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# ***Interactive comment on “Hydroxy fatty acids in fresh snow samples from northern Japan: long-range atmospheric transport of Gram-negative bacteria by Asian winter monsoon” by P. Tyagi et al.***

**Anonymous Referee #1**

Received and published: 29 September 2015

Tyagi et al describe distributions and abundances of  $\alpha$ -,  $\beta$ -, and  $\omega$ -hydroxy fatty acids in snow samples from the city of Sapporo in northern Japan. Along with air mass back trajectories, they use the hydroxyl acids as indicators of long-range atmospheric transport of continental soil material from Siberia and North China. Scavenging of hydroxyl-acids by snowfall removes these components from the atmosphere. Since hydroxy fatty acids, especially the  $\beta$ -isomers, are components of the lipopolysaccharide (LPS) of Gram negative bacteria (GNB), the concentrations of these acids are used to estimate the amount of GNB endotoxin/LPS that might effectively be removed from the

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Discussion Paper

atmosphere by scavenging in snow.

By and large, the manuscript is well written and for the most part the conclusions are supported by the data and its presentation (tables and figures). However, some revisions are needed that would improve the manuscript and clear up several questions.

p 1337 line 4 – “these plant pathogenic bacteria” – this would read a bit better if it were “these bacteria, which are plant pathogens can influence. . .”

p 13379 line 6 onwards in this paragraph. This is pretty much verbatim from the Yamamoto paper that is cited in the next paragraph. Perhaps a bit different wording is needed.

p 13379 section 2.2. The protocol of Yamamoto et al. used weak acid hydrolysis. Is this adequate to get at the LPS-hydroxy acids since this analysis usually requires stronger acid and heating for some period of time. Otherwise it seems that the hydroxyl-acids reported here are mostly free (unbound) ones. This might not make much of a difference, but it should be noted. On the other hand, the manuscript later on used the hydroxyl-acid concentrations to estimate GNB endotoxin concentrations. Are the hydroxyl-acids in the mathematical expression for calculating endotoxins (p 13380 line 12) “free”, “bound” or “total”. Whichever is the case, this should be explained; are the estimated of endotoxin calculate here “lower limits” due to the specifics of the analytical protocol? p 13384 section 3.4. Hydroxy acids can derive from either plant waxes or soil GNB, as pointed out. How might these be distinguished, in order that the amount of GNB-derived endotoxins may be calculated?

p 13384 line 13. At least the Wakeham et al. paper did not assay endotoxin LSP, at least not directly. Don't know about the other papers. Perhaps the text should simply read that hydroxyl-acids were assayed in these references.

p 13384 lines 18 and 24. Are the concentrations ng kg<sup>-1</sup> and μg kg<sup>-1</sup> for kg of unmelted snow, or kg of meltwater? And a little background would be useful – any information

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about concentrations of endotoxin or GMB biomass in rainwater (presumably this also scavenges these components); what concentrations of airborne biogenic particles in snow might be causing the allergic reactions noted in Golokhvast et al, for comparison with the concentrations reported here?

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Interactive comment on Biogeosciences Discuss., 12, 13375, 2015.

**BGD**

12, C5870–C5872, 2015

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Discussion Paper

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