

## ***Interactive comment on “Global CO<sub>2</sub> emissions from cement production” by Robbie M. Andrew***

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I thank the reviewer for their comments on the manuscript.

The reviewer has indicated clearly that I have not represented EDGAR correctly, by referring to older datasets than were available. This is regrettable. I had looked at all of the data files available for download from the EDGAR website and not found any that specifically listed cement emissions beyond 4.1/4.2. I used 4.1 because the downloadable data file had the same emissions data as 4.2 but had one additional year, 2009. It was my mistake not to find the tables in the reports which do indicate cement emissions from later datasets. I will revise the manuscript accordingly. One reason that the manuscript focusses more on comparisons with CDIAC was that the starting point of the work was in the context of the Global Carbon Project, for which the fossil fuel and industry emissions are based largely on CDIAC. I will add EDGAR's

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emissions estimates to Figure 3. For Figure 4 it is not so clear that adding EDGAR will be beneficial, partly because the figure will become very cluttered, but also because for two of the countries presented there I show UNFCCC time series, which will be identical to EDGAR.

The statement in the abstract about cement being the third-largest anthropogenic source of CO<sub>2</sub> was for general context and not intended to be particularly specific. But by Fossil Fuels I meant oxidation, not combustion. And by Land-Use Change I meant the previous IPCC category LULUCF, part of the new IPCC category AFOLU excluding agriculture. Emissions of CO<sub>2</sub> in the IPCC's Agriculture sector are very minor, being only from urea and lime application. The 2006 IPCC guidelines include combustion of biomass in the AFOLU sector. Therefore, using the definitions I have followed, cement process emissions are the third-highest. This statement is not critical to the article, and is merely for general context.

I agree that the abstract should have specified that only process emissions were included, and this will be remedied. I also agree that the period used for cumulative emissions should be given in both the abstract and in the main body of the manuscript, and this will also be remedied.

With respect to China's reports to the UNFCCC, I believe the reviewer is referring to the Biennial Update Report from China, which is dated 12 January 2017 on the UNFCCC website ([http://unfccc.int/national\\_reports/non-annex\\_i\\_natcom/reporting\\_on\\_climate\\_change/items/8722.php](http://unfccc.int/national_reports/non-annex_i_natcom/reporting_on_climate_change/items/8722.php)), but in fact the date given in the report is December 2016. January 2017 was presumably the date of submission to the UNFCCC. I have referred to this report on page 6 at line 5 (NDRC, 2016). The most recent National Communication from China was November 2012. I go into more detail in the section on China in the Supplementary Material, which states: "China has released several official estimates of process emissions from cement production in reporting to the UNFCCC. In its First National Communication to the UNFCCC, China reported process emissions from cement production of 157.8 Mt

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CO<sub>2</sub> in 1994 from about 300 Mt clinker (SDPC, 2004). In its Second National Communication, China reported 411.7 Mt CO<sub>2</sub> in 2005 from about 765 Mt of clinker (NDRC, 2012, 2014). And in its first Biennial Update Report, China doesn't report emissions from cement production separately, but does report clinker production of 1303.9 Mt in 2012 (NDRC, 2016), which, with China's emission factor of 0.5383, would have led to about 702 MtCO<sub>2</sub>. In all three cases, China has used firm-level surveys to determine the emission factor."

I agree that the specific CRF datasets from the UNFCCC should have been referenced. All data were from 2017 submissions, the most recent available at the time of final data assembly. Countries submit revised datasets through the year, so I will add a statement to indicate when the data were downloaded. The intention is that this is a living dataset and that revised data will be downloaded and incorporated as it becomes available, and this intention has clearly led to a lack of clarity in the manuscript. The information is in fact (insufficiently) squirreled away in the data files: "Data as at 7 June 2017".

The reference to EDGAR in section 4 will be revised to refer to the data presented in the 2016 report, for the year 2015, since that is the most recent available.

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