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The significance of upper-level features during the Convective Storm Initiation Project (CSIP)

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The Convective Storm Initiation Project (CSIP) was an observational campaign held in the southern UK during the summer of 2005 involving several UK and German universities and the UK Met Office. The aim of the campaign was to understand the development of convective storms with the ultimate goal of improving their representation and accurate prediction in numerical weather prediction models. Of the 18 Intensive Operational Periods (IOPs) that were undertaken during CSIP, it was of note that the convective events being observed were on many occasions (10 IOPs) significantly influenced by upper-level features; it is the aim of this paper to summarise the impact of these upper-level features. The following list gives a flavour of the range of upper-level features that were observed and their impacts.

Convective inhibition beneath an upper-level potential vorticity (PV) anomaly: an isolated thunderstorm cluster was driven by an orographically forced convergence line and reduced tropospheric stability caused by a small upper-level PV anomaly. More widespread convection was inhibited by a lid that was itself derived from downward flow associated with the same breaking Rossby wave that spawned the upper-level PV anomaly.

Convective intensification forced by a descending dry layer: a line of convection behind a shallow cold front was seen to intensify when an "arm" of dry stratospheric air descended overhead. This was observed by radiosondes, MST radar, wind profiling radar and lidar. This descending "arm" had flowed around a much larger PV anomaly to the north of the UK, which itself influenced the local conditions.

A large stratospheric streamer over the UK: an indistinct tropopause and layers

of high wind shear throughout the troposphere linked with a north-south orientated streamer that covered the whole of the UK assisted in organising and driving relatively intense showers with lightning and hail over the UK.