Mesoscale Group

Methods and Tools

✓ Idealised & case-study simulations (MetUM, LEM)
✓ Ensemble methods
✓ MetUM Tracers
  Diabatic PV, theta and moisture tracers
✓ Trajectory analysis
✓ Sensitivity analysis
✓ Dispersion modelling (NAME)
✓ SAL methodology (developed by H. Wernli)
✓ Reanalysis diagnostic tools
✓ Cyclone Tracking and compositing (developed by Kevin Hodges):
  Extratropical Cyclone Atlas
✓ Parameterization development
Mesoscale Group
Senior Staff

Sue Gray
- Conditional symmetric instability
- Polar lows and tropical cyclones
- Pollution transport
- Synoptic and convective-scale predictability

Bob Plant
- Convection - large-scale dynamics interaction
- Convective-scale forecasting
- Stochastic aspects of convection
- Parameterization of convection

Helen Dacre
- Development mechanisms of Extratropical cyclones (Extratropical Cyclone Atlas)
- Secondary cyclone dynamics
- Pollution transport
- Volcanic ash dispersion

Peter Clark
- Deep convection and ‘Grey-Zone’ parameterization / COPS
- Atmospheric modelling
- Extratropical cyclone structure and sting-jet dynamics.
- Urban-area mesoscale meteorology

Jeffrey Chagnon
- Gravity and acoustic waves
- Adjustment and balance
- Stratosphere/troposphere exchange
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Diabatic Processes (DIAMET)

Researchers

Oscar Martinez-Alvarado

PIs: Sue Gray, Jeffrey Chagnon, Bob Plant

Diabatic PV distribution in an evolving synoptic-scale wave (Chagnon, Gray and Methven 2012)

Latent heat release in the warm conveyor belt

Sting jets in models and observations

Others Involved

Laura Baker
John Methven
Nigel Roberts (MetOffice@Reading)
Humphrey Lean (MetOffice@Reading)
Mesoscale Group
Mesoscale Convective Systems

Students
Samantha Clarke

Multiscale prediction and upscale impact of mesoscale convective systems

Others involved
Nigel Roberts (MetOffice@Reading)
Mesoscale Group

ETC Moisture Processes

Students

Latent heat release in ETCs in remote sensing data, reanalysis and HiGEM

Matt Hawcroft

Projected changes in extreme European rainfall due to N. Atlantic cyclones

Ruari Rhodes

Others Involved:
Len Shaffery
Kevin Hodges

Helen Dacre
Sue Gray
The moisture cycle in mid-latitude weather systems

Others Involved:
Stephen Belcher
Conditional Symmetric Instability

The Role of Conditional Symmetric Instability (CSI) in Numerical Weather Prediction

ERA-Interim mean SCAPE ($J kg^{-1}$) climatology

Students

Michael Glinton

Sue Gray  Jeffrey Chagnon
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Sting Jet Windstorms

Researchers

Neil Hart

Sting jet windstorms in current and future climates

Students

Aga Mega

Dynamics of sting jets and their relation to large-scale drivers

Others Involved:
Laura Baker
Oscar Martínez-Alvarado
Mesoscale Group

Stationary convective systems

Students

Quasi-stationary convective systems
- Case study (21 July 2010)
- UK climatology
- Idealised modelling

New cells form here
Cell Motion
System Propagation

Adapted from Schumacher and Johnson (2005)

Others involved:
Dan Kirshbaum
Humphrey Lean

Bob Plant

Rob Warren
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Orographic Rainbands

Researchers

Mechanisms and predictability of stationary convective rainbands

Andrew Barrett

Students

Regimes of banded convection downwind of mountains

Caroline Crowther

Others involved: Dan Kirshbaum

NIMROD Network Radar: 2011/08/27 15-18 UTC

Sue Gray
Mesoscale Group

SUMMARY

Mesoscale features of extra-tropical cyclones
- Sting jets
- Diabatic processes
- Moist processes

Meeting: Tues, 10am, 1L61
www.met.reading.ac.uk/~mwp

Convection
- Stationary convective systems
- Orographic convective banding
- Parameterization development
- Grey-zone

Unified Model
- High resolution (<1km)
- Idealised Ensembles
- Tracers

NAME dispersion modelling

Cyclone tracking and compositing

Climatologies
- SCAPE
- Stationary convection
- Cyclone intensity and features

Extratropical Cyclone Atlas
www.met.reading.ac.uk/~storms