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Interactive comment on “Influence of cloud processing on CCN activation behaviour in the Thuringian Forest, Germany during HCCT-2010” by S. Henning et al.

Anonymous Referee #2

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General comments

The manuscript presents a novel method to study cloud processing of aerosol particles, as well as interesting results from a study at Mt. Schmücke in Germany. Cloud processing significantly increase the CCN activity of aerosols. Ground-based cloud experiments are excellent in these type of studies, in order to collect sufficient amount of data to achieve results and conclusions of high statistical significance. Measurements were performed upwind and downwind of a cloud experimental site during periods both with clouds present at the mountain summit and without clouds.

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The manuscript is very well written, novel methods are used, relevant scientific questions are addressed, the results are sufficient to support the interpretations and conclusions, and substantial conclusions are reached. I recommend publication in ACP after minor revisions.

Specific comments

Section 2 “Experimental design and setup”: How is LWC measured?

Section 2.1, page 1623, line 21: What is $\delta^{34}\text{S}$? Section 2.1, page 1623, lines 16-23 (last paragraph of section 2.1): It is not describe how sulfur isotope analysis can be used to study cloud processing of aerosols. The paragraph need a few more sentences to describe the purpose of the described measurements.

Section 2.2, second paragraph (page 1624, lines 12-28): It is mentioned that the CCNc is either used to measure saturation scans or diameter scans. However, it is not clear if both methods are used in this study, or only one of them. A discussion of advantages and/or disadvantages of the two methods might also be relevant. I suppose both methods can be used to obtain the requested results. It seems that the sentence “The CCNc can be used either to measure saturation scans, . . . , or to measure diameter scans, . . .” would be better. Also, if the authors have used only one method, the reasons why selecting that method would be interesting to know more about.

Section 2.3, second paragraph (page 1626, lines 17-28 + page 1627, lines 1-2): Maybe you could mention that the correction method makes use of the particle number size distributions. It’s indirectly mentioned, but could be more direct mentioned as an introduction.

Section 3.2: I cannot follow all details in the statistical analysis, but I suppose it would be possible to reproduce the analysis following the described method.

Section 3.3: Arguments are missing for the interpretations and conclusions. How is sulfur isotope analysis used to draw the conclusion on page 1630, lines 22-26? I

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suppose it's explained in Harris et al. 2014, but maybe a short description could be included here or in the last paragraph of section 2.1.

Technical corrections

Section 3, first sentence (page 1627, lines 4-5): Something is wrong in this sentence. Either the grammar is not correct, or maybe just a word is missing.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 1617, 2014.

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