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Patterns of precipitation: Fine-scale rain dynamics in the South of England

Sarah Callaghan
British Atmospheric Data Centre, STFC Rutherford Appleton Laboatory, UK (sarah.callaghan@stfc.ac.uk)

The consensus in the climate change community is that one of the (many) effects of climate change will be that the nature of rain events will change, and in all likelihood, they will become more extreme. Currently, most long-term rain rate data sets are hourly (or longer) rain accumulations, so investigating the rain events that occur for less than 0.01% (52.5 minutes) of a year is not possible. Rain datasets do exist with smaller temporal resolution, but these are either not continuous, or simply have not been in operation long enough to investigate any trends in climate change.

The Chilbolton Observatory in the south of England is one of the world's most advanced meteorological radar experimental facilities, and is home to the world's largest fully steerable meteorological radar, the Chilbolton Advanced Meteorological Radar (CAMRa). It also hosts a wide range of meteorological and atmospheric sensing instruments, including cameras, lidars, radiometers and a wide selection of different types of rain gauges. The UK atmospheric science, hydrology and Earth Observation communities use the instruments located at Chilbolton to conduct research in weather, flooding and climate. This often involves observations of meteorological phenomena operating below the current resolution of (forecasting and climate) models and work on their effective parameterisation.

The Chilbolton datasets contain a continuous drop counting rain gauge time series at 10 seconds integration time, spanning from January 2001 to the present. Though the length of the time series is not sufficient to confidently identify any effects of climate change, the time resolution is sufficient to investigate the differences in the extreme values of rain events over the nine years of the dataset, characterising the inter-annual and seasonal variability. Changes in the occurrence of different rain events have also been investigated by looking at event and inter-event durations to determine if there is any change in the relative number of stratiform and convective events over the time period.

Knowledge of the fine scale variability of rain (both in the spatial and temporal domains) is important for the development of accurate models for small-scale forecasting, as well as models for the implementation and operation of rain affected systems, such as microwave radio communications and flood mitigation. As the rain gauge measurements made at Chilbolton will continue for the foreseeable future, these datasets will become increasingly valuable, as they provide a "ground-truth" that can be compared with the results of climate and other models.