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# ***Interactive comment on “The impact of volcanic aerosol on the Northern Hemisphere stratospheric polar vortex: mechanisms and sensitivity to forcing structure” by M. Toohey et al.***

**Anonymous Referee #1**

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This manuscript presents a modeling investigation of the impact of volcanic aerosols on the NH stratospheric vortex. Model simulations are performed to examine the impact of the 1991 Mt Pinatubo eruption using four different aerosol forcing datasets. The analysis shows several robust results across the different forcing datasets (including changes in lower stratosphere temperatures, wave activity, and residual circulation), but also shows some differences. Perhaps the most important result is the lack of a robust NH polar vortex response.

The manuscript is well written, results are interesting and clearly presented, and I think the manuscript is suitable for publication in ACP in its current form.

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I only have a couple of suggestions for the authors to consider.

1. Currently only ensemble mean quantities are shown. I think it would be useful to include at least one figure showing the variability between the ensemble members, especially for polar vortex diagnostics. Maybe something like Figure 2, e.g., equivalent of Figure 2a but for each set of 12 runs.

2. The full results for the 2 observation-based forcings are currently presented, and then the analysis is repeated for the model-based forcings. I wonder if it might not be better to combine together, and compare extinction and heating for all 4, then temperature and winds for all 4, etc. I found myself effectively doing this as I read the paper.

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 16777, 2014.

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