Contribution ID: **44** Type: **Talk**

The Organization and Vertical Structure of Shallow Convection in Marine Cold-Air Outbreaks, based on Cold-Air Outbreaks in the Marine Boundary Layer Experiment (COMBLE): Developing the Framework for an Intercomparison Modeling Study

Tuesday, 17 May 2022 11:00 (15 minutes)

The Arctic's complex atmospheric environment remains a large source of uncertainty for numerical models across a range of scales, especially during cold-air outbreaks (CAOs). Under CAO conditions, the convective boundary layer grows rapidly with increasing fetch and intricate cloud structures transition from narrow rolls near the ice edge to cells downstream. To study the CAO cloud regime, the Cold-air Outbreaks in the Marine Boundary Layer Experiment (COMBLE) was conducted from December 2019 to May 2020. Here we study an exemplary case from 12-13 March 2020. Results from numerical simulations using a Lagrangian large-eddy simulation approach suggest that the transition from convective rolls to cells is reasonably well captured. Nonetheless, we find that discernable differences in cloud parameters important to energy and water budgets arise among two modeling platforms. Given the wealth of COMBLE data, we are motivated to initiate a community-wide intercomparison modeling study of the 12-13 March 2020 case. This presentation will first highlight initial results from our simulations of the CAO event, including model sensitivities to microphysical parameters, as well as strength of surface forcing. Then, we will provide overarching goals and plans for the proposed intercomparison study in an effort to solicit interest from various modeling groups.

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Session Classification: Shallow convection