High resolution aerosol-cloud modelling over the Southern Ocean and Antarctic

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Radiation biases in the Southern Ocean and Antarctic atmosphere models have been a persistent problem at all time scales. With the inclusion of a double moment microphysics scheme in the Unified Model Regional Nesting Suite we can represent microphysical processes, including aerosol-cloud interactions, in greater detail. In this work, we show a range of experiments, based at Davis Station, Antarctica, where we have adjusted aerosol-cloud parameters to improve the representation of clouds and radiation. This includes a comparison to the Polar WRF model of an atmospheric river event observed during the Year of Polar Prediction. Inclusion of an ice nucleating particle parameterisation derived empirically from observations at Mawson Station has significantly increased the amount of super-cooled liquid water cloud and reduced the radiative bias. Further, we show how sophisticated instrument simulators can be used to do detailed evaluation of cloud microphysical properties.