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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The environmental impact of the Puyehue-Cordon Caulle 2011 volcanic eruption on Buenos Aires" *by* G. B. Raga et al.

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Concern: Review of the manuscript "The environmental impact of the Puyehue-Cordon Caulle 2011 volcanic eruption on Buenos Aires" by Raga et al.

General Comments

The paper presents data coming from a suite of instruments located at Buenos Aires which detected volcanic cloud produced during the 2011 Puyehue-Cordón Caulle eruption. The main results of the work is that, due to the presence of the volcanic activity, the concentration of condensation nuclei, the mass concentration of particle-bound

polycyclic aromatic hydrocarbons and the light absorption coefficient exceed the average background value by more the one standard deviation. Authors also assert that the volcanic cloud affects the local meteorology and causes a decrease of the average temperature. The manuscript is well written but I recommend the publication after that the authors clarify some specific points.

Specific Points

1. The description of the 2011 Puyehue-Cordon Caulle eruption should be improved. In particular the 2011 Puyehue-Cordon Caulle eruption was produced from the Cordón Caulle fissure while the authors write from the strato-volcano Puyehue (P1509 L6-P10). As authors are showing data from 1-2 July, they should add a description of the activity near the days of their measurements.

2. The authors should clarify what "particle properties" mean (e.g. optical? Type of particles?). No data about shape and composition are given.

3. Fig.4 shows an high vertical profile of aerosol extinction associate to a lower value of PM10 (at the beginning of the measurement). A ceilometer should not be able to identify volcanic ash from other type of aerosols (e.g. SO2) so the authors should add and discuss why they are sure to detect volcanic ash.

4. The authors should add other data that prove the presence of a volcanic cloud above Buenos Aires during the measurements (e.g. satellite images). An image of volcanic plume from MODIS on 2 July 2011 shows a volcanic plume direct toward the NW direction (http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=51316). It is possible that the plume moved and went above Buenos Aires but it should be verified and discussed.

5. The variation of temperatures looks very high. Variations of 0.5° and 1.5° were for example observed during the two years following the Pinatubo eruption (Yang and Schlesinger, 2002). Furthermore, authors should discuss the results of a paper of

Okazaki and Heki (2012) on the atmospheric temperature changes in the 2010 Icelandic and 2011 Chilean cases that reports as “Post-eruption negative temperature anomalies at the 250 hPa plane were clearly observed in the Eyjafjallajökull eruption. In the Puyehue eruption, however, such anomalies were not so clear due possibly to insufficient accuracy of the forecast model”. I suggest the authors to change the background (e.g. considering a wider time space without no volcanic ash cloud) and see if they find the same result.

6. Volcanic activity is very variable in time and in order to make a valuable comparison of AOT retrieved from different instruments, the same scene should be seen at the same time. This is probably why the authors find this inhomogeneity. Consequently, I suggest authors to delete the comparison of AOT if the volcanic plume is not retrieved at the same instant or very near.

7. References about the eruptions, the synoptic description and about other works on this eruption should be added.

Technical corrections

1. Introduction

P1509 L7. In the reference SERNAGEOMIN (2011), the link doesn’t work.

P1509 L9-L11. Authors state that the eruption column reached 10 km of height. They should specify if it is above sea level or above the crater rim.

P 1511 L14. Specify the days.

P1514. Clicking at the website, there are data from 4 stations. You should add the station where data come from.

2. Methodology

P1511 L22. Add the distance in km from the eruptive vent.

P1512 L14. PSAP is for Particle Soot Absorption Photometer?

3. Results

P1514 L14. Add the day of all four case studies.

P1514 L15. Why are you showing only this case?

P1514 L16. Add also the day of this test case.

3.1 Synoptic description

P1514 L18-19. In “The synoptic situation in each case” authors refer to all four cases? If yes, authors should add the day and the synoptic situation for all the studied case.

3.2 Meteorology and particle properties

P 1515 L5. LST is for the local solar time?

P1515 L6. Add the hour.

P1515 L20. If volcanic ash is “fallen” did authors or others collect or see volcanic ash on the ground?

P1515 L23-25. Authors should support this assertion adding other information (e.g. quantify the increase of wind velocity).

3.3 Analysis of all volcano days

P1516 L10. What are these 8 days?

P1516 L27-28. Explain better the sentence.

4. Discussion

P1518 L22. The authors write that “The plume was injected at an altitude of around 10 km” but when? The volcanic plume reached 12 km on 4 June. Add the reference.

P1518 L26-27. I am not really sure that this sentence is well supported.

P1520 L6. Chemical reaction with volcanic ash surface?

P1520 L12 Metals are contained in volcanic ash in small proportion that could not justify a so increase of BC.

5. Summary and conclusion

P1522 L5. The authors assert that “There is consistency between the values of AOT derived from 5 AERONET, ceilometer and MODIS, since all three platforms were able to identify the volcanic ash plume simultaneously.” This is not really true.

P1523 L1. The authors should mention what type of compounds could cause the anomalous absorption coefficients.

Figures and Tables

In the caption of Fig. 2 and 3, the square should indicate the right volcanic vent.

Fig. 4. May you add the hours in the plot? I also suggest to indicate the hour reported in the text.

Table 1. List of eruptive episode?

Table 2. The authors should add the wavelength as reported in the paper. They should explain UNAM in the table caption. UBA is University of Buenos Aires in the text while Facultad de Ciencias Exactas y Naturales in the Acknowledgements.

References Yang F. and M.E. Schlesinger (2002), On the surface and atmospheric temperature changes following the 1991 Pinatubo volcanic eruption: A GCM study, Journal of Geophysical Research, 107, 0.1029/2001JD000373.

Okazaki I. and K. Heki (2012), Atmospheric temperature changes by volcanic eruptions: GPS radio occultation observations in the 2010 Icelandic and 2011 Chilean cases, Journal of Volcanology and Geothermal Research 245–246, 123–127.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1507, 2013.