



## **A dynamic extension of the pragmatic blending scheme for scale-dependent sub-grid turbulent mixing in the boundary layer grey zone**

Robert S. Plant (1) and George A. Efstathiou (2)

(1) Department of Meteorology, University of Reading, United Kingdom (r.s.plant@reading.ac.uk), (2) Department of Mathematics, Centre for Geophysical and Astrophysical Fluid Dynamics, University of Exeter, UK

The pragmatic blending approach of Boutle et al. (2014) is used for operational simulations in the boundary layer grey zone with the Met Office Unified Model. It treats sub-grid turbulent mixing using a weighted averaged of a 1D mesoscale-model and a 3D Smagorinsky formulation. Here the approach is modified and extended to incorporate a scale-dependent dynamic Smagorinsky scheme instead of a static Smagorinsky scheme. Results from simulating an evolving convective boundary layer show that the new scheme is able to improve the representation of turbulence statistics and potential temperature profiles at grey-zone resolutions during the transition from the shallow morning to the deep afternoon boundary layer. This is achieved mainly because the new scheme enables and controls an improved spin-up of resolved turbulence. The dynamic blending scheme is shown to be more adaptive to the evolving flow and somewhat less sensitive to the blending parameters. The new approach appears to offer a more robust and more flexible formulation of blending and the results are strongly encouraging of further assessment and development.