494 CONTRADICTIONS TO IPCC'S CLIMATE CHANGE THEORY

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Abstract

The United Nations *Intergovernmental Panel on Climate Change* (IPCC) claims human CO2 is responsible for all the increase in atmospheric CO2 since 1750, or above 280 ppm. The IPCC model cannot reproduce how 14CO2 decayed from 1970 to 2014. The IPCC model cannot even predict itself if it is restarted at any future time. The IPCC model assumes human CO2 reduced the buffer capacity of the carbonate system. But the 14C data show the buffer capacity has not changed. The IPCC model treats human and natural CO2 differently, so IPCC model is fundamentally wrong.

By contrast, a simple physics model makes only one assumption: outflow is proportional to level. It accurately predicts the decay of 14CO2 from 1970 to 2014 and shows its e-time is 16.5 years. This is the upper bound e-time for 12CO2.

The physics model shows human and natural CO2 behave the same. Neither accumulate in the atmosphere. Human and natural CO2 inflows set independent and additive balance levels for CO2 in proportion to their inflows. The level moves to its balance level until outflow equals inflow. Then the level remains at its balance level so long as inflow remains constant. Continued, constant human emissions do not add more CO2 to the atmosphere.

The simple physics model concludes human CO2 adds only 18 ppm to the atmosphere while natural CO2 adds 392 ppm. Human CO2 does not cause climate change and all efforts to reduce human CO2 emissions will not stop climate change.

1. Introduction

The United Nations *Intergovernmental Panel on Climate Change* (IPCC, 2001a, b, c) Executive Summary claims human emissions caused atmospheric CO2 to increase from 280 ppm in 1750, to 410 ppm in 2018, for a total increase of 130 ppm.

IPCC claims “abundant published literature” shows, with “considerable certainty,” that nature has been a “net carbon sink” since 1750, so nature could not have caused the observed rise in atmospheric carbon dioxide.

The U.S. Global Change Research Program Climate Science Special Report (USGCRP, 2018) claims,

> “This assessment concludes, based on extensive evidence, that it is extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century.”

IPCC and USGCRP claim there are “no convincing alternative explanations” other than their theory to explain “observational evidence.” IPCC and USGCRP are wrong.

This paper shows these IPCC and USGCRP claims are incorrect and presents the “convincing alternative explanation” that IPCC and USGCRP claim does not exist.

IPCC (1990) bases all its climate conclusions on this argument:

> How do we know that in fact human activity has been responsible for the well documented 25% increase in atmospheric CO2 since the early 19th century? Couldn’t this rise instead be the result of some long-term natural fluctuation in the natural carbon cycle? Simple arguments allow us to dismiss this possibility.
>
> First, the observational CO2 records from ice cores … show that the maximum range of natural variability about the mean of 280 ppm during the past 1000 years was small.
>
> Second, the observed rate of CO2 increase closely parallels the accumulated emission trends from fossil fuel combustion and from land use changes.
>
> Third, the observed isotropic trends of 13C and 14C agree qualitatively with those expected due to the CO2 emissions form fossil fuels and the biosphere, and they are quantitatively consistent with results from carbon cycle modeling.

Segalstad (1998), Jaworowski (2004), Ball (2008, 2013, 2018), and Salby (2014) present evidence that

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the CO2 level before 1750 was much higher than 280 ppm. Therefore, IPCC's first claim is assumption, not fact. Nevertheless, this paper allows IPCC's first claim because it makes no difference to this paper's conclusions.

For simplicity, this paper uses levels in units of ppm, and flows in units of ppm per year. GtC (Gigatons of Carbon) units are converted into CO2 units in ppm (parts per million by volume in dry air), using:

1 ppm = 2.13 GtC

Fig. 1 illustrates the disagreement between the physics theory and IPCC theory. The theories agree that the annual inflows of human and natural CO2 are 4.6 and 98 ppm respectively.

Data from Boden et al. (2017) show human CO2 emissions from fossil-fuel burning, cement manufacturing, and gas flaring in 2014 was 4.6 ppm (9.855 GtC) per year. IPCC (2001) says nature's CO2 emissions are 98 ppm per year.

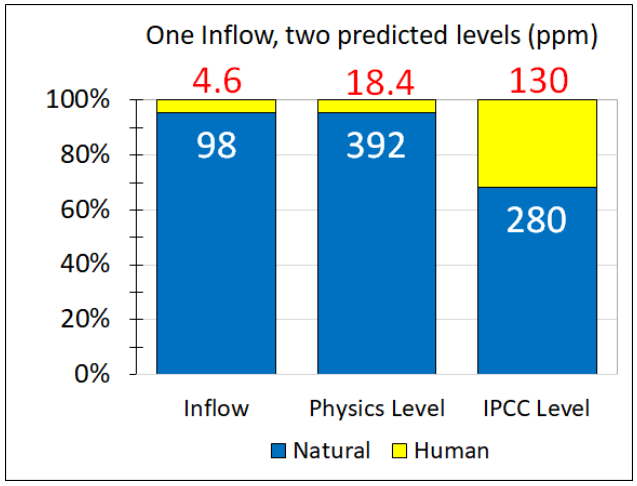

Fig. 1. IPCC and physics theory assume human and natural annual inflow is 4.6 and 98 ppm per year respectively. The physics model predicts these inflows add 18 ppm and 392 ppm to the level of atmospheric CO2. The IPCC model predicts nature's addition stays constant at 280 ppm while human inflow adds all the increase above 280 ppm.

Authors who conclude human emissions cause only a minor increase in the level of atmospheric CO2 include Revelle and Suess (1957), Starr (1992), Segalstad (1992, 1996, 1998), Rorsch et al. (2005), Courtney (2008), Siddons and D'Aleo (2007), Quirk (2009), Spencer (2009), MacRae (2010, 2015), Essenhigh (2009), Glassman (2010), Wilde (2012), Caryl (2013), Humlum et al. (2013), Salby (2012, 2014, 2016), Pettersson (2014b), Harde (2017a,b), and Berry (2018).

Authors who support the IPCC include Cawley (2011), Kern and Leuenberger (2013), Masters and Benestad (2013), Richardson (2013), and the Kohler et al. (2017) comment on Harde (2017a).

2. Theories must simulate data

2.1 The 14C Data

The above-ground atomic bomb tests in the 1950s to 1960s almost doubled the concentration of 14C in the atmosphere. The 14C atoms were in the form of CO2, hereinafter called 14CO2.

The 14C data are in units of D14C per mil. In D14C units, the natural balance level is zero, as defined by the average measured level before 1950.

After the cessation of the bomb tests in 1963, the concentration of 14CO2 gradually decreased toward its natural balance level. The decrease occurred because the bomb-caused 14C inflow went to zero while the natural 14C inflow remained.

There are two good 14C data sources. Hua et al. (2013) processed 14C data for both hemispheres from 1954 to 2010 using 61 mid-year data points. Turnbull et al. (2017) processed 14C data for Wellington, New Zealand, from 1954 to 2014 using 721 data points. After 1970, 14CO2 were well mixed between the hemispheres, so the 14C data from both sources are virtually identical after 1970.

Fig. 2 shows the global average data for D14C (Hua et al., 2013). Fig. 3 shows the New Zealand data for D14C (Turnbull et al., 2017).

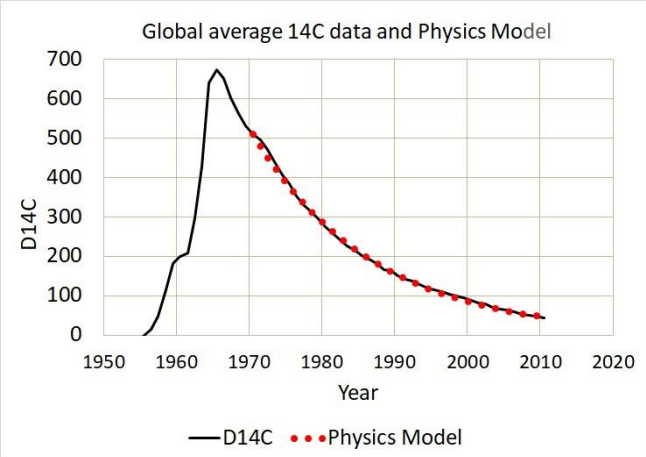

Fig. 2. Global average 14C data from Hua et al. (2013) using 61 mid-year data points. The dotted red line is from the physics model.

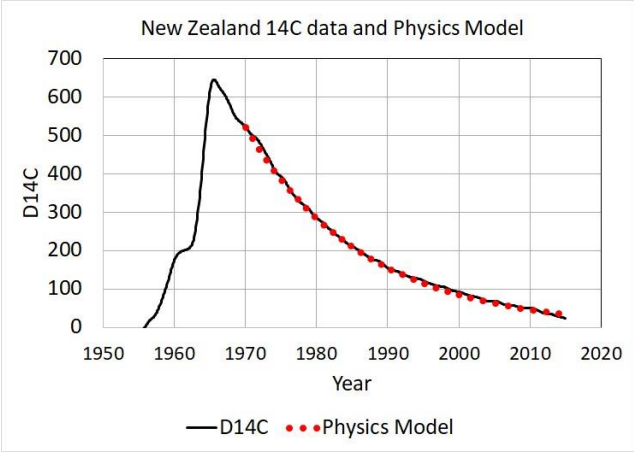

Fig. 3. Wellington, New Zealand 14C data from Turnbull et al. (2013) using 721 data points. The dotted red line is from the physics model.

2.2 Physics model simulates the 14C data

Section 3 and Appendix A describe the physics theory and model. The only hypothesis the physics model uses is outflow equals level divided by e-time, *Te*.

Figs. 2 and 3 show the physics model (red line) accurately predicts the 14CO2 data from 1970 to 2014. The physics model uses Eq. (A.8) with the "e-time" set to 16.5 years and the balance level set to zero.

To calculate the results of the physics model in Figs. 1 and 2 using Eq. (A.8), set the starting level *Lo* to the measured D14C level in mid-1970, and set the balance level *Lb* to zero. Find the e-time *Te* by trial and error until the result gives a good "eyeball" fit to the data.

The physics model has no arbitrary curve-fit parameters. Once the e-time *Te* matches the data, the fitting is done.

2.3 IPCC's model cannot simulate the 14C data

Section 4 and Appendix B describe the IPCC theory and model.

All valid CO2 models must replicate the 14C data after 1970. According to the scientific method, it is impossible to prove a theory correct but if a prediction is wrong, the theory is wrong.

Fig. 4 uses Eq. (A.8) of the physics model with e-time equal to 16.5 years to simulate the 14CO2 data and an e-time of 4 years to simulate 12CO2.

Fig. 4 uses Eq. (B.1) of the IPCC Bern model to calculate the Bern model predictions. All model calculations begin with the initial level set to 100 and the balance level set to zero.

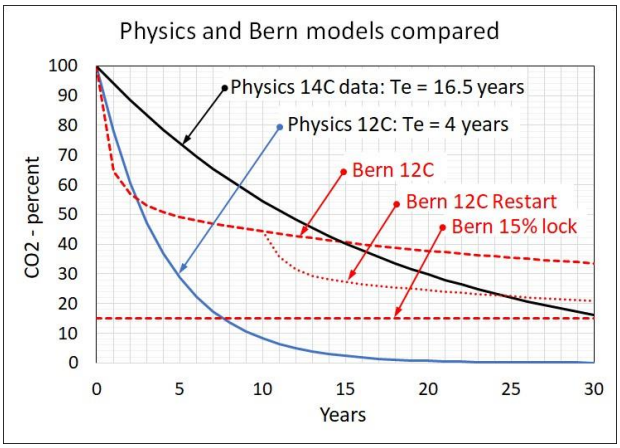

Fig. 4. The physics model (black line) accurately simulates the 14CO2 data from 1970 to 2014, using a e-time of 16.5 years. The physics model (blue line) simulates 12CO2 data when the e-time is 4 years. The Bern model (red lines) cannot simulate CO2 outflow. The Bern model, if restarted at any point on the Bern line, cannot simulate the original Bern prediction line.

The Bern model predicts a dramatically different change in level than the physics model does. For the first year, the Bern outflow is faster than the physics model for 12CO2. Then the Bern model outflow decreases while its e-time increases. The Bern model line crosses the 14C data line which is the upper bound for 12CO2 e-time.

The Bern model is also unphysical. The Bern model, if restarted at any point on its prediction line, cannot simulate its original Bern prediction line. A valid model must continue its same prediction line if it is restarted at any point on its line. The Bern model predicts a different future if it is restarted at any point on its curve.

2.4 The 14C data support the physics model

Human fossil-fuel emissions of "14C-free" CO2 lower the 14C balance level. IPCC (1990) and Kohler et al. (2017) claim this proves human CO2 caused all the rise in atmospheric CO2. However, the numbers show otherwise.

The physics model assigns 95.5 percent to natural emissions and 4.5 percent to human emissions. The IPCC model assigns 68 percent to natural emissions and 32 percent to human emissions, according to IPCC (2001a) as shown in Fig. 1.

The physics model predicts human CO2 has lowered the balance level of 14C from zero to -4.5. The calculations are shown in Appendix D. Fig. 5 shows how the physics model plot changes when the balance level is changed from zero to -4.5.

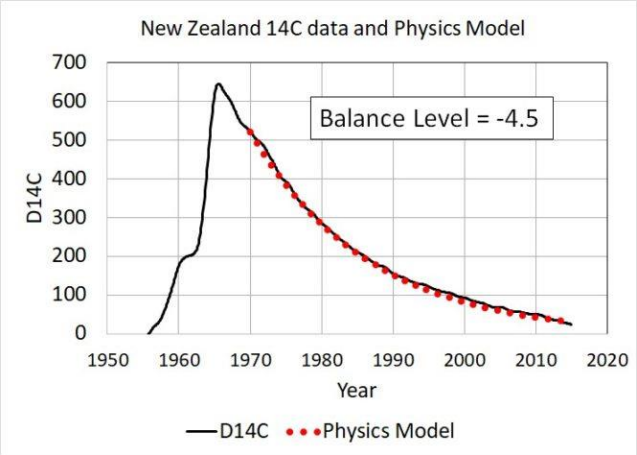

Fig. 5. The dotted line is the physics curve fit with the balance level set to -4.5, as predicted by the physics model. This balance level fits the data.

Fig. 5 shows little difference from Fig. 3 which uses a balance level of zero. This shows the physics prediction for 13C fits the data.

The IPCC model predicts human CO2 has lowered the balance level of 14C from zero to -32, or 7.2 times as much as the physics model predicts. Fig. 6 shows how the plot changes when the balance level is set to -32.

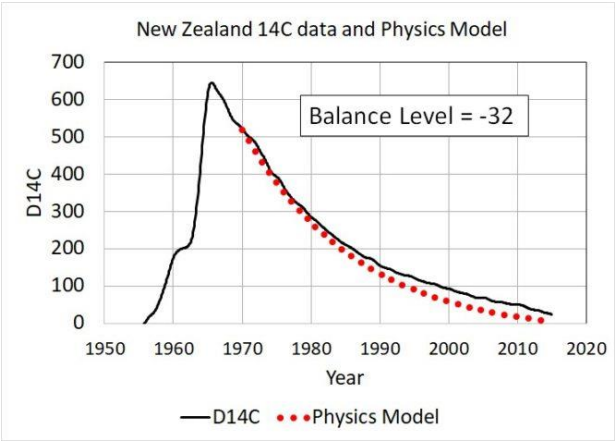

Fig. 6. The dotted line is the physics curve fit when the balance level is set to -32, as predicted by the IPCC theory. Clearly, this balance level is too low to fit the data.

Fig. 6 shows a significant difference from Fig. 3. This shows the IPCC prediction does not fit the data. Therefore, the 14C data support the physics model and prove the IPCC model is wrong.

Discussion

Pettersson (2014b) shows how industrial emissions of 14C may have raised the 14C balance level and how the 12CO2 increase would lower the D14C balance level. However, Levin et al. (2010) used absolute values of 14C and still concluded the "ocean-atmosphere disequilibrium today is close to pre-industrial times."

2.5 The 13C data support the physics model

RealClimate (2004b), in support of the IPCC, says the 13C/12C ratio for human emissions is about 98 percent of the ratio in natural emissions, and the ratio has declined about 0.15 percent since 1850. RealClimate concludes the above data prove human CO2 caused all the increase in atmospheric CO2 since 1850. The numbers show otherwise.

The physics model concludes human emissions will have lowered the 13C ratio by 0.09. The IPCC model concludes human emissions will have lowered the 13C ratio by 0.64. The calculations are shown in Appendix E.

Fig. 7 compares the decrease in the 13C ratio according to RealClimate, the physics model, and the IPCC model.

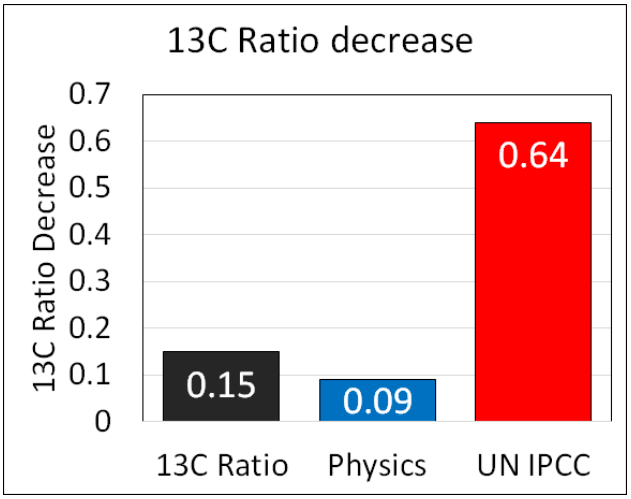

Fig. 7. The IPCC 13C ratio decrease according to RealClimate, the physics model, and the IPCC model. Clearly, the physics model is the better fit to the data.

Clearly, the 13C data support the physics theory and contradict the IPCC theory.

2.6 The isotope 14CO2 follows 12CO2

Levin et al. (2010) conclude the C14 data provide "an invaluable tracer to gain insight into the carbon cycle dynamics."

The 12CO2 molecules participate in the same chemical reactions as 14CO2 except 12CO2 reacts faster because it is lighter than 14CO2.

RealClimate (2004a) agrees:

> "All isotopes of an element behave in a similar way chemically. However, because the mass of each isotope is slightly different there are certain physical processes that will discriminate (or 'fractionate') between them."

However, Kohler et al. (2017) claim 14CO2 does not trace 12CO2 because 12CO2 is restrained by the decreased the ocean's buffer capacity while 14CO2 is not.

Kohler's claim is wrong. First, there is no physical or chemical mechanism to explain Kohler's claim. If buffer capacity decreased and slowed the flow of 12CO2 into the oceans, it would also slow the flow of 14CO2 into the oceans. Second, there is no evidence of decreased buffer capacity.

Therefore, 14CO2 traces how 12CO2 flows out of the atmosphere.

Means (2014), supporting the IPCC position, claims the 14C data do not represent how 12CO2 outflows from the atmosphere. He claims incorrectly:

> The CO2 [inflow] is depleted in 14C [compared to the outflow]and this gives an artificial false picture of rapid CO2 sequestration rates.

The physics model shows why Means' claim is incorrect. Apply the physics model only to 14CO2. The natural inflow, mostly formed in the atmosphere by cosmic rays, sets the balance level. The 14C inflow from the ocean need not match the 14C outflow from the atmosphere, as Means claims.

The 14C data are valuable because the 14C level was much higher than its balance level. That difference allows us to measure how the level returns to its balance level.

If Means' claim were relevant, then it would change the balance level of 14C. But the 14C data show no measurable change in the balance level of 14C.

3. The physics model

3.1 Physics model derivation

A system describes a subset of nature. A system includes levels and flows between levels. Flows are rates. Levels set the flows and the flows set the new levels (Forrester, 1968).

Fig. 8 illustrates the system for atmospheric CO2. The system includes the level (concentration) of CO2 in the atmosphere and the inflow and outflow of CO2.

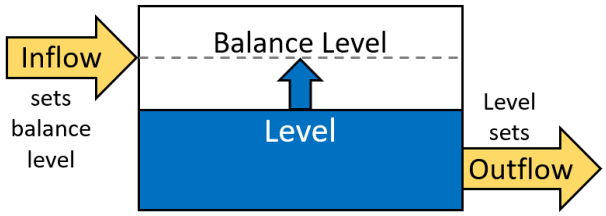

Fig. 8. The system for atmospheric CO2 includes the level (concentration) of CO2 and the inflow and outflow of CO2. It applies to all definitions of CO2.

The physics theory results in mathematical equations that become the physics model. The physics model shows how natural CO2 inflow sets a "balance level" for CO2. The level always moves towards its balance level. When the level equals the balance level, outflow equals inflow, and the level remains constant.

The level of CO2 in the atmosphere behaves like the level of water in a lake where water flows into the lake and then out over a dam. Inflow sets the balance level. The inflow raises the lake level until level equals the balance level and outflow equals inflow. No water "accumulates" in the lake.

The level of CO2 in the atmosphere also behaves like water in a bucket where water flows into the bucket and flows out through a hole in the bottom. As the level increases, outflow increases. When outflow equals inflow, the level remains constant. No water "accumulates" in the bucket.

Inflow and outflow include all the effects of outside processes. The only way an outside process can change the level is by changing inflow or outflow. Therefore, the physics model is complete.

The physics model applies to all definitions of CO2, for example, 14CO2, 12CO2, human CO2, and natural CO2, and their sums. The mathematics used to describe the physics model are simple and analogous to the mathematics used to describe many engineering systems.

Appendix A shows the mathematical derivation of the physics model. It begins with the continuity equation, Eq. (A.1). Then it adds one hypothesis: Outflow equals Level divided by e-time as shown in Eq. (A2).

All other physics model equations are deductions from the continuity equation and the one hypothesis. For example, the balance Level equals inflow multiplied by e-time, Eq. (A.4).

Equation (A.8) is the analytic solution to the physics model rate equation. It calculates the level as a function of time for any starting level, a balance level, and an e-time.

Discussion

The Kohler et al. (2017) comment on Harde (2017a) concludes,

> "Harde … uses a too simplistic approach, that is based on invalid assumptions, and which leads to flawed results for anthropogenic carbon in the atmosphere. We suggest that the paper be withdrawn by the author, editor or publisher due to fundamental errors in the understanding of the carbon cycle."

There is no tolerance in Kohler's world for a contradictory opinion. Like the promoters of Lysenkoism, Kohler wants Harde (2017a) withdrawn. In possible response, the journal refused to publish Harde's (2017b) rebuttal to Kohler.

Kohler claims Harde's system, and therefore the physics system, is "too simplistic" to be valid. Kohler claims a valid atmospheric CO2 system must contain at least two levels.

Kohler is wrong. There is no such thing as a system being "too simplistic." A system should be as simple as possible to solve a problem. Each level of a system is isolated and connected to other levels by inflows and outflows.

The physics system does not exclude the effects of outside processes. Outside processes change the atmosphere level by changing its inflow or outflow. The physics system properly computes how inflow and outflow change the level of CO2 in the atmosphere. Its equations and conclusions for the atmosphere level would not change if the atmosphere level were connected to another level.

Kohler's comments on Harde are invalid because they derive from Kohler's misunderstanding of the system that Harde used.

Kohler can't correctly model the physics of the atmosphere. Kohler et al. think adding more levels would correct errors in the atmosphere level. Kohler claims more complex models give more correct answers.

It does not work that way. One must get the physics inside each level correct independently before hooking levels together with flows. Like software development, one must get the functions and procedures correct independently. Then one can connect the parts of the program by flows of data.

3.2 Physics model consequences

Eq. (A.4) shows the balance level equals the product of inflow and e-time. Using IPCC numbers, the balance levels of human and natural CO2 are,

$$Lbh = 4.6 \text{ (ppm/year)} * 4 \text{ (years)} = 18.4 \text{ ppm} \quad (1)$$

$$Lbn = 98 \text{ (ppm/year)} * 4 \text{ (years)} = 392 \text{ ppm} \quad (2)$$

Their ratio and percentage are independent of e-time,

$$Lbh / Lbn = 4.6 / 98 = 18.4 / 392$$

$$= 4.6 \text{ percent} \quad (3)$$

$$Lbh / (Lbn + Lbh) = 4.6 / 102.6 = 18.4 / 410$$

$$= 4.5 \text{ percent} \quad (4)$$

These results are indicated in Fig. 1.

Equation (1) shows present human emissions create a balance level of 18 ppm. This balance level for human emissions is independent of nature's balance level. If nature's balance level remained at 280 ppm as IPCC claims it was in 1750, then the present human emissions would have increased the level of CO2 in the atmosphere by 18 ppm, for a total of 298 ppm.

Equation (2) shows present natural emissions create a balance level of 392 ppm. The addition of the human contribution of 18 ppm brings the total balance level to 410 ppm, which is close to the level in 2018.

Equation (3) shows the ratio of human- to nature-produced CO2 in the atmosphere equals the ratio of their inflows, independent of e-time. The IPCC calls the ratio in Eq. (3) the "airborne fraction."

Equation (4) shows the percentage of human-produced CO2 in the atmosphere equals its percentage of its inflow, independent of e-time.

Equations (1) and (2) support Harde (2017a) and its key conclusions:

> "Under present conditions, the natural emissions contribute 373 ppm and anthropogenic emissions 17 ppm to the total concentration of 390 ppm

(2012)."

The conclusion is human CO2 emissions have a negligible effect on the level of atmospheric CO2.

While the details are outside the scope of this paper, Appendix C, from Harde (2017a), shows how temperature can increase the balance level to account for the rise in atmospheric CO2 since 1750. Salby (2014) and Pettersson (2014a) show how the CO2 level is a consequence of temperature.

Discussion

Cawley (2011) tries but fails to prove that human CO2 caused all the increase of atmospheric CO2 above the IPCC-claimed 280 ppm in 1750.

Cawley's Eq. (3) intends to do the same job as Eq. (A.2), namely, to represent how level sets outflow. Cawley adds to his Eq. (3) a term that represents a steady-state outflow that is independent of level. Cawley's added term is fictitious because his first term on the right side of his Eq. (3) is the true source of all outflow.

So, Cawley added outflow twice. First as a level-driven outflow. Second, as a fictitious steady-state outflow that does not exist. As a result, Cawley's Eqs. (3), (4), (5), and his equation after (5) are wrong. Therefore, his whole paper is wrong.

Cawley's Eqs. (7) and (8) are wrong. His Eq. (7) should include his Fa for human inflow. Both equations should omit his arbitrary Fe for outflow and set outflow equal to level (his C) divided by his residence time, which is also inaccurate as shown in Section 4.1.

Cawley argues the ratio of human to natural CO2 in the atmosphere is a function of residence-time, which is incorrect. The physics model, Eq. (3) above, and common sense show the ratio is independent of e-time. Cawley equations cannot simulate the 14C data. Therefore, they are wrong.

4. The IPCC Model

4.1 IPCC's time constants

The only hypothesis in the physics model is "outflow equals level divided by Te" where Te is a time constant as shown in Eq. (A2). The continuing derivation of the physics model shows,

> *Te* = time for the level *L* to move (1 - 1/e) of the distance from L to its balance level, *Lb*

We call Te "e-time" to distinguish it from IPCC's residence time, adjustment time, and turnover time which have unphysical and confusing definitions and interpretations.

IPCC (2001b) defines "turnover time (Tt)" as:

> The ratio of the mass M of a reservoir (e.g., a gaseous compound in the atmosphere) and the total rate of removal S from the reservoir: Tt = M/S.

While IPCC's turnover time appears to be the same as e-time, it is not the same. The turnover time uses a "total rate of removal" which can be interpreted as the negative difference between inflow and outflow. Whereas, e-time is defined only in terms of outflow and level.

IPCC (2001b) defines "adjustment time (Ta)" as:

> The time-scale characterising the decay of an instantaneous pulse input into the reservoir.

Cawley (2011) defines a similar "adjustment time (Ta)" as:

> The time taken for the atmospheric CO2 concentration to substantially recover towards its original concentration following a perturbation.

Notice the word "substantially" which indicates the definition is imprecise. The fuzzy definition for adjustment time is necessary to allow for an equally fuzzy definition of residence time.

Cawley (2011) follows the IPCC to define "residence time (Tr)" as:

> The average length of time a molecule of CO2 remains in the atmosphere before being taken up by the oceans or terrestrial biosphere.

The IPCC and its supporters like Cawley claim their opponents confuse "residence time with adjustment time." However, it is the IPCC and its supporters like Cawley who are confused.

The physics model defines e-time precisely only in terms of level and outflow. E-time is independent of inflow, which makes it different than all IPCC's characteristic times. The definition of e-time applies to all conditions of level, inflow, and outflow. By contrast, the IPCC and its supporters think incorrectly that they need a different time constant depending upon whether the level is far from its balance level or close to its balance level.

When the level is far from its balance level (which can even be zero), the IPCC thinks e-time is an adjustment time because the level is moving rapidly toward its balance level.

When the level is close to its balance level, the IPCC thinks e-time is a residence time because outflow is almost equal to inflow and “molecules” are flowing in and out with little change in level.

The IPCC thinks it needs turnover times, residence times, and adjustment times to cover all the conditions. IPCC’s time definitions do not use proper physics. IPCC’s time definitions do not properly model how CO2 flows through the atmosphere.

IPCC requires a decay to originate from a pulse. This is unphysical because a system does not know its history. IPCC includes inflow in its time definitions. This is unphysical because the true decay time depends only upon outflow and level.

The physics model’s e-time covers all conditions. E-time does not require a pulse input. E-time applies to instantaneous outflow no matter what the inflow or the history.

Discussion

Cawley (2011) says,

> Unlike other atmospheric gasses, the residence time and adjustment time are not the same for carbon dioxide.

However, the IPCC says:

> In simple cases, where the global removal of the compound is directly proportional to the total mass of the reservoir, the adjustment time equals the turnover time: Ta = Tt.

The physics model applied to the 14C data shows the 14CO2 outflow is proportional to level. Therefore, by IPCC’s own definition, its adjustment time equals its residence time.

IPCC (2001b) agrees 12CO2 residence time is about 4 years but claims its adjustment time is much longer. IPCC claims adjustment time is “fast initially and slower later on,” which describes the prediction of its Bern model in Fig. 4:

> In more complicated cases, where several reservoirs are involved or where the removal is not proportional to the total mass, the equality T = Ta no longer holds.
>
> Carbon dioxide (CO_2) is an extreme example. Its turnover time is only about 4 years because of the rapid exchange between atmosphere and the ocean and terrestrial biota.
>
> Although an approximate value of 100 years may be given for the adjustment time of CO_2 in the atmosphere, the actual adjustment is faster initially and slower later on.

Figs. 2 and 3 show the e-time of 14CO2 is 16.5 years, not hundreds of years. The 14CO2 level approached its balance level exactly as the physics theory predicts. IPCC is totally confused about how CO2 flows out of the atmosphere. That is why the IPCC’s conclusions about how human CO2 exits the atmosphere are completely wrong.

Kohler et al. (2017) claim:

> “The IPCC summarizes the state of the art in peer-reviewed literature. Hence neither the residence time nor the adjustment time are assumptions or interpretations of the IPCC-AR5, but robust outcomes of the underlying science.”

Kohler attempts to argue by authority. That is not the way of science. The implication of “Hence” is that the IPCC summaries are so perfect that no one may disagree. The problem with Kohler's claim is the IPCC model prediction disagrees with data. Therefore, the IPCC theory is wrong.

Respectfully, the IPCC theory fails the scientific method. It makes wrong predictions. It contradicts physics. Its so-called “state of the art in peer-reviewed literature” is a repetition of inbred, invalid, pampered, and protected claims. It is time for Toto to pull the curtain to reveal the wizard for the fraud that it is.

4.2 IPCC core argument is illogical

The IPCC (2001a) claims “abundant published literature” shows, with “considerable certainty,” that nature has been a “net carbon sink” since 1750, so nature could not have caused the observed rise in atmospheric carbon dioxide.

But “abundant published literature” is irrelevant in science because votes don’t count. Claims of “extensive evidence” are irrelevant because the scientific method says if a theory makes only one false prediction the theory is wrong. The IPCC theory makes many false predictions that prove its “abundant published literature” claims are wrong.

In its core argument, the IPCC correctly notes that human emissions from 1750 to 2013 totaled 185 ppm while atmospheric CO2 increased by only 117 ppm. But the IPCC incorrectly concludes that this proves human CO2 caused the increase.

The IPCC argument omits natural CO2 which totaled about 26,000 ppm in the same period. So, the

stronger logical counter-argument is that nature caused all the increase.

The IPCC assumes nature's CO2 inflow remained exactly constant since 1750. That assumption is not proven and not justified but it is necessary for IPCC to reach its conclusion.

The IPCC also correctly notes nature is a "net absorber" because it absorbs the outflow of human CO2 emissions. But the IPCC incorrectly argues that this proves human CO2 caused all the increase.

Inflow and outflow are two different physical processes. Nature's absorption of human CO2 outflow cannot constrain nature's CO2 inflow. The natural inflow of 98 ppm per year shown in Fig. 1 can be any number, larger or smaller, and nature will still absorb the outflow of human CO2. The IPCC invents constraints where none exist.

4.3 IPCC buffer theory is wrong

IPCC theory says human CO2 emissions, but not natural emissions, reduce the "buffer capacity" of the carbonate system.

There are three things wrong with this IPCC claim:

1. It requires nature to separate human CO2 from natural CO2, which is impossible.
2. It assumes nature's inflow does not increase and reduce buffer capacity.
3. The 14C data show there has been no reduction in buffer capacity.

Discussion

IPCC's theory is based upon its assumption that natural CO2 inflow remained constant after 1750 while human CO2 inflow caused all the CO2 increase after 1750.

IPCC (2001a) claims,

> "The fraction of anthropogenic CO2 that is taken up by the ocean declines with increasing CO2 concentration, due to reduced buffer capacity of the carbonate system."

Kohler et al. (2017) claim human emissions reduced the "buffer capacity" of the carbonate system:

> "the rise in atmospheric and oceanic carbon content goes along with an increase in the Revelle factor, a phenomenon which is already measurable. This implies that the oceanic uptake of anthropogenic carbon will become slower if we continue to increase anthropogenic CO2 emissions. This is already seen in all CHIMP5 model simulations."

Kohler's last sentence illustrates the illogical method used by Kohler and the IPCC. They use circular reasoning. They claim a model proves what has been fed into the model.

Regarding the Revelle factor being "measurable," the 14C data show no evidence of its effect. Reduced buffer capacity would restrict the outflow of CO2 and increase the CO2 level, which would increase e-time. But the 14C data, shown in Figs. 2 and 3, prove e-time has been constant while CO2 increased from 1970 to 2014.

The Bern model predicts an increase in e-time because it incorrectly assumes that human CO2 has reduced the buffer capacity.

Ecologist Patrick Moore (2017) claims human CO2 has converted locked carbon into free carbon and upset nature's balance. Therefore, Moore argues, human CO2 has caused all the increase in atmospheric CO2 above 280 ppm. He produces no numbers to support his claim. If Moore's claim were correct, then human CO2 would have reduced the buffer capacity of the carbonate system.

The 14C data prove there has been no decrease in buffer capacity. Therefore, IPCC theory and Patrick Moore are wrong.

4.4 IPCC theory contradicts nature

The IPCC did not begin with a physical theory. The IPCC began with its assumptions that human CO2 added all the CO2 increase since 1750, natural CO2 emissions stayed constant, and human CO2 reduced the buffer capacity of the carbonate system. All these IPCC assumptions are invalid. The IPCC has not proved human CO2 causes all the increase above 280 ppm because IPCC assumed that in its models.

IPCC (2007) admits its estimates of "gross fluxes generally have uncertainties of more than ±20%." Yet the IPCC ignores the 14C data that are far more accurate than IPCC's estimates of CO2 inflow and outflow. The IPCC inserted its "theory" into its climate models.

Appendix B shows IPCC's Bern model (Bern, 2002) which assumes CO2 exits the atmosphere according to a polynomial with four decay times. One decay time is infinity. The IPCC curve-fit the coefficients and decay times to make the Bern polynomial match the output of its climate models (Joos et al., 2013).

IPCC's Bern Eq. (B.1) predicts 15 percent all CO2 entering the atmosphere stays in the atmosphere forever and about 40 percent stays in the atmosphere for almost 1000 years. IPCC (2001a)

assumes its Bern model applies only to human CO2. However, that assumption is invalid because CO2 molecules from human and natural sources are identical. Therefore, all valid models must treat human and natural CO2 the same.

Bern Eq. (B.1) applied to natural CO2 predicts 100 ppm per year for 100 years will leave 1500 ppm in the atmosphere forever. This clearly invalid prediction proves the Bern model and IPCC's theory are wrong. Also, since the Bern model cannot simulate the 14C data, the IPCC theory is wrong.

The Bern model is wrong because

1. it cannot simulate the 14C data,
2. its predictions for human and natural CO2 are wrong,
3. it predicts a different future if it is restarted at any point on its curve, and
4. it treats human and natural CO2 differently.

Discussion

Siegenthaler and Joos (1992) created the original Bern model. The original model contained levels for the deep and interior oceans that connected to the upper ocean, as can be seen in their Fig. 1.

IPCC reconnected the original model's deep and interior ocean levels directly to the atmosphere level, bypassing the upper ocean level. That is why the Bern model has three decay times rather than one. Connecting flows to the wrong levels violates the principles of systems (Forrester, 1968) and will give the wrong answer.

The Bern model forces the three decay times to act in series rather than in parallel. The series connection lets a long decay time restrict outflow with a small decay time. This is like a small hole in a bucket restricting the flow out of a large hole. Only a parallel connection would properly represent the three decay times.

Siegenthaler and Joos (1992) understood their model should reproduce the carbon-14 data and were disappointed that it did not do so.

4.5 Human CO2 does not correlate

IPCC (2001a) claims annual human CO2 emissions cause annual increases in the level of CO2 in the atmosphere. Cawley (2011) says,

> Lastly, the rise in atmospheric carbon dioxide closely parallels the rise in anthropogenic emissions, leading to an approximately constant airborne fraction,18 which would be somewhat of a coincidence if the rise were essentially natural in origin!

However, proper statistics requires a detrended analysis of a time series before concluding cause and effect. Munshi (2017) shows the "detrended correlation analysis of annual emissions and annual changes in atmospheric CO2" is zero. Where there is no correlation, there is no cause and effect.

Statistics show human CO2 is not responsible for most of the increase in atmospheric CO2 since 1750. Therefore, IPCC's claim of "considerable certainty" that human emissions increase atmospheric CO2 fails.

5. Conclusions

The IPCC claims human CO2 is responsible for all the increase in atmospheric CO2 since 1750, or above 280 ppm. Simple physics proves otherwise.

The IPCC model cannot reproduce how 14CO2 fell from 1970 to 2014. The IPCC model cannot even predict itself if it is restarted at any future time.

The IPCC model assumes human CO2 reduced the buffer capacity of the carbonate system. But the 14C data show the buffer capacity has not changed.

The IPCC model treats human and natural CO2 differently, which is impossible because it violates the equivalence principle.

The IPCC includes inflow in its definitions of residence, adjustment, and turnover times. This is wrong because the system response time relates to outflow, not inflow. The IPCC uses adjustment time when level is much higher than balance level and residence time applies when level is near its balance level without understanding where the change occurs.

The physics model defines its e-time only in terms of outflow and uses e-time for all conditions. The simple physics model makes only one assumption: outflow equals level divided by e-time.

The physics model accurately predicts how 14CO2 fell from 1970 to 2014 when its e-time is set to 16.5 years and the balance level set to near zero. The physics model uses no arbitrary parameters to curve-fit the data. E-time for 14CO2 is the upper bound e-time for 12CO2.

The physics model properly requires that human and natural CO2 behave the same.

Human CO2 reduces the levels of 14C and 13C in the atmosphere. The IPCC claims this proves human CO2 caused all the rise in atmospheric CO2 above 280 ppm. However, the data support the physics model and reject the IPCC model.

The physics model makes the following significant deductions.

The ratio of human to natural CO2 in the atmosphere equals the ratio of their inflows, independent of residence time.

Neither human nor natural CO2 inflow "add" CO2 to the atmosphere. Inflow only increases the level until outflow equals inflow. Then, the level remains constant and does not accumulate.

Human and natural inflows set independent balance levels which add up. Present human CO2 inflow increases the level by about 18 ppm and present natural CO2 inflow increases the level by about 392 ppm. Their total is about 410 ppm. Continued, constant human emissions do not add more CO2 to the atmosphere.

If all human CO2 emissions stopped and natural inflow stayed the same, the CO2level would fall only by 18 ppm with an e-time of about 4 years. Human CO2 does not cause climate change and all efforts to reduce human CO2 emissions will not stop climate change.

Appendix A: Physics model math

We use the system definition of Section 3.1 to derive the physics model. We begin with the continuity equation:

$$dL/dt = Inflow - Outflow \qquad (A.1)$$

Where

L = CO2 level

dL/dt = rate of change of L

t = time

Inflow = rate CO2 moves into the system

Outflow = rate CO2 moves out of the system

Assume outflow is proportional to level,

$$Outflow = L / Te \qquad (A.2)$$

where Te is "e-time."

Substitute Eq. (A,2) into the continuity Eq. (A.1),

$$dL/dt = Inflow - L / Te \qquad (A.3)$$

To find an equation for Inflow, let the level equal its balance level, Lb. Then the level is constant and Eq. (A.3) becomes

$$Lb = \text{Inflow} * Te \qquad (A.4)$$

Equation (A.4) shows how inflow sets the balance level. Substitute Eq. (A.4) for Inflow into Eq. (A.3) to get,

$$dL/dt = -(L - Lb) / Te \qquad (A.5)$$

Equation (A.5) shows how level always moves toward its balance level. If inflow is zero, Lb is zero, and outflow will continue until the level goes to zero. Rearrange Eq. (A.5) to get

$$dL / (L - Lb) = -dt / Te \qquad (A.6)$$

Then integrate Eq. (A.6) from Lo to L on the left side, and from 0 to t on the right side, to get,

$$\text{Ln}[(L - Lb) / (Lo - Lb)] = -t / Te \qquad (A.7)$$

where

Ln = natural logarithm or logarithm to base e

Lo = Level at time zero (t = 0)

Lb = the balance level for a given inflow and Te

Te = time for L to move (1 - 1/e) of the distance from L to Lb

e = 2.7183

(The original integration of Eq. (A.6) contains two absolute functions, but they cancel each other because both L and Lo are always either above or below Lb.)

Raise e to the power of each side of Eq. (A.7), to get the level as a function of time:

$$L(t) = Lb + (Lo - Lb) \exp(-t / Te) \qquad (A.8)$$

Equation (A.8) is the analytic solution of Eq. (A.5).

The only assumption in the physics model is Eq. (A.2), namely, outflow equals level divided by e-time. All equations after Eq. (A.2) are deductions from this assumption.

Appendix B: Bern model math

The Bern (2002) model is an integral equation rather than a level or rate equation. The Bern model integrates the inflow of CO2 from minus infinity to any time in the future.

To deconstruct the integral version of the Bern model, let inflow occur only in the year when "t-prime" equals zero (t' = 0). Then the integral disappears, and the Bern model becomes a level equation.

The Bern level equation is,

$L(t) = Lo\ [\ A_0 + A_1 \exp(-\ t\ /T_1) + A_2 \exp(-\ t\ /T_2) + A_3 \exp(-\ t\ /T_3)]$ (B.1)

Where

t = time in years

Lo = the level of atmospheric CO2 due to inflow in year t = 0

$L(t)$ = the level of atmospheric CO2 after year t = 0

where the Bern TAR standard values are,

$A_0 = 0.152$

$A_1 = 0.253$

$A_2 = 0.279$

$A_3 = 0.319$

$T_1 = 173$ years

$T_2 = 18.5$ years

$T_3 = 1.19$ years

The A-values merely weight the four terms on the right-hand side of Eq. (B.1):

$A_0 + A_1 + A_2 + A_3 = 1.000$

Set t equal to infinity. Then Eq. (B.1) becomes,

$L = Ao\ Lo = 0.152\ Lo$ (B.2)

Equation (B.2) predicts a one-year inflow that sets Lo to 100 ppm, followed by zero inflow forever, will cause a permanent level of 15 ppm.

Appendix C: How temperature increases CO2

It is outside the scope of this paper to show how the balance level of CO2 changes with surface temperature. Here is reference information.

Harde (2017a) showed how both inflow and outflow depend on surface temperature, and how this causes the balance level to be a non-linear function of surface temperature. Harde used paleoclimate data as well as modern instrumental data to show how the natural balance level of CO2 in the atmosphere depends on surface temperature.

Kohler (2017) criticize Harde's method. However, Harde (2017b) proves Kohler is wrong. Unfortunately, the journal did not publish the Harde (2017b) reply to Kohler.

Fig. C.1 shows a plot using Harde's Eq. (17).

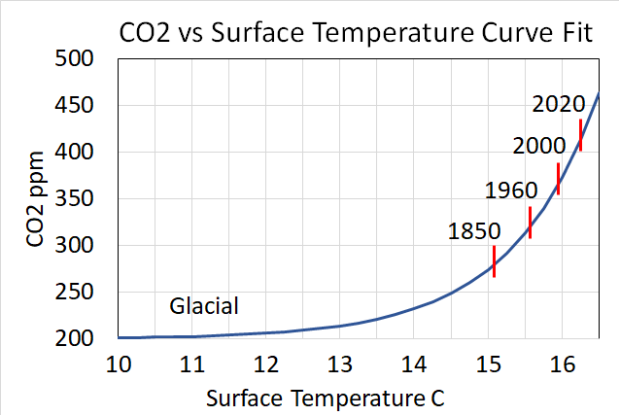

Fig. C1. Curve fit to data from Harde (2017) Eq. (17). CO2 balance level increases with surface temperature exponentially.

Appendix D: How the models fit the 14C data

In Table D.1, Row 1 shows the natural and human 14C ratios in units of D14C. Row 2 and Row 4 show the physics and IPCC natural and human fractions. Row 3 is the product of Row 1 and Row 2. Row 5 is the product of Row 1 and Row 4.

Table D.1. 14C test. Row 1 shows the natural and human 14C ratios in units of D14C. Row 2 and Row 4 show the physics and IPCC natural and human fractions. Row 3 is the product of Row 1 and Row 2. Row 5 is the product of Row 1 and Row 4.

Row	14C Test	Natural	Hum	Sum	Test
1	14C Ratio	0	-100		Figs
2	Physics	.955	.045		
3	Result	0	-4.5	-4.5	Pass
4	IPCC	.68	.32		
5	Result	0	-32	-32	Fail

Appendix E: How the models fit the 13C data

In Table E.1, Row 1 shows the natural and human 13C ratios. Row 2 and Row 4 show the physics and IPCC natural and human fractions. Row 3 is the product of Row 1 and Row 2. Row 5 is the product of Row 1 and Row 4.

Table E.1. 13C test. Row 1 shows the natural and human 13C ratios. Row 2 and Row 4 show the physics and IPCC natural and human fractions. Row 3 is the product of Row 1 and Row 2. Row 5 is the product of Row 1 and Row 4.

Row	13C Test	Natural	Hum	100 - Sum	Test
1	13C Ratio	100	98		-0.15
2	Physics	.955	.045		
3	Result	95.5	4.4	-0.1	Pass
4	IPCC	.68	.32		
5	Result	68.0	31.4	-0.6	Fail

Downloads

- Global 14C data
- New Zealand 14C data
- Physics and Bern models

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