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How well do large-eddy simulations capture the observed co-variability of trade-wind cloudiness and its environment?

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Recent observations revealed that meso-scale patterns of shallow convection in the downwind trades can be connected to specific atmospheric environments whose characteristics are not solely from within the trades but have traces from tropical or mid-latitudinal origin depending on the pattern. As a consequence of this co-variability of patterns and air-mass characteristics, a different feedback to a changing climate is anticipated and will be modulated by the observed, pattern-dependent net cloud radiative effects. By conducting large-eddy simulations we evaluate how well current climate models reproduce this co-variability in cloudiness and its environment and whether the meso-scale patterns are represented due to the observed mechanisms. To capture the full range of patterns and its processes these simulations are done on a large-scale domain with grid-spacings of 625m, 312m and 156m and focus on the EUREC4A field campaign time period for further observational process understanding.

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