Thanks to authors for intent to share data. This reader can easily download and open any of three products from Zenodo.

Not sure how to react to this product? Good methods but trivial outcome? Absence of necessary information and incompatibilities with other products cloud my overall judgement.

Serious questions first, followed by technical issues.

Time period. Title implies 1963 to 2020. Authors never explain why 1963 nor why 2020? Guo et al. (in ESSD 2021: https://doi.org/10.5194/essd-13-1791-2021) report - for cement - 1930 to 2019. Andrew, also considering cement but published a year earlier (https://doi.org/10.5194/essd-11-1675-2019) used 1928 to 2018. Global carbon budget (multiple versions published in ESSD but here I use GCB 2021, https://doi.org/10.5194/essd-14-1917-2022, to extract data for 2020 used below) covers (in detail) 1959 through current year. Although these authors expend considerable text (e.g. in lines 69 to 83) to justify closing gap in China data (evidently restricted to 2002-2016) via statistical extrapolation, readers never see explanation for start year of 1963. Comes from US, via USGS? Or something from RoW? Readers can guess why data extend to 2020, but 1963 never explained and doesn't match other products.

Problem with single years. Authors discuss 2020 lime emissions but with almost no discussion: a) they had to extrapolate - at least for China data - to get to that number; b) we know that any single year carries very large (larger than 95% CI) uncertainty; and c) we know that 2020 particularly, occurring as it did as countries emerged (or, not) from economic and social impacts of pandemic, itself represented an unusual year.

Impact estimate. Weaknesses in using specific single years notwithstanding, this reader evaluated 2021 GCB (https://doi.org/10.5194/essd-14-1917-2022). I find total 2020 emissions as 9.3 $\pm$ 0.5 GtC/yr (using customary well-justified GCB $\pm$ 5% uncertainty) when they include cement carbonation correction. Without carbonation correction they report 9.5 GtC/yr, so total cement carbonation term = 0.2 GtC/yr in 2020. Authors of this manuscript give 134.33 Mt CO2, converts to approximately 36 MtC per 2020. Given overall uncertainties of 500 MtC per year and total cement carbonation of 200 MtC per year in 2020, numbers presented here (36 / 200) represent at most 20% correction on carbonation (numbers provided by these authors in their Table 2 tend to support my estimates) and only 0.4% correction on overall emissions, well within uncertainty limits. Not clear to this reader why authors consider this work worthy of ESSD publication? Although they proclaim (lines 22-23) importance of lime processes in carbon cycle, actual numbers (which they never quote but should) prove otherwise. On the other hand, we need to quantify all these corrections (however minor) so authors need to demonstrate special efforts and skills to certify extremely small numbers. Not clear to this reader how authors came up with 38% number (line 19) nor what "associated processes" (line 20) they refer to. Later they quote another author (line 42) that total lime-related carbonation occurs within only 34% of lime produced. Authors' obvious enthusiasm for their topic obscures practical impact; this reader had to resort to own calculation (above). Most readers will need a statement about minimal current impact, coupled with justification to quantify as precise albeit small correction and as possible future mitigation option.

Please can I also suggest that: a) these authors need to reconsider how they can justify reporting unrealistic uncertainties at tenths or hundredth of Mt CO2); and b) work could have stronger impact if they adopted units (C rather than CO2) and uncertainty conventions of GCB.

ESSD references. It seems poor form to miss so much highly-relevant prior work, much of it cited above, published in the journal which these authors choose to use. Perhaps with focus on lime processes and lime engineering they have missed relevant climate impact literature?

Fair enough if they want engineers as their audience but they clearly reach for climate relevance. If so, they need to cite relevant literature.

Posting uncertainties in separate file to actual data seems unusual at best? Derives from authors' mechanisms (after-the-fact Monte Carlo simulations) to estimate uncertainties? Validations very challenging for one-off products but I have given some budget-related hints above. Authors might know other validation options? Unfortunately, these authors never address validation. Perhaps they should review ESSD guidelines at https://www.earth-syst-sci-data.net/10/2275/2018/. I decided not to list further line-by-line technical changes. I vacillate between recommending rejection or recommending major revisions; I leave that question to handling editor. In reading this manuscript I wanted but could not find key justification and relevance nor acceptable uncertainties nor any validation attempt.