

Interactive comment on “Transfer of organic Br and Cl from the Biosphere to the Atmosphere during the Cretaceous/Tertiary Impact: Implications for the stratospheric Ozone Layer” by K. Kourtidis

Anonymous Referee #1

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General comments

This manuscript considers the possible effects on atmospheric ozone as a result of large increases in the concentrations of methyl chloride and methyl bromide immediately after the Cretaceous/Tertiary Impact. While we are familiar with the effects of anthropogenic halocarbons on ozone levels in today's atmosphere, it is not surprising to think that ozone depletion events could have occurred in the past without human intervention as a result of some violent, catastrophic event such as a meteor impact.

The science behind the manuscript is more or less clearly laid out and the author's conclusions seem entirely reasonable. The paper is a little difficult to read in some locations, although some degree of editing is likely to clear this up.

Specific comments

Page 6770, Line 11: The methyl halides themselves are not considered “active”, but are a source material for active halides (e.g. X, XO, etc.).

Page 6772: Perhaps I am missing something, but do the source and sink rates make sense? For example, the source numbers given for methyl chloride add up to about 1.6 Tg yr^{-1} and the sink values add up to -3.2 Tg yr^{-1} for a net loss of -1.7 Tg yr^{-1} . How is the burden of 4.3 Tg maintained? Maybe the author implies the balance is made up of sources other than biomass burning and the oceans. If that is the case, simply say “other sources account for ...”.

Page 6772: The paragraph at the bottom of the page discusses relative emission rates. To me, the numbers seem to run into one another. I was wondering if a small table would be in order here to quickly compare and contrast the relative rates.

Page 6773, Line 12: Does the author mean enough CO_2 was injected after the impact to yield a mixing ratio of 1000 ppm?

Page 6775: The transition from the preceding bulleted list into the discussion on the two-box model is not smooth. The author sort of just jumps right into things. On the first pass through the paper, I found myself wondering why methyl bromide was being used as the example; it was not until Page 6778, Line 10, that I found out a model did not exist for methyl chloride. In general, the text describing the model should be shortened up as much as possible. The long lists of variables make for more difficult reading. For example, why spend time on describing variables that are just set to zero in the end (e.g., Page 6778, Line 1)? Also, the only difference between Equation 1 and 1' is that F_{OH} replaces F_a . Cannot this be taken care of in the text somehow? I suspect

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that Equations 3 and 3' as well as 4 and 4' can be similarly compacted.

Technical comments

Page 6770, Line 14: Change “lead” to “led”.

Page 6770, Line 22: Replace “... result from ...” with “... yield ...”.

Page 6770, Line 23: Here and other places, put a comma before “and” when specifying a list of items.

Page 6771, Line 3: Insert “during” between “surface” and “the”.

Page 6771, Line 5: Insert comma after “ago”.

Page 6771, Line 6: Use “g” for gram to maintain consistency throughout the paper.

Page 6771, Line 18: Remove “have”.

Page 6771, Line 23: Replace “which” with “and thus”.

Page 6772, Line 14: Replace “extend” with “extent”.

Page 6772, Line 24: Insert “the” between “measured” and “relative”.

Page 6772, Line 28: Insert a period after “respectively”.

Page 6772: Be consistent in the citation of numbers. Perhaps sticking with scientific notation is the best to avoid unnecessary confusion when comparing scientific notation based numbers against prefixed units.

Page 6773, Line 14: Replace “have been” with “were”.

Page 6773, Line 24: Eliminate double period.

Page 6773, Line 25: Insert “would have” between “layer” and “occurred”.

Page 6774, Line 25: Move “a)” before “we”.

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Page 6774, Line 27: Replace period with a semi-colon and change “This” to “this”.

Page 6775, Line 1: Replace period with “, or”.

Page 6775, Line 16: What is “patm”? Units of atmosphere? (See also Page 6776, Line 15).

Page 6775, Line 18: Change all flux units of type “moles y^{-1} ” to “mol yr^{-1} ”. The unit yr^{-1} was used in the text before to represent “per year”.

Page 6776, Line 12: Change “pseudofirstorder” to “pseudo-first order”.

Page 6776, Line 19: Replace “it” with “, k_a ”.

Page 6777: The small paragraphs at the top of this page might be better integrated in with the model discussion.

Page 6777, Line 11: Swap the order of the reactions to coincide with how they are introduced in the text.

Page 6777, Line 17: Replace “basecase” with “baseline”.

Page 6778, Line 2: Make sure that all variables are italicized properly (e.g., the “z” in this line).

Page 6778, Line 3: The surface area of the ocean was already cited on Page 6776, Line 2.

Page 6778, Line 12: Insert “quickly” between “is” and “removed”.

Page 6778, Line 13: Delete “rather fast”.

Page 6779, Line 10: Delete “ultimately, “.

Page 6779, Line 11: Insert “ultimately” between “would” and “depend”.

Page 6780, Line 17: Insert space between “g” and “ cm^{-3} ”.

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Page 6782, Line 4: Change “presented” to “present”.

Page 6782, Line 9: Replace “more” with “additional”.

Page 6782, Line 10: Replace “constrain of” with “constraints to”.

Page 6786: In Table 1, change “base case” to “baseline”. Also, no need to tabulate temperature since it is the same in each case.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 6769, 2004.

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