



A Forward model for atmospheric backscatter due to aerosols, clouds and rain

C. L. Charlton-Perez, O. Cox, S. P. Ballard, and D. Klugmann

UK Met Office, Reading, United Kingdom (c.charlton-perez@metoffice.gov.uk)

Ceilometer measurements of atmospheric backscatter can provide detailed information about the boundary layer's (BL) height and evolution, the aerosol content of the BL, cloud base height and precipitation. The ceilometers in the Met Office network reporting vertical profiles of backscatter have both high time frequency (30 s) and high vertical resolution (30 m). Therefore, assimilation of these observations have the potential to benefit convective-scale NWP. A forward model for creating synthetic profiles of attenuated backscatter due to aerosol, liquid cloud and rain has been designed. Case studies have been conducted comparing the synthetic backscatter to observations over a diurnal cycle at different UK sites for clear-sky conditions, cloudy skies and rainy conditions. The synthetic profiles successfully reproduce the significant meteorological features in the observations. A monitoring system is being developed to record the observed and synthetic backscatter over a long period for various sites in order to study the statistics of the differences between the two. From this statistical analysis we will determine whether to add the observed backscatter profiles directly into the 4D-VAR data assimilation system of the Met Office convective-scale model.