Boundary layer control variables for variational data assimilation

S. L. Dance (1) and M. J. P. Cullen (2)

(1) School of Mathematics, Meteorology and Physics, University of Reading, Reading UK (2) Met Office, Exeter, UK

In variational data assimilation, model variables are often transformed to a second set of nearly uncorrelated control variables that are chosen to distinguish between balanced and unbalanced motion. At synoptic scales, the balances used are typically geostrophic (or similar), however such balances are not applicable everywhere. In particular, at the surface, frictional effects are important. A good description of the surface layer is expected to improve the assimilation of surface observations, the characterisation of surface divergence and convergence, and provide boundary conditions for the analysis of vertical motions, in the form of an Ekman-pumping velocity at the top of the boundary layer. In this work we describe a method of incorporating an Ekman-type balance into the control variable and present some preliminary results.