

## ***Interactive comment on “Surface temperature response to the major volcanic eruptions in multiple reanalysis data sets” by Masatomo Fujiwara et al.***

### **Anonymous Referee #1**

Received and published: 7 July 2019

#### General comments

The manuscript describes the response of the surface temperature to major volcanic eruption. The manuscript is in the scope of ACP. The authors applied multiple linear regression analysis (MLR) to retrieve the response from several atmospheric reanalysis products. Several studies of the climate response to volcanic eruptions based on model and observation results have been published before. The novelty of this work consists of the exploitation of multiple reanalysis data sets. However, the applications of similar observation data for all reanalysis products leads to visually similar, patchy and marginally significant response pattern making the manuscript difficult for the read-

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ers. The problem is enhanced by a high number of very small panels and to simplified description of the figures. The manuscript is interesting and should be published, but the authors should make it more attractive for the readers. Otherwise, they great efforts will not be fully appreciated.

#### Major issues

1. I do not completely understand the motivation of the SST application as a proxy for MLR. Can be part of the signal lost due to this procedure.
2. Would it be possible to explain how the statistical significance was estimated? In text it is said that 1 SD criteria was used, but is it not too weak?
3. In the introduction I recommend describing expectations for the surface temperature response to volcanic eruptions. Then it will be easier to describe the obtained results.

Minor issues: 1. Page 8, first paragraph: How to explain similar anomalies during the periods w/o volcanos. Is it the results of similar observations used for assimilation?

2. Page 8, line 28: Why for two reanalyses only? Do the others produce similar results?
3. Page 10, first para: It is difficult to read. It looks like text description of the pattern visible from the figure
4. Page 11, line 1: More sophisticated methods are not always more accurate.
5. Page 11, second para: Not conclusive. What are the conclusions from the discussion?
6. Page 11: Too descriptive to my taste. I recommend improving the text.
7. Page 11, lines 24-26: Please, discuss why the difference between considered periods is so important.
8. Page 12, line 11: Maybe because it is not robust.
9. Page 12, line 22: “All known externally-forced”. Could be internal than?

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10. Page 12, lines 31-32: Not instructive conclusions. Kind a everything is possible. . .

11. Page 13, 3rd papa: Strong point. Can it be confirmed by radiative forcing consideration? How about models? They are not perfect, but at least does not depend on MLR problems.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-384>, 2019.