In partnership with: Bureau of Meteorology, Commonwealth Scientific and Industrial, Research Organisation (CSIRO), Korea Meteorological Administration, the Ministry of Earth Sciences, the National Institute of Water and Atmospheric Research (NIWA)

4th Convective Scale Modelling Workshop
Boulder, Colorado, USA
28-31 January 2020

The Unified Model partnership will be holding its 4th Convective Scale modelling workshop at NCAR's Center Green conference facility from Tuesday 28 January (start 08:30) to Friday 31 January (close by 12:00).

Venue details

NCAR & UCAR Center Green Campus
3080 Center Green Drive
Boulder, CO 80301, USA
https://www.ucar.edu/who-we-are/contact-us

Workshop goals

1. To present internationally cutting edge kilometre gridscale modelling activities for weather and climate services
2. To identify, prioritize and plan priorities for kilometre gridscale model development and how to take this forward
3. To engage operational meteorologists and climate users in the development of kilometre gridscale modelling systems
4. To develop collaboration between the UM Partnership, NCAR and its US partners

Workshop registration

Please register in the Center Green lobby from 8:15 Tuesday 28 January

The workshop website is at:
https://www.metoffice.gov.uk/research/approach/collaboration/unified-model/fourth-convective-scale-modelling-workshop
A full set of presentations will be available at:
https://code.metoffice.gov.uk/trac/rmed/wiki/4thRMEDworkshop

In association with: South African Weather Service, Interdisciplinary Centre for Mathematical and Computational Modelling, United States Air Force

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Tuesday 28 January 2020			
Time	**Session**	**Topic**	**Presenter**
Plenary 1: Welcome & Overview			**Chair: Rich Neale**
0845-0850	1a	Local logistics	Rich Neale, NCAR
0850-0900	1b	NCAR welcome	Everette Joseph, NCAR
0900-0910	1c	A brief introduction to UM partnership	George Pankiewicz, Met Office
0910-0930	1d	Developing kilometre grid-scale modelling systems for weather and climate	Jon Petch, Met Office
0930-0950	1e	Kilometre grid scale climate and weather modelling at NCAR	Roy Rasmussen, NCAR
0950-1010	1f	Regional Modelling in Africa	Stephanie Landman, SAWS
1010-1030	1g	US Air Force modelling challenges for global operations	Mike Farrar, USAF
1030-1100		Coffee Break	
Plenary 2: Overview Science			**Chair: Jon Petch**
1100-1115	2a	Operational meteorologist perspectives on km grid-scale modelling in UM partnership	Nava Fedaeff, NIWA
1115-1130	2b	Operational forecasting challenges in kilometre grid-scale modelling US	Stan Benjamin, NOAA
1130-1145	2c	Tropical cyclones in global km-scale models	Falko Judt, NCAR
1145-1200	2d	Ensembles subsetting techniques for forecasting High Impact Weather	Austin Coleman, Texas Tech University
1200-1215	2e	Preparing for the “general questions” breakout	Caroline Bain
Plenary 3: Convection processes			**Chair: Beth Woodhams**
1215-1235	3a	Overview of issues with representation of convection at convective scales at NCAR	Bill Skamarock
1235-1345		Lunch	
1345-1355	3b	Overview of issues with representation of convection at convective scales	Humphrey Lean
1355-1415	3c	Understanding and reducing biases in km-scale simulations of convection	George Bryan
1415-1430	3d	Sub-km modelling of convection with the UM	Kirsty Hanley
1430-1445	3e	Summary of DYMECS-related work and turbulence retrieval from radar	Matt Feist
1445-1500	3f	Sub-km ensemble simulations of a severe thunderstorm and tornado outbreak	Charmaine Franklin
1500-1515	3g	400m model over Australia	Scott Wales (VC)
1515-1530	3h	Discussion	Humphrey Lean
1530-1600		Tea Break	
1600-1645		Breakout session 1	
Breakout: General questions (in groups of 10-20)			**Rapporteur: 1 person from each group**
Plenary 4: General question feedback and discussion			**Chair: Caroline Bain**
1650-1730		Feedback in plenary	
1600-1715		Closed session of RA coordination group of UM partnership	
1815		Ice breaker activity – Mesa Lab	

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Wednesday 29 January 2020			
Time	**Session**	**Topic**	**Presenter**
Plenary 4: Op Met perspectives on using and testing km scale models			**Chair: Aurore Porson**
0845-0900	4a	Op Met perspectives on ensembles from the UK	David Walters & Steve Willington
0900-0915	4b	Introduction to HWT ensemble	David Walters & Andy Hartley
0915-0935	4d	Overview of the UM performance at the 2019 HWT testbed	Adam Clark
0935-0955	4e	The Extreme Weather Desk's Australian HWT	Charmaine Franklin
0955-1015	4f	Improving convective hazard prediction with convection-allowing models & machine learning	Ryan Sobash
1015-1045		Coffee break	
Plenary 5: Verification and evaluation			**Chair: David Walters**
1045-1100	5a	SINGV report card (Jun 2018 to Nov 2019)	Peter Heng
1100-1115	5b	Convective scale modelling activities at NCMRWF	Saji Mohandas
1115-1130	5c	Flow dependent errors to help diagnose model deficiencies in precipitation forecast skill	Marion Mittermaier
1130-1145	5d	The Use of the METplus Verification and Diagnostic Capability in Forecast Evaluation across Multiple Scales and Applications	Tara Jensen
1145-1200	5e	Met Office decision to adopt MET/METplus as future operational verification capability for Next Generation Modelling System (NGMS)	Marion Mittermaier
1200-1215	5f	Discussion	
1215-1400		Lunch including **Poster Session**	See Annex
Plenary 6: Physical processes: parametrization and evaluation			**Chair: Adrian Hill**
1400-1425	6a	Aerosol-cloud interactions with double-moment microphysics in cloud-resolving UM simulations	Hamish Gordon
1425-1440	6b	Demistify - GASS fog intercomparison project	Ian Boutle
1440-1455	6c	Atmospheric Rivers and microphysics	Annareli Morales
1455-1510	6d	CASIM and cloud scheme developments in the UM: science, status and plans	Adrian Hill
1510-1525	6e	Advances in forecast guidance for fog in Australia	Belinda Roux
1525-1530	6f	Discussion	
1530-1600		Tea break and workshop photo	
1600-1730		Breakout session 2	
Breakout: Convective processes			**Rapporteurs: One per group**
Breakout: Verification processes (and WG?)			**Rapporteurs: Marion Mittermaier**
Breakout: O2R, Testbeds & HWT 1			**Rapporteurs: Caroline Bain / Aurore Porson**
1800-2100		**Workshop dinner at the Hotel Boulderado, 2115 13th St, Boulder**	

Thursday 30 January 2020			
Time	**Session**	**Topic**	**Presenter**
Plenary 7: Feedback from Tuesday's general questions breakout			**Chair: Caroline Bain**
0845-0910	7a	RA coordination group feedback/ general discussion and more time for general questions feedback	
Plenary 8: Regional climate model development at the km grid scale			**Chair: Chun Hsu Su and Lizzie Kendon**
0910-0930	8a	Convective scale climate modelling at the UKMO: Progress and challenges	Lizzie Kendon
0930-0950	8b	Convective-scale climate modelling at NCAR	Andreas Prein
0950-1005	8c	Progress on convective-scale climate modelling at BoM	Chun Hsu Su
1005-1020	8d	Progress made with SINGV as a Regional Climate model	Prasanna Venkatraman
1020-1045		Coffee break	
1045-1100	8e	Convective-scale climate runs over the US	Chris Short
1100-1115	8f	Challenges in CPM climate modelling at NIWA	Steve Stuart
1115-1130	8g	Model development for climate and global scale modelling at kilometre scales	Jon Petch
1130-1145	8h	Discussion	
Plenary 9: Sub-km modelling			**Chair: Kirsty Hanley**
1145-1200	9a	Delhi Model with Chemistry and Aerosol Framework	Jayakumar Aravindakshan Pillai
1200-1215	9b	Case study runs for fog and convection	Stephanie Landman
1215-1230	9c	Update on London Model	Anke Finnenkoetter
1230-1245	9d	Short update on urban surface strategy followed by general sub-km discussion	Humphrey Lean
1245-1400		Lunch	
Plenary 10: Ensembles, ensemble spread and post-processing			**Chair: Stu Webster**
1400-1415	10a	Hourly cycling MOGREPS-UK	Aurore Porson
1415-1430	10b	NCAR CS ensemble research	Craig Schwartz
1430-1445	10c	Experience of convective scale ensembles in the HWT	Israel Jirak
1445-1500	10d	City Ensemble: The Bureau of Meteorology's Convective Scale NWP Ensemble	Shaun Cooper
1500-1515	10e	CS Ensembles at NIWA: Status and Plans	Stuart Moore
1515-1530	10f	Discussion	
1530-1600		Tea Break	
1600-1730		Breakout session 3	
Breakout: Physical processes			**Rapporteurs: Adiran Hill**
Breakout: Climate simulations			**Rapporteurs: Lizzie Kendon**
Breakout: Ensembles science		**Chair: Stuart Moore**	**Rapporteurs: Stu Webster (tbc on day)**

Friday 31 January 2020			
Time	**Session**	**Topic**	**Presenter**
0845-1015		Breakout session 4	
Breakout: O2R, Testbeds & HWT 2			**Rapporteurs: Caroline Bain**
Breakout: Convection WG			**Rapporteurs: One per group**
0845-0930: General discussion on global kilometre scale modelling challenges			
0940-1015: NCAR/UM partner strategy discussions			
Breakout options – for matters arising during week			
0845-1015		Convection WG meeting	
1015-1045		Coffee break	
1015-1045		RA Coordination Group meeting	
Plenary 11: Feedback from breakouts 5 minutes feedback or summary of discussions of talks back to back followed by 25 mins for questions or discussion around these. Presented by chairs of breakout sessions			**Chair: Jon Petch**
1045-1050	11a	Convective processes (and WG)	Humphrey Lean, Met Office /Beth Woodhams, U of Leeds
1050-1055	11b	Verification processes (and WG)	To be decided on the day
1055-1100	11c	O2R, Testbeds & HWT	To be decided on the day
1100-1105	11d	Physical processes	To be decided on the day
1105-1110	11e	Climate modelling	To be decided on the day
1110-1115	11f	Ensemble spread	To be decided on the day
1115-1145	11g	Questions and discussion	To be decided on the day.
Plenary 12: Final wrap up 15 minute session for closing remarks etc...			**Chair: Roy Rasmussen**
1145-1200	12a	Final wrap up, and more from RA Coordination Group and thanks	George Pankiewicz, Met Office and Chris Davies, NCAR
1200-1300		Lunch	
1300		Workshop close	

Breakout Sessions

Tuesday 28 January 2020

Time: 1600-1645 **Rooms:**	**General questions breakout (in groups of 10-20)**
What are priorities for improved kilometre grid scale modelling capabilities for weather and climate? What grid lengths do we think are optimal now and in 10 years? What should be thinking about if we want to be ready to run global simulations with kilometre grid scale? How can collaboration help us/how can the UM partners engage effectively with NCAR to support above areas?	

Time: 1600-1730 **Room:**	**RA governance group (closed meeting)**
Details sent to participants	

Wednesday 29 January 2020 1600-1730 Breakout sessions

Time: 1600-1730 Room:	**Convective processes breakout**
This breakout will cover topics related to the analysis, evaluation and understanding of convective processes in kilometre gridscale models	
Setting the scene for group discussions and “future avenues”. Initial discussion in small groups about whether new projects should be added to the list of potential projects. Come together for short discussion of new projects. More detailed discussion in self selected group by project to add detail to the potential projects listed (including any new ones). Come together. Groups briefly present findings and any discussion.	

Time: 1600-1730 Room:	**Verification processes breakout**
This breakout will cover topics related to the verification methods and evaluation methods to understand performance of weather and climate models	
What do we want the RA evaluation of the (near) future to look like? How can we collaborate better in developing and using common tools? “UM precipitation around the world: a review paper. “	

Time: 1600-1730 Room:	**O2R/Testbeds/HWT 1**
This breakout will cover topics related to evaluating kilometre gridscale systems including ensembles through testbeds, engagament with forecasters etc...	
Session Aim: Discussion on ensemble questions we would want to answer from a testbed activity and examples from HWT Introduction to high-resolution ensembles contributed to the 2019 HWT - Craig Schwartz Testbeds view from USAF - Evan Kuchera How could we improve our subjective evaluation of ensemble spread? - David Walters Towards using multi-model ensembles - Aurore Porson Advertise Friday’s session	

Thursday 30 January 2020 1600-1730 Breakout sessions

Time: 1600-1730 Room:	**Physical processes**
Parametrization development etc...	
10 min talk by Anupam Hazra "Electrical Route to Realising Intensity Simulation of Heavy Rain Events in Tropics and Progress towards Achieving Lightning Flash Prediction Using Dynamical Model" Non-live (slide based) demo of CASIM and UKCA-CASIM coupling in the nesting suite General discussion about regional modelling of clouds, aerosol and aerosol-cloud interactions	

Time: 1600-1730 Room:	**Climate simulations**
This will look at all things climate	
Evaluation of convective-scale climate models? Links with NWP? Ensembles of convection-permitting climate simulations? Outstanding issues and future model development?	

Time: 1600-1730 Room:	**Ensemble spread**
All things ensembles and spread...	
Convection-allowing ensemble efforts at USAF - Evan Kuchera Spread PEG - Aurore Porson Verification of NCMRWF CS ensemble prediction system for Indian summer monsoon 2019- Abhijit Sarkar Model Uncertainty in next generation cloud-resolving numerical weather prediction models - Judith Berner Approaches to achieving “good spread” and whether we know what that is? What do we know about ensemble initial perturbations for CS? Physics and boundary perturbations?	

Friday 31 January 2020 0845-1015 Breakout sessions

Time: 0845-1015 Room:	**O2R/Testbeds/HWT 2**
Second all things O2R ...	

Session aims:

1. What processes would we recommend to put in place across the partnership to better understand issues highlighted by forecasters?
2. What format would make for a good testbed that works for the partnership?
3. What ensemble question would we want to answer in a testbed?

Expected outputs

1. To find out what the priorities of the partnership are in relation to testbeds
2. To engage the partnership in O2R, establish the value of doing it, and establish science collaboration on characterizing some key issues
3. Suggestions for future activities that we can do across the partnership

Time: 0845-1015 Room:	**Convection WG**
Convection WG	**Rapporteurs: to be decided on day**

Observations pooling: what do we have available, how can we make best use of this data?
What could you contribute to a paper about model biases?
Any other discussion points?

Time: 0845-0930 Room:	**Global kilometre grid-scale discussion**
An informal discussion about the challenges of having global kilometre grid-scale modelling systems	

Weather and climate
Technical and science
Any next step plans for collaborative activities?

Time: 0940-1015 Room:	**NCAR – UM partner collaboration discussions**
An informal discussion about opportunities for collaboration between UM partners and NCAR	

Open to all. General open chat.

Time: 0845-1015 Room:	**Space for other discussions arising from the week**
We would encourage specific groups to use this time to plan and develop work	

To be used as needed

Posters

Wednesday 29 January 2020 Poster session			
Time	**Session**	**Topic**	**Presenter**
Poster session			**Organiser: Joao Teixeira**
1215-1400	1. Role of dry-air intrusions and land-surface processes in the progression of the Indian monsoon in nested suite simulations using the UK Met Office Unified Model - Arathy Menon 2. Verification of NCMRWF Convection-permitting model parameters against Meteosat and regional reanalysis products - Arulalan Thanigachalam 3. SWIFT Convection-Permitting Ensembles Strategy - Beth Woodhams 4. Convective scale work in the Future Climates for Africa project at Leeds - Beth Woodhams 5. What does a CAM "ensemble of opportunity" buy us in convective forecasting? - Brett Roberts 6. The Convection-Allowing Model Scorecard - Burkely Gallo 7. Sub-km ensemble simulations of a severe thunderstorm and tornado outbreak - Charmaine Franklin 8. Ocean Coupling at convection permitting scales in tropical environments - Claudio Sanchez 9. Looking at differences in trials. Proposal of a tool to identify events - Jorge Bornemann 10. Impact of changing Intercept parameter of gamma distribution on precipitation over the western Cape of South Africa: Model development - Gift Rambuwani 11. Data Assimilation Enhancements to Air Force Weather's Land Information System - Jerry Wegiel 12. The Dark-Gray Zone of PBL and shallow convection: Can we tolerate the errors incurred in mesoscale models on sub-1-km grids? - Wayne Angevine 13. Prediction of extreme weather events over India using NCMRWF regional ensemble prediction system - Kiran Prasad Siripurapu 14. Ensembles and Post-processing - Stephanie Landman 15. NCUM-R forecast product for Renewable Energy - Sushant Kumar 16. The impact of radar data assimilation on the prediction of high impact weather in the convective scale model - Won Choe 17. Simulation of convective storm characteristics in idealized UM and WRF Models – Ragi Rajagopalan 18. FOREST – Caroline Bain 19. Two-dimensional Hadley circulation modeling with explicitly simulated convective processes - Ryuji Yoshida 20. What does a CAM "ensemble of opportunity" buy us in convective forecasting? – Brett Roberts 21. What does a CAM "ensemble of opportunity" buy us in convective forecasting? Part 2 - Burkely Twiest		