



# WESTERN SNOW CONFERENCE

---



86th Annual Western Snow Conference  
Snow in the Context of Climate Extremes and Change

April 16-19, 2018

Crowne Plaza Hotel  
Albuquerque, NM

<http://westernsnowconference.org>  
[westernsnowconference@gmail.com](mailto:westernsnowconference@gmail.com)

## **Monday, April 16**

- 9:00 – 2:00 Short Course: Communicating Complex Environmental Information to Broad Audiences (includes lunch) – *Colorado/Texas*
- 2:00 – 5:30 Vendors Setup, Poster Paper Setup – *Promenade East*
- 2:30 – 5:30 WSC Executive Committee Meeting – *Arizona South*
- 5:30 – 7:00 Registration and Hospitality – *Executive Viewing Lounge*

## **Tuesday, April 17**

- 7:00 – 8:00 Author's Breakfast – *Garden Room*
- 7:00 – 8:30 Conference Registration, Vendor Setup, Poster Paper Setup – *Promenade East*

## **CONFERENCE OPENING SESSION**

- 8:30 – 8:40 Opening Remarks: Noah Molotch, Conference Chair – *Southwest Ballroom*
- 8:40 – 8:50 Welcome: Scott Pattee, WSC General Chair

8:50 – 9:10 Keynote Address: Dr. David Gutzler, University of New Mexico

9:10 – 9:20 Vendor Introductions: Connie Maxwell, Vendor Chair

**ORAL SESSION I: *Advances in Snow Modeling and Observations.***

***Chair: McKenzie Skiles***

9:20 – 9:40 On the use of snow and climate information in statistical streamflow forecasting – Flavio Lehner, National Center for Atmospheric Research

9:40 – 10:00 Snow drought in the western U.S. mountains: proximate causes, regional differences, and sensitivity to a warming climate – Adrian Harpold, University of Nevada, Reno

10:00 – 10:15 BREAK – *Promenade East*

10:15 – 10:35 Filling the holes in the space-time cube of snowpack evolution with lasers, cameras, computers, and snow shovels – Mark Raleigh, NSIDC, CIRES, University of Colorado

10:35 – 10:55 Uncertainty in the Future of Seasonal Snowpack over North America – Rachel McCrary, National Center for Atmospheric Research

10:55 – 11:15 Is aerosol pollution appreciably reducing water resource in the Colorado River Basin? – William Cotton, Colorado State University

11:15 – 11:35 Advancing operational streamflow prediction for water management through new watershed modeling and methods – Andy Wood, National Center for Atmospheric Research

11:35 – 1:00 **Lunch (on your own)**

1:00 – 5:00 **Concurrent Session: Rio Grande Runoff Meeting** – *Garden Room*

**ORAL SESSION II: *The Science and Management of Droughts, Floods and Other Extreme Events***

***Chair: Mark Raleigh***

1:00 – 1:20 The role of atmospheric river rain-snow levels and pre-existing snowpack in the 2017 Oroville Dam crisis – Brain Henn, Scripps Institution of Oceanography, UC San Diego

- 1:20 – 1:40 A proposal for the discontinuation of cloud seeding in Utah – Randall Julander, USDA NRCS
- 1:40 – 2:00 Large projected increases in rain-on-snow flood potential over western North America – Keith Musselman, University of Colorado
- 2:00 – 2:30 BREAK – *Promenade East*
- 2:30 – 2:50 Effects of Precipitation Type on Streamflow Efficiency At Critical Zone Observatories in the Western United States – Kate Hale, Colorado University Boulder/INSTAAR
- 2:50 – 3:10 From drought to floods: A water balance analysis of the Tuolumne River Basin during extreme conditions (2015 - 2017) – Andrew Hedrick, ARS Northwest Watershed Research Center
- 3:10 – 3:30 More than just a pretty picture: New applications for Airborne Snow Observatory imagery – McKenzie Skiles, University of Utah

**3:30 – 5:30 Poster Introductions, Poster Papers, and Vendor Displays**

***30 second poster flash presentations given in poster order.***

1. The Spatial Distribution of Fine Resolution Snow Surface Roughness – Eric Thomas, Colorado State University
2. Potential for Changing Extreme Snowmelt and Rainfall Events in the Mountains of the Western United States – Mackenzie Kohler, University of Nevada, Reno
3. Observations of the Effect of the 2017 Total Solar Eclipse on a Solar Pannel at the Starr Ridge SNOTEL site in central Oregon – Jon Lea, Western Snow Conference
4. Characterization of Changing Model Parameter Behavior Within Streamflow Forecast Models Applied to the Rio Grande Headwater Region – Nels Bjarke, University of New Mexico
5. Montane forest water-use under increased episodic and earlier snowmelt – Ava Cooper, University of Nevada, Reno
6. Extremes of Opportunity: Mitigation of Snowmelt Decreases through Improved Management of Local Extreme Precipitation Events – Erin Towler, National Center for Atmospheric Research
7. Co-Managing Forests for Snow on the West Shore of Lake Tahoe, California – Devon Eckberg, University of Nevada, Reno

8. Is Snow a Drought Buster? The Effects of Snow on Drought in the Western U.S. – Jenna Weiner, University of Nevada, Reno
  9. The Effect of Forest Structure on Snowpack along Arizona’s Mogollon Rim – Patrick Broxton, School of Natural Resources and the Environment, University of Arizona, Tucson
  10. How do progressively warming temperatures impact runoff volume and streamflow timing in Rio Grande watersheds? – Ryann Smith, USDA Southwest Climate Hub
  11. Relationships among snow depth, snow water equivalent, streamflow and virus activity in two Colorado watersheds – Dustin Ward, New Mexico State University
  12. Development and implementation of tools for estimating snow accumulation and ablation in an operational river forecasting environment. – Ryan Lucas
  13. IDS-20 Next Generation Ice Detection System – Peter Ward
  14. Ultrasonic snow depth sensor refurbishment and testing at the Natural Resources Conservation Service National Water and Climate Center Electronics Maintenance Facility, Portland, OR – Chris Brown, NRCS National Water and Climate Center
  15. Determining Trends in Snow Line Elevation in the Indus Basin using MODSCAG – Chelsea Ackroyd, University of Utah, Department of Geography
  16. Mapping snow cover on three volcanoes in Western Washington: Synthetic Aperture Radar compared to MODIS visual imagery – Kate Baustian, University of Utah, Department of Geography
  17. Snow radiative forcing by dust from exposed Great Salt Lake bed in the Wasatch Mountains, U.S. – Michael Mason, University of Utah, Department of Geography
  18. Colorizing the Airborne Snow Observatory lidar points cloud with coincident RGB images – Joe Meyer, University of Utah, Department of Geography
  19. A new grain size lookup table for the Airborne Snow Observatory Imaging Spectrometer – Matthew Olson, University of Utah, Department of Geography
  20. Evaluation of physically based spatially distributed snowmelt model in Senator Beck Basin, Southwestern Colorado, USA – Jonathan Wagner, University of Utah, Department of Geography
- 5:30 – 7:00 Join us in the **Executive Viewing Lounge** for snacks, a cold one and showing of the documentary “Saving Snow” – Across the country, people who depend on winter for their livelihood are feeling the heat. On the sidelines of skiing and snowboarding, an epic struggle to reverse rising temperatures is

unfolding. Ski towns and the snow sports industry are paving the way towards a clean energy future. Join us for this 53 minute documentary on how climate change is impacting many forms of winter recreation and the economies built on snow and ice.

Representatives from Citizens Climate Lobby (CCL) will be on-site to answer questions about CCL.

### **Wednesday, April 18**

- 9:00 – 1:00            Guest breakfast and tour: Indian Pueblo Cultural Center and Albuquerque Old Town – *Hotel restaurant*
- 8:30 – 8:45            Conference Announcements – *Southwest Ballroom*

### **ORAL SESSION III: *The Changing Mountain Snowpack: Historical Trends and Predictions of the Future.***

***Chair: Keith Musselman***

- 8:45 – 9:05            Response of Soil Moisture to Snowmelt as a Function of Canopy Density in the Ponderosa Pine/Mixed Conifer Forest Transition Zone of the Valles Caldera National Preserve, NM – Angela Gregory, University of New Mexico
- 9:05 – 9:25            Snow depth distributions with respect to forest canopy and topography in multiple climates – William Currier, University of Washington, Civil and Environmental Engineering
- 9:25 – 9:45            Climate, Snow and Infiltration Interactions on the Pajarito Plateau, New Mexico – Katrina Bennett, Los Alamos National Lab
- 9:45 – 10:15           BREAK – *Promenade East*
- 10:15 – 10:35           Impacts of Reduced Snow Pack on Local Communities in the Western States – Nancy Baca, Northern Arizona University
- 10:35 – 10:55           Snowdrift modeling using a Linear Particle Distribution Equation – Noriaki Ohara, University of Wyoming
- 10:55 – 11:15           Detection of reversal of the magnetic field of the sun in snowfall records in the Sierra, Cascade, and Rocky mountain ranges of the western United States. – John Kleppe, University of Nevada, Reno
- 11:30 – 1:00            **Lunch (on your own)**

### **ORAL SESSION IV: *Advances in snow monitoring and measurement***

**Chair: Kyle Douglas-Mankin**

- 1:00 – 1:20 Combining Ground Penetrating Radar with Terrestrial LiDAR Scanning to Observe the Spatial Distribution of Liquid Water Content in Seasonal Snowpacks – Ryan Webb, University of Colorado Boulder
- 1:20 – 1:40 Lidar and DTS Mapping of Fractional Snow Cover in Montane Forests: Implications for Optical Remote Sensing of Seasonal Snow – Tihomir Kostadinov, Desert Research Institute
- 1:40 – 2:00 Mapping snow depth variability and ecosystem response with a multispectral unmanned aerial system (UAS) – Oliver Wigmore, University of Colorado Boulder
- 2:00 – 2:30 BREAK – *Promenade East*
- 2:30 – 2:50 Remotely Monitoring Snow Water Equivalent Using Basic Photogrammetry – Peter Marshall, Metro Vancouver
- 2:50 – 3:10 Research and Development in Advancing Fluidless Snow Water Content Monitoring – Anne Heggli, Alpine Hydromet
- 3:10 – 3:30 **Technical Tour Announcements and Special Banquet Events**
- 3:30 – 4:00 **Western Snow Conference Annual Business Meeting (All Attendees)**

**CONFERENCE BANQUET & AWARDS**

- 6:00 – 7:00 Hospitality – *Garden Room*
- 7:00 – 9:00 Banquet and Awards – *Garden Room*  
Guest Speaker: John Fleck, Director, University of New Mexico Water Resources Program and author of "Water is for Fighting Over and Other Myths about Water in the West"

**Thursday, April 19**

- 8:00 – 6:15 Technical Tour: Please join us for a tour of historic and hydrologic points of interest in the Rio Grande Valley, including the first stream gaging station installed in the United States.