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Assessing the NWP performance of different representations of convection using limited-area Unified Model forecasts for South East Asia.

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Since the end of 2016 the Met Office has been running real-time limited-area Unified Model (UM) forecasts for South East Asia as part of a UK government Newton fund project. Five-day forecasts are run twice daily over South East Asia – specifically, over a rectangular domain spanning 90E to 154E and 17S to 25N. Four different configurations, each of which represent convection in a different way, are run for each forecast time. Two of these use a 10 km grid-length and, since their configurations follow those defined for the global versions of the UM, atmospheric convection is parametrized. The first configuration is the same as the current global forecast model (the sixth Global Atmosphere (GA6) configuration), whilst the other is an experimental configuration which includes a number of changes to the convection parametrization, most notably a prognostic entrainment scheme which helps to improve the diurnal cycle of convection. The other two configurations use a 4.4 km grid-length and represent convection explicitly. These configurations are based on the operational convective-scale model used over the UK (known at the UKV), but additionally include a number of tropics-specific changes developed and tested over the last couple of years. The representation of convection in these two configurations differs primarily through the large-scale cloud scheme; the first uses the diagnostic "Smith" scheme whilst the second uses the prognostic "PC2" cloud scheme, which has been used in the global versions of the UM for a number of years.

In this presentation results will be presented which illustrate the impact of the different representation of convection in these four real-time forecast configurations. In particular, the sensitivity of various aspects of the forecast rainfall will be examined, including the rainfall distribution and pdfs, the ability of the models to capture extreme events and the timing of the diurnal cycle. Furthermore, an objective assessment of the forecasts by computing fractional skill scores against the Global Precipitation Measurement satellite observations will be presented. The sensitivity of other aspects of the model forecasts, such as the cloud fields, will also be presented. Finally, the implications of these results on the representation of convection in both parametrized and explicit convection versions of the UM will discussed.