A Case Study of Convection Initiation on 6 August 2007 during COPS

Alan M. Blyth\textsuperscript{1,2}, Lindsay J. Bennett\textsuperscript{1}, Tammy M. Weckwerth\textsuperscript{3}, Ralph R. Burton\textsuperscript{1,2} and Alan M. Gadian\textsuperscript{1,2}

\textsuperscript{1}School of Earth and Environment, University of Leeds
\textsuperscript{2}National Centre for Atmospheric Science
\textsuperscript{3}National Center for Atmospheric Research, Boulder, USA

Acknowledgements

Bruce Morley and Tracy J. Emerson, NCAR, USA
Strengthening north-westerly flow over Vosges increases convergence with easterly upslope flow.
WRF SIMULATIONS

• V3.1 (Apr 09)

• Initialized with GFS (1°) analyses at 0000 UTC

• Three domains, 2-way nesting: D1=6.3 km; D2=2.1 km; D3=0.7 km

• 121 vertical levels

• Microphysics: Thompson

• Surface layer: Eta similarity based on Monin-Obukhov

• Boundary layer: Mellor-Yamada-Janjic (MYJ)

• Land surface: Noah land surface model

• Convection: Betts-Miller-Janjic on D1, D2/D3 explicit
WRF Outer Domain – Clouds and precipitation

1600 UTC

Surface Reflectivity (dBZ)

Column-integrated cloud mixing ratio
Summary

Initiation of convection over Vosges Mountains
- Deep, moist convective boundary layer develops over eastern slopes of Vosges
- Easterly upslope low-level winds develop
- South-westerly prevailing flow ahead of the approaching cold front progresses eastwards over Vosges with time
- Convergence zone in the lee of the Vosges between the two flows
- Possible presence of a lee vortex in Rhine valley enhances convergence

WRF simulations
- Model simulates front and flow structure reasonably well
- Convection initiates in the right location at the right time
- Clouds are too narrow, individual cores develop along an arc, weaker organisation and shorter lifetime than observed
- Altitude and intensity similar to observed