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Statistics of the Subgrid Cloud of an Idealized Tropical Cyclone at Convection-Permitting Resolution

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Large-eddy simulations of an idealized tropical cyclone (TC) were conducted as benchmarks to provide statistical information about subgrid convective clouds at a convection-permitting resolution over a TC convection system in different stages. The focus was on the vertical and spatial distributions of the subgrid cloud and associated mass flux that need to be parameterized in convection-permitting models. Results showed that the characteristics of the subgrid clouds varied significantly in various parts of the TC convection system. Statistical analysis revealed that the subgrid clouds were mainly located in the lower troposphere and exhibited shallow vertical extents of less than 4 km. The subgrid clouds were also classified into various cloud regimes according to the maximum mass flux height. Local subgrid clouds differed in mass-flux profile shape and magnitude at various regimes in the TC convection system.