

## ***Interactive comment on “The sulfur- and halogen-rich super eruption Los Chocoyos and its impacts on climate and environment” by Hans Brenna et al.***

### **Anonymous Referee #3**

Received and published: 10 November 2019

The paper simulates the climatic and environmental effects of the Los Chocoyos super eruption using an advanced Earth System Model with the interactive bin aerosol module. The specific feature of this research is the effect of the volcanically emitted halogens on the ozone layer and the volcanic effect in general. The subject of the study is scientifically intriguing and timely. The chosen approach is scientifically sound. I suggest the paper could be published after a major revision.

General comments: The paper is a little superficial. The authors choose to discuss multiple aspects of the simulation but did it relatively shallow. The discussion would benefit from the relevant references. It is not like the authors do not have any refer-

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ences, but in many places, it would be better to make the text more strict and reference proper prior studies. The authors have to formulate their science questions explicitly and make a stronger focus on their primary research subject, i.e., the ozone depletion and its effects on temperature and precipitation. The discussion of the other physical effects is sketchy, and the mechanisms are not well explained. The text has to be cleaned up and corrected from grammatic errors.

Specific comments:

L23: "southward"

L38: Correct the sentence

L47: "block", "cool"

L72: Bekki did not have ocean and did not account for the cross-tropopause water vapor transport

L103-104: English et al. (2013) do not account for aerosol radiative effect at all

L105: "smaller ones"

L117: Please reference proper studies

L120: Please reference Predybaylo et al. and Pausata et al

L144-147: Please formulate science questions explicitly

L149: "eruption"

L144: Why 10% of halogen mass?

L177-178: Wrong sentence

L198-200: What is ONI? Why don't you take the existed Nino3.4?

L214-219: What about the tropopause layer warming that will lead to increasing the water vapor flux into the stratosphere?

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L225-228: This is not consistent with Timmreck et al. (2010). Maybe you underestimate the size of sulfate aerosol particles?

L259: Toohey was not the first who studied this effect

L266: Is it an increase in 5.45 times, or it is an addition of 545% of mass?

L310-316: The interhemispheric asymmetry of the aerosol plume maybe experiment and model-dependent.

L330-339: References are needed. If you talk about the impact on ENSO, why don't you talk about the impact on the overturning circulation?

L353: English et al. (2013) do not account for radiative effect of aerosols and do not calculate climate response. So it is a wrong reference in this place

L367-369: Hansen et al. discussed this 30 years ago. Please reference

L409: Correct the grammar

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