

Diabatic heating and cooling rates derived from in-situ microphysics measurements: A case study of a wintertime UK cold front

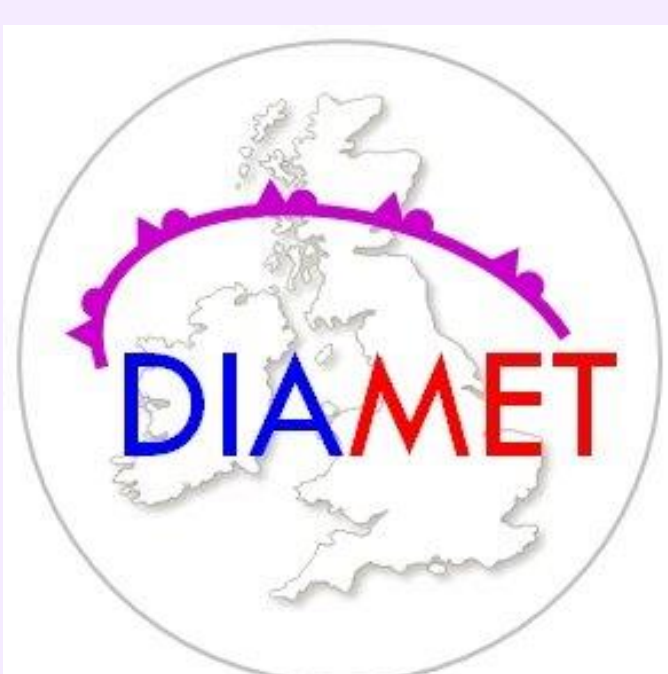
C. Dearden, P. Connolly, T. Choularton, G. Lloyd, J. Crosier, K. Bower, and G. Vaughan



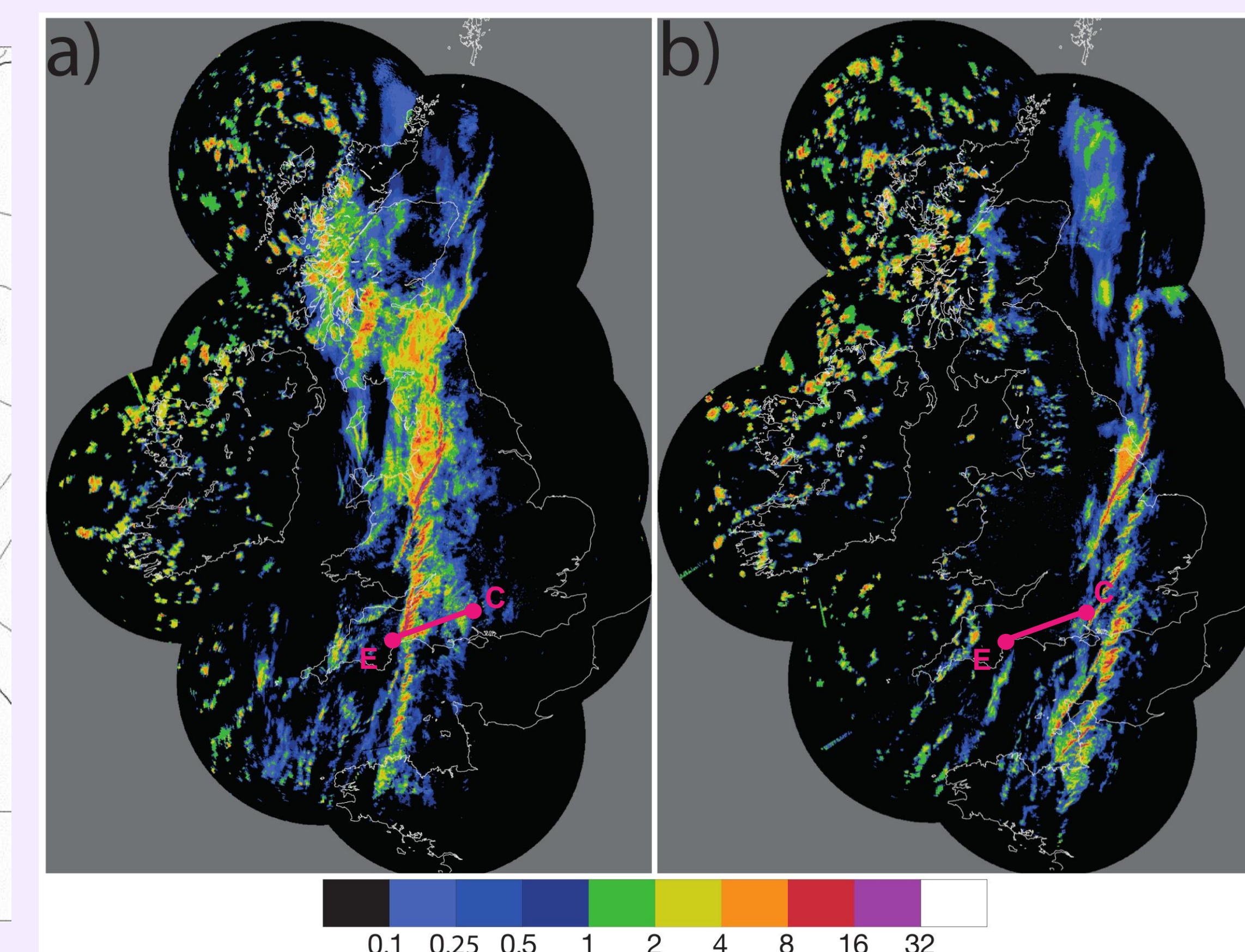
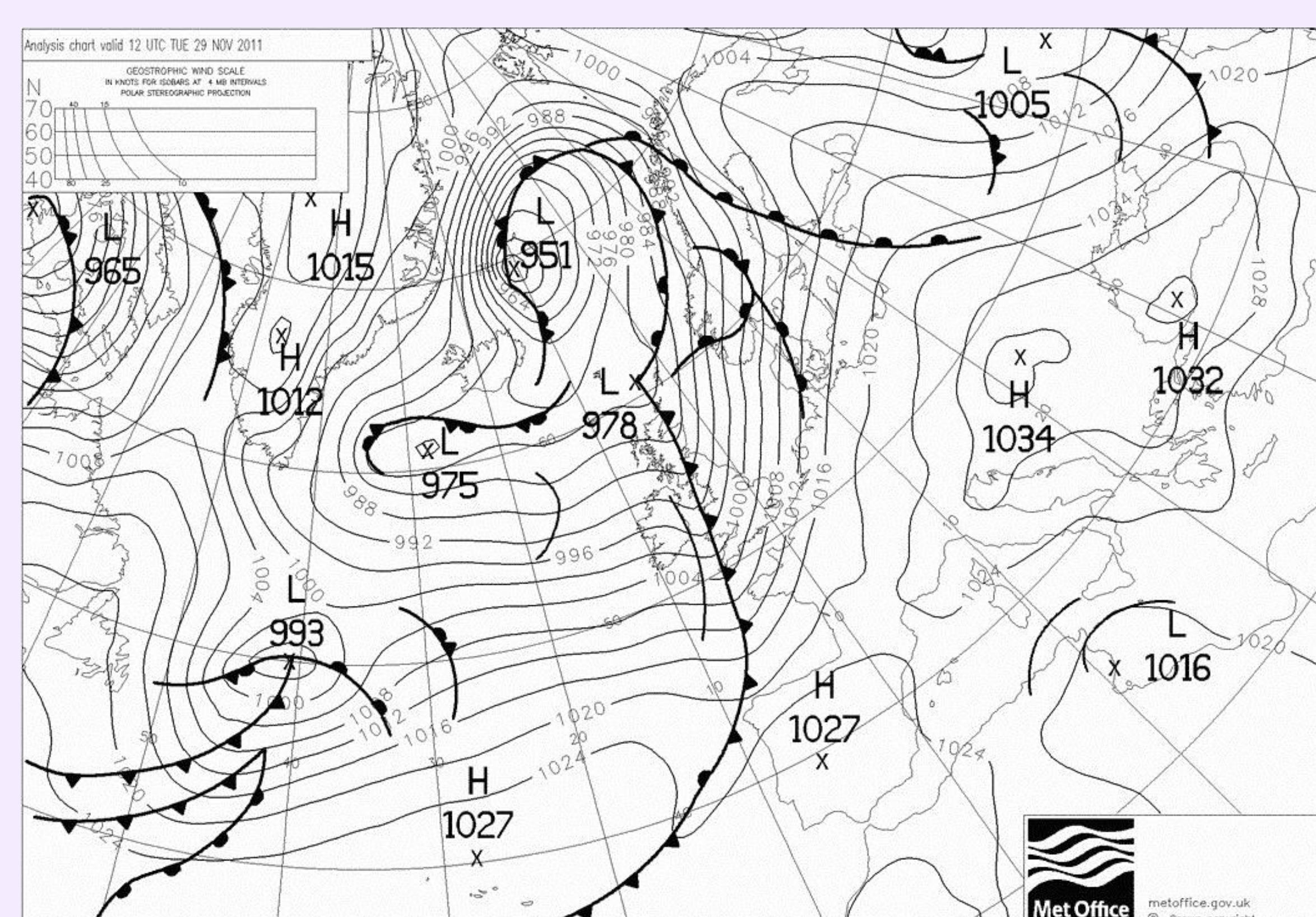
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Q: How important are ice phase processes in terms of their diabatic effect on mesoscale structures associated with extratropical cyclones, and are these processes well represented in forecast models?

Case study: 29th November 2011. Cold front undergoing an anvil to kata transition as it crosses the UK mainland.



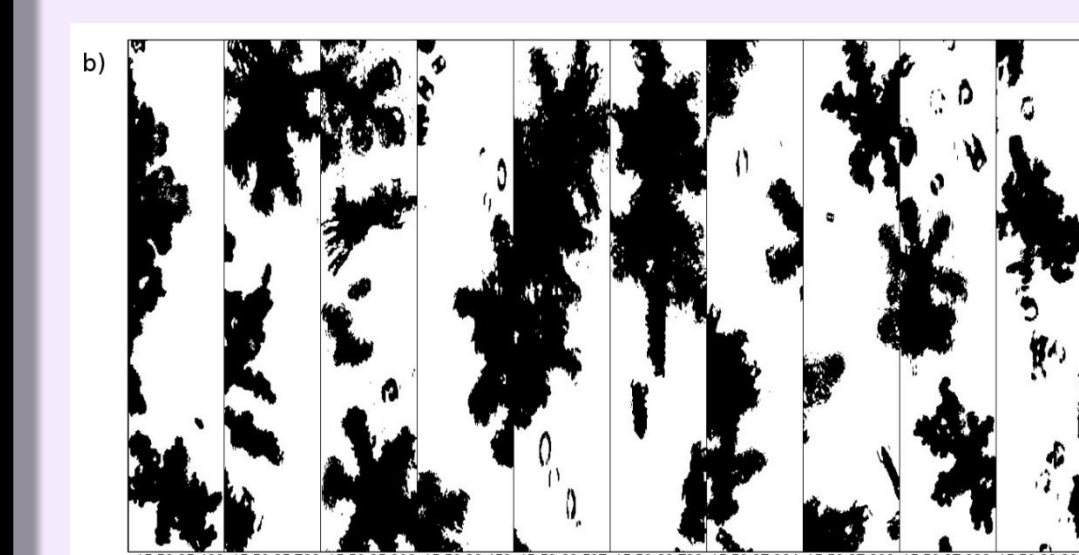
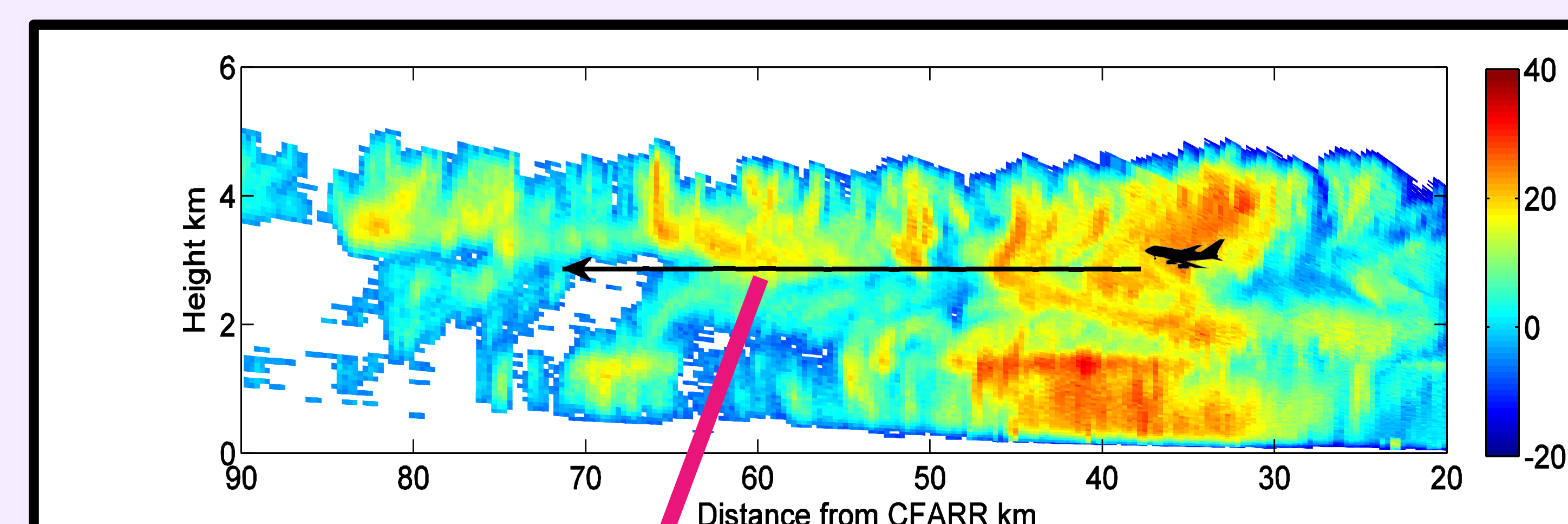
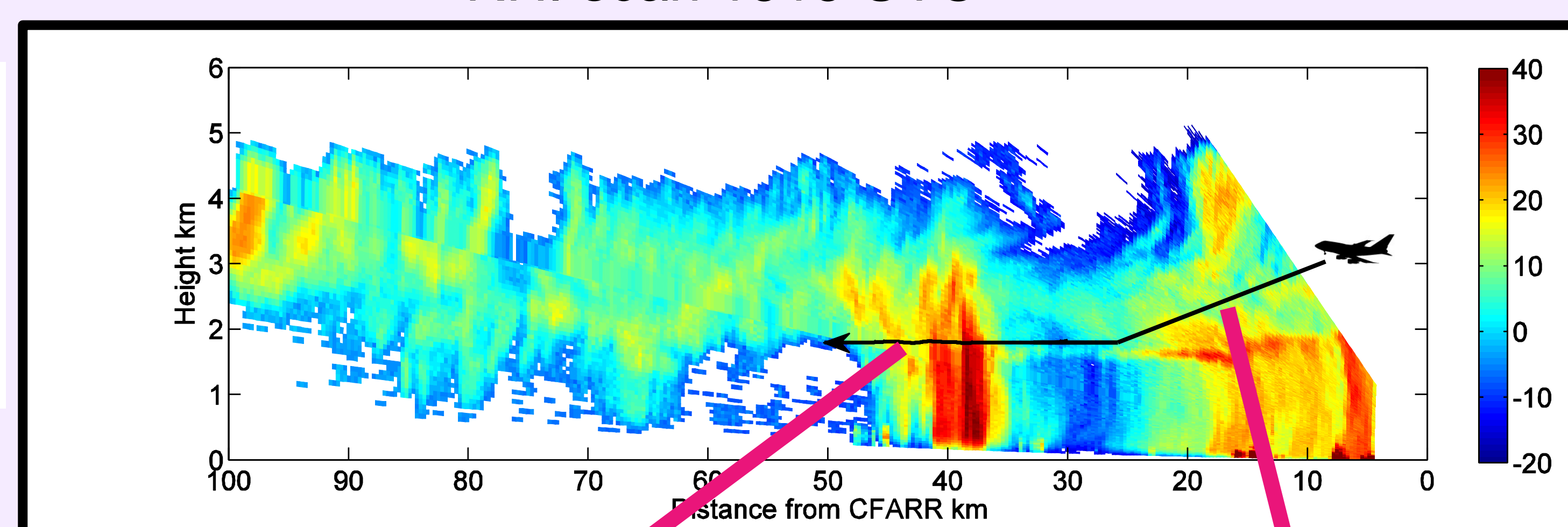
Left: Met Office analysis chart, 1200 UTC 29th November 2011.
Far left: Precipitation rate (mm/hr) from Met Office rainfall radar network at a) 1400UTC and b) 1615UTC. Pink dots labelled 'C' and 'E' refer to the locations of the Chilbolton Facility for Atmospheric and Radio Research (CFARR) and Exeter Airport respectively. The pink line shows the 253° radial from CFARR to Exeter, along which both the BAe 146 research aircraft and the 3 GHz Doppler radar at CFARR took measurements.



RHI scan 1515 UTC

RHI scans from the Doppler radar at CFARR

RHI scan 1547 UTC

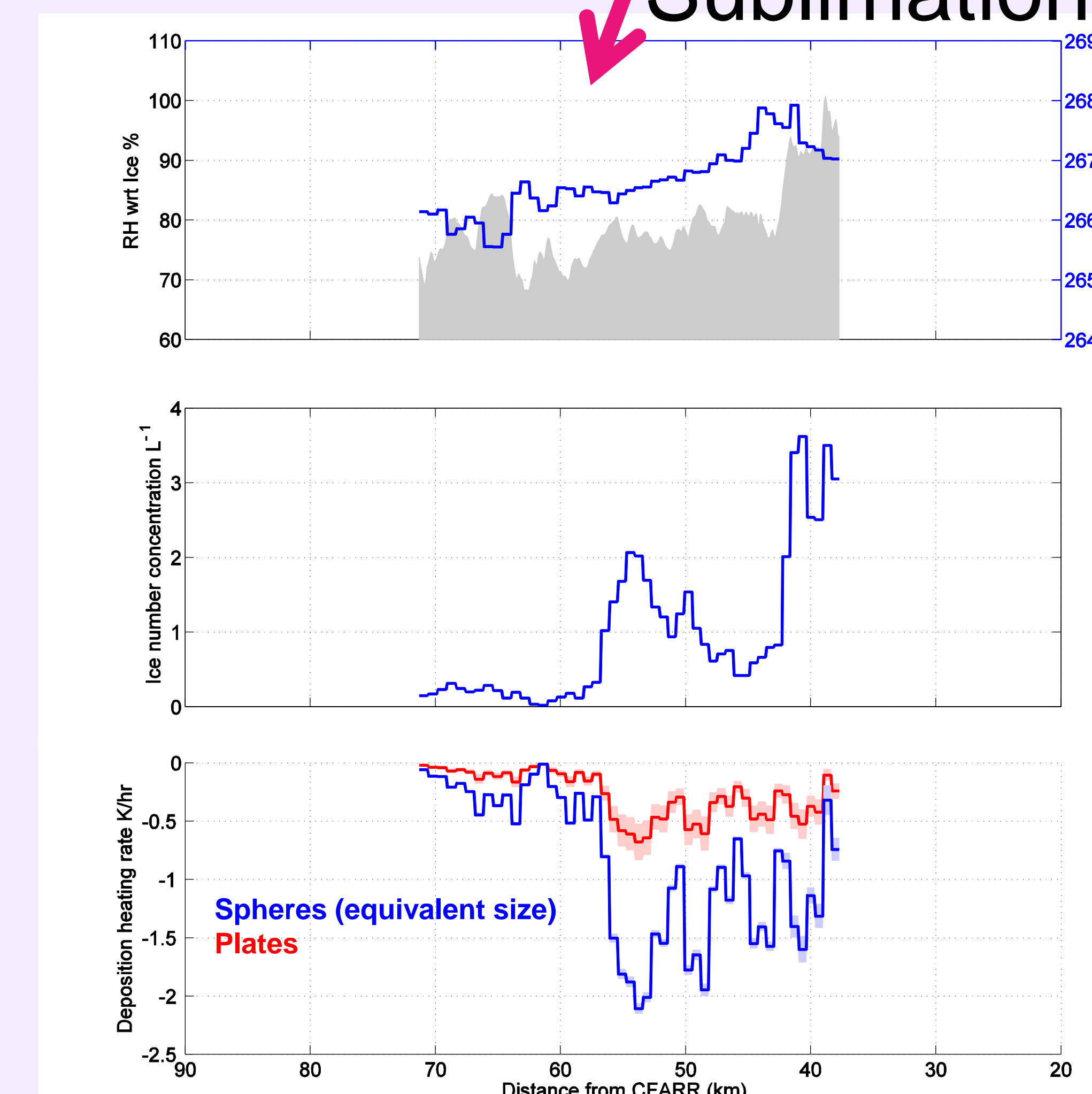
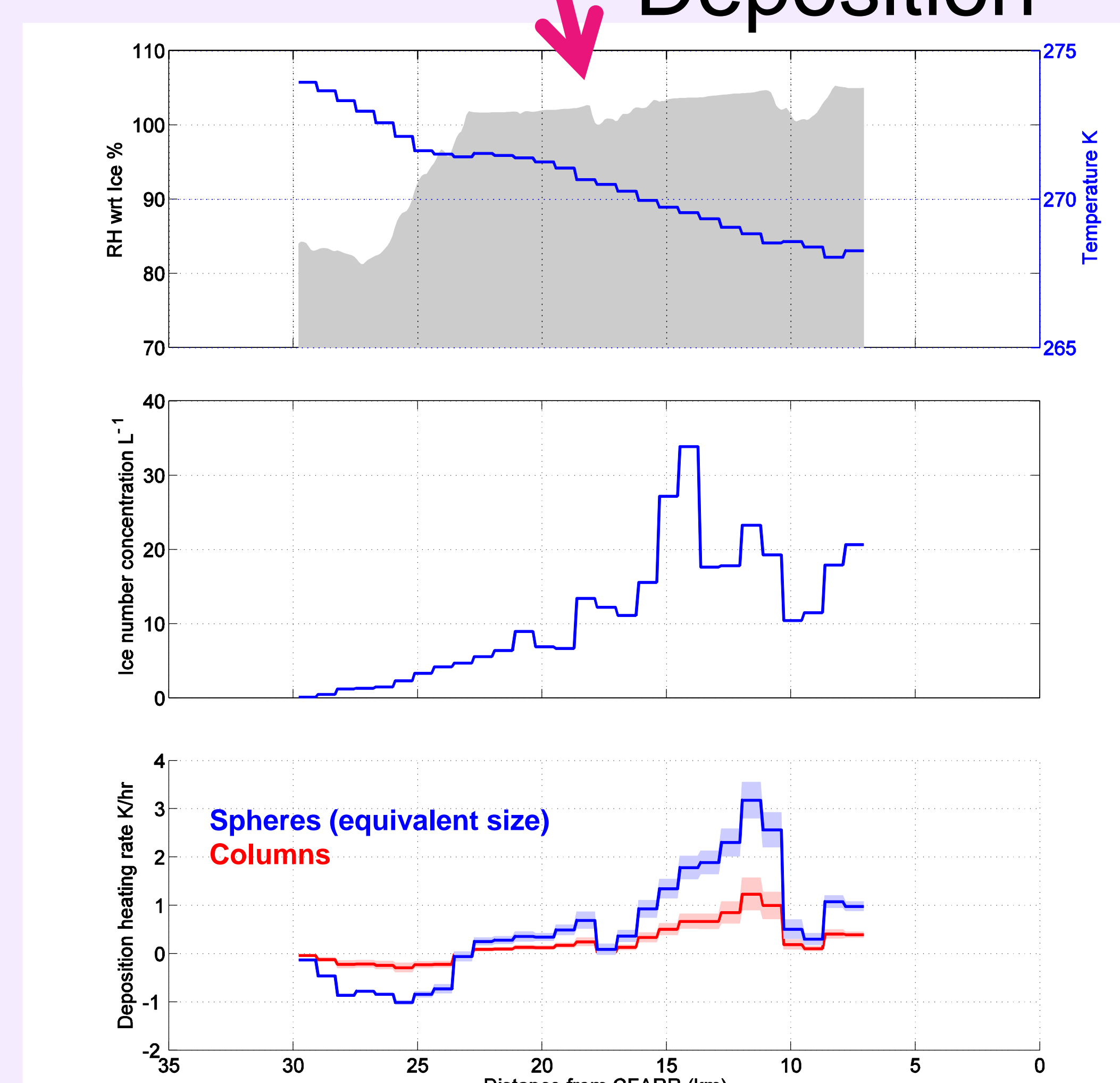
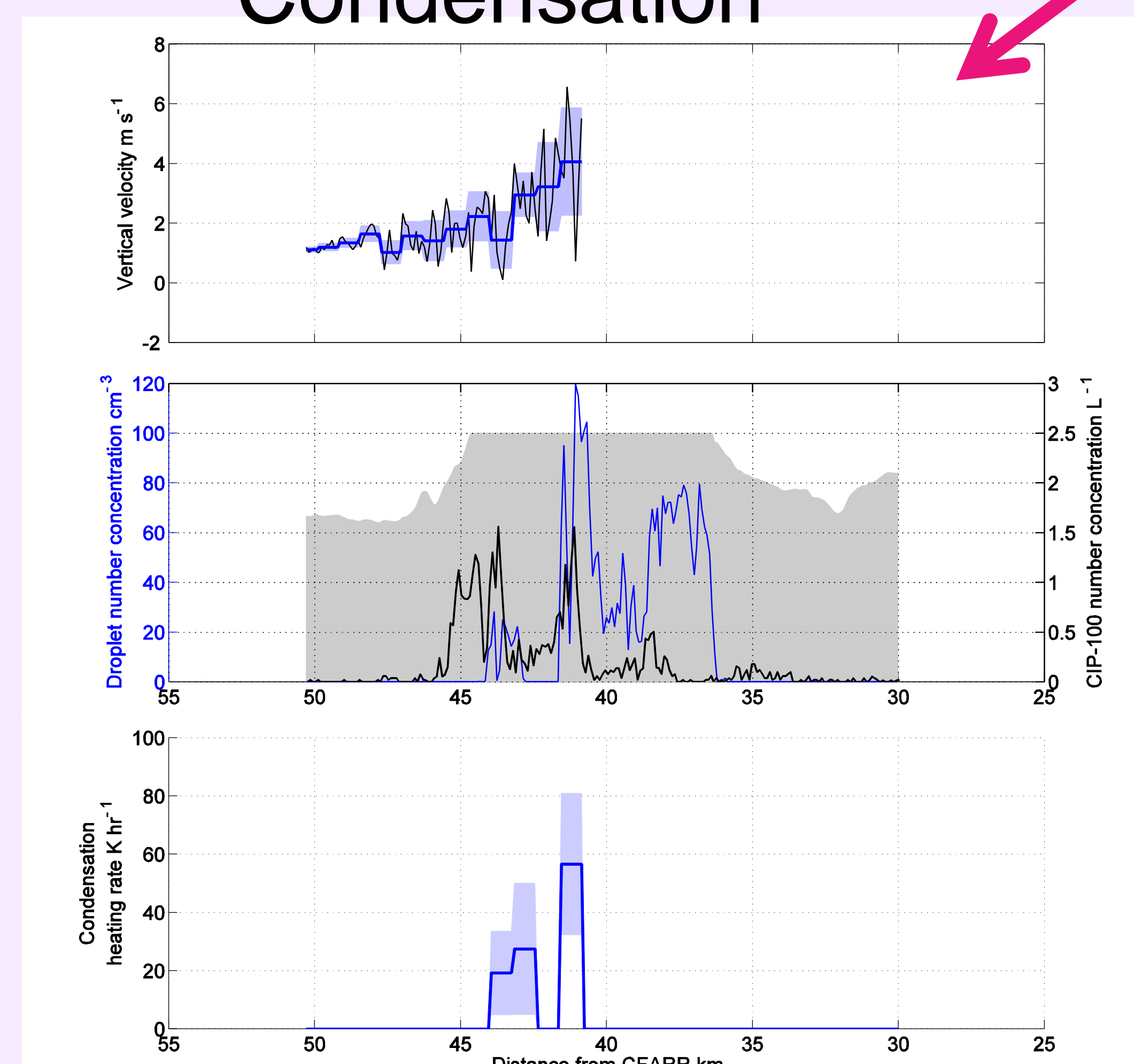


Images of pristine plates and aggregates from the 2D-S probe, taken at 1550 UTC

Condensation

Deposition

Sublimation



Summary

Ice crystals in this case study show large variations in number concentration and habit, despite the relatively warm cloud tops

Habit is shown to influence the local diabatic heating and cooling rate

Further modelling work is necessary to explore the influence of habit evolution on mesoscale precipitation structures in the context of mid-latitude cyclones

Related posters: #24 and #65

