**Dear Dr. Ryan Sullivan**

**We appreciate the helpful comments made by editor. We have modified the manuscript accordingly. Please see our responses below.**

Below, we indicate in detail the revisions made to the manuscript.
Changes in the revised manuscript are shown in red.
Based on the comment 8, figure numbers were reorganized in the revised MS.

**Comments to the Author:**
The authors have revised the manuscript to largely address the questions and comments raised by the Referees. Importantly, the highly speculative discussion of monocarboxylic acids enhancing the ice nucleation properties of the Asian dust particles has been removed. The manuscript should now be suitable for publication in ACP. There are however, several areas requiring further clarification and revision before the manuscript can be accepted for publication, as listed below. Please address each of these carefully. The manuscript also requires careful copy-editing to bring it up to proper English standards. The list of typos and other corrections below is not a complete list of all the grammatical errors.

*1) Referee 1 asked for information regarding the function used to perform the various regressions, but this detail was not provided in the Response or revised manuscript. I believe they are asking what regression equation was used, e.g. the standard Pearson correlation, or the Demming equation, or another function. The Pearson correlation allows for uncertainty only in the y-variable, while Demming accounts for uncertainty in both the x and y variable. Therefore, the Demming regression seems more appropriate for the regression analysis performed here, as there is uncertainty in both variables. Please also provide the uncertainty for the variables plotted and used in each regression.*

**Response:**

We are sorry for the unclear description. In our previous MS, we used the "standard Pearson correlation (regular linear regression)" for the regression analysis. As suggested, "Deming linear regression" is more appropriate than regular linear regression because of minimization of the distance between the observed data and fitted line in both x and y directions. We used the "Deming linear regression" for the regression analysis in the revised MS. We have modified Figs. 5-10 with the captions as below, except for Figure

7. Please see figures.

Figure 7 shows ion balance. The slope of regular linear regression (y-intercept is zero) shows the balance of ions (cations (x-axis) and anions (y-axis)). Regular linear regression is appropriate than Deming linear regression for this type of data.

Page/line references are used for the following:

*2) 2/5: "as CCN and ice nuclei (IN)." should be deleted, as wet deposition also scavenges aerosol particles, and water soluble gases. The individual contribution of CCN, IN, aerosols, and gases to material found in the snow pack cannot be determined. "Thus, organic acids are scavenged by wet deposition from the upper troposphere." is a more appropriate description.*

**Response:**

As suggested, we deleted the phrase of "as CCN and ice nuclei (IN)". Please see page 2 line 5.

*3) 4/1 & 4/8: should be "blow-down"*

**Response:**

Corrected. Please see page 4 line 1 and page 4 line 8.

*4) 4/23: should be "were injected into an ion chromatograph"*

**Response:**

Corrected. Please see page 4 line 23.

*5) 5/24: "We found that differences in the concentrations of each monocarboxylic acids between sample #4 and sample #4' are comparable to the relative standard deviation." It is not clear what relative standard deviation you refer to here. Of standards analyzed? Please clarify.*

**Response:**

We are sorry for the unclear description. We have added the following description in the revised MS.

"We found that differences in the concentrations of each monocarboxylic acids between sample #4 and #4' are comparable to the total relative standard deviations based on triplicate analysis of real samples." Please see page 5 lines 24-25.

*6) 6/2: "Higher concentrations of monocarboxylic acids were observed in the snow samples with the dust layers than those without dust layers in both 2009 and 2011." Please state the values/range for the samples with versus dust layers to make a quantitative comparison. As the association of dust with the monocarboxylic acids is the major focus of this paper this data should be presented more clearly.*

**Response:**

Based on the comment, we have rephrased to the following sentences in the revised MS.

"Average concentrations of total monocarboxylic acids in the dust layers (2009: 739 ng $g^{-1}$, 2011: 114 ng $g^{-1}$) were greater than that in the without dust layers (2009: 313 ng $g^{-1}$, 2011: 43 ng $g^{-1}$) (Fig. 4)." Please see page 6 lines 3-5.

*7) 6/14: This single-sentence paragraph should be included in one of the neighboring paragraphs and not left on its own.*

**Response:**

Based on the comment, the sentences "The pH of melt snow samples ranged from 4.4 to 6.9 (Table 3). The higher pH were found in samples #1, #3, and #4 (pH = 6.7–6.9), in which dust layers were observed." have merged with the previous paragraph. Please see page 6 lines 14-15.

*8) Results: A large amount of the measurement data are presented as text in the paper, which makes it hard to really grasp the main features of the dataset. Please provide more of the data in the form Figures, as possible, instead of just listing long strings of measured values in the text. A well designed Figure could nicely show the differences in the LWM carboxylic acid concentrations for the different years, and for layers with and without suspected significant dust contributions, for example.*

**Response:**

Based on the comment, we have added Figure 4 as below.

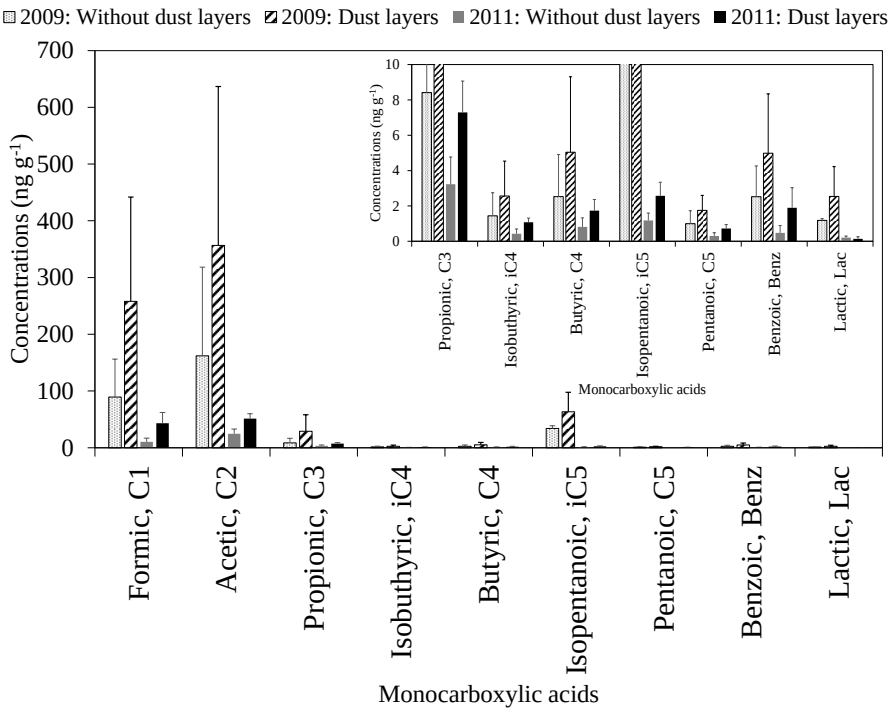


Figure 4. Concentrations of selected low molecular weight monocarboxylic acids in Mt. Tateyama snow samples.

In addition, we have modified in Tables 1, 2, and 3. Shaded columns represent dust layers.

*9) Figure 2: What does the color scale correspond to? Please properly label this on the Figure and explain in the Figure caption. "means no data of dusts" does not make sense, please reword.*

**Response:**

We have modified in Figure 2 caption and added the right y axis label of "Extinction coefficient of dust particles".

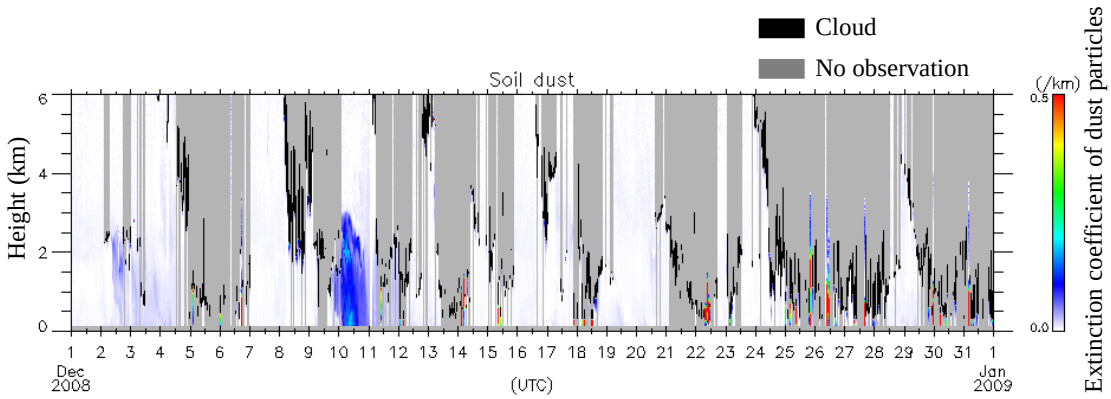

Figure 2. Example of lidar measurements of dusts obtained at Imizu, Toyama (ca. 40 km northwest of Mt. Tateyama) during December 1-31, 2008. The color scale indicates extinction coefficient of dust particles based on lidar measurements. Black line represents clouds and gray shade above the black lines represents no data.

*10) Figure 3: "Lines indicate trajectories the snow pit samples with dust layers." does not make sense, please reword.*

**Response:**

Based on the comment, we have rephrased to the following sentence in the revised MS.

"Color lines show the trajectories associated with dust layers as observed by a lidar."

Please see Figure 3 caption.

*11) Figure 5: y-axes – is this the natural logarithm of the values? The axes labels say "ln". I think these were changed from log-log to linear plots, and these axes labels need to be corrected.*

**Response:**

Y-axis is the natural logarithm of the values. Based on the comment, we have modified the y-axis label.

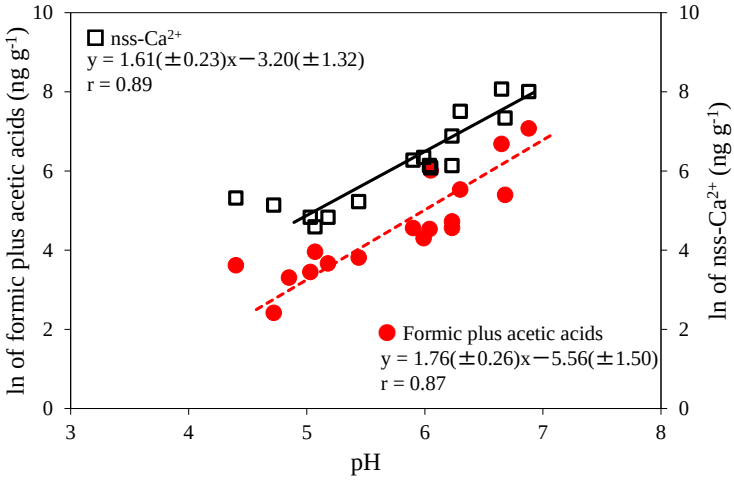


Figure 6. Scatter plots of natural logarithm of formic plus acetic acids and pH, and natural logarithm of nss-$Ca^{2+}$ and pH. The solid and dotted lines represent the Deming linear regression.