



# WESTERN SNOW CONFERENCE

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*\*Draft Program\**

**84<sup>th</sup> Annual Western Snow Conference**

**April 18-21, 2016**

**Best Western Plus Executive Inn**

**Seattle, Washington**

## **Monday, April 18**

8:00-8:30 **Short Course set up, Registration, Poster Set up.**

8:30-11:30 **Short Course: "Validation of the Rain/Snow Global Precipitation Measurements (GPM) Satellite Data in the Olympic Mountains: University of Washington and NASA"**

11:30-12:30 Lunch

12:30-2:30 **Short Course:** continued.

3:00-5:00 **Executive Committee Meeting**

3:00-7:00 **Poster and Vendor Set up**

5:30-7:00 **Registration and Chairman's Hospitality**

## **Tuesday, April 19**

7:00-8:00 **Authors Breakfast Buffet.** Authors Bios collected by session chairs.

7:00-8:00 **Conference Registration, vendor set up, poster set up.**

8:00-8:10 **Conference Welcome and Opening Remarks:** Jolyne Lea, 2016 Conference Chair

8:10-8:30 **Keynote and Welcome:** Gary Freeman, Pacific Gas And Electric Company, Western Snow Conference General Chair: **Snowmelt Runoff in the Sierra Nevada and Southern Cascades during California's Fourth consecutive Year of Drought.**

8:30-9:00 **Vendor Presentations:** Keith Bellingham

**Oral Session I**    ***Snow Drought and Extremes Session. Chair: Jolyne Lea***

- 9:00-9:20    **Inter- and Intra-Annual Variability in Snow Albedo, Grain Size, and Snow Covered Area from the Airborne Snow Observatory During Low Snow Years (2013-2015), Tuolumne River Basin, CA.** McKenzie Skiles, NASA Jet Propulsion Laboratory.
- 9:20-9:40    **The 2014-2015 Snow Drought in Washington State: What Does It Tell Us About Future Drought Risk?** Joe Casola, Climate Impacts Group, University of Washington.
- 9:40-10:00    **Challenges with Depicting Pacific Northwest Snowpack Conditions on the US Drought Monitor.** Karin Bumbaco, Washington State Climatologist, University of Washington.
- 10:00-10:30    Break
- 10:30-10:50    **Regional variation of the rain-snow temperature threshold over North America.** Taylor Winchell, University of Colorado, Boulder.
- 10:50-11:10    **Regional Buffering of Changes From Snow To Rain by Humidity Regimes Under Climate Warming in the Western U.S.** Jackson Crews, Desert Research Institute, University of Nevada, Reno.
- 11:10-11:30    **Recognizing the Human Faces in the Context of Reduced Snow Pack.** Dean Howard Smith, Northern Arizona University.
- 11:30-11:50    **Warning from the past - The message, meteorology and myths from the Great West Coast winter of 1861-1862.** Lawrence Schick, U.S. Army Corps of Engineers.
- 11:50-1:00    Lunch

***Oral Session II Snow in the Mountains: Effects of Terrain & Forest Canopy***    ***Chair: Matt Brunengo***

- 1:00-1:20    **Snow disappearance timing in warm winter climates is dominated by forest effects on snow accumulation.** Susan Dickerson-Lange, University of Washington.
- 1:20-1:40    **The Effect of the Vertical Canopy Structure on Snow Processes in Low and High Snow Scenarios: Simulations of the Vertical Response Energy Fluxes & Snow Interception Using a Higher Order Closure Multi-Layer Soil-Vegetation-Atmospheric Model.** Laura McGowan, University of California, Davis.
- 1:40-2:00    **Capturing spatiotemporal variability in the influence of topography and vegetation on snow depth in the Tuolumne River Basin using geographically weighted regression.** Ian Bolliger, University of California, Berkeley.
- 2:00-2:30    Break

- 2:30-2:50 **Climate change impacts on soil moisture and fire risk in the western United States.** Diana Gergel, University of Washington.
- 2:50-3:10 **The need for including snow surface temperature in model evaluations.** Karl Lapo, University of Washington.
- 3:10-3:30 **Cloud Seeding Efficacy for Reversing Declining Snowpack Trends in the Southern Sierra Nevada.** Richard Stone, RHS Consulting.

### **3:30-5:00: Poster Session and Refreshments.**

1. **Water Year 2015: Record Low Mountain Snowpack in Oregon.** Julie Koeberle, USDA NRCS Oregon Snow Surveys.
2. **The 2015 Snow Season in the Pacific Northwest: Will This Be the New Normal?** Hordur Helgason, University of Washington.
3. **Snow Covered Area in Western North America: a Comparison of Winter 2014/15 to Normal Conditions.** Joel Trubilowicz, Northwest Hydraulic Consultants.
4. **The Battle of Winter Along the St. Lawrence Valley and in Canada from 1760 to 1900.** Jerry Toupin, University of Alberta.
5. **Seasonal Snowpack Cold Content Dynamics and Snowmelt Rate Distributions in the Alpine and Subalpine, Niwot Ridge, Colorado.** Keith Jennings, INSTAAR, University of Colorado.
6. **Exploring the Impacts of Reduced Snowpack Due to Light Absorbing Impurities in Snow, Including Potential Influence on Wildfires.** Catalina Oaida, Jet Propulsion Laboratory, NASA.
7. **Using Temporal and Spatial Analogs to Characterize Non-Stationary Snow-Climate Relationships and Their Sensitivity to Temperature and Precipitation.** Abby Lute, U.S. Forest Service, Rocky Mountain Research Station.
8. **Predictive SWE Model Based on Snow Depth and Ambient Air Temperature.** Theodore Thorson, University of Washington.
9. **Comparing SNOTEL Extended Air Temperature Sensor and Equations to an NSIT Certified Sensor in an Environmental Chamber.** Deborah Harms, USDA NRCS, National Water and Climate Center.
10. **Thermal Infrared Remote Sensing of Snow Surface Temperature: Quantifying Snow's Energy Budget.** Eric Keenan, University of Washington.
11. **Data Fusion for Better Spatio-Temporal Estimation of Sierra Nevada Snowpack Conditions.** Zeshi Zheng, University of California, Berkeley.
12. **The Consequences of Snow-Rain Partitioning to Hydrological Model Performance.** Seshadri Rajagopal, University of Nevada, Reno.
13. **Investigating Precipitation and Snow Storage in Southern Idaho Via a High Resolution Regional Climate Model.** Katelyn Watson, Boise State University.
14. **Predicting Weather Using Sea Surface Temperature Anomalies.** Tim Brewer, Idaho Power.
15. **Weather Forecasting for Water Resource Management in Mountainous Terrain.** Matt Masarik, Boise State University.

16. **Quantifying Lateral Flow Using Stable Isotopes.** Andrew Karlson, Boise State University.
17. **Modeling Future Water Availability in a Snowmelt-Dominated System.** Amy Steimke, Boise State University.
18. **An Intercomparison of Modeling Approaches for Snowmelt Simulation and Forecasting in the Pacific Northwest.** Elizabeth Clark, University of Washington.
19. **Sierra Nevada Precipitation Spatial Distribution and Uncertainty.** Brian Henn, University of Washington.
20. **Hydrologic Connectivity and Snow Disappearance in Mountain Watersheds: Does It Impact Streamflow?** Rose Petersky, University of Nevada, Reno.
21. **Mapping the Hydrological Sensitivity of Changes from Snow to Rain in the Sierra Nevada and Great Basin.** Patrick Longley, University of Nevada, Reno.
22. **Streamflow and Snow Contribution to the Boulder Creek Watershed Under Climate Change.** Qinghuan Zhang, Colorado University, Boulder.
23. **Examining Pattern Changes of High Elevation Streamflow Across the Southern Rocky Mountains.** Anna Pfohl, Colorado State University.
24. **Hydrologic Response Along the Intermittent-Persistent Snow Transition of the Western U.S.** John Hammond, Colorado State University.
25. **Modeling Snowpack and Surface-Subsurface Water Dynamics with Integrated Regional Weather and Climate Models with Process Ecohydrology Models at High Resolution in Semiarid Landscapes.** Miguel Aguayo, Boise State University.
26. **Applying the Snowmelt Runoff Model (SRM) to Estimate Snowmelt Contribution from Gangotri Glacier, India.** Rodney Chai, University of Kansas.

## Wed April 20

**9:00 - Spouse Tour:** Breakfast 9:00-10:00. 11:30-1:00 "Ride the Ducks" tour of Seattle. Explore Seattle for the afternoon on your own.

**8:00-8:20 Announcements**

### *Oral Session III Data Collection/Remote Sensing. Chair: Scott Pattee*

- 8:20-8:40 **Design and Evaluation of a Basin-Scale Wireless Sensor Network for Mountain Hydrology.** Ziran Zhang, University of California, Berkeley.
- 8:40-9:00 **Acoustic Observation and Imaging of Snow.** Nicholas Kinar, University of Saskatchewan.
- 9:00-9:20 **Remote, Real Time Snow Properties with Ground Penetrating Radar.** Mark Robertson, Boise State University.

- 9:20-9:40 **Estimating Snow Depth from Observations of Remotely-Sensed Snow Covered Area and Depression Storage Capacity.** Dominik Schneider, Colorado University, Boulder, INSTAAR.
- 9:40-10:10 Break
- 10:10-10:30 **An Evaluation of Terrain-Based Downscaling of MODIS-Based Fractional-Snow-Covered-Area datasets over the Tuolumne River, CA based on LIDAR Derived Snow Data.** Nicoleta Cristea, University of Washington.
- 10:30-10:50 **Using Snow Water Equivalent Reconstruction for Operations: Two Case Studies.** Ned Bair, Earth Research Institute, University Santa Barbara.
- 10:50-11:10 **Declining high-latitude spring snow cover extent - challenges and advances in modeling snow processes using the Regional Arctic System Model.** Joseph Hamman, University of Washington.
- 11:20-1:00 Lunch

***Oral Session IV Forecasting/Modeling. Chair: Jon Lea***

- 1:00-1:20 **Characteristics of Snowmelt Hydrographs in Utah.** Randy Julander, USDA Natural Resources Conservation Service, Utah Snow Surveys.
- 1:20-1:40 **Investigating the response of an operational snowmelt model to unusual snow conditions and melt drivers.** Mark Raleigh, University of Colorado, CIRES.
- 1:40-2:00 **Rapid Snowmelt Leads to Greater Streamflow Across the Western United States.** Theodore Barnhart, Department of Geography, University of Colorado, Boulder.
- 2:00-2:30 Break
- 2:30-2:50 **Does Including Soil Moisture Observations Improve Operational Streamflow Forecast in Snow-Dominated Watersheds?** Adrian Harpold, University of Nevada, Reno.
- 2:50-3:10 **Harnessing predictability in seasonal streamflow forecasts.** Julie Vano, Center for Atmospheric Research.
- 3:10-3:30 **Model Differences in Projections of the Pacific Northwest Snowpack During the 21<sup>st</sup> Century.** Oriana Chegwiddden, University of Washington.
- 3:40-3:50 Field Trip instructions
- 3:50-4:30 Western Snow Conference Annual Business meeting
- 4:40-5:00 Awards Committee meeting

6:00-7:00 No Host Happy Hour

7:00-9:30 Conference Banquet & Awards. Vendor Prize Drawing.

*Speaker: Past General Chair, Fred Strauss*

Thursday April 21

8:00-5:00 Technical Tour: Skagit Valley watershed tour. This includes the geology review of the Oso Landslide, stops to see the Seattle City Light Hydropower Project, Skagit overlook to view and discuss the dams, North Cascades National Park glaciology discussion, return along the Skagit River with additional natural history information, and drive through the tulip fields in the lower Skagit Valley. Limit 50 people.