Alleged plagiarism in “Reviewing the effect of CO2 and the sun on global climate” by Florides et al.

Used abbreviations:
- pg = paragraph.
- ch = chapter.
- F13 = Florides et al. (2013), the paper under plagiarism analysis.
- F10 = Florides et al. 2010 book chapter
- IPCC AR4 = Solomon *et al.* (2007)

Analysis is presented in three columns, of which left-most column is F13 content, middle column is F10 content, and right-most column is content from other references.

Analysis proceeds paragraph-by-paragraph, and individual paragraphs have in many cases been divided to different parts and aligned horizontally with the contents of different references in order to make cross-comparison of the contents easier.

We have used following color coding for copied texts:

Blue Text has been copied word-for-word, and in order.

Green Text has been copied word-for-word, but in rearranged order.

Yellow Trivial changes within copied texts. These are doable by copy editor. These kinds of changes are sometimes done by plagiarists to lessen mechanical detection. However, these changes also show that the copied text in question is not just an innocent copy, where someone intended to add quotes and forgot.

In some places the contents have been copied from F10, but F10 have copied (at least parts of) the text from some other reference. In those cases color coding in F13 and F10 columns reflect the content similarity between F13 and F10, and the color coding in the rightmost column reflects the similarity of contents between F10 and the other reference.

Some of the highlighted passages contain only minor copying of contents, but for the sake of completeness we have highlighted those parts as well.

It should be noted that giving a reference nearby, and then copy-paste-editing of the text with no quotes is still plagiarism.

There is also July 2013 (Florides et al. 2013b) conference paper that seems to be very similar to F13.

We did not find obvious plagiarism from these F13 paragraphs:

- Introduction, paragraphs 1, 2, and 4.
- Chapter 2.1, paragraphs 6 and 8.

F13	F10	Other antecedents
The plagiarism analysis **F13, ch 1, pg 3:** There are though other factors – besides the greenhouse gases – that affect the global temperature, like changes in solar activity, cloud cover, ocean circulation and so forth.	**F10 p. 1:** There are though other factors – besides the greenhouse gases – that affect the global temperature, like changes in solar activity, cloud cover, ocean circulation and others.	

F13	F10	Other antecedents
F13, ch 1, pg 5:	**F10 p. 25:**	**NASA Sun Worldbook**
The sun emits electromagnetic radiation in various forms like infrared radiation (that we feel as heat), visible light, ultraviolet rays, microwaves, X-rays, gamma rays and so forth.	The Sun emits electromagnetic radiation in the form of visible light, infrared radiation that we feel as heat, ultraviolet rays, microwaves, X-rays, gamma rays and so forth. This radiation …	
All forms of electromagnetic radiation travel through space at the speed of light.	All forms of electromagnetic radiation travel through space at the speed of light (299792 km×s–1).	All forms of electromagnetic radiation travel through space at the same speed, commonly known as the speed of light: 186,282 miles (299,792 kilometers) per second. At this rate, a photon emitted by the sun takes only about 8 minutes to reach Earth.
At this rate, a photon emitted by the sun takes 8 min to reach the earth, which is	At this rate, a photon emitted by the sun takes 8 minutes to reach the Earth that travels around the sun	
at an average distance of about 149,600,000 km The amount of electromagnetic radiation from the sun that reaches the top of the earth's atmosphere, known as the solar constant, is about 1365Wm–2.	at an average distance of about 149600000 km. The amount of electromagnetic radiation from the sun that reaches the top of the Earth's atmosphere is known as the solar constant. This amount is about 1370 W×m–2. Of this energy only about 40% reaches the Earth's surface.	The amount of electromagnetic radiation from the sun that reaches the top of Earth's atmosphere is known as the solar constant. This amount is about 1,370 watts per square meter. But only about 40 percent of the energy in this radiation reaches Earth's surface.
The atmosphere blocks some of the visible and infrared radiation, almost all the ultraviolet rays, and all the X-rays and gamma rays.	The atmosphere blocks some of the visible and infrared radiation, almost all the ultraviolet rays, and all the X-rays and gamma rays. Nearly all the radio energy reaches the Earth's surface.	The atmosphere blocks some of the visible and infrared radiation, almost all the ultraviolet rays, and all the X rays and gamma rays. But nearly all the radio energy reaches Earth's surface.
The sun also emits particle radiation, consisting mostly of protons and electrons comprising the solar wind.	The Sun also emits particle radiation, consisting mostly of protons and electrons comprising the solar wind.	

F13	F10	Other antecedents
F13, ch 1, pg 6: Also in [6] some of the evidence for a solar influence on the lower atmosphere is reviewed and some of the mechanisms whereby the sun may produce more significant impacts than might be expected by the mere consideration of variations in solar irradiance are discussed.		**Haigh (2007):** This article reviews some of the evidence for a solar influence on the lower atmosphere and discusses some of the mechanisms whereby the Sun may produce more significant impacts than might be surmised from a consideration only of variations in total solar irradiance.

F13 | F10 | Other antecedents

F13, ch 2.1, pg 1:

The sun powers the climate of the earth, radiating energy at very short wavelengths [7]. Roughly one-third of the solar energy that reaches the top of the earth's atmosphere is reflected directly back to space. The remaining two-thirds are absorbed by the surface and, to a lesser extent, by the atmosphere. The earth balances the absorbed incoming energy, by radiating

on average

the same amount of energy back to space

at much longer wavelengths primarily in the infrared part of the spectrum.

Much of this emitted thermal radiation

is absorbed by the

atmosphere and clouds, and is reradiated back to earth warming the surface of the planet and causing the so called "greenhouse effect." Without this natural greenhouse effect life, as we know it, would not be possible because the average temperature at the earth's surface would be below the freezing point of water.

F10 p. 7:

According to IPCC (2007b, p. 144)

the Sun powers the climate of the Earth, radiating energy at very short wavelengths. Roughly one-third of the solar energy that reaches the top of Earth's atmosphere is reflected directly back to space. The remaining two-thirds are absorbed by the surface and, to a lesser extent, by the atmosphere. The Earth balances the absorbed incoming energy, by radiating

on average

the same amount of energy back to space

at much longer wavelengths primarily in the infrared part of the spectrum.

Much of this emitted thermal radiation

is absorbed by the

atmosphere and clouds, and is reradiated back to Earth warming the surface of the planet. This is what is called the greenhouse effect. The natural greenhouse effect makes life as we know it possible because without it

the average temperature at the Earth's surface would be below the freezing point of water.

IPCC AR4, FAQ 1.3:

The Sun powers Earth's climate, radiating energy at very short wavelengths, … Roughly one-third of the solar energy that reaches the top of Earth's atmosphere is reflected directly back to space. The remaining two-thirds is absorbed by the surface and, to a lesser extent, by the atmosphere. To balance the absorbed incoming energy, the Earth must,

on average, radiate

the same amount of energy back to space. Because the Earth is much colder than the Sun, it radiates

at much longer wavelengths, primarily in the infrared part of the spectrum (see Figure 1). Much of this thermal radiation emitted by the land and ocean

is absorbed by the atmosphere, including clouds, and reradiated back to Earth. This is called the greenhouse effect. The…

Without the natural greenhouse effect,

the average temperature at Earth's surface would be below the freezing point of water. Thus, Earth's natural greenhouse effect makes life as we know it possible However, human activities, primarily the burning of fossil …

F13

F10

Other antecedents

F13, 2.1, pg 2:

However, as it is by and large accepted, most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations. (see, for example, [4]). It is argued that it is likely that there has been significant anthropogenic warming over the past 50 years averaged over each continent (except Antarctica).

Atmospheric concentrations of CO_2 (379ppm) and CH_4 (1774ppb) in 2005 exceed by far the natural range over the last 650,000 years. Global increases in CO_2 concentrations are mainly due to fossil fuel use and land-use change that provides another significant but smaller contribution. It is very likely that the observed increase in CH_4 concentration is predominantly due to agriculture and fossil fuel use. However the CH_4 growth rates have declined since the early 1990s.

IPCC AR4, ch. 2.4:

Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations.[8]

...

It is likely that there has been significant anthropogenic warming over the past 50 years averaged over each continent (except Antarctica) (Figure 2.5). {WGI 3.2, 9.4, SPM}

IPCC AR4, ch. 2.2:

The atmospheric concentrations of CO_2 and CH_4 in 2005 exceed by far the natural range over the last 650,000 years. Global increases in CO_2 concentrations are due primarily to fossil fuel use, with land-use change providing another significant but smaller contribution. It is very likely that the observed increase in CH_4 concentration is predominantly due to agriculture and fossil fuel use. Growth rates have declined since the early 1990s, consistent with total emissions (sum of anthropogenic and natural sources) being nearly constant during this period. {WGI 2.3, 7.4, SPM}

F13	F10	Other antecedents
F13, 2.1, pg 2 (continued): CO_2 is the most important anthropogenic GHG. Its annual emissions grew by about 80% between 1970 and 2004.		**IPCC AR4, ch. 2.1:** Carbon dioxide (CO_2) is the most important anthropogenic GHG. Its annual emissions have grown between 1970 and 2004 by about 80% from 21 to 38 gigatonnes (Gt), and represented 77% of total anthropogenic GHG emissions in 2004 (Figure 2.1).

F13	F10	Other antecedents
F13, 2.1, pg 3: Water vapor is the most important gaseous source of infrared opacity in the atmosphere, accounting for about 60% of the natural greenhouse effect for clear skies [8] with CO_2 being the second-most important one.	**F10, p. 7:** The greenhouse effect comes from molecules that are complex and much less common, with water vapor being the most important greenhouse gas (GHG), and carbon dioxide (CO_2) being the second-most important one. …	**IPCC AR4, ch 3.4.2:** Water vapour is also the most important gaseous source of infrared opacity in the atmosphere, accounting for about 60% of the natural greenhouse effect for clear skies (Kiehl and Trenberth, 1997), and provides the largest positive feedback in model projections of climate change (Held and Soden, 2000). **IPCC AR4, FAQ 1.3:** Adding more of a greenhouse gas, such as CO_2, to the atmosphere intensifies the greenhouse effect, thus warming Earth's climate.
The amount of warming depends not only on the added amount of GHG, especially CO_2, but also on the various feedback mechanisms. This happens because, as the atmosphere warms up due to rising levels of GHG, its concentration of water vapor increases, further intensifying the greenhouse effect. This in turn causes more warming, which consequently causes an additional increase in water vapor in a self-reinforcing cycle. This water vapor feedback may be strong enough to approximately double the increase of the greenhouse effect due to the added CO_2 alone.	The amount of warming depends on various feedback mechanisms. For example, as the atmosphere warms up due to rising levels of greenhouse gases, its concentration of water vapor increases, further intensifying the greenhouse effect. This in turn causes more warming, which causes an additional increase in water vapour in a self-reinforcing cycle. This water vapor feedback may be strong enough to approximately double the increase of the greenhouse effect due to the added CO_2 alone.	The amount of warming depends on various feedback mechanisms. For example, as the atmosphere warms due to rising levels of greenhouse gases, its concentration of water vapour increases, further intensifying the greenhouse effect. This in turn causes more warming, which causes an additional increase in water vapour, in a self-reinforcing cycle. This water vapour feedback may be strong enough to approximately double the increase in the greenhouse effect due to the added CO_2 alone.

F13	F10	Other antecedents
F13, 2.1, pg 4:	**F10, p. 7:**	**IPCC AR4, ch 1.3.3:**
IPCC reports that climate has changed in some defined statistical sense and assumes that the reason for that is anthropogenic forcing. As it states, traditional approaches with controlled experimentation with the earth's climate system is not possible. Therefore, in order to establish the most likely causes for the detected change with some defined level of confidence, computer model simulations are used.	IPCC (2007b, p. 121) reports that climate has changed in some defined statistical sense and assumes that the reason for that is anthropogenic forcing. As it states, traditional approaches with controlled experimentation with the Earth's climate system is not possible. Therefore, in order to establish the most likely causes for the detected change with some defined level of confidence, IPCC uses computer model simulations that demonstrate that the detected change is not consistent with alternative physically plausible explanations of recent climate change that exclude important anthropogenic forcing.	Detection of climate change is the process of demonstrating that climate has changed in some defined statistical sense, without providing a reason for that change. Attribution of causes of climate change is the process of establishing the most likely causes for the detected change with some defined level of confidence. Using traditional approaches, unequivocal attribution would require controlled experimentation with our climate system. However, with no spare Earth with which to experiment, attribution of anthropogenic climate change must be pursued by: (a) detecting that the climate has changed (as defined above); (b) demonstrating that the detected change is consistent with computer model simulations of the climate change 'signal' that is calculated to occur in response to anthropogenic forcing; and (c) demonstrating that the detected change is not consistent with alternative, physically plausible explanations of recent climate change that exclude important anthropogenic forcings.
The results of the computer simulations show that anthropogenic CO2 emissions to the atmosphere are the main reason for the observed warming and that doubling the amount of CO2 in the atmosphere will increase the temperature by about 1.5–4.5 °C [9]. A similar result is mentioned in [10], where the equilibrium global mean warming for a doubling of atmospheric CO2 is likely to lie in the range of 2–4.5 °C, with a most likely value of about 3 °C (see Fig. 2).	The results of the computer simulations are that anthropogenic CO2 emissions to the atmosphere are the main reason for the observed warming and that doubling the amount of CO2 in the atmosphere will increase the temperature by about 1.5°C to 4.5°C. A similar result is mentioned in IPCC (2007c, p. 749), where the equilibrium global mean warming for a doubling of atmospheric CO2, is likely to lie in the range 2°C to 4.5°C, with a most likely value of about 3°C.	

F13	F10	Other antecedents

F13, 2.1, pg 5:

Additionally, according to [12] during the past 50 years, the sum of solar and volcanic forcing would likely have produced cooling, not warming, and hence the observed patterns of warming and their changes are simulated only by models that include anthropogenic forcing and not external forcing.

Therefore it is further concluded that, with very high confidence, the global temperature increase is due to the net effect of human activities since 1750.

IPCC AR4, SPM 2:

During the past 50 years, the sum of solar and volcanic forcings would likely have produced cooling. Observed patterns of warming and their changes are simulated only by models that include anthropogenic forcings. Difficulties remain in simulating and attributing observed temperature changes at smaller than continental scales. {2.4}

…

There is very high confidence that

the net effect of human activities since 1750 has been one of warming.[6] {2.2}

F13	F10	Other antecedents
F13, 2.1, pg 7: Sorokhtin and collaborators [14] stress that a sound theory, using laws of Physics, for the greenhouse effect was lacking and all predictions were based on intuitive models using numerous poorly defined parameters. Their examination showed that at least 30 such parameters were contained in the models.	**F10 p. 21:** As stressed by Sorokhtin et al. (2007), until recently a sound theory, using laws of Physics, for the greenhouse effect was lacking and all predictions were based on intuitive models using numerous poorly defined parameters. Their examination showed that at least 30 such parameters were contained in the models making the numerical solution of the problem incorrect.	

F13

F10

Other antecedents

F13, 2.2, pg 1:

Studying past records is an undeniable tool to test the assumption that CO2 is the main driving factor for the earth climate. The first time period under consideration refers to the last millennium. As Veizer [16] mentions, Greenland is a representative case for the climate record of the northern hemisphere. The calculations based on oxygen isotope values in ice layers suggest that the temperatures in the 11th century were similar to those of today (Fig. 5). This warm interval was followed by a temperature decline until the 14th century, then by generally cold temperatures that lasted until the 19th century, and finally by a warming in the 20th century.

[16] Veizer (2005):

Let us now look at the record of the last millennium (Fig. 1), starting with Greenland, the climate record of the northern hemisphere.

The calculations based on oxygen isotope values in ice layers suggest that the temperatures in the 11th century were similar to those of today (Fig. 12). This warm interval was followed by a temperature decline until the 14th century, then by generally cold temperatures that lasted until the 19th century, and finally by a warming in the 20th century. The "Medieval Climatic Optimum" (MCO) and the "Little Ice Age" (LIA), were both global phenomena (Soon and Baliunas, 2003; McIntire and McKitrick, 2003), and not, as previously claimed (Mann et al., 1999), restricted solely to Greenland or to the North Atlantic.

F13

F10

Other antecedents

F13, 2.2, pg 1 (continued):

Note that the coeval “ice bubble CO2” pattern in Greenland and Antarctic ice caps was essentially flat (IPCC-[17]), despite these large climatic oscillations. CO2 begins to rise only at the termination of the “Little Ice Age”, toward the end of the 19th century.

F13, 2.2, pg 2:

Examining the palaeoclimate one can compare the temperature data and the CO2 variation during greater time spans in order to obtain a deeper insight on how the CO2-concentration change affects the temperature.

F10, p. 10:

Let us now compare the temperature data and the CO2 variation during greater time spans in order to obtain a deeper insight on how the CO2-concentration change affects the temperature.

[16] Veizer (2005) (cont):

Note that the coeval "ice bubble CO2" pattern in Greenland and Antarctic ice caps was essentially flat (IPCC, 2001), despite these large climatic oscillations. CO2 begins to rise only at the termination of the "Little Ice Age", toward the end of the 19th century. In direct contrast to CO2, 14C and 10 Be correlate convincingly with the climate record (Fig. 13), again arguing for celestial phenomena as the primary climate driver.

F13	F10	Other antecedents
F13, 2.2, pg 3: In Fig. 6 the temperature difference in Antarctica (as measured in ice cores by Jouzel et al. [36] is compared to various CO2 concentrations: Petit et al. [20] for the past 420,000 years from the Vostok ice cores and Monnin et al. [21] for the High resolution records of atmospheric CO2 concentration during the Holocene as obtained from the Dome Concordia and Dronning Maud Land ice cores. It is clear (see circled points) that the temperature increase by natural causes precedes the CO2-concentration increase.	**F10 p. 10:** In Fig. 11 the temperature difference in Antarctica (as measured in ice cores by Jouzel et al., 2007) is compared to various CO2 concentrations: Petit et al. (1999) for the past 420000 years from the Vostok ice cores, Monnin et al. (2004) for the High resolution records of atmospheric CO2 concentration during the Holocene as obtained from the Dome Concordia and Dronning Maud Land ice cores, and others. It is clear (see circled points) that the temperature increase by natural causes precedes the CO2-concentration increase.	**Monnin *et al.* (2004) abstract:** High resolution records of atmospheric CO2 concentration during the Holocene are obtained from the Dome Concordia and Dronning Maud Land (Antarctica) ice cores. [Notice especially how F10 and F13 have left the capital letter in the word "High", which might indicate that they have copy-pasted the text directly.]

F13	F10	Other antecedents
F13, 2.2, pg 4: On a greater time scale, stomata in leaves of fossil plants can be used as biological sensors of past levels of atmospheric CO_2. Stomata are the pores on the epidermis of leaves that control gas exchange, including uptake of the CO_2 used in photosynthesis. It has been observed that an inverse relationship exists between the number of stomata on the leaves of woody plants and ambient concentrations of CO_2. Retallack [22] has created and validated a record of CO_2 extending back to 300 million years ago. Kurschner [23] presented a comparison of this record to the relative trends in temperature as inferred from the oxygen isotope record of marine fossils [19]		**Kürschner (2001) pg 247-248:** On page 287 of this issue 4 Retallack describes how he has taken a different approach to the problem, using the stomata in leaves of fossil plants as biological sensors of past levels of atmospheric CO_2. Stomata are the pores on the epidermis of leaves that open and close to control gas exchange, including uptake of the CO_2 used in photosynthesis. Retallack' s approach is based on the inverse relationship, first noted by Woodward, between the number of stomata on the leaves of woody plants and ambient concentrations of CO_2. He has created a new record of CO_2 concentration through time by gathering data from the leaves of living Ginkgo trees and from the fossil leaves of four groups of Ginkgo relatives (Fig. 1). The record is extraordinarily long, extending back to 300 million years ago. Relative trends in temperature are inferred from the oxygen-isotope record of marine fossils.

F13	F10	Other antecedents
F13, 2.2, pg 5: Next by checking how CO2-concentration has fluctuated over a larger time scale, throughout the Phanerozoic eon, one can definitely draw further conclusions about the former's correlation with the temperature. Palaeo-climatologists calculated palaeolevels of atmospheric CO2 using the GEOCARB III model [24]. GEOCARB III models the carbon cycle on long time-scales (million years resolution) considering a variety of factors that are thought to affect the CO2 levels. The results are in general agreement with independent values calculated from the abundance of terrigenous sediments expressed as a mean value in 10 million year time-steps [25]. As shown in Fig. 8A, CO2 levels were very high, about 20–26 times higher than at present, during the early Palaeozoic—about 550 Ma. Then a large drop occurred during the Devonian (417–354 Ma) and Carboniferous (354–290 Ma), followed by a considerable increase during the early Mesozoic (248–170 Ma). Finally, a gradual decrease occurred during the late Mesozoic (170–65 Ma) and the Cainozoic (65 Ma to present).	**F10 pp. 10-11:** Let us finally check how CO2-concentration has fluctuated throughout the Earth's history and draw conclusions about its correlation with the temperature over the geologic aeons. Palaeo-climatologists calculated palaeolevels of atmospheric CO2 using the GEOCARB III model (Berner & Kothavala, 2001).GEOCARB III models the carbon cycle on long timescales (million years resolution) considering a variety of factors that are thought to affect the CO2 levels. The results are in general agreement with independent values calculated from the abundance of terrigenous sediments expressed as a mean value in 10 million year timesteps (Royer, 2004). As shown in Fig. 13A, CO2 levels were very high, about 20-26 times higher than at present, during the early Palaeozoic – about 550 million years ago (Ma). Then a large drop occurred during the Devonian (417–354 Ma) and Carboniferous (354–290 Ma), followed by a considerable increase during the early Mesozoic (248–170 Ma). Finally, a gradual decrease occurred during the late Mesozoic (170–65 Ma) and the Cainozoic (65 Ma to present).	**Berner & Kothavala (2001):** This includes: (1) new GCM (general circulation model) results for the dependence of global mean surface temperature and runoff on CO2, for both glaciated and non-glaciated periods, coupled with new results for the temperature response to changes in solar radiation; (2) demonstration that values for the weathering-uplift factor fR(t) based on Sr isotopes as was done in GEOCARB II are in general agreement with independent values calculated from the abundance of terrigenous sediments as a measure of global physical erosion rate over Phanerozoic time;

F13	F10	Other antecedents
F13, 2.2, pg 5 (continued): Also the blue line presents temperature deviations relative to today, adjusted accordingly for pH effects [25]. Fig. 8B presents the intervals of glacial (dark color) and cool climates (light blue). As it is observed from 530 to 480 Ma the CO_2-concentration dropped, followed by a temperature decline between 520 and 450 Ma. Then the temperature increased first from 450 to about 380 Ma, followed by a decline in the CO_2-concentration at first and then an increase. From 380 to about 300 Ma both of them decline. This is also followed by a temperature increase followed by the increase of CO_2-concentration.	**F10 pp. 11-12:** In Fig. 13B, C and D the range of global temperature through the last 500 million years is reconstructed. Figure 13B presents the intervals of glacial (dark color) and cool climates (dashed lines). Figure 13C shows the estimated temperatures, drawn to time-scale, from mapped data that can determine the past climate of the Earth (Scotese, 2008). These data include the distribution of ancient coals, desert deposits, tropical soils, salt deposits, glacial material, as well as the distribution of plants and animals that are sensitive to climate, such as alligators, palm trees and mangrove swamps. Figure 13D presents the temperature deviations relative to today from δ18O records (solid line) and the temperature deviations corrected for pH (dashed line). As indicated in Figure 13B, one of the highest levels of CO_2-concentration (about 16 times higher than at present) occurred during a major ice-age about 450 Ma, indicating that it is not the CO_2-concentration in the atmosphere that drives the temperature.	
The logical conclusion drawn from Fig. 8B is that the Earth's temperature fluctuates continuously and CO_2 is not proven to be a major driving factor.	The logical conclusion drawn from Fig. 13 is that the temperature of the Earth fluctuates continuously and the CO_2-concentration is not a driving factor.	

F13	F10	Other antecedents
F13, 2.2, pg 6: At this point a natural question to ask is about the physical relation between the CO2 levels and temperature. It is well known that CO2 dissolves in seawater. When the Earth's temperature decreases the CO2-concentration in the atmosphere decreases too because the solubility of CO2 in the seawater increases. This physical phenomenon is very well-established as shown in Fig. 9. For example if seawater of salinity 35 is cooled from 20 1C to 10 1C it will absorb about 35.7% more CO2 (aq). The solubility coefficient is the concentration of the dissolved gas (CO2 (aq)), in moles per litre of seawater of a salinity of 35 (Weiss, 1974 in [27]).		**[27] Skelton (2003):** The solubility coefficient is the concentration of the dissolved gas (CO2(aq)), in moles per litre of seawater of given salinity, when at equilibrium with the pure gas at a pressure of 1 atmosphere.

F13 | F10 | Other antecedents

F13, ch 2.3:

Archibald [28] presents an interesting comparison of estimates of the effect that CO2 would have if its concentration in the atmosphere doubles to 600 ppmv, and

concludes that the models of the IPCC apply an enormous amount of compounding water vapor feedback and, at their worst, the IPCC models take 1K of heating and turn it into 6.4K (see Fig. 10)

Idso derived an estimate of climate sensitivity from nature observations.

Kininmonth estimates a 0.6K and this is based on water vapor amplification but also includes the strong damping effect of surface evaporation.

Lindzen's estimation is based on water vapor and negative cloud feedback. Spencer examined the data from the Aqua satellite and performed simple model analysis. Finally, the Stefan–Boltzmann figure of 1K is based on the Stefan–Boltzmann equation without the application of feedbacks and as Archibald comments everybody agrees with this figure when no feedbacks are involved.

F10, p. 18:

In addition Archibald (2008), presents an interesting comparison of estimates of the effect that CO2 would have if its concentration in the atmosphere doubled from its pre-industrial level, and he concludes that the models of the IPCC apply an enormous amount of compounding water vapor feedback and, at their worst, the IPCC models take 1 K of heating and turn it into 6.4 K (see Fig. 20).

For Fig. 20 Archibald explains that:

a. The Stefan-Boltzmann figure of 1 K is based on the Stefan-Boltzmann equation without the application of feedbacks and as he comments everybody agrees with this figure when no feedbacks are involved.

b. Kininmonth estimates a 0.6 K and this is based on water vapor amplification but also includes the strong damping effect of surface evaporation.

c. Lindzen's estimation is based on water vapor and negative cloud feedback.

d. Idso derived an estimate of climate sensitivity from nature observations and Spencer used data from the Aqua satellite for his estimates and proved that these are very close to what happens in Nature.

Archibald (2008) p. 43:

The Stefan Boltzmann figure of one degree centigrade is based on the Stefan-Boltzmann equation without the application of feedbacks. Everybody agrees that this is what would happen if there were no feedbacks involved.

Bill Kininmonth is a former head of Australia's National Climate Centre. His estimate of the forcing is 0.6C and this is based on water vapour amplification but also includes the strong damping effect of surface evaporation. Richard Lindzen is America's most eminent climate scientist. His estimate of the forcing is based on water vapour and negative cloud feedback. Roy Spencer's work on data from the Aqua satellite has now proven that these estimates are very close to what happens in Nature.

The models the IPCC rely upon take the one degree of heating from the Stefan-Boltzmann equation and apply an enormous amount of compounding water vapour feedback. At their worst, the IPCC models take one degree of heating and turn it into 6.4 degrees.

F13

F13, ch 2.4:

Physical observations and measured data are of paramount importance in estimating the global warming produced by the rising levels of greenhouse gases.

Idso [29] presented a comparison for the CO2 greenhouse effect on Mars, Earth and Venus by plotting the CO2 warming vs. the CO2 atmospheric partial pressure on a log-log scale (see Fig. 11). He concludes that considering the consistency of all empirical data, atmospheric CO2 fluctuations influence surface air temperature largely, independently of atmospheric moisture conditions, because water vapor quantities are practically non-existent on Mars, “medium” on Earth and large on Venus (in an absolute sense).

Hence, the long-espoused claim of a many-fold amplification of direct CO2 effects by a positive water vapor feedback mechanism would appear to be rebuffed by the analysis

F10

F10 p. 17:

Idso (1988), presented a comparison for the CO2 greenhouse effect on Mars, Earth and Venus by plotting the CO2 warming and the CO2 atmospheric partial pressure on a log-log scale (Fig. 18). He concludes that considering the consistency of all empirical data, atmospheric CO2 fluctuations influence surface air temperature largely, independently of atmospheric moisture conditions, because water vapor is practically non-existent on Mars, is intermediate on Earth and large on Venus (in an absolute sense).

Hence, the long-espoused claim of a many-fold amplification of direct CO2 effects by a positive water vapor feedback mechanism would appear to be rebuffed by the analysis

Other antecedents

Idso (1988):

Consider, finally, the consistency of all of the preceding empirical data. Since water vapor is practically non-existent on Mars, intermediate on Earth, and large on Venus (in an absolute sense) – varying in much the same way that cloud amounts vary among the three planets – yet, as near-perfect results are obtained in all situations investigated here in terms of their accurate portrayal by the one simple relationship of Fig. 1, it follows that atmospheric CO2 fluctuations influence surface air temperature largely independently of atmospheric moisture conditions

Hence, the long-espoused claim of a many-fold amplification of direct CO2 effects by a positive water vapor feedback mechanism would appear to be rebuffed by this analysis.

F13

F10

Other antecedents

F13, 2.4 (continued):

As a result, Idso's final conclusion is that the

scientific consensus on the strength of the CO2 greenhouse effect, as expressed in past reports of the U.S. National Research Council, is likely to be in error by nearly a full order of magnitude. Based on the comparative planetary climatology relationship of Fig. 11, a 300–600 ppmv doubling of earth's atmospheric CO2 concentration should only warm the planet by about 0.4K.

F10 p. 17:

As a result, the final conclusion is that the

scientific consensus on the strength of the CO2 greenhouse effect, as expressed in past reports of the U.S. National Research Council, is likely to be in error by nearly a full order of magnitude. Based on the comparative planetary climatology relationship of Fig. 18, a 300–600 ppmv doubling of Earth's atmospheric CO2 concentration should only warm the planet by about 0.4 K.

Idso (1988):

As a result, the final conclusion of immediate concern is almost inescapable: the current scientific consensus on the strength of the CO2 greenhouse effect, as expressed in past reports of the U.S. National Research Council, is likely to be in error by nearly a full order of magnitude. Based on the comparative planetary climatology relationship of Fig. 1, a 300-600 ppm doubling of Earth's atmospheric CO2 concentration should only warm the planet by about 0.4°C.

F13

F13, 2.5, pg 1:
On earth we know of only one type of life form that is based on the molecule of carbon. Carbon forms normal chemical bonds with other elements but also forms special type of molecules the so-called organic molecules on which all life is based on. In the human body carbon is the second most abundant element by mass (about 18.5%) after oxygen. So is human life in real danger if atmospheric CO2 continues to increase the way it already increased during the 20th century? And then, what is the upper limit of CO2 concentration for absolute danger? In an indoor air test we can find CO2 levels as high as 600ppm, which is typical of indoor air and is considered an acceptable and safe level. Note that a 100% CO2 concentration in the atmosphere corresponds to 1,000,000 ppm, and hence 1% concentration corresponds to 10,000 ppm of CO2. At 10,000 ppm concentration of CO2 and under continuous exposure at that level, such as in an auditorium filled with people and poor fresh air ventilation, some individuals are likely to feel drowsy.
Toxic levels of CO2 are reached at levels above 5% [30]. So, it must be clear that at present and near future levels CO2 does not seem to pose direct danger to human life.

F10

Other antecedents

Wikipedia: Carbon:

It is present in all known life forms, and in the human body carbon is the second most abundant element by mass (about 18.5%) after oxygen.

InspectAPedia: Toxicity of Carbon Dioxide
In an indoor air test (in our laboratory) the detector found that the CO2 level was about 600ppm which is typical of indoor air and is considered an acceptable and safe level.
…
•1,000,000 ppm of a gas = 100 % concentration of the gas, and 10,000 ppm of a gas in air = a 1% concentration.
•At 1% concentration of carbon dioxide CO2 (10,000 parts per million or ppm) and under continuous exposure at that level, such as in an auditorium filled with occupants and poor fresh air ventilation, some occupants are likely to feel drowsy.
…
•Toxic levels of carbon dioxide: at levels above 5%, concentration CO2 is directly toxic.

F13	F10	Other antecedents
F13, 2.5, pg 2: But what about CO_2's usefulness in life? The IPCC [31] mentions that increased CO_2 concentrations can fertilize plants by stimulating photosynthesis, which (as various models suggest) has contributed to increased vegetation cover and leaf area over the 20th century. Increases in the Normalized Difference Vegetation Index (a remote sensing product indicative of leaf area, biomass and potential photosynthesis) have been observed, although other causes, besides the increased CO_2, including climate change itself are also likely to have contributed. Increased vegetative cover and leaf area would decrease surface albedo, which would act to oppose the increase in albedo due to deforestation. The RF due to this process has not been evaluated and there is a very low scientific understanding of these effects.		**IPCC AR4, WG1, 2.5.8:** Increased CO_2 concentrations can also 'fertilize' plants by stimulating photosynthesis, which models suggest has contributed to increased vegetation cover and leaf area over the 20th century (Cramer et al., 2001). Increases in the Normalized Difference Vegetation Index, a remote sensing product indicative of leaf area, biomass and potential photosynthesis, have been observed (Zhou et al., 2001), although other causes including climate change itself are also likely to have contributed. Increased vegetation cover and leaf area would decrease surface albedo, which would act to oppose the increase in albedo due to deforestation. The RF due to this process has not been evaluated and there is a very low scientific understanding of these effects.

F13	F10	Other antecedents
F13, 2.5, pg 3: The full extent of the beneficial effect that CO_2 has on plant life can be found in a website maintained by CO_2 Science [32], where an expanding archive of the results of peer-reviewed scientific studies that report the growth responses of plants to atmospheric CO_2 enrichment can be found. Results from thousands of scientific articles are tabulated according to two types of growth response: dry weight and photosynthesis. Table 1 indicates the mean percentage increase in yield for some important species, for a 300 ppm increase in atmospheric CO_2 concentration.		**CO_2 Science, Plant Growth Database:** In this section of our web site we maintain an ever-expanding archive of the results of peer-reviewed scientific studies that report the growth responses of plants to atmospheric CO_2 enrichment. Results are tabulated according to two types of growth response (Dry Weight and Photosynthesis). To begin, click on the response you are interested in below.

F13 | F10 | Other antecedents

F13, 2.5, pg 4:

Moreover, in [33] 55 ways are outlined in which the modern rise in atmospheric CO2 is benefiting the earth's biosphere, as reported in the peer-reviewed scientific literature. The general conclusion is that

rising atmospheric CO2 concentrations lead to more numerous and more robust plants, which yearly remove ever-greater quantities of CO2-derived carbon from the atmosphere, storing it initially in their own tissues, eventually in the soil, and ultimately in the depths of the sea.

[33] Idso & Idso, The many benefits of atmospheric CO2 Enrichment:

The Many Benefits of Atmospheric CO2 Enrichment – A new book written by Drs. C. D. and S. B. Idso and produced by the Science and Public Policy Institute (Vales Lakes Publishing, LLC, Pueblo West, Colorado, USA) – attempts to rectify this imbalance by outlining 55 ways in which the modern rise in atmospheric CO2 is benefiting earth's biosphere, as reported in the peer-reviewed scientific literature. And like love, carbon dioxide's many splendors are seemingly endless. Order your copy now, and enjoy this guide to the wonderful CO2-enriched world of the future, made bright by the amazing molecule that the U.S. Environmental Protection Agency has had the audacity to so wrongly characterize as a dangerous air pollutant!

...

10. Carbon Sequestration –

Rising atmospheric CO2 concentrations lead to more numerous and more robust plants, which yearly remove ever-greater quantities of CO2-derived carbon from the atmosphere, storing it initially in their own tissues, eventually in the soil, and ultimately in the depths of the sea.

F13 F10 Other antecedents

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IPCC AR4, ch. 2.4:
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