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## New particle formation events persistently reduce cloud droplets in boundary layer clouds

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A considerable fraction of cloud condensation nuclei (CCN) originates from new particle formation (NPF). Because of this, NPF events themselves are thought to also increase CCN and cloud droplet number (CDN) and contribute to climate cooling. High resolution state-of-the-art simulations over Europe however portray a different view: radiatively important stratiform clouds influenced by NPF events experience a systematic and substantial decrease in droplet number during and after nucleation events. The drop in CDN occurs because particles present prior to the NPF experiences slower growth during and after each event (as the condensable material is consumed by the growth of the NPF particles that do not typically activate), leading to fewer CCN at the low supersaturation levels characteristic of stratiform clouds (~0.1%). Convective clouds, however, tend to experience a modest increase in cloud droplet number – consistent with established views on the NPF-cloud link. Our results are corroborated by published observational evidence and all together reshape our conceptual understanding of NPF events on clouds, where droplets in stratiform clouds tend to be reduced (leading to local warming from reductions in cloud albedo) but enhance in convection. Combined, these effects could bear important impacts on cloud structure following NPF events.