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Characterization of CCN and IN activity of bacterial isolates collected in Atlanta, GA

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Characterization of CCN activity of bacteria, other than a few select types such as Pseudomonas syringae, is limited, especially when looked at in conjunction with corresponding IN activity. The link between these two points is especially important for bacteria as those that have high CCN activity are likely to form an aqueous phase required for immersion freezing. Given the high ice nucleation temperature of bacterial cells, especially in immersion mode, it is important to characterize the CCN and IN activity of many different bacterial strains. To this effect, we developed a droplet freezing assay (DFA) which consists of an aluminum cold plate, cooled by a continuous flow of an ethylene glycol-water mixture, in order to observe immersion freezing of the collected bacteria. Here, we present the initial results on the CCN and IN activities of bacterial samples we have collected in Atlanta, GA. Bacterial strains were collected and isolated from rainwater samples taken from different storms throughout the year. We then characterized the CCN activity of each strain using a DMT Continuous Flow Streamwise Thermal Gradient CCN Counter by exposing the aerosolized bacteria to supersaturations ranging from 0.05% to 0.6%. Additionally, using our new DFA, we characterized the IN activity of each bacterial strain at temperatures ranging from -20oC to 0oC. The combined CCN and IN activity gives us valuable information on how some uncharacterized bacteria contribute to warm and mixed-phase cloud formation in the atmosphere.