

Radar and aircraft observations made during COPE of convective clouds forced by convergence lines in SW of England

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Convective clouds often form along convergence lines in the south-west of England and sometimes produce prolonged heavy rain. Flash floods have occurred on several occasions previously, most famously at Boscastle in 2004 where a convergence line remained for about 4 hours and cell after cell of relatively deep convection formed along the line. Two strong convergence lines occurred during the COncvective Precipitation Experiment (COPE) on 2 and 3 August, 2013 and had the potential of producing flash floods. Radar and aircraft observations will be presented of the convective clouds that formed along the convergence lines on these two days. WRF model results used to help interpret the observations will also be shown. The radar observations were made with the National Centre for Atmospheric Science (NCAS) mobile X-band, Doppler, dual-polarisation radar which scanned complete volumes out to 150 km approximately every 5 minutes. The Wyoming King Air and Facility for Airborne Atmospheric Measurements (FAAM) BAe146 research aircraft made multiple penetrations through the clouds at a variety of altitudes. They were equipped with state-of-the-art microphysics instruments. Only the Wyoming King Air was involved on 2 August mainly due to an uncertain forecast. The ultimate goal of COPE is to improve forecasts of flash flooding due to heavy convective precipitation such as was experienced on these two days. There were several surprising observations, such as values of reflectivity that sometimes exceeded 50 dBZ, very large raindrops, high values of cloud liquid water content, and heavy precipitation involving only the warm rain process, despite the concentration of cloud droplets being relatively high.