



2018 North American
Hail Workshop
 August 14 -16 • Boulder, CO



August 14

7:30 am to 12:00 pm	Registration Open
8:00 am to 8:10 am	Opening Remarks
8:10 am to 8:30 am	Keynote presentation: “Bridging Knowledge Gaps in Hailstorm and Hail Research” <i>Julian Brimelow, Environment Canada</i>
8:30 am to 9:30 am	Session 1: Convection & Hail in a Changing Climate Session Chair: Andrew Heymsfield Expert Panel: “Convection and Hail in a Changing Climate” Moderator: <i>John Allen, PhD: Central Michigan University</i> <i>Julian Brimelow, Environment Canada</i> <i>Victor Gensini, Northern Illinois University</i> <i>Mark Bove, MunichRe</i> <i>Andreas Prein, National Center for Atmospheric Research</i>
9:30 am to 9:50 am	P1.1 “Hail Occurrence Under Anthropogenic Climate Change as Investigated with Convection Permitting Dynamical Downscaling” <i>Jeff Trapp*, Kim Hoogewind, Sonia Lasher-Trapp</i> <i>*Presenting author affiliation: University of Illinois, Champaign-Urbana, Illinois</i>
9:50 am to 10:10 am	P1.2 “Hail Production Under Anthropogenic Climate Change Investigated with a “Pseudo-Global Warming” Approach” <i>Sonia Lasher-Trapp*, Jeff Trapp</i> <i>*Presenting author affiliation: University of Illinois, Champaign-Urbana, Illinois</i>
10:10 am to 10:30 am	Morning Break
10:30 am to 10:50 am	P1.3 “Severe Convective Storm Losses in the United States: What the Hail is Happening?” <i>Steve Bowen*</i> <i>*Presenting author affiliation: AON Benfield, Chicago, Illinois</i>



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10:50 am to 11:10 am	P1.4 “The Intensity and Evolving Risk of Damaging Hailstorms in the U.S.” <i>Brian H. Tang*</i> , <i>*Presenting author affiliation: SUNY-Albany, Albany, New York</i>
11:10 am to 12:00 pm	Expert Panel: “ Catastrophe Models: Assessing Hail Risk & Vulnerability Today and into the Future ” Moderator: <i>Jason Butke, Travelers Insurance</i> <i>Jurgen Grieser, Risk Management Solutions</i> <i>Eric Robinson, AIR-Worldwide</i> <i>David Smith, CoreLogic</i> <i>Steve Drews, AON Benfield/Impact Forecasting</i>
12:00 pm to 1:00 pm	Lunch Break
1:00 pm to 1:30 pm	Keynote presentation: “ An Inside Look at Hailstorms ” <i>Paul Smith, South Dakota School of Mines and Technology, Rapid City, South Dakota</i>
1:30 pm to 1:50 pm	P1.5 “Changes in the Convective Population and Thermodynamic Environments in Convection-Permitting Regional Climate Simulations Over the United States” <i>Kristen Rasmussen*</i> , <i>Andreas Prein</i> , <i>Roy Rasmussen</i> , <i>Kyoko Ikeda</i> , <i>Changhai Liu</i> , <i>Erin Dougherty</i> <i>*Presenting author affiliation: Colorado State University, Fort Collins, Colorado</i>
	Session 2: Hail Climatology, Risk, and Loss Session Chair: Jason Butke
1:50 pm to 2:20 pm	Keynote presentation: “ Hail Observations: Limitations, Oddities and Impacts ” <i>John T. Allen, Central Michigan University, Mount Pleasant, Michigan</i>
2:20 pm to 2:40 pm	P2.1 “Seasonal and Monthly Forecasting of US Hail Activity” <i>Chiara Lepore*</i> , <i>Michael K. Tippett</i> , <i>John T. Allen</i> <i>*Presenting author affiliation: Columbia University, New York</i>
2:40 pm to 3:00 pm	P2.2 “CHAT-The Colorado Hail Accumulation from Thunderstorms Project” <i>Katja Friedrich*</i> , <i>Robinson Wallace</i> , <i>Bernard Meier</i> , <i>Weibke Deierling</i> , <i>Evan Kalina</i> , <i>Paul Schlatter</i> <i>*Presenting author affiliation: University of Colorado, Boulder, Colorado</i>
3:00 pm to 3:20 pm	P2.3 “Eastern Colorado Severe Hail Climatology Conundrums” <i>Samuel Childs*</i> <i>*Presenting author affiliation: Colorado State University, Fort Collins, Colorado</i>
3:20 pm to 4:00 pm	Afternoon Break & Poster Session 1
4:00 pm to 4:20 pm	P2.4 “Using Spaceborne Sensors to Detect Hailstorms and Build Climatologies” <i>Daniel J. Cecil*</i> , <i>*Presenting author affiliation: NASA Marshall Spaceflight Center, Huntsville, Alabama</i>
4:20 pm to 4:40 pm	P2.5 “The Swiss National Hail Climatology Project – Overview and First Results” <i>Katharina Schroer*</i> , <i>S. Trefalt</i> , <i>C. Schwierz</i> , <i>U. Germann</i> , <i>A. Hering</i> , <i>T. Schlegel</i> , <i>L. Nisi</i> <i>*Presenting author affiliation: MeteoSwiss</i>



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4:40 pm to 5:00 pm	P2.6 "A New Era of Hail Monitoring, Forecasting, and Climatology in Switzerland" <i>Simona Trefalt*, H. Barras, N. Besic, A. Hering, L. Nisi, K. Schroer, C. Schwierz, D. Wolfensberger, U. Germann</i> <i>*Presenting author affiliation: MeteoSwiss</i>
5:00 pm to 5:20 pm	P 2.7 "Using > 50,000 Crowdsourced Hail Reports for the Verification of Radar Based Hail Products" <i>Helene Barras*, A. Hering, U. Germann, O. Martius</i> <i>*Presenting author affiliation: University of Bern, Bern, Switzerland</i>
5:20 pm to 5:40 pm	P2.8 "Hail Frequency in Central Europe Estimated from Single-Pol Radar Reflectivity and the Relation to Local- and Large-Scale Environmental Conditions" <i>Michael Kunz*, Jan Wandel, Sven Baumstark, Elody Fluck, David Piper</i> <i>* Presenting author affiliation: Karlsruhe Institute of Technology, Center for Disaster Management and Risk Reduction Technology, Karlsruhe, Germany</i>
Adjourn	

August 15

8:00 am to 12:00 pm	Registration Open
	Session 2 Continued
8:00 am to 8:20 am	P2.9 "The May 8, 2017 Metro Denver Hailstorm: One of the Costliest in U.S. History" <i>Paul Schlatter*</i> <i>*Presenting author affiliation: National Weather Service Forecast Office Boulder, Colorado</i>
	Session 3: Hail Damage & Mitigation Session Chair: Ian Giammanco
8:20 am to 9:10 am	Keynote Presentation: " Hail Kinetic Energies & Test Protocols: Where are We & How did We Get Here " <i>Andrew J. Heymsfield, National Center for Atmospheric Research</i> <i>Robert Wright, Robert L. Wright & Associates</i> <i>Ian M. Giammanco, Insurance Institute for Business & Home Safety</i>
9:10 am to 9:30 am	P3.1 "History of Underwriters Laboratory's Impact Testing Program and Certification" <i>Dwayne Sloan*</i> <i>*Presenting author affiliation: Underwriters Laboratory, Chicago, Illinois</i>
9:30 am to 9:50 am	P3.2 "RICOWI Hail Investigation Program: April 11, 2016 North Texas Hailstorm" <i>*Richard Herzog</i> <i>*Presenting author affiliation: Haag Engineering, Burnsville, Minnesota</i>
9:50 am to 10:10 am	P3.3 "A Non-Destructive Hail Test Model" <i>Matthew Phelps*</i> <i>*Presenting author affiliation: Texas Tech University, Lubbock, Texas</i>
10:10 am to 10:30 am	Morning Break
10:30 am to 10:50 am	P3.4 "Automated Hailswaths – Claims and Damage Ratios in the Insurance Industry" <i>*Andrew Siffert</i> <i>*Presenting author affiliation: BMS Group</i>



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10:50 am to 11:10 am	<p>P3.5 “Modeling Hail Impact: How Many Hailstones of What Size?” <i>Jurgen Grieser*</i> <i>*Presenting author affiliation: Risk Management Solutions, London, England</i></p>
11:10 am to 11:30 am	<p>P3.6 “Hail Hazard and Hail Risk Modeling for Germany Based on a Combination of Radar and Insurance Data” <i>Manuel Schmidberger, James E. Daniell, Michael Kunz*</i> <i>*Presenting author affiliation: Karlsruhe Institute of Technology, Karlsruhe, Germany</i></p>
11:30 am to 11:50 am	<p>P4.1 “HAILCAST Hail Forecasting Performance during the NOAA/Hazardous Weather Testbed Spring Forecasting Experiments” <i>Rebecca Adams-Selin*</i> <i>*Presenting author affiliation: AER, Offutt AFB, Nebraska</i></p>
11:50 am to 1:30 pm	Lunch Break
1:30 pm to 2:30 pm	<p>Expert Panel: “Hail Resiliency – Can We Get There?” Moderator: <i>Tanya Brown-Giammanco, Insurance Institute for Business & Home Safety</i> <i>Heather Estes, Insurance Institute for Business & Home Safety</i> <i>Greg Malarkey, Sr. VP Malarkey Roofing</i> <i>Ellen Thorp, EPDM Roofing Association</i> <i>John Gimble, RICOWI & Gimble Consulting Engineering</i></p>
2:30 pm to 2:50 pm	<p>Session 4: Hail Detection & Forecasting Session Chair: Bryan Wood P4.2 “Observations of Supercells Containing Large Hail Using a Rapid-Scan X-band, Mobile, Polarimetric Doppler Radar (RaXPo)” <i>*Howard B. Bluestein, Jeffrey Synder, Jana Houser, Zach Wienhoff, Dylan Reif, Kyle Thiem</i> <i>*Presenting author affiliation: University of Oklahoma, Norman, Oklahoma</i></p>
2:50 pm to 3:10 pm	<p>P4.3 “Hail Research at CIMMS/NSSL Using the SHAVE and MYRORSS Databases” <i>Kiel L. Ortega*</i>, <i>*Presenting author affiliation: CIMMS - University of Oklahoma, Norman, Oklahoma</i></p>
3:10 pm to 3:30 pm	Afternoon Break
3:30 pm to 4:30 pm	<p>Expert Panel: “Future Applications in Hail Detection and Forecasting” Moderator: <i>Matthew Kumjian, The Pennsylvania State University</i> <i>David John Gagne, PhD, National Center for Atmospheric Research</i> <i>Daniel Betten, PhD, CoreLogic / Weather Fusion</i> <i>Alex Kubicek, Understory</i> <i>William Ramstrom, Verisk Weather Solutions</i></p>
4:30 pm to 4:50 pm	<p>P4.4 “Development of a Post-Event Tool for the Spatiotemporal Analysis of Hail Events” <i>Justin E. Jones*, Leigh A. Munchak</i> <i>*Presenting author affiliation: Weather Analytics, Dover, New Hampshire</i></p>
4:50 pm to 5:10 pm	<p>P4.5 “Hail Detection and Prediction Using 1-Minute GOES 14 & 16 Satellite Imagery and Ground-Based Dual Polarization Radar” <i>Elisa Murillo*, Cameron Homeyer, Kristopher Bedka, Thea Sandmael</i> <i>*Presenting author affiliation: University of Oklahoma, Norman, Oklahoma</i></p>



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5:10 pm to 5:30 pm	P4.6 “Real-time Hail Prediction Using Machine Learning Algorithms with HREFv2” <i>Amanda Burke*, Nathan Snook, Amy McGovern, David John Gagne</i> <i>*Presenting author affiliation: University of Oklahoma, Norman, Oklahoma</i>
5:45 pm to 7:00 pm	Information Exchange at Center Green

August 16

	Session 4 Hail Detection & Forecasting Continued
8:00 am to 8:20 am	P4.7 “The Operational Application of the Lightning Jump Algorithm for Hail Nowcasting in Catalonia” <i>Carme Farnell*, Tomeu Rigo, Oriol Puig</i> <i>* Presenting author affiliation: University of Barcelona and Meteorological Service of Catalonia, Barcelona, Spain</i>
8:20 am to 8:40 am	P4.8 “A Comparison of the Lightning Jump Algorithm Using Total Lightning Versus Cloud-to-Ground Flashes” <i>Tomeu Rigo*, Carme Farnell</i> <i>*Presenting author affiliation: Meteorological Service of Catalonia</i>
8:40 am to 9:00 am	P4.9 “Continental Scale Hail Frequency Estimation from Geostationary Satellite Data” <i>Heinz Jurgen Punge*, Kristopher M. Bedka, Michael Kunz</i> <i>*Presenting author affiliation: Karlsruhe Institute of Technology, Karlsruhe, Germany</i>
9:00 am to 9:20 am	P4.10 “Hail Detectability Using Backscatter Differential Phase by X-Band Dual Polarization Radar” <i>Takeshi Maesaka*, Shin-ichi Suzuki, Yukari Shusse, Koyuru Iwanami</i> <i>*Presenting author affiliation: National Research Institute for Earth Science and Disaster Resilience, Japan</i>
9:30 am to 10:30 am	Morning Break & Poster Session 2
	Session 5: Microphysics & Dynamics of Hailstorms Session Chair: Hugh Morrison
10:30 am to 11:00 am	Keynote Presentation: “ Microphysics and Dynamics of Hail-Producing Thunderstorms ” <i>Zachary Lebo, University of Wyoming, Laramie, Wyoming</i>
11:00 am to 11:30 am	Keynote Presentation: “ Features of Hailstones and their Formation ” <i>Charles Knight, National Center for Atmospheric Research, Boulder, Colorado</i>
11:30 am to 11:50 am	P5.1 “Hail Prediction in the Canadian 2.5-km NWP system using the P3 Microphysics Scheme” <i>Jason Milbrandt* *Presenting author affiliation: Meteorological Research Division/Environment and Climate Change, Canada</i>
12:00 pm to 1:30 pm	Lunch Break
1:30 pm to 1:50 pm	P5.2 “Potential Impacts of Aerosol Pollution on Hailstorms” <i>William R. Cotton*, Adrian M. Loftus, and Gustavo G. Carrio</i> <i>*Presenting author affiliation: Colorado State University, Fort Collins, Colorado</i>



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1:50 am to 2:10 pm	P5.3 "Investigating the Characteristics of Hail Accumulating Thunderstorms" <i>Robinson Wallace*</i> , <i>Katja Friedrich</i> , <i>Bernard Meier</i> , <i>Wiebke Deierling</i> , <i>Evan Kalina</i> , <i>Paul Schlatter</i> <i>*Presenting author affiliation: University of Colorado, Boulder, Colorado</i>
2:10 pm to 2:30 pm	P5.4 "High-Resolution EnKF Analyses and Forecasts of the 8 May 2017 Colorado Severe Hail Event" <i>Jonathan Labriola*</i> , <i>Nathan Snook</i> , <i>Youngsun Jung</i> , <i>Ming Xue</i> <i>*Presenting author affiliation: University of Oklahoma, Norman, Oklahoma</i>
2:30 pm to 2:50 pm	P5.5 "Subtropical South American Hailstorm Storm Characteristics and Environments" <i>Zachary S. Bruick*</i> , <i>Kristen L. Rasmussen</i> , <i>Daniel J. Cecil</i> <i>*Presenting author affiliation: Colorado State University, Fort Collins, Colorado</i>
2:50 pm to 3:10 pm	Afternoon Break
3:10 pm to 3:30 pm	P5.6 "Interpretable Deep Learning Representations of Hail Growth Processes" <i>David John Gagne*</i> <i>Presenting author affiliation: National Center for Atmospheric Research, Boulder, Colorado</i>
3:30 pm to 3:50 pm	P5.7 "Improving Graupel and Hail Treatment in the Thompson Microphysics Parameterization" <i>Greg Thompson*</i> , <i>Sarah Tessendorf</i> , <i>Kyoko Ikeda</i> , <i>Andrew Heymsfield</i> <i>*Presenting author affiliation: National Center for Atmospheric Research, Boulder, Colorado</i>
3:50 pm to 4:10 pm	P5.8 "Characteristics of Hail Events Near the Sierras de Cordoba, Argentina" <i>Jeremiah Otero Piersante*</i> , <i>Deanna Hence</i> , <i>Sarah Tessendorf</i> , <i>Roy Rasmussen</i> <i>*Presenting author affiliation: Hobart and William Smith Colleges, Geneva, New York</i>
4:10 pm to 4:30 pm	P5.9 "Comparison of Hailstorm Properties Between China and the United States" <i>Qinghong Zhang*</i> , <i>Xiang Ni</i> , <i>Chuntao Liu</i> , <i>Daniel J. Cecil</i> <i>Presenting author affiliation: Peking University, Beijing, China</i>
4:30 pm to 4:50 pm	P5.10 "The Role of Initial Cloud Condensation Nuclei Concentration in Hail Using the WRF-NSSL 2-Moment Microphysics Scheme" <i>Xiaofei Li*</i> , <i>Presenting author affiliation: Peking University, Beijing China</i>
4:50 pm to 5:00 pm	Closing Remarks
	Adjourn



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	POSTER PRESENTATIONS <i>(Blue shading corresponds to poster Session 1; Purple shading corresponds to poster session 2. Authors should display their poster for the full 3 days of the workshop but be present at their work during the designated session)</i>
PP1	“Life Cycle Analysis of Potentially Destructive Convective Cells for Nowcasting Purposes in Consideration of Atmospheric Environment Conditions” <i>Jannik Wilhelm*, Ulrich Blahak, Kathrin Wapler, Roland Potthast, Michael Kunz</i> <i>* Presenting author affiliation: Karlsruhe Institute of Technology, Karlsruhe, Germany</i>
PP2	“Hail Pore Air Volume and Relative Ice, Water, and Air Analysis” <i>Matthew Phelps, Texas Tech University, Lubbock, Texas</i>
PP3	“Development of a Relative Hailstone Hardness Scale” <i>Matthew Phelps, Texas Tech University, Lubbock, Texas</i>
PP4	“Advances in Australian Hail Retrieval Tools, Data, and Science” <i>Joshua Soderholm*, Alain Protat, Jordan Brook</i> <i>* Presenting author affiliation: University of Queensland and Bureau of Meteorology, Australia</i>
PP5	“Properties of Hailstorms over the United States from Multi-Radar Multi-Sensor System Data” <i>Nana Liu, Chuntao Liu, Andrew Heymsfield, Ian Giammanco</i> <i>* Presenting author affiliation: Texas A&M University at Corpus Christi, Corpus Christi, Texas</i>
PP6	“The Regional Risk Perception of Extreme Weather Events: The Example Hail in Germany” <i>Susanna Mohr*, Martin Doring, Frauke Feser, Tina Kunz-Plapp, Beate Ratter, Reimund Schwarze, Michael Kunz</i> <i>* Presenting author affiliation: Karlsruhe Institute of Technology, Center for Disaster Management and Risk Reduction Technology, Karlsruhe, Germany</i>
PP7	“Temporal Variability of Severe Convective Storms Connected with Hail Events Across Europe and Their Relevant Drivers” <i>Susanna Mohr*, David Piper, Jan Wandel, Olivia Martius, Michael Kunz</i> <i>*Presenting author affiliation: Karlsruhe Institute of Technology, Center for Disaster Management and Risk Reduction Technology, Karlsruhe, Germany</i>
PP8	“Radar Characteristics in Hailstorms in Catalonia” <i>Carme Farnell*, Tomeu Rigo</i> <i>*Presenting author affiliation: Meteorological Service of Catalonia and University of Barcelona</i>
PP9	“Developing a Physical Model to Estimate Hail Trajectories” <i>Jordan Brook*, Alain Protat, Joshua Solderholm, Hamish McGowan</i> <i>*Presenting author affiliation: University of Queensland, Australia</i>
PP10	“In Situ Hail Observations Using a Rapidly Deployable Network of Hail Impact Disdrometers”



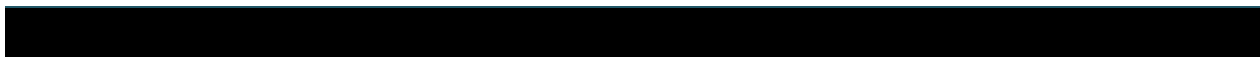
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	<p><i>Ian M. Giammanco*</i>, <i>Tanya M. Brown-Giammanco</i> <i>*Presenting author affiliation: Insurance Institute for Business & Home Safety, Richburg, South Carolina</i></p>
PP11	<p>“Trends in Environments Conducive for Large Hail” <i>Presenting author affiliation: Brian H. Tang, SUNY-Albany, Albany, New York</i></p>
PP12	<p>“Hailstorms in Surrogate Climate Change Simulations Over Switzerland” <i>Andrey Martynov*</i>, <i>Olivia Martius</i> <i>*Presenting author affiliation: University of Bern, Bern, Switzerland</i></p>
PP13	<p>“Deployment of a Novel Automated Hail Sensor Network in Switzerland” <i>Daniel Wolfensberger, H. Barras, A. Berne, A. Berne, A. Hering, O. Martius, L. Nisi, K. Schroer, C. Schwierz, S. Trefalt*, U. Germann</i> <i>*Presenting author affiliation: MeteoSwiss & University of Bern</i></p>
PP14	<p>“Comparing Hail Estimation with Warnings in 2017” <i>Tomeu Rigo*</i>, <i>Carme Farnell, Oriol Puig</i> <i>*Presenting author affiliation: Meteorological Service of Catalonia</i></p>
PP15	<p>“Environmental and Radar Characteristics of Gargantuan Hail-Producing Storms” <i>Rachel Gutierrez*</i> <i>Matthew R. Kumjian</i> <i>*Presenting author affiliation: Penn State University, State College, Pennsylvania</i></p>
PP16	<p>“Hailstone Stable Isotope Measurements as Indicators of Storm Environment Conditions” <i>Lijun.Tian*</i>, <i>B. Weissling, A.V. Rodriguez, C. Ray, Y. Gao, S.F. Ackley</i> <i>*Presenting author affiliation: University of Texas at San Antonio, San Antonio, Texas</i></p>
PP17	<p>“Experimental measurement of large hail terminal velocity in the free atmosphere at air pressures from 550 to 1000 millibars” <i>Carl Schmitt*</i>, <i>Andrew Heymsfield, Wilmer Sanchez Rodriguez, Ellen Lapham, John All, Juan Jose Zuniga Negrón, Julio Warthon</i> <i>*Presenting author affiliation: National Center for Atmospheric Research, Boulder, Colorado</i></p>
PP18	<p>“CoCoRaHS: A 20-year Hail Data Repository for the United States and Canada” <i>Henry Reges*</i>, <i>Russ Schumacher, Nolan Doeskin, Noah Newman, Julian Turner, Dani Talmadge</i> <i>*Presenting author affiliation: Colorado State University</i></p>
PP19	<p>“Development of a hail monitoring algorithm using X-band polarimetric radars in and around the Tokyo metropolitan area, Japan” <i>Yuakri Shusse*</i>, <i>Shin-ichi Suzuki, Hitoshi Yokoyama, Takeshi Maesaka, Kaori Kieda, Koyuru Iwanami, Kohin Hirano</i> <i>*Presenting author affiliation: National Research Institute for Earth Science and Disaster Resilience, Japan</i></p>
PP20	<p>“A Hail Detection Algorithm using X-Band dual-polarization radar observation network in Japan and its Comparison with Field Survey Results” <i>Shin-ichi Suzuki, Yukari Shusse, Hitoshi Yokoyama, Takeshi Maesaka, Kaori Kieda, Koyuu Iwanami, Kohin Hirano</i> <i>*Presenting author affiliation: National Research Institute for Earth Science and Disaster Resilience, Japan</i></p>



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PP21	<p>“Global Wind Oscillation and Hail Activity in the U.S.” <i>Victor A. Gensini</i> <i>*Presenting author affiliation: University of Northern Illinois</i></p>
PP22	<p>“Real-Time Hail Warning and Community Outreach in the CASA DFW Urban Network” <i>Venkatachalam Chandrasekar*, Haonan Chen, Brenda Phillips</i> <i>*Presenting author affiliation: Colorado State University</i></p>
PP23	<p>“Hail Precursors and Predictability in Regions North and South of the Swiss Alps” <i>Simona Trefalt*, A. Carrera, U. Germann, D. Ginssbourger, A. Hering, O. Martius</i> <i>Presenting author affiliation: MeteoSwiss & University of Bern</i></p>
PP24	<p>“Next-Day Hail Size Forecasts for the 8 May 2017 Colorado Severe Hail Event Using a Convection Allowing Model” <i>Jonathan Labriola, Nathan Snook, Ming Xue, Kevin Thomas</i> <i>*Presenting author affiliation: University of Oklahoma</i></p>



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