

Scientific summary of *On an error in applying feedback theory to climate*

Monckton of Brenchley *et al.* (2018)

Abstract

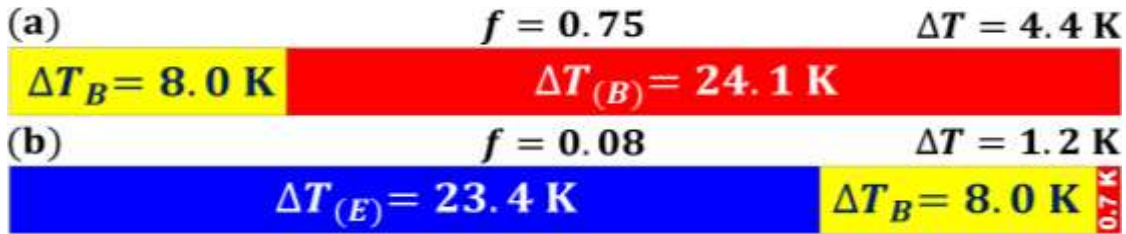
In a dynamical system, even an unamplified input signal induces a response to any feedback. Hitherto, however, the large feedback response to emission temperature has been misattributed to warming from the naturally-occurring, non-condensing greenhouse gases. After correction, the theoretically-derived pre-industrial feedback fraction is demonstrated to cohere with the empirically-derived industrial-era value an order of magnitude below previous estimates, mandating reduction of projected Charney sensitivity from 3.3 ± 1.2 K to 1.2 ± 0.15 K.

Current position: In the CMIP5 models (Andrews 2012), the radiative forcing ΔQ_0 from doubled CO_2 is 3.5 W m^{-2} . The Planck sensitivity parameter λ_0 is $0.313 \text{ K W}^{-1} \text{ m}^2$ (IPCC, 2007, p. 631 fn.). Therefore, before accounting for feedbacks the CMIP5 reference sensitivity $\Delta T_S = \Delta Q_0 \lambda_0 = 3.5 \times 0.313 = 1.1$ K. Then, from the zero-dimensional model, Eq. (1), estimated Charney sensitivity ΔT implicit in Lacis (2010) is 4.4 K, somewhat above the CMIP5 models' mid-range estimate $\Delta T = 3.3$ K (Andrews 2012), which implies $f = 1 - 1.1/3.3 = 0.67$, obtained from (2).

$$\Delta T = \Delta T_S / (1 - f) = 1.1 / (1 - 0.75) = 4.4 \text{ K.} \quad | \quad \text{Zero-dimensional-model} \quad (1)$$

Natural temperature T_N ($= 287$ K) is the difference between today's temperature T_S ($= 288$ K) and the anthropogenic warming ΔT_A (≈ 1 K) since 1850. The "natural greenhouse effect" ΔT_G had been thought to constitute the entire 32 K difference between T_N and emission temperature T_E ($= 255$ K), comprising a direct warming ΔT_B ($= 8$ K) from the naturally-occurring, non-condensing greenhouse gases, a feedback response $\Delta T_{(B)}$ ($= 24$ K) to ΔT_B (Lacis 2010), yet no feedback response $\Delta T_{(E)}$ to T_E ($= 255$ K) (panel (a) below). Eq. (2) shows the feedback fraction f in Lacis (2010).

$$f = 1 - \Delta T_B / \Delta T_G = \Delta T_{(B)} / \Delta T_G = 1 - 8/32 = 24/32 = 0.75. \quad (2)$$



Correction of the long-standing neglect of the feedback response $\Delta T_{(E)}$ to T_E

In reality, emission temperature T_E as well as natural greenhouse warming ΔT_B induces a feedback response. Then pre-industrial $f = 0.08$, taken illustratively as constant, is derived in (3), while (4) gives the impossible maximum feedback fraction $f_{\text{max}} = 0.11$. Then the feedback response $\Delta T_{(E)}$ to T_E is $255.4 f / (1 - f) = 23.4$ K, hitherto erroneously added to $\Delta T_{(B)}$, which is itself only $8f / (1 - f) = 0.7$ K (panel (b) above). Whether $f = 0.08$ or 0.11 (Eq. 3 or Eq. 4), Charney sensitivity $\Delta T = 1.1 / (1 - f) \approx 1.2$ K, not the CMIP5 models' 3.3 K, still less Lacis' 4.4 K.

$$f = 1 - (T_E + \Delta T_B) / T_N = 1 - (255.4 + 8) / 287.6 \approx 0.08. \quad \text{Pre-industrial feedback fraction } f \quad (3)$$

$$f_{\text{max}} = 1 - T_E / T_N = 1 - 255.4 / 287.6 \approx 0.11. \quad \text{Impossible maximum pre-industrial } f \quad (4)$$

Verification

Method 1. IPCC (2013) estimated that net anthropogenic forcing ΔQ_0 to 2011 was 2.29 W m^{-2} , implying reference sensitivity $\Delta T_N = \Delta Q_0 \lambda_0 = 2.29 / 3.2 = 0.72$ K. Observed equilibrium sensitivity from 1850-2011 was 0.76 K. Thus, from (1), industrial-era $f = 1 - 0.72 / 0.76 \approx 0.05$, close to 0.08, implying $\Delta T \approx 1.1 / (1 - 0.05) \approx 1.15$ K.

Method 2. Ten authoritative estimates of net industrial-era manmade forcing were set against surface temperature trends and calculations as in Method 1 were conducted for each period. The results were averaged, whereupon predicted and observed warming were found to be equal for $f \approx 0.12$, implying $\Delta T \approx 1.1 / (1 - 0.05) \approx 1.25$ K.

Method 3. The IPCC 3.3 K 21st-century warming rate is identical to the CMIP5 Charney sensitivity. The HadCRUT4 centennial-equivalent warming rate from 1950-2017 was 1.2 K, identical to the Charney sensitivity found here.

Method 4. Tests commissioned at a government laboratory confirmed that even an unamplified input signal induces a response to any feedback. Consequently the feedback fraction f is 0.05-0.12, not 0.67-0.75, whereupon Charney sensitivity will not be 3.3 [2.0, 4.5] K but **1.2** [1.15, 1.25] K, an abatement of two-thirds against previous projections.

New scientific paper proves global warming fears unfounded

After correcting a large error of physics, global warming will be just **1.2 C°**, not 3.3 C°

Global warming will be small, slow, harmless and beneficial. A new scientific paper, *On an error in applying feedback theory to climate*, published after 12 years' research by an international team, reveals a grave, long-standing and strikingly elementary error of physics inbuilt in current climate models. The paper provides definitive scientific proof that fears of rapid, catastrophic global warming arose solely from that error. Such fears are now proven unfounded. Global-warming mitigation was and is entirely unnecessary.

Instead of the 3.3 C° manmade warming per CO₂ doubling predicted by IPCC in 1990 and 2007 and by the fifth-generation (CMIP5) computer models in 2013, we will cause a small, slow, harmless and beneficial **1.2 C°** warming.

This new result, obtained by a theoretical method, was confirmed by several empirical methods whose results agreed with it. Further confirmation came in experimental tests first by the researchers and then at a government laboratory.

The news will come as a relief to those who had feared that our impact on the climate would be dangerous and even catastrophic. Governments worldwide have already spent trillions trying to solve what turns out to be a non-problem.

For four decades since 1979, when Dr Jule Charney wrote a report for the U.S. National Research Council predicting that for every doubling of CO₂ concentration there would be 1.5 to 4.5 C° global warming with a best estimate of 3 C°, the error of physics exposed by the new paper, unwittingly incorporated five generations of general-circulation computer models of the climate, had misled scientists into exaggerating all their predictions of global warming.

The error of physics arose when climate scientists borrowed feedback methods and mathematics from control theory, originally developed to calculate feedbacks in analog telephone circuits, and then misapplied them. Inconsistently, they had imagined that without any greenhouse gases the Earth's emission temperature of 255 K (−18 C°) would induce no knock-on feedback response at all, while the 8 C° warming from the naturally-occurring greenhouse gases would induce a very large feedback response of 24 C°. For they had mistakenly added the 23.4 C° feedback response induced by the 255 K emission temperature to the tiny 0.7 C° feedback response to the natural greenhouse gases.

Scientists had thus erroneously imagined the pre-industrial feedback fraction was $24 / (8 + 24) = 0.75$, when in reality it is only $0.7 / (8 + 0.7) = 0.08$. Similarly, the industrial-era feedback fraction, based on IPCC's official estimate of 2.29 W m⁻² net manmade forcing to 2011, implying manmade warming of 0.72 C° before accounting for feedback and the HadCRUT4 measured warming of 0.76 C° from 1850-2011, is $1 - 0.72 / 0.76 = 0.05$, not 0.75.

After correction, feedbacks (though mentioned 1000 times in IPCC's 2013 *Fifth Assessment Report*) will not add more than about a tenth of a degree to the 1.1 C° global warming directly caused by doubling CO₂ concentration.

Lord Monckton, the author of many peer-reviewed papers on climate sensitivity and mitigation economics and lead author of the new paper, said: "Climate science had illogically assumed that the Earth's 255 K emission temperature would induce no feedbacks at all, but that the far smaller direct warming of about 8 K driven by the natural greenhouse gases would suddenly induce a very large feedback response, as if by magic. We don't believe in magic."

"What this means," said Dr Willie Soon, a co-author of the new paper, "is that official climatology has long been at odds with mainstream science. Lord Stern's 2006 government review of climate economics estimated a 1 in 10 chance that global warming would end the world by 2100. We have now proven that global warming is not a threat to our planet. The unjustifiable cost of mitigating it harms poor people, who need affordable electricity from coal, which is cheaper than other methods of generation and provides clean, reliable, continuous, lowish-tech, base-load power. Fixing this serious error of physics means international action to mitigate global warming is simply unnecessary."

Co-authors were Dr Soon, an award-winning solar physicist from the Harvard-Smithsonian Center for Astrophysics; Dr David Legates, Professor of Climatology at the University of Delaware; Dr William Briggs, a statistician from Cornell University; Dipl-Ing. Michael Limburg, an electronics engineer from the European Institute for Climate and Energy; Dr Dietrich Jeschke, professor of control theory at the Flensburg University of Applied Sciences; Mr Alex Henney, an expert on the U.K. electricity supply industry; Mr John Whitfield, an electronics engineer, who built a test circuit to verify the team's results; and Mr James Morrison, a university undergraduate in environmental sciences.

Funding was not required for this research because all authors generously gave their time for science without charge.