



Nature Controls the CO₂ Increase II

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Vol. 3.2 (2023) **Abstract**

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This paper continues the debate sponsored by Science of Climate Change on the role of human emissions in the CO₂ increases since 1750.

Keywords: CO₂; carbon cycle; climate change; climate emergency; climate alarmism; climate fraud; climate crisis; human emissions.

Submitted 2023-04-25, Accepted 2023-05-09. <https://doi.org/10.53234/scc2023xx/xx>

1. Introduction

The *Intergovernmental Panel on Climate Change* (IPCC, 2013, p. 467, Executive Summary, selected paragraphs) say incorrectly and without scientific basis,

The Human-Caused Perturbation in the Industrial Era CO₂ increased by 40% from 278 ppm about 1750 to 390.5 ppm in 2011.

The removal of human-emitted CO₂ from the atmosphere by natural processes will take a few hundred thousand years (high confidence).

This very-long time required by sinks to remove anthropogenic CO₂ makes climate change caused by elevated CO₂ irreversible on a human time scale.

By contrast, since the beginning of the Industrial Era, fossil fuel extraction from geological reservoirs, and their combustion, has resulted in the transfer of significant amount of fossil carbon from the slow domain into the fast domain, thus causing an unprecedented, major human-induced perturbation in the carbon cycle.

The IPCC assumes the natural CO₂ level remained at about 280 ppm since 1750.

Berry (2019, 2021, 2023) made the following points:

1. The bomb-caused increase in $\delta^{14}\text{C}$ before 1970 has returned to its original balance level of zero with an e-time (level/outflow) of 16.5 years, and this is significant.
2. IPCC's (2007, 2013) natural carbon cycle data can be replicated by a simple four-reservoir "physics" carbon cycle model that uses only one hypothesis, namely, that Outflow equals Level divided by an e-time.
3. This simple, IPCC-approved hypothesis allows us to calculate the human and natural carbon cycles separately.
4. Inserting IPCC's own data into the physics carbon cycle model calculates IPCC's true human carbon cycle.
5. This true IPCC human carbon cycle shows the human addition to atmospheric CO₂ as of 2020 was about 33 ppm.
6. This means natural carbon emissions have increased since 1750 to add about 100 ppm to the 1750 280 ppm CO₂ level as of 2020.
7. This means the fundamental claim of the IPCC that human emissions have caused all the CO₂ increase above 280 ppm is a fraud of global proportions.

8. The e-times of human and natural CO₂ are identical because their molecules are identical.
9. This means IPCC's claim that human CO₂ has an e-time of thousands of years while natural CO₂ has an e-time of 3.5 years is not just wrong but a fraud.
10. This means IPCC's claim that human emissions caused all the CO₂ increase is also a fraud.
11. The percentages of carbon in each reservoir in IPCC's natural carbon cycle represents the natural equilibrium percentages.
12. The human carbon cycle at equilibrium will have these same percentages.
13. Since total human carbon emissions are only one percent of natural carbon in the carbon cycle, the present equilibrium level of human CO₂ is only 4 ppm.
14. This 4 ppm contradicts IPCC's claim that human emissions have caused an unprecedented, major perturbation in the carbon cycle.
15. The return of δ¹⁴C to its original balance level of zero indicates that natural processes cause the δ¹⁴C balance level to remain at zero.
16. This explains the ¹⁴CO₂ increase to be a result of the ¹²CO₂ increase while the δ¹⁴C balance level to remain at zero.
17. The return of δ¹⁴C to its balance level of zero, and not to a lower balance level, shows human emissions have not significantly increased the CO₂ level.

Andrews (2023a, 2023b) contests some of the above points made by Berry.

2. Andrews makes a basic physics error

Andrews (2023b) begins with his equation (1), shown here with e_H on the right side:

$$dL / dt = e_N - a_N + e_H \quad (1)$$

where

L = carbon level (PgC)

t = time (years)

dL / dt = rate of change of L (PgC / year)

e_N = natural carbon inflow (PgC / year)

e_H = human carbon inflow (PgC / year)

a_N = natural carbon outflow (PgC / year)

a_H = human carbon outflow (PgC / year)

Andrews writes we "all now accept" his (1) and.

"It is based simply on carbon conservation and **the absence of significant anthropogenic absorption processes**. Other than that, it is model independent with the two emission and one absorption variables independent and unconstrained. It treats natural and anthropogenic emissions on an equal footing. **There is not a shred of circular reasoning in its derivation.**" (My bolding.)

However, we do not accept (1) because it is missing a way for human carbon to flow out of the atmosphere. We must correct Andrews (1) by subtracting a_H to get (2):

$$dL / dt = (e_N - a_N) + (e_H - a_H) \quad (2)$$

Andrews incorrectly assumes human carbon outflow is insignificant and he omits this outflow in his equation (1). His omission assumes human carbon causes all the CO₂ increase, which is what he claims he proved. This is the circular reasoning that he claims does not exist in (1).

Since Andrews (1) is wrong, all his conclusions are incorrect.

3. Correct physics

Berry's (2021, 2023) equation (1) is a correct formulation as follows:

$$dL / dt = Inflow - Outflow \quad (3)$$

Equation (1) applies independently and in total to N for natural carbon and H for human carbon:

$$dL_N / dt = I_N - O_N \quad (4)$$

$$dL_H / dt = I_H - O_H \quad (5)$$

$$dL / dt = I_N - O_N + I_H - O_H \quad (6)$$

Added together, where L is the sum of human and natural carbon, (6) is the same as (2)

To solve (4), (5), or (6), to find human carbon added to the atmosphere, we need more data.

Berry (2021, 2023) used IPCC's own data to calculate that human carbon emissions have added 33 ppm of CO₂ and natural carbon 100 ppm to the 280-ppm level as of 2020.

4. Andrews first two primary points are wrong.

Andrews (2023b) includes "three primary points" in his Introduction.

- Point (1) is invalid because it omits the term for human carbon emissions.
- Point (2) is invalid because it ignores Berry's calculations of IPCC's true human and natural carbon cycles.

5. Berry's reply to Andrews' two questions

Andrews' (2023b) definition of net sink is based on his equation (1) that omits human carbon outflow. Equation (2) shows why Andrews' claim that nature is a net absorber is wrong.

Berry's calculation of the human carbon cycle shows how human carbon flows from the atmosphere to the land, surface ocean, and deep ocean reservoirs, according to IPCC's data.

6. Berry's questions for Andrews

6.1 Use of ice-core data to reconstruct CO₂ data

How do you justify (in your Figure 1) your comparison of CO₂ levels derived from ice-core proxy data before 1900 with CO₂ levels derived from in-situ data after 1960 when you consider the following?

- Segalstad (1998) shows why ice core reconstructions of CO₂ levels are not reliable.
- Jaworowski (2007) shows ice cores underestimate CO₂ levels.
- Salby (2012, pp. 21, 66) shows ice-core reconstructions of CO₂ levels do not accurately measure historical CO₂ levels.
- There is no published confirmation that the proxy data agree with the in-situ data.

6.2 Best explanation for the ¹⁴C increase after 1960.

- Do you agree the δ¹⁴C balance level has returned to its original balance level of near zero (Berry, 2023, Figure 13)?
- Do you understand Berry's hypothesis that accurately predicts the ¹⁴C increase?
- Do you agree that Berry's hypothesis is the simplest Occam's Razor hypothesis?

6.3 Cawley's analogy.

- Do you admit Cawley's (2011) analogy supports Berry's physics model?

6.4 Calculating human and natural carbon cycles independently.

- Do you agree we should calculate the human and natural carbon cycles independently?

6.5 How human CO₂ remaining in the atmosphere equals the human CO₂ added.

- Do you agree Berry's calculated human carbon level is the same as the amount of human CO₂ added to the atmosphere?

6.6 How δ¹⁴C measures the human CO₂ added.

- Do you agree the δ¹⁴C balance level near zero means the human-caused increase in the CO₂ level is also near zero?

7. Conclusions

Andrews (1) omits the term to calculate human carbon outflow. So, his argument is circular.

Debate-Editor: Olav Martin Kvalheim.

Acknowledgements

My thanks to all who have helped me continue my climate physics research.

Funding

The author received no financial support for this work.

Conflicts of Interest

The Author declares he has no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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