Comment on Skrable et al. (2022)

I read with interest the recent ^{14}C analysis suggesting that the burning of fossil fuel accounts for only about 23% of the recent enormous increase in atmospheric CO_2 concentration (Skrable et al. 2022). I commend the authors for bringing apparently novel quantitative information to bear on a very complex topic. I was, however, perplexed by some conclusions regarding global warming the authors deduced as they moved beyond their actual findings to dabble in climate science. Specifically, Conclusion 3 asserts that the huge increase in atmospheric CO_2 concentration (from <280 ppm in 1750 to >410 ppm today) is mostly "due to increases in temperatures from solar insolation in 1950 and afterwards." The publication of this paper in HPJ seems inappropriate because it has nothing to do with health physics (if we acknowledge that the Society's aim is radiation safety). Also, publishing this work in a journal having no relation to climate science shielded this manuscript from peer review by actual climate scientists. A cursory review of the data casts doubts on both the implication of insolation variations and on the oversimplification that fossil fuel-related CO_2 is the only significant anthropic driver of global warming.

Fig. 1 of the paper shows that solar insolation has actually been declining significantly for a couple thousand years. Solar insolation varies only slightly (~0.2%) during its 11-y cycle, and the 1950 peak was not significantly larger than other peaks (SORCE 2022; Bralower and Bice n.d.). This statistically insignificant variation in solar insolation does not appear to correlate with the recent changes in either CO_2 concentration or rising average temperatures (NASA 2021). Complex positive feedback mechanisms and the many non-fossil fuel anthropic contributions to global warming can account for increasing temperatures without the need to appeal to the barely discernible variations in solar insolation.

For example, massive deforestation and urbanization impact the 27% of CO_2 that the authors consign to terrestrial reservoirs by releasing CO_2 when forests are cut down, eliminating a CO_2 sink from then on (Nunez 2019), changing albedo, disrupting the water cycle, and so on.

Our planet supports about a billion head of beef cattle (Shabbandeh 2022a) and about 700 million pigs (Shabbandeh 2022b) on any given day. This industrial meat production generates huge quantities of methane, as do other anthropic activities (e.g., natural gas production; landfills are the third-leading source). Methane is shorter-lived and lower volume but a much more potent greenhouse gas than CO_2. Like CO_2, increasing global temperatures may also release methane from the oceans (Hamden et al. 2016), and methane concentration (mostly non-fossil fuel related) has proportionately increased even more dramatically than CO_2 (NASA Earth Observatory n.d.).

The lower volume but far more potent anthropogenic greenhouse gasses nitrous oxide and fluorinated compounds also increase global warming (US EPA 2021). There are many other non-fossil fuel anthropogenic factors that contribute to global warming. Amplified by positive feedback mechanisms, these factors have pushed global temperatures higher, releasing still more CO_2 and resulting in the highest CO_2 (Lindsey 2021) and methane (US EPA 2016) concentrations by far in 800,000 years.

It really would be reassuring to share the author's assumption that if we simply wait long enough on geologic timescales, average temperatures will "decrease again as they have done over all of the previous glacial-interglacial cycles." We may have honest disagreements regarding the relative significance of the many individual anthropogenic contributors to global warming or of the associated positive feedback loops in what we can all agree is a very complex climate system. However, ignoring the cumulative effect of the many continuously growing anthropogenic contributions that correlate to global warming, while focusing on (comparatively minuscule and uncorrelated) solar insolation variations, would in the authors' words lead to "unsupported conclusions." More to the point, I urge the authors to celebrate their intellectual and scientific integrity by submitting their interesting and novel findings to a publication focused on climate science rather than one dedicated to radiation safety. This would benefit the climate science community and avail the authors of more applicable peer review.

The author declares no conflicts of interest.

0017-9078/22/0

Ben E. Edwards

Chapel Hill, NC

DOI: 10.1097/HP.0000000000001565

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