We have addressed all comment. Our responses are indicated in red.

Editor Decision: Publish subject to technical corrections (03 Feb 2015) by Dr. Alex Huffman
Comments to the Author:
Authors,

Thank you for submitting your revised manuscript for consideration for publication in Atmospheric Chemistry & Physics. The referees agree that the manuscript is ready for publication, and I will accept it pending minor technical corrections/suggestions listed below.

Line 51: Huffman et al. (2013) does not show results related to GCCN, but rather suggests that GCCN could play a role. The sentence as written in Line 51 is not correct, however. I suggest simply removing GCCN from this sentence, or altering the sentence to make more accurate to the cited text. **OK**

Figures 1-5 state "days from a key day" on the x-axis. This is ambiguous, as written, whether it implies only "after" or also "after and before." Please make this explicitly clear. This will aid readers in understanding the messages quickly. **We mean "after". In the figure headings,"from" was changed to "after"**

Referee #3 offered suggestions that I feel strengthen the text. I have copied these here below. Please process these suggestions as appropriate:

The abstract does not fully reflect the main conclusion of the paper. It contains information that is more suitable for the introduction. This material could be shortened in the abstract, to allow more space for the main conclusions to be discussed. For instance, lines 12-15 are very wordy when describing the methods. This could be shortened to something along the lines of, "Differences in IN concentrations and rainfall after and before days of large rainfall accumulation (i.e., key days) were calculated for measurements made over the past century in southeastern and southwestern Australia." **OK, I used this sentence**

The second paragraph in the abstract reads too much like an introduction. It would be helpful if the authors added one introductory sentence in the first paragraph (after the very first sentence) delineating that in particular, biological species such as bacteria (i.e., P. syringae) and fungi are released following rainfall and have been shown to serve as efficient IN, in turn impacting cloud and precipitation formation. Further, the abstract should have a more general closing sentence reiterating the scientific significance of this work. **I made the change that the reviewer suggested and added a conclusion about the general significance of the work.**

Minor comments:

Line 11: Include, "its formation, quantity, frequency, and location" after

"influence". **OK**
Line 11: Specify which effects of IN on rainfall are being investigated (i.e., frequency and quantity) **OK**
Line 15: The authors should clarify the logarithmic trends are increasing after a key day. **OK**
Lines 14-17: Combine sentences to, "Cumulative differences in IN concentrations and daily rainfall quantity and frequency as a function of days from a key day demonstrated statistically significant increasing logarithmic trends (r2 > 0.97)." **OK**

The authors might also want to add how many sites for each factor were correlated above 0.97.

We note that that figures 4a and 4b were averages of groups with high correlations and do not correspond exactly to the values in the tables that, themselves are not averaged. So we have modified the text to indicate the precise correlations for these figures. The text that was modified in Section 5.1 is indicated below.

Section 5.1:

We have seen that there was an approximately logarithmic increase in cumulative after-before key day differences (CD) in atmospheric IN concentrations up to at least 20 days after rain. Using the same type of analysis for CD_F, approximately logarithmic increases were again almost universal. For 34% of the sites in the southeastern group and 69% of the sites in the southwestern group the correlation R^2 between CD_F and a logarithmic curve was ≥0.85 within 20 days from a key day. Figure 4a shows the very close fit (R^2=0.99) to a logarithmic curve of the mean CD_F curve for those 34% of southeastern sites. Figure 4b shows the mean CD_F curve for those 69% of southwestern sites. The correlation with a logarithmic curve was R^2=0.97. The improved correlations obtained by averaging many cases implies that most curves contained small random deviations from a logarithmic form. The comparable logarithmic increases in CD_F following heavy rain events to those in IN suggests a common cause.

Line 20: include "rainfall" before "totals". **OK**
Lines 35-38: Run-on, consider splitting this sentence into two. **OK**
Lines 98-100: This sentence is more appropriate for the abstract. **That sentence refers to the previous study. Therefore we changed "this" to "Our previous work" and we moved the citation to the end of this sentence rather than after the previous sentence.**

Line 278: Put which day in January. **We added the remark: "(between 20 and 25 days)"**

Line 308: Clarify that the 0.97 is r2. **This has now been specified.**
Lines 491-493: Are there any references the authors could cite to corroborate this statement? **We have added: Cotton, W. R., Bryan, G.**

H. and van den Heever, S. C. The influence of mountains on airflow clouds and precipitation, pp 673-750 *IN*: Storm and Cloud Dynamics, Academic Press, Burlington, MA, 2011.

Line 531: Clarify that these are biological IN. **OK**
Figure 2 and Figure 3 captions: Cumulative differences (CD) in IN concentrations… **OK, "of" has been changed to "in" and an "s" has been added to "difference" in the legend of Fig 3.**
Conclusion section: The authors could emphasize that these measurements are among the few of the long-term measurements of IN and rainfall relationships. **We added a remarks about this as the first sentence of the conclusion and later on in the 1st paragraph.**

Non-public comments to the Author:
I add one more non-public comment. The Huffman et al. (2013) was published in parallel with a companion paper, citation below. I suggest adding citation to this somewhere in your manuscript, although it is not required to add mention of Prenni et al. every time the Huffman et al. manuscript is mentioned. I leave this to your discretion. **This is a good suggestion, we have added this reference and cited it together with the first citation of Huffman et al**.

Citation:
Prenni, A. J., Tobo, Y., Garcia, E., DeMott, P. J., Huffman, J. A., McCluskey, C. S., Kreidenweis, S. M., Prenni, J. E., Pöhlker, C. and Pöschl, U.: The impact of rain on ice nuclei populations at a forested site in Colorado, Geophysical Research Letters, 40, 227-231, 10.1029/2012gl053953, 2013.