long-term average temperature at the Earth's surface. The last 53 million years were significantly colder than the previous average [6], as indicated by oxygen isotopes of shells in sea floor cores [7], but comparable to earlier cold periods.

Around 56 million years ago, marine and continental isotopic records indicate that a significant pulse of new light carbon appeared in the atmosphere (the Paleocene-Eocene Thermal Maximum or PETM), but evidence also exists that a period of climate warming preceded that release of light carbon [8]. Unusual warming of the deep oceans may have released both dissolved carbon dioxide and seabed methane. Both before and after the PETM, six less extreme and shorter duration warming events have been documented [9]. In contrast to the PETM warming, a significant decrease in sea surface temperatures [10] appears to have lasted about 3 million years within a >20 million long Ice Age around 44.5 million years ago. This fall in temperature is associated with a reduction in atmospheric light carbon (^{12}C) relative to heavy (^{13}C) [11]. The timing of the initiation of the change in carbon composition, however, has not yet been resolved relative to the ~20 million year long cold anomaly in sea surface temperatures during a period of already cold temperatures and continental glaciations.

Forty-three million years ago, declining carbon dioxide concentration reached about 1400 ppm, followed by three oscillations during the next 10 million years with amplitudes of about 1000 ppm [12]. With one known exception [13], temperature apparently remained relatively constant during these ancient carbon dioxide oscillations. The exception occurred during the most recent oscillation when oxygen isotope ratios indicate a sharp drop in temperature [14] 33.5 million years ago. This correlates with about the time ice sheets began to accumulate on Antarctica [15] and a drop in sea level of about 40 m over two million years [16]. Relative to today's values, declining atmospheric carbon dioxide levels remained relatively high (740-1400 ppm) even as Antarctica cooled.

About 22 million years ago, with its continued slow migration away from Africa, Australia, and South America, the ocean distribution and currents around Antarctica began to resemble modern configurations [17], with partial deglaciation of that continent beginning about 14-15 million years ago [18]. A particularly warm two million years for the tropical Earth latitudes developed about 4 million years ago even as sea surface

temperatures slowly declined toward present levels **[19]**. This seemingly contradictory situation apparently related to a long-term north-south expansion of the warm tropical ocean waters resulting in a factor of four reduction in the sea surface temperature gradient from the equator to at least 34 °N (~2 °C gradient versus ~8 °C, today) that lasted until about 1.5 million years ago. Along with disruptions of the El Niño Southern Oscillation, convective tropical Hadley circulation in the atmosphere apparently slowed during this long period with both effects probably leading to significant global climate impacts.

About 2.75 million years ago **[20]**, major ice ages began to oscillate with periods of warmth (interglacials). This occurred in spite of the concurrent anomaly in the tropical sea surface temperature gradient. Recent examination of dust deposits spanning four million years of sediment accumulation in the sub-Antarctic zone of the Southern Ocean shows that dust, iron and associated nutrients increased sharply there about 1.25 million years ago **[21]**, possibly recording a rise in the amount of global glacial activity. The last 800,000 years of this dust record correlate well with the EPICA Dome C and Vostok ice cores from Antarctica **[22]**. During the last million years, ten specific high latitude ice ages took place, apparently correlated with a change from the Earth's 41,000-year orbital obliquity cycle to its 100,000-year eccentricity cycle as the dominant solar influence on cooling **[23]**. A significant decrease in the overall concentration of atmospheric carbon dioxide occurred at about the same time as this change in orbital influence. Even greater, temporary reductions in carbon dioxide were associated with each ice age as cooler oceans would have dissolved more of this gas; however, the reported data do not support a causal association of this decrease in carbon dioxide with the overall cooling during this million-year period **[24]**.

Compilations of temperature changes in the oceans and seas, as preserved by oxygen isotope variations in shells from cores of bottom sediments, provide a record of natural cycles of major climate change back for 1.8 million years **[25]**. For example, geological analysis of features related to sea level changes over the last 500,000 years shows a remarkable correlation of these changes with major natural climate change **[26]**. These data further indicate the approach of the peak of the warming portion of a normal climate cycle that began with the end of the last Ice Age **[27]**.

Terminations of past ice ages appear to be associated with increased solar heating (insolation), as orbital influences changed, and not with triggering increases in carbon dioxide levels; although such increases certainly accompanied the terminations. Suggestions have been made recently that increase in atmospheric carbon dioxide forced temperature increases and ice age terminations over the last 20 million years or so **[28]**. Such speculations suffer from science's inability to adequately time-correlate most these very ancient changes in carbon dioxide levels with changes in global temperature. Carbon dioxide release from more slowly warming oceans would be expected to lags surface warming by hundreds to thousands of years **[**see below**]**. No observational support exists for a conclusion that a specific natural carbon dioxide change forced a specific temperature change.

The lesson in these variations in values for atmospheric carbon dioxide and global temperature through geologic time, at least at a million-year or so time-resolution, appears to be that no evidence exists that increases and decreases in carbon dioxide have triggered global temperature changes as derived from fossil oxygen isotope ratios. Other long-term geological and solar-related phenomena affecting atmospheric water concentrations may have overwhelmed any broad greenhouse effects related to carbon dioxide; or, alternatively, the proxies used for estimating ancient atmospheric carbon dioxide concentrations may be invalid **[29]**. All we really know at present is that natural variations in climate have been very complex, often extreme, and that before human industrial activity existed.

Studies of Antarctic ice cores indicate that during the last 420,000 years Earth-surface temperatures several degrees warmer than present existed during the four interglacials that preceded our own **[30]**. At a low time-resolution of 1000s of years, carbon dioxide in the atmosphere during these interglacials apparently did not rise above 290 ppm (compared to 385 ppm today), and its changes would appear to be correlated directly with temperature changes **[31]**. On the other hand, high time-resolution ice core data indicates that both increases and decreases in atmospheric carbon dioxide lag associated increases and decreases in global temperature by hundreds to a thousand years for major long-term temperature variations **[32]**. The broad rise or fall in average ocean temperature would be expected to precede any effect on stored carbon dioxide due to the oceans' relatively high mass and slow circulation.

During the latter portion of the period covered by the Antarctic ice cores, and within the solar irradiance variability related to the Earth's 100,000-year eccentricity cycle, the effects of the ~21,000-year cyclic precession of the Earth's orbit have been documented. Studies of strontium isotopes in a 150,000-year record of sediment in Africa's Lake Turkana indicate that rainfall variations in the lake's watershed correlate with this precession cycle **[33]**.

As the Earth moved out of the last major Ice Age beginning about 19,000 years ago **[34]**, dramatic climate and temperature oscillations occurred based on analyses of oxygen isotopes **[35]** and lake sediments **[36]**. These oscillations reached steady state periods of relative warmth or cold that lasted 500 to 1000 years before another major change occurred. Northern Hemisphere warming after the Younger Dryas, the last major cold period, began about 11,600 years ago and proceeded rapidly over about 100 years before a more gradual, 1500-year warming trend took over. Geological analysis of New Zealand mountain glaciers indicate that the post-Younger Dryas warming also occurred in the Southern Hemisphere **[37]**. From about 10,000 years ago to the present, a period of relative warm conditions, the Holocene Climate Optimum (last 10,000 years), has prevailed, although multi-decade long variations have occurred **[38]**, including the Medieval Warm Period and Little Ice Age discussed below.

Recent study of sediment cores from the Antarctic margin on the Pacific side of the Western Antarctic Peninsula suggests a somewhat different temperature history for that region versus the Northern Hemisphere **[39]**. Although this analysis of proxies for sea

surface temperature shows a comparable warming between 12,000 and 9000 years ago after the Younger Dryas, a 7000-year erratic but overall cooling trend followed. This is in contrast to the Northern Hemisphere warm period over this time, documented in studies of tree rings. Another Antarctic warm interval, however, appears to have existed between about 1800 and 500 years ago, possibly roughly correlated with the Northern Hemisphere's Medieval Warm Period (500-1300). Cooling set in again between 500 and 200 years ago, possibly associated with the north's Little Ice Age.

As discussed above, a particularly prolonged warm period in the current interglacial between 9000 and 6000 years ago has been documented, most recently in oxygen isotopic analyses of Greenland ice sheet cores **[40]**, in Great Lakes Region tree ring analyses **[41]**, and in Arctic Ocean sea-ice variability **[42]**. That warm period resulted in significant thinning of Greenland's ice sheet to thicknesses within a 100 m of those of today. Several other warm periods have occurred since, the most pronounced of which has been termed the Medieval Warm Period (500-1300) **[43]**. Warm periods of this nature, sometimes referred to as "climate optimums" or "climate anomalies," were largely highly beneficial to fledgling human cultures. During the latter centuries of the Medieval Warm Period, however, overpopulation relative to available technology, severe weather and drought, and other factors forced migrations from many centers of civilization **[44]**, primarily to places with more reliable water resources. These adverse effects of warming, however, stand in contrast to the advantageous migrations of modern humans about 22,000 years ago from Asia toward the Americas during the last Ice Age. At that time, low sea levels created a land bridge between Asia and North America **[45]**. Adaptability is the key.

After a century-long transition from the Medieval Warm Period, the Little Ice Age of 1400-1900 recorded the most recent interval of significant global cooling. Global cooling characterized the Little Ice Age in most regions of the Earth, accompanied in some areas by droughts **[46]**. By 1400, however, Arctic ice pack had enclosed Iceland and Greenland and driven Viking settlers away from their farms on those islands **[47]**. By the end of the 1600s, in response to the continued climate cooling, glaciers had advanced over valley farmlands cultivated as those same glaciers receded during the Medieval Warm Period **[48]**. Indeed, essentially all of the consequences of warming prior to 1300 reversed during the next several hundred years of the Little Ice Age, only to see the glaciers generally retreat as slow warming commenced again in the late 1600s. Decadal and multi-century variations in the extent of North American mountain glaciers from 1200 to 2000 have been studied and also show significant glacial retreat since the last Little Ice Age minimum about 1700 **[49]**.

Since about 1660, gradual global warming of about 0.9 °F (0.5 °C) each 100 years has occurred **[50]**, although decades-long cooling events have modulated this trend. Antarctic sea ice, however, now has been expanding northward for about two decades **[51]** after indications in the Law Dome ice core of an additional gradual retreat between about 1960 and 1990 **[52]**.

As geological proxy records for temperature approach the present, analyses show that measurement of modern, short-term trends in Earth surface temperature are suspect **[53]**,

if only because thousands of rural measuring stations have disappeared in favor of reliance on relatively warm airport and other urban stations [54]. Difficulties also arise from many land sensors being located within the expanding effect of urban heat islands [55] and many sea surface temperature measurements being inconsistently determined [56]. Rigorous investigation and analysis of the sources of data that appear to show Earth surface warming accelerating during the last century indicates many non-climatic factors may influence the quality and magnitude of measurements [57] if not the overall trend in slow warming. Government agency reports that the first decade of the 21st Century set records for warmth, based largely on Earth surface-based instruments [58], appear inconsistent with satellite and other observations and may be biased by the measurement problems cited here.

After 1979, earth-orbiting satellites have provided data on temperature variations through globally averaged, microwave determination of temperatures of the lower atmosphere [59]. These measurements are independent of local biases affecting temperatures measured at weather stations [60]. Global circulation models appear to have failed to make correct predictions of the temperature of the lower atmosphere (troposphere) looking back over the last 50 years of direct satellite-based observations. Reports that instrument re-calibrations now confirm the model predictions [61] remain in sharp dispute [62]. Some of this failure in the models recently has been attributed to not including variability in stratospheric aerosol concentrations [63]; however, stratospheric aerosol variability over more than a few decades remains unknown. Additionally, the long-term trends of 20th Century atmospheric circulation indices representing several major oceanic oscillations do not support climate model simulations for the same period [64].

Near-surface atmospheric temperature variations since 1979, as well as over the last 120 years, correlate much more closely with solar variations than with the steady rise in carbon dioxide levels [65]. Analyses of much less variable sea surface temperatures (SST) indicate that such temperatures rose from about 1900 to the 1940s, fell until the mid-1970s, and subsequently have been rising [66]. Other reports, however, have SST leveling off or decreasing [67] with no net heat increase for the last 58 years [68], particularly since 2003 [69] and possibly since 1990 [70]. The long-term climatic implications of this apparent broad scale ocean cooling are not known. An abrupt drop in SST in the Northern Hemisphere at a minimum in the 11-year sunspot cycle between about 1968 and 1972 has not yet been fully explained, but it illustrates nature's variability over relatively short time spans.

Another temperature anomaly relative to the long-term slow warming trend exists in satellite data that shows a decline in Antarctic snowmelt between 1979 and 2009 [71]. Research on this anomaly suggests that levels of Antarctic snowmelt correlate with oceanic and atmospheric interactions in the mid to high latitudes of the South Pacific (the El Niño-Southern Oscillation in ocean and atmosphere temperature and the Southern Hemisphere Annular Mode of pressure gradient variation). These interactions, on the other hand, show no correlation with the slow trend in modern global warming [72]. In contrast to Antarctica, snowmelt in Greenland appears to be on the increase and may be

contributing to more rapid movement of its ice sheet **[73]**. Additionally, reports of accelerating ice sheet mass loss in Greenland and Antarctica **[74]** need to be reconciled with reports that conflict with these assessments **[75]**.

Throughout geologic history, biological systems' responses to global cooling and warming show the effects of natural climate change. Extinctions, regional die-offs, redistribution in altitude and latitude, and basic evolutionary change of plant and animal species in response to climate change have been the rule, not the exception. Increased research and media scrutiny makes us more aware of what plant and animal species do continuously, if often episodically, in response to change. Polar bear fossil evidence **[76]** and their modern distribution **[77]** indicate that the species clearly has adapted repeatedly to over 100,000 years of climates warmer than at present, such as the Medieval Warm Period. Corals have survived hundreds of millions of years of extraordinary geological and climate change.

Glacial and interglacial temperature changes of at least 5 °C between 324,000 and 193,000 years ago in the Pleistocene caused the redistribution of Andean mountainous plant species by as much as 1000m **[78]**. Elsewhere, tree mortality may be on the upswing as species adjust to gradual, warming induced changes in the location of optimum habitats **[79]**, but this surely also happened during other warm periods when we were not around to notice. Net terrestrial primary biological production, however, has remained roughly constant over the last decade although down slightly from the previous decade **[80]**. Warming induced die-offs in some plant species will be compensated to some degree by increased growth in other species due to increases in available atmospheric carbon dioxide **[81]**. Local variations in biological production in response to Arctic Sea ice retreats and redistributions have been documented; however, it is not clear that there has been a regional reduction in primary production as measured by chlorophyll concentrations **[82]**.

Geological and recorded histories of temperature change on Earth show a high degree of natural variability, far beyond that experienced over the last 100 years. Evaluations of modern global, regional and local temperature changes, including the gradual warming since the Little Ice Age, should take into account this variability before looking for means to mitigate or even eliminate any long-term climate change.

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Chapter 2

(*left*): A hazard sign located at Horseshoe Lake, CA. (*right*): Lava spattering from Kamoamoa fissure, HI.

CARBON DIOXIDE

History of Atmospheric Carbon Dioxide

All of the political focus and almost all of the publicly reported scientific allegations related to present and future climate change centers on atmospheric carbon dioxide rather than on the immense complexity of natural climate. Not only do the legislative and regulatory proposals to control human production of carbon dioxide violate many provisions of the Constitution of the United States of America; but also the so-called scientific justifications for those proposals do not adhere to basic principles of scientific enquiry and analysis that require objectivity, skepticism about one's own ideas as well as those of others, hypothesis testing and retesting, and debate **[1]**.

After water, carbon dioxide constitutes the second most important greenhouse gas in the atmosphere, but still makes up only 0.05% by weight compared to about 2.7% for water. There remains, however, significant uncertainty about the relative effects of water and clouds versus carbon dioxide. The science of "radiative transfer physics" relates to the greenhouse contribution of any given atmospheric gas. Pure radiative physics considerations indicate that water dominates by about a factor of 3 **[2]**; however, the effect of clouds is poorly understood**.** Some observers suggest that water and clouds dominate the greenhouse effect in the atmosphere by a factor of about 10-20 over other components **[3]**. Water absorbs infrared radiation over a much broader range of wavelengths than does carbon dioxide, and water and clouds, unlike carbon dioxide, also adsorb radiation due to collisions between molecules or particles that also act briefly like

complex, adsorbing molecules [4]. The fact that climate models using current understanding of radiative transfer physics fail to predict observed temperature trends in the lower atmosphere (troposphere) [5] indicates that the models lack some important parameters or observational controls. Our quantitative knowledge of the actual concentrations and distribution of water in the atmosphere, feedbacks between various heating and cooling effects, and the weather phenomena that affect these parameters, can only be described as very poor [6]. All discussions of water as a greenhouse gas should be tempered by recognition of this ignorance.

Carbon dioxide, of course, forms an essential ingredient for the plant and marine life on Earth on which all other life depends. Indeed, the planet life essential to human existence initially evolved in the geologic past at levels of carbon dioxide many times higher than exist today and still grows significantly more vigorously at higher carbon dioxide levels, particularly with increasing temperature [7]. Increased biomass production due to higher carbon dioxide levels, however, may increase production of methane and nitrous oxide and their release into the atmosphere [8], the net effects of which is not yet clear. Indeed, current estimates of the annual uptake of carbon by plants vary from 117 to 175 petagrams (1 petagram = 1 billion metric tonnes) [9] or by almost 50%. Existing plant life obviously has adapted to a long-term trend of decreasing atmospheric carbon dioxide that has prevailed over the last 175 million years [10]. In that context, studies of the sizes of fossil Ginkgo leaf stomata (gas exchange pores) indicate that high, but erratic carbon dioxide levels persisted in the Western United States, and certainly across the Earth, from 250 to 65 million years ago [11].

Direct, continuous measurements of carbon dioxide in the atmosphere at the top of Mauna Loa, Hawaii, over the last 53 years appear to show a steady increase from 260 to 385 ppm [12], amounts many times lower than those for most of Earth history. Unfortunately, validity of Mauna Loa measurements is not without its questions [13]. These data have been adjusted by assuming a constant value for atmospheric carbon dioxide emissions from the burning of fossil fuels [14]. The raw data from Mauna Loa show that carbon dioxide emissions are not constant and actually showed a decrease after 1992 [15]. Mauna Loa measurements, however, may be the best we can do until direct satellite measurements are available. Indeed, atmospheric carbon dioxide concentrations only declined to about 260 ppm approximately 9000-years ago, or some 19,000 years after slow warming began following the peak of the last major Ice Age [16]. During the Mauna Loa measurement period, at least 50% of the carbon dioxide produced by fossil fuel burning cannot be accounted for even if one makes the unlikely assumption that the measured rise since 1958 is entirely the result of fossil fuel burning. Advocates of human-caused global warming see this Missing Sink for carbon dioxide as lurking somewhere yet to be discovered [17]. The missing carbon dioxide is probably in the oceans; it is definitely not in the atmosphere.

Carbon isotope ratios appear to be the only means to measure how much atmospheric CO_2 has resulted from the burning of fossil fuels. Fossil fuels contain about 1.080% ^{13}C (heavy carbon) while at the other extreme, the oceans contain about 1.112% ^{13}C with the atmosphere in between at 1.102%. One would think that an isotopic analysis and mass

balance calculation would be an obvious project to undertake **[18]**, but the just referenced publications by Professor T. V. Segalstad of the University of Oslo, Norway, appear to be the only such analyses published **[19]**.

Professor Segalstad has done a very logical thing. He has noted that fossil fuels contain more of the light carbon isotope (^{12}C), relative to heavy carbon (^{13}C), than carbon produced by geological processes such as limestone solution and volcanoes. That is, the biological processes that continuously produce original organic matter ultimately enriched buried fossil fuels in the light isotope, ^{12}C. The atmospheric lifetime of any addition of carbon dioxide is well established as being only about five years, during which it dissolves in the oceans. There, it equilibrates with geologically derived carbon, enriched in the heavy isotope, ^{13}C. By analyzing the current isotopic ratio of ^{12}C to ^{13}C in the atmosphere, Professor Segalstad shows that no more than about 4% of the carbon in today's atmosphere can be directly attributed to burning fossil fuels. The remaining 96% must therefore come largely from natural ocean emissions, in which the heavy ^{13}C is more concentrated. The 35-year trend in atmospheric isotopic composition, however, is toward gradually increasing light ^{12}C, suggesting that more and more carbon dioxide from fossil fuels is being recycled from the oceans.

No significant evidence exists that historic changes in atmospheric carbon dioxide have caused measurable global temperature variations **[20]**. The last 50 years of steady increase in carbon dioxide of one molecule per 100,000 molecules of air every five years has had no demonstrable effect on the multi-decade cooling and warming cycles since 1979, when collection of temperature data by satellite began to augment other measurement sources. Cooling between 1935 and 1975 and after 2000 **[21]** occurred even as a steady rise persisted in atmospheric carbon dioxide. The slow long-term warming since the coldest portion of the Little Ice Age (500-1900) shows no signs of acceleration during 150 years of industrialization and use of fossil fuels. This warming has averaged about 0.9 °F (0.5 °C) per 100 years for the last 350 years **[22]**.

The mathematically derived maximum sensitivity of surface temperature to doubling atmospheric carbon dioxide, to about 760 ppm, is 3.5-5.5 ºF (2-3 ºC). This calculation is tightly constrained by over three decades of records of both carbon dioxide concentrations on Mauna Loa and global temperatures measured by satellite **[23]**. At the rate of carbon dioxide increase since 1960, doubling from today would occur in about 150 years, assuming that there were no prolonged intervals of global cooling. Doubling the atmospheric content of carbon dioxide just from new fossil fuel emissions, however, would require burning an unrealistic quantity of fossil fuels as most new emissions ultimately would end up dissolved in or precipitated from the oceans.

It must be noted, however, that the calculation in the paragraph above relates to the ***maximum possible*** sensitivity of temperature to a doubling of atmospheric carbon dioxide if, and only if, that gas were a significant factor in current global warming. The actual sensitivity can be affected by many other factors and, in fact, no obvious correlation exists between the relatively constant rise in carbon dioxide of 15 ppm per decade over the last 50 years and variations in temperature during that time **[24]**. Further,

since about 1996 the average global surface temperature has remained nearly constant while carbon dioxide has continued to rise, steadily **[25]**. Since the last temperature minimum of the Little Ice Age, carbon dioxide has more than doubled from about 180 ppm to 380 ppm **[26]**, but temperature has risen only about 2 °C in 350 years **[27]**. Maximum possible sensitivity, therefore, must be closer to 2 °C than 3.5°, the lower figure in the calculation referenced in the preceding paragraph. Analyses of actual measurements of climate sensitivity indicate that a doubling would only increase global temperature by 0.4-0.5 °C **[28]** or, at most, ~1 °C **[29].**

A number of factors appear to be at work that significantly limits the sensitivity of temperature to increasing atmospheric carbon dioxide. Firstly, carbon dioxide is a minor greenhouse gas compared to water, contributing only about 10% of the total of ~30 °C natural greenhouse heating of the atmosphere **[30]**. Secondly, the contribution of carbon dioxide to increasing atmospheric temperature has a negative logarithmic nature; that is, the first 20 ppm provides half of its contribution to temperature, or ~1.5°, and decreases dramatically from there until the most recent 20 ppm adds only about 0.03° in temperature rise **[31].** Finally, the temperature feedback from increasing carbon dioxide may be negative, contrary to assumptions made in most global climate models **[32]**.

Should the observed rate of natural warming since the Little Ice Age continue during the next 150 years, the global temperature would increase about 1.4 ºF (0.7 ºC) or about one-third of that if atmospheric carbon dioxide were doubled. Barring temporarily increased emissions from major volcanic eruptions **[33]**, this suggests that the long-term ***rate*** of increase in carbon dioxide, at least in part, actually may be a measure of the ***rate*** of natural warming, reflecting release of gas from global sinks, particularly the deep oceans **[34]**. Recent studies and investigations of deep sea cores, for example, indicate a significant release of carbon dioxide from the Southern Ocean during the waning millennia of the last Ice Age **[35]**.

Major non-fossil fuel sources of modern carbon dioxide **[36]** include volcanic eruptions **[37]**, input from rivers **[38]**, biological processes and decay, wildfires **[39]**, and, probably most importantly, release from the oceans due to slow warming over the past three and a half centuries. Major volcanic eruptions, not including undersea eruptions, occur every few years with each eruption releasing about two times the mass of current annual emissions from fossil fuel use **[40]**; however, such eruptions occur only every few years on average. As would be expected due to their huge capacity to hold carbon dioxide and the rapid exchange between the ocean and atmosphere, the oceans regulate the amount of that gas in the atmosphere as climate variations occur over the scale of decades to centuries **[41]**. They do so by containing about 50 times the dissolved carbon dioxide present in the atmosphere **[42]**, including derived chemical species, with solubility increasing with decreasing temperature **[43]**. Over at least the last 130 years, the varying ***rate*** of increase of carbon dioxide in the atmosphere closely follows temperature increases and decreases **[44]**. Overall, however, the fraction of new carbon dioxide emissions absorbed by the oceans appears to have remained roughly constant for the last 250 years, if not much longer.

Where, then, is all the carbon dioxide from fossil fuels that is not in the atmosphere **[45]**? Geoscientists have long known that most atmospheric carbon dioxide cycles through the upper ocean every 5-10 years **[46]**. Some new carbon dioxide, with estimates of 20-35 percent of new emissions from all sources **[47]**, cycles down into cold deep waters where its solubility is greatest and where recycling times slow to hundreds or thousands of years **[48]**. Mechanisms and the timing for the release of stored carbon dioxide from the deep ocean, rich in old carbon (depleted in radioactive ^{14}C), and the timing of such releases, remain uncertain **[49]**. Upwelling and mixing of warm currents constitute important release mechanisms. Some carbon dioxide goes into organic and inorganic deposition of calcium carbonate that ends up in the sediments on the ocean floor. Life processes have sequestered significant carbon in new biomass, particularly in phytoplankton **[50]** and non-edible hydrocarbons **[51]** in the oceans. Accelerated rock weathering also occurs **[52]** with the calcium released precipitated as carbonate in soils and ocean sediments.

Although atmospheric carbon dioxide has risen slowly in response to slow warming following the Little Ice age, ice cores suggest that atmospheric methane (CH_4) has been rising for about 5,000 years only to accelerate in the last 200 years **[53]**. Like major climate changes, the variation in atmospheric methane over thousands of years appears to correlate with systematic variations in the precession of the Earth's orbit around the Sun **[54]**. The nearer term acceleration in the quantity of methane has been attributed to human activity **[55]**, but, as with increased carbon dioxide concentrations, it also correlates with the post-Little Ice Age warming of the last 350 years. Warming may be increasing the rate of release of stored methane as well as the rate of biological methane production through an increase in plant productivity due to higher temperatures and carbon dioxide fertilization as well as more rapid decomposition rates **[56]**.

Studies of the history of atmospheric gas concentrations show that natural, non-volcanic increases in carbon dioxide and methane normally ***follow***, that is, lag global temperature increases by several hundred to a thousand years **[57]**. Similarly, and even more clearly, natural decreases in carbon dioxide and methane ***follow***, that is, lag global temperature decreases. This suggests that current increases in atmospheric carbon dioxide and methane reflect, at least in large part, a response to the average century-by-century global temperature increases since about 1660 as those increases gradually permeate the deep oceans. This cause and effect reflects the fact that increased temperature will accelerate the release of both carbon dioxide and methane **[58]** from warming oceans and biological processes. Further, for as long as warming continues, methane releases from wetlands may contribute to atmospheric increases **[59]**, now that pipeline leakage has been greatly reduced and atmospheric methane concentration has leveled off at about 1730 ppb **[60]** indicating that a steady-state between production and natural removal may have been reached.

The majority of establishment climate scientists ignore the lag between global temperature increases and oceanic and biological carbon dioxide release, and this is at their peril. For example, oxygen isotope analysis of cores from the Southern Ocean discloses that a temperature oscillation at about 40 million years was quite extreme **[61]**.

A major increase in atmospheric carbon dioxide appears to have been associated with this period of overall temperature rise. The analysts, however, do not know which came first, a rise in temperature or a rise in carbon dioxide. They dismiss as unlikely any potential role for any other cause of global atmospheric and oceanic heating even though strong correlations exist between ice ages and orbital cycles of the Earth. Similarly, others assume that modern increases in atmospheric carbon dioxide cannot be the result of anything but fossil fuel uses **[62]** even though well-recognized natural increases have occurred in the geologic past. The potential positive or negative greenhouse effects of the delayed response of atmospheric concentrations of carbon dioxide to temperature changes might affect the ultimate scale of those temperature changes; but the complexities of water and cloud feedback related to atmospheric carbon dioxide may make such a determination difficult at best **[63]**.

Major, long-term carbon dioxide emissions resulting from huge outpourings of lava, as occurred over ~600,000 years from the Central Atlantic Magmatic Province (201 million years ago) **[64]**, also may be instructive as to the relative roles of atmospheric components in climate change. This particular series of eruptions appears to have raised atmospheric carbon dioxide from about ~2000 to ~4400 ppm with no identified associated global temperature anomaly. In turn, this suggests that volcanic carbon dioxide, even at elevated levels that may have persisted for hundreds of thousands of years, is not an effective greenhouse gas given other potential complexities such as co-produced aerosols and clouds that are known to cause net cooling of the atmosphere.

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Chapter 3

Blue ice covering Lake Fryxell in the Transantarctic Mountains

ICE CORES

Role of Ice Cores in Climate Science

Analysis of ice cores from Antarctica [1] and Greenland [2] play an important role in understanding the history of global temperatures and atmospheric concentrations of carbon dioxide, methane, and other gases and aerosols. Through analysis of dust, they also provide up to 800,000-year chronologies of global scale volcanic eruptions and major trends toward desertification. Clearly, data from ice cores play a critical underlying role in the science of climate change. Unfortunately, the uncritical use of ice core data has characterized presentations by various politicians as well as some climate scientists.

Ice cores do not always appear to be a totally reliable record of past carbon dioxide or methane concentrations in the atmosphere. Their information needs to be confirmed by consistency with data from other sources. Particular care must be taken in the

interpretation of the carbon dioxide "record" in ice cores due to core-specific uncertainties in the mechanics of gas preservation over time **[3]**.

In some cases, the trapped "atmosphere" in the ice sheets may not be part of a closed system. To be a closed system for carbon dioxide or methane, no gas components can escape or be added during the burial process; liquid water cannot have interacted with the gases; none of the trapped gas components can combine, separate, diffuse, or solidify; and all components must stay in the same proportions as pressure increases with time due to added ice above. The observational science of ice has demonstrated that for some cores all these conditions do not hold. Further, the process of core extraction from great depth to surface pressure may open and disturb the gas systems.

For example, the Siple Antarctic ice core would suggest that carbon dioxide reached a level of about 330 ppm in about 1900. Comparison with the 1960 initial Mauna Loa measurement of 260 ppm suggests that either (1) the Siple data is just wrong, or (2) there was a drop of about 60 ppm in carbon dioxide level between 1900 and 1960, or (3) it takes 80 some years for the carbon dioxide gas system to close **[4]**. This discrepancy does not appear to have been resolved by the climate community **[5]**; but the smooth shape of the unaltered Siple core carbon dioxide curve as a function of core depth (approaching a constant level with increasing core depth/age) suggests it might not ever have been a closed system. Over time, carbon dioxide in the sampled Siple ice may have gradually equilibrated to a constant carbon dioxide value of about 280 ppm now indicated in the 1720-year old and older layers. Also, this core suffered some melting during transport and prior to analysis **[6]**. An additional new problem to watch for has been identified at the Dome A site related to freezing from the base of the East Antarctic Ice Sheet, a process that could affect the oldest ice potentially available at some locations **[7]**.

Not surprisingly, considering the known variability in ice preservation, measured carbon dioxide concentrations in the trapped gases of many cores older than about 300 years hold remarkably constant over the last 7-8000 years of ice accumulation **[8]**. This constancy is incompatible with variability shown in other data, including that from other ice cores and from preserved Ginkgo leaf stomata, both indicating significant variation during that period. Stomata are pores through which a plant takes in carbon dioxide. They vary in size depending on the carbon dioxide concentration in the air; and preserved stomata suggest that carbon dioxide levels ranged between 270 and 326 ppm over the last 7-8000 years **[9]**.

Some Greenland ice cores do not show expected temperature driven carbon dioxide increases during the Medieval Warm Period (~800-1300) or the expected decreases during the Little Ice Age (~1400-1900) **[10]**, although these events show clearly in other cores **[11]**. This further indicates that some ice cores potentially give an unreliable history of atmospheric carbon dioxide, nitrogen, and methane concentrations. On the other hand, up to 123,000 years of climate temperature variations measured in three deep cores from the Greenland ice sheet (GRIP, GISP2, and NGRIP) appear to be consistent with other climate proxy data, such as North Atlantic sediment cores **[12]**. Correlation of the Greenland ice core data with that of Antarctica has suggested an on-going, natural

"thermal bipolar seesaw" in climate changes between the two polar-regions that relates to the strength of the north-south overturning circulation in the Atlantic Ocean **[13]**. Strong circulation, for example, correlates with warming in the North Atlantic (Dansgarrd-Oeschger events) but also with a change from warming to cooling in Antarctica. Modeling of the bipolar seesaw has shown good correlations between the last 100,000 years of Greenland and Antarctic climate changes, particularly with respect to atmospheric CO_2, as well as the last 400,000 years of data on variations in the Asian monsoon **[14]**.

Analyses from the EPICA Dome C and Vostok cores of the Antarctic ice sheets, on the other hand, show plausible synchronous relationships between various climate variables. A strong correlation exists back to ~800,000 years ago between carbon dioxide and methane concentrations and deuterium and oxygen isotopic temperature determinations **[15]**. The approximately 500-year time resolution of these correlations, however, remains insufficient to determine if carbon dioxide and methane changes lead or lag temperature changes. Other, higher resolution ice core information indicates that increases in gas concentrations lag increases in temperature by hundreds of years **[16]**. Other geological studies suggest a similar lag. For example, about 56 million years ago, marine and continental isotopic records indicate that significant new light carbon appeared in the atmosphere, but isotopic evidence from mammalian teeth stratigraphicaly immediately below the carbon anomaly indicates that a warming period preceded that release **[17]**.

Although carbon dioxide measurements can be suspect in some ice cores, data from many others constitute extremely valuable records of additional parameters that exist within truly closed subsystems. For example, Greenland ice core data indicate that large climatic temperature shifts can occur over a very few years. Oxygen isotopes, deuterium, dust and calcium, sodium, and ice accumulation rates support data from cave deposits that indicate rapid cooling often follows periods of gradual natural warming **[18]**.

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Chapter 4

Sunset along a Pacific coast beach near La Jolla, CA

OCEANS

Role of the Oceans in Decadal Scale Climate Change

The oceans of the Earth play the dominant role in the perpetuation and mediation of naturally induced change of global climate [1]. Density variations linking the Northern and Southern Hemisphere portions of the Pacific and Atlantic Oceans through the Southern Ocean drive the primary circulation system that controls hemispheric and global climate. Differences in temperature and salt concentration produce these density variations that circulate heat around the planet. For the last several years in this circulating environment, the sea surface temperature of the oceans appears to be leveling off or decreasing [2] with no net heat increase for the last 58 years [3] and particularly since 2003 [4] and possibly since 1990 [5]. The long-term climatic implications, as well as the impact on continental precipitation [6], of this recent broad scale ocean cooling are not known.

Density increase due to evaporation in the North Atlantic normally creates a salt-rich, cold, deepwater current that generally flows south to join the Antarctic Circumpolar Current. Upwelling from that Circumpolar Current brings nutrient and carbon dioxide-rich deep seawater into the upper Southern Ocean. This Southern Ocean water then moves north into the Pacific toward the equator where it joins a warm water current flowing from the North Pacific, through the tropics and the Indian Ocean, and then northward through the Atlantic to become the Gulf Stream. The Gulf Stream flows into the North Atlantic where, as part of a continuous process, wind-driven evaporation increases salt concentration and density, and the water sinks to feed the deepwater flow back to the south. Natural interference in the normal functioning of the ocean conveyor can occur. At times during the Last Glacial Maximum between 23,000 and 19,000 years ago, strong evidence exists that current flow in the Atlantic changed, bringing old, deep water from the Southern Ocean northward **[7]**, rather than from the Indian Ocean as is the pattern today. Also, melting of Northern Hemisphere ice sheets, accumulation of meltwater behind ice dams, and abrupt fresh water inputs into the North Atlantic cause major disruptions in global ocean circulation **[8]**. For example, as the North Atlantic cooled 18,000 to 15,000 years ago due to meltwater infusion, extreme, long-term drought prevailed in the monsoon regions of Africa and Asia **[9]**.

The oceans both moderate and intensify weather and decadal climate trends due to their great capacity to store solar heat as well as their global current structure, slow mixing, salinity variations, internal frontal turbulence, wind interactions, and oscillatory changes in heat distribution over large volumes **[10]**. The Northern Pacific Decadal Oscillation (PDO) **[11]**, the El Niño-La Niña Southern Pacific Oscillation (ENSO) **[12]**, the long period “anchovy-sardine” Southern Pacific Oscillation **[13]**, the Gulf Stream Northern Atlantic Oscillation (NAO) **[14]**, the Indonesian Through-Flow (ITF) **[15]**, the Agulhas Current **[16]**, and other related ocean currents and cycles have demonstrably large, decadal scale effects on regional as well as global climate **[17]**. The ENSO cycles, for example, strongly correlate with variations in the O-18/O-16 ratio in atmospheric carbon dioxide **[18]**. That ratio would vary in accordance with the amount of tropical rainfall and be passed on into carbon dioxide during plant respiration. Further, satellite observations during the last decade of ENSO activity suggest that the oceans’ modulate global radiative balance (heat loss or gain) **[19]**.

Possibly the greatest oceanic influence on global climate results from the full hemispheric reach and scale of the Southern Ocean’s Circumpolar Current as it circulates around Antarctica and between the continents of the Southern Hemisphere **[20]**. In particular, the northward migration of the cold to warm water front off South Africa during ice ages may restrict warm, salty water of the western Indian Ocean’s Agulhas Current from entering the South Atlantic and eventually amplify ice age cooling in North America and Europe **[21]**.

In several major portions of the global ocean heat conveyor, natural variations in heating, evaporation, freshwater input **[22]**, atmospheric convection, surface winds, and cloud cover can influence the position and strengths of related local ocean currents near the continents. This variation in current positioning, therefore, modifies carbon dioxide

uptake and release, storm patterns [23], tropical cyclone frequency [24], phytoplankton abundance [25], drought conditions, and sea level rise that drive the reality of, as well as our perceptions of climate change. Dynamic interactions complicate all of these factors as interactions occur between changes in sea surface temperature, trade winds, and depth of the ocean's thermocline [26].

With respect to sea level change, some geological records provide may be more reliable than others. For example, isotopic studies of sediments in the salt marshes of North Carolina have produced a record of sea level changes at that location over the last 2100 years that shows the effects of the Medieval Warm Period, the Little Ice Age, and the slow warming since about 1900 [27]. Also, since about 7000 years ago, sea level rise has averaged about eight inches (20cm) per century for a total of about 55 feet (16m) [28]. This same approximate rate appears to have held from 1842 to the mid-1980s [29]. The trend in sea level rise between the early 1900s and 1940 showed no observable acceleration attributable to increasing atmospheric carbon dioxide [30]. Satellite data show an apparent 50% increase of this rate after 1992, but this presumably will slow again soon due to the effects of the current period of global cooling on thermal contraction of the oceans. If the post-Ice Age slow rate of long-term global warming (about 0.5°C per 100 years) should continue for 100 years, the total sea level rise attributable to worldwide glacier melting and ocean thermal expansion would be no more than about four inches (10 cm) [31].

Greenland's ice sheet also plays a cyclic role in sea level changes. In the 1950s, Greenland's glaciers retreated significantly only to advance again between 1970 and 1995 [32], a pattern of retreat and then advance repeated again between 1995 and 2006 [33]. Predicting future sea level rise from short-term observation of Greenland's glaciers would seem to have little validity, particularly as there appears to be a half a decade lag in observable melting and ice accretion responses relative to global temperature variations [34]. The same conclusion now can be made relative to Himalayan glaciers [35].

There also seems to be little danger of a catastrophic melting of the East Antarctic Ice Sheet that would cause a major rise in sea level [36]. Great uncertainty also exists relative to the natural dynamics and history of the West Antarctic Ice Sheet with Ross Sea sedimentary cores suggesting that major cycles of ice cover changes have occurred over the last five million years [37]. Overall, short-term sea level changes relate more to local geological dynamics in underlying Earth's crust than to glacial variations [38].

Compilations of temperature changes in the oceans and seas, as preserved by oxygen isotope variations in shells from cores of bottom sediments, provide a record of natural oceanic reactions to cycles of major climate change back for 1.8 million years [39]. For example, geological analysis of sea level changes over the last 500,000 years show a remarkable correlation with major natural climate change [40]. These data further indicate that the Earth probably is approaching the peak of the warming portion of a normal climate cycle that began with the end of the last Ice Age, about 11,500 years ago [41].

The oceans play the major role in removing carbon from the atmosphere; however, the total carbon in the oceans and its distribution remains poorly understood [42]. Seawater calcium and various inorganic and organic processes in the oceans fix carbon from dissolved carbon dioxide as calcium carbonate [43], parts of planktonic and benthic organisms, and inedible forms of suspended carbon [44]. In so doing, these processes constitute major factors in global cycles of atmospheric carbon dioxide concentration. Calcium availability in the oceans, in turn, relates to major geological dynamics, including mountain building, volcanism, river flows, and the growth, alteration, and destruction of crustal plates beneath the oceans.

Over the last 28 million years, marked variations in the ratios of precipitated calcium isotopes from seawater, particularly beginning about 13 million years ago, indicate major changes in sources of calcium rather than major variations in the quantity of atmospheric carbon dioxide [45]. This change in seawater calcium isotopic makeup may relate to events that included the partial deglaciation of Antarctica [46]. As most plant activity requires carbon dioxide, low atmospheric carbon dioxide values would reduce the rate of biologically assisted rock weathering. A limit on such weathering may buffer minimum atmospheric carbon dioxide to between 150 and 250 ppm by limiting levels of seawater calcium [47].

Significant introductions of calcium into the oceans from any source would be expected to result in a drawdown of atmospheric carbon dioxide to maintain chemical balances in local as well as global seawater. Ultimately, the history of seawater calcium concentrations may explain many of the long-term variations in carbon dioxide levels shown in various studies; however, correlations between calcium dynamics and carbon dioxide levels are not at sufficient geological resolution to make firm, dated correlations. Similarly, anomalous introductions of carbon dioxide, particularly those caused by major volcanic events, can disrupt normal ocean processes involving calcium. This appears to have happened, for example, about 200 million years ago [48] and 120 million years ago [49]. Such events remain unpredictable and rare and, other than in two or three extreme long past examples, do not simulate the adaptive responses of the biosphere as do the usual long-term variations in atmospheric carbon dioxide due to natural cycles of warming and cooling.

The oceans are moderately alkaline, not acidic (pH less than 7.0), and attempts to make it appear otherwise are not helpful to public understanding [50]. Very slightly reduced ocean alkalinity (ocean pH is stable at 8-8.2 and may be higher in shallow water [51]) of the local environments of sea dwelling organisms may occur related to the absorption of new emissions of carbon dioxide, natural or otherwise [52]. Species responses to slightly decreased alkalinity are complex [53]. Loss of ocean carbon dioxide due to naturally rising temperature works to mitigate acidification trends as will organic and inorganic processes that control ocean acidity by broad scale chemical buffering (reactions going forward or back depending on related chemical concentrations) [54].

Iron ion and iron complex concentrations in seawater, mediated by oxidation potential (Eh) and hydrogen ion concentration (pH), play an additional role in organic carbon fixation. Relatively simple laboratory experiments suggest that decreases in ocean alkalinity might reduce availability of chelated iron in the life cycle of phytoplankton **[55]**. The complexity of this process in nature, however, and the many other variables that potentially would play a role in iron metabolism, indicate a need for a much more comprehensive experimental analysis before conclusions can be drawn.

Additionally, there appears to be a relationship between sea surface temperature and phytoplankton biomass in the oceans as intuitively might be expected, although mesoscale circulations introduce regional variability in chlorophyll concentrations as measured from satellites **[56]**. Phytoplankton constitute approximately half of the Earth's total biomass. Increasing sea surface temperature over the past 110 years of post-Little Ice Age warming, however, appears to be correlated globally with declining biomass **[57]**; although individual ocean areas show significant variability. Over about 2000 years, foraminifera biomass in the far North Atlantic seems to correlate inversely with water temperature until, strangely, about 1900, the end of the Little Ice Age cold period **[58]**. At that point, warming temperature correlates with increasing biomass of foraminifera. Variability in oxygen and nitrogen contents, however, also affects marine productivity, a variability that is a function of many oceanic variables **[59]**. For example, no long-term or geographically broad records of ocean oxygenation exist so great uncertainty accompanies any projections into the future, whether local or global **[60]**. It is clear that more extensive integration of geologic, historic, modern, and satellite observations, as well as data on predator abundances, biomass preservation in sediment cores, and ice cover effects over time will be required to understand these relationships. It may be, for example, that declining fish populations in some regions have resulted foraminifera biomass increase over the last 100 years.

Exactly what may happen in specific ecosystems remains uncertain relative to small increases or decreases in the alkalinity of ocean habitats or the change in the quantities and ratios of dissolved oxygen, carbon dioxide, nitrate, phosphate, and silica **[61]**. Coral reefs, phytoplankton, and other ocean organisms, for example, have been very adaptable over geologic time and extensive research strongly suggests that they adapt well, on a global scale, to long-term climatic changes and small associated chemical changes in the oceans **[62]**. So far, research indicates that some organisms benefit and some do not **[63]**, as might be expected. Indeed, this interplay between losses and gains has occurred many times in the geologic past as nature has continuously adjusted to climatic changes much greater than the slow natural warming over the last 350 years. The Earth's vast layers of carbonate rocks derived from carbon fixing organisms, including ancient, now dead coral reefs, as well as deeply submerged coral reefs on existing sea mounts **[64]**, show that the production and evolution of such organisms remains a continuous, if locally or regionally punctuated process.

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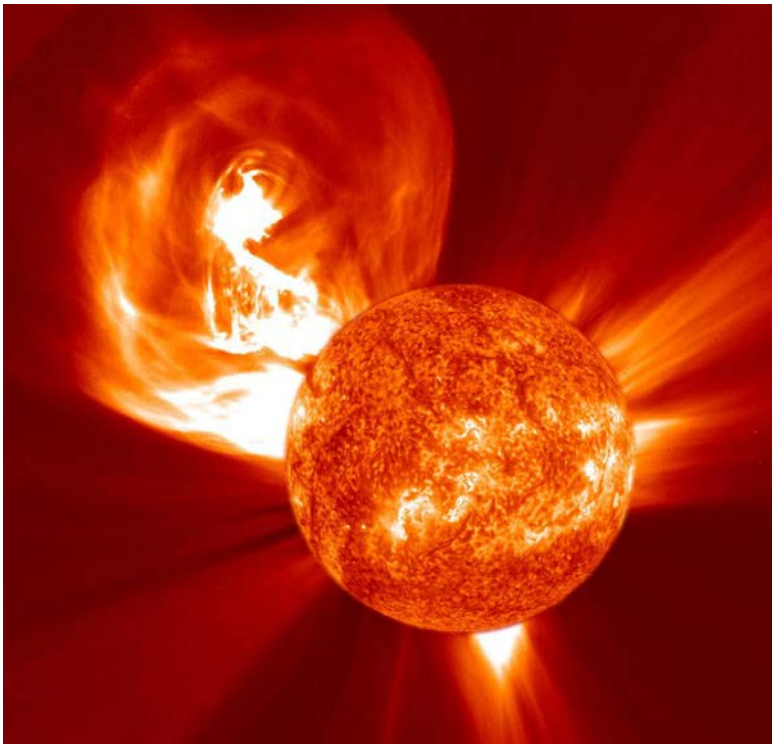
Chapter 5



An exploding Coronal Mass Ejection (CME)

THE SUN

Sun's Central Role in Climate Change

There has been a slow natural increase in global surface temperature of about half a ºC per 100 years (0.9 ºF) over the last three and a half centuries [1]. Observational climate data and objective interpretations of those data strongly indicate that nature, not human activity, has exerted the primary influence on this long term warming and on all global climate variations. Human influence through use of fossil fuels has been and remains minor if even detectable [2]. Claims to the contrary only find support in highly questionable climate models that fail repeatedly when tested against the reality of nature. What, then, stimulates historically and geologically observed, sometimes slow and sometimes radical, changes in climate?

The primary alternative hypothesis to human-caused global warming is natural climate change driven by the variations in the activity of the Sun [3]. Unfortunately, the "human-caused global warming" or "carbon dioxide forcing" hypothesis has become embedded in the minds of otherwise strong teams of observational scientists and their

publication outlets. They cannot entertain any other alternative to enhance and amplify variations in the natural heating of the Earth as a result of solar influences [4]— nor can they prove their own hypothesis of human-caused global warming [5].

As many scientists have documented, the position and orientation of the Earth in its orbit around the sun, and the Sun's variable influence and activity, determine weather and climate [6]. Seasons vary because of changing solar energy input in annual response to the varying orientation of Earth's Northern and Southern Hemispheres. Indeed, the Earth's 23º inclination to the rays from the Sun and its annual orbit around that star guarantee large seasonal changes away from the equator. Further, variations in solar radiation received by the Earth correlate with short-term variations in Earth's weather, based on variations in the slow movement of loops called "Rossby waves" [7] in atmospheric jet streams [8].

Observations by astronomers over the centuries, as well as studies of tree rings [9], stalagmite layers [10], ice cores [11], sea sediment cores [12], and other pre-historic and geological records [13], have defined a normally present 11-year sunspot cycle superposed on a number of longer climate cycles [14]. Much modern research documents that this sunspot cycle also correlates with variations in various natural phenomena, including stratospheric winds [15] and ozone production [16], geomagnetic storms [17], cosmic ray flux [18], ionosphere-troposphere interactions [19], and the global electrical circuit that exists between the ionosphere and the Earth's surface [20].

Further, correlations of records of seasonal changes, solar activity cycles, and local and regional rainfall oscillations all confirm that, through some means, solar activity correlates with changes in weather and climate [21]. The solar interplanetary magnetic field, whose polarity varies every 22 years or twice the sunspot cycle, may play an additional role as its strength varies directly with increases and decreases in numbers of sunspots [22]. Although their basic data collection appears to be useful, some researchers attribute increased cosmogenic nuclide production in the atmosphere to increased solar activity in support of models of El Niño conditions [23], whereas, "increased solar activity" actually correlates with decreased cosmogenic nuclide production. Solar maxima correspond with increased solar magnetic field strength, decreased cosmic ray interaction with the atmosphere, less cloud formation, and warmer terrestrial conditions [24].

As a further natural demonstration of the importance of the Sun in determining climate variation, the well-documented solar shielding effects of atmospheric ash and aerosols from volcanic eruptions document the tie between solar irradiance and at least short-term climate swings. Particularly illustrative historically have been eruptions such as Huaynaputina (1600) [25], Tambora (1815) [26], Krakatoa (1883) [27], and Pinatubo (1991) [28].

More broadly, geological and planetological observations show that major perturbations in climate relate to the position and orientation of the Earth in its orbit around the Sun. For example, as Serbian mathematician Milutin Milankovic pointed out

in 1941 [29], and confirmed by many others since [30], initiation of the major ice ages on Earth correlate with a 23,000-year precession cycle [31], a 41,000-year obliquity cycle [32], and a 100,000-year eccentricity cycle [33] in the position of the Earth relative to the Sun. Cyclic global temperature variations measured in oxygen isotope ratios that correlate with the growth of ice sheets and biogeochemical responses closely reflect the 23,000-year precession cycle [34]. Also, the dynamics of the East African Equatorial monsoon appear related to a half-precession cycle [35]. In addition, the 41,000-year obliquity cycle shows strongly in North American marine depositional records [36].

Climate cycles related to internal solar activity are superposed on long-term orbital cycles. For example, the Medieval Warm Period (800-1300) and the Little Ice Age (1400-1900) correlate, respectively, with very active and very passive periods of recorded sunspot activity [37]. As a fairly recent example of solar influence on climate, the Little Ice Age occurred during a 500-year long sequence of three deep and prolonged reductions in sunspot frequency [38]. The coldest temperatures came during the last of these minima, a 70-year period of exceptionally few sunspots (the Maunder Minimum) [39]. The Medieval Warm Period, (when the Vikings colonized Greenland as glaciers retreated and farmers could at least survive there) [40] also correlates with repeated, multi-century long intervals of high sunspot frequency [41]. Since the end of the early 1900s, peak values in sunspot activity rose steadily until 1960, leveling off at higher than normal values until apparently starting to fall about 2000 [42].

The 11-year sunspot cycle repetitions are superposed on a number of long-term cycles of past highs and lows in solar activity. For example, the Gleissberg cycle has imprecisely defined periods of 90±30 years in length [43]. More energetic sunspot activity in the Gleissberg cycle may correlate with temporary decades of warming, such as in the 1930s and 1990s with the reverse being true in the 1810s and 1910s. Analyses of tree rings, lake levels, cave deposits, tree ring recorded variations in cosmic ray-produced isotopes (^{14}C and ^{10}Be) [44], and oxygen isotope ratios record what appear to be other long period solar cycles, specifically, 2400, 1500, 200 years, as well as the Gleissberg cycle [45]. Clearly, cycles of activity in a variable sun have strongly affected the Earth's climate.

Many advocates of human-caused global warming agree that solar cycles show correlations with regional climate variations [46]; but, absent a proven amplification mechanism to enhance small solar energy (irradiance) variations, they reject nature in favor of human fossil fuel burning as an explanation for warming during the last 100 years. These reviews by solar influence skeptics all document broadly accepted relationships of weather and climate with many different repetition cycles in solar activity [47], ranging from the 11-year sunspot cycle [48] to the long-term Milankovic orbital repetitions discussed above. Unfortunately, IPCC (International Panel on Climate Change) reports only consider the Total Solar Irradiance (TSI) in their modeling rather than including likely enhancements of solar variations such as those from the solar magnetic field, particle streams, ultraviolet radiation, and other potential direct and indirect solar interactions with the Earth's atmosphere and oceans.

Specifically with respect to the last 120 years, the correlation of measured solar energy input variations with global surface temperature and sea surface temperature is very strong **[49]**. The statistical correlation of solar irradiance with air temperature has been about 79% **[50]**. In contrast, during the last 50 years, the correlation of measured carbon dioxide increases with global surface temperature has been only about 22%. This directly contradicts the assumption that carbon dioxide has had a large influence on climate in the last 50 years **[51]**.

Since the end of the last Ice Age 11,000 years ago, the increase in total energy from the Sun has been about 0.6 watts per square meter **[52]**, an increase of less than 0.05% over an average total of about 1367 watts per square meter (equivalent to about 14 100-watt light bulbs per square yard). On shorter time scales, total variations reach about 3 watts per square meter, or 0.22% from the average **[53]**. Considering the actual amount of possible atmospheric heating (30% of incoming solar energy is reflected to space), this variation results in a third to a half a ºC (0.6 to 0.9 ºF) global temperature change, up or down, over seven years, that is, a half sunspot cycle **[54]**.

Various natural mechanisms for water vapor feedback and visible, infrared, and UV light reflection, adsorption, emission determine the net direct solar heating or radiative forcing effect on the Earth **[55]**. Global atmospheric circulation moderates the ***short-term*** solar energy inputs, particularly by upward convection of oceanic heat and water vapor in the large scale equatorial Hadley Cells that span latitudes from 30ºS to 30ºN **[56]**. Ocean circulation overall moderates the ***long-term*** transfer of solar energy around the globe **[57]**.

Evidence for the existence of a means for amplifying solar energy-solar magnetic field interactions with Earth comes from the oceans. Determination of the total contribution of the oceans to heating of the atmosphere, using three independent observational measures of oceanic heat flux, shows that the oceans' contribution to heating to be five to seven times larger than variations in total solar energy input **[58]** indicated the existence of a means for amplification.

Additional support that an amplification mechanism exists comes from recent observational data on variations in stratospheric water vapor concentrations over three decades. These data suggest that decreases in water vapor have contributed to amplified sea surface cooling since 2000 while increases between 1980 and 2000 accentuated surface warming **[59]**. Cooling since 2000 may correspond with stratospheric cooling and lower water retention due to lower than average solar energy input.

Climate change driven by the Sun constitutes a strongly competitive, purely scientific alternative to the climate modeling-political hypothesis of human-caused global warming advocated by climate modelers and their acolytes in the science, media, and political establishments. Solar influence ranges from significant but random solar flares and mass ejections affecting the thermosphere and jet stream tracks **[60]**, to the 11-year sunspot cycle **[61]**, to the 22-year magnetic polarity cycle, up to the long-term Milankovic orbital repetitions discussed above. The recent cold winters in the northern United States and

Europe coincide with a relatively prolonged reduction in sunspot activity below even the norm for a minimum in the 11-year cycle **[62]** and a projected maximum in 2013 significantly below the average for the last 100 years.

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Chapter 6

The “Hand of God” X-ray nebula of pulsar PSR B1509-58

COSMIC RAYS

Effects of Cosmic Rays on Climate

Climate change driven primarily by the sun constitutes a strongly competitive hypothesis to the climate modeling-political hypothesis of human-caused global warming. As many scientists have documented, the position and orientation of the Earth in its orbit around the sun and the sun’s variable activity determine weather and climate **[1]**. As part of this process, oceans store enormous amounts of solar energy, dwarfing by a factor of about 3300 the energy stored in the atmosphere as related to the total heat capacity **[2]**. Ocean currents create climate variations over vast regions by transferring their energy around the globe over decades and centuries through a system of interconnected currents and current oscillations **[3]**.

Increasing evidence suggests that a mechanism exists for strong amplification of the relatively small variations observed in total solar insolation (TSI) of only ±0.1%. That mechanism lies within the interaction of changes in the ionosphere, heating of the

stratosphere, ozone production, ionization in the troposphere, concentrations of atmospheric water and other greenhouse gases, nucleation of reflective clouds, and variations in ionization effects and resistive heating within the global electric circuit **[4]**. Obviously, this constitutes a very complex mix of interrelationships, not likely to be soon subject to accurate predictive computer modeling.

The direct relationship of the strength of solar magnetic fields with the sunspot activity on the sun **[5]** may provide a large part of the amplification answer. Research by Henrik Svensmark of Denmark's Center for Sun-Climate Research and others indicates that the strength of solar magnetic fields influences the depth of penetration of cosmic rays entering the Earth's atmosphere **[6]**. These cosmic rays consist largely of extremely high-energy, electrically charged hydrogen and helium nuclei that to some degree can be diverted from entering the solar system by sufficiently strong solar magnetic fields. Cosmic ray collisions with gases in the atmosphere also produce isotopes of Beryllium (^{10}Be) and Carbon (^{14}C) that in turn provide a measurable history of variations in cosmic ray intensity when taken up in tree rings and other annually layered materials **[7]**.

The physical mechanism for a cosmic ray stimulation of low cloud formation appears to be increased ionization of aerosols and the resulting enhancement of water nucleation sites **[8]**. Work at CERN with the CLOUD experiment appears to confirm this enhancement role for cosmic ray generated ions with a two to ten or more fold increase in the cloud particle nucleation rate of sulphuric acid and sulphuric acid-ammonia aerosols **[9]**. Indeed, the increase in satellite measured global brightening since about 1992 probably relates to a steady increase in total global cloud cover **[10]**. Periods of weak solar magnetic fields, known to correlate with low sunspot activity, allow cosmic rays to penetrate more deeply into the lower atmosphere **[11]** where they ionize more gas molecules than average, thus seeding more cloud cover and increasing the reflection of solar energy back into space. The reverse occurs with periods of strong solar magnetic fields.

As cloud cover expands, more solar radiation reflects back into space, resulting in a net cooling of the atmosphere and increased snow accumulation, particularly in temperate and arctic regions. A current illustration of the cooling effect of decreased solar activity appears to be in the currently very quiet sun and the recent reversal of the slightly elevated warming trend of the 1970s through 1990s. How long this cooling trend will persist remains to be seen; however, Greenland glaciers have been advancing since 2006 **[12]** and snowy, cold winters have dominated weather news coverage from northern North America and Europe. In addition, 2009 Fall Arctic sea ice has returned to most of its 1979 levels of coverage **[13]**.

Satellite observations of cloud cover, isotopic analysis of tree rings, ice cores and stalagmites, and historical analyses of solar activity support the hypothesis that cosmic rays can amplify solar variations. The strong correlation between the monsoon rainfall in southern Arabia and ^{14}C production, both recorded in a Th-U dated stalagmite from Oman, illustrate the close relationship between solar activity and cosmic ray penetration into the atmosphere **[14]**. As to the fundamental nature of sunspot generation and corresponding strengthening of the interplanetary magnetic field, a strong positive correlation exists

between small changes in solar radius and sunspot number [15] as well as with variations in magnetic fields at the surface of the Sun [16]; but a full understanding of these phenomena remains elusive.

Additional evidence of long-term variations in cosmic ray damage in meteorites, correlated with major ice ages on a 150 million year cycle of global cooling, strongly suggest that such ice ages may result from (or be intensified by) the solar system's passage through the regions of high intensity cosmic ray sources in the spiral arms of the Milky Way Galaxy [17]. This potential galactic influence on cloud formation and colder climate matches the observation that long periods of very low sunspot activity, and an accompanying weakened solar magnetic field, correlate with the coldest periods within the of the Little Ice Age of 1400-1900 [18].

A significant test of the existence of significant solar amplification may occur over the next sunspot cycle (Cycle 24); the beginning of which was delayed at least two years and its slow onset, and its trend towards a significantly lower 2013 peak than the average for the last 100 years, continues to confound predictions [19]. This slow onset has been accompanied by a particularly large decline in ultraviolet radiation, a commensurate decline in stratospheric ozone, and solar activity apparently out of phase with radiative forcing of global temperature [20]. Given the recent research findings discussed above, the current prolongation of less solar irradiance, reduced solar magnetic field strength, and greater convective energy between the surface and stratosphere may combine to create increased cosmic ray induced cloud formation and cooling in middle latitudes and greater total energy of tropical hurricanes and cyclones originating in the tropics [21].

The north-south flow of material at the Sun's surface has been faster and more variable than normal during the approach to sunspot Cycle 24 and the current prolonged sunspot minimum— the quietest in 100 years [22]. This coincides as well with an anomalously low output of solar soft x-rays [23]. The strength of the resulting solar polar magnetic fields during the drop off from the sunspot maximum in 2000-2001 has been about half of normal and also may have resulted in increased cosmic ray induced cloud formation since that maximum. That would coincide with evidence of relatively constant or decreasing global temperature since about 2000.

In addition to strong evidence that solar mediated cosmic ray flux can amplify variations in solar energy input, the theoretical potential also exists for a weakly varying solar heating or cooling signal to be amplified through "stochastic resonance," that is, amplification by the addition of nature's random weather-related background noise to an otherwise weak solar signal [24]. Such an addition could raise a solar heating signal over and above the background and could be further amplified by a non-linear system like ocean currents.

A further complication for those trying to model the future of climate change lies in the aforementioned global electric circuit. This circuit carries a net electric current of about one kilo-amp that flows from thunderstorms in the lower atmosphere (troposphere) into the ionosphere and magnetosphere and then closes with the Earth's surface through

atmospheric contact and lightning **[25]**. Convection in thunder-storms, solar wind interaction with the Earth's magnetosphere, and tides in the atmosphere's thermosphere (high temperature, ionized, very thin atmosphere above about 80 km) power the global electric circuit. Thunderstorms, particularly those in the equatorial Intertropical Convergence Zone, appear to be the most important component this process. No indication exists that current global climate models adequately address any of these global natural phenomena.

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THE CONSTITUTION

Chapter 7

Aerial view of the U. S. Capitol complex, seat of the U.S. government, seen from the northwest.

CLIMATE AND THE CONSTITUTION

Limits on Climate-Related Legislation, Executive Orders, and Regulation

Americans should think long and hard about their children's future before giving up liberties and incomes to politicians in Washington and at the United Nations in the name of "doing something" about climate change. Given how little we actually know about climate, as well as great uncertainties in what we do know, the President, regulators, and Congress have chosen an extraordinarily dangerous path of unconstitutional usurpation of the rights of the people and the constitutionally reserved powers of the States.

Climate change assumptions rather than facts, and computer modeling rather than real-world observations, underpin the Government's efforts to restrict American liberties and confiscate trillions of dollars of American income. The scientific rationale behind this proposed massive intrusion into American life requires more than a "consensus" of like-minded climate analysts and bureaucrats. It needs to be right.

Recent disclosures and admissions of scientific misconduct by the United Nations and advocates of the human-caused global warming hypothesis shows the fraudulent foundation of this much-ballyhooed, but non-existent scientific consensus about climate. Equally disturbing has been the packing of the IPCC structure with human-caused global warming advocates from various Non-Governmental Organizations **[1]**. Supposedly "scientific" advocates actually used a mathematical trick to hide a real decline in global temperature between 1961 and 2000. Still, the Environmental Protection Agency, the Department of Energy, the Securities and Exchange Commission, and other Government

agencies persist in over-stepping their regulatory authority to jam climate related requirements into our lives and economy at the expense of liberty, jobs, and incomes. Federal control of energy production and use, advocated by special "climate" interests, will have a vanishingly small effect on slowing three and a half centuries of very slow, erratic, but natural global warming.

Prudent protection of local environments by the States and the people has justification in the 9th Amendment's protection of natural rights, including "Life, Liberty and the Pursuit of Happiness" as formalized in the Declaration of Independence. Further, the 10th Amendment leaves to the States all governance responsibility for environment as no direct or indirect mention of it exists in the Constitution. A long-term federal and commercial agenda to gather power and profit in the name of "environment" at the expense of liberty, therefore, has no moral or constitutional foundation. Only research on climate and other aspects of the earth sciences and engineering find justification in the Constitution by virtue of a strong foundation in the Preamble's mandated promotion of the "common Defence and general Welfare" as limited by the enumerated powers in Articles I and II and in the duly ratified Amendments.

The constitutional relationship, if any, between climate-related taxation and regulation, on the one hand, and national security and economic health, on the other, demands close examination. Meeting the constitutional requirement in the Preamble and Articles I to "provide for the common Defence and the general Welfare" requires a strong economy and ready access to abundant energy. Efforts to unconstitutionally limit energy production and tax carbon emissions would clearly adversely affect the economy and thereby limit the Nation's ability to counter potential adversaries or direct attacks. The President and Congress already have intentionally and aggressively weakened the nation's economy and undermined the general welfare by focusing recession recovery on deficit spending, a weak dollar, more heavy-handed regulations, and future tax increases. A carbon emissions cap and tax on energy production and use further jeopardizes the economy and our ability to respond to security threats or to add new jobs.

Trying to "do something" about the current slow, long-term warming in Earth-surface temperatures will not work against natural climate forces discussed in the previous Section of ***Climate and the Constitution***. When Americans realize what liberties have been lost in this unconstitutional power grab, we will deeply regret that we did not just prepare for natural climate change rather than trying to stop the unstoppable. Our focus should be on producing more energy to maintain economic growth, to raise worldwide living standards and, where necessary, deal with the actual effects of natural climate change whether warming or cooling. We should never limit growth in energy use with its associated improvements in human conditions and standards of living.

Critical differences in scientific approach exist between scientists who observe weather and climate and those who attempt to model nature's complexities in computers. Those who observe the natural, economic, and sociological aspects of climate change are "realists". Too many modelers, on the other hand, have become office-bound "tinkerers" who believe complex mathematics and parameter tweaking can accurately forecast long-term changes in climate— Earth's most complex natural system. Many of the tinkerers

also have let ideological emotions and political advocacy cloud their scientific objectivity.

Observations of natural variations in atmospheric and oceanic temperatures, gas concentrations, and currents only provide clear indications of how, but not when, climate will change. Historical and geological records illustrate the high levels of uncertainty in any forecast of either the direction or the timing of future climate trends. Climate forecasts based on computer models have proven to be unsuccessful due to the great number and great complexity of critical variables, some of which, like the effects of water vapor and clouds, so far defy mathematical definition. Little wonder that climate models fail, both in replication of past conditions and in forecasting the future.

Computer models of global climate just do not work as predictive tools: their value, which can be considerable, is therefore entirely heuristic. For example, the models' unanimous predictions do not match actual measurements of temperatures in the troposphere (lower 0-18 miles of the atmosphere, depending on latitude). According to the models, the troposphere should have warmed significantly in response to rising levels of atmospheric carbon dioxide. On the contrary, the troposphere has remained little changed during the last 50 years during which satellite and balloon-borne measurements of temperature and continuous direct measurement of carbon dioxide levels became available. Models cannot truly deal with the realities of weather, that is, evaporation, convection, clouds, rain, wind variations, ocean heat storage and currents, and all the other pathways in which nature inexorably moves heat from warm regions to cold. Model predictions also depend on knowing if there is a positive or negative temperature feedback for increasing atmospheric carbon dioxide and how great is that feedback. If feedback is positive, temperature increases and if negative, temperature decreases. In fact, satellite observations indicate that this problem of the direction of feedback, much less its absolute magnitude, has not been solved **[2]**.

So, what should we do now about climate change, if anything? We at least must prepare to adapt to inevitable change, however unpredictable it may seem. We can recognize that production and use of our own domestic oil, gas, coal, and nuclear resources buys us time to meet these challenges and, at the same time, preserve our liberty. We can develop far better surface and space observational techniques and use them consistently over decades to better understand the science of our Earth. On political time scales, we can quit taking actions with unknown unintended consequences. We can choose sustained research and development of energy alternatives, those with clear paths to commercialization, rather than continue tax dollar subsidies and loan guarantees for premature or flawed introduction of politically motivated concepts such as large scale solar and wind projects. We can provide investment and business environments that will mature new sources of energy, particularly through reduction of personal and business income tax rates.

Instead, President Obama now proposes loan guarantees, rather than regulatory and legal reform, to add more nuclear power to the 20% currently meeting electrical power demand in the United States. His proposal for the Government to guarantee $8.33 billion

in loans, allegedly to encourage a single power company (Southern) to build two nuclear fission plants, reflects cynical manipulation of the facts. First of all, such a proposal and targeted loan guarantees in general are unconstitutional, violating the equal protection rights of other Americans provided by the 5th and 14th Amendments. Secondly, the proposal can always be withdrawn and does not include an elimination of those unnecessary regulations, judicial reviews, and barriers to nuclear waste disposal or reprocessing that make raising private capital for nuclear plants essentially impossible. Thirdly, the President hopes that his proposal, whether or not ever consummated, will garner support for similar loan guarantees to otherwise uneconomic wind, solar energy, and biofuel plants and for passage of unworkable and scientifically invalid climate change legislation. Fourth, the proposal would give the Government, once again, effective financial control of another segment of the American economy while distorting competition, capital markets, and good business practice. Finally, Government loan guarantees ultimately constitute a liability held by the American taxpayer. Don't we have enough of such liabilities already?

In addition to regulatory and legal reform to encourage private investment in nuclear power, the Government should help research institutions and industry develop nuclear waste reprocessing and reuse technology, terminated under the Carter Administration. Also, such cooperative research and technology development efforts should advance the capability to transform unusable portions of nuclear waste into stable or short-lived radioisotopes, using advance fusion processes. This type of Government support at least would be constitutional.

Instead of being ideologically greedy and ignoring good science and economics, we can start being wise and truly concerned about our children and their children and the society in which they will live. That concern needs to be manifested in the 2012 election of Congressmen and women and a President with common sense and a strong perception of reality relative to the needs of American citizens.

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Chapter 8

The Rotunda of the University of Virginia in Charlottesville

ACADEMIC RESPONSIBILITY

Conflicts of Interest in Studies of Climate Change

Extraordinarily complex natural processes underlie changes in the Earth's climate. They represent decadal to millennial to epochal variations in weather patterns as nature continuously attempts to compensate for solar heating imbalances in and between the atmosphere, oceans, and landmasses.

Nature's attempts to restore heat balance at and near the Earth's surface take place under many complicating influences. These include the rotating Earth's seasonally variable orientation relative to the Sun; periodic differences in Earth's orbital positioning around the Sun; movement and release of heat stored in the oceans; atmospheric circulation; the Sun's variable irradiance and magnetic fields; frequent and unpredictable volcanic eruptions; and geologically slow but exorable redistribution and reconfiguration of land, ocean, and ice masses. No evidence exists that these natural processes have become more extreme as a result of human influences on climate change over the last several centuries. **[1]**

In this context of natural reality, the recent report, "America's Climate Choices," released May 19, 2010, by the National Research Council of the National Academy of Sciences (NAS), illustrates how far that formerly illustrious Academy has strayed from the principles of "science." Those principles are, simply: observe, hypothesize, test, analyze, retest, and repeat this cycle until plausible, objective conclusions appear to be warranted – conclusions that others or nature can replicate.

The Academy, in contrast, has become just another political arm of the governmental establishment, promoting a federal mandate of "major technological and behavioral change" based on flawed as well as selective science. The report's conclusions that "climate change is occurring, caused largely by human activities…" and that "the U.S. should act now to reduce greenhouse gas emissions" ignore contradictory tests of such hypotheses that come through objective observations.

Unfortunately, support for the Academy's political statements also comes from Alan Leshner, CEO of the American Association for the Advancement of Science (AAAS) **[2]**. The AAAS, in an Essay Review of books related to the climate change debate in its ***Science*** magazine **[3]**, could not even bring itself to require consideration of books dissenting from the "consensus" that current climate change is human caused **[4]**. Both ***Science*** and its near twins, ***Nature*** and ***EOS***, continue to editorialize in support of the human-caused climate change hypothesis **[5]**, with ***EOS*** only recently suggesting that "severe" tests of climate change hypotheses should be undertaken **[6]**. In addition, these publications allow the same biased commentary to be included routinely in reports of observational data and modeling runs.

In taking these political, non-scientific positions, the National Academy has joined another political body, the UN's International Panel on Climate Change (IPCC), in attacking the heart of free institutions and economic prosperity. The Academy's and British Royal Society's Presidents and membership have exacerbated their loss of credibility rather than enhancing it **[7]** in defensive reactions and justifications after the 2009 public disclosure of fraud within the climate science political community **[8]**. The Royal Society takes a particularly disappointing and ironic position, as its founders' motto 350 years ago was to "accept nothing on authority **[9]**." The National Academy now has embarrassed itself further by using a statistical analysis of publication records as "scientific" justification of the so-called "consensus" that humans cause climate change **[10]**.

Unfortunately, bias permeates both the reports and the published work reviewed in reports produced by the Academy and IPCC for the use of "policy makers." This bias follows from the dependency on government funding of so many climate researchers and bureaucrats as well as from the extra-constitutional political leanings of most academics today **[11]**. If grant applications from the researchers involved do not ***propose*** to show the effects of humans on climate, their proposals risk not being funded by bureaucrats that want justification for their grab for regulatory control. If the research conclusions do not ***allege*** an effect by humans on climate, however tenuous that effect might be, their career-

essential papers probably will not be published by politically committed journals. Not following liberal orthodoxy on climate change thus may create problems of tenure at home institutions.

If the recent climate science policy scandals **[12]** show nothing else, they show the existence of political bias as well as scientific fraud in the academic hierarchy of Western nations. Even the Academy's study of "America's Climate Choices" was funded by the leadership of the Congress and the National Oceanic and Atmospheric Administration (NOAA), both of which have huge political and budgetary interests, respectively, in reaching the conclusion that humans cause modern climate change. 85% of the Academy's future study funding **[13]** depends on concluding what your political customers, the politicians and bureaucrats, want you to conclude.

On the other hand, Ralph J. Cicerone, President of the National Academy of Sciences, correctly states "that the state of climate change science is strong;" however, ironically, he refers to the wrong aspects of climate change science when he makes that statement. Recent international scientific conferences hosted by the Heartland Institute of Chicago, the broad compilation of information contained in ***Climate Changed Reconsidered*** **[14]**, published by the Non-governmental International Panel on Climate Change (NIPCC); and an increasing body of published research data, documented in subsequent essays, shows that ***observational*** climate change science is indeed strong.

The results of this observational scientific research and analysis show that natural processes dominate changes in Earth's climate and it is that conclusion that should drive national policy. The last thing policy makers should rely on is guidance based on assumptions put into obviously flawed computer models. It is factually, professionally, and absolutely wrong for the former Chairman of the National Science Board to state in congressional testimony that there exist no "specifics, alternate hypotheses, and facts" contrary to the human-caused climate change hypothesis **[15]**. As statements in the NAS report confirms, a socialist political agenda drives government policy and that policy seeks control over all aspects of local as well as national economic activity, particularly energy production and use. The politically positioned scientific establishment continuously ignores the common sense analysis of Austro-British philosopher, Karl Popper, that a hypothesis is scientific only if its formulation is followed by systematic efforts to falsify or independently test the hypothesis as severely as possible **[16]**. Observational science continually tests, and tests "severely", the hypothesis that nature controls climate change. The nation's and its citizen's economic well-being requires equally severe tests of the alleged "consensus" hypothesis that modern climate change results from human production of carbon dioxide **[17]**.

The global warming debate should not be about whether human activity can affect local and even regional climate. Levels of stored organic carbon in soils have been reduced for thousands of years by agricultural activity **[18]**, although new carbon retention practices in the United States and elsewhere have begun to mitigate this long-term trend. Asia's rapid industrialization and the carbon soot deposited on Tibetan glaciers, the third largest accumulation of terrestrial ice, appears to be increasing the rate

of melting of at least some of those glaciers **[19]**. Aerosols introduced in South Asia may have weakened the summer monsoon over the since World War II **[20]**, although long-term natural factors also affect monsoon intensity on decadal to multi-century scales. An extreme decline in regional fish stocks appears to have resulted in more abundant phytoplankton and, in turn, in the drawdown of ocean carbon **[21]**. Regional urban pollution, such as that in and downwind from many large metropolitan areas, constitutes a continuing concern **[22]**; however, great progress has been made since the 1960s in reducing such pollution, particularly in the United States **[23]**. Other examples exist of human impact that may or may not affect climate, such as rainforest loss and possible stratospheric ozone depletion. Satellite observations and/or biological surrogates, however, have not yet revealed the long-term natural variability of stratospheric ozone **[24]** since the so called "ozone holes" over Antarctica **[25]** and the Arctic **[26]** were discovered. In the case of rainforest loss, although the long term effects on carbon emissions of such loss would be difficult to measure within the spectrum of carbon sources and sinks, logic would suggest that massive loss of rainforest would not be the desirable outcome for various biological, economic, and esthetic reasons.

What do we actually know about global climate variability over the part of Earth history most relevant to the present? Actually, we know a lot. Since the last Ice Age ended about 10,000 years ago **[27]** (the glacial maximum lasting between 33,000 and 19,000 years ago **[28]**), geological and tree ring records document prolonged periods of warmth and cold, ranging from 3000 years to a few hundred years in duration **[29]**. The Little Ice Age of 1400-1900 **[30]**, following the Medieval Warm Period of 600-1300, recorded the last multi-century period of global cooling during that 10,000 years, although decades-long cooling has occurred several times since.

By 1400, Arctic ice pack had enclosed Iceland and Greenland and driven Viking settlers away from their farms on those islands **[31]**. By the end of the 1600s, in response to the earlier climate cooling, Alpine glaciers had advanced over valley farmlands cultivated after those same glaciers had receded during the Medieval Warm Period **[32]**. Indeed, all of the consequences of warming prior to 1300 reversed during the next several hundred years of the Little Ice Age.

Since about 1660, the middle of the last, 70 year-long phase of the Little Ice Age, global surface and near surface temperatures have risen an average of about 0.9 °F (0.5 °C) each 100 years **[33]**. In response, a general retreat of world glaciers has taken place over the last century or more, not just in the last decades of the 20th Century **[34]**, repeating the documented pattern of the Medieval Warm Period.

The Arctic Ocean ice pack has retreated northward since about 1800 **[35].** Since 1979 and the beginning of satellite monitoring, a continuous decline in ice pack area has been alleged **[36]**; but with the most obvious decline only starting in about 1998. 1998 also is about the time the current cycle of decadal Northern Hemisphere warming leveled off, a correlation suggesting that wind or ocean currents may be at play more than water temperature. It should be remembered in this context, that during the Medieval Warm Period, Arctic sea ice probably largely disappeared during some summers, depending on

high latitude atmospheric circulation **[37]**, and may do so in the future for natural reasons **[38]**. Similarly, though only on a decadal rather than a century scale, satellite observations since 1979 show that the decrease in the area of the Arctic ice pack since 1996 appears to have reversed from its 2007 summer minimum **[39]**, although there is no near-term indication of a sustained expansion of the area of pack ice **[40]**. Antarctic sea ice also has retreated from the extent reported by explorers and whalers early in the 20th Century **[41]**. Antarctic sea ice, however, has been expanding northward for about two decades **[42]** after indications of an additional gradual decline following the 1950s **[43]**. Further, winter ice cover on the Great Lakes, although highly variable since satellite data became available in 1973, has been rising steadily since 2006 from its minimums in that year and in 2002 **[44]**, consistent with the current trend in Arctic ice cover.

Since the last vestiges of the most recent major Ice Age about 11,600 years ago (the end of the Younger Dryas cold period **[45]**), decades-long periods of warming and cooling have been superposed on even longer cycles. The longest of these cycles repeats about every 1500 years and the shortest about every 55-60 years **[46]**. These latter, short, multi-decade intervals of rapid warming and cooling **[47]** have occurred during the current, 350-year long general warming trend. The most recent short-term variations have been cooling between 1935 and 1975, warming between 1975 and 1995, and now cooling again since 2000.

In short, nothing other than ordinary natural climate variations have occurred since fossil fuel use accelerated in the 20th Century. General agreement exists among both climate change alarmists and climate change realists that most of the slow variations over the centuries before 1949 came from natural causes **[48]**, with a general warming trend continuing the recovery from the extremes of the Little Ice Age. Then politics took over when definitive measurements of a steady increase in atmospheric carbon dioxide became available after 1960 **[49]**. Since then, "carbon dioxide," an essential ingredient for life itself, has become a stalking-horse for increased government control of consumers, private business, industry, and the economy. Sadly, even the historic Geological Society of London, of which the author has been proud to be an Honorary Member, has jumped to the remarkably unscientific conclusion that the current rise in atmospheric carbon dioxide is human-caused, even after noting that nature has caused far greater increases in the past **[50].**

A new scientific concern arises from calls for global geo-engineering projects to cool climate **[51]** even though nature has done a great job of this in the past. Considering the limitations on our understanding of nature's role in climate, much less the uncertainties of the effects of geo-engineering and its unintended consequences, no credence whatsoever should be wasted on its advocates of tinkering with the Sun's interaction with the Earth's atmosphere. Resources would be applied better to dealing with the consequences of change and to gathering better observational information on what change to expect.

In the name of the impossible goal of climate control through taxes and regulation **[52]**, many in Congress wish to vote on legislation that would seriously and unconstitutionally harm the American economy and employment dependent on the

strength of that economy. The Environmental Protection Agency, in particular, already has assumed unauthorized, unconstitutional, dictatorial powers to regulate carbon dioxide emissions as a pollutant. Unfortunately, the Supreme Court has joined in this scientifically ridiculous intrusion into American liberty by agreeing with the Agency that carbon dioxide can be controlled as a pollutant.

These continue to be dangerous times for liberty and constitutional protection of that liberty. Election battle lines have formed for America's long-term effort to restore and maintain constitutional principles and common sense in climate policy.

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Chapter 9

An oil donkey at Hollister, CA

ENERGY, CLIMATE AND THE CONSTITUTION

A Constitutionally Mandated National Energy Plan

Fruitless attempts to control climate change focus almost entirely on limiting the use of fossil fuels in the production of useful forms of energy. The consequence of these misguided efforts by the Federal Government and some State Governments has been to raise costs of energy for the American consumer, destroy jobs for the American worker, increase taxes on American incomes, and greatly expand the debt burden that threatens all Americans, now and in the future.

Independently of natural climate change, impossible as it is to control, there exists a constitutional mandate for a rational, scientific, and economically sound national energy plan. That rationale lies in its close modern relationship to the constitutionally mandated "common defence". Dependence on foreign sources of oil, and therefore transportation fuels, limits both near and long-term national security options. That dependence also creates an economic burden to our economy that restricts the liberty of Americans and their 9th Amendment guarantee of the pursuit of happiness. Reduction in the use of coal to generate electricity, absent an aggressive increase in the use of nuclear power and

natural shale gas, puts the American economy at even greater risk than already has been done by other misguided Federal economic policies.

Dependence on imported oil removes the defensive and foreign policy leverage needed to prevent attacks by terrorist states. Imports subsidize the financial supporters of terrorism. Dependence has the further effect of giving the United States no influence over the price it pays for oil. If the price of oil came under the direct economic influence of the United States, for example, Iran would have great difficulty affording the development of nuclear weapons and their delivery systems.

Dependence on oil and gasoline imports also gives China further means to intimidate our national leaders into acquiescence to its continuing ambition for international dominance. China's rapidly growing economy has a major influence on world energy supply and cost, competing directly with our needs. Cold War II has begun; however, it is being fought on an economic and energy front as well as on a military deterrence front. On this point, China's rapidly developing space capabilities and its expressed interest in lunar helium-3 energy resources cannot be ignored.

Many varied elements are necessary to a long-range plan that would ultimately provide for energy independence and a more stable economy. A scientifically and economically based, long-range plan also would provide far more benefit to the preservation of the environment and natural resources than possible today.

In the near term, Congress must take back the control of regulatory laws it has transferred to the Executive Branch, particularly those rules that prevent attaining energy independence from commercially viable natural energy resources. Closely tied to independence are the facilities necessary to refine domestic crude oil into gasoline, diesel, and jet fuel. The One House Legislative Veto **[1]** constitutes a constitutional means for the Congress to control rule making delegated to the Executive.

President Obama's continuing statements and restrictive actions notwithstanding, the only commercially viable natural resource that currently offers an unsubsidized path to independence from imported oil is domestically accessible crude oil and natural gas, including shale gas, along with the domestic refineries necessary to create fuel oil, diesel, gasoline, and jet fuel. Natural gas offers some potential to reduce imports portable fuels over the near term; however, the use of tax credits or direct subsidies of the initial capital costs for fleet conversions to natural gas, and the infrastructure to support such conversions, should come with payback provisions as those conversions realize long-term economies.

To fully understand the potential and challenges of gaining near-term energy independence, industry, national, and state policy makers require a more complete understanding of the potential resources of oil and natural gas available beneath public lands and in off-shore areas. A rapid, cooperative industry-federal-state scientific assessment of those potential resources would provide the knowledge necessary to

evaluate the private investments and national enabling policies necessary to achieve and maintain independence.

Research and technology development aimed at future portable fuels that are commercially viable alternatives should focus on the following: coal liquids, ethanol from nonfood crops, and algal bio-diesel, and water-derived hydrogen from catalytic systems energized by the sun or by waste heat from needed power plants. Significant historical and current technological progress has been made with regard to these fuels; however, commercial viability must include unsubsidized production costs low enough to enable the creation of convenient and cost-effective fuel delivery infrastructures. Battery-based systems do not constitute a viable, broadly applicable alternative portable drive system due to their very low, coal- or uranium-to-power-train total efficiency, as well as their charging inconvenience.

Major solar energy systems such a large scale wind and solar electric plants are far from being competitive without major subsidies from taxpayers or ratepayers. For these systems to have any hope of being practical contributors to the national energy mix, a significant technology development effort must be undertaken by industry. Due to the great competitive gulf between these systems and standard coal and nuclear systems, it is questionable if the federal government should be funding a new round of technology development. Many other critical energy initiatives require priority attention.

The previous Section of ***Climate and the Constitution*** made the scientific case that climate change largely results from natural phenomenon and that attempts to reduce the very small human induced component to such change will have little practical effect. At the same time, misguided political efforts to control climate change unconstitutionally restrict the liberties of Americans. On the other hand, even if not persuaded by the scientific evidence ***against*** human-caused climate change, the replacement of end-of-life coal-fired power plants with advanced nuclear plants constitutes the best of all economic and environmental worlds. The first step in such replacement should be the reform and streamlining of regulations governing nuclear plant construction. If that is done, and the time necessary to construct plants is halved, investment capital will follow the demand without any need for loan guarantees or subsidies.

At the same time as America should be moving toward nuclear power as the source of most of its electricity, the effort to find underground repositories for the burial of spent nuclear fuel rods should be abandoned. Monitored, retrievable, above ground storage makes much more sense in the long-term. Future reprocessing of these rods will provide additional fuel for electrical power generation as well as numerous useful isotopes for medical and industrial applications. The actual useless waste, that is, the much reduced, left over high-level radioisotopes, ultimately can be changed (transmuted) into stable isotopes or easily confined short-lived radioisotopes.

Reprocessing of nuclear fuel rods and transmutation of the remaining high-level radioactive waste will require significant new investment by industry. Although defense-related spent fuel rods are currently reprocessed and France reprocesses its civil reactor

fuels, commercial reprocessing development in the United States was terminated by the Carter Administration. It should be restarted, immediately. Transmutation of actual waste from reprocessing can be done most efficiently by exposure of radioisotopes to energetic protons produced by helium-3 fusion systems. Until reprocessing and transmutation technologies have been developed to a commercial level of readiness, above ground, spent fuel rod storage is the most practical solution to this contentious issue.

In the longer term, the development of modular nuclear breeder systems, high temperature gas reactors, thorium-fueled reactors, and lunar helium-3 fusion should be part of the mix of systems examined by robust research and technology development programs. Government, industry, and academia should be mobilized into joint technology development efforts not unlike those that made American aeronautics the envy of the world in the 20th Century. Unfortunately, inherent scientific, engineering, capital cost, and waste disposal issues mean that the billions being spent on pursuing tritium-fueled fusion will not succeed in developing a commercially viable fusion power system.

A central underlying issue in the implementation of a defense-oriented national energy plan continues to be the lack of both objectivity and quality in the American educational system **[2]**. From beginning to end, most young people now miss both the essential foundations of history, constitutional government, and science and mathematics necessary to participate in the implementation of such a plan. No energy plan, much less our national defense, can be successful unless the States begin to fully live up to their 10th Amendment responsibilities in education. As during the height of World War II and the Cold War, the Federal Government only should be a non-controlling partner in the funding of those elements of science and engineering education essential to the "common Defence" but no more than this if liberty is to be preserved.

Previous Congresses and Administrations have not upheld their constitutional mandate to "provide for the Common defence" relative to energy and instead have used politically motivated legislation and regulation to prevent the private sector from providing for the nation's critical energy needs. This neglect has led to a national security crisis through progressively increased dependence on foreign sources of oil as well as other strategic resources. The Constitution requires that there be a concerted and immediate federal focus on energy independence. This is not what the Founders would have desired, but past neglect means no choice remains other than capitulation to the economic and military intimidation of the enemies of liberty.

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References cited in Chapter 9

1. The Founders clearly intended by Clause 18 of Article I, Section 8, that enactment of federal laws to be the responsibility of the Congress and not passed on to the Executive Branch through generalized regulatory authority. In order to return to the Founders' intent, Congress should create a One House Legislative Veto process relative to any decision, order, or regulation promulgated by the Executive Branch. That process of regulation review and potential disapproval should begin with 20 percent or more of the members of either House petitioning to discharge an introduced Resolution of Disapproval from the relevant Committee or Committees and move its consideration to the floor of the initiating House. If the Resolution passes either House, the Congress can maintain constitutional control of this On House Legislative Veto process by a sequence of one House passage of a Resolution of Disapproval, followed by the other House's opportunity to pass a Resolution of Disapproval of the first House's action. This sequence avoids the constitutional requirement for the President to sign any joint action by the House and Senate (Article I, Section 7, Clause 3). Should an Agency or Department refuse to honor the Legislative Veto of a specific regulation, the Congress should use the Appropriations Bill to rescind funding for its enforcement.

2. **See:** ***America's Uncommon Sense*** **Essays: No. 13**, *Education and the Constitution #1*; **No. 14**, *Education and the Constitution #2*; **No. 15**, *Education and the Constitution #3*; and **No. 25**, *Education and the Constitution #4*, all available to read or download from the downloads page at http://americasuncommonsense.com/blog/downloads/.

Chapter 10

The Aurora Borealis seen above Bear Lake, Eielson Air Force Base, Alaska

CLIMATE CHANGE

Summary of Major Constitutional Limits on Policy

The Constitution of the United States of America sets clear limits on the powers of the Federal Government and permits exercise of those powers only in specifically enumerated activities that relate to providing for the "common defence", promoting the "general Welfare", and securing "the Blessings of Liberty" to all Americans and future Americans. The first ten Amendments to the Constitution, and the 14th Amendment, further limit the powers of Federal and State Governments relative to the rights of the people, leave to the people those natural rights not specifically protected, and reserve all un-enumerated powers to the States. Other Amendments expand the powers of the Federal Government but, again, only within specified limits.

Article V defines the process by which constitutional powers can be changed and the rights and liberties of the people possibly further limited. The Constitution defines no process that allows any of the three branches of the Federal Government to change their powers or the rights of the people without a constitutional amendment. Unfortunately,

over many decades, the amendment process of Article V has not been followed in the determination of many extra-constitutional national legislation, executive actions, and Court decisions. Rather, there have been assumptions of non-enumerated powers by all three branches of Government.

In analyzing the Constitution, it is critical to recognize the clear requirement in the Preamble and Article I to "provide for the common Defence and the general Welfare". Meeting this requirement demands ready access to abundant energy in order to have a strong economy that can support national security and other constitutional functions of Federal, State, and local government. Unconstitutionally limiting energy production and taxing carbon emissions to "do something about climate change" would clearly adversely affect the economy and thereby limit the Nation's ability to counter potential adversaries or direct attacks and provide for the general welfare.

Actions related to modification of "climate change" clearly are not included within the directly enumerated powers of Congress given in Article I, of the President in Article II, or of the Judiciary in Article III. Therefore, the question arises as to whether such actions can be constitutionally justified or invalidated under various enumerated powers or within the Amendments that protect political and natural rights. In answering this question, the constitutional powers of the three branches of Government must be considered relative to permissible law, regulation, executive order, or judicial decision. Similarly, the relevant rights guaranteed by the 5th, 9th, 10th and 14th Amendments also must be reviewed.

Legislative Power: Clauses 2 through 17 of Article I, Section 8, lay out the specific limits on Congress's power to undertake the duties stated in Clause 1 of that Article. Nothing in those sixteen Clauses, directly or indirectly, gives the Congress the power to attempt to regulate climate, assuming that Nature would permit such regulation to be effective. Where commerce between the States in energy, transportation or industry needs to be regulated to prevent economic discrimination between those States, Congress has the power to do so under Clause 3, the "Commerce Clause". To extend such regulation in an attempt to affect climate, however, would have no constitutional basis.

Some would argue that Clause 18 permits Congress to legislate in any way it deems "necessary and proper"; however, this phrase, in specific words, applies only to the "Execution of the foregoing Powers, and all other Powers vested by this Constitution in the Government of the United States, or in any Department or Officer thereof." Clearly, no extra-constitutional powers, such as attempts to regulate climate, can be assumed by the Congress by way of Clause 18.

Executive Power: Article II gives significant executive power to the President, but in no way gives that Office legislative authority beyond that wielded by the Congress in which the President participates by signature or veto. In fact, the President's Oath of Office specifically requires that the President "preserve, protect and defend the Constitution…" and thus requires a veto of any legislation that is unconstitutional on its face. Further, any Executive Order by the President must be limited to the management of the Office of the

President or to the implementation of the responsibilities of Executive Branch Departments and Agencies as defined by the Constitution or by Acts of Congress. Executive Orders are explicitly unconstitutional if they have no tie to constitutional Acts of Congress or violate the rights of individual Americans or the States as defined by Amendments to the Constitution. No Executive Order that attempts to mandate actions relative to climate, therefore, would be constitutional.

Executive Order 13524, for example, issued October 5, 2009, by President Obama, requires that Federal agencies set "sustainability goals" for their use of energy. This order would be constitutional if its stated purpose were to reduce the cost of the Executive Branch operations through cost-effective energy related operations; however, the stated primary purpose of the Order is "to establish an integrated strategy towards sustainability in the Federal Government and to make reduction of greenhouse gas emissions (GHG) a priority for Federal agencies." This is a purpose for which the President has no constitutional authority to implement. In addition, it is well documented that a reduction in carbon emissions by means other than employing under-utilized technology of enhancing fossil fuel combustion and conversion efficiency will not net cost savings and will lead to greater costs of government. The Order also states that Order 13524 is "intended as a means to create a clean energy economy" and to "foster markets for sustainable technologies and environmentally favorable materials, products, and services". This is an industrial policy purpose for picking economic winners and losers for which there is no constitutional basis.

Regulatory Agencies: The Environmental Protection Agency (EPA) has no direct constitutional foundation for existing because "environmental regulation" is not an enumerated power of Congress or the President. The 10th Amendment leaves all un-enumerated powers to the States without equivocation. A State, therefore, with the implicit consent of the electorate in that State and with solid scientific justification, can regulate activities that affect the environment within the borders of that State. If activities in one State adversely affect the environment in another State, and the issue cannot be resolved between the two parties, then Article III, Section 2, provides for recourse to Federal Courts, stating that "The judicial Power shall extend…to Controversies between two or more States;…"

There exists a strong argument that under the Commerce Clause of Article 1, Section 8, Congress can provide for regulation of interstate commercial activities for which there is strong scientific evidence of potential harm to the health and safety of Americans arising from those activities. Some of the few examples of such harm come from excessive release of Mercury, Lead, Arsenic, radiation and some artificial chemicals into the environment. The critical scientific issue in these and all cases of potential harm lies in the dose received by individuals. The key to any environmental regulation is "strong scientific evidence of potential harm to health and safety" and the balancing of the benefit of the regulation against its full economic cost and its infringement on the constitutional rights of the people. These constitutional rights, of course, include the inherent natural rights protected by the 9th Amendment **[1]**. With respect to the EPA's moves to regulate the use of fossil fuels in the name of fighting global warming, as discussed in previous

Chapters, there is no strong scientific basis that such regulation can significantly counter natural warming or cooling cycles.

Similarly, the Department of Energy (DOE) has no constitutional basis for attempting to affect commercial decisions through its subsidies for solar, wind, battery and bio-fuel energy production. Again, industrial policy is not an enumerated function of the Federal Government. As with regulations promulgated by the EPA, DOE's authority to provide such subsidies is supported by partisan political rationales rather than engineering and economic reality. Federally funded research and technology development in these significantly non-economic areas of energy conversion can be justified by their potential long term tie to national security **[2]** in relation to future depletion of currently much more economic and more environmentally friendly North American fossil and nuclear energy production **[3]**.

Regulatory mandates by the Federal Government, including the Executive Branch, that artificially raise the price of goods and services indirectly and unconstitutionally manipulate industrial policy and introduce damaging non-market forces into private decision making. For example, the President and the Secretary of Energy have expressed a clear Administration policy to raise the price of fuel and energy derived from fossil fuels through increased fuel taxes; mandated additives, such as ethanol; mandated unscientific emissions controls, such as to reduce emissions of carbon dioxide and infinitesimal amounts of Mercury; and the imposition of regulatory requirements for power companies to distribute minimum amounts of wind and solar generated electrical energy. These policies, of course, mean that the price goes up on food, trucks and cars, and everything else that needs energy to be produced.

The President's and the Secretary of Energy's decision to not uphold the Federal Governments legal and constitutional responsibility to reprocess or dispose of spent nuclear fuel rods, a need for which power companies continue to be taxed, clearly is aimed at eventual closure of all U.S. nuclear power plants. This decision, along with the closure of many existing coal-fired power plants by regulatory fiat, poses a grave threat to the stability of the national electrical power grid and to the future economic health of the country and the livelihoods of its citizens.

Judicial Power: Decisions by the Supreme Court, outside the resolution of apparent conflicts within the wording and intent of the Founders, best illustrate the assumption of non-enumerated powers by Government. The Court has frequently "amended" the Constitution to insert the Federal Government into issues reserved to the people by the 9th Amendment or to the States by the 10th Amendment. Both the Legislative and Executive Branches, however, also routinely ignore constitutional limits on their powers. Cases in point are the expansion of the enumerated limits on the general welfare provision of Article I (Section 8, Clause 1), particularly with respect to property rights; over interpretation of the meaning of the "Commerce Clause" (Article I, Section 8, Clause 3); and delegation and lack of oversight of the powers to regulate use of or dispose of public lands (Article IV, Section 3, Clause 2).

Through the last two centuries, the Supreme Court has assumed far greater power than intended by the Founders. Most seriously, the Court has substituted its decisions for the constitutional amendment process provided by Article V and, in so doing, has given the Federal Government powers not enumerated in the Constitution and therefore left to the States by virtue of the 10th Amendment. The Court also has expanded legislative, executive and judicial powers beyond the obviously restrictive intent of Articles I, II and III, respectively. For example, the Court's 2007 decision to allow the Environmental Protection Agency to regulate production of a natural atmospheric gas, carbon dioxide, essential to life on Earth, clearly expanded the EPA's powers beyond the intent of Congress or what would be constitutionally permissible.

In addition, the current deliberations relative to the constitutionality of a mandate that Americans must purchase health insurance highlight how the "Commerce Clause" has been amended by Court decisions to mean far more than the narrow intended purpose "To regulate Commerce…among the several States…" Specifically related to the scientifically misguided efforts to affect climate, the legislative or regulatory mandates for Americans to use particular products, such as ethanol in gasoline or a specific type of light bulb, attempt to expand the power of the Commerce Clause in the same way as the now contested health insurance mandate.

5th Amendment: The 5th Amendment's guarantee that "No person shall…be deprived of life, liberty, of property, without due process of law…" has been violated by the many mandated or prohibited actions that unnecessarily and unscientifically regulate the otherwise free exercise of individual liberty and the use of private property. Examples abound and grow day by day: the legislated phase-out of incandescent light bulbs in favor of less desirable and dangerous fluorescent bulbs; regulated property-use restrictions based on unscientific definitions of wetlands; and regulated mileage standards that restrict access to desired personal transportation.

9th Amendment: The 9th Amendment protects the natural rights of the people that are not otherwise enumerated in the Constitution and its Amendments. These natural rights include "life, liberty, and the pursuit of happiness", as mentioned specifically in the Declaration of Independence, and other rights derived from our natural, and societal instincts as free human beings. Other natural rights include free association, education, travel, work, communication, thought, privacy, property, shelter, and defense of self and family. In addition to their basic unconstitutionality as discussed above, attempts to control the behavior of Americans in a fruitless effort to control climate change violate most of their natural rights.

Overall, pernicious and unjustified regulation restricts "liberty". Direct and indirect costs transferred to individuals by the regulation of carbon dioxide as a pollutant stand in the way of "the pursuit of happiness", in other words the exercise of economic liberty. Federal grant processes and educational publications biased in favor of research on human-caused global warming corrupt both "education" and the science necessary to support legitimate national needs. Otherwise affordable "travel" is limited by unscientific and costly requirements on vehicle fuels and performance. "Work" options are lost as

unjustified regulatory burdens force closure of power plants and agricultural and other businesses. Political browbeating of those skeptical of the human-caused global warming hypothesis clearly attempts to restrict "thought" as well as free scientific and political speech. Taxes, fees and regulatory costs in support of unproven climate science destroy "property" in the form of individual wealth. As a final example of 9th Amendment violations related to misguided climate policy, so-called green building requirements make individually owned "shelter" unaffordable for many Americans.

10th Amendment: The 10th Amendment leaves to the States, and thus to the people, those powers not enumerated as available to the Federal Government. This particularly applies to the powers of Congress addressed specifically in Article I. For example, nowhere in Article I is Congress given power to regulate climate and environment, energy, health, retirement, housing, welfare, transportation or many more of the areas in which the Federal Government has assumed authority. Regulation of any aspect of these areas, but still under the restrictions imposed by the Bill of Rights and the 14th Amendment, can come only indirectly through Section 8 Clauses related to commerce and defense and through the powers given Congress in Article IV related to guarantees made to the States and the management of United States territory.

14th Amendment: Whatever constitutional justification may support it, any legislation passed by Congress and signed into law by the President that provides federal monetary, tax credits or penalties, or mandated use subsidies for some individuals and entities and not others in a particular competitive area of commercial activity violates the 14th Amendment's guarantee of "…equal protection of the laws." Of particular note are subsidies given to energy sources that are not economically competitive with fossil fuels and nuclear power made in the name of altering trends in climate change, such as subsidies for bio-fuels, wind and solar electric power, and battery and hydrogen powered transportation. A constitutional case for such subsidies could be made from a national security perspective only if the country did not have the capacity to produce sufficient fossil fuel and nuclear energy to satisfy defense and economic requirements.

All in all, the overt and covert climate and energy initiatives of the Federal Government pose a clear and present danger to the economic future and national security of the United States. These initiatives stand in clear violation of the intent of the Founders and the constraints on the imposition of tyranny that they provided in the Constitution.

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1. **See: *America's Uncommon Sense* Essay: No. 36**, *Natural Rights and the 9th Amendment*, available to read or download from the downloads page at http://americasuncommonsense.com/blog/downloads/.

2. **See: *America's Uncommon Sense* Essay: No. 35**, *Science Policy and the Constitution*, available to read or download from the downloads page at http://americasuncommonsense.com/blog/downloads/.

3. **See: *America's Uncommon Sense* Essay: No. 44**, *Energy and the Constitution #1*, available to read or download from the downloads page at http://americasuncommonsense.com/blog/downloads/.

EPILOGUE

Policy makers at the head of government in the United States and in many States want to believe, and to have others believe, that human use of fossil fuels constitutes the primary cause of modern global warming. They pursue this quest in order to impose ever greater and clearly unconstitutional control on the economy and personal liberty in the name of a hypothetically omnipotent and infallible government. There exists no true concern about the true effects of climate change— only a poorly concealed, ideologically driven attempt to use conjured up threats of catastrophic consequences as a lever to gain more authoritarian control of society.

On the other hand, unconstitutional coercion will make matters worse for the economy while at the same time eroding essential and constitutionally protected liberty and rights. The scientific rationale behind the United Nations', the Administration's and the Congress' proposed massive intrusion into American life in the name of climate change requires more than a consensus of like-minded climate analysts and bureaucrats about carbon dioxide **[1]** before such measures are implemented. It requires recognition that climate has changed in both the recent and geological past with little or no evidence that earlier changes in atmospheric carbon dioxide concentrations caused the change.

Even given how little we actually know about global climate relative to its extraordinary natural complexity, and in particular about the bogeyman called "carbon dioxide," the President, the Environmental Protection Agency (EPA), Congress, and some ideological State governments and politically fearful corporations have chosen an extraordinarily dangerous path in attempting to stop natural change. As the most egregious example, the EPA's regulatory over-reach is forcing (1) the shutdown coal-fired power plants with no consideration of the impact of this on the stability of the national power grid; (2) a doubling of the fuel economy standard for America's automobile fleet with no realistic evaluations of the overall cost, the reduction in passenger safety, or the impact on the transportation needs of low income workers; and (3) the adoption of carbon emission controls by illegal and unconstitutional regulation in spite of Congress specifically declining to do so by law. Against its citizens' wishes, on the other hand, Australian elected officials have moved to directly tax carbon dioxide emissions and damn the economic torpedoes that will result. At least Australians have an Opposition Leader, Mr. Tony Abbot, who has stated his determination to fight the incumbent Labor government at the next election on a policy of completely repealing their carbon dioxide taxation legislation: and so much for business certainty! The contrast with our unelected career bureaucrats in the EPA, making policy up as they go along, is painful to contemplate. Maybe the Congress seated in 2013 will have the strength of character to clean up the economic mess being created by that Agency under the Obama Presidency.

The next thing we will see is the EPA moving to stop the recovery of natural gas from shale - America's near-term path to partial independence from unstable foreign energy imports. In fact, "EPA" now stands for Employment Prevention Agency more than having anything to do with environmental "protection". The Department of Energy has joined EPA in this blatant attack on energy jobs and the economy by its misguided exposure of the taxpayer to default on "green energy" loan guarantees and by refusing to live up to its obligation to at least store if not reprocess nuclear power plant waste. The latter inaction is a clear move to sound the long-term death knell of nuclear power in the United States— the one truly environmentally and economically acceptable alternative to coal for power generation. Not to be outdone, the Department of the Interior has initiated moves to further limit access to energy resources beneath public lands and the outer continental shelf.

The Founders clearly envisioned that the Federal Government would have some overarching regulatory authority, but only within the context of the constitutionally enumerated powers given to Congress in Article I, Section 8, to provide that authority. Most of the enumerated power relative to the production and use of energy derives from the Commerce Clause (Clause 3) of Section 8. That Clause was intended to regularize "commerce" between the various States, Indian Tribes, and foreign nations and nothing else. If activities in one State impinge directly on another State, such as the dumping of taconite production waste in Lake Superior or transmission of energy from point of production to point of use, then Congress can authorize Federal regulatory authority properly. Only if pollution arising in one State creates definable effects in another State, that cannot be dealt with cooperatively by the States concerned, does the Federal Government potentially have a role in the mitigation of that pollution. The attempt by federal agencies to regulate global climate, even if it were possible to do so and were authorized by Congress, clearly bears no logical relationship to the realm of commercial activities envisioned by the Founders and is unconstitutional.

The climate science establishment provides a continuous drumbeat of model-based rather than observation-based predictions in support of moving along this regulatory path of economic decline **[2]**. Activists within the science community, government bureaucracies, and socialist environmental groups actually appear to have raised their belief in human-caused climate change to the level of a cult religion, including their excommunication of anyone who challenges the scientific foundations of their beliefs **[3]**. Unlike true scientists, who welcome any opportunity to debate their beliefs with skeptics, many environmental zealots steadfastly refuse to engage those who disagree – preferring personal attacks and smears to rational discussions and facts. They also promulgate endlessly the complete untruth that no expert scientists disagree with the IPCC's alarmist views on global warming, an assertion most recently given the lie by the publication of a letter of dissent in the Wall Street Journal by 16 prominent scientists **[4]**.

Ten thousand years of natural, post-Ice Age climate variability should give pause to those who fanatically maintain that current slow global warming and carbon dioxide increases result largely from human use of fossil fuels. Public confidence in self-styled climate scientists and in scientists in general is already suffering from the exposure of

fraudulent academic and bureaucratic misbehavior aimed at overriding normal processes of skeptical scientific review and debate. Most damaging to public confidence has been the fact that supposedly "scientific" advocates of human-caused global warming used a mathematical trick to hide a real decline in global temperature prior to 2000 because it did not fit their hypothesis that human activities have caused global warming **[5]**.

In the face of diligent and realistic climate observations by others, believers in human-caused global warming and their tightly bound socialist supporters have circled the wagons. The National Academy of Sciences, ***Nature*** and ***Science*** magazines, and the mainstream climate establishment have increased the volume, but not the reasonableness, of both their denunciations of disagreeing scientists and their rationalizations for the missteps of other scientists with whom they agree **[6]**. The observational scientists want objective enquiry to take place before forcing unconstitutional legislative and regulatory decisions on an increasingly skeptical electorate– decisions that will cost both liberty and the American economy dearly.

Actual observations show that climate varies almost entirely in response to natural forces and that human burning of fossil fuels has had negligible effect over the last 100 years. Let us hope that State and national policy makers taking office in 2013 and in the future will understand the facts about natural climate change, and the lack of evidence of a significant human influence on change, before taking enormous constitutional and economic risks— and before liberty and incomes suffer further erosion.

What is the primary policy implication of the complicated natural science summarized in the Climate Science Section of ***Climate and the Constitution***? The unconstitutional regulatory responses in the name of controlling climate proposed by the Environmental Protection Agency, the Departments of Energy and Interior, some in the Congressional Leadership, the President, and many State leaders must be resisted with the certainty that strong scientific research supports the hypothesis that climate is controlled by nature, not by human use of fossil fuels. Bad science and unconstitutional usurpation of the natural rights of the people and the constitutionally reserved powers of the States did not sit well with the electorate in 2010 and also should not sit well in subsequent elections.

The President, regulators, and Congress have chosen to try to push Americans along an extraordinarily dangerous path. That path includes unconstitutional usurpation of the enumerated and natural rights of the people and the reserved powers of the States as well as economic stagnation. Current and future Congresses absolutely must get this right! The long road back to constitutional protection of the environment began with the elections of 2010 and must continue with the elections of 2012 and beyond.

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Endpiece

Apollo 17 Astronaut Harrison H. (Jack) Schmitt, a lunar explorer a very long way from home. The pose, although deliberate, was a lucky accident. Gene Cernan, seen mirrored in Jack's gold visor, held the Hasselblad camera down and at arm's length hoping that the flagpole hanging bar would point the American flag homeward bound towards the Earth. A portion of the Moon can be seen behind Jack and in his visor. This mission concluded America's first great human exploration of our nearest neighbor in space nearly 40 years ago (NASA Photo AS17-134-20384).

Back Cover (overleaf)

Apollo 17 lifting off for the Moon on December 7, 1972 at ca. 12:40 a.m. (NASA Photo)