

Components of CO₂ in 1750 through 2018 Corrected for the Perturbation of the ¹⁴CO₂ Bomb Spike

Dear Editors:

This letter relates to information in our paper (Skrable et al. 2022) and to a letter that concludes our paper should be retracted from *Health Physics* in its entirety (Schwartz et al. 2022). Our response to this letter counters those comments and conclusion. The following information provides further details.

The letter from Schwartz et al. (2022) contains a figure that includes a curve from 1750 through 2015 of ¹⁴C specific activities in our paper as well as a curve of their specific activities labeled as “No bombs” that is modeled to remove the perturbation of the increase in ¹⁴CO₂ from atmospheric nuclear bomb tests in the 1950s and 1960s. The curve of specific activities from our paper appears to be about 2 dpm (gC)⁻¹ higher than the “No bombs” curve throughout the entire period from 1750 to 2015 (traditional units are used here because they are used in ¹⁴C dating and in each of the three references in this letter). We admittedly recognized in our paper and in our response to their letter that our specific activities were likely elevated. However, we did not recognize in our paper, based upon cited data from Wikipedia and NOAA, that our specific activities did not adequately consider the interference from ¹⁴CO₂ in atmospheric nuclear bomb tests.

None of the four letters to the editor in the June 2022 issue of *Health Physics* include any specific criticism of the assumptions, methodologies, and simple equations that we use in our paper to estimate the anthropogenic fossil and non-fossil components present each year in the atmosphere. We have estimated from the “No bombs” curve, modeled in the absence of the perturbation due to nuclear weapons testing, an approximation fitting function of annual expected specific activities.

Annual mean concentrations of CO₂ in our paper are used along with our revised expected specific activities to calculate values of the anthropogenic fossil and non-fossil components of CO₂. These values are presented in revisions of Table 2a, Table 2, and figures in our paper. They are included here in a revised supporting document for our paper, which provides a detailed discussion of the assumptions, methodology, equations, and example calculations of the two components of CO₂ in 2018. Our revised results support our original conclusions and produce an even smaller anthropogenic fraction of CO₂ in the atmosphere. The file for the revised supporting document, including Table 2, is available at the link: (Supplemental Digital Content link, <http://links.lww.com/HP/A230> provided by HPJ).

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0017-9078/22/0

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DOI: 10.1097/HP.0000000000001606