

Uncertainty of shortwave cloud radiative impact due to the parameterization of liquid cloud optical properties.

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In general circulation models (GCMs) the shortwave (SW) cloud radiative effect (CRE) largely depends on the bulk radiative properties of clouds. These properties rely on the amount of condensed water, and the single scattering properties (SSP) of cloud particles. The SSPs, which quantify the interactions between radiation and individual cloud particles, are governed by the size and shape of the particles. In GCMs, the liquid clouds prognostic variables are generally liquid water content and total droplet concentration, but no information is provided regarding particle size. As a consequence, an assumption is required on the droplet size distribution (DSD) to diagnose the cloud particle effective radius (r_{eff}). SSPs are then parameterized in terms of r_{eff} . To this end, new SSPs parameterizations, covering various DSD assumptions, are developed and implemented in the radiative scheme of ecRad to assess the uncertainties in CRE, resulting from the hypotheses on parameterization of SSPs.