

Polarimetric X-band radar measurements of the development of precipitation observed during COPE

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The COncvective Precipitation Experiment (COPE) took place during July and August 2013 in the southwest of England. The goal of COPE is to improve forecasts of flash flooding due to heavy convective precipitation. Convective clouds form along convergence lines in the region and sometimes produce prolonged heavy rain. The National Centre for Atmospheric Science (NCAS) mobile X-band, Doppler, dual-polarisation radar was deployed on Davidstow Airfield. It has a beamwidth of approximately 1 deg. It scanned complete volumes out to 150 km approximately every 5 minutes. The Chilbolton Advanced Meteorological Radar (CAMRa) located north of Winchester and the Met Office radars near the COPE domain provided additional coverage. Three aircraft were involved in the Project. Two of the aircraft, the Facility for Airborne Atmospheric Measurement (FAAM) BAe 146 and the University of Wyoming King Air (WKA), made transects through developing convective clouds, making measurements of aerosols, cloud physics and dynamics. The WKA also operated a cloud radar and a lidar for high-resolution measurements of cloud structure and composition. In addition a range of other surface based instruments were deployed and high-resolution models were run in forecast mode. In this presentation, we show radar measurements of the development of precipitation, in particular, the supercooled raindrops with high values of ZDR in conjunction with aircraft observations of the raindrop size distribution. Large supercooled raindrops with sizes up to 6 mm and larger were observed by the aircraft instruments. We also discuss the range of convective events that were observed by the X-band radar and the UK operational C-band radar located at Cobbacombe some distance from the study area. Examples of X-band polarimetric variables showing clear air convergence, and deep and shallow convection are also discussed. Measurements illustrating the rainfall processes which may lead to flash floods in this region are shown.