



Atmospheric Chemistry
Observations & Modeling

ACOM Seminar

Making a Splash in Model Development: Improving Parameterizations of Sea Spray Aerosols

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Link: <https://operations.ucar.edu/live-acom>

ABSTRACT

Oceans cover 71% of the globe and dominate natural aerosol production. Sea spray aerosols (SSA) directly influence climate through reflecting or absorbing radiation and indirectly through seeding clouds. Acting as cloud condensation nuclei (CCN) and ice nucleating particles (INPs), SSA impact cloud albedo, lifetimes, and precipitation patterns. It is vital to understand the production processes of SSA and the environmental drivers including wind speed and temperature. Despite over 50 years of investigations, SSA production fluxes remain poorly constrained, particularly among Earth system models (ESMs). This seminar will characterize how SSA production is parameterized in 17 ESMs including the Community Earth System Model (CESMv2), present novel measurements from the Scripps Ocean-Atmosphere Research Simulator (SOARS), and emphasize the importance of proper SSA parameterizations in ESMs. The ESMs investigated stem from eight individual parameterizations but exhibit disagreements in number flux estimates of one order of magnitude at best and seven orders of magnitude at worst. New measurements from a cutting-edge air-sea interface simulator offer updated estimates, identifying a typical underestimate of SSA in models leading to underestimates in CCN. Finally, the uncertain role of temperature on SSA production is probed, exhibiting a strong depression of aerosol production with increasing temperature. This contradicts relationships currently integrated into models and has implications for projecting changes in natural aerosol forcing under a warming climate.

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