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Radiative impacts of convective anvil outflow in the Asian monsoon region

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We investigate the radiative impacts of convectively detrained and in-situ formed ice crystals at uppermost altitudes with high-resolution ICON model runs in the Asian monsoon region. Radiatively, this area should be characterized by persistent longwave warming from thin and ubiquitous anvils and intermittent shortwave cooling from deep but infrequent convective systems. But how do different degrees of sophistication in the ice microphysics schemes modulate this picture? Three days coinciding with the StratoClim field campaign are simulated (6-9 August 2017), using two-moment microphysics, and in-situ ice water content (IWC) values and specific humidity profiles are used for validation. We calculate the shortwave and longwave radiative fluxes associated with IWC between 14 and 17 km over different timescales and examine the role of ambient dryness in anvil base radiative heating. We compare our results with the cloud-resolving Meso-NH simulation of Lee et al. ACP 2019 in which moist and ice layers were identified and tracked through the uppermost troposphere.