

Interactive comment on “Atmospheric radiocarbon measurements to quantify CO₂ emissions in the UK from 2014 to 2015” by Angelina Wenger et al.

Anonymous Referee #1

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This paper aims to use ¹⁴C measurements and modelling to examine fossil fuel CO₂ emissions in the UK. The concept is good, and I think that the results could be quite useful. Unfortunately though, this work is not yet ready for publication. The writing is so disorganized that it is not possible to assess the quality of the science. As I read through the paper, I started to make notes on specific points that were unclear. After five pages of noting my confusion with every section beyond the introduction, I gave up in frustration. I am very sorry to have to be so harsh, but this paper needs to be entirely rewritten so that the (likely very good) research can be reviewed and the meaning can become apparent.

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Just to choose two examples: Section 3.2 is titled “Isotope modelling”. The content of this section is a series of equations, many of which are inappropriate or even wrong. For example, $\delta^{14}\text{C}$ is explicitly detailed in an equation, but the equation is incorrect. Further, $\delta^{14}\text{C}$ is never actually used in the paper, rather $\delta^{14}\text{C}$ is used but never explained in any equation. It is also not clear what these equations are used for. Are they used to determine simulated ^{13}C and ^{14}C values based on the model simulation? Or are they meant to show how the ^{13}C and ^{14}C content of the measurements was calculated? Whichever of these is the intent, it needs to be clear what it is that is being determined from the equations, and the equations presented should be pertinent to the results that are being shown later in the paper.

Section 3.3 and 4.1. The discussion of biogenic and nuclear corrections looks interesting, but it is never explained where the values in figure 2 come from. Are these model simulations? Or based on observations? Further, the values plotted in figure 2 are not defined in the text or in any of the equations that are presented in the paper. A very knowledgeable reader would guess that these correction terms are meant to represent the bias term in equation 10, but with that bias term split out into “biogenic” and “nuclear” rather than lumped together into “other”.

I cannot evaluate the science in this paper until it is more clearly presented, and therefore have no choice but to recommend rejection and resubmission of a new, completely rewritten paper based on the same underlying research. I recommend that the more experienced coauthors expend some effort in assisting with the writing.

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