Comments on "World Atmospheric CO_2, Its ^{14}C Specific Activity, Non-fossil Component, Anthropogenic Fossil Component, and Emissions" by Skrable et al. (2022)

Dear Editors:

The goal of the paper by Skrable et al. (2022) was to examine the source of increasing CO_2 in the atmosphere and implications of this examination on climate change and potential strategies to deal with it. In their examination the authors relied on published measurements of $^{14}\Delta CO_2$ in air, a measure of the ratio of the abundances of the trace radioactive isotope ^{14}C to the abundant stable isotope ^{12}C. Radioactive $^{14}CO_2$ is present only in modern carbon (on account of its half-life of 5,000 y) but not in fossil fuels. Hence, a decrease in $^{14}\Delta CO_2$ in air would result from introduction of CO_2 from fossil fuel combustion. This phenomenon, called the Suess effect, has been known for some 70 y (Suess et al. 1967).

The difficulty with quantitative interpretation of the decrease in $^{14}\Delta CO_2$ in air arises mainly from uncertain rate and extent of coupling of CO_2 in the atmospheric reservoir with other reservoirs (ocean, terrestrial biosphere). A further difficulty arises from the large increase in atmospheric $^{14}CO_2$ resulting from atmospheric testing of nuclear weapons in the 1950s and early 1960s, which more or less precludes inferences of the atmospheric CO_2 budget from measurement of $^{14}\Delta CO_2$ in air since that time. Clearly the authors believe they have surmounted these difficulties in arriving at their conclusion that the contribution of fossil fuel CO_2 emissions to the observed increase in atmospheric CO_2 over the industrial period is much less than is accepted by virtually all of the atmospheric science community as reflected, for example, in the several reports by the Intergovernmental Panel on Climate Change Assessment Reports (https://www.ipcc.ch/assessment-report/ar6/).

From the perspective of publication of the Skrable article in *Health Physics*, the question arises as to its suitability for this Journal. Their analysis has no connection to any concept related to radiation effects to the environment (radioecology) or health effects to people (dosimetry and risk assessment), which are in the purview of the Journal. The phenomenology of ^{14}C in the paper was simply a characteristic of nuclear physics. There were no references to any scientific publications related to health physics except for one to a textbook on radioecology (Eisenbud and Gesell 1997). It was cited only for the physics of ^{14}C production in the environment. The textbook cited a 1953 reference to Anderson on the production mechanism by cosmic rays in the atmosphere; thus, while the textbook is relevant to health physics, the citation is not (Anderson 1953).

Notwithstanding, the authors put forth an interesting hypothesis and good faith effort to prove the hypothesis, but they did not appear to attempt a direct engagement with the primary scientific community of atmospheric scientists to whom they posed a widely divergent and controversial opinion. The draft was presented for peer review to experts in health physics but not to scientists who are expert in CO_2 emissions and who study CO_2 and ^{14}C in the atmosphere. Conversely, if an atmospheric science journal editor had sent me the manuscript to referee, I would have declined without hesitation.

Certainly, the authors believe they have arrived at a finding and conclusion that the atmospheric science mainstream does not currently embrace. Why not then publish in a disciplinary journal such as *Journal of Geophysical Research* or *Geophysical Research Letters* where precisely this type of research is published, or in a high-impact multidisciplinary journal such as *Proceedings of the National Academy of Sciences* or *Nature*?

The relationship of ^{14}C behavior to global climate behavior has no characteristic of radiation protection. The Journal was not the correct venue for the content of the paper by Skrable et al. (2022).

Despite the venue of publication, I feel confident that the paper of Skrable et al. (2022) will receive scrutiny from the atmospheric science community.

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The authors declare no conflicts of interest.

The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

0017-9078/22/0

DOI: 10.1097/HP.0000000000001569

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