

Review on “Global Carbon Budget 2022” by Friedlingstein submitted to ESSD
(#essd-2022-328/)

General comment

The Global Carbon Program (GCP) annually publishes a detailed analysis of the global carbon cycle budget using simulation model results, observational and statistical data. This manuscript is the latest edition of such analysis, and many parts of the methodology have been thoroughly reviewed in previous editions. The manuscript is deemed acceptable assuming that the authors provide appropriate responses to these comments.

Specific comments

1. II.214-216: In line 190, the authors excluded cement carbonation. It is not quite clear whether the “total anthropogenic emissions” include cement carbonation or not. Please clarify.
2. section 2.5: The authors mention several times on emissions from peat fire, but not on those from natural and anthropogenic biomass burning. How are they treated in this estimate?
3. Some of the DGVMs list in Table A1 are not DGVMs in its narrow sense, i.e., models that predict the distribution of plant types. VIST, for example, deals with biomass variation with a fixed distribution of plant types. Note somewhere that the term “DGVMs” in this manuscript simply means vegetation models. Also, it would be more user-friendly if Table 4 is referred to in addition to Table A1.
4. I.562: ONI index -> The acronym ONI includes the word “index”. Please just say “ONI” instead of “ONI index”. There are a few other places where the same expression is used. I am afraid that the authors are well aware of this, but I presume many of the readers will feel uncomfortable with this expression.
5. I. 891: This sentence says that 30% is from LUC and 79% is from fossil fuel. The sum exceeds 100%.
6. I. 976: The text says “one new model is included” but Table 4 shows there are two models that are new this year. Perhaps the authors meant something like “one of the new models bears an estimate higher than the average”?
7. II.1034-1035: “This suggests... by the ocean.” This sentence casts doubt on the scheme adopted in the manuscript to calculate ocean uptake as an average between GOBM estimates and observation-based products. Isn't it more suitable to put some weight on the observation-based products when the authors are so sure that GOBMs underestimate the uptake? Explanation from the authors on this point would be appreciated.
8. II. 1398-1399: It is stated that the importance of ELUC is increasing, but given the fact that the fraction of ELUC to the entire