Joint WRF and MPAS Users' Workshop Program
25 – 28 June 2024, Boulder Colorado USA

Tuesday, June 25	Session 1: Model Development Updates Chair: Jordan Powers (NSF NCAR)
8:45 – 9:00	Opening Remarks
9:00 – 9:20	The Weather Research and Forecasting Model: 2024 Annual Update. Jimy Dudhia, MMM NSF National Center for Atmospheric Research.
9:20 – 9:40	Model for Prediction Across Scale - Atmosphere: Update. Bill Skamarock, MMM NSF NCAR.
9:40 – 10:00	WRFDA and MPAS-JEDI Annual Update. Liu, Zhiquan, MMM NSF NCAR.
10:00 – 10:30	Coffee Break
	Session 1: Development Updates (Continued) Chair: Lou Wicker (NOAA/NSSL)
10:30 – 10:45	Updates on WRF land components. Cenlin He, RAL NSF NCAR.
10:45 – 11:00	Physics Updates in stand-alone MPAS. Laura D. Fowler, Michael G. Duda, and W.C. Skamarock, MMM NSF NCAR.
11:00 – 11:15	Updates on the Development of MUSICA. Mary Barth, Matthew Dawson, Louisa Emmons, Gabriele Pfister, William Skamarock, Warren Smith, Francis Vitt, NSF NCAR.
11:15 – 11:30	The 2024 Release of MPAS-CMAQ. Jeff Willison, Jonathan Pleim, David Wong, Robert Gilliam, Russ Bullock, Jerry Herwehe, Christian, Hogrefe, George Pouliot, Golam Sarwar, Fahim Sidi, Rohit Mathur, Daiwen Kang and Wyat Appel, Center for Environmental Measurement & Modeling, Office of Research and Development, and Environmental Protection Agency, USA (virtual)
11:30 – 11:45	MPASSIT: A scalable tool for MPAS data post-processing. Larissa Reames, NSSL and Cooperative Institute for Severe and High-Impact Weather Research and Operations (CIWRO) (virtual)
11:45 – 12:00	Use of UXarrays. John Clyne, Philip Chmielowiec, and Orhan Eroglu, Computational and Information System Lab NSF NCAR.
12:00 – 1:00	Lunch Break
	Session 2: MPAS in Forecast Applications Chair: Hendrik Tolman (NOAA/NWS) (18 min for each talk)
1:00 – 1:18	Evaluations of deterministic and ensemble regional MPAS configurations for severe weather forecasting during the 2024 NOAA/Hazardous Weather Testbed Spring Forecasting Experiment. Adam Clark, NOAA/OAR National Severe Storms Laboratory and School of Meteorology, University of Oklahoma, Kent Knopfmeier, Yunheng Wang, Nusrat Yusouf, Larissa Reames, NSSL and CIWRO, OU, Israel Jirak, NOAA/NWS Storm

	Prediction Center, Louis Wicker, Pamela Heinselman, NSSL and OU, David Dowell, NOAA/OAR Global Systems Laboratory, Craig Schwartz, Michael Duda, William Skamarock, MMM NSF NCAR, and Patrick Burke, NSSL.
1:18 – 1:36	Evaluation of Real-time, Medium-range, Convection-allowing Ensemble Forecasts Produced with MPAS for NOAA's Hazardous Weather Testbed Spring Forecasting Experiments. Craig Schwartz, Ryan Sobash, and David Ahijevych, NSF National Center for Atmospheric Research.
1:36 – 1:54	The Weather Company's Global High-Resolution Atmospheric Forecasting (GRAF) System: Migration to JEDI for Cycled Data Assimilation. James Cipriani, David Heeps, Brett Wilt, and John Wong, The Weather Company.
1:54 – 2:12	Assessing convective hazard predictability from Days 1–5 using MPAS during Spring 2023. Ryan Sobash, Craig Schwartz, Dave Ahijevych, MMM NSF NCAR.
2:12 – 2:30	Advancements in Implementing the MPAS-A Regional Model at the Central Weather Administration. Wu, Y.-J., Central Weather Administration, Taiwan, W. Wang, NSF NCAR, C.-Y. Chen, Y.-L. Chen, NVIDIA, S.-L. Huang, B.-S. Lin, L.-F., Hsiao, CWA.
2:30 – 3:00	Coffee Break
	Session 2: MPAS in Forecast Applications (Continued) Chair: Bill Skamarock (NSF NCAR)
3:00 – 3:15	NOAA/GSL Model Prediction Development with MPAS. Curtis R. Alexander, NOAA/GSL.
3:15 – 3:30	Development Strategy for GSL-led to Physical Parameterization for all Model Hosts/Applications. Joseph B. Olson, NOAA/Global Systems Laboratory, Wayne M. Angevine, NOAA/Chemical Science Laboratory and Cooperative Institute for Research in Environmental Sciences, Anders Jensen, Georg Grell, GSL, Tanya Smirnova, and Michael Toy, CIRES/GSL.
3:30 – 5:00	Discussion I: Development and support of MPAS in future application spaces Chair: Bill Skamarock (NSF NCAR)
5:00 – 6:30	Reception

Wednesday, June 26	**Session 3: Physics Development and Testing** Chair: Robert Gilliam (EPA)
8:30 – 8:45	Coupling the Community Fire Behavior Model to WRF. Pedro A. Jimenez, Anthony Islas, Michael Duda, Dan Rosen, and Jimy Dudhia. NSF NCAR.
8:45 – 9:00	Univariate Flux Partition Functions for Planetary Boundary Layer Schemes at Gray Zone Resolutions. Mengjuan Liu, Key Laboratory for Mesoscale Severe Weather, Ministry of Education, and School of Atmospheric Sciences, Nanjing University, Nanjing, Shanghai Typhoon Institute, China Meteorological Administration, and Asia-Pacific Typhoon Collaborative Research Center, Shanghai, China, and Bowen Zhou, Key Laboratory for Mesoscale Severe Weather, Ministry of Education, and School of Atmospheric Sciences, Nanjing University.
9:00 – 9:15	Stratocumulus (and other) clouds in WRF with MYNN-EDMF and downdrafts. Wayne M. Angevine, CIRES, University of Colorado, and NOAA CSL, Joseph Olson and David D. Turner, NOAA GSL, Julia Simonson, CIRES and NOAA GSL and Yao-Sheng Chen and Takanobu Yamaguchi, CIRES and NOAA CSL.
9:15 – 9:30	Sensitivity of Planetary Boundary Physics in a High-Resolution Domain over Complex Terrain. William Y.Y. Cheng, Rajesh Kumar, Gabriele Pfister, Stefano Alessandrini, Research Applications Laboratory and ACOM, NSF National Center for Atmospheric Research, Boulder, Colorado, Miriam Hacker3, Sergio Guerra, Vinjay Kumar, Jennifer Turk, Colorado Department of Public Health and Environment.
9:30 – 9:45	Quantifying Uncertainty in the Prediction of Near-Surface Meteorological Parameters over South Korea Associated with Planetary Boundary Layer and Urban Canopy Processes in the WRF model. Hyeyum Hailey Shin, RAL NSF NCAR, Jimy Dudhia, MMM NSF, Sang-Hun Park, Department of Atmospheric Sciences and Global Environmental Laboratory, Yonsei University, South Korea, Sung-Chul Hong, and Jae-Bum Lee, National Institute of Environmental Research, Incheon, South Korea.
9:45 – 10:00	High-resolution urban coupled meteorology and air quality model. Jonathan Pleim, Jerry Herwehe, Center for Environmental Measurement & Modeling, USEPA, Roger Turnau, Marine, Earth and Atmospheric Sciences, North Caroline State.
10:00 – 10:30	Coffee Break
	Session 3: Physics Development and Testing (continued) Chair: Wayne Angevine (NOAA/CSL and CIRES)
10:30– 10:45	Evaluating the new Aerosol–aware & Hail Thompson microphysics scheme on hailstorm and hail prediction. Wu, Wanchen, Asia-Pacific Typhoon Collaborative Research Center, Shanghai, China.
10:45 – 11:00	An Advanced Double-Moment Cloud Microphysics Parameterization Scheme for Global Weather Forecasting. Songyou Hong, Cooperative Institute of Research in Environmental Science, University of Colorado and

	Physical Science Laboratory, Earth System Research Laboratory, NOAA, Haiqin Li, CIRES and Global System Laboratory, ESRL, NOAA, Jian-Wen Bao, PSL, NOAA, Sara Michelson, PSL and CIRES, Evelyn Grell, PSL and CIRES, and Jimy Dudhia, NSF NCAR.
11:00 – 11:15	The Thompson-Eidhammer Microphysics Parameteriza6on for Opera6ons (TEMPO): A Flexible Microphysics Parameteriza6on for Opera6onal Applica6ons. Anders A. Jensen, NOAA/PSL.
11:14 – 11:30	Development and applications of the latest GF parameterization in MPAS. Georg Grell, NOAA/GSL, Saulo Freitas, Haiqin Li, NOAA/GSL.
11:30 – 11:45	Physics Interoperability: Connecting MMM Shared Physics to the CCPP Single-Column Model. Weiwei Li, Soren Rasmussen, NSF NCAR/RAL and DTC, Laura Fowler, NSF NCAR/MMM, Dustin Swales, NOAA/GSL, Jimy Dudhia, MMM NSF NCAR, Lulin Xue, and Louisa Nance, RAL and DTC NSF NCAR.
11:45 – 12:00	Improving Earth System Models via Hierarchical System Development. Tracy Hertneky, Mike Ek, Jimy Dudhia, Tara Jensen, Michael Kavulich, Weiwei Li, Louisa Nance, Kathryn Newman, Soren Rasmussen, Tim Schneider, Lulin Xue (NSF NCAR, DTC), Ligia Bernardet, Jeff Beck, Dustin Swales (NOAA/GSL, DTC), Xia Sun, Samuel Trahan, Man Zhang (CIRES, NOAA/GSL, DTC), Grant Firl (CIRA, NOAA/GSL, DTC), Stelios Flampouris, Yi-Cheng Teng (Tomorrow.io, NOAA/EPIC), Christiane Jablonowski (Univ. Michigan), Cristiana Stan (George Mason Univ.), Louis Wicker (NOAA/NSSL).
12:00 – 1:00	Lunch Break
	Session 4: Chemistry Applications Chair: Georg Grell (NOAA/GSL)
1:00 – 1:15	Multi-scale Modeling of Air Quality and Greenhouse Gases over Greater Boston, Part I: Evaluation of Regional to Local Predictions Using Surface and Satellite Data. Yiyue Yang, Yang Zhang, Ying Wang, Civil and Environmental Engineering Department, Northeastern University, Siqi Ma and Daniel Tong, Atmospheric, Oceanic and Earth Sciences Department, George Mason University.
1:15 – 1:30	Multi-scale Modeling of Air Quality and Greenhouse Gases over Greater Boston, Part II: Sensitivity of Street-level Predictions to On-road Emissions from Traffic Activity Data. Ying Wang, Yang Zhang, Yiyue Yang, Lijiao Wang, Haris Koutsopoulos, Civil and Environmental Engineering Department, Northeastern University, Siqi Ma, and Daniel Tong, Atmospheric, Oceanic and Earth Sciences Department, George Mason University.
1:30 – 1:45	Enhancing air quality decision-making activity in eastern and southern Africa. Shima Shams, RAL/ACOM NSF NCAR.
1:45 – 2:00	Vertical transport and wet scavenging of aerosols in WRF simulations for deep convection during the SEAC4RS field campaign. Ajay Parottil, Mary Barth, ACOM NSF NCAR, Gustavo Cuchiara, CIRA/Colorado State

	University, Jose Jimenez and Pedro Campuzano-Jost, University of Colorado.
2:00 – 2:15	Analyzing the impact of inserting soil moisture retrievals from SMAP to improve dust simulations with WRF-Chem. Jared A. Lee, Pedro A. Jimenez, Rajesh Kumar, and Cenlin He, RAL NSF NCAR.
2:15 – 2:30	Evaluation of an Advanced Air Quality Forecasting and Decision Support System for Effective Pollution Management in Delhi. Prafull P. Yadav, Indian Institute of Tropical Meteorology, Ministry of Earth Sciences, Pune and Dept. of Atmospheric and Space Sciences, Savitribai Phule Pune University, Pune, India, Sachin D. Ghude, Indian Institute of Tropical Meteorology, Ministry of Earth Sciences, Pune, Rajesh Kumar, NSF NCAR, Gaurav Govardhan, Indian Institute of Tropical Meteorology, Ministry of Earth Sciences, Pune, and Chinmay Jena, India Meteorological Department, Ministry of Earth Sciences, New Delhi, India.
2:30 – 2:45	Discussion II: The need for future chemistry applications.
2:45 – 3:00	**Session 5: Poster 1-slide presentation** Moderator: Wei Wang, NSF NCAR/MMM
3:00 – 3:30	Coffee Break
3:00 – 5:00	**Session 5: Posters**
	1. A Java-based GUI to drive the Atmospheric Model Evaluation Tool (AMET). Michael Morton, Robert Gilliam, Wyat Appel and Kristen Foley, EPA.
	2. Multi-Scale Modeling of Meteorology and Air Quality over Southwest Asia. Daniel Schuch, Yang Zhang and Kiarash Farzad, Department of Civil and Environmental Engineering, Northeastern University, USA.
	3. Calibration of Precipitation Forecasts for nine cities in Brazil using Machine Learning. Waldenio Gambi de Almeida, National Institute for Space Research (INPE), Brazil, Matheus Souza Ruiz, Renan Braga Ribeiro, Santa Cecília University, Pedro Nazareno Ferreira da Costa, INPE, and Alexandra Franciscatto Penteado Sampaio, Santa Cecília University.
	4. Indian Monsoon Onset and Convective Timescales with the WRF Model. Lucy Recchia, University of Colorado.
	5. Impact of resolution on the representation of polar lows in the Weather Research and Forecasting Model. Marta Moreno Ibáñez, CIRES, National Snow and Ice Data Center, John J. Cassano, CIRES, NSIDC, ATOC, Mark Seefeldt: CIRES, NSIDC, and Amy Solomon: CIRES, NOAA/PSL.
	6. Using WRF and SWAN models in calculating wind and wave conditions for Typhoon Jebi (2018). Haruka Miura, Meteorological Engineering Center, Japan.
	7. The Role of Upper-level Jet Imbalance in a Gravity Wave of Depression Organized Near Complex Terrain. Ananya Sen, University of Nevada. (*virtual*)

	8. The characterization and impact of extreme winds along Nares Strait. Alexandra Stephens, and G. W. Kent Moore, University of Toronto.
	9. Study of the Impact of Heatwaves on Meteorology in Delhi using the Weather Research and Forecasting (WRF) Model. Priyanka Sharma, University of Illinois, Mrinal Biswas, Cenlin He, NSF NCAR, Ashish Sharma, UI, and Rajesh Kumar, NSF NCAR.
	10. A revised potential vorticity diagnostics package for MPAS-Atmosphere. package for MPAS-Atmosphere. Manda Chasteen, and May Wong, MMM NSF NCAR.
	11. Examining the Impact of Airborne Radio Occultation Observations on Short Term Precipitation Forecasts of an Atmospheric River Using MPAS-JEDI. Nghi Do, Jennifer S. Haase, Scripps Institution of Oceanography, University of California San Diego, Ivette Hernandez Banos, NSF NCAR, Pawel Hordyniec, Institute of Geodesy and Geoinformatics, Wrocław University of Environmental and Life Sciences, Wrocław, Poland, and Bing Cao, Scripps Institution of Oceanography, UCSD.
	12. A new software toolkit for creating and nesting variable-resolution MPAS-A meshes. Russ Bullock, EPA.
	13. Building an MPAS App with the Unified Workflow Tools. Janet Derrico, Emily Carpenter, Christina Holt, CIRES and NOAA/GSL.
	14. Application of a High-Resolution Terrain Dataset to the MPAS Mesh: An Interpolation Study. Kent Sparrow, USACE.
	15. Expanding the Unified Forecast System to include the MPAS dynamical core. Ligia Bernardet (NOAA/OAR/GSL and DTC), Dom Heinzeller (UCAR/JCSDA), Jun Wang (NOAA/NWS/EMC), Kevin Viner (NOAA/NWS/EMC), Dustin Swales (NOAA/OAR/GSL), and Dan Rosen (NCAR/CGD).
	16. The state of the UFS spring 2024. Hendrik L. Tolman, NOAA/NWS/OSTI.

Thursday, June 27	**Session 6: Model Applications** Chair: James Cipriani (The Weather Company)
8:30 – 8:45	Development of Early Warning Systems in Bangladesh for Flash Floods and Cyclonic Storm Surges to Enhance Climate Resilience. AKM Saiful Islam, GM Tarekul Islam, Sujit Kumar Bala, Anisul Haque and Mohammad Asad Hussain, Institute of Water and Flood Management, Bangladesh University of Engineering and Technology (BUET), Dhaka 1000, Bangladesh, Tom Hopson, NSF NCAR/RAL.
8:45 – 9:00	Evaluating the Use of Lightning Data Assimilation in WRF to Improve the Simulation of Parameterized Deep Convection. Cansu Duzgun, Henry Fuelberg, Department of Earth, Ocean, and Atmospheric Science, Florida

	State University, Tallahassee, Florida, Rebecca Adams-Selin, Atmospheric and Environmental Research, Inc., Lexington, Massachusetts, Nicholas Heath, PSE Healthy Energy, Oakland, California.
9:00 – 9:15	High-resolution Numerical Simulations of Tropical Convection for the NASA INCUS Mission: Preliminary Analysis. Itinderjot Singh, Jennie Bukowski, Peter J. Marinescu, Leah Grant, Department of Atmospheric Science, Colorado State University, Rachel Storer, University of California – Los Angeles; NASA Jet Propulsion Laboratory, Gabrielle Leung, and Susan van den Heever, CSU.
9:15– 9:30	Operational WRF Ensemble Updates at the US Air Force's 16th Weather Squadron. Burkely Gallo, Evan Kuchera, Scott Rentschler, Glenn Creighton, Andrew Elliott, and Matthew Vaughan, USAF 16th Weather Squadron.
9:30 – 9:45	The Weather On Demand weather forecast framework - Recent developments and outlook. Ólafur Rögnvaldsson, Belgingur Ltd.
9:45 – 10:00	Destroying A Hurricane and Simulating Downslope Flow with WRF: Lessons from the 2023 Maui Wildfire Event. Cliff Mass and David Ovens, University of Washington.
10:00 – 10:30	Coffee Break
	Session 6: Model Applications (Continued)
	Chair: Cliff Mass (University of Washington)
10:30 – 10:45	The responses of pseudo-global warming simulations to different experimental designs. Zeyu Xue, Pacific Northwest National Laboratory, Paul Ullrich, University of California, Davis, and Lai-Yung Ruby Leung, Pacific Northwest National Laboratory.
10:45 – 11:00	Simulating Blowing Snow Events in the Northern Great Plains with Polar WRF. David H. Bromwich, Polar Meteorology Group, Byrd Polar and Climate Research Center, The Ohio State University and Atmospheric Sciences Program, Department of Geography, The Ohio State University, Aaron Kennedy, Department of Atmospheric Science, University of North Dakota, Lesheng Bai, BPCRC, Saurav Dey Shuvo, BPCRC and Atmospheric Sciences Program, Department of Geography, The Ohio State University, and Alec Sczepanski, Department of Atmospheric Science, University of North Dakota.
11:00 – 11:15	Modelling the Extreme July 2023 Hudson Valley Precipitation Event Using WRF. L. A. Treinish, A. P. Praino and M. Tewari, IBM Thomas J. Watson Research Center, Yorktown Heights, NY.
11:15 – 11:30	An Experiment in Hybrid Weather Prediction for Downslope Windstorms. Robert G. Fovell and Matthew J. Brewer, University at Albany, Scott B. Capps, Technosylva, Inc.
11:30 – 11:45	Modeling superstorm Ida's precipitation over the New York Metropolitan Area using WRF. Jorge Bravo, Marouane Temimi, and Mohamed Abdelkader, Stevens Institute of Technology. (*virtual*)
11:45 – 12:00	A WRF-based System for Forecasting High-Impact Weather for a Northern California Power Utility. Richard Carpenter, Taylor Gowan, Samuel Lillo, and

	Douglas Chenevert, DTN, LLC, Minneapolis, Minnesota, Scott Strenfel, A. J. Eiserloh, Evan Duffey, Shaun Tanner, and Bereket Habtezion, Pacific Gas and Electric Company, San Ramon, California, Xin Qu, Scott Capps, Rui Liu, and Wei Zhuang, Technosylva, La Jolla, California. (*virtual*)
12:00 – 1:00	Lunch Break
	Session 7: New Applications with MPAS Chair: Robert Fovell (SUNY Albany)
1:00 – 1:15	An Ensemble Forecast and Verification Framework for WRF versus MPAS Twin Experiments. Colin Grudzien, Corrine DeCiampa, Evan Sawyer, Jennifer Haase, Caroline Papadopoulos, Dan Steinhoff, Matthew Simpson, Luca Delle Monache, The Center for Western Weather and Water Extremes, the Scripps Institution of Oceanography, University of California San Diego. (*virtual*)
1:15 – 1:30	Effect of variable-dependent localization and static B in the hybrid-3DEnVar configuration using MPAS-JEDI. Byoung-Joo Jung, Junmei Ban, Ivette Hernández Baños, Zhiquan (Jake) Liu, Chris Snyder, MMM NSF NCAR, Benjamin Ménétrier, Norwegian Meteorological Institute, Oslo, Norway.
1:30 – 1:45	All-Sky satellite radiance data assimilation using Gain-form of Local Ensemble Transform Kalman Filter within MPAS-JEDI: implementation, tunning, and evaluation. Tao Sun, Jonathan J. Guerrette, Zhiquan Liu, Junmei Ban, Byoung-Joo Jung, Chris Snyder, Mesoscale and Microscale Meteorology Laboratory, NSF NCAR.
1:45 – 2:00	On the Impact of Climate Change on Extreme Extratropical Cyclones in the Northeastern U.S. Andreas F. Prein, Alexandra Ramos Valle, Abby Jaye, MMM NSF NCAR, Kerry Emanuel, Massachusetts Institute of Technology.
2:00 – 2:15	Impact of upstream errors on the medium-range predictability of convection-permitting forecasts. May Wong, MMM NSF NCAR.
2:15 – 2:30	A Comparison of Idealized Squall Line "Climates" from WRF and MPAS. Louis J. Wicker, NOAA National Severe Storms Laboratory, Norman, Oklahoma.
2:30 – 3:00	Coffee Break
3:00 – 4:00	Discussion III: General Topics
4:00	

Friday, June 28	Mini-Tutorials
8:45 – 10:15	Unstructured Grids Visualization with UXarray with MPAS Focus. Orhan Eroglu, Philip Chmielowiec, Rachel Tam, CISL NSF NCAR
10:30 – 12:00	Learning about GPU (tentatively), Daniel Howard, CISL NSF NCAR