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# Can rain and hail nuclete cloud droplets?

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Clouds play an important role in weather prediction and climate change studies. An important process in clouds is the nucleation of water droplets under super saturated conditions. We present results from a laboratory scale moist Rayleigh Benard convection experiment composed of a mixture of pressurized sulphur hexafluoride (liquid and vapor phase) and helium (gas phase) to mimic the wet (saturated water vapor) and dry components (nitrogen, oxygen etc.) in the earth's atmosphere. The experiments were operated close to critical conditions to allow for homogeneous nucleation of sulphur hexafluoride droplets. The liquid SF6 pool is heated from below and the warm SF6 vapor from the liquid-vapor interface rise and condense underneath the cold top plate. We observe the nucleation of microdroplets in the wake of cold drops falling through the SF6-He atmosphere. Using classical nucleation theory, we show that the nucleation was caused by isobaric cooling of SF6 vapor in the wake of the cold drop. Furthermore, we argue that in an atmospheric cloud, falling hail and large cold raindrops may induce heterogeneous nucleation of microdroplets in their wake. We also observed that under certain conditions these microdroplets form a stable horizontal layer, which separates regions of super and sub-critical saturation.