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WesCon 2023: Wessex UK Summertime Convection Field Campaign

Paul Barrett¹, Steven Abel¹, Humphrey Lean¹, Jeremy Price¹, Thorwald Stein², Alison Stirling¹, and Timothy Darlington

¹The Met Office, Exeter, UK (paul.barrett@metoffice.gov.uk)

²University of Reading, Meteorology Department, Reading, UK

Faithful physical representation of summertime convection over the United Kingdom, and beyond, remains elusive in convection permitting (CP) numerical weather prediction (NWP) models. Biases include the incorrect representation of the size and spatial distribution characteristics of convective elements, timing errors in the diurnal cycle of convection and under-representation of high-intensity precipitation events. A key requirement for model improvement is 3D observations of convective clouds, updrafts and turbulence along with the pre-convective environment.

Increased computational power and novel parameterisation schemes (e.g. CoMORPH: scale-aware convection scheme, CASIM: Cloud AeroSols Interactive Microphysics) are on the cusp of facilitating significant advances to the representation of convective cloud systems, both at high resolution cloud resolving scales from O(100m) to O(1km) and for CP ensemble prediction systems. Observational constraints are now required to validate and develop this suite of numerical modelling and the WesCon campaign has been designed for this purpose.

Met Office and University of Reading are planning an observational field campaign from June through to August 2023 to investigate summertime convection. Focussing on the Wessex region encompassing South West and South Central England we will benefit from the remote sensing capability of the Chilbolton Observatory to observe clouds and precipitation (including a new X-band radar) and the research radar (C-band) at Met Office Warden Hill (Dorset) to observe precipitation structures.

Up to 80 research flight hours with the FAAM BAe146 research aircraft (Facility for Airborne Atmospheric Measurement) will probe the thermal, dynamical, updrafts and microphysical structures of the planetary boundary layer and lower free-troposphere on horizontal length-scales from the turbulence scale O(1 m) to the mesoscale (10's kms). Ground based measurements will be deployed across the region making observations of surface exchange, turbulence and boundary layer properties. Radiosondes and dropsondes along with aircraft profiles will probe the atmosphere in the vertical.

Airborne measurements will place particular emphasis on the pre-convective environment, convective inhibition (CIN) and the early stages of the development of convective systems. The full

lifecycle of convective systems will be observed from the vantage point of remote sensing observations.

Here we present the aims and measurement strategy of the WesCon campaign and solicit interest and involvement from other modelling or observations groups within the community who may wish to join us to collaborate.