



CONVECTION PARAMETERIZATION: PROGRESS AND CHALLENGES

Monday 15 July 2019

08:15 Bus from Holland Hall to Met Office

08:30 – 09:00 Photo ID Checks

09:00 – 09:30 Welcome

Chair: Penelope Maher

09:30 – 12:00 Convection scheme progress

09:30 Still some convection developments in the IFS
Peter Bechtold and Sylvie Malardel

09:50 Current Developmental Activity on the Grell-Freitas Cumulus Parameterization Including the Addition of Number Concentrations and Storm Motion
Hannah Barnes, Georg Grell, Saulo Freitas, Haiqin Li, Keren Rosado and Gregory Thompson

10:10 On improving microphysics in convection parametrizations
Richard Forbes

10:30 – 11:00 Coffee and Tea Break

Chair: Alison Stirling

11:00 Mass Flux Approaches to Convection Parameterization: Impact of a Unified Convection Scheme (UNICON) on Global Climate in CMIP6
Sungsu Park, *Invited*

11:35 Why use a deep convective parametrization at 2.5 km?
Danahé Paquin-Ricard, Lubos Spacek, Jason A. Milbrandt, Paul A. Vaillancourt and Stéphane Bélair

11:55 A New Generalised Mass-flux Convection Scheme for the Met Office Unified Model
Michael Whittall

12:15 – 13:15 Lunch (all posters to be put up)

Chair: Christopher Holloway

13:15 Ecology of entropic entities, tensioned by telos
Brian Mapes, *Invited*

13:50 – 15:10 Objective frameworks for understanding scheme behaviour

13:50 HIGH-resolution simulations to improve and TUNE boundary-layer cloud parameterizations, the HIGH-TUNE project
Fleur Couvreux, Frederic Hourdin, Najda Villefranque, Richard Fournier, Romain Roehrig, Catherine Rio, Daniel Williamson and Victoria Volodina

14:10 Convection parameterization in the CNRM climate model: calibration and structural limits
Romain Roehrig, Fleur Couvreux and Daniel Williamson

14:30 Using a cloud-resolving model to diagnose the effects of different wind shear profiles on deep convective cloud fields
Mark Muetzelfeldt, Robert Plant, Peter Clark and Alison Stirling

14:50 Exploring uncertainty in model representation of atmospheric convection through Universal Structural Parameterisation
Hugo Lambert, Peter Challenor, Richard Keane and Mark Webb

15:10 – 15:40 Coffee and Tea Break

Chair: Todd Jones

15:40 – 17:00 Convection interactions

Monday, continued

- 15:40 **The role of the boundary layer when deep convection is very active: Forcing or response?**
David Randall
- 16:00 **The role of interactive SST in the cloud-resolving simulations of aggregated convection**
Chien-Ming Wu and Yan-Ting Chen
- 16:20 **A simple model of a balanced boundary layer coupled to a large-scale convective circulation**
Robert Beare and Michael Cullen
- 16:40 **FLEX-UM: The Flexible Model Framework for the UK Met Office Unified Model**
Penelope Maher, Paul Earnshaw and Geoffrey Vallis

17:00 – 17:10 **30-second *Lightning Lectures* by Poster Presenters**

17:10 – 19:00 **Drinks and Posters**

19:00 **Bus to Dinner at City Gate Hotel, EX4 3RB**

19:30 **Dinner at City Gate Hotel**
An opportunity to continue informal discussion and networking

Monday's Poster Presentations

101	A two-fluid single-column model of the convective boundary layer: improvements to and physics John Thuburn and Georgios Efstathiou
102	Parameterization of the perturbation pressure in a unified turbulence-convection framework Jia He, Yair Cohen and Tapio Schneider
103	Exploring the sensitivity of convection to moisture using the idealised UM Sally Lavender, Alison Stirling, Rachel Stratton and Michael Whittall
104	Unified parameterization of boundary layer clouds and turbulence based on two prognostic turbulence energies Ivan Bastak Duran and Juerg Schmidli
105	The role of the cold pool scheme in convective memory in a hierarchy of models, and its impact on precipitation frequency Maxime Colin, Jean-Yves Grandpeix, Sandrine Bony, Steven Sherwood
106	Linking stochasticity of convection to large-scale vertical velocity to improve Indian summer monsoon simulation in the NCAR CAM5 Yong Wang, Guang Zhang and Yiquan Jiang
107	The balance and interaction of convective parametrization and microphysics scheme Taro Anzai, Masashi Ujiie and Hiroshi Kusabiraki
108	Simulating clouds using a massively parallel parcel-based framework Steven Böing, Gordon Gibb, Nick Brown, Michèle Weiland and David Dritschel
109	Evaluation of heavy rain events over India during the southwest summer monsoon using high resolution Global Forecast System suite (GFS T1534 and GEFS T1534) Snehlata Tirkey, Parthasarathi Mukhopadhyay, R Phani Murali Krishna, Medha Deshpande, Malay Ganai, Tanmoy Goswami, Sahadat Sarkar, Radhika Kanase, Mata Mahakur and Kumar Roy
110	Cold pools and the organization of tropical convection in global cloud-system resolving simulations Steven Krueger
111	Prognostic turbulence parametrization with sub-filter cloud scheme applied to grey-zone convection Thomas Lloyd Webb and Peter Clark



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Tuesday 16 July 2019

08:15 Bus from Holland Hall to Met Office

Chair: Peter Clark

09:00 – 14:35 Turbulence and EDMF

- 09:00 **A statistical approach to evaluate parametrised turbulence in convection-permitting models using radar-retrieved eddy dissipation rates**
Matthew Feist, Peter Clark, Humphrey Lean, Thorwald Stein, Chris Westbrook and Carol Halliwell
- 09:20 **Turbulence Kinetic Energy - Scalar Variance Mixing Scheme for NWP Models**
Dmitrii Mironov and Ekaterina Machulska
- 09:40 **Impact of turbulence representation on deep convective clouds**
Didier Ricard, Christine Lac, Nicolas Rochetin, Clément Strauss and Antoine Verrelle
- 10:00 **Unity, fidelity, and simplicity in parameterizations: The example of momentum fluxes**
Vincent Larson, *Invited*

10:35 – 11:05 Coffee and Tea Break

Chair: John Thuburn

- 11:05 **Performance of a 3D, second order turbulence scheme in the turbulence grey-zone**
Carol Halliwell and Peter Clark
- 11:25 **Using updraft covariances for entrainment closures in an extended eddy diffusivity/mass flux model**
Yair Cohen, Anna Jaruga, Ignacio Lopez, Jia He, Charles Kawczynski and Tapio Schneider
- 11:45 **Using LES as a non-hydrostatic testing ground for designing scale-adaptive and stochastic parameterizations for the grey zone**
Roel Neggers, Philipp Griewank and Thijs Heus
- 12:05 **Scale-aware tests of the MYNN-EDMF PBL and shallow cumulus scheme with a novel framework**
Wayne Angevine and Joseph Olson

12:25 – 12:35 30-second *Lightning Lectures* by Poster Presenters

12:35 – 14:25 Lunch and Posters

Chair: Adrian Lock

14:25 – 15:05 Multi-fluids approaches

- 14:25 **Multi-fluid Modelling of Convection**
Hilary Weller, William McIntyre and Dan Shi
- 14:45 **Identifying coherent structures by optimising a two-fluid representation of shallow convection**
Georgios Efstathiou and John Thuburn

15:05 – 17:30 Updraught/downdraught dynamics

- 15:05 **What is the basic structural unit of cumulus convection, and why does it matter?**
Hugh Morrison, *Invited*

Tuesday, continued

15:40 – 16:10	Coffee and Tea Break
<i>Chair: Leo Donner</i>	
16:10	A simple model of convective drafts accounting for the perturbation pressure term Jean-Marcel Piriou, Julien Leger, Jean-Philippe Lafore and Jean-François Gu�er�emy
16:30	Dynamics of subsiding shells in actively growing clouds with vertical updrafts Vishnu Nair, Thijs Heus and Maarten van Reeuwijk
16:50	Detecting thermals in deep convection Liam Till, Thorwald Stein, Peter Clark and Carol Halliwell
17:10	Entrainment and its dependence on convective organization and large-scale state in convection-permitting simulations Tobias Becker and Cathy Hohenegger
17:30 – 17:50	Returning to the large scale (Part I)
17:30	A physical mechanism for the relationship between climate sensitivity, low-level cloud feedback and double-ITCZ bias Mark Webb and Adrian Lock
18:00	Bus to Dinner at Puerto Lounge, EX2 4AE
18:30	Dinner at Puerto Lounge An opportunity to continue informal discussion and networking Those not attending dinner should plan public transport to Holland Hall.

Tuesday's Poster Presentations

201	Towards improving the representation of divergent-type modes of tropical variability in the NOAA GFS Stefan Tulich and Jian-Wen Bao
202	The Subgrid Convection and Turbulent Mixing Parameterizations in the Grey Zone Jian-Wen Bao
203	Buoyancy-Driven Entrainment in Dry Thermals Brett McKim, Nadir Jeevanjee and Daniel Lecoanet (<i>Remote presentation</i>)
204	Assessment of model tendencies in the transition towards resolved deep convection Luc Gerard
205	Convectively coupled equatorial wave simulations using the ECMWF IFS and the NOAA GFS cumulus convection schemes in the NOAA GFS model Bengtsson, L., Dias, J., Gehne, M., Bechtold, P., Whitaker, J., Bao., J.-W., Magnusson, L., Michelson, S., Pegion, P., Tulich, S., and Kiladis., G.N.
206	Enhancing model convective precipitation in the presence of lightning Jos�e Davi Moura, Sin-Chan Chou and Osmar Pinto
207	Wind shear and deep moist convection Megan Bickle, John Marsham, Andrew Ross and Stephen Griffiths
208	The influence of the urban surface on boundary-layer cloud formation: from observing processes to model evaluation Natalie Theeuwes, Janet Barlow, Ryan Teuling, Sue Grimmond, Simone Kotthaus and Ian Boutle
209	Exploring the consequences of nearest neighbour interaction in convective parametrisations Tobias Goecke
210	Evaluation of a modified convection scheme and its impact on systematic SST biases using initialized ensemble seasonal hindcasts Hsi-Yen Ma, Cheska Siongco, Stephen Klein, Shaocheng Xie, Alicia Karspeck, Kevin Raeder, Jeffrey Anderson, Guang Zhang and Xiaoliang Song



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Wednesday 17 July 2019

08:15 Bus from Holland Hall to Met Office

Chair: Natalie Harvey

09:00 – 10:20 Constraints on convection permitting models

09:00 Radiative-convective equilibrium across the gray zone: Bulk convergence with resolution

Todd Jones and Carol Halliwell

09:20 The representation of convection in the Unified Model at 1.5km to 50m gridlength

Kirsty Hanley and Humphrey Lean

09:40 Biases in the diurnal cycle of convection in convection permitting configurations of the UM in different parts of the world.

Humphrey Lean, Kirsty Hanley, Stuart Webster, Will Keat, Thorwald Stein, Todd Lane, Martin Jucker, Elizabeth Kendon and Giorgia Fosser

10:00 Slantwise Convection: Dynamics and Sensitivity to Resolution in Numerical Modeling

Ting-Chen Chen, M. K. Yau and Daniel Kirshbaum

10:20 – 10:40 Coffee and Tea Break

Chair: Michael Herzog

10:40 – 11:35 Machine learning for understanding organisation

10:40 Machine Learning: Building parameterizations and understanding clouds

Stephan Rasp, *Invited*

11:15 Unsupervised classification of convective organisation with Deep Learning

Leif Denby

11:35 – 12:15 Grey zone

11:35 The Grey Zone Project: an intercomparison project of scale-aware approaches to turbulence and convection

Lorenzo Tomassini, Rachel Honnert, Georgios Efstathiou, Adrian Lock, Stephan de Roode and Pier Siebesma

11:55 AROME model in the grey zone and Grey Zone Project II

Rachel Honnert, Ghislain Faure and Fleur Couvreur

12:15 – 12:25 30-second *Lightning Lectures* by Poster Presenters

12:25 – 12:35 Group Photo

12:35 – 13:45 Lunch and Posters

13:45 – 15:00 Discussion Sessions

15:00 – 15:15 Coffee and Tea Break

15:15 – 16:45 Grey Zone Project Meeting

17:00 Bus to Holland Hall

18:00 Conference Dinner at Reed Hall

Wednesday, continued

Wednesday's Poster Presentations

301	How is a single updraft influenced by other clouds in a convective ensemble? Anne Barber, Steven Boeing, Andrew Ross, Alan Blyth and Alison Stirling
302	In search of a suitable scheme for modelling grey zone convection with the multi-fluid approach Will McIntyre, Hilary Weller, Chris Holloway and Dan Shipley
303	Multi-fluid modelling of Rayleigh-Benard convection at grey-zone resolutions Daniel Shipley, Hilary Weller, Peter Clark, Tom Webb and Will McIntyre
304	The Non-Traditional Coriolis Force and Convective Clouds Matthew Igel and Joseph Biello
305	Differentiation between dynamical and physical contributions to sub-grid process at grey zone Lijuan Li
306	Developing the RAP/HRRR Physics Suite to Improve Shallow-Cumulus Structures Across the Greyzone Joseph Olson, Jaymes Kenyon and Wayne Angevine
307	Evaluation of the diurnal precipitation cycle in the New Tiedtke scheme May Wong, Glen Romine and Chris Snyder
308	Evaluating size-dependent parametrized plume profiles with Large-Eddy-Simulations of shallow convection Philipp Griewank, Neggers and Heus
309	The Impact of Variability in Aerosol Concentrations on the Convective Mixed-Phase Clouds in the Arctic Jan Chylik, Roel Neggers and Stephan Mertes



CONVECTION PARAMETERIZATION: PROGRESS AND CHALLENGES

Thursday 18 July 2019

08:15 Bus from Holland Hall to Met Office

Chair: Hilary Weller

09:00 – 11:20 Spectral approaches

- 09:00 **Evaluation of bulk mass flux formulation using large-eddy simulations**
Jian-Feng Gu, Robert Plant, Christopher Holloway, Todd Jones, Alison Stirling, Peter Clark and Steven Woolnough.
- 09:20 **Coexistence of subgrid-scale convective processes within a GCM grid-cell: The picture inferred from a large-eddy simulation**
Catherine Rio, Frédéric Hourdin, Jean-Yves Grandpeix, Caroline Müller, Abdoul-Khadre Traore and Nicolas Rochetin.
- 09:40 **Spectral cumulus parameterization based on cloud-resolving model and its application to AGCMs**
Yuya Baba
- 10:00 **Stochastic plume ensembles for a unified shallow-deep mass flux cumulus parameterization in the single column Community Earth System Model (CESM)**
Bidyut Bikash Goswami, Boualem Khouider, Phani Murali Krishna Ravuri and Andrew Majda
- 10:40 **Single-column model experiments with the MetUM coupled to a stochastic multi-cloud model**
Rob Warren and Christian Jakob

10:20 – 10:40 Coffee and Tea Break

Chair: Humphrey Lean

- 11:00 **First Results from Coupling the Convective Cloud Field Model to the Met Office's Unified Model**
Eimear Dunne, Michael Herzog, Maria Russo and Luke Abraham.

11:20 – 12:35 Convective Organisation

- 11:20 **Convective organization: should we parameterize it?**
Cathy Hohenegger, *Invited*
- 11:55 **Evaluating the bias of South China Sea summer monsoon precipitation associated with fast physical processes using climate model hindcast approach**
Wei-Ting Chen, Chien-Ming Wu and Hsi-Yen Ma
- 12:15 **Using convective aggregation to inform convection parametrization development**
Christopher Holloway and Todd Jones

12:35 – 12:45 30-second *Lightning Lectures* by Poster Presenters

12:45 – 14:30 Lunch and Posters

Chair: Andrew Ross

14:30 – 17:00 Cold pools and triggering

- 14:30 **The simulation of the diurnal cycle of deep convection over land in a new Met Office Cloud-Resolving model**
Chimene Daleu, Natalie Harvey, Robert Plant and Steven Woolnough
- 14:50 **Development and tests of a cold-pool scheme in the Met Office Unified Model**
Gabriel Rooney
- 15:10 **Cold pool driven convection initiation and missing aspects in km-scale models**
Mirjam Hirt, Sophia Schäfer, Julien Savre and George Craig
- 15:30 **Coupling cold pools with shallow convection in LMDZ6**
Ludovic Touze-Peiffer and Jean-Yves Grandpeix

Thursday, continued

15:50 – 16:20	Coffee and Tea Break
<i>Chair: Bob Plant</i>	
16:20	Diurnal Cycle of Precipitation Simulated by the E3SM Atmosphere Model Version 1 (EAMv1) with a Revised Convective Trigger Shaocheng Xie
16:40	A stochastic triggering parameterization for deep convection in LMDZ Nicolas Rochetin, Jean-Yves Grandpeix, Fleur Couvreux, Catherine Rio and Frederic Hourdin
17:00 – 17:35	Evaluation
17:00	Precipitation-buoyancy relationships and their consequences for fundamentals of precipitation statistics David Neelin, <i>Invited, Remote Presentation</i>
18:00	Bus to Dinner at The Stable, EX4 3EB
19:00	Dinner at The Stable An opportunity to continue informal discussion and networking

Thursday's Poster Presentations

401	Kurnell Storm (2015) simulation with high resolution ACCESS models Hongyan Zhu and Alain Protat
402	Understanding the impact of surface heterogeneity on the diurnal cycle of deep convection Natalie Harvey, Chimene Daleu, Steven Woolnough and Bob Plant
403	A Stochastic Unified Convection Scheme (UNICON) Jihoon Shin and Sungsu Park
404	A composite study of cloud structure and its implication for the parameterization of vertical fluxes Jian-Feng Gu, Robert Plant, Christopher Holloway and Todd Jones
405	Using WRF Single Column Model as a testbed for convective parameterization Yi-Ling Hwong and Steve Sherwood
406	The genesis of convective clouds Leif Denby, Steven Boeing, Doug Parker and Mike Whitall
407	Recent Approach toward More Physically-based Convection Scheme in the JMA Operational Global Model Akira Shimokobe, Masashi Ujiiie, Hitoshi Yonehara, Masayuki Nakagawa, Kei Saitou, Ryoji Nagasawa, Hitoshi Sato and Manabu Ueda
408	The effects of switching-off parameterized convection at grey-zone resolutions Jesus Vergara-Temprado, Nikolina Ban and Christoph Schaer
409	NWP forecast of hydrological cycle in FV3 with a different convection scheme Haiqin Li, Georg Grell, Saulo Freitas, Hannah Barnes and Keren Rosado
410	A study on the relationship between stable water isotopes and precipitation characteristics in the tropics using NICAM-isotope Yuki Takano and Yikari N. Takano



CONVECTION PARAMETERIZATION: PROGRESS AND CHALLENGES

Friday 19 July 2019

08:15 Bus from Holland Hall to Met Office

Chair: Hannah Barnes

09:00 – 11:20 Evaluation, *continued*

- 09:00 **Convection over and surrounding an idealised island**
Rachel Stratton
- 09:20 **Cloud Trails: Are the clouds important?**
Michael Johnston, Christopher Holloway and Robert Plant
- 09:40 **Evaluation of convective precipitation using space-borne radar observation**
Kengo Matsubayashi
- 10:00 **New Paradigm for Organized Convection Parameterization in GCMs**
Mitchell Moncrieff

10:20 – 10:40 Coffee and Tea Break

Chair: Alison Stirling

- 10:40 **Object-Based Precipitation System Bias in Grey Zone Simulation: A Preliminary Study for Unified Parameterization**
Chun-Yian Su, Chien-Ming Wu, Wei-Ting Chen and Jen-Her Chen
- 11:00 **Diagnosing Convection in Extra-Tropical Cyclones in GFDL AM4**
Leo Donner, Catherine M Naud, James F Booth, Charles Seman, Ming Zhao, Huan Guo and Yi Ming

11:20 – 11:40 Returning to the large scale (Part II)

- 11:20 **The role of convective schemes in regulating lapse rates and midlatitude jet latitudes**
Steven Sherwood and David Fuchs

11:40 – 12:00 Discussion

12:00 – 14:00 Lunch

14:00 – 16:30 Wrap-up Discussions

16:30 Bus to Exeter St David's Station
At least 20 minutes to station. Suggested for trains booked after 17:00.

Friday, continued