**Enabling Aerosol-cloud interactions at GLobal convection-permitting scalES (EAGLES)**

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The “Enabling Aerosol-cloud interactions at GLobal convection-permitting scalES (EAGLES)” project seeks to increase confidence in, and understanding of, the role of aerosols and aerosol-cloud interactions (ACI) in the evolution of the Earth system. The team uses new modeling techniques that are scientifically robust and computationally efficient for global convection-permitting simulations envisioned for Energy Exascale Earth System Model (E3SM) version 4 (E3SMv4). To address the challenge of balancing between the representation of complex processes at convection-permitting scales and the associated computational cost, the EAGLES team to (1) improve the accuracy, efficiency, and trustworthiness of physical parameterizations critical for aerosol and cloud lifecycles using modern modeling techniques to achieve reasonable estimates of effective radiative forcing (ERF) associated with aerosol-radiation interactions (ERFari) and with ACI (ERFaci); (2) integrating processing understanding from observations from Atmospheric Radiation Measurement User Facility (ARM), satellites, and other sources, as well as large-eddy simulations (LES), into E3SM model development by developing and applying process constraints in model physics and by using novel machine learning techniques to bridge model and data; and (3) assess the impacts of improved parameterizations on the climate in the past, present, and future. Our integrated approach enables representation of critical aerosol and ACI processes that are evaluated against real-world observations, and therefore will give greater confidence in predictions of aerosols and ACI in liquid clouds, providing improved realism in predictions of the Earth system.