

Understanding the interaction of solar radiation with cirrus ice crystals – implications for the radiative transfer and climate modelling

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There still exists a great uncertainty in understanding the magnitude and even the sign of the ice cloud short wave radiative effect. Partly, this is due to the difficulties of modelling and parametrising the optical properties of usually non-spherical ice crystals. The current global climate and general circulation models use simplified optical models to represent the radiative properties of ice crystals. Improving these parameterisations is difficult since not enough direct in situ measurements of ice crystal optical properties are available. In this talk I will show how better understanding of the ice crystal optical properties can be used to improve global climate models. I will present laboratory and airborne measurements of ice crystal angular light scattering properties. Ice cloud angular light scattering functions were measured at several geographical locations from the Arctic to the Tropics and the findings from the field measurements were parameterised and applied in a global climate model. It was found that the atmospheric ice crystals are more reflective than thought, which will have significant consequences for modelling of the ice cloud radiative effect. At the end of the talk I will give insight of the next steps towards better characterisation of the cirrus cloud radiative effect.