

Abstract:

"Aerosol-cloud interactions are a key source of uncertainty in accurately simulating how Earth's radiative balance is affected by human activities. Clouds are very variable on small spatial scales, so simulations of weather and climate require high spatial resolution to represent them. In this seminar I will discuss how we have developed and applied the weather and climate model of the UK Met Office to represent aerosol-cloud interactions at high spatial resolution. I will focus on two example scientific questions my group is addressing with this model. First, I will discuss how aerosol formation via gas-to-particle conversion, or nucleation of new aerosols, contributes to concentrations of the aerosols that form cloud droplets, and how clouds in turn create favorable environments for this process to occur. In this context I will explain our understanding of how, quantitatively, aerosol formation is important to aerosol radiative forcing of climate. Second, I will discuss how we can use the model to better predict aerosol effects on the visibility and lifecycle of fog, which is of use in numerical weather prediction. Our studies of fog motivate detailed examination of how weather and climate models can simulate the process by which aerosols activate to form cloud droplets."