# Development of Novel Methods for Predicting Convective Hazards

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Forecasts of convection, despite improvements in modelling, still pose an important forecasting challenge due to the potential for high-impact events with pronounced socio-economic impacts. The most frequent errors are associated with the location, organisation, timing, and intensity of the convection. Here, I discuss recent examples of novel prediction methods for convective behaviour that were jointly devised between Science and Services, at the Met Office, with the benefit for Operational Meteorologists (OMs) at the forefront of the research.

In recent years, it has been noted by OMs that elevated convection is poorly represented in convective-scale models. These comments focus on the location and organisation of events. Through close collaboration diagnostics designed to indicate the nature of the convective environment, to act as guidance for increased awareness of these model problems, were created, compared, and tested in an operational context. Three diagnostics I) the ratio between surface-based and most unstable convective available potential energy, II) the height of the inflow layer base compared to boundary layer depth, and III) a diagnostic combining the two were viewed favourably by the OM community. These diagnostics have been made available as experimental products to OMs to help develop use cases for potential future operations/use in R2O-O2R cycles.

I further consider methods that can give OMs a steer of what could happen when convection moves into certain environments. This includes a method that is currently in development to help indicate whether convection is able to be maintained in environments that are often viewed as unfavourable for convection.

The diagnostics and methods presented here aim to help give extra tools to the OM community to add supplementary information to pre-existing methods to further advance the use of convective-scale models and ultimately help enhance warnings for severe convection.