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Modelling tropical deep convection with a convective-scale Numerical Weather Prediction model

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Numerical Weather Prediction (NWP) models with grid resolutions of the order of a kilometre will become operational at many National Meteorological Services over the next few years. One of the goals is to improve the prediction of deep convective storms, but one difference between convective-scale NWP models and "Cloud Resolving Models" (CRMs), traditionally used for the study of convective processes in the atmosphere, is the increased emphasis on computational efficiency for operational forecasts. At the UK Met Office, the non-hydrostatic Unified Model (UM) with semi-lagrangian semi-implicit dynamics is being enhanced for high resolution use, including a new turbulence parametrization scheme and additional hydrometeors in the microphysics parametrization. The GCSS Deep Convection Working Group case studies provide a useful test bed for the assessment of the representation of convection in the model and comparison against other CRMs. Results from recent idealised tropical deep convective cases are described, with particular emphasis on sensitivity to resolution and the relative importance of different aspects of the parametrizations in the model.