

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-628

Anonymous Referee #1

Referee comment on "Insoluble lipid film mediates transfer of soluble saccharides from the sea to the atmosphere: the role of hydrogen bonding" by Minglan Xu et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-628-RC1>, 2022

This manuscript presents a comprehensive study on the transfer of soluble saccharides at the sea-air interface, which affects the number concentration, chemical composition, and morphology of the resulting sea spray aerosols. I appreciate the fascinating experimental methodology of the study, and I enjoy digesting the results. The combination of Langmuir monolayer technology and infrared reflection-absorption spectroscopy helps to explain the interaction between soluble saccharides and insoluble fatty acids, and thus deduce a unique mechanism of hydrogen bonding, which is a novel technique and interesting results presentation, and certainly deserves more attention. Overall, the manuscript is well-written and most important the authors do a brilliant job in the reference list, very multidisciplinary and very updated. The authors have considered multiple views, and it is worth considering to be published in ACP after addressing some general issues.

I have two questions about the abstract. Whether insoluble lipid monolayers can be absorbed at the air/water interface or simply float on the surface? Regarding hydrogen bond analysis, I think the authors are more illustrated by the changes in the infrared spectra of the carbonyl region, and it is necessary to consider whether the expression here is appropriate.

Line 104: "A possible explanation for the SSA composition in saccharides involves", whether or not the original meaning of expression should be the saccharides in the SSA composition, perhaps this sentence needs to be rewritten.

Line 148-149: It is best for the authors to explain why this molar ratio is used to obtain the mixed fatty acid solution in the method section, rather than in the results and discussion section below.

In the experiment of preparing Langmuir monolayer, whether the volatilization time of 15 min is enough to make chloroform volatilize completely?

Line 226: Whether R and R_0 in the eq2 should be the surface covered by fatty acid monolayers and the surface of pure seawater solution?

Section 3.1 The authors have compared the SSA produced using the sea spray aerosol generator in this study with other laboratory devices, and obtained similar consistency, but lack a comparison with the particle number size distribution of the real SSA observed in the field. In other words, whether the device can fully simulate the real SSAs?

A drawback of the presented results is the lack of quantitative information describing the SSA production, specifically the variation of SSA number concentration. A clearer presentation of measured aerosol number concentrations would be most helpful.

Line 261-264: An ambiguous sentence. According to the above description, the author here should be referring to the comparison of SSA particles produced by artificial seawater solution containing such organic matter, rather than SSA particles containing these substances.

Line 325-326: Here the decrease in the lift-off area and molecular area of the stearic acid film should be relative to the previous palmitic acid. Therefore, this sentence should be correct only if it is added with respect to palmitic acid.

Line 355-360: In the Langmuir isotherms and infrared spectroscopy experiments, the authors designed concentrations about 3 orders of magnitude higher than in the real environment, and said that this high concentration is still environmentally relevant, how can it be better explained?

Some minor comments:

Line 43: It is better to use the generic name: humic-like substances (HULIS).

Line 157: "solution" should be changed to plural "solutions".

Line 272: "change"- "changes"

Line 355: There are several instances in the manuscript where "Glucose and Trehalose" should be lowercase.