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# Simulations of cirrus cloud radiative signatures in the mid- and far-infrared

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We assess the ability to simulate the radiative signatures of cirrus cloud across the mid- and far-infrared using sophisticated radiative transfer codes in combination with state-of-the-art cirrus optical property databases. We present comparisons between these simulated spectra and aircraft based measurements of nadir radiances above cirrus cloud, obtained during the Cirrus Coupled Cloud-Radiation Experiment (CIRCCREX). Sensitivity of the simulated radiance spectra in the mid- and far-infrared to ice crystal size and habit are investigated.

Results from the comparisons show that whilst multiple solutions for the cloud optical properties can satisfy agreement to within measurement uncertainties in the mid-infrared, it is currently not possible to achieve agreement in the far-infrared to within the estimated measurement uncertainties.

These results demonstrate the need for more observations of the far-infrared spectrum, such as those proposed by the Far Infrared Outgoing Radiation Understanding and Monitoring (FORUM) mission, to enable the further development and validation of cirrus cloud bulk optical models, which in turn will lead to an improved understanding of the impact of cirrus clouds on the Earth's radiation balance.