



EGUsphere, referee comment RC1  
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## **Comment on egusphere-2022-561**

Anonymous Referee #1

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Referee comment on "Marine nitrogen fixation as a possible source of atmospheric water-soluble organic nitrogen aerosols in the subtropical North Pacific" by Tsukasa Dobashi et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-561-RC1>, 2022

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This paper attempts to address the uncertainty around sources of aerosol WSON in the marine atmosphere of the subtropical North Pacific. They report data from an east to west cruise transect across the N. Pacific including WSON aerosol concentration and surface ocean chl, primary productivity and N<sub>2</sub> fixation rates. Their main approach is to compare east to west trends in the measured parameters. They conclude that since N<sub>2</sub> fixation and aerosol WSON are both higher in the eastern N. Pacific than the western N. Pacific, then N<sub>2</sub> fixation must be the source of aerosol WSON. The mechanism the authors invoke is that N<sub>2</sub> fixation increases ammonium and DON concentrations in the surface ocean which then flux to the atmosphere and lead to secondary WSON. This paper is an example of "correlation does not equal causation." It is undeniable that the east to west trends are similar in N<sub>2</sub> fixation and WSON aerosol concentrations, as in, they are both higher in the east than the west. But that could be due to multiple factors, and in no way suggests that one is causing the other. The authors proposed mechanism is completely untestable as they do not present ammonium or surface ocean DON concentrations. They suggest the WSON must be secondary as it does not correlate with sodium, but it also does not correlate with MSA, a classic indicator of secondary processing. I have chosen not to present a detailed review of the manuscript as the general framework presented is not supported in the literature, nor do the authors present a mechanism that can be tested by the existing data. The conclusions drawn are therefore based on a single correlation and are not supported in any way by what is presented in the paper.