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Simulating mixed-phase cloud properties with ICON around the CAPRICORN field campaign at the kilometre scale

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Stratocumulus clouds are low-level boundary layer clouds that cover 23% of the ocean surface on a global average, with a mean coverage of 25% to 40% in the mid-latitude oceans. These clouds affect Earth's radiative balance due to their strong radiative cooling effect. Many climate models underestimate the reflection of short wave radiation over the Southern Ocean (SO) which results in a positive mean bias of 2K in the annual mean SST in the mid-latitudes of the southern hemisphere. The organization, cloud field properties and the cloud radiative effects of these clouds occur at the lee of cold front in the SO are analyzed in this study. At this conference, we will present preliminary results.
Real case simulations are performed in this study by using ICON - LAM (Icosahedral Nonhydrostatic - Limited Area Model) with two-way nesting domains of resolutions 4.9 km to 2.4 km to 1.2 km. The initial and lateral boundary conditions for the model are derived from IFS meteorological data. CAPRICORN (Clouds, Aerosols, Precipitation, Radiation, and Atmospheric Composition over the Southern Ocean) field campaign that took place during March and April 2016 has continuously observed the open-cell and stratocumuli using shipborne radars and lidars on 26 and 27 March 2016 at the lee of a cold front between 47ºS 144ºE and 45ºS 146ºE (South of Tasmania). The results are evaluated quantitatively and qualitatively with the shipborne observations and HIMAWARI satellite retrievals respectively.