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Process Oriented evaluation of the oversea AROME configuration: focus on the representation of cloud organisation

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This study evaluates the ability of the French Convection-Permitting model AROME-OM to represent shallow cumulus and their main organisations for boreal winter conditions in the North Atlantic trades.
It uses a set of three winter seasons (January-February 2018-2020) of high-resolution (1.3 and 2.5 km) simulations over the Caribbean domain (9.7-22.9°N, 75.3°W-51.7°W).
The model is assessed against soundings at Grantley Adams Airport and remote-sensing observations at a site located on the east coast of Barbados which is representative of downwind trades regimes.
The thermodynamic environment of the model fits the observations overall but the boundary layer is slightly too deep, resulting in a weak cold and dry bias.Both model and observations clearly exhibit a double peak of cloud fraction,
a first peak near the cloud base and a second one near the cloud top. The tops of the deepest cumuli around 2 km contain more variance with a higher sensitivity to the environment.
We then take advantage of the EUREC4A field campaign which took place in January-February 2020 to assess the ability of the model to reproduce the four main mesoscale patterns (Stevens et al., 2020)
and to characterize the air-masses in which they occur. All the observations confirm the capacity of the model to predict the different mesoscale organizations and the environment in which they develop.
I will also present new results from a free-running AROMEOM simulation over the EUREC4A period over a domain that extends to Cape Verde.
The main motivation being to investigate the main causes of large-scale variability that drive mesoscale organizations.

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