A review of *Heaven+Earth (Global Warming; The missing Science)* by Ian Plimer

by John McDonald

Abstract

The author believes that the sun is the primary cause of global warming and that anthropogenic (human-based) behavior (including CO_2 production) plays no role. Most of the science Plimer discusses in lengthy sections of his book is informative, well-documented and not controversial. He teaches open-mindedness, the importance of uncertainty in science and honesty. When however, on numerous occasions he attempts to discredit anthropogenic global warming, the quality of his writing deteriorates. The justifications for his conclusions are based on his absolute certainty on many matters, disrespect for and misrepresentation of opposing viewpoints, selective use of only data that supports his thesis (a practice which he states is dishonest), numerous factual errors, inconsistent positions on the role of government and relentless attacks on the motives, honesty and "ignorance" of people and institutions not supportive of his point of view. These are serious weaknesses in somebody attempting to do research.

Plimer fails to alter the factual balance for or against anthropogenic climate change. Why did he do such a poor job? Perhaps the Intergovernmental Panel on Climate Change and others have made a case for such change, leaving Mr. Plimer with only his rigid ideology. and deep disrespect of opposing viewpoints. If Plimer believes what he writes, then what he believes changes as he writes. Neither the IPCC nor Plimer references any research by Plimer in climatology. Plimer may be a capable scientist in his primary field of geology, but his review of the work of others regarding anthropogenic warming suggests that he may suffer from confirmation bias[1].

Introduction

Before writing this review, my knowledge of global warming - as with most people - was obtained from television or newspaper articles. Reviewing a book dealing with a complex subject does not require that one be an expert in the area, if one is reviewing rationality and a lack of bias.

My career was in the chemical industry, designing and optimizing chemical processes. In resolving complex issues, the development of a body of work benefits from comprehensive written reports, to improve insight and consistency by the researcher and enable peer review. Like a jigsaw puzzle, the parts must be fitted together to help build and demonstrate the overall picture. One must never be absolutely certain that one knows the correct answer. Being surprised by new information and being wrong on numerous occasions is important as one attempts to rationalize the data. A series of half-truths can lead to conclusions which are superficially rational. The gap between possibility and certainty can be overlooked when ideology influences ones thinking, but the admission of uncertainty persuade others of one's integrity.

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[1] The tendency to search for, interpret and prioritize information in a way that confirms one's preconceptions. Individuals may discredit information that does not support their views. It is related to cognitive dissonance, whereby individuals may reduce inconsistency by searching for information which re-confirms their views.

Opinions on climate change differ strongly between those who believe that human-based activity (anthropogenic) has resulted in most of the global warming since the industrial revolution, and those who are skeptical of or reject such claims.

According to Beveridge[2], the human mind has a tendency to judge, from its own experience, knowledge and prejudices rather than on the evidence. Describing an article in Time magazine[3] the editor states "We are suffering from a national case of confirmation bias, the idea that we lend credence to information that confirms our opinions and ignore evidence that doesn't - even in the face of facts. Scientific studies show that voters with more information are likely to be more biased than those who know less."

In April 2014, the IPCC released it's fifth assessment review indicating that warming of the climate system is unequivocal. The atmosphere and oceans have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased. The Stern review (2006) on the economics of climate change concluded - " If we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever. If a wider range of risks and impacts is taken into account, the estimates of damage could rise to 20% of GDP or more. In contrast, the costs of action – reducing greenhouse gas emissions to avoid the worst impacts of climate change – can be limited to around 1% of global GDP each year."

Discussion

Heaven and Earth - Global Warming: the Missing Science, by Ian Plimer is a 500-page book containing 2,311 literature references. The book states that at the time of publication in 2009, Plimer was Australia's best-known geologist and Professor of Earth Sciences at the University of Melbourne. Plimer is a contrarian who believes that the sun is the primary driving force of climate change rather than green house gases such as carbon dioxide.

Most of the science Plimer discusses in lengthy sections of his book is informative, well-researched and not controversial.

I analyzed Plimer's attacks on anthropogenic warming, reading many referenced scientific papers and the IPCC reports. I hoped to find a weakness in the argument for anthropogenic global warming that could be of value to the IPCC, but found none. I did find irrational arguments regarding seven issues which I detail in my full report[4] and discuss briefly below.

a) Plimer falsely claims that CO_2 is regarded by human-induced warming advocates as the only cause of such warming (seven sources are discussed by the IPCC), states that they are conflicted

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[2] W.I.B Beveridge, The art of scientific investigation, Vintage books, New York, 1950

[3] Time, Editor's Desk, R. Stengel, on article "The Fact Wars" by M. Scherer Oct 15, 2012

[4] see my website at jmcscotty.com

by contrary data and accuses them of cognitive dissonance. His statement that the IPCC has essentially ignored the role of natural climate variability is false. The IPCC considers the sun, volcanoes, El Niño and other natural phenomenon but concludes that their role in climate change is minor, although the role of the ocean is significant. According to the IPCC, in Global Climate Models water vapor provides the largest positive radiative feedback: alone, it roughly doubles the warming from other factors such as greenhouse gas increases.

b) Plimer attempts to discredit the validity of IPCC future temperature predictions. Plimer states - "there is no relationship between the predicted future temperature and actual measured temperatures even over a short period of time-------" and concludes that therefore they are invalid. He misrepresents the IPCC which states - "models are used to make projections of possible future changes over time scales of many decades." Plimer's position is analogous to stating that a forecast for the Dow Jones Industrial Average over a period of 30 years (a basis for long-term investments) is not valid because of unpredictable short-term swings in the DJIA. The DJIA rose 26% between 1999 and 2007 and fell 23% between 2001 and 2009. From 1985 to 2004 (3 decades) it gained 1,180%. It has been rising with occasional dips since 1896. Shiller and Fama won the Nobel Prize for different accounts of asset price predictability: the former regarding its bounded long term predictability and the latter regarding its short term unpredictability. With the stock market or global warming, one cannot draw conclusions on long-term trends by carefully selecting data from a period of less than 10 years, intended to support ones ideology and preconception of the longer term trend.

Plimer states - "Global warming stopped in 1998." Based on a high temperature in 1998 (an El Niño year which brings temporary global high temperature) and a one-year dip in temperature in 2007-8 just before his book went to press, he argues that the global temperature is declining. In 2010, the dip reversed itself becoming a one year spike. In a nine-page segment Plimer two identical spikes in global temperature due to volcanic action and four positive spikes due to El Niño since 1985. Misusing such common and unpredictable anomalies in interpreting temperature trends shows ineptness. He omits data from the IPCC indicating a 90% confidence level that global temperature continues to increase in the 21st century contrary to his theory (It has however slowed according to the IPCC charts and other authors).

Plimer argues that future temperature predictions are invalid based on the aforementioned dip in 2007 when the temperature deviated for 1-2 years by 0.3^{O}C from the IPCC prediction. He ignored the IPCC error distribution (bell-shaped curve), and ignored the IPCC statement that "possible future variations in natural forcing (e.g. a large volcanic eruption) are not possible to predict and are not shown on predicted future temperature trends." Using the <u>false premise</u> that the temperature prediction was intended to be exact he claimed - "the hypothesis that human emissions of CO_2 create global warming is invalid." Further, assuming a hypothesis is incorrect solely because the future effect of a cause cannot be determined accurately or determined at all is irrational.

Plimer gives 15 additional reasons why temperature predictions by the IPCC are invalid. They include - "To try to predict the future based on just one variable (CO_2) in extraordinarily complex natural systems is folly," - "Data yet to be discovered cannot be used in a model," - "At times scientific evidence is manipulated and simplified by computer models," - "The significant

manipulation of the source data and the lack of use of many known variables create uncertain output." "It is very easy for the modeler to produce the predestined outcome before the model is run." He is unwilling to manage uncertainty, while teaching that it is important and he mistrusts others. He gives no rational reasons why research by capable and honest people cannot be done on climate prediction - as many are doing.

c) Plimer expresses contempt for the environmental movement. He states - "Environmentalism is an ascientific disconnection from the natural world arising from a modern urban lifestyle where the necessities of life come from shops. Environmental romantics have a loathing of population increase and promote pagan superstitions. Rabid environmentalism embraces fundamental Christianity - Judgement Day is at hand."

d) Plimer states- "The sun is the primary driving force of climate change rather than long-lived green house gases as indicated by the IPCC. The hypothesis that human emissions of CO_2 create global warming is invalid; there is no relationship between measured temperature and CO_2 emissions; there is no correlation between global temperature and CO_2; even in modern times there is no relationship between temperature and CO_2." These unequivocal statements are evidence of his absolute certainty that global warming in the last century is caused primarily by solar activity and not human (anthropogenic) activity such as CO_2 production. Then, Plimer contrarily states;

> "The science of any phenomenon is never settled; where there is doubt there is freedom."
> Ian Plimer

> "The claim by some scientists that the threat of human-induced global warming is 90% certain is comparable to 100% certainty professed by religious devotees that theirs is the only true faith. Human-induced global warming has developed into an urban atheistic religion to fill a spiritual vacuum in the Western world." *Ian Plimer*

Despite his numerous absolutist statements (contrary to his teaching) that CO_2 produces no global temperature increase, he contradicts himself in a single instance by stating - "Shaviv[5] and Idso's (two researchers) independent analyses suggest that a maximum of only 15-20% of the warming of the 20th century can be attributed to the rise in the air's CO_2 content. Shaviv's result validated the temperature increase ($0.1^{O}C$) from CO_2 calculated by Idso." One of Plimer's positions must be false. A proposition cannot be simultaneously asserted and denied.

e) Plimer failed, contrary to his own teaching, to manage uncertainty when he misrepresented Shaviv's estimate of the warming from CO_2 as $0.14^{O}C$ instead of the correct value of $0.14 \pm 0.36°K$, not factoring in Shaviv's huge uncertainty due to poor understanding of the indirect contribution of aerosols to cloud cover in the IPCC 2001 report. When I used data from the IPCC (2014) which includes thirteen years of additional research, Shaviv's original estimate of the anthropogenic warming is increased from 25% to 75% of the IPCC 2001 total (anthropogenic plus natural) warming. A reason for the increase was the reduced estimate of the aerosol effect

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[5] Shaviv,N.J. 2005 :On climate response to changes in the cosmic ray flux and radiative budget. Journal of Geophysical Research 110 (A8); A08105.1-A08105.15,doi:10.1029/2004JA010866

on clouds. Shaviv's professional analysis led to an updated best estimate that was within both his original range and that of the IPCC(2001). Plimer by ignoring the uncertainty locked himself into his position. Plimer separately described the work of Bryden as "sloppy" because Bryden "overlooked the first lesson in school physics - errors of measurement."

f) Plimer's analysis of the Shaviv/Ido data contains other elementary errors. First, the statement by Plimer that Idso calculated a temperature increase of 0.1^{O}C for the 20th century from CO_2 increase is unintentionally false.[6] Second, the climate sensitivity parameter λ defined as the increase in the earth global surface air temperature in degrees C for each increase in radiation forcing in Watts/m^2 is, according to Shaviv, 0.28^{O}C/W/m^2 and according to Idso 0.10 ^{O}C/W/m^2. One or both of these numbers must be wrong, because they differ by a factor of almost three.[7] A competent analysis of the literature by Plimer would have detected these issues.

g) According to Plimer, "The IPCC process is related to environmental activism, politics and opportunism. It is an ascientific political organization where environmental activists and government representatives encourage protectionism, boost trade and push their own sovereign barrow."

> *Most proponents of human-induced global warming are either ignorant of science or have too much personally invested.* *Ian Plimer*

h) To support his hypothesis that the sun is the primary driver of climate change, Plimer provided a chart by Friis-Christensen and Lassen[8] (1991) showing a positive correlation between global temperature and solar activity as measured by the solar cycle (a shorter cycle from the typical 11 years means more sunspots) for the "last 140 years." It does not include the period of 1985 to 2007, during which the CO_2 level in the atmosphere has continued to rise. Lockwood and Frohlich[9] (2007) showed that the global temperature increased during this period as the number of sunspots and hence solar activity decreased. Plimer by his own words is dishonest.

> Bias is the retention of only the data that fits the theory and is scientifically dishonest-
> - Ian Plimer quoting Charles Babbage

Plimer stated - "there is a good correlation between CO_2 and temperature from 1976 to 1998, but correlation does not mean causation." He made no such argument regarding the Friis-Christensen, E. Lassen correlation, showing inconsistency.

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[6] The statement originated from Idso (2006) where he (Idso) falsely claimed to have achieved this result in his 1998 paper. The only 0.1 in the paper refers to his estimate of the temperature sensitivity parameter of 0.1^{O}C/W/m^2 not a temperature rise.

[7] According to AR4 (Section 2.8) GCM studies have indicated that the climate sensitivity parameter was more or less constant (varying by less than 25%) between mechanisms (Ramaswamy et al., 2001; Chipperfield et al., 2003).

[8] Friis-Christensen, E. Lassen K 1991 Length of the solar cycle: an indicator of solar activity closely associated with climate. *Science*. **245**, 698–700.

[9] Lockwood M and C Frohlich ,Proc. of the Royal Society 2007, vol. 463,p 2447-2460 and 2008, vol.464, p1367.

i) The 'Hockey Stick' is a reported sudden upswing in temperature of about 0.6^{O}C in the last century. The Medieval Warming Period (MWP) a thousand years ago (also about 0.6^{O}C) demonstrates from Plimer's point of view that the current warming trend is not unique, thus reducing its significance. According to Plimer, '*the IPCC (*2001) *uncritically accepted the hockey stick and rejected without explanation the thousands of scientific studies on the Medieval Warming and the Little Ice Age. The IPCC knew that the hockey stick was invalid. In the 2001 IPCC report, Mann's "hockey stick" was used and the Medieval Warming and Little Ice Age were expunged from the record. In the next IPCC report (2007), the Medieval Warming and Little Ice Age mysteriously reappeared."*

Plimer's statement is riddled with errors and has no merit. He omitted data by Hughes and Diaz[10] reported by the IPCC in 1996 indicating that the MWP was not global but was limited to England where the data was collected by Lamb (1965). The IPCC in it's 1996 report removed the Lamb MWP graph two years before the hockey stick was invented. Plimer falsely claimed that the MWP mysteriously reappeared in 2007. It didn't.[11] Contrary to Plimer's statement, the IPCC discussed the last 1,000 years of climate in three pages including 35 literature references.

j) Despite his opposition to the ICPP partly because of government involvement, Plimer applauds a congressional investigation (some called it a witch-hunt), instigated by Smokin' Joe Barton - a Senator and global warming skeptic) into Michael Mann's Hockey Stick data. The Wegman report criticized Mann for using inappropriate statistical methods in analyzing data and not getting the correct type of peer review of his paper. Plimer and Wegman ignored views of other scientists[12] who supported Mann and duplicated his results. Plimer omitted reference to the National Research Council report several weeks earlier which stated that some statistical failings had little effect on Mann's results. Plimer misrepresented one researcher (Huybers) as being critical of Mann's work. In fact, Huybers supported Mann's work.

> Matters of Science cannot be resolved by authority -
> Scientific evidence is unrelated to politics, ideology,---Ian Plimer

Plimer engaged in personal attacks, stating - "Mann was guilty of fraud, did not check his work or knew it was wrong" and "the ICPP knew that the hockey stick was invalid," serious charges of unethical conduct. No such charges are in the ninety-page Wegman report. Plimer's analysis omits facts contrary to his position, makes unsupported accusations of improper conduct and flip-flops on the appropriate role of government.

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[10] **Hughes,** M . and H.F. Diaz, 1994: Was there a Medieval Warm Period, and if so. where and when? *Clim. Change,* **26,** 109-142.)

[11] The peak of the Lamb MWP in the year 1150 was 0.7 Deg.C. (AR1 in 1990). In the Mann Hockey Stick (AR3 2001) it was 0.2 Deg. C and in the AR4 (2007) it was 0.2 Deg.C

[12] McIntyre,S and McKitrick,R.2003; (Corrections to the Mann et al. "Proxy data base and Northern Hemisphere temperature series, 1998". *Energy and Environment* 14;751-771.

k) According to the IPCC (2007), increased acidity of the oceans in the 21st century could affect marine organisms that form their exoskeletons out of $CaCO_3$. The Royal Society[13] in 2005 stated - "It will take tens of thousands of years for ocean chemistry to return to a condition similar to pre-industrial times, because it takes that long for mixing to take place throughout the oceans." Plimer states - "Over time, basalt-seawater reactions have controlled the atmosphere and seawater chemistry. Oceans continually remove dissolved CO_2 by shell formation, limestone formation chemical reactions with rocks and sediments. The more CO_2 is dissolved the more is removed." The problem with PLimer's comments is that they ignore the time required for these processes to occur. Time-wise Plimer is thinking as a geologist. He correctly writes the chemical equations which will adjust the environment over thousands of years but fails to address the potential threat of ocean acidification from CO_2 over the next century.

j) Over the last 15 years, progress has been made in understanding the effect of the oceans on the global air surface temperature. The uptake of heat in the North Atlantic deep water results from the Meridional Overturning Circulation (also known as the Atlantic Multidecadal Oscillation-AMO) with a cycle of approximately 60 years. The underlying net anthropogenic warming rate in the industrial era is found to have been steady since 1910 at 0.07–0.08 °C/ decade, with superimposed AMO-related ups and downs that included the early 20th century warming, the cooling of the 1960s and 1970s, the accelerated warming of the 1980s and 1990s, and the recent slowing of the warming rates. The recurrent phenomenon accounts for 40% of the observed recent 50-y warming trend. Chen and Tung in August 2014 indicated - "Based on previous trends, the current cooling cycle is likely about halfway over. Rapid warming is expected to resume again in about a decade."

Plimer discusses the AMO. He does not mention the 50-80 year cyclical nature of the AMO and states "The evidence shows that the primary driver is a change in solar activity. There was warming from 1850 to1940, cooling from 1940 to 1976, warming from 1976 to 1998 and cooling since 1998. The current cooling of the North Atlantic waters may be due to a decrease in the mean annual heat from the Sun during the last 11,000 years. The multi-decadal models of the near surface show an increase in total heat from 1955 to 2003 followed by a dramatic loss of the average heat content of the upper oceans from 2003 to 2005. This should be a wake up call for computer climate models." He fails to mention several papers published before 2008 which discuss the 60-70 year periodicity of the AMO and the effect it can have on the global temperature. For example, Wu et al (2007) stated - "the rapidity of the warming in the late twentieth century was a result of concurrence of a secular (*over a period of centuries*) warming trend and the warming phase of a multidecadal (~65-year period) oscillatory variation and estimated the contribution of the former to be about 0.08°C per decade since ~1980." RA Kerr (2000) quoting Michael Mann - "It is possible the enhanced warming in the North Atlantic recently is a superposition of a natural mode plus an anthropogenic mode." Jungclaus (2005) indicated - "Mann et al. (1998) demonstrate that the Northern Hemisphere temperature time series exhibits fluctuations with periods of about 50–100 years. Similar variations can be found in the North Atlantic SST dataset produced by the Hadley Centre."

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[13] Ocean acidification due to increasing atmospheric carbon dioxide. The Royal Society June 2005

The information which Plimer failed to mention directionally explains the lack of global air temperature rise in the mid-20th century and slowing of the rise in the 21st century. Instead he used these decreased heating periods as evidence that CO_2-induced heating was false insisting that the sun is the primary driver for climate change.

Conclusions

As a result of his unscientific writing style, Plimer makes conclusions which he fails to justify and loses credibility as a scientist. He fails to alter the factual balance for or against human-based global warming. Why did Plimer do such a poor job? Perhaps the IPCC and other writers have made a reasonable case that anthropogenic warming is real, thus leaving Mr. Plimer with only his rigid ideology and disrespect for other viewpoints in trying to make his case. If Plimer believes what he writes, then what he believes changes as he writes. He may not be aware that he flagrantly breaks the rules of science he claims to support. Global warming is politicized. Ideology and confirmation bias can interfere with our ability to rationalize the facts. Plimer is rational in parts of his book unrelated to anthropogenic warming and may be a capable scientist in his primary field of geology, but irrational arguments against anthropogenic warming suggest that he may suffer from confirmation bias or even what he accuses others of - cognitive dissonance[14].

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[14] In psychology, **cognitive dissonance** is the mental stress or discomfort experienced by an individual who holds two or more contradictory beliefs, ideas, or values at the same time, or is confronted by new information that conflicts with existing beliefs, ideas, or values