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Oral
(Invited Talk)

Explicit, grid-scale cloud predictions with moderately complex bulk microphysics parameterizations have vastly improved in the past few decades. Even so, NWP models in global as well as moderately high resolution regional simulations continue to produce fewer clouds overall compared to observations. It is not as simple as saying that sub-grid scale, boundary layer, or convective clouds are lacking or labeling it as a gray-zone problem. It is also unfair to blame microphysics schemes for lacking clouds when it is the dynamics and attendant upward motions that produce saturated conditions. Recent experiments with stochastic perturbations to critical microphysics parameters help illustrate this point, which will be shown in the talk. Another important discussion topic is a comprehensive evaluation of cloud prediction using numerous metrics including radiation fluxes, cloud-top brightness temperature, and cloud fraction, although the latter is fraught with concerns about definition of the metric itself. Good cloud prediction is obviously very critical regardless of the context of climate prediction or tomorrow's near-surface temperature, so improved observation and validation is critical to guide NWP model improvements among highly coupled physical parameterizations: radiation, turbulence, land-surface, convection, etc.

Presentation file

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