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Process-oriented evaluation of AROME-OM with a focus on its representation of organization

Friday 7 May 2021 16:00 (1h 45m)

Since 2016, the AROME-OM model is operational over the Carribean area at a 2.5 km resolution. Availability of these operational forecasts raises several scientific questions : i) to what extent this new generation of models significantly improves the forecast in the Overseas; ii) does this huge ensemble of simulated data represent an opportunity to study the processes that govern the shallow convection in a wide range of thermodynamical situations and its spatial organization. To explore to which extend this data set can be used for process studies, an in depth assessment of the model performance is needed, with respect to different types of observations, namely i) thermodynamical profiles provided by radiosoundings and dropsondes spawned within the simulation domain, ii) cloud profiles measured continuously at the Barbados Cloud Observatory (https://barbados.mpimet.mpg.de/), iii) cloud organization inferred from GOES East geostationary satellite observations.

This study is conducted during the EUREC4a international measurement campaign (January-February 2020, http://eurec4a.eu/) that took place East off the island of Barbados (13N, 57W). During the campaign, the AROME-OM was run at 1.3 km offering an opportunity to evaluate the added value by this increase in resolution.

Comparisons at the Barbados site shows the good skill of the AROME-Antilles model to represent the double peak of cloud fraction with one peak located at the base of the cumulus and the other at the trade-wind inversion ; those two peaks are associated with the presence of very shallow cumulus and much thicker cumulus that reach 3 km with a frequent occurrence of an anvil at this altitude.

As defined in Tobin et al (2020, Journal of Climate), we will apply some metrics on the outputs of the two versions of AROME (1.3 km and 2.5 km) to characterize the spatial organization of the shallow convection and investigate the capability of the model to reproduce the different patterns of organization (sugar, gravel, fish, flower) defined by Stevens et al. (2019, QJRMS) and their associated large-scale environment as shown in Bony et al (2020).

Authors: BEUCHER, Florent (Météo France); COUVREUX, Florence; BOUNIOL, Dominique; FAVOT, F.; FAURE, G.; BRUNET, Y.; GUILLEMOT, A.; TESSIOT, O.

Presenter: BEUCHER, Florent (Météo France)

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