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RESEARCH INTERESTS

Mountain hydrology and biogeochemistry, climate impacts and water resources, climate applications.

EDUCATION

Ph.D. 1985 Environmental Engineering Science, California Institute of Technology
M.S. 1984 Social Science, California Institute of Technology
M.S. 1975 Civil Engineering, University of California, Berkeley
B.S. 1974 Civil Engineering, Purdue University

EMPLOYMENT

2003-present: Sierra Nevada Research Institute, University of California, Merced (Director 2008-2013, Acting Director 2007-08, member 2003-07).
2003-present: School of Engineering, University of California, Merced (Distinguished Professor 2015-present, Professor 2003-15, founding faculty member).
1984-2003: Department of Hydrology and Water Resources, University of Arizona, (Assistant Professor 1984-1989, Associate Professor 1989-1995, Professor 1995-2004).
1980-84: Graduate Research Assistant, California Institute of Technology.
1975-80: Project Manager and Project Engineer, Brown and Caldwell, Pasadena, California

REGISTRATION

Civil Engineer 27677, California

OTHER APPOINTMENTS

2013-present: Adjunct Professor, Civil and Environmental Engineering, University of California, Berkeley.
2012-present. Researcher and water initiative co-leader, Center for Information Technology Research in the Interest of Society, UC Berkeley
2004-2015. Member, Hydrology Graduate Group, University of California, Davis.
2008-2013: Natural Reserve System Campus Director and Yosemite Field Station Campus Director, University of California, Merced.
2000-2003: Deputy Director (co-leader), NSF Science and Technology Center for the Sustainability of Semi-Arid Hydrology and Riparian Areas, University of Arizona

2000-2003: Member, Committee on Remote Sensing and Spatial Analysis, University of Arizona.
1999-2003: Director, Regional Earth Science Applications Center, University of Arizona
1998-2003: Lead Investigator, Climate Assessment for the Southwest Project, University of Arizona.
1997-1999: Director, Institute for the Study of Planet Earth, University of Arizona
1994-2003: Member, Interdisciplinary Committee for Global Change, University of Arizona. Chair, 1994-1997.
1994-2000: Investigator, Center for Toxicology, University of Arizona.
1994-1995: Visiting Fellow, Udall Center for Studies in Public Policy, University of Arizona.
1989-93: Associate Researcher, Department of Geography, University of California, Santa Barbara.

PROFESSIONAL SOCIETIES

American Geophysical Union (Fellow), American Society for the Advancement of Science (Fellow), American Meteorological Society (Fellow), American Society of Civil Engineers, American Chemical Society, Association of Environmental Engineering Professors.

PROFESSIONAL ACTIVITIES

2007-2010. Member, science leadership team, WATERS Network.
2006-2012. Member, Board of Directors, Great Valley Center, Modesto, CA.
2004-2007. Member, Committee on Integrated Hydrologic Observations, Water Science and Technology Board, National Research Council.
2003-2010. Member, National Advisory Board, Long Term Ecological Research (LTER) Network.
2003-2007: Member, Committee on Metrics for Global Change Research, National Research Council.
2002-2006: Member, Committee on Geophysical and Environmental Data, National Research Council.
2001-2008: Member Representative, Consortium of Universities for the Advancement of Hydrologic Science, Inc. 2006-2008: Chair Hydrologic Measurement Facility Oversight Committee. 2005-2006: Member, Science Agenda Team. 2001-2004: Member, Board of Directors. 2001-2003: Member, Executive Committee. 2000-2001: Chair, steering committee to form consortium and PI on grant that funded the consortium.
2000-2011: Steering Committee Chair and Science Coordination Office Director, Summit Greenland Environmental Observatory.

1999-2000, Chair, Steering Committee, Southwest Regional Assessment, U.C. Global Change Research Program; Member, Regional Assessment Team.

2000-2002: Member, Advisory Committee, Geosciences Directorate, National Science Foundation.

2000-2002, Steering Committee, Eos, Transactions, American Geophysical Union. Hydrology Editor, 1997-2001.

1999-2002: Member, Committee on Hydrologic Sciences, National Research Council.

1999-2001: Chair, Ice Core Working Group. Member, 1997-1999.

1999-2000: Member, Water Cycle Study Group, U.S. Global Change Research Program.

1994-1996: Hydrology section secretary, American Geophysical Union.

1992-1996: Associate editor, Water Resources Research.

1992-1996: Member, Committee on Glaciology, National Research Council.

1991-1996: U.S. representative, International Commission on Water Quality, International Association of Hydrologic Sciences.

1991-1995: Chair, Snow-Atmosphere Chemical Exchange Working Group, International Commission for Snow and Ice.

1990-1993: Fall meeting program chair, Hydrology Section, American Geophysical Union.

1987-1990: Steering Committee, Snow Chemistry Working Group, International Commission for Snow and Ice.

1985-1990: Water Quality Committee, Hydrology Section, American Geophysical Union.

1989-1991: Coagulation Research Committee, American Water Works Association.

PUBLICATIONS

Peer-reviewed journals

156. R.C. Bales, M.L. Goulden, C.T. Hunsaker, M.H. Conklin, P.C. Hartsoug, A.T. O'Geen, J.W. Hopmans, M. Safeeq. Mechanisms controlling the impact of multi-year drought on mountain hydrology, *in press, Scientific Reports*, doi:10.1038/s41598-017-19007-0.
155. P.Z. Klos, M.L. Goulden, C.S. Riebe, C.L. Tague, A.T. O'Geen, B.A. Flinchum, M. Safeeq, M.H. Conklin, S.C. Hart, A. Asefaw Berhe, P.C. Hartsough, W.S. Holbrook, R.C. Bales. Subsurface plant-accessible water in mountain ecosystems with a Mediterranean climate, *accepted, WIRES water*.
154. Y. Su, R.C. Bales, Q. Ma, K. Nydick, R.L. Ray, W. Li, Q. Guo. Emerging stress and relative resiliency of Giant sequoia groves experiencing multiyear dry periods in a warming climate. *Journal of Geophysical Research: Biogeosciences*, 122, 3063–3075, doi:10.1002/2017JG004005, 2017.
153. Z. Zhang, S. Glaser, R.C. Bales, M.H. Conklin, R. Rice, and D. Marks. Insights into mountain precipitation and snowpack from a basin-scale wireless-sensor network, *Water Resour. Res.*, 53, 6626–6641, doi:10.1002/2016WR018825, 2017.
152. Z. Zhang, S. D. Glaser, R. C. Bales, M. Conklin, R. Rice, and D. G. Marks. Technical report: The design and evaluation of a basin-scale wireless sensor network for mountain hydrology, *Water Resour. Res.*, 53, 4487–4498, doi:10.1002/2016WR019619, 2017.
151. S.L. Brantley, W.H. McDowell, W.E. Dietrich, T.S. White, P. Kumar, S.P. Anderson, J. Chorover, K.A. Lohse, R.C. Bales, D.D. Richter, G. Grant, J. Gaillardet. Designing a network of critical zone observatories to explore the living skin of the terrestrial Earth, *Earth Surface Dynamics*, 5(4), 841-860; doi:10.5194/esurf-5-841-2017, 2017.
150. S. Szabo, R.J. Nicholls, B. Neumann, F.G. Renaud, Z. Matthews, Z. Sebesvari, A. AghaKouchak, R.C. Bales, C. Warren Ruktanonchai, J. Kloos, E. Foufoula-Georgiou, P. Wester, M. New, J. Rhyner, C. Hutton. Making SDGs Work for Climate Change Hotspots. *Environment: Science and Policy for Sustainable Development*, 58(6), 24-33, doi:10.1080/00139157.2016.1209016, 2016.
149. C.A. Oroza, Z. Zheng, S. D. Glaser, D. Tuia, Optimizing embedded sensor network design for catchment-scale snow-depth estimation using LiDAR and machine learning. *Water Resour. Res.*, 52, 8174–8189, doi:10.1002/2016WR018896, 2016.
148. D.E. Rheinheimer, R.C. Bales, C.A. Oroza, J.R. Lund, J.H. Viers. Valuing year-to-go hydrologic forecast improvements for a peaking hydropower system in the Sierra Nevada, *Water Resour. Res.*, 52, 3815–3828, doi:10.1002/2015WR018295, 2016.
147. Z. Zheng, P.B. Kirchner, R.C. Bales. Topographic and vegetation effects on snow accumulation in the southern Sierra Nevada: a statistical summary from lidar data, *The Cryosphere*, 10, 257-269, doi:10.5194/tc-10-257-2016, 2016.
146. B. Harrison, R.C. Bales, Skill Assessment of Water Supply Forecasts for Western Sierra Nevada Watersheds, *Journal of Hydrologic Engineering*, 21(4), doi:10.1061/(ASCE)HE.1943-5584.0001327, 2016.
145. Z. Zheng, P. Kirchner, R.C. Bales. Orographic and vegetation effects on snow accumulation in the southern Sierra Nevada: a statistical summary from LiDAR data. *The Cryosphere Discussions*, 9, 4377-4405, doi:10.5194/tcd-9-4377-2015, 2015.
144. B. Harrison, R.C. Bales, Skill Assessment of Water Supply Outlooks in the Colorado River Basin, *Hydrology*, 2, 112-131; doi:10.3390/hydrology2030112, 2015.
143. AA Harpold, NP Molotch, KN Musselman, RC Bales, PB Kirchner, M. Litvak, P. D. Brooks. Soil moisture response to snowmelt timing in mixed-

- conifer subalpine forests. *Hydrological Processes*, 29,12, 2782-2798, doi:10.1002/hyp.10400, 2015.
142. M.L. Goulden, R.C. Bales. Mountain runoff vulnerability to increased evapotranspiration with vegetation expansion. *Proceedings of the National Academy of Sciences*, doi:10.1073/pnas.1319316111, 2014.
 141. R.C. Bales, R. Rice, S.B. Roy. Estimated Loss of Snowpack Storage in the Eastern Sierra Nevada with Climate Warming. *J. Water Resour. Plann. Manage*, doi:10.1061/(ASCE)WR.1943-5452.0000453, 2014.
 140. J.R. McConnell, O.J. Maselli. M., Sigl, P. Vallenga, T. Neumann, H. Anchut, R.C. Bales, M.A.J. Curran, S.B. Das, R. Edwards, S. Kipfstuhl, L. Layman, E.R. Thomas. Antarctic-wide array of high-resolution ice core records reveals pervasive lead pollution began in 1889 and persists today. *Nature*, doi:10.1038/srep05848, 2014.
 139. S.E. Martin, M.H. Conklin, R.C. Bales. Seasonal accumulation and depletion of local sediment stores of four headwater catchments. *Water*, 6,7,2144-2163, doi:10.3390/w6072144, 2014.
 138. P.B. Kirchner, R.C. Bales, N.P. Molotch, J. Flanagan, Q. Guo. LiDAR measurement of seasonal snow accumulation along an elevation gradient in the southern Sierra Nevada, California. *Hydrology and Earth System Sciences Discussions*, 11(5), 5327-5365, doi:10.5194/hessd-11-5327-2014, 2014.
 137. A.A. Harpold, Q. Guo, N. Molotch, P.D. Brooks, R.C. Bales, J.C., Fernandez-Diaz, K.N. Musselman, T.L. Swetnam, P. Kirchner, M.W. Meadows, J. Flanagan, R. Lucas, R. LiDAR-derived snowpack data sets from mixed conifer forests across the Western United States. *Water Resources Research*, 50(3), 2749-2755, DOI: 10.1002/2013WR013935, 2014.
 136. S. Masclin, M.M. Frey, W.F. Rogge, R.C. Bales. Atmospheric nitric oxide and ozone at the WAIS Divide deep coring site: a discussion of local sources and transport in West Antarctica, *Atmos. Chem. Physics*, 13:8857-8877 DOI: 10.5194/acp-13-8857-2013, 2013.
 135. S.C. Welch, B. Kerkez, R.C. Bales, S.D. Glaser, K. Rittger, R.R. Rice, Sensor placement strategies for snow water equivalent (SWE) estimation in the American River basin, *Wat. Resour. Res.*, 49, , doi: 10.1002/wrcr.20100, 2013.
 134. J. W. Hopmans, R.C. Bales, A. T. O'Geen, M. Meadows, P. C. Hartsough, P. Kirchner, C. T. Hunsaker, D. Beaudette, Response to comment on "Soil moisture response to snowmelt and rainfall in a Sierra Nevada mixed-conifer forest", *Vadose Zone J.* doi: 10.2136/vzj2012.0004r, 2012.
 133. E. Trujillo, N.P. Molotch, M.L. Goulden, A.E. Kelly, R.C. Bales, Elevation-dependent influence of snow accumulation on forest greening, *Nature Geoscience*, doi: 10.1038/NGEO1571, 2012.
 132. B. Kerkez, S.D. Glaser, R.C. Bales, M.W. Meadows, Design and performance of a wireless sensor network for catchment-scale snow and soil moisture measurements, *Wat. Resour. Res.*, 48, doi: 10.1029/2011WR011214, 2012.
 131. M.L. Goulden, R.G. Anderson, R.C. Bales, A.E. Kelly, M. Meadows, G.C. Winston, Evapotranspiration along an elevation gradient in California's Sierra Nevada, 117, doi: 10.1029/2012JG002027, 2012.
 130. K.N. Muselman, N.P. Molotch, S.A. Margulis, P.B. Kirchner, R.C. Bales, Influence of canopy structure and direct beam solar irradiance on snowmelt rates in a mixed conifer forest, 161, doi: 10.1016/j.agrformet.2012.03.011, 2012.
 129. C. T. Hunsaker, T. Whitaker, R.C. Bales, Water yield and runoff timing across the rain-snow transition in California's southern Sierra Nevada, *J. Amer. Wat. Resour. Assn.*, 48, doi: 10.1111/j.1752-1688.2012.00641.x, 2012.
 128. S.R. Fassnacht, R.C. Bales, K.A. Dressler, D.M. Hultstrand Temporal inconsistencies in coarse-scale snow water equivalent patterns: Colorado river basin elementary-topography regressions, *Pirineos.Revista de Ecología de Montaña*, 167, 167-186., doi: 10.3989/Pirineos.2011.166008, 2012.
 127. E. Hanna, P. Huybrechts, J. Cappelen, K. Steffen, R.C. Bales, E. Burgess, J. R. McConnell, J. P. Steffensen, M. Van den Broeke, L. Wake, G. Bigg, M. Griffiths, D. Savas, Greenland Ice Sheet surface mass balance 1870 to 2010 based on Twentieth Century Reanalysis, and links with global climate forcing, *JGR Atmospheres*, D24121, doi:10.1029/2011JD016387, 2011
 126. R. Rice, R.C. Bales, T. H. Painter, J. Dozier, Snow water equivalent along elevation gradients in the Merced and Tuolumne River basins of the Sierra Nevada, *Wat. Resour. Res.*, 47, doi: 10.1029/2010WR009278, 2011.
 125. R.C. Bales, J. W. Hopmans, A. T. O'Geen, M. Meadows, P. C. Hartsough, P. Kirchner, C. T. Hunsaker, D. Beaudette, Soil moisture response to snowmelt and rainfall in a Sierra Nevada mixed-conifer forest, *Vadose Zone J.*, 10, doi: 10.2136/vzj2011.0001, 2011.
 124. F. Liu, C. Hunsaker, R. Bales, Controls of streamflow generation in small catchments across the snow-rain transition in the Southern Sierra Nevada, California, *Hydrological Processes*, doi: 10.1002/hyp.9304, 2012.
 123. E. W. Burgess, R. R. Forster, J. E. Box, E. M. Thompson, D. H. Bromwich, R.C. Bales, and L. C. Smith, A spatially calibrated model of annual accumulation rate on the Greenland Ice Sheet (1958-2007), *J. Geophys. Res.*, doi:10.1029/2009JF001293, 2010.
 122. R. Rice R.C. Bales, Embedded sensor network design for snow cover measurements around snow pillow and snow course sites in the Sierra Nevada of California, *Wat. Resour. Res.*, 46, W03537, doi:10.1029/2008WR007318, 2010.

121. J. Ettema, M. R. van den Broeke, E. van Meijgaard, W. J. van de Berg, J. L. Bamber, J. E. Box, R.C. Bales, Higher surface mass balance of the Greenland ice sheet revealed by high-resolution climate modeling, *Geophys. Res. Lett.*, 36, L12501, doi:10.1029/2009GL038110, 2009.
120. M. Frey, M. Hutterli, G. Chen, S. Sjøstedt, J. Burkhart, D. Friel, and R. Bales, Contrasting atmospheric boundary layer chemistry of methylhydroperoxide (CH₃OOH) and hydrogen peroxide (H₂O₂) above polar snow., *Atmos. Chem. Phys.*, 9, 3261-3276, 2009.
119. R.C. Bales, D. Shen, G. Du, Q. Guo, J.R. McConnell, J. Burkhart, V.B. Spikes, E. Hanna, J. Cappelen, Annual accumulation for Greenland updated using ice core data developed during 2000-2006 and analysis of daily coastal meteorological data, *J. Geophys. Res.*, 114, D06116, doi:10.1029/2008JD011208, 2009.
118. J.F. Burkhart, R.C. Bales, J.R. McConnell, M.A. Hutterli, M. Frey, Geographic variability of nitrate deposition and preservation over the Greenland Ice Sheet, *J. Geophys. Res.*, 114: D6, D06301, doi.org/10.1029/2008JD010600, 2009.
117. F. Liu, R.C. Bales, M.H. Conklin, M.E. Conrad, Streamflow generation from snowmelt in semi-arid, seasonally snow-covered, forested catchments, Valles Caldera, New Mexico, *Wat. Resour. Res.*, 44, W12443, doi:10.1029/2007WR006728, 2008.
116. J.R. Banta, J.R. McConnell, M. Frey, R.C. Bales and K. Taylor, Spatial and temporal variability in snow accumulation at WAIS Divide over recent centuries, *J. Geophys. Res.*, 113, D23102, doi:10.1029/2008JD010235, 2008.
115. F. Liu, R. Parmenter, P. D. Brooks, M. H. Conklin, R.C. Bales, Seasonal and interannual variation of streamflow pathways and biogeochemical implications in semi-arid, forested catchments in Valles Caldera, New Mexico, *Ecohydrology*, 1, 239-252, 2008.
114. S.A. Anderson, R.C. Bales, C.J. Duffy, Critical Zone Observatories: Building a network to advance interdisciplinary study of Earth surface processes, *Mineralog. Mag.*, 72(1), pp 7-10, 2008.
113. R.C. Bales, K.A. Dressler, B. Imam, S. R. Fassnacht, D. Lampkin, Fractional snow cover in the Colorado and Rio Grande basins, 1995-2002, *Wat. Resour. Res.*, 44, W01425, doi:10.1029/2006WR005377, 2008.
112. T. Meixner, A. K. Huth, P. D. Brooks, M. H. Conklin, N. B. Grimm, R.C. Bales, P. A. Haas, and J. R. Petti, Influence of shifting flow paths on nitrogen concentrations during, *J. Geophys. Res.*, 112, G03S03, doi:10.1029/2006JG000266,, 2007.
111. M.A. Hutterli, T. Crueger, H. Fischer, K.K. Andersen, C.C. Raible, T.F. Stocker, M.L. Sigggaard-Anderson, J.R. McConnell, R.C. Bales, J.F. Burkhart, The Influence of regional circulation patterns on wet and dry mineral dust and sea salt deposition over Greenland, *Clim. Dynam.*, 28:635-647, DOI 10.1007/s00382-006-0211-z, 2007.
110. C. Brown-Mitic, W. J. Shuttleworth, R.C. Harlow, J. Petti, E. Burke and R. Bales, Seasonal Water Dynamics Of A Sky Island Subalpine Forest In Semi-Arid Southwestern United States, *J. Arid Environ.*, 69:2:237-258, 2007.
109. J.F. Burkhart, R.C. Bales, J.R. McConnell, M.A. Hutterli, Influence of North Atlantic Oscillation on anthropogenic transport recorded in northwest greenland ice cores, *J. Geophys. Res.*, 111:D22, D223092006
108. K.A. Dressler, S.R. Fassnacht, and R.C. Bales, A comparison of snow telemetry (SNOTEL) and snowcourses measurements in the Colorado River Basin, *J. Hydrometeor.*, 7:4:705-712. 2006
107. M.M. Frey, R.C. Bales, J.R. McConnell, Climate sensitivity of the century-scale hydrogen peroxide (H₂O₂) record preserved in 23 ice cores from West Antarctica, *J. Geophys. Res.*, 111: D21, D21301, doi:10.1029/2005JD006816, 2006
106. R.C. Bales, N.P. Molotch, T.H. Painter, M.D. Dettinger, R. Rice, and J. Dozier, Mountain hydrology of the western United States, *Water Resour. Res.*, 42:W08432, DOI:10.1029/2005WR004387, 2006
105. N.P. Molotch, R.C. Bales, SNOTEL representativeness in the Rio Grande headwaters on the basis of physiographics and remotely sensed snow cover persistence, *Hydrological Processes*, 20:4:723-739, 2006.
104. N.P. Molotch, R.C. Bales, Comparison of ground-based and airborne snow surface albedo parameterizations in an alpine watershed: Impact on snowpack mass balance, *Water Resour. Res.*, 42, W05410, 2006.
103. K. Dressler, G. Leavesley, R. Bales, S. Fassnacht, Evaluation of Gridded Snow Water Equivalent and Satellite Snow Cover Products for Mountain Basins in a Hydrologic Model, *Hydrol. Proc.*, 20:4:673-688, 2006
102. N.P. Molotch, R.C. Bales, Scaling snow observations from the point to the grid element: Implications for observation network design, *Water Resour. Res.*, 41:11, 2005
101. Frey, M., R.W. Stewart, J.R. McConnell and R.C. Bales, Atmospheric hydroperoxides in West Antarctica: Links to stratospheric ozone and atmospheric oxidation capacity, *J. Geophys. Res.*, 110:D23301. 2005
100. N.P. Molotch, R.C. Bales, M. Colee, J. Dozier, Estimating the spatial distribution of snow water equivalent in an alpine basin using binary regression tree models: the impact of digital elevation data and independent variable selection, *Hydrol. Proc.* 19:7:1459-1479, 2005
99. J.C. Morrill, R.C. Bales, M.H. Conklin, Estimating stream temperature from air temperature: implications for future water quality. *J. Environ. Engr.*, 131:1, 139-146, 2005

98. D.D. Davis, F. Eisle, J. Crawford, G. Huey, D. Tanner, S. Slusher, L. Maudlin, . Oncley, D. Lenschow, S. Semmer, R. Shetter, B. Lefer, R. Arimoto, A. Hogan, P. Grube, M. Lazzara, A. Brandy, D. Thornton, H. Berresheim, H. Bingemer, M. Hutterli, J. McConnell, R.C. Bales, J. Dibb, M. Buhr, P. McMurry, A. S. Swanson, D. Blake. An overview of ISCAT 2000. *Atmospheric Environment*, 38(32), 5363-5373, DOI: 10.1016/j.atmosenv.2004.05.037, 2004.
97. R.C. Bales, D.M. Liverman, B.J. Morehouse. Integrated assessment as a step toward reducing climate vulnerability in the southwestern United States, *Bull. Am. Met. Society*, 85 (11): 1727,2004.
96. J.F. Burkhart, M.H. Hutterli, R.C. Bales J.R. McConnell, Seasonal accumulation timing and preservation of nitrate in firn at Summit, Greenland, *J. Geophys. Res.*, D19302, 2004
95. M.A. Hutterli, J.R. McConnell, G. Chen, R.C. Bales, D.D. Davis, D.H. Lenschow, Formaldehyde and hydrogen peroxide in air, snow and interstitial air at South Pole, *Atmos. Environ.* 38:5439-5450, 2004.
94. T. Meixner, J.R. Shaw, R.C. Bales, Temporal and spatial variability of cation and silica export in an alpine watershed, Emerald Lake, California. *Hydrol. Proc.* 18(10): 1759-1776, 2004.
93. N.P. Molotch, S.R. Fassnacht , R.C. Bales, S.R. Helfrich, Estimating the distribution of snow water equivalent and snow extent beneath cloud cover in the Salt-Verde River basin, Arizona. *Hydrol. Proc.* 18(9): 1595-1611, 2004.
92. A.K. Huth, A. Leydecker, J.O. Sickman, R.C. Bales, A two-component hydrograph separation for three high-elevation catchments in the Sierra Nevada, California, *Hydrol. Proc.* 18 (9):1721-1733, 2004.
91. N.P. Molotch, T.H. Painter, R.C. Bales, J. Dozier, Incorporating remotely-sensed snow albedo into a spatially-distributed snowmelt model, *Geophys. Res. Lett.* 31(3): Art. No. L03501, 2004.
90. H.W. Jacobi, R.C. Bales, R.E. Honrath, M.C. Peterson, J. E. Dibb, A.L. Swanson, M. R. Albert, Reactive trace gases measured in the interstitial air of surface snow at Summit, Greenland, *Atmos. Environ.*, 38: 1687-97, 2004.
89. K.J. Franz, H.C. Hartmann, S. Sorooshian, R.C. Bales, Verification of National Weather Service Ensemble Streamflow Predictions for Water Supply Forecasting in the Colorado River Basin, *J. Hydrometeorology*, 4(6): 1105-1118, 2003.
88. T. Meixner, C. Gutmann, R.C. Bales, A. Leydecker, J. Sickman, J. Melack, J. McConnell, Multidecadal hydrochemical response of a Sierra Nevada watershed: sensitivity to weathering rate and changes in deposition, *J. Hydrology*, 272-285, 2003.
87. S.R. Fassnacht, K.A. Dressler, R.C. Bales, Snow water equivalent interpolation for the Colorado River Basin from snow telemetry (SNOTEL) data, *Water Resour. Res.*, 39(8): 1208-1217, 2003.
86. J.A. Rohrbough, D.R. Davis, R.C. Bales, Spatial variability of snow chemistry in an alpine snowpack, southern Wyoming, *Water Resour. Res.*, 39(7): 1190-1201,2003.
85. M.A. Hutterli, J.R. McConnell, R.C. Bales, R.W. Stewart, Sensitivity of hydrogen peroxide (H₂O₂) and formaldehyde (HCHO) preservation in snow to changing environmental conditions: Implications for ice core records, *J. Geophys. Res.*, 108(D1): 4023-4031, 2003.
84. T. Meixner, R.C. Bales, Hydrochemical modeling of coupled C and N cycling in high-elevation catchments: Importance of snow cover, *Biogeochemistry*, 62(3): 289-308, 2003.
83. T.M. Dassau, A.L. Sumner, S.L. Koenger, P.B. Shepson, J. Yang, R.E. Honrath, N.J. Cullen, K. Steffen, H.W. Jacobi, M. Frey, R.C. Bales, Investigation of the role of the snowpack on atmospheric formaldehyde chemistry at Summit, Greenland, *J. Geophys. Res.*, 107(D19): 4394-4407, 2002.
82. S. Sorooshian, R. Bales, H. Gupta, G. Woodard, J. Washburne, A brief history and mission of SAHRA: A National Science Foundation Science and Technology Center on 'Sustainability of semi-arid hydrology and riparian areas', *Hydrol. Proc.*, 16(16): 3293-3295,2002.
81. R. Bales, Climate assessment for the Southwest-Preface, *Climate Res.*, 21(3): 1, 2002
80. H.C. Hartmann, R. Bales, S. Sorooshian, Weather, climate, and hydrologic forecasting for the US Southwest: a survey, *J. Climate*, 21(3): 239-258, 2002.
79. T. Meixner, L.A. Bastidas, H.V. Gupta, R.C. Bales, Multicriteria parameter estimation for models of stream chemical composition, *Water Resour. Res.*, 38(3): 1027-1035,2002.
78. M.A. Hutterli, R.C. Bales, J.R. McConnell, R.W. Stewart, HCHO in Antarctic snow: Preservation in ice cores and air-snow exchange, *Geophys. Res. Lett.*, 29(12): 1587 & 29(8):1235, 2002.
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01. M.P. Valdez. *The incorporation of sulfur dioxide into snow and depositing ice*. Ph.D. Dissertation, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1988. 172 p.

MASTERS THESES SUPERVISED

32. M. Pickard. Influence of within-stand tree spatial arrangement on snowpack distribution and ablation in the Sierra Nevada, CA. Master's thesis, Environmental Systems graduate Group, UC Merced, 2015, 78 pp.
31. Stephen Welch. Sensor placement strategies for SWE estimation in the American River basin, Master's thesis, Department of Civil and Environmental Engineering, University of California, Berkeley, CA, 2012.
30. S. Martin. Erosion in Southern Sierra Nevada headwater catchments, Master's thesis, Environmental Systems graduate Group, UC Merced, 2009.
29. C. Peters. *Hydrologic Resource Assessment of Upper Sabino Creek Basin, Pima County, Arizona*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 2000.
28. J. Clemmons. *A comparison of water quality methods and data: Globe Program vs. United States Geological Survey*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 2000. 124p.
27. J.F. Burkhart *Sorption behavior of formaldehyde to ice grains*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 2000. 51 p.
26. A.M. Kramer. *GLOBE water quality data in context: A comparative study of volunteer and governmental agency databases*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1998. 107 p.
25. B.D. Wolaver. *Comparison of snow distribution methods in the Echaurren Basin, Chilean Andes*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1999.
24. J.A. Rohrbough. *Spatial variability of snow chemistry in a seasonal snowpack, Southeastern Wyoming*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1998. 181 p.
23. J.R. Shaw. *Modeling of silicate mineral weathering reactions in an alpine basin of the southern Sierra Nevada, California*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1997. 145 p.
22. B.J. Cadle. *Application of snow distribution models within the Laguna Negra basin, Chile*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1996. 166 p.

21. J.R. Winterle. *Sorption kinetics of H₂O₂ to snow grains*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1996.
20. S.M. Carroll. *Evaluation of virus removal by sandy soils during soil-aquifer treatment using indigenous bacteriophage as indicator organisms*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1996. 110 p.
19. D. McCaulou. *Bacteria transport through soil columns*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1993, 114 p.
18. T. Kinoshita. *Effects of pH and hydrophobicity on the transport of viruses and bacteria in saturated media*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1991. 114 p.
17. C.E. Petersen. *Ion flux through a shallow snowpack: effects of initial and melt conditions*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1990. 90 p.
16. S. Hinkle. *Modeling colloid transport in saturated porous media*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1990. 68 p.
15. J.G. Van de Water. *Physical and Chemical Processes affecting Forced Ventilation of Benzene and p-Xylene in a Desert Soil*, Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989.
14. K. Stocking. *Adsorption of MS-2 bacteriophage to silica*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989. 91 p.
13. K.G. Pill. *The Use of a Multiparameter Bacterial Aquatic Toxicity Test*, Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989.
12. E. E. Hopkins. *Characterization of the Dissolution of Hornblende with Application to Natural Waters*, Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989.
11. D. Hunter. *Influence of pH and counterion concentration on the sorption of acridine to unbonded silica*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989. 100 p.
10. T. W. Kroeger. *Hydrophobic partitioning of the bacteriophage MS-2*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989. 104 p.
09. P.A. Noppe. *Nitrogen cycling at Emerald-Lake Watershed, Sequoia National Park*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989. 170 p.
08. J. H. Davis. *Sorption and Desorption of Benzene and p-Xylene on an Unsaturated Desert Soil*, Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1989.
07. G.E. Kupillas. *Development and Investigation of a Multiparameter Microbial Toxicity Test Using the Bacterium *Salmonella Typhimurium**, Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1988.
06. D.G. Kebler. *Coagulation of submicron colloids by supramicron silica particles*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1988. 98 p.
05. P.W. Lawson. *Sorption of fulvic acid on aluminum oxide and desert soil*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1988. 117 p.
04. K.L. McClellen. *Biodegradation of trichloroethylene by bacteria indigenous to a contaminated site*. Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1987. 75 p.
03. D.A. Stanley. *Atmospheric and aqueous flux of sulfur in snow*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1987. 112 p.
02. T.W. Whitehead. *Sorption and desorption of volatile alkyl halides in a desert soil*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1987. 117 p.
01. A. Klein. *Sorption reactions of 1,4-Dichlorobenzene in low organic carbon soils*. Master's thesis, Department of Hydrology and Water Resources, University of Arizona, Tucson, AZ, 1986. 107 p.

CURRENT STUDENTS

Ph.D. Christine Ma (co-supervise), Joseph Rungee, Zeshi Zeng.

POSTDOCTORAL RESEARCHERS

Prior. M. Anklin, R. Banta, C. Brown-Mitic, J. Burkhart, D. W. Cline, S. R. Fassnacht, R. Ghanbari, M. Glueck, M. Hutterli, H. W. Jacobi, F. Liu, J. Morrill, R. Ray, D. Rheinheimer, R. Rice, A. Seth, D. Shen, B. Tobin.
Current. Z. Klos

COURSES TAUGHT

University of California, Berkeley
Graduate Level: Water Resources.

University of California, Merced
Lower Division: Service Learning; Freshman Seminar (global change)
Upper Division: Hydrology and Climate, Engineering Economics.
Upper Division/Graduate Level: Field Methods in Snow Hydrology, Mountain Hydrology,
Graduate Level: Water Resources.

University of Arizona

Lower Division: Introduction to Global Change; Water and the Environment.

Upper Division: Principles of Water Quality; Environmental Hydrology.

Graduate Level: Topics in Semi-Arid Hydrology; Global Biogeochemical Cycles; Water Quality Dynamics; Pollutants in the Hydrologic Environment; Sorption Phenomena; Aquatic Chemistry of Surfaces; Water Quality Planning and Policy; Physical Oceanology and Limnology for Hydrologists; Computational Methods in EOS Hydrology, Hydrology and Climate.

Short Course: Chemical Behavior of Organic Contaminants. 40-hr course for professional hydrologists.

RESEARCH GRANTS

Current grants

03. UCOP, Water security and sustainability research initiative (PI) 1/15-12/18 (collaborative research, 5 Co-I's) \$3,529,749.
02. EPIC-CEC, Improving hydrological snowpack forecasting for hydropower generation using intelligent information systems (co-PI), \$499,060
01. NSF. Southern Sierra Critical Zone Observatory: (PI) 10/13-9/18 (collaborative research, 6 Co-I's) \$4,900,000.

Completed grants

78. UC-ANR. Effect of forest management on water yields and other ecosystem services in Sierra Nevada forests (collaborator) 1/12-12/15, \$599,500 (Bales budget)
77. NSF. Development of a Basin-scale Water-balance Instrument Cluster for Hydrologic, Atmospheric and Ecosystem Science (PI) 7/11-6/15, \$1,995,156.
76. USDA. Variable thinning using historical stand structure data to create fire-resilient forests and enhance ecosystem services in a changing climate (Co-PI) 6/12-5/15, \$222,195 CA-DWR and USFS. Sierra Nevada adaptive management project (Co-PI) 9/07-12/15, \$1,500,000.
75. NSF, Continued core measurements at Summit, Greenland Environmental Observatory. 09/09-08/14, (Co-PI. collaborative with DRI), \$500,000 UCM budget.
74. NSF. Critical Zone Observatory: Snowline processes in the southern Sierra Nevada (PI) 8/07-9/13 (collaborative research, 6 Co-I's) \$5,250,000.
73. NPS. Vulnerability of sequoia groves to moisture stress under a changing climate (Co-PI) 9/11-1/13, \$37,078 (Bales budget)
72. NPS. SEKI natural resources condition assessment. (PI) 4/11-7/12, \$14,375.
71. NPS. An assessment of snowcover in major river basins of the Sierra Nevada Network parks and potential approaches for long-term monitoring (PI) 9/09-11/11, \$17,639.
70. NSF. Atmospheric, snow & firn chemistry studies

for interpretation of WAIS-divide cores (Co-I) 9/07-8/12, \$341,344.

69. NSF. Sierra Nevada Research Institute Informatics and Data Visualization Center in Yosemite National Park (Co-PI) 01/10-12/11, \$411,000.
68. CA-DWR. Water and climate measurement program, (PI) 1/10-12/11, \$300,000.
67. CA-SNC. Sierra Nevada Watershed Ecosystem enhancement Program (PI) 5/08-11/11, \$47,847.
66. NSF. Science coordination office for Summit, Greenland Environmental Observatory (PI. collaborative project with UNH), 8/05-7/11, \$480,511 Bales budget.
65. NSF, Core measurements at Summit, Greenland Environmental Observatory. 09/03-02/10, (PI. collaborative with DRI and UC Davis), \$939,126 total budget.
64. NSF. Development of a multi-axis differential optical absorption spectrometer for measurements of trace gases in the polar troposphere (PI. 1 Co-PI, at UCLA), 8/04-7/09, \$484,651 total budget.
63. NSF. Science planning for WATER and environmental research system network (PI) 5/08-8/09, \$56,280.
62. NASA. Multi-resolution snow products for the hydrologic sciences (Co-PI. subcontract from UCSB) 03/05-12/09, \$704,195 Bales budget.
61. NSF. Science and Technology Center for Sustainability of Semi-Arid Hydrology and Riparian Areas, (Co-PI and deputy director on renewal; stepped aside upon leaving Arizona), 1/05-12/09, \$17,000,000 total budget, \$300,000 UCM budget.
60. NSF. Technician Support: Phase I: A Multi-purpose Environmental Analytical Laboratory at UC Merced (Co-PI) 12/05-05-10, \$149,986.
59. NSF. Observatory Design in the Mountain West: Scaling Measurements and Modeling in the San Joaquin Valley and Sierra Nevada (PI), 8/06-7/10, \$194,727.
58. NSF. Development of a Water-Balance Instrument Cluster for Mountain Hydrology, Biochemistry and Ecosystem Science (PI) 8/06-7/10, \$578,171.
57. LLNL. Integrated measurements and modeling of Sierra Nevada water balance (PI), 2/06-5/08, \$99,993.
56. USDA Forest Service. Sierra Nevada Adaptive Management (PI for UCM sub, 2-Co-PI's; collaborative research with UC Berkeley), 7/05-9/07, \$81,272.
55. NASA. Variability of ice sheet elevation and mass balance at regional spatial scales (Co-PI, collaborative research with DRI) 1/03-12/05, \$212,976 Bales budget.
54. NSF. Hydrologic investigations within the GLOBE program, (Co-PI) 8/02-7/08, \$424,000.
53. NSF. Antarctic Troposphere Chemistry Investigation (ANTCI) (Co-PI; collaborative research with 16 others), 03/03-03/05, \$105,880 Bales budget.
52. NSF. Record of atmospheric photochemistry at South Pole (PI. collaborative research with DRI), 01/00-12/04, \$166,233 Bales budget.

51. NSF. Impact of Snow Photochemistry on Atmospheric Radical Concentrations at Summit, Greenland (Co-PI; collaborative research with 10 others), 09/02-09/05, \$220,109 Bales budget.
50. NSF. Science coordination office for Summit, Greenland Environmental Observatory (PI. collaborative project with UNH), 1/00-12/05, \$292,137 Bales budget.
49. NSF. Hydrogen peroxide, formaldehyde, and sub-annual snow accumulation in West Antarctica: participation in the West Antarctic traverse (PI. collaborative research with DRI), 1/99-12/04, \$295,000 total budget.
48. NSF. Greenland ice sheet accumulation variability, 8/02-12/04 (PI), \$97,899.
47. NOAA. Variability, social vulnerability, and public policy in the Southwestern U.S. (PI until 2003; 10 Co-PI's), 6/02-7/07, \$5,000,000 total budget, \$300,000 Bales budget.
46. NSF. Science and Technology Center for Sustainability of Semi-Arid Hydrology and Riparian Areas. (Co-PI & deputy director; stepped aside upon leaving Arizona), 1/00-12/04, \$16,000,000.
45. NASA. Applications of remotely sensed land-surface data for seasonal and long-term hydroclimate predictions (Co-PI; collaborative research with UCLA & LBL), 06/02-12/04, \$153,115 Bales budget.
44. Raytheon. Synergy II Partnership to Demonstrate the Use of EOS Data and EOS-DIS in the Public Interest (one of 3 Co-PI's), 1/01-2/03, \$1,200,000.
43. NASA. Southwest Regional Earth Science Applications Center (PI. 5 Co-I's), 2/99-12/02, \$1,500,000.
42. NSF. Development of a high-resolution continuous flow analysis system (PI), 6/01-12/02, \$113,685.
41. NSF. Hydrologic investigations within the GLOBE program (PI. 3 Co-PI's), 6/98-8/02, \$723,017.
40. NSF. Snow-atmosphere transfer function for reversibly deposited species in West Antarctica (PI) 6/98-7/03, \$345,000.
39. NSF. Current Relationships between air and snow chemistry in winter at Summit, Greenland (Co-PI. collaborative research with UNH). 11/98-6/02, \$90,000 Bales budget.
38. NOAA. Variability, Social Vulnerability, and Public Policy in the Southwestern U.S. (PI. 6 Co-PI's), 2/98-5/02, \$1,611,571.
37. NASA. Analysis of Ice Cores for Estimating Annual Accumulation in Greenland. (PI. 1 Co-PI), 1/98-12/01, \$365,000.
36. NSF. Transfer function for photochemically produced chemical species in Greenland snow, firn and ice (PI), 1/99-12/01, \$270,000.
35. NASA: Hydrology, Hydrochemical Modeling and Remote Sensing in Seasonally Snow-Covered Alpine Drainage Basins (Co-PI. subcontract from UCSB), 01/91-12/00, \$900,000 Bales budget.
34. NSF. Collaborative Research, Biochemical and hydrologic controls on solutes and flowpaths in alpine watersheds (PI) 9/95-8/99, \$72,000.
33. NSF. General education course development for earth system science and global change (PI) 4/95-1/99, \$100,001.
32. NSF. Relationships between air and snow chemistry in winter at Summit, Greenland (PI) 9/96-6/00, \$19,404.
31. NSF. Snow-Atmosphere Transfer Function for Reversibly Deposited Chemical Species (PI), \$268,054. 7/93-12/96.
30. NSF. Distribution of Reactive Chemical Species in Snow and Ice (PI), \$190,000 7/92-12/94.
29. NSF. Modeling Snowmelt Runoff and Chemistry in Alpine Basins (PI) \$191,337. 1/93-1/96.
28. NSF. Scientific Basis for Modeling Snow Distribution and Melt in Alpine Catchments of the Chilean Andes (PI) \$22,308. May 1994 to April 1996
27. NSF. Modeling snowmelt runoff and chemistry in alpine basins of the Sierra Nevada (PI) 8/93-6/98, \$30,837.
26. NIEHS. Effect of Cosolutes on Hydrophobic Contaminant Transport (PI) 4/92-3/95, \$452,800.
25. NIEHS. Subsurface Transport of Biocolloids (Co-I) 3/92-3/95, \$360,000.
24. NSF. Undergraduate Laboratory Improvement for Earth System Science and Global Change (PI) 6/93 to 12/95, \$33,215.
23. NATO. Snow- Atmosphere Transfer Exchange of Chemical Species, Reversibly Deposited to Snow (PI) 10/93-10/94, \$7,000.
22. USDOE. Transport of Subsurface Biocolloids in Porous Media (PI) 8/91-8/94, \$292,835.
21. NSF. Solute Transport in Seasonal Snowpacks. (PI) 1/91-12/93, \$236,802.
20. USEPA. Microscale Kinetic Effects and the Subsurface Transport of Volatile Contaminants (PI) 10/90-9/93, \$218,963.
19. USEPA. Delineation of Wellhead Protection Zones: Considerations of Virus and Bacteria Transport (PI) 9/91-9/93, \$199,447.
18. NSF. Workshop on Processes of Snow-Atmosphere Chemical Exchange (PI) 2/92-8/93, \$13,690.
17. USFS. Development and Application of Snowmelt Modeling for GLEES (PI) 9/91-12/93, \$25,000.
16. Arizona WRRRC. Underground Fate and Transport of Microorganisms (PI), 6/90-5/92, \$66,735.
15. NASA. Hydrology, Hydrochemical Modeling and Remote Sensing in Seasonally Snow-Covered Alpine Drainage Basins (Co-I), 7/89-12/90, \$21,000.
14. NIEHS. Subsurface Transport of Biocolloids (PI) 3/90-3/92, \$193,947.
13. NIEHS. Effect of Cosolutes on Hydrophobic Contaminant Transport (PI) 3/90-3/92, \$220,205.
12. USEPA. Sorption and Partitioning of Hydrophobic Ionizable Organic Compounds (PI) 6/97-6/90, \$256,803.

11. USGS. Surface-Chemical Factors Affecting Transport of Bio-colloids in Subsurface Media (PI) 9/87-6/90, \$128,873.
10. Calif ARB. Development of Watershed Models for Emerald Lake Watershed for Sequoia National Park and for Other Lakes of the Sierra Nevada (PI) 6/87-5/89, \$150,000.
09. USFS. The Transport of Tracer Pollutants through a Layer of Natural Snow Melting in a Controlled Environment (PI) 5/88-5/89, \$18,000.
08. USFS. SO₂ Fumigation of Natural Snow in a Controlled Environment (PI) 3/88-5/88, \$5,000.
07. Salt River Project, Subsurface Removal of Volatile Organic Compounds Using Forced Ventilation (PI) 8/87-9/88, \$45,330.
06. ACS PRF. Effect of Binding Mechanisms on Sorption Kinetics (PI) 9/85-8/87, \$15,000.
05. NSF. Kinetics of Sorption Reactions in Groundwater, (PI) 6/85-12/87, \$64,880.
04. USEPA. Coagulation and Nucleation of Submicron Particles (PI) 6/85-12/87, \$94,305.
03. Motorola, Inc. Physicochemical and Biological Factors Affecting the Feasibility of Cleanup Measures in Contaminated Sediments (PI) 6/85-9/86, \$48,204. 6/85-6/86.
02. Federal Water Resources Research Program, Biodegradation of Organic Contaminants in Groundwater (PI) 5/85-6/87, \$21,316.
01. USFS, Fumigation of Snow with SO₂ and NO₂ (PI) 4/85-6/86, \$60,000.

RECENT TALKS (update pending)

Academic talks (invited)

- April, 2015. "*Opportunities: Drought Early Warning, Panel*, California Drought Chapman Conference, Irvine, CA. R. Bales.
- April, 2014, "Mountain Hydrology, Forest Management and Water Security in the Sierra Nevada", Keynote talk at Hydrologic Sciences Annual Research Symposium, University of Colorado, Boulder. Bales, R.C.
- March, 2014, "Mountain Hydrology, Forest Management and Water Security in the Sierra Nevada", Water Resources Research Seminar, Stanford University, Palo Alto, Bales, R.C.
- March, 2014, "Can Forest Management to reduce fire risk in the high Sierra result in more stream-flow at the mountain front?", 2014 Research Symposium, Sierra Nevada Research Institute, University of California, Merced. Bales, R.C.
- May, 2013, "Water information, water security & climate change in the Sierra Nevada", Seminar series, University of California, UC Sacramento Center. Bales, R.C.
- March, 2013, "How better information can transform water management in California", Center for Information Technology Research in the Interest of Society Seminar, University of California, Berkeley. Bales, R.C. See also <https://www.youtube.com/watch?v=OkqQ-otG86Q>.
- January, 2013, "Visualizing the Environment", Data Innovation Day, Center for Information Technology

Research in the Interest of Society, Berkeley. Bales, R.C. See also <https://www.youtube.com/watch?v=WYq2bU1u0hw&list=PLYTiwx6hV33tm98-qoxhKwY2N-jEXr4X&index=13>.

- January, 2012, "Snowpack, climate change & water balance in a Sierra-Nevada forest", Seminar, California Institute of Technology, Pasadena, CA. Bales, R.C.
- March, 2011, "The California mountain water cycle: knowns & unknowns", Regional meeting, National Academy of Engineering (NAE), UC Berkeley, CA. Bales, R.C.
- January, 2011, "Water & biogeochemical responses to seasonal-to-inter-annual changes across the rain-snow transition in the Southern Sierra Nevada", University Seminar, Global Change and Ecosystem Center, University of Utah, UT. Bales, R.C.
- January, 2011, "Snowpack, soil moisture & water balance across the rain-snow transition in a Sierra-Nevada mixed-conifer forest", Departmental seminar, Ecosystem Sciences, Department of Environmental Science, Policy and Management, UC Berkeley, CA. Bales, R.C.
- January, 2011, "Sierra Nevada snowpack, climate change & water management", Departmental seminar, Department of Environmental Science Policy and Management, UC Berkeley, CA. Bales, R.C.
- November, 2009, "Southern Sierra Critical Zone Observatory Research", Seminar presented at UC Davis, Hydrology Seminar Series, University of California, Davis. Bales, R.C.
- April, 2009, "Critical Zone Observatories", Briefing for NSF Assistant Directors & Staff, NSF, Arlington, VA. Bales, R.C.
- April, 2008, "Sierra Nevada snowcover patterns & watershed processes", Seminar, Oregon State University, Corvallis, OR. Bales, R.C.
- September, 2007, "Snowcover patterns in the Sierra Nevada from blended satellite & ground-based networks", CITRIS seminar series, Center for Information Technology Research in the Interest of Society, Berkeley, CA, USA. Bales, R.C.
- November, 2006, "Sierra Nevada/San Joaquin (CA) Test Bed", Water and Environmental Research Systems Network meeting, Austin, TX. Bales, R.C.
- May, 2006, "Challenges & opportunities: water resources measurement & information systems", Talk presented at CITRIS Corporate Sponsor Day, UC Berkeley, Center for Information Technology Research in the Interest of Society, Berkeley, CA. Bales, R.C.
- November, 2004, "Mountain hydrology of the semi-arid western U.S.", Consortium of Universities for the Advancement of Hydrologic Science, Inc., cyberseminar. Bales, R.C.
- November, 2004, "Integrating satellite & ground-based measurements for modeling Sierra Nevada snowmelt", Seminar presented at UC Berkeley, Civil & Environmental Engineering, University of California, Berkeley, Bales, R.C.

- October, 2004, "Snow hydrology: remote sensing, ground measurements, modeling & applications", Seminar presented at UC Santa Cruz, Earth System Science, University of California, Santa Cruz, Bales, R.C.
- April, 2004, "Mountain Hydrology Research", Seminar presented at UC Davis, Hydrology Seminar Series, University of California, Davis. Bales, R.C.

Academic workshops (by invitation)

- August, 2014. "Wolverton basin and Kings River research summary," Sequoia National Park. R. Bales.
- April, 2014, "Southern Sierra CZO Whats new? Whats critical? Whats exciting?", Annual Meeting, National Science Foundation, Critical Zone Observatory Network, Charlotte, NC. Bales, R.C.
- September, 2013, "Southern Sierra CZO update", Critical Zone Observatory Annual Meeting, National Science Foundation, Arlington, VA. Bales, R.C.
- October, 2012, "Impact of strategic fuel treatments on water quality and quantity", Sierra Nevada Adaptive Management Project (SNAMP) annual science meeting, Marin Headlands. Bales, R.C., Conklin, M. H., Womble, P., Saksa, P., Martin, S.
- May, 2012, "Southern Sierra CZO update", Critical Zone Observatory Annual Meeting, National Science Foundation, San Juan, PR. Bales, R.C.
- February, 2012, "Water supplies from mountains", Workshop, IBM Almaden Research Center, San Jose, CA. Bales, R.C.
- May, 2012, "CZO's & water security: Western U.S. lessons & global implications", Belmont Forum briefing, National Science Foundation, Arlington, VA. Bales, R.C.
- September, 2011, "Investigation of Boundary Layer Photochemistry at the WAIS-Divide site through measurement of major photochemically active species in snow and air", WAIS Divide annual meeting, National Science Foundation, La Jolla, CA. Masclin, S., Frey, M., Rogge, W. F., Bales, R.C.
- September, 2010, "Water balance, nutrient cycling and weathering across the rain-snow transition", Critical Zone Observatory, national meeting, NSF, Boulder, CO. Bales, R.C.
- September, 2010, "Impact of strategic fuel treatments on water quality and quantity", Sierra Nevada Adaptive Management Project (SNAMP) annual science meeting, Marin Headlands. Bales, R.C., Conklin, M. H., Womble, P., Saksa, P., Martin, S.
- September, 2010, "Investigation of Boundary Layer Photochemistry at the WAIS-Divide", WAIS Divide annual meeting, National Science Foundation, La Jolla, CA. Masclin, S., Frey, M., Rogge, W. F., Bales, R.C.
- June, 2010, "Water", UC Natural Resources Continuing Conference, UC Division of Agriculture and Natural Resources, Sacramento. Bales, R.C.
- October, 2009, "First measurements of Nitric Oxide (NO) and Ozone (O3) at the WAIS-Divide site", WAIS Divide annual meeting, National Science

- Foundation, La Jolla, CA. Masclin, S., Frey, M., Rogge, W. F., Bales, R.C.
- September, 2009, "Hydrology, ecology, biogeochemistry and weathering across the rain-snow transition", Critical Zone Observatory, national meeting, NSF, Penn State University, PA. Bales, R.C.
- September, 2009, "Impact of strategic fuel treatments on water quality and quantity", Sierra Nevada Adaptive Management Project (SNAMP) annual science meeting, Sausalito, CA. Bales, R.C., Conklin, M. H., Saksa, P., Martin, S.
- April, 2009, "Status of NEON in California", Briefing, Multi-campus meeting, University of California, Berkeley, Berkeley, CA, USA. Bales, R.C.
- September, 2008, "Southern Sierra CZO", Critical Zone Observatory, national meeting, NSF, Shaver Lake, CA. Bales, R.C.
- April, 2008, "California water, mountain hydrology, & UC Merced", UC-WRRRC synthesis Meeting, Woodlake, CA. Bales, R.C.
- October, 2007, "Project Planning for Atmospheric Chemistry", WAIS Divide annual meeting, National Science Foundation. Lake, Tahoe, CA. Bales, R.C., Rogge, W.F.
- January, 2007, "Update on Greenland accumulation & climate connections", NASA Program for Arctic Regional Climate assessment meeting, Pasadena, CA. Bales, R.C.
- October, 2006, "Understanding the Streamflow Generation Using a Hydrologic Model and Remote Sensing in Headwaters of the Upper Rio Grande", 6th annual meeting, Center for Sustainability of semi-Arid hydrology & riparian Areas. Bales, R.C.
- April, 2006, "Mountain hydroclimatology & biogeochemistry research & education at UC Merced", Workshop with Sichuan University Scientists, Yosemite National Park. Bales, R.C.
- November, 2005, "The role of long-term atmospheric measurements in Arctic research: the Greenland Summit Environmental Observatory", International Conference on Arctic Research Planning II meeting, Copenhagen, Denmark. Bales, R.C.
- October, 2005, "Greenland accumulation & analysis of regional ice core-climate connections", NASA Program for Arctic Regional Climate assessment meeting, Baltimore, MD. Bales, R.C.
- October, 2005, "Evaluation of Gridded Snow Water Equivalent and Satellite Snowcover Products for Mountain Basins in a Hydrologic Model", 5th annual meeting, Center for the Sustainability of Semi-Arid hydrology & riparian Areas, University of Arizona. Bales, R.C.
- October, 2005, "Feedbacks Between Snow Distribution, Soil Water-Balance, and Vegetation in Mid-latitude Sub-alpine Forests", 5th annual meeting, Center for the Sustainability of Semi-Arid hydrology & riparian Areas. Bales, R.C.
- October, 2005, "Stream Flow Generation in Semi-Arid, Forested and Seasonally Snow-Covered Catchments, Vales Caldera, New Mexico", 5th annual meeting, Center for the Sustainability of

Semi-Arid hydrology & riparian Areas, University of Arizona, Valles Caldera, NM. Bales, R.C.
 October, 2004, "Evaluation of the Representativeness of Automated Snow Water Equivalent Sensors in the Rio Grande Headwaters", 4th annual meeting, Center for the Sustainability of Semi-Arid Hydrology & Riparian Areas. Bales, R.C.
 October, 2004, "Streamflow Estimation from Hydrologic Model Assimilation of Remotely Sensed Snow Information in Snowmelt Dominated Basins", 4th annual meeting, Center for the Sustainability of Semi-Arid Hydrology & Riparian Areas. Bales, R.C.

Public and stakeholder events (invited)

November, 2014. *Climate change & water planning: Tuolumne-Stanislaus IRWM*, Stanislaus-Tuolumne IRWM, Sonora, CA, R. Bales.
 September, 2014. *Water, forests and climate*, Tucare Annual Meeting, Sonora, CA. R. Bales
 June, 2014, "Drought & the Sierra Nevada in a changing climate", Sierra Water Workgroup Summit, Kings Beach, CA. Bales, R.C.
 June, 2014. "California drought & water planning", U.C. Merced foundation Board of Trustees, semi-annual meeting, Merced. Bales, R.C.
 May, 2014. "California drought – making a water-secure future", U.C. Merced Planned Giving Council semi-annual meeting, Merced. Bales, R.C.
 May, 2014, "Scott River Water Yield Enhancement Study", Watershed Forum, Ft. Jones, CA. Bales, R.C.
 May, 2014, "Climate change & water planning: Madera IRWM", Madera Integrated Regional Water Management forum, Madera, CA. Bales, R.C.
 May, 2014, "Forests, water, climate and disturbance in the Sierra Nevada: critical knowledge gaps", Fire Ecosystem Forest Management & Water Yield Symposium, American River Watershed Institute and others, McClellan, CA. Bales, R.C. See also <https://www.youtube.com/watch?v=wH9jq4PuHHk>.
 May, 2014, Fire Ecosystem Forest Management & Water Yield Symposium, American River Watershed Institute and others, Panel: Researchers' Forum: Assessment of existing research, gaps and needs, McClellan, CA. Enstice, N., Bales, R.C., Hunsaker, C., Conklin, M.H., Hogue, T.
 April 2014, "Climate change & water planning: Yosemite-Mariposa IRWM", Yosemite-Mariposa Madera Integrated Regional Water Management forum, Mariposa, CA. Bales, R.C.
 April, 2014, "Forest management and stream flows in the Sierra", Drought Summit, University of California, Office of the President, Panel: Coping with the drought, California State Capital, Sacramento. Bales, R.C. See also <https://www.youtube.com/watch?v=Aal7AAGSis0>.
 April, 2014, "Water & Sierra Nevada forests: recent findings & lingering questions", Yosemite Hydroclimate Meeting, Yosemite National Park. Bales, R.C.
 March, 2014, "Drought briefing", U.C. Merced

Foundation, Merced, CA. Bales, R.C.
 February, 2014, "Enhancing California's water supply through active management of natural capital", Futuristic Water Management, Urban Water Institute Spring Conference, Palm Springs, CA. Bales, R.C.
 January, 2014, "Water & Sierra Nevada forests; What do we know & what do we not know?", Water-Forestry Forum, Calaveras County Water District, San Andreas, CA. Bales, R.C.
 January, 2014, "Natural Capital & Ecosystem Evaluation; Sierra Nevada examples & coastal opportunities", Annual Board Retreat and Public Meeting, Marin Municipal Water District, Tiburon, CA. Bales, R.C.
 January, 2014, "Rain, Snow and Temperature", Natural Resource Conservation Assessment Symposium, Sequoia & Kings Canyon National Parks, Three Rivers, CA. Bales, R.C.
 December, 2013. "Post-fire watershed management & opportunities to transform water management", Association of California Water Agencies Annual Conference, Los Angeles. Bales, R.C.
 November, 2013, "Climate Change & Impact on Water Resources in the San Joaquin Valley", University Friends Circle, University of California, Merced, CA. Bales, R.C.
 October, 2013, "Impact of strategic fuel treatments on water quality and quanti", Sierra Nevada Adaptive Management Project (SNAMP) annual stakeholder meeting, University of California, Sacramento, CA. Bales, R.C.
 September, 2013, "Water response to climate & forest management in the Sierra Nevada", Sierra Nevada Alliance Annual Meeting, South Lake Tahoe, CA. Bales, R.C.
 September, 2013, "Post-fire watershed management & opportunities to transform water management", Natural Resources Summit, Tuolumne County Alliance for Resources and Environment, Sonora, CA. Bales, R.C.
 August, 2013, "Source-water measures that can transform water management in Sierra Nevada watersheds", Upper Watershed Tour, Delta Stewardship Council, South Lake Tahoe, NV. Bales, R.C.
 May, 2013, "Water implications of various forest management strategies", Healthy Headwaters Leadership Convening, Carpe Diem West, Sacramento, CA. Bales, R.C.
 May, 2013, "Watershed research in the Sierra Nevada", Spring Meeting, Association of California Water Agencies, Sacramento, CA. Bales, R.C.
 May, 2013, Spring Meeting, Association of California Water Agencies, Panel: Articulating research needs for a new program on improved management of California's headwaters, Sacramento, CA. Conklin, M.H., Guo, Q., Bales, R.C.
 April, 2013, "Regional temperature and water perturbations", Climate Preparedness in the Valley Forum, Union of Concerned Scientists, Fresno State University. Bales, R.C.

- April, 2013, "Sierra Nevada and California's water", Monthly meeting, Merced County Realtors, Merced, CA. Bales, R.C.
- January, 2013, "Managing Forests for Snowpack Storage and Water Yield", Climate Change Symposium, California Dept. Food and Agriculture, Monterey. Bales, R.C.
- October, 2012, "Moisture stress monitoring in giant sequoia groves", Yosemite Hydroclimate Meeting, Yosemite National Park, CA. Ray, R., Bales, R.C., Guo, Q.
- September, 2012, "Forests, water & research in the Sierra Nevada", Fall meeting, Association of California Water Agencies, Sacramento. Bales, R.C.
- July, 2012, "SNRI Research in the Sierra Nevada", California Almond Board, Science Advisory Committee, Merced, CA. Bales, R.C.
- July, 2012, "UC Research in Yosemite National Park & Sierra Nevada", Open House, Yosemite Field Station, Wawona, Yosemite National Park. Bales, R.C.
- June, 2012, "Forests and Water in the Sierra Nevada", Ecosystem Management Strategy for the Sierra Nevada, Mountain Counties Water Resources Association, Placerville, CA. Bales, R.C.
- April, 2012, "Effect of forest management on water yields & other ecosystem services in Sierra Nevada forests", Monthly Board meeting, Placer County Water Agency, Auburn, CA. Bales, R.C.
- March, 2012, "Forests and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project", Monthly meeting, El Dorado County Board of Supervisors, Placerville, CA. Bales, R.C.
- October, 2011, "Impact of strategic fuel treatments on water quality and quantity", Sierra Nevada Adaptive Management Project (SNAMP) annual stakeholder meeting, Sacramento. Bales, R.C., Conklin, M. H., Womble, P., Saksa, P., Martin, S.
- October, 2011, "Southern Sierra mountain front precipitation accumulation and ablation analyzed with scanning lidar snow depth an in situ instrumental measurements", Yosemite Hydroclimate Meeting, Yosemite Valley, Yosemite NP. Kirchner, P., Bales, R.C., Flannagan, J.
- October, 2011, "An assessment of 2011 snowcover from MODIS imagery -- extent, duration and snow water in the Southern Sierra", Yosemite Hydroclimate Meeting, Yosemite NP. Bales, R.C.
- September, 2011, "Sierra Nevada snowpack, runoff and climate change: challenges and emerging opportunities", 2nd Annual Water Conference, Southern California Edison, Tulare, CA. Bales, R.C.
- July, 2011, "The California mountain water cycle: knowns & unknowns", Seminar, Southern California Edison, Shaver Lake, CA. Bales, R.C.
- April, 2011, "Impact of strategic fuel treatments on water", Sierra Nevada Adaptive Management Project (SNAMP) Integration Team Public meeting, University of California, Merced, CA. Bales, R.C., Saksa, P., Martin, S.
- February, 2011, "Sierra Nevada snowpack, climate change & water management", Seminar, Yosemite National Park. Bales, R.C.
- October, 2010, "An assessment of snowcover in major river basins of Sierra Nevada network parks & potential approaches for long-term monitoring", Yosemite Hydroclimate Meeting, Yosemite NP. Bales, R.C., Rice, R.
- October, 2010, "Impact of strategic fuel treatments on water quality and quantity", Sierra Nevada Adaptive Management Project (SNAMP) annual stakeholder meeting, Sacramento. Bales, R.C., Conklin, M. H., Saksa, P., Martin, S., Liu, F.
- October, 2010, "Canopy-adjustment of the MODIS fractional snow covered area in forest catchments in the Sierra Nevada", Yosemite Hydroclimate Meeting, Yosemite Valley, Yosemite National Park. Rice, R., Bales, R.C., Kirchner, P., Rittger, K., Painter, T., Dozier, J.
- September, 2010, "Sierra Nevada water cycle: climate, snowpack & forest management", Quincy Library Group, Quincy, CA. Bales, R.C.
- August, 2010, "Climate change and Sierra Nevada hydrology", Tulare Basin Integrated Regional Water Management coordination meeting, Visalia. Bales, R.C.
- May, 2010, "Soil moisture measurement program, Sierra Nevada Hydrologic Observatory", Sierra Nevada Soil Moisture Workshop, California Department of Water Resources, Sacramento. Bales, R.C.
- April, 2010, "Mountain Water Cycles and Instrumentation", Annual Meeting, Sierra Nevada Alliance. Bales, R.C.
- March, 2010, Briefing on vision for a UC Natural Reserve in the Tulare Basin, Conservation Strategy Group, Sacramento, CA. Bales, R.C.
- October, 2009, "Water and Geochemical Responses to Seasonal Changes Across the Rain-Snow Transition in the Southern Sierra Nevada", Yosemite Hydroclimate Conference, Yosemite National Park, Bales, R.C., Hunsaker, C., Kerkez, B., Meadows, M., Liu, F., Glaser, S.
- August, 2009, "Greenland Ice Sheets Mass Balance in a Changing Climate 1908-2008", Nuuk Climate Days talk, Nuuk, Greenland. Bales, R.C.
- June, 2009, "Climate briefing" E & J Gallo Winery executives, Modesto, CA. Bales, R.C.
- April, 2009, Climate change & potential effects on the Valley, Public Hearing, Fresno, CA.
- October, 2008, "Hydrologic investigations", Presentation at Sierra Nevada adaptive management project public meeting. Bales, R.C.
- December, 2008, "Sierra Nevada Research Institute", Briefing for US EPA Region 9, SNRI, Research Priorities for Sierra Nevada and Central Valley. Bales, R.C.
- October, 2008, "Integrating measurements of snowpack, soil moisture, ET and streamflow for understanding the Sierra Nevada water balance", Yosemite Hydroclimate Meeting, Yosemite National Park, CA. Bales, R.C.

September, 2008, "Hydroclimate, ecosystem links & the Southern Sierra Critical Zone Observatory", Southern Sierra Science Symposium, Visalia, CA. Bales, R.C.

October, 2007, "Sources of streamflow and potential climate warming effects on streamflow regime in the Merced River, Sierra Nevada, CA", Yosemite Hydroclimate Meeting, Yosemite National Park, CA. Bales, R.C., Liu, F.

October, 2007, "Update on Snow Hydrology Research", Yosemite Hydroclimate Meeting, Yosemite National Park. Bales, R.C.

October, 2007, "Hydrologic investigations", Presentation at Sierra Nevada adaptive management project public meeting. Bales, R.C.

July, 2007, "Science at Summit, Greenland", Congressional and NSF visitors as part of briefing for House Science Committee,, Ilulisat, Greenland. Bales, R.C.

February, 2007, "California water, mountain hydrology & UC Merced", UC Merced Board of Trustees, Yosemite Valley. Bales, R.C.

October, 2006, "Origins & pathways of the Merced water supply", East Merced Resource Conservation District, Merced, CA. Bales, R.C.

October, 2006, "Update on Sierra Nevada hydrologic observatory projects", Yosemite hydroclimate meeting, Yosemite National Park, Yosemite, CA. Bales, R.C.

June, 2006, "Planning for Sierra Nevada adaptive management project", Sierra Nevada Adaptive Management Project (SNAMP) stakeholder meeting, Bales, R.C.

June, 2006, "Water, geology, climate & soils: Sierra Nevada, Merced River & Central Valley connections, presented to Gallo Co. marketing group, Fish Camp, CA. Bales, R.C.

December, 2005, "Water research update", Sierra Nevada Adaptive Management Project public meeting, University of California. Bales, R.C.

October, 2005, "Update on snow hydrology & remote sensing research", Yosemite hydroclimate meeting, Yosemite, CA. Bales, R.C.

August, 2005, "Science at GEOSummit: Global, regional and local results from studies of atmospheric chemistry and the ice sheet", Greenland Technological Society, Nuuk, Greenland. Bales, R.C.

March, 2005, "Quenching the Valley's thirst: The connection between Sierra Nevada snowpack and regional water supply. Inaugural talk", UC Merced Chancellor's Lecture Series, University of California, Merced, Bales, R.C.

November, 2004. "Sierra Nevada snow & Central Valley water: Connections & climate change", public talk, Challenger Learning Center, Atwater, CA. Bales, R.C.

October, 2004, "Hydrologic observatory design update", Yosemite hydroclimate meeting, Yosemite National Park, Yosemite, CA. Bales, R.C.

October, 2004, "Snow hydrology research update", Yosemite hydroclimate meeting, Yosemite National

Park, Yosemite, CA. Bales, R.C.

Scientific meetings

July, 2014. "Does timber harvest have a measurable effect on the water cycle in the southern Sierra Nevada, California?" Global Fair and Workshop on Long-Term Observing Systems of Mountain Social-Ecological Systems, Reno, NV. R.C. Bales, M. Meadows, M. Goulden, P. Hartsough, C. Hunsaker, M.H. Conklin.

December 2014. "Mountain Runoff Vulnerability to Increased Evapotranspiration with Vegetation Expansion at the Southern Sierra Critical Zone Observatory." *2014 Fall Meeting, AGU, San Francisco, Calif.*, M. Goulden, R.C. Bales. .

December 2014. "Design, implementation and hydrologic evaluation of a snow-measurement network using wireless sensors in the American River basin of California." *2014 Fall Meeting, AGU, San Francisco, Calif.*, 9-13 Dec., R. Rice, R.C. Bales, D.G. Marks, M.H. Conklin, Z. Zhang, S.D. Glaser.

December 2014. "Evaluation of High-Temporal-Resolution Bedload Sensors for Tracking Channel Bed Movement and Transport Thresholds in Forested Mountain Headwater Catchments." *2014 Fall Meeting, AGU, San Francisco, Calif* S. Martin, M.H. Conklin, R.C. Bales.

December 2014.. "Optimization of Sensor Placements Using Machine Learning and LIDAR data: a Case Study for a Snow Monitoring Network in the Sierra Nevada." *2014 Fall Meeting, AGU, San Francisco, Calif.*, 9-13 Dec., C. Oroza, Z. Zheng, S.D. Glaser, R.C. Bales, M.H. Conklin..

December 2014. "Assessing the Value of Improved Hydrologic Forecasting for Hydropower in the Sierra Nevada at Multiple Spatial Scales." *2014 Fall Meeting, AGU, San Francisco, Calif.*, . D.E. Rheinheimer, R.C. Bales, J.R. Lund, J.H. Viers.

December 2014. "Cross-sites analysis of snowpack depth from LiDAR in Southern Sierra Nevada." *2014 Fall Meeting, AGU, San Francisco, Calif.*, Z. Zheng, P.B. Kirchner, R.C. Bales, S.D. Glaser.

June 2014. "Using large-scale, shallow soil water measurements to estimate deeper soil water storage in a mixed-conifer forest of the southern Sierra Nevada." Geological Society of America, Cordilleran Section meeting, Fresno, Calif., M. Meadows, P. Hartsough, R. Bales, J. Hopmans, A. Malazian..

April, 2014, "Percent Bias Assessment of Water-Supply Outlooks in the Colorado River Basin", Western Snow Conference, Durango, CO. Harrison, B., Bales, R.C.

December, 2013, "Developing a robust wireless sensor network structure for environmental sensing", Fall meeting, American Geophysical Union, San Francisco, CA. Zhang, Z., Oroza, C., Glaser, S. D., Bales, R.C., Conklin, M. H.

December, 2013, "Estimating forest snow accumulation with LiDAR derived canopy metrics, southern Sierra Nevada, California", Fall meeting,

- American Geophysical Union, San Francisco, CA. Kirchner, P., Bales, R.C., Painter, T. H.
- December, 2013, "Impacts of forest thinning and climate change on transpiration and runoff rates in Sierra Nevada mixed-conifer headwater catchments", Fall meeting, American Geophysical Union, San Francisco, CA. Saksa, P. C., Ray, R. L., Bales, R.C., Conklin, M. H.
- December, 2013, "The impact of variable density forest thinning on snow-cover distribution patterns", Fall meeting, American Geophysical Union, San Francisco, CA. Pickard, M. R., Bales, R.C., Rice, R. R., Knapp, E.
- December, 2013, "Timber harvest effect on soil moisture in the southern Sierra Nevada: Is there a measurable impact?", Fall meeting, American Geophysical Union, San Francisco, CA. Meadows, M. W., Bales, R.C., Conklin, M. H., Goulden, M., Hartsough, P. C., Hopmans, J. W., Hunsaker, C. T., Lucas, R. G., Malazian, A. I.
- December, 2013, "Tracking channel bed resiliency in forested mountain headwater catchments using high-temporal-resolution bedload data", Fall meeting, American Geophysical Union, San Francisco, CA. Martin, S., Conklin, M. H., Bales, R.C., Womble, P., Patel, T.
- December, 2013, "Building an Intelligent Water Information System - American River Prototype", Fall meeting, American Geophysical Union, San Francisco, CA. Glaser, S. D., Bales, R.C., Conklin, M. H.
- December, 2013, *Invited*, "The strength of strategically placed in situ networks: The Critical Zone Observatory Program", Fall meeting, American Geophysical Union, San Francisco, CA. Bales, R.C., Brooks, P. D., Molotch, N. P.
- June, 2013, *Invited*, "Wireless-sensor technology for basin scale hydrology", Extreme Precipitation Symposium, Davis, CA. Bales, R.C.
- May, 2013. "Using large-scale, shallow soil water measurements to estimate deeper soil water storage in a mixed-conifer forest of the southern Sierra Nevada", Geological Society of America, Cordilleran Section meeting, Fresno, CA. M. Meadows, P. Hartsough, R. Bales, J. Hopmans, A. Malazian.
- April, 2013, "Measuring Under-Canopy Snow Accumulation Using Airborne and Ground Based Sensors in the Southern Sierra Nevada, California", Western Snow Conference, Jackson, WY. Kirchner, P. B., Painter, T. H., Bales, R.C., Musselman, K., Molotch, N.
- December, 2012, *Invited*, "Connecting the snowpack to the internet of things: an IPv6 architecture for providing real-time measurements of hydrologic systems", Fall meeting, American Geophysical Union, San Francisco, CA. Kerkez, B., Zhang, Z., Oroza, C., Glaser, S. D., Bales, R.C.
- December, 2012, *Invited*, "Critical Zone Observatories (CZO): Integrating measurements and models of Earth surface processes to improve prediction of landscape structure, function and evolution", Fall meeting, American Geophysical Union, San Francisco, CA. Chorover, J., Anderson, S. P., Bales, R.C., Duffy, C., Scatena, F. N., Sparks, D. L., White, T. S.
- December, 2012, *Invited*, "Effects of forest structure on snow accumulation and melt derived from ecohydrological instrument clusters across the Western US", Fall meeting, American Geophysical Union, San Francisco, CA. Molotch, N. P., Musselman, K. N., Kirchner, P., Bales, R.C., Brooks, P. D.
- December, 2012, *Invited*, "Water and energy gradients produce resilience and thresholds in ecosystem function in the western Sierra Nevada Mountains", Fall meeting, American Geophysical Union, San Francisco, CA. Kelly, A. E., Goulden, M., Bales, R.C., Meadows, M. W., Winston, G.
- December, 2012, "Comparison of sap flux data from two instrumented tree species in a forested catchment with different levels of water stress", Fall meeting, American Geophysical Union, San Francisco, CA. Hartsough, P., Roudneva, E., Malazian, A. I., Meadows, M. W., Kelly, A. E., Bales, R.C., Goulden, M., Hopmans, J.
- December, 2012, "Inter-annual snow accumulation and melt patterns in a sub-alpine mixed conifer forest: results from a distributed physically based snow model", Fall meeting, American Geophysical Union, San Francisco, CA. Musselman, K., Molotch, N., Margulis, S., Kirchner, P., Bales, R.C.
- December, 2012, "Forest management effects on snow, runoff and evapotranspiration in Sierra Nevada mixed-conifer headwater catchments", Fall meeting, American Geophysical Union, San Francisco, CA. Ray, R. L., Saska, P. C., Bales, R.C., Conklin, M. H.
- December, 2012, "Integrating soil water measurements from plot to catchment scale in a snow-dominated, mixed-conifer forest of the southern Sierra Nevada", Fall meeting, American Geophysical Union, San Francisco, CA. Meadows, M. W., Hartsough, P. C., Bales, R.C., Hopmans, J. W., Malazian, A. I.
- December, 2012, "Paired tree and soil instrumentation: what can we learn from two instrumented sites across various gradients in a forested catchment", Fall meeting, American Geophysical Union, San Francisco, CA. Hartsough, P. C., Roudneva, E., Malazian, A. I., Meadows, M. W., Bales, R.C., Hopmans, J. W.
- December, 2012, "Sampling design and optimal sensor placement strategies for basin-scale SWE estimation", Fall meeting, American Geophysical Union, San Francisco, CA. Kerkez, B., Welch, S. C., Bales, R.C., Glaser, S. D., Rittger, K. E., Rice, R. R.
- December, 2012, "Seasonal Accumulation and Depletion of Localized Sediment Stores of Four Headwater Catchments in the Sierra Nevada Mountains, California", Fall meeting, American Geophysical Union, San Francisco, CA. Martin, S., Conklin, M. H., Bales, R.C.

- December, 2012, "Skill Analysis for Runoff Forecasts on the Western Slope of the Sierra Nevada", Fall meeting, American Geophysical Union, San Francisco, CA. Harrison, B. D., Bales, R.C.
- December, 2012, "Under-canopy snow accumulation and ablation measured with airborne scanning LiDAR altimetry and in-situ instrumental measurements, southern Sierra Nevada, California", Fall meeting, American Geophysical Union, San Francisco, CA. Kirchner, P., Bales, R.C., Musselman, K. N., Molotch, N. P.
- July, 2012, *Invited*, "The Southern Sierra CZO as a Template for the American River Hydrologic Observatory", CUAHSI Third Biennial Colloquium on Water Science and Engineering, Boulder, CO, R.C. Bales.
- December, 2011, *Invited*, "Effects of evapotranspiration heterogeneity on catchment water balance in the Southern Sierra Nevada of California", Fall meeting, American Geophysical Union, San Francisco, CA. Kerkez, B., Kelly, A. E., Lucas, R. G., Son, K., Glaser, S. D., Bales, R.C.
- December, 2011, "An Assessment of Snowcover in 6 Major River Basins of Sierra Nevada and Potential Approaches for Long-term Monitoring", Fall meeting, American Geophysical Union, San Francisco, CA. Rice, R., Bales, R.C.
- December, 2011, "Comparing methods for quantifying soil moisture in the southern Sierra Nevada, California", Fall meeting, American Geophysical Union, San Francisco, CA. Meadows, M., Hartsough, P., Kerkez, B., Bales, R.C., Kelly, A., Hopmans, J., Hedge, C., Goulden, M., Glaser, S.
- December, 2011, "Effects of evapotranspiration heterogeneity on catchment water balance in the Southern Sierra Nevada of California", Fall meeting, American Geophysical Union, San Francisco, CA. Kerkez, B., Kelly, A., Lucas, R., Son, K., Glaser, S., Bales, R.C.
- December, 2011, "Estimating Snow Water Equivalent over the American River in the Sierra Nevada Basin Using Wireless Sensor Networks", Fall meeting, American Geophysical Union, San Francisco, CA. Welch, S., Kerkez, B., Glaser, S., Bales, R.C., Rice, R.
- December, 2011, "Forest management for water: a hydro-ecological modeling exercise of headwater catchments in the mixed-conifer belt of the Sierra Nevada", Fall meeting, American Geophysical Union, San Francisco, CA. Saksa, P., Bales, R.C., Ray, R.
- December, 2011, "Mountain front precipitation accumulation over a 3300m elevation gradient from scanning LiDAR snow depth and in-situ instrumental measurements, southern Sierra Nevada, California", Fall meeting, American Geophysical Union, San Francisco, CA. Kirchner, P., Bales, R.C., Flanagan, J., Musselman, K., Molotch, N.
- December, 2011, "Water and carbon cycling along the Sierra Nevada climate gradient", Fall meeting, American Geophysical Union, San Francisco, CA.
- Kelly, A., Goulden, M., Meadows, M., Bales, R.C., Winston, G.
- December, 2011, "Greenland Ice Sheet surface mass balance 1870 to 2010 based on Twentieth Century Reanalysis, and links with global climate forcing", Fall meeting, American Geophysical Union, San Francisco, CA. Hanna, E., Huybrechts, P., Cappelen, J., Steffen, K., Bales, R.C., Burgess, E., McConnell, J., Steffensen, J.-P., van den Broeke, M. P., Wake, L. M., Bigg, G. R., Griffiths, M., Savas, D.
- August, 2011, "Estimation of nitrate photolysis in the snowpack of the WAIS-Divide site and its contribution to measured atmospheric nitric oxide budget", Fall 2011 National Meeting, American Chemical Society, Denver, CO. Masclin, S., Frey, M., Rogge, W., Bales, R.C.
- June, 2011, "Investigation of boundary layer photochemistry at the WAIS-Divide site through measurement of major photochemically active species in snow and air", 3rd Workshop on Air-Ice Chemical Interactions (AICI), Columbia University, New York. Masclin, S., Frey, M., Rogge, W., Bales, R.C.
- April, 2011, "A Comparison of the Fractional MODIS and LANDSAT Thematic Mapper Snow Covered Area with Ground-Based Snow Surveys in the Sierra", Western Snow Conference, South Lake Tahoe, NV. Rice, R., Bales, R.C., Kirchner, P., Saksa, P., Rittger, K., Painter, T., Dozier, J.
- April, 2011, "Measuring and Modeling Under-Canopy Snow Ablation in Southern Sierra Nevada Subalpine Red-Fir Forest", Western Snow Conference, South Lake Tahoe, NV. Kirchner, P., Bales, R.C., Rice, R., Musselman, K., Molotch, N.
- April, 2011, "Wireless Sensor Networks for Distributed Snow Depth Monitoring in the Sierra Nevada", Western Snow Conference, South Lake Tahoe, NV. Kerkez, B., Rice, R., Glaser, S., Bales, R.C., Meadows, M., Saksa, P.
- December, 2010, "A Comparison of the Fractional MODIS and LANDSAT Thematic Mapper with Ground-Based Snow Surveys in the Sierra Nevada", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Rice, R., Bales, R.C., Kirchner, P. B., Saksa, P. C., Rittger, K. E., Painter, T. H., Dozier, J.
- December, 2010, "Comparing plot-scale sensor measurements to the watershed level: a comprehensive case study of snow depth and soil moisture in the southern Sierra Nevada, California", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Meadows, M. W., Kerkez, B., Hartsough, P. C., Lucas, R. G., Bales, R.C., Hopmans, J. W., Glaser, S. D.
- December, 2010, "Design and development of a wireless sensor network to monitor snow depth in multiple catchments in the American River basin, California: hardware selection and sensor placement techniques", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Kerkez, B., Rice, R., Glaser, S. D., Bales, R.C.,

- Saksa, P. C.
 December, 2010, "Estimating under-canopy ablation in a subalpine red-fir forest, southern Sierra Nevada, California", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Kirchner, P. B., Bales, R.C., Rice, R., Musselman, K. N., Molotch, N. P.
- December, 2010, "Hydrologic monitoring in 1-km² headwater catchments in Sierra Nevada forests for predictive modeling of hydrologic response to forest treatments across 140-km² fireheds", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Saksa, P. C., Bales, R.C., Conklin, M. H., Martin, S. E., Rice, R.
- December, 2010, "NOx emission from snowpack at the WAIS-Divide site and its impact on local tropospheric photochemistry", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Masclin, S., Frey, M. M., Rogge, F., Bales, R.C.
- December, 2010, "Simulating plot-scale variability of snowpack states in conifer forests using hemispherical photography and a process based one-dimensional snow model", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Musselman, K. N., Molotch, N. P., Margulis, S. A., Lehning, M., Kirchner, P. B., Bales, R.C.
- December, 2010, "Soil Moisture/ Tree Water Status Dynamics in Mid-Latitude Montane Forest, Southern Sierra Critical Zone Observatory, CA", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Hartsough, P. C., Malazian, A., Meadows, M. W., Roudneva, K., Storch, J., Bales, R.C., Hopmans, J. W.
- December, 2010, "Spatial distribution of snow water equivalent across the central and southern Sierra Nevada", 2010 Fall Meeting, American Geophysical Union, San Francisco, CA. Bales, R.C., Rice, R., Meng, X.
- June, 2010, "First measurements of nitric oxide and nitrate at the WAIS-Divide: impact of the snowpack on NOx photochemistry", International Polar Year Oslo Science Conference. Poster, Oslo, Norway. Masclin, S., Frey, M. M., Rogge, W. F., Bales, R.C.
- May, 2010, "Year-Round Major Ion Measurements at Greenland Environmental Observatory, Summit (GEOSummit)", NOAA Earth system Research Laboratory (ESRL), Global Monitoring Division (GMD) Annual Conference, Boulder, CO. Banta, R., Bales, R.C., McConnell, J., Zhao, L., Moon, C.
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UNIVERSITY SERVICE

Systemwide

UC Global Climate Leadership Council, Member. (May, 2014 - Present).

UC Natural Reserve System Advisory Committee, Member. (July, 2009 - 2013).

Advisory Panel, WRCA-BWC Water Data Management Project, Member. (February, 2009 - June, 2010).

California Climate Solutions Institute (proposal to California Public Utilities Commission and State Legislature), Member. (2007-2008).

University Committee On Planning & Budget (System Wide), Member. (September, 2006 - September, 2008).

Board of Admissions and Relations with Schools (System Wide), Member. (September, 2004 - September, 2006).

Multi-campus ad hoc planning group for Sierra Nevada Hydrologic Observatory, Organizer. (November, 2003 - Present).

UCM Campus

Director, Sierra Nevada Research Institute. (July, 2008 - Present). Overall leadership for Organized Research Unit (ORU). <http://snri.ucmerced.edu/>. Note that this appointment precluded senate service at both campus and system level.

Director, UC Merced Natural Reserve System. (2008 - 2013).

Director, Yosemite Field Station, Sierra Nevada Research Station. (July, 2008 - May, 2013).

Director, Environmental Analytical Laboratory. (July, 2008 - January, 2013).

Director, Interim, Sierra Nevada Research Institute. (July, 2007 - June, 2008).

National Parks Institute, Steering Committee, Member (2009 - 2013).

Great Valley Center, Board member (January, 2006 - July, 2012). The Great Valley Center became administratively part of UC Merced in 2006, and split from UC Merced in 2012..

Academic Surge Building Advisory Committee, Member. (2010).

School of Management planning committee, Member (July, 2008 - present).

Search Committee, Dean of Engineering, (October, 2009 - May, 2010).

Great Valley Center Director Search Committee, (2007 - 2008).

Senate Committee On Academic Planning & Resource Allocation, (September, 2004 - September, 2008). Chair. (September, 2005 - September, 2007).

UCM Division Council, (August, 2004 - August, 2008). Vice-Chair. (2005; August, 2007 - August, 2008).

UC Merced budget committee, Member. (2006 - 2007).

Sierra Nevada Research Institute Advisory Committee, Member. (2003 - 2007).

UCM Ad hoc space planning committee, Member. (2005 - 2006).

UCM Instructional Technology Advisory Committee, Member, Appointed. (January, 2004 - December, 2005).

Undergraduate Council (UGC), (2003 - 2005). Chair (2004-2005)

UCM School of Engineering

Search Committee, Ecological Engineering, Chair. (February, 2014 – June 2014). School of Engineering, UC Merced

Search Committee, Management, Chair. (July, 2010 - June, 2011). School of Engineering, UC Merced School of Engineering Faculty, Chair (August, 2006 - August, 2008).

Air pollution faculty search committee, Member, Appointed. (2005 - 2007).

Environmental economics faculty search committee, Member. (2005 - 2006).

Environmental policy faculty search committee, Chair. (2005 - 2006).

Renewable energy faculty search committee, Member. (2005 - 2006).

Spatial analysis faculty search committee, Chair. (2004 - 2005).

Public and community

Ad hoc. Planning for new Water information System for California (September, 2007 - Present).

Great Valley Center, Board Member, State, (January, 2006 - July, 2012).

Sierra Nevada Snowpack and Water Resources, Guest Speaker, San Francisco, CA, Local. (May, 2009). High school hydrology class, Bay School of San Francisco

CA Energy Commission. Workshop on Developing Research Plan for Networks for Recharge change, Sacramento, CA, (July, 2007).

U.S. EPA, Testimony supporting California's application for a waiver to regulate CO2 from passenger vehicles, Sacramento, CA, (May, 2007).

CA Public Utilities Commission hearing, "Climate change & potential effects on the Valley", Invited Testimony, Fresno (October, 2006).

Climate science education day, CA state legislature, Participant, CA, Appointed, Pro Bono, State. (May, 2006; August, 2005).

Greenland Summit Environmental Observatory, biannual review and planning meeting., Chair, Denver, CO, (January, 2006).

California Ecological Observatory Network, and National Ecological Observatory Network, participant in and local contact for planning activities, including site selection and site visits

(August, 2005 - present).

Presentation to Turlock and Modesto Irrigation Districts on applications of satellite snowcover products (August, 2005).

University of Arizona (2002-2003 only)

Advisory committee on focused excellence initiatives for the university, University of Arizona, Provost.

Advisory Committee, Vice President for Research.

Department of Hydrology and Water Resources, University of Arizona, Graduate Policy Committee

Faculty Senate, University of Arizona, Member.

Faculty status committee, College of Engineering and Mines, University of Arizona, Promotion and Tenure.

Flandreau Science Center (planning exhibit content for new science museum), University of Arizona, Science and Technology Working Group.

Institute for the Study of Planet Earth, University of Arizona, Executive Committee.

RECENT CONSULTING

2017. Blue Forst Conservation.

2014, Kennedy-Jenks Consultants, Mariposa Integrated Water Management Plan. Climate change impacts on regional hydrology.

2014t, Provost & Prichard Consulting Group, Madera Integrated Water Management Plan. Climate change impacts on regional hydrology

2013 - 2014, Scott River Watershed Cooperative Planning Group,

2009 - 2010, Tetrattech, Inc. Climate change study for L.A. Department of Water and Power.

2009 - 2010, Department of Justice, Consultant to legal team defending Yosemite National Park.