

## Informing Ocean and Atmospheric Aerosol Chemistry:

### Interfacial Organization, Hydration, Binding, and Electric Fields at Aqueous Surfaces

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**Bio.** Dr. Allen is the Dow Professor in the Department of Chemistry and Biochemistry at The Ohio State University and holds a courtesy appointment in the Department of Pathology. Her research specializes in spectroscopic instrumentation, molecular organization, ion pairing, and hydration at aqueous interfaces with applications ranging from atmospheric and ocean surface chemistry to biophysics of the lung and cancer detection. She received her B.S., M.S. and Ph.D. degrees in Chemistry from the University of California, Irvine. She was recently awarded the **2022** American Chemical Society's Irving Langmuir Award in Chemical Physics for her seminal contributions toward the understanding of liquid surfaces.

**Abstract.** We investigate ions and lipids at liquid surfaces to better understand their complexation and speciation to then inform on atmospheric aerosol, cloud, and marine surface processes to ultimately impact climate model outcomes. The underlying driving forces for surface activity of bare aqueous surfaces with salts such as magnesium, calcium and sodium chlorides are one class that is explored. Research will be presented on the aqueous salt surfaces revealing surface propensity of hydrated ions and ion pairs that dominate the interfacial response in addition to interfacial hydration studies of calcium/magnesium-fatty acid surface complexation. Interfacial electric field measurements using surface potentiometry with radioactive Americium, second harmonic generation (SHG), and vibrating plate methods will be presented as well as data from surface tensiometry, Brewster angle microscopy, vibrational sum frequency generation (SFG), and infrared reflection absorption spectroscopy (IRRAS) to provide clarity on surface acidity, ionization state, ion-lipid and ion-ion speciation, and thermodynamic stability of aqueous films. Also, I will mention the newest work in our lab that integrates machine learning methods with ocean sampling.