

CARAMEL: Cloud-Resolving Model Machine Learning

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Convective-scale models are known to provide better cloud cover predictions. What if we could get the behaviour of a convective-scale cloudiness in a coarser model but without the massive resolution-dependent increase in cost? This talk will show how convective-scale simulations can be used as a source of training data to develop global model parametrizations. We will present an example of the steps involved: running a multi-site nesting suite, coarse-graining the data, rebalancing, training, validation, coupling of the neural network to the Unified Model and running of stable multi-year climate simulations. Avenues for future work will also be discussed e.g. 1) development of a physics-package bias corrector that is a machine-learned scheme that nudges towards convective-scale thermodynamic evolution, 2) learning about sub-global-model-gridbox variability to inform stochastic physics schemes, 3) addressing the need to include extremes and the varying climate in the training data, 4) using convective-scale simulations to augment the training data used when replacing NWP with AI.