Comment on egusphere-2022-826
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Community comment on "Microphysics of liquid water in sub-10 nm ultrafine aerosol particles" by Xiaohan Li and Ian C. Bourg, EGUsphere, https://doi.org/10.5194/egusphere-2022-826-CC1, 2022

Summary
This is a comprehensive study of the thermodynamics of nanoscale aerosol particles presenting some unintuitive but well explained results. There are some shortcomings in the work that need to be addressed before it is ready for publication.

Major comments
L13: Relevance to sea spray particles is questionable since (a) particles this small are likely composed primarily of sea surface organics and (b) the physical processes that generated sea spray are not able to generate particles in the ~10nm size range.

L125: what are the implications of a 1.2 nm cut-off for Coulombic and VDW interactions? 1.2 nm is much larger than these molecules and ions and monopole-dipole interactions could be significant. What is the justification for this cut-off.

Equation 1: How is the interfacial width parameter determined? How sensitive are the results to changes in its value? What value was used?

L450-480: This is the opposite trend to what I expected. Since NaCl is concentrated in the core of the particle due to exclusion from the surface, that should lower the water activity in the particle relative that in the bulk at the same NaCl concentration. The opposite trend is observed. More discussion about this discrepancy is needed.

Minor comments
Equation 2: What are N_w and N_org?
Equation 6: what are P_k and P_U?
L174: vapor pressure of the bulk water?
L269: different numbers of water molecules
L299: diminished
L333: dividing