

Interactive comment on “Designing global climate and atmospheric chemistry simulations for 1 km and 10,diameter asteroid impacts using the properties of ejecta from the K-Pg impact” by Owen B. Toon et al.

Anonymous Referee #1

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1 General comments

The paper contains a comprehensive review of material relevant to study the impact of asteroid strikes on the atmosphere of the Earth. It considers particulates of all scales released or formed during or after the collision including huge amounts of soot from ignited biomass which severely perturbs the radiation budget of the Earth, but also gases like halogens and sulfur perturbing atmospheric chemistry. This includes gases and particles released during a marine impact. The tables provide data to be used for simulations with comprehensive chemistry climate models. First simulations have

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been performed by one of the authors using a state of the art model. The paper should be published in ACP after some minor corrections.

2 Specific comments

Sometimes the word "atmosphere" can be misleading. I suppose in line 414 troposphere is meant.

The sections 2.4.1.2 and 2.4.1.3 are difficult to understand because references are messed up or not listed. At the beginning of section 2.4.1.3 (line 836) this even leads to a sentence containing nonsense.

In general, some references are cited too often, sometimes words like "they" or "the latter" would be better.

Section 4 might be slightly shortened since it contains too many details discussed earlier. Better give a reference to WACCM at the end.

3 Technical corrections

Several citations have to be corrected because "et al" is missing or the paper is not listed or the author misspelled (lines 90, 310, 790, 830, 1085, 1096, 1104, 1213, 1328, 1332, 1335).

Typos in lines 792, 837(?), 879, 948, 1067, 1091, 1332, 1456, Table 5.

Insert "their" in line 418 before "Figure".

Something is missing in line 265.

I cannot find Hervig et al (2006), line 561, 588, 1698. Should it be Hervig et al (2009)?

Gulik et al (2008) is not cited.

Please complete citation in Table 1. Also better say there " $< 1 \mu\text{m}$ ". Improve caption or first 2 rows of Table 2 concerning units and scale factor. Ambient values or burden?

Table 3, row 2: total amount and column density?

Tables 2 and 4: The footnotes concerning CO_2 should be the same.

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