Roger C. Bales

Mobile: 209-658-7148, Email: rbales@ucmerced.edu
Homepage: http://www.rogerbales.com/

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

ACADEMIC EXPERIENCE

2003-present: School of Engineering, University of California, Merced (Distinguished Professor 2015-present, Professor 2003-15, founding faculty member). Departments of Civil and Environmental Engineering (primary), and Management of Complex Systems.
2013-present: Adjunct Professor, Civil and Environmental Engineering, University of California, Berkeley.
2003-present: Sierra Nevada Research Institute, University of California, Merced (Director 2008-2021, Acting Director 2007-08).
2004-2015. Member, Hydrology Graduate Group, University of California, Davis.
1984-2003: Department of Hydrology and Water Resources, University of Arizona, (Assistant Professor 1984-1989, Associate Professor 1989-1995, Professor 1995-2004).
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.
1980-84: Graduate Research Assistant, California Institute of Technology.

PROFESSIONAL ENGINEERING EXPERIENCE

1975-80: Project Manager and Project Engineer, Brown and Caldwell, Pasadena, California

PROFESSIONAL REGISTRATION

Civil Engineer 27677, California

CURRENT PROFESSIONAL AFFILIATIONS

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

RESEARCH INTERESTS

Current focus. Climate solutions, climate applications, water resources, hydrology.

Prior areas. Polar glaciology and atmospheric chemistry, contaminant hydrology of colloidal and organic compounds.

PUBLICATIONS

Peer-reviewed journals

190. W. Guo, M. Safeeq, H. Liu, X. Wu, G. Cui, Q. Ma, M. Goulden, M. Lindeskog, R. Bales. Mechanisms controlling carbon sinks in semi-arid mountain ecosystems. *Global Biogeochem. Cycles* doi:10/1029/2021GB007186, 2022.
189. T. Maurer, F. Avanzi, S.D. Glaser, R.C. Bales. Drivers of drought-induced shifts in the water balance through a Budyko approach. *Hydrol. Earth Syst. Sci.* doi:10.5194/hess-26-589-2022.
188. Y. Yang, A.A. Berhe, C.T. Hunsaker, D.W. Johnson, M. Safeeq, M.E. Barnes, E.P. McCorkle, E.M. Stacy, R.C. Bales, R.R. Bart, M.L. Goulden. Impacts of climate and disturbance on nutrient fluxes and stoichiometry in mixed-conifer forests. *Biogeochemistry*, doi:10.1007/s10533-021-00882-9, 2022.
187. G. Cui, Q. Ma, R. Bales. Assessing multi-year-drought vulnerability in dense Mediterranean-climate forests using water-balance-based indicators. *J. Hydrol.* doi:10.1016/j.jhydrol.2022.127431, 2022.
186. K. Moreland, Z. Tian, A.A. Berhe, K.J. McFarlane, P. Hartsough, S.H. Hart, R.C. Bales, A.T. O'Geen. Deep in the Sierra Nevada critical zone: saprock represents a large terrestrial organic carbon stock. *Environ. Res. Lett.* doi:10.1088/1748-9326/ac3bfe, 2021.
185. T. Stillinger, C. Costello, R.C. Bales, J. Dozier. Reservoir Operators React to Uncertainty in Snowmelt Runoff Forecasts. *J. Water Resour. Plan. Manag. doi:*10.1061/(ASCE)WR.1943-5452.0001437, 2021.
184. T. Maurer, F. Avanzi, C.A. Oroza, S.D. Glaser, M. Conklin, R.C. Bales. Optimizing spatial distribution of watershed-scale hydrologic models using Gaussian Mixture Models. *Environ. Model. Softw.* doi:10.1016/j.envsoft.2021.105076, 2021.
183. B. McKuin, A. Zumkehr, J. Ta, R. Bales, J.H. Viers, T. Pathak, J.E. Campbell, Energy and water co-benefits from covering canals with solar panels, *Nat. Sustain.* doi:10.1038/s41893-021-00693-8, 2021.
182. A. Cantor, M. Kiparsky, S.S. Hubbard, R. Kennedy, L.C. Pecharroman, K. Guivetchi, G. Darling, C. McCready, R. Bales. Making a water data system responsive to information needs of decision makers. *Front. Clim.* doi:10.3389/fclim.2021.761444, 2021.
181. H. Guo, M. Conklin, T. Maurer, F. Avanzi, K. Richards, R. Bales. Valuing enhanced hydrologic data and forecasting for informing hydropower operations. *Water* doi:10.3390/w13162260, 2021.
180. T. Maurer, F. Avanzi, S.D. Glaser, RC Bales, Drivers of drought-induced shifts in the water balance through a Budyko approach, *Hydrol. Earth Syst. Sci.* (2021) doi: 10.5194/hess-2021-55.
179. R.R. Bart, R.L. Ray, M.H. Conklin, M. Safeeq, P.C. Saksa, C.L. Tague, R.C. Bales. Assessing the effects of forest biomass reductions on forest health and

streamflow, *Hydrol. Process*. doi:10.1002/hyp.14114., 2021.

178. G. Cui, R. Bales, R. Rice, M. Anderson, F. Avanzi, P. Hartsough, M. Conklin, Detecting Rain-Snow-Transition Elevations in Mountain Basins Using Wireless Sensor Networks, *J. Hydrometeorology* doi:10.1175/JHM-D-20-0028.1, 2020.
177. P.C. Saksa, R.C. Bales, C.L. Tague, J.J. Battles, B.W. Tobin, M.H. Conklin. Fuels treatment and wildfire effects on runoff from Sierra Nevada mixed-conifer forests, *Ecohydrol*. doi:10.1002/eco.2151, 2020.
176. F. Avanzi, T. Maurer, S.D. Glaser, R.C. Bales, M.H. Conklin. Information content of spatially distributed ground-based measurements for hydrologic-parameter calibration in mixed rain-snow mountain headwaters, *J. Hydrol*. doi:10.1016/j.jhydrol.2019.124478, 2020.
175. D. Li, O. Wigmore, M. Durand, B. Vander-Jagt, S.A. Margulis, N. Molotch, R. Bales, Potential of Balloon Photogrammetry for Spatially Continuous Snow Depth Measurements, *IEEE Geosci. Remote. Sens. Lett*. doi:10.1109/LGRS.2019.2953481, 2020.
174. Q. Ma, R.C. Bales, J. Rungee, M.H. Conklin, B.M. Collins, M.L. Goulden. Wildfire controls on evapotranspiration in California's Sierra Nevada, *J. Hydrol*. doi:10.1016/j.jhydrol.2020.125364, 2020.
173. S. Malek, R.C. Bales, S.D. Glaser. Estimation of daily spatial snow water equivalent from historical snow maps and limited in-situ measurements, *Hydrol*. doi:10.3390/hydrology7030046, 2020.
172. J.W. Roche, Q. Ma, J. Rungee, R.C. Bales. Evapotranspiration mapping for forest management in California's Sierra Nevada. *Front. For. Glob. Change* doi:10.3389/ffgc.2020.00069, 2020.
171. J. Ackerer, C. Steefel, F. Liu, R. Bart, M. Safeeq, A. O'Geen, C. Hunsaker, R. Bales. Determining how critical zone structure constrains hydrogeochemical behavior of watersheds: learning from an elevation gradient in California's Sierra Nevada. *Front. Water* doi:10.3389/frwa.2020.00023, 2020.
170. Z. Zheng, Q. Ma, S. Jin, Y. Su, Q. Guo, R.C. Bales. Canopy and terrain interactions affecting snowpack spatial patterns in the Sierra Nevada of California, *Wat. Resour. Res.* doi:10.1029/2018WR023758, 2019.
169. F. Avanzi, J. Rungee, T. Maurer, R.C. Bales, Q. Ma, S.D. Glaser, M.H. Conklin. Evapotranspiration feedbacks shift annual precipitation-runoff relationships during multi-year droughts in a Mediterranean mixed rain-snow climate, *Hydrol. Earth Syst. Sci.* doi:10.5194/hess-2019-377, 2019.
168. M.L. Goulden, R.C. Bales. California forest die-off linked to multi-year deep soil drying in 2012–2015 drought, *Nat, Geosc.* doi:10.1038/s41561-019-0388-5, 2019.
167. S.A. Malek, S.D. Glaser, R.C. Bales. Wireless sensor networks for improved snow water equivalent and runoff estimates, *IEEE Access*, doi:10.1109/ACCESS.2019.2895397, 2019.
166. J.W. Roche, R. Rice, X. Meng, D.R. Cayan, M.D. Dettinger, D. Alden, S. Patel, M.A. Mason, M.H. Conklin, R.C. Bales. Climate, snow, and soil moisture data set for the Tuolumne and Merced River watersheds, California, USA, *Earth Syst. Sci. Data*, doi: 10.5194/essd-11-101-2019, 2019.
165. R.C. Bales, M.L. Goulden. C.T. Hunsaker, M.H. Conklin, P.C. Hartsough, A.T. O'Geen, J.W. Hopmans, and M. Safeeq, Mechanisms controlling the impact of multi-year drought on mountain hydrology, *Sci. Reports*, doi:10.1038/s41598-017-19007-0, 2018.
164. J. Rungee, R.C. Bales, M. Goulden. Evapotranspiration response to multiyear dry periods in the semiarid western United States, *Hydrol. Process.* doi:10.1002/hyp.13322, 2018.
163. R.C. Bales, E.M. Stacy, X. Meng, M.H. Conklin, P.B. Kirchner, Z. Zheng, Z., Spatially distributed water-balance and meteorological data from the Wolverton catchment, Sequoia National Park, California, *Earth Syst. Sci. Data*, doi:10.5194/essd-10-2115-2018, 2018.
162. A. O'Geen, M. Safeeq, J. Wagenbrenner, E. Stacy, P. Hartsough, S. Devine, Z. Tian, R. Ferrell, M. Goulden, J.W. Hopmans, R.C. Bales, Southern Sierra Critical Zone Observatory and Kings River Experimental Watersheds: A synthesis of measurements, new insights, and future directions, *Vadose Zone J*. doi:10.2136/vzj2018.04.0081, 2018.
161. Z. Zheng, Q. Ma, K. Qian, R.C. Bales, Canopy Effects on Snow Accumulation: Observations from Lidar, Canonical-View Photos, and Continuous Ground Measurements from Sensor Networks, *Remote Sens.* doi:10.3390/rs10111769
160. R.C. Bales, E. Stacy, M. Safeeq, X. Meng, M. Meadows, C. Oroza, M. Conklin, S. Glaser, J. Wagenbrenner. Spatially distributed water-balance and meteorological data from the rain–snow transition, southern Sierra Nevada, California. *Earth Syst. Sci. Data*, doi: 10.5194/essd-10-1795-2018, 2018.
159. J.W. Roche, M.L. Goulden, R.C. Bales. Estimating evapotranspiration change due to forest treatment and fire at the basin scale in the Sierra Nevada, California. *Ecohydrol.* doi.org/10.1002/eco.1978, 2018.
158. C.A. Oroza, R.C. Bales, E.M. Stacy, Z. Zheng, S.D. Glaser. Long-term variability of soil moisture in the Southern Sierra: measurement and prediction. *Vadose Zone J*. doi:10.2136/vzj2017.10.0178, 2018.
157. Z. Zheng, N.P. Molotch, C.A. Oroza, M.H. Conklin, R.C. Bales. Spatial snow water equivalent estimation for mountainous areas using wireless-sensor networks and remote-sensing products, *Wat. Resour. Res*. doi: 10.1016/j.rse.2018.05.029, 2018.
156. 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, *WIRES water,* doi:10.1002/wat2.1269, 2018.
155. 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. *J. Geophys. Res.: Biogeosci.*, 122, 3063–3075, doi:10.1002/2017JG004005, 2017.
154. Z. Zhang, S. Glaser, R.C. Bales, M.H. Conklin, R. Rice, 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.
153. P.C. Saksa, M.H. Conklin, J.J. Battles, C.L. Tague, R.C. Bales. Forest thinning impacts on the water balance of Sierra Nevada mixed-conifer headwater

basins, *Wat. Resour. Res*. doi: 10.1002/2016WR019240, 2017.

152. Z. Zhang, S. D. Glaser, R. C. Bales, M. Conklin, R. Rice, 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 Surf. Dyn.* doi:10.5194/esurf-5-841-2017, 2017.
150. W.D. Collins, S.J. Davis, R. Bales, J. Burney, R. McCarthy, E. Rignot, W. Torre, D. Victor; Chapter 3. Science and Pathways for Bending the Curve. *Collabra* doi:10.1525/collabra.62, 2016.
149. 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. *Environ.: Sci. Policy Sustain. Develop.* doi:10.1080/00139157.2016.1209016, 2016.
148. 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.
147. 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, *Wat. Resour. Res*., 52, 3815–3828, doi:10.1002/2015WR018295, 2016.
146. 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.
145. B. Harrison, R.C. Bales, Skill Assessment of Water Supply Forecasts for Western Sierra Nevada Watersheds, *J. Hydrol. Eng*. 21(4), doi:10.1061/(ASCE)HE.1943-5584.0001327, 2016.
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. *Hydrol. Process.*, 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. Proc. Natl. Acad. Sci. U.S.A, 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. Vallelonga, T. Neumann, H. Anchutz, 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. *Hydrol. Earth Syst. Sci. 11(5)*, 5327-5365, doi:10.5194/hess-18-4261-2014, 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. *Wat. Resour. Res. 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*, Nat. Geos., 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, *J. Geophys. Res.: Biogeosci.* 117, *doi:10.1029/2012JG002027, 2012.*
130. K.N. Muselman, N.P. Molotch, S.A. Marguilis, P.B. Kirchner, R.C. Bales, Influence of canopy structure and direct beam solar irradiance on snowmelt rates in a mixed conifer forest, *Agric. For. Meteorol.* 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

telementary-topography regressions, *Pirineos.Revista de Ecología de Montaña, 167*, *167-186., doi: 10.3989/Pirineos.2011.166008, 2012*.

127. F. Liu, C. Hunsaker, R. Bales, Controls of streamflow generation in small catchments across the snow-rain transition in the Southern Sierra Nevada, California, *Hydrol. Process., doi:10.1002/hyp.9304, 2012.*
126. 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, *J. Geophys. Res.: Atmos. D24121, doi:10.1029/2011JD016387, 2011*
125. 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.*
124. 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.*
123. E.W. Burgess, R.R. Forster, J.E. Box, E.M. Thompson, D.H. Bromwich, R.C. Bales, 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. Sjostedt, J. Burkhart, D. Friel, 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 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, 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. Siggaard-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 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, 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 (H202) 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, 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, *Hydrol. Proc*. 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 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. *Atmos. Environ., 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. Hydrometeorol.*, 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. Hydrol.*, 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 (H_20_2) 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.
77. H.W. Jacobi, M.M. Frey, M.A. Hutterli, R.C. Bales, O. Schrems, N.J. Cullen, K. Steffen, C. Koehler, Measurements of hydrogen peroxide and formaldehyde exchange between the atmosphere and surface snow at Summit, Greenland, *Atmos. Environ*., 36(15-16): 2619-2628, 2002.
76. J.F. Burkhart, M.A. Hutterli, R.C. Bales, Partitioning of formaldehyde between air and ice at –35 degrees C to –5 degrees C, *Atmos. Environ*., 36(13): 2157-2163, 2002.
75. H.C. Hartmann, T.C. Pagano, S. Sorooshian, R. Bales, Confidence builders – Evaluating seasonal climate forecasts from user perspectives, *Bull. Am. Met. Society*, 83(5): 683-699, 2002.

74. R.C. Bales, J.R. McConnell, E. Mosley-Thompson, and B. Csatho, Accumulation over the Greenland ice sheet from historical and recent records. *J. Geophys Res.,* 106(D24) 33,813-26, 2001.
73. J.R. McConnell, G. Lamorey, E. Hanna, E. Mosley-Thompson, R.C. Bales, D. Belle-Oudry J.D. Kyne. Annual Net Snow Accumulation over Southern Greenland from 1975 to 1998. *J. Geophys. Res.*, 106(D24) 33,827-38, 2001.
72. E. Mosley-Thompson, J.R. McConnell, R.C. Bales, Z. Li, P.-N. Lin, K. Steffen, L.G. Thompson, R. Edwards D. Bathke, Local to regional-scale variability of Greenland accumulation from PARCA cores. *J. Geophys Res.,* 106(D24) 33,839-52, 2001.
71. C.M. Brown-Mitic, I.J. MacPherson, P.H. Schuepp, B. Nagarajan, P.M.K. Yau, R.C. Bales, Aircraft observations of surface-atmosphere exchange during and after snow melt for different arctic environments: MAGS 1999. *Hydro. Proc.*, 15, 3585-3602, 2001.
70. M.A. Hutterli, J.R. McConnell, R.W. Stewart, H.-W. Jacobi, R.C. Bales, Impact of Temperature-Driven Cycling of Hydrogen Peroxide (H_2O_2) Between Air and Snow on the Planetary Boundary Layer. *J. Geophys. Res.*, 106(D14), 15,395-404, 2001.
69. R.C. Bales, J.R. McConnell, E. Mosley-Thompson G. Lamorey, Accumulation Map for the Greenland Ice Sheet: 1971-1990. *Geophys. Res. Lett.*, 28(15): 2967-70, 2001.
68. R.C. Bales, E. Mosley-Thompson J.R. McConnell, Variability of accumulation in northwest Greenland over the past 250 years. *Geophys. Res. Lett.*, 28: 2679-82, 2001.
67. J.R. McConnell, R.J. Arthern, E. Mosley-Thompson, C.H. Davis, R.C. Bales, R. Thomas, J.F. Burkhart, J.D. Kyne, Changes in Greenland ice sheet elevation attributed primarily to snow accumulation variability. *Nature*, 406: 877-879, 2000 & 410:240, 2002.
66. J. Choi, M.H. Conklin, R.C. Bales, R.A. Sommerfeld, Experimental Investigation of SO_2 Uptake in Snow. *Atmos. Environ.*, 34: 793-801, 2000.
65. J.R. McConnell, E. Mosley-Thompson, D.H. Bromwich, R.C. Bales, J.D. Kyne, Interannual variations of snow accumulation on the Greenland Ice Sheet (1985-1996): new observations versus model predictions. *J. Geophys. Res.,* 105(D3), 4039-46, 2000.
64. T. Meixner, R.C. Bales, M. W. Williams, J. S. Baron D. H. Campbell, Stream chemistry modeling of two watersheds in the Front Range, Colorado. *Wat. Resour. Res.*, 36: 77-87, 2000.
63. Seth, R.C. Bales, R. E. Dickinson, A framework for the study of seasonal snow hydrology and its interannual variability in the alpine regions of the Southwest. *J. Geophys. Res.*, 104(D18): 22,117-35, 1999.
62. J.M. Jin, X. Gao, Z.-L. Yang, R.C. Bales, S. Sorooshian, R E. Dickinson, Comparative analyses of physically based snowmelt models for climate simulations. *J. Climate*, 12: 2643-2657, 1999.
61. Z.-L. Yang, R.E. Dickinson, A. Hahmann, G.-Y. Niu, M. Shaikh X. Gao, R.C. Bales, S. Sorooshian J. Jin, Simulation of snow mass and extent in general circulation models. *Hydrol. Proc.*, 13: 2097-2113, 1999.
60. D.G. Jewett, B.E. Logan, R.G. Arnold, R.C. Bales, Transport of *Pseudomonas fluorescens* strain P17 through quartz and sand columns as a function of water content. *J. Contaminant Hydrol.*, 36: 73-89, 1999.
59. J. Jin, X. Gao, R.C. Bales, S. Sorooshian, R.E. Dickinson, S.-F. Sun, G.-X. Wu, Comparative analyses of physically based snowmelt models for climate simulations. *J. Climate*, 12: 2643-2657, 1999.
58. M.A. Hutterli, R. Röthlisberger, R.C. Bales, Atmosphere-to-snow-to-firn transfer studies of HCHO at Summit, Greenland. *Geophys. Res. Lett.*, 26: 1691-94, 1999.
57. T. Meixner, H.V. Gupta, L.A. Bastidas, R.C. Bales, Sensitivity analysis using mass flux and concentration. *Hydrol. Proc.*, 13: 2233-44, 1999.
56. M. Anklin, R.C. Bales, E. Mosley-Thompson, K. Steffen, Annual accumulation at two sites in northwest Greenland during recent centuries. *J. Geophys. Res.*, 103(D22): 28,775-83, 1998.
55. D. W. Cline, R.C. Bales, J. Dozier, Estimating the spatial distribution of snow in mountain basins using remote sensing and energy balance modeling. *Water Resour. Res.*, 34: 1275-85, 1998.
54. D. Cline, K. Elder, R. Bales, Scale effects in a distributed snow water equivalence and snowmelt model for mountain basin. *Hydrol. Proc.*, 12: 1527-1536, 1998.
53. R. Harrington R.C. Bales, Interannual, seasonal, and spatial patterns of meltwater and solute fluxes in a seasonal snowpack, *Water Resour. Res.*, 34(4), 823-831, 1998.
52. R. Harrington R.C. Bales, Modeling ionic solute transport in melting snow. *Water Resour. Res.*, 34(7), 1727-1736, 1998.
51. J. R. McConnell, R.C. Bales, R. W. Stewart, A. M. Thompson, M. R. Albert, R. Ramos, Physically based modeling of atmosphere-to-snow-to-firn transfer of H_2O_2 at South Pole. *J. Geophys. Res.*, 103(D9), 10,561-70, 1998.
50. T. Meixner, A. D. Brown, R.C. Bales, Importance of biogeochemical processes in modeling stream chemistry in two watersheds in the Sierra Nevada, California. *Water Resour. Res.*, 34: 3121-33, 1998.
49. M. Anklin R.C. Bales. Recent increase in H_2O_2 concentration at Summit, Greenland. *J. Geophys. Res.*, 102(D15): 19,099-104, 1997.
48. J.R. McConnell, R.C. Bales, D.R. Davis. Recent intra-annual snow accumulation at South Pole: Implications for ice core interpretation. *J. Geophys. Res.*, 102(D18): 21947-21954, 1997.
47. J.R. McConnell, J.R. Winterle, R.C. Bales, A. M. Thompson, R.W. Stewart, Physically based inversion of surface snow concentrations of H_2O_2 to atmospheric concentrations at South Pole. *Geophys. Res. Lett.*, 24(4): 441-4, 1997.
46. J.R. McConnell, R.C. Bales, J.R. Winterle, H. Kuhns, C.R. Stearns, A lumped parameter model for the atmosphere-to-snow transfer function for hydrogen peroxide. *J. Geophys. Res.*, 102(C12): 26,809-18, 1997.
45. R.C. Bales, S. Li, T.-C.J Yeh, M.W. Lenczewski, C.P; Gerba, Bacteriophage and microsphere transport in saturated porous media: Forced-gradient experiment at Borden, Ontario. *Water Resour. Res.*, 33(4): 639-648, 1997.
44. R.F. Harrington, R.C. Bales, P. Wagnon, Variability of meltwater and solute fluxes from homogeneous melting

snow at the laboratory scale, *Hydrol. Proc.*, 10(7): 945-953, 1996.

43. R.A. Wolford, R.C. Bales, S. Sorooshian, Development of a hydrochemical model for seasonally snow-covered alpine water- sheds: application to Emerald Lake Water- shed, Sierra Nevada, California. *Water Resour. Res.*, 32(4):1061-1074, 1996.
42. J.E. Dibb, R.W. Talbot, S.I. Whitlow, M.C. Shipham, J. Winterle, J. McConnell, R. Bales, Biomass burning signatures in the atmosphere and snow at Summit, Greenland: An event on 5 August 1994. *Atmos. Environ.*, 30(4):553-561, 1996.
41. R.A. Wolford, R.C. Bales, Hydrochemical modeling of Emerald Lake watershed, Sierra Nevada, California: Sensitivity of stream chemistry to changes in fluxes and model parameters. *Limnol. Oceanog.*, 41(5): 947-954, 1996.
40. R.C. Bales, J.R. McConnell, M.V. Losleben, M.H. Conklin, K. Fuhrer, A. Neftel, J.E. Dibb, J.D.W. Kahl, C.R. Stearns, Diel variations of H_2O_2 in Greenland: A discussion of the cause and effect relationship. *J. Geophys. Res.*, 100(D9):18661-18668, 1995.
39. M.J. Gross, O. Albinger, D.G. Jewett, B.E. Logan, R.D. Bales, R.G. Arnold, Measurement of bacterial collision efficiencies in porous media. *Water Res.*, 29(4): 1151-1158, 1995.
38. R.C. Bales, S. Li, K.M. Maguire, M.T. Yahya, C.P. Gerba, R.W. Harvey, Virus and bacteria transport in a sandy aquifer, Cape Cod, MA. *Ground Water*, 33(4):653-661, 1995.
37. R.C. Bales R.F. Harrington, Recent progress in snow hydrology. *Rev. Geophys.*, *Supplement, U.S. National Report to International Union of Geodesy and Geophysics* 1991-1994:1011-1020, 1995.
36. D.G. Jewett, T.A. Hilbert, B.E. Logan, R.G. Arnold, R.C. Bales, Bacterial transport in laboratory columns and filters: Influence of ionic strength and pH on collision efficiency. *Water Res.*, 29(7): 1673-1680, 1995.
35. D.R. McCaulou, R.C. Bales, R.G. Arnold, Effect of temperature-controlled motility on transport of bacteria and microspheres through saturated sediment. *Water Resour. Res.*, 31(2): 271-280, 1995.
34. R.C. Bales, M. Losleben, J. McConnell, K. Fuhrer, A. Neftel, H_2O_2 in snow, air and open pore space in firn at Summit, Greenland. *Geophys. Res. Lett.*, 22(10):1261-1264, 1995.
33. M.W. Williams, R.C. Bales, A.D. Brown, J. M. Melack, Fluxes and transformation of nitrogen in a high-elevation catchment, Sierra Nevada. *Biogeochemistry*, 28:1-31, 1995.
32. R.A. Matzner R.C. Bales, Dependence of acridine adsorption on ligand hydration enthalpy. *J. Coll. Interface Sci.*, 168: 61-66, 1994.
31. R.A. Matzner, R.C. Bales, J.E. Pemberton, *In Situ* Raman spectroscopy of aza-arene absorbed at the aqueous/silica interface. *Appl. Spectroscopy*, 48(9): 1043-1053, 1994.
30. R.A. Matzner R.C. Bales, Transport of acridine in saturated porous media. *Chemosphere*, 29(8):1775-1773, 1994.
29. R.A. Sommerfeld, R.C. Bales, A. Mast, Spatial statistics of snowmelt flow: Data from lysimeters and aerial photos. *Geophys. Res. Lett.*, 21(25):2821-2824, 1994.
28. D.R. McCaulou, R.C. Bales, J.F. McCarthy, Use of short pulse experiments to study bacteria transport through porous media. *J. Contaminant Hydrol.*, 15:1-14, 1994.
27. J.G. Jewett, R.C. Bales, B.E. Logan, R.G. Arnold, Comment on Application of clean-bed filtration theory to bacterial deposition in porous media. *Environ. Sci. Technol.*, 27:984-985, 1993.
26. M.H. Conklin, A. Sigg, A. Neftel, R.C. Bales, Atmosphere-snow transfer function for H_2O_2: Microphysical considerations. *J. Geophys. Res.,* 98(D10):18,367-18,376, 1993.
25. M.H. Conklin R.C. Bales, SO_2 uptake on ice spheres: liquid nature of ice-air interface. *J. Geophys. Res.*, 98:16851-16855, 1993.
24. T. Kinoshita, R.C. Bales, M.T. Yahya, C. P. Gerba, Effect of pH on bacteriophage transport through sandy soils. *J. Contaminant Hydrol.*, 15:55-70, 1993.
23. T. Kinoshita, R.C. Bales, M. Yahya, C. P. Gerba, Bacteria transport in porous media: retention of Bacillus and Pseudomonas on silica surfaces. *Water Res.*, 27(8): 1295-1301, 1993.
22. R.C. Bales, R.E. Davis, M.W. Williams, Tracer release in melting snow: diurnal and seasonal patterns. *Hydrol. Proc.*, 7:389-401, 1993.
21. L. McKay, J. Cherry, R.C. Bales, M. Yahya, C. P. Gerba, A field example of bacteriophage as tracers of fracture flow. *Environ. Sci. Technol.*, 27(6): 1075-1079, 1993.
20. R.C. Bales, S. Li, K. Maguire, M. Yahya, C. P. Gerba, MS-2 phage and poliovirus transport through porous media: sorbent hydrophobicity and chemical perturbations. *Water Resour. Res.*, 29:957-963,1993.
19. M. Yahya, L Galsiomes, C. P. Gerba, R.C. Bales, Survival of bacteriophages MS-2 and PRD-1 in ground water. *Water Sci. Technol.,* 27(3-4): 409-412, 1993.
18. R.C. Bales, M. W. Williams, R. A. Wolford, Discussion on 'Acidification potential of snow- packs in Sierra Nevada'. *J. Environ. Engr.,* 119: 399-401, 1993.
17. Z. K. Chowdhury, G. L. Amy, R.C. Bales, Incorporation of submicron colloids into larger floc: observations in conventional water-treatment plants. *J. Environ. Engr.,* 119(1): 192-199, 1993.
16. R.C. Bales, S. R. Hinkle, T. W. Kroeger, K. Stocking, C. P. Gerba, Bacteriophage adsorption during transport through porous media: chemical perturbations and reversibility. *Environ. Sci. Technol.,* 25:2088-2095, 1991.
15. Z. K. Chowdhury, G. L. Amy, R.C. Bales, Coagulation of submicron particles in water treatment by incorporation into aluminum-hydroxide floc. *Environ. Sci. Technol.,* 25: 1766-1773, 1991.
14. R.C. Bales J. E. Szecsody, Temperature effects on chlorinated-benzene sorption to hydrophobic surfaces. *Chemosphere,* 22:1141-1151, 1991.
13. R.C. Bales, R. E. Sommerfeld, D. G. Kebler, Ionic tracer movement through a Wyoming snowpack. *Atmos. Environ.,* 24A(11): 2749-2758, 1990.
12. R.C. Bales, R. E. Davis, D. A. Stanley, Ion elution through shallow homogeneous snow, Water Resour. Res., 25(8), 1869-1877, 1989

11. M. P. Valdez, G. A. Dawson, R.C. Bales, Sulfur dioxide incorporation into ice depositing from the vapor. *J. Geophys. Res.,* 94 (D1):1095-1103, 1989.
10. R.C. Bales, C. P. Gerba, G. H. Grondin, S. L. Jensen, Bacteriophage transport in sandy soil and fractured tuff. *Appl. Environ. Microbiol.,* 55:2061-67, 1989.
09. J. E. Szecsody R.C. Bales, Sorption kinetics of low-molecular-weight hydrophobic organic compounds on surface-modified silica. *J. Contaminant Hydrol.,* 4:181-203, 1989.
08. D. G. Kebler, R.C. Bales, G. L. Amy, Coagulation of submicron colloids by supramicron silica particles. *Water Sci. Technol.,* 21:519-528, 1989.
07. K. L. McClellan, N. S. Buras, R.C. Bales, Biodegradation of trichloroethylene by bacteria indigenous to a contaminated site. *J. Environ. Sci. Health,* A24:561- 570, 1989.
06. M. P. Valdez, R.C. Bales, D. A. Stanley, G. A. Dawson, Gaseous deposition to snow: I. experimental study of SO_2 and NO_2 deposition. *J. Geophys. Res.,* 92(D8):9779-9789, 1987.
05. R.C. Bales, M. P. Valdez, G. A. Dawson, Gaseous deposition to snow: II. Physical- chemical model for SO_2 deposition. *J. Geophys. Res.,* 92(D8): 9789-9799, 1987.
04. R.C. Bales, Surface chemistry in water treatment: the solid-liquid interface. *J. Amer. Water Works Assn.,* 78(11): 59- 66, 1986.
03. R.C. Bales J. J. Morgan, Dissolution kinetics of chrysotile at pH's 7 to 10. *Geochimica et Cosmoch. Acta,* 49: 2281-2288, 1985.
02. R.C. Bales J. J. Morgan, Surface charge and adsorption properties of chrysotile asbestos in natural waters. *Environ. Sci. Tech.,* 19:1213-1219, 1985.
01. R.C. Bales, S. B. Hayward, D. D. Newkirk, Chrysotile asbestos in California surface waters: from upstream rivers through water treatment. *J. Amer. Water Works Assn.,* 76: 66-74, 1984.

Perspective pieces (editor reviewed)

R. Bales. First solar canal project is a win for water, energy, air and climate in California, *The Conversation*. 22 February 2022.

R.C. Bales, W.E. Dietrich. Linking critical zone water storage and ecosystems, *Eos, 101*, doi:10.1029/2020EO150459, 14 October 2020.

R. Bales. California's water supplies are in trouble as climate change worsens natural dry spells, especially in the Sierra Nevada, *The Conversation*. 7 December 2021.

R. Bales, B. McKuin. Installing solar panels over California's canals could yield water, land, air and climate payoffs. *The Conversation*. 3 May 2021.

R. Bales, M. Conklin. Restoring California's forests to reduce wildfire risks will take time, billions of dollars and a broad commitment. *The Conversation*. 13 October 2020.

R.C. Bales and J. E. Dibb. Year-round research gets boost at Summit of Greenland ice sheet. *Eos, Transactions,* 80(5):51, Feb. 2, 1999.

05. W. Abdalati and R. Bales. Highlights of 1996 and 1997 Arctic Research: National Aeronautics and Space Administration. *Arctic Research of the United States,* 12:64-73, Spring/Summer 1998.
04. W. Abdalati, R. Bales. Program for Arctic Regional Climate Assessment: Investigations of the Climate and State of Balance of the Greenland Ice Sheet. *Arctic Research of the United States*, 12:38-54, Fall-Winter 1998.
03. R.C. Bales, E.W. Wolff. Interpreting natural climate signals in ice cores. *Eos, Transactions*, 76(47):482-483, November 21, 1995.
02. R.C. Bales. Section concerns addressed at Spring Meeting. *Eos, Transactions,* 76(40) :396, Oct. 3, 1995.
01. R.C. Bales. Section Activities Advanced at Spring Meeting. *Eos, Transactions,* 77(38):368, Sept. 17, 1996.

Archived data sets (partial list)

Note: several of our polar ice-core, snow and atmospheric chemistry data sets are offline as paleoclimate archives transition. Other field data sets not yet in archives are available to download at https://sndl.ucmerced.edu/.

B. McKuin, A. Zumkehr, J. Ta, R. Bales, J. Viers, T. Pathek, J.E. Campbell. Energy and water co-benefits from covering canals with solar panels, Dryad, Dataset, doi:10.6071/M32H30, 2021.

R. Bales, M. Meadows, E. Stacy, M. Conklin, X. Meng. Southern Sierra Critical Zone Observatory (SSCZO), Providence Creek meteorological data, soil moisture and temperature, snow depth and air temperature, Dryad, Dataset, doi:10.6071/Z7WC73, 2020.

R. Bales, G. Cui, R. Rice, X. Meng, Z. Zhang, P. Hartsough, S. Glaser, M. Conklin. Snow depth, air temperature, humidity, soil moisture and temperature, and solar radiation data from the basin-scale wireless-sensor network in American River Hydrologic Observatory (ARHO) , Dryad, Dataset, doi:10.6071/M39Q2V, 2020.

J. Rungee, R. Bales, M. Goulden, G. Flerchinger, G. Barron-Gafford, X. Meng. Data from: Evapotranspiration response to multiyear dry periods in the semiarid western United States, Dryad, Dataset, doi:10.6071/M3M660, 2020.

Q. Ma, R. Bales, J. Rungee, M. Conklin, X. Meng, M. Goulden. Evapotranspiration data from eddy-covariance flux-tower measurements and Landsat imagery in California's Sierra Nevada from 1985 to 2019, Dryad, Dataset, doi:10.6071/M3010D, 2020.

J. Roche, R. Rice, X. Meng, D. Cayan, M. Dettinger, D. Alden, S. Patel, M. Mason, R. Bales. Climate, snow, and soil moisture data set for the Tuolumne and Merced River watersheds, California, USA, Dryad, Dataset, doi:10.6071/M3FH3D, 2018.

R. Bales, E. Stacy, M. Meadows, P. Kirchner, M. Conklin, X. Meng. Southern Sierra Critical Zone Observatory (SSCZO), Wolverton Creek meteorological data, soil moisture and temperature, Dryad, Dataset, doi:10.6071/M3S94T, 2017.

R. Bales. Measurements of Air and Snow Photochemical Species at WAIS Divide, Antarctica, U.S. Antarctic Program (USAP) Data Center. Also NSIDC-0585-1. doi:10.7265/N5GX48HW, 2014.

R. Bales. Core Measurements at Summit, Greenland Environmental Observatory. NSF Arctic Data Center, urn:node:ARCTIC. urn:uuid:d9aaac33-178f-4e49-a8e7-1c84137cdbe5, 2013.

R. Bales, M. Frey, J. McConnell. Twenty-Three Century-

scale Ice Core Records of Hydrogen Peroxide (H_2O_2) from West Antarctica. U.S. Antarctic Program (USAP) Data Center. Also NSIDC-0392-1. doi: 10.7265/N5TM7826, 2009.

R. Bales, M. Frey, J. McConnell. Atmospheric Mixing Ratios of Hydroperoxides above the West Antarctic Ice Sheet. U.S. Antarctic Program (USAP) Data Center. Also NSIDC-0394-1. doi:10.7265/N5PZ56RS, 2009.

R. Bales. Core Measurements at Summit, Greenland Environmental Observatory. NSF Arctic Data Center, urn:node:ARCTIC. urn:uuid:d9aaac33-178f-4e49-a8e7-1c84137cdbe5, 2009.

N. Chellman, R. Bales. Core Measurements at Summit, Greenland Environmental Observatory: Snow Accumulation. NSF Arctic Data Center, doi:10.18739/A2V97ZQ91, 2009.

R. Banta, R. Bales. Core Measurements at Summit, Greenland Environmental Observatory: Atmospheric Chemistry. NSF Arctic Data Center, doi:10.18739/A2QJ77X58., 2009.

J.R. Banta, J.R. McConnell, M.M. Frey, R.C. Bales, K.C. Taylor. ITASE 00-1,WAIS Divide WDC05A,WAIS Divide WDC05Q - Snow Accumulation Data. NOAA World Data Center for Climatology, www.ncdc.noaa.gov/paleo/study/8617, 2008.

R. Bales, J. McConnell. Snow-atmosphere Transfer Function for Reversibly Deposited Chemical Species in West Antarctica" U.S. Antarctic Program (USAP) Data Center. Also NSIDC-0122-1. doi:10.7265/N5ZP441W, 2002.

E. Mosley-Thompson, J.R. McConnell, R.C. Bales, Z. Li, P.-N. Lin, K. Steffen, L.G. Thompson, R. Edwards, D. Bathke. Annual Accumulation Data from 1997 and 1998 PARCA Ice Cores. National Snow and Ice Data Center, NSIDC-0624-1, 2001.

Books

E. Wolff, R. Bales, editors. *Chemical Exchange between the Atmosphere and Polar Snow.* Springer-Verlag, 1996. 675 pp.

Book chapters

18. W. Dietrich, L. Derry, K. Lohse, S. Anderson, A. Aufdendkampe, R. Bales, P. Kumar, D. Richter, B. McDowell. The Role of Critical Zone Observatories in Critical Zone Science. *Developments in Earth Surface Processes*, Vol. 19. http://dx.doi.org/10.1016/B978-0-444-63369-9.00002-1
17. G.M. Stock, N. Sitar, J.W. Borchers, E.L. Harp, J.B. Snyder, B.D. Collins, R.C. Bales, G.F**.** Wieczorek. Evaluation of hypothesized water-system triggers for rock falls from Glacier Point, Yosemite National Park, California, USA. In *Proc. 11th Int. Conf. and 2nd North American Symp. on Landslides and Engineered Slopes*. (pp. ISBN 978-0-415-62123-6, 1165-1171). CRC Press, 2012.
16. R.C. Bales, M.H. Conklin, B. Kerkz, S. Glaser, J.W. Hopmans, C.T. Hunsaker, M. Meadows, P,C, Hartsough. Sampling Strategies in forest hydrology and biogeochemistry. *Forest Hydrology & Biogeochemistry*, D. Levia, D. Carlyle-Moses, T. Tanaka, eds. *Springer,2010*.
15. C. Brown-Mitic, S. Kaharabata, R.C. Bales. Priority parameters and their measurements. in Environmental *Monitoring, Encyclopedia of* Environmental and Ecological Sciences, Engineering and Technology Resources *The Encyclopedia of Life Support Systems (EOLSS),* H. I. Inyang, J.L. Daniels, section eds. UNESCO-EOLSS Publisher Co., Baldwin House, Aldates, Oxford, UK, 2005.
16. R.C. Bales, D. Cline. Snow Hydrology and Water Resources (Western U.S.). T.D. Potter, B. Colman, editors. *Handbook of Weather Climate and Water*. pp 443-460, Wiley-Interscience, Hoboken, NJ, 2003.
14. R.C. Bales, J. Choi. Conceptual framework for interpretation of exchange processes. In E. Wolff, R. Bales, editors, *Chemical Exchange between the Atmosphere and Polar Snow,* NATO ASI Series, Vol. I 43, pp. 319-338. Springer- Verlag, Berlin Heidelberg, 1996.
13. N. Ohte, R.C. Bales. Multi-dimensional parameter estimation of the integrated alpine hydro- chemical model using Monte-Carlo simulation. In K. A. Tonnessen, M. W. Williams,, M. Tranter, editors, *Biogeochemistry of Seasonally Snow-Covered Catchments,* pp. 175-183. IAHS-AIHS Publication 228, Wallingford, UK, 1995.
12. R.E. Davis, C.E. Petersen, R.C. Bales. Ion flux through a shallow snowpack: effects of initial conditions and melt sequences. In K. A. Tonnessen, M. W. Williams, M. Tranter, editors, *Biogeochemistry of Seasonally Snow- Covered Catchments,* pp. 115-126. IAHS-AIHS Publication 228, Wallingford, UK, 1995.
11. R.F. Harrington, K. Elder, R.C. Bales. distributed snowmelt modeling using a clustering algorithm. In K.A. Tonnessen, M.W. Williams, M. Tranter, editors, *Biogeochemistry of Seasonally Snow-Covered Catchments*, pp. 167-174. IAHS-AIHS Publication 228, Wallingford, UK, 1995.
10. R.C. Bales. Nitric acid in firn: discussion. In R. Delmas, editor, *Ice Core Studies of Global Biogeochemical Cycles,* pp. 241-245. NATO ASI Series I, Vol. 30, 1995.
09. A. Neftel, R.C. Bales, D.J. Jacob. H_20_2 and HCHO in polar snow and their relation to atmospheric chemistry. In R. Delmas, editor, *Ice Core Studies of Global Biogeochemical Cycles,* NATO ASI Series, Vol. I 30, pp. 249-264. Springer-Verlag, Berlin Heidelberg, 1995.
08. J.-L. Jaffrezo, J. E. Dibb, R.C. Bales, A. Neftel. Current status of atmospheric studies at Summit (Greenland) and implications for future research. In R. Delmas, editor, *Ice Core Studies of Global Biogeochemical Cycles,* pp. 427-458. NATO ASI Series I, Vol. 30, 1995.
07. R.C. Bales. Modeling biocolloid transport in porous media: chemical aspects and reversibility. In J. F. McCarthy F. J. Wobber, editor, *Manipulation of Groundwater Colloids for Environmental Restoration,* pp. 81-85. Lewis Publishers, Boca Raton, FL, 1993.
06. R.C. Bales. Snowmelt and the ionic pulse. In *The Encyclopedia of Earth Science,* volume 1, pp. 199-207. Academic Press, Orlando, FL, 1992.
05. R.C. Bales. Modeling in-pack chemical transformations. In T. D. Davies, H. G. Jones, M. Tranter, editors, *Processes of Chemical Change in Seasonal Snowcover,* NATO ARW Series, pp. 139-163. Springer-Verlag, 1991.
04. R. A. Matzner, D. H. Hunter, R.C. Bales. The effect of pH and anions on the solubility and sorption behavior

of acridine. In R. Baker, editor, *Organic Substances and Sediments in Water,* ACS Symposium Series, pp. 365-381. American Chemical Society, Washington, D.C., 1991.

03. R.C. Bales, J. E. Szecsody. Microscale processes in porous media: Transport of chlorinated benzenes in porous aggregates. In D. C. Melchior, R. L. Bassett, editors, *Chemical Modeling in Aqueous Systems II,* number 416 in ACS Symposium Series, pp. 526-538. American Chemical Society, Washington, D.C., 1990.
02. G.A. Amy, M.R. Collins, J.C. Kuo, Z.K. Chowdhury, R.C. Bales. The effects of humic substances on particle formation, growth, and removal during coagulation using aluminum sulfate. In *Influence of Aquatic Humic Substances on Fate and Treatment of Pollutants,* number 219 in Advances in Chemistry Series, pp. 443- 452. American Chemical Society, Washington, D.C., 1988.
01. R.C. Bales, M. P. Valdez, G. A. Dawson, D. A. Stanley. Physical and chemical factors controlling gaseous deposition of SO_2 gas to snow. In H. G. Jones, W. J. Orville-Thomas, editor, *Seasonal snowcovers: Physics, Chemistry, Hydrology,* pp. 289-297. Reidel, Amsterdam, 1987.

Recent research and technical reports

15. R. Bales, S. Rebich-Hespanha, L. Leombruni, H. Hodges, A. Heeren, H. Gelbach, N. Van Leuvan, J. Christensen. 2018. Strategic Communication to Achieve Carbon Neutrality within the University of California, Report of the UC TomKat Carbon Neutrality Project. doi:10.6071/H87D2S8W.
14. R.C. Bales, R. York. Scott River Water Yield Enhancement Study Phase I Report. Scott River Watershed Cooperative Planning Group, 2014.
13. Q. Guo, J. Zhu, R. Ray, R. Bales. Vulnerability of Giant Sequoia to Moisture Stress in a Changing Climate: A pilot study of potential moisture proxies. Natural Resource Report NPS/SEKI/ NRR—2013/XXX, 2013.
12. R. Rice, R.C. Bales. An Assessment of Snowcover in Major River Basins of Sierra Nevada Network Parks and Potential Approaches for Long-term Monitoring. Natural Resource Technical Report NPS/SIEN/NRTR—2013/800, 2013.
11. R. Rice, R.C. Bales. A natural resource condition assessment for Sequoia and Kings Canyon National Parks: Appendix 7a – Water Quantity: rain, snow, and temperature. Natural Resource Report. NPS/SEKI/NRR—2013/665.7a. National Park Service. Fort Collins, Colorado. Published Report-2195540, 2013.
10. M.H. Conklin, R.C. Bales, R. Ray, S. Martin, P. Saksa, P. Womble. *Sierra Nevada Adaptive Management Project Water-Team Field Activities, Methods and Results.* UC Merced, Sierra Nevada Research Institute, 2012.
09. J. Chorover, F.N. Scatena, T. White, S. Anderson, A.K. Aufdenkampe, R.C. Bales, S. Brantley, G. Tucker. *Common Critical Zone Observatory (CZO) Infrastructure and Measurements.* National CZO Program, CZO Community, 2012.
08. R.C. Bales, J.J. Battles, Y. Chen, M.H. Conklin, E. Holst, K.L. O'Hara, P. Saksa, W. Stewart, *Forests and Water in the Sierra Nevada: Sierra Nevada Watershed Ecosystem Enhancement Project.* Publisher – Co-published by Sierra Nevada Research Institute Report (UC Merced), Center for Forestry (UC Berkeley), Environmental Defense Fund, 2011.
07. R.S. Anderson, S. Anderson, A.K. Aufdenkampe, R.C. Bales, S. Brantley, J. Chorover, C.J. Duffy, F.N. Scatena, D. Sparks, P.A. Troch, K. Yoo. *Future Directions for Critical Zone Observatory (CZO) Science.* National CZO Program, CZO Community, 2010.
06. J. Dozier, J. B. Braden, R. P. Hooper, B. S. Minsker, J. L. Schnoor, R.C. Bales, M. H. Conklin, L. A. Derry, T. Harmon, A. Michalak, J. R. Mihelcic, J. Myers, S. L. Schneider, D. Tarboton, J. M. VanBriesen, P. R. Wilcock. Living in the water environment: The WATERS Network Science Plan, *Report for Cooperative Agreement CBET-0838607*. Arlington VA; National Science Foundation; doi:10.4211/sciplan.waters.20090515, 2009.
05. G.M. Hornberger, J.D. Alber, J. Bahr, R.C. Bales, K. Beven, E. Foufoula-Georgiou, G. Katul, J.L. Kinter III, R.D. Koster, D. P. Lettenmaier, D. McKnight, K. Miller, K. Mitchell, J.O. Roads, B.R. Scanlon, E. Smith, *A Plan for a New Science Initiative on the Global Water Cycle*. US Global Water Cycle. US Global Change Research Program, Washington, DC, 2001.
04. H.C. Hartmann, R. Bales, S. Sorooshian, *Weather, Climate and Hydrologic Forecasting for the Southwest U.S.*, CLIMAS Report CL2-99, Inst. for the Study of Planet Earth, Univ. Arizona, Oct 1999.
03. Committee on Hydrologic Science (D. Entekhabi, M. Anderson, R. Avissar, R. Bales, E. Gorham, M. Parlange, C. Peters-Lidard K. Potter, E. Wood) National Research Council, *Hydrologic Science Priorities for the U.S. Global Change Research Program*, National Academy Press, Washington, DC, 1999.
02. R. Merideth, D. Liverman, R. Bales, M. Patterson, eds., *Climate Variability and Change in the Southwest: Impacts, Information Needs, and Issues for Policymaking*, Udall Center for Studies in Public Policy, Univ. Arizona, Jul 1998.
01. R. Bales, C. Gerba, S. Hinkle, T. Kroeger, S. Li, K. McGuire, K. Stocking, M Yahya, *Surface Chemical Factors Affecting Transport of Biocolloids in Subsurface Porous Media*, Univ. Arizona, NTIS PB91-107326/AS, 197 pp, 1990.

Papers in conference proceedings

38. B. Kerkez, S. D. Glaser, J. A. Dracup R.C. Bales. A Hybrid System Model of Seasonal Snowpack Water Balance. *Proceedings, Hybrid Systems: Computation and Control*, 13th Int. Conf., Stockholm, Sweden, 2010.
37. R. Rice, R.C. Bales. Embedded sensor network design for spatial snowcover. In *Proceedings of the 76th Annual Western Snow Conference. 76th Western Snow Conference, 2008.*
36. J. McConnell, R. Bales. Investigation of the chemical transfer processes between atmosphere and snow at South Pole, In Summary Report No. 27, 2002-2003, National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Laboratory (CMDL), 2004.

35. R.C. Bales, J.C. Morrill, M.H. Conklin, Using GLOBE Snow Data in Regional Studies in Proceedings of the 7th Annual GLOBE Conference, Chicago, Illinois, Jul 21-26, 2002.
34. M.H. Conklin, A. Leonard, J.C. Morrill, R.C. Bales, Students and scientists investigate Agua Caliente Spring, Tucson, AZ, Proceedings of the 7th Annual GLOBE Conference, Chicago, Illinois, Jul 21-26, 2002.
33. J.C. Morrill, R.C. Bales, M.H. Conklin, Estimating Future Stream Temperatures and Dissolved Oxygen Levels at GLOBE Sites, Proceedings of the 7th Annual GLOBE Conference, Chicago, Illinois, Jul 21-26, 2002.
32. J. McConnell, R. Bales. Investigation of the chemical transfer processes between atmosphere and snow at South Pole, In Summary Report No. 26, 2000-2001, National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Laboratory (CMDL), 2002.
31. M. H. Conklin, J. C. Morrill, R.C. Bales, J. Whittier, A. Leonard, Relating Surface Water Alkalinity and Regional Geology, Proceedings 6th Annual GLOBE Conference, Blaine, WA, Jul 2001.
30. J. C. Morrill, M. H. Conklin, R.C. Bales, J. Whittier, Surface water pH in GLOBE: Sensitivity of pH to Instrument Choice, Proceedings 6th Annual GLOBE Conference, Blaine, WA, Jul 2001.
29. R.C. Bales, B.J. Morehouse. Climate Assessment for the Southwest Project: An integrated approach. 12th Symposium on Global Change and Climate Variations, American Meteorological Society, Albuquerque NM, 2001.
28. B. Imam, R.C. Bales. Utilization of remote sensing information for water resource management in the Southwestern US. Proceedings of the *IEEE 2001 International Geoscience and Remote Sensing Symposium*, Sydney, Australia, 2001.
27. S.R. Fassnacht, K. A. Dressler, D.J. Lampkin, S.R. Helfrich, R.C. Bales, B. Imam. Comparing AVHRR and hydrologically modeled discontinuous alpine snow-covered area estimates. *Proceedings of the IEEE 2001 International Geoscience and Remote Sensing Symposium*, Sydney, Australia, 2001.
26. S.R. Fassnacht, S.R. Helfrich, D.J. Lampkin, K.A. Dressler, R.C. Bales, E.B. Halper, D. Reigle, B. Imam. Snowpack modeling of the Salt-Verde Basin with water management implications. *Proc. 69th Western Snow Conference*, Sun Valley, ID, 8 pp, 2001.
25. B.J. Morehouse, M.F. Glueck, R.C. Bales, A.C. Comrie, R.H Carter, P.R. Sheppard, G.M. Garfin. A vertically integrated assessment of climate impacts on water supply in Arizona. *12th Symposium on Global Change and Climate Variations*, American Meteorological Society, Albuquerque NM, 2001.
24. N.P. Molotch, T.H. Painter, M.T. Colee, C.W. Rosenthal, J. Dozier, R.C. Bales. Analysis of the spatial variability of snow cover depletion in an alpine watershed, Tokopah Basin, Sierra Nevada, California, U.S.A., *Annual Meeting of the Western Snow Conference*, 2001.
23. R. Bales, M. Conklin, J. Morrill, Relating Air and Water Temperatures: Implications for Climate Variability and Change, *Proceedings, 5th GLOBE Annual Meeting*, Annapolis, MD, July 2000.
22. S. Yool, D. Lampkin, A. White, S. Marsh, R. Davis, R. Bales. Mapping snow covered area and vegetation in the Colorado Basin. ASPRS 2001.
21. J. Clemmons, M. Conklin, R. Bales. A comparative study of GLOBE and USGS water quality monitoring data. *Volunteer Monitor Annual Meeting*, Austin, TX, 2000.
20. J. McConnell, R. Bales. Investigation of the transfer function between atmosphere and snow concentrations of hydrogen peroxide at South Pole, In Summary Report No. 25, 1998-1999, National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Laboratory (CMDL), 2000.
19. M. Conklin, R. Bales, J. Clemons, R. Brice, D. Belle-Oudry. Strategies for Effective Water Quality Monitoring, Proceedings, *4th Annual GLOBE Meeting*, Durham, NH, July 18-23, 1999.
18. M. Conklin, R. Bales, J. Clemons, R. Brice. Use of GLOBE Hydrology Data in Water Quality Assessments, *Proceedings, 4th Annual GLOBE Meeting*, Durham, NH, July 18-23, 1999.
17. M. Conklin, R. Bales, J. Clemons, R. Brice. Regional pH and Alkalinity Patterns in GLOBE Data, Proceedings, *4th Annual GLOBE Meeting*, Durham, NH, July 18-23, 1999.
16. Z.-L. Yang, G.-Y. Niu, R.E. Dickinson, R.C. Bales, 1999: Modeling of snow processes in climate models. *LMSP Meeting*, Nov. 2-3, 1999.
15. M.H. Conklin, A.M. Kramer, C.J. Peters, R.C. Bales. GLOBE Water Quality Data in Context: A Comparative Study of GLOBE and Government Agency Temperature, pH and Alkalinity Data. Proceedings, *3rd GLOBE Annual Conferenc*e, August 2-7, 1998. Snowmass, CO.
14. R.C. Bales, C.J. Peters, M.H. Conklin, S. Rosengreen. Assessing changes in surface water quality over time using globe transparency and dissolved oxygen data. Proceedings, *3rd GLOBE Annual Conference*, August 2-7, 1998. Snowmass, CO.
13. J.R. McConnell, R.C. Bales, Investigation of the Transfer Function Between Atmosphere and Snow Concentrations of Hydrogen Peroxide at South Pole, In Summary Report No. 24, 1996-1997, National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Laboratory (CMDL), 1998.
12. R.C. Bales. Stream response to snowmelt and rain. Proceedings*, 2nd GLOBE Annual Meeting*, July 21-24, 1997. Airlie, VA.
11. R.C. Bales. Assessing water quality: When, why and where. Proceedings, *2nd GLOBE Annual Meeting*, July 21- 24, 1997. Airlie, VA.
10. J.R. McConnell, R.C. Bales. Investigation of the transfer function between snow and atmosphere concentrations of hydrogen peroxide at South Pole: A cooperative project with NOAA CMDL. In D. J. Hofmann, J. T. Peterson, R. M. Rosson, editors, *Summary Report 1991 - 1995, No. 23,* pp. 132-133. National Oceanic and Atmospheric Administration (NOAA) Climate Monitoring and Diagnostics Laboratory (CMDL), 1996.
09. R.H. Galarraga Sanchez, R.C. Bales. Metodo distributivo para la determinacidn de deshie- los en cuencas de montafia con cobertura nival estacional. In Colegio de Ingenieros Civiles del Guayas, editor, *XVII*

Congreso Latinoamericano de Hidrdulica, Guayaquil, Ecuador, Octubre 21- 25, 1996. Asociacidn Internacional de Investigaciones Hidraulicas.

08. R.C. Bales, R. Galarraga-Sanchez, K. Elder. Distributed approach to modeling snowmelt runoff in alpine catchments. In *Proc. of the Workshop on the Effects of Global Climate Change on Hydrology Water Resources at the Catchment Scale,* pp. 207-217. Public Works Research Institute, Tsukuba, Japan, February 1992.
07. K. Elder, R.E. Davis, R.C. Bales. Terrain classification of snow-covered watersheds. *Proceedings of the Eastern Snow Conference,* 48:39-49, 1991.
06. R.E. Davis, R.C. Bales. Recent developments in snow-chemistry research in the western U.S. In *Proceedings, 47th Eastern Snow Conference,* CRREL Special Report 90-44, pp. 99- 107, 1990.
05. C.P. Gerba, R.C. Bales. Virus transport in the subsurface. In C.B. Fliermans, T.C. Hazen, editors, *Proceedings of the First International Symposium on Microbiology of the Deep Sub-surface, Orlando, FL,* pp. 7:23-7:31. WSRC Information Services, Aiken, SC, January 15-19, 1990.
04. R.C. Bales. Modeling surface-chemical reactions in recharge. In *Groundwater Recharge Processes in an Arid Environment,* pp. 1-5, Tucson, Arizona, 1989. Department of Hydrology and Water Resources, University of Arizona.
03. R.C. Bales. Surface chemistry in water treatment: the solid-liquid interface. In *Proceedings, American Water Works Association 1985 Annual Conference,* Washington, D.C., June 23-28, 1985.
02. R.C. Bales, I.J. Wright, L.E. Larson. 5 MW Refuse-to-Electricity facility in the city of Santa Monica, California. In *Proceedings, BIO-ENERGY '80 World Congress and Exposition.* Atlanta, Georgia, April 21-24, 1980.
01. R.C. Bales, E.M. Biederman, G.A. Arant. Reclaimed-water distribution system planning - Walnut Valley, California. In *Proceedings, First Water Reuse Symposium.* American Water Works Association, Washington, D.C., March 25-29, 1979

Abstracts of conference papers at (inter)national science meetings

Note: R. Bales and co-authors have published over 300 abstracts of presentations at scientific meetings, with the largest fraction being the annual fall meeting of the American Geophysical Union.

OTHER COMMUNICATIONS

Note: In the current socio-political environment it is no longer possible for the research community to just publish research and expect decision makers to use or even acknowledge the findings. It is now well accepted that we must actively socialize our research. Thus, I have made this a central focus of what I do, finding and using effective means of communicating climate solutions to decision makers and the public. I have also engaged many other UC Merced faculty to be interviewees and contributors.

Film and video (partial list)

California's Watershed: Healing. Hour-long documentary film by the non-profit Chronicles Group, planned for release in summer 2022, with screenings followed by PBS nationwide distribution. My roles: Advising on content, connecting film maker with interviewees, and securing funding. Film draws on the main themes of our ecosystem-climate-solutions work and is a sequel to the 2019 watershed film.

Beyond the Brink: California's Watershed. Half-hour-long film by the non-profit Chronicles Group, released on PBS nationwide in 2019. My roles: Advising on content, connecting film maker with interviewees, and securing funding. Film outlines the main challenges and possible solutions at the forest-wildfire-climate-water nexus.

Beyond the Brink. A 90-minute film by the non-profit Chronicles Group, released on streaming video in 2018. My roles: Advising on content, connecting film maker with interviewees, and securing funding. . Film outlines the main challenges and possible solutions at the food-water-climate nexus.

UCTV, Sustainable California channel. While leading UC Water, I engaged several collaborators to launch (fund) this new UCTV channel and push out monthly video clips. No new content added for 2 years during pandemic, and I aim to reengage partners and resume adding new content in fall 2022.

SNRI video. Professionally made 6-minute video now posted on SNRI homepage and also distributed through AGU-TV. Was screened in common areas throughout fall 2019 AGU meeting in San Francisco, as part of a series highlighting research institutes.

Onward California. Four video clips made by D4D for UCOP in 2012 highlighting R. Bales' water-resources research and how it contributes to the state. Aired in various venues, linked below.

Press reports

Note: The press from across TV, radio, magazines, and newspapers in California have interviewed R. Bales on water and climate issues facing the state, and/or wrote about his research. In the 2-year period ending mid 2018 R. Bales was interviewed or his research was written about in over 40 news reports. More recently, the press reports on our climate-solutions and other global-change research have been too numerous to efficiently track. For example, there have been dozens of reprints of our pieces in *The Conversation*, and also of parallel press releases and news items pushed out by UC Merced Communications. In 2022 alone R. Bales has done interviews with major outlets in the U.S. and Europe, including NPR, PBS, BBC, VOA, Time, and other print media. The frequency has often been at more than one per week.

As an indication of the reach of the outlets that R. Bales has worked with, or that reprinted articles on his work, The Conversation reports over 300,000 readers for in 2021-22 for the 4 articles we wrote plus a summary that they wrote on our work (includes outlets that reprinted the articles).

Nationally, in recent years R. Bales has done interviews with Lou Dobbs (Fox), Fresh Air (WBUR, NPR), Science, News Deeply, Physics Today, New York Times (front page of Tuesday Science section), Circle of Blue, Mother Jones, High Country News, Radio and Television of Portugal (RTP), a German TV station, Wall Street Journal, and several smaller outlets. Links to several are at www.rogrbales.com.

Public and stakeholder events (invited)

Note: R. Bales is an invited speaker local, regional and statewide groups. Examples from the past 5 years provided. Recordings of some recent talks are posted online.

April 2022. “Multi-benefit analysis for forest restoration”. Pacific Forest Trust webinar, online.

April 2022. “Multi-benefit, sustainable management of California’s forested headwaters”. North Bay Watershed Association webinar, online.

July 2021. “Hydrology, water resources & the sustainable management of California’s forested headwaters”. Assistant Secretary, California Natural Resources Agency, online.

September 2021. “Multi-benefit, sustainable management of California’s forested headwaters”. California Wildfire Symposium, hosted by UC Vice President for Research, online.

October 2021. “Multi-benefit, sustainable management of California’s forested headwaters”. Yosemite Hydroclimate Meeting, online.

October 2021. “Hydrology, water resources & the sustainable management of California’s forested headwaters”. Briefing, Executive leadership, State Water Resources Control Board, online.

October 2020. “Economic Drivers of Sustainable Forest Management Matter for California’s Headwaters”. Association of California Water Agencies, online.

August 2020. “How California’s geography & climate shape our water security”. California Water Environment Association (CWEA), online.

December 2019. “Forest Restoration: A Water-Resources Perspective”. USDA Climate Hub, with participation of California Natural Resources Agency. San Francisco.

November 2019. “Innovation Center for Advancing Ecosystem Climate Solutions”. Strategic Growth Council, Climate Change Research Program briefing, Sacramento.

October 2019. “Linking Wildfire, Forest Water Use, and Runoff in the Central Sierra”. Yosemite Hydroclimate Meeting, Yosemite National Park.

October 2019. . “Forest Restoration: A Water-Resources Perspective”. California Council for Environmental and Economic Balance, Sacramento.

June 2019. “Evaluating and partitioning the multi-sectoral benefits of forest restoration; including wildfire risk, erosion, air quality, forest health & resilience, and carbon storage”. Mountain Counties Water Resources Association, Auburn, CA.

May 2019. “Forest restoration: a water-resources perspective”. California Air Resources Board Public Meeting, Natural and Working Lands and Carbon Neutrality, Sacramento.

November 2018. “Sierra Nevada forests depend on water stored in weathered bedrock during droughts”. Sequoia-Kings Canyon Science Symposium, Three Rivers, CA.

October 2018. “Forest disturbance, water management & opportunities for landscape restoration”. Yosemite Hydroclimate Meeting, Yosemite National Park.

June 2018. “UC as a scalable collaboratory for society, energy and the environment”. California Higher Education Sustainability Conference (CHESC), held at UC Santa Barbara.

February 2018. “Avoiding California’s next water crisis: lessons from a warming Sierra Nevada”, Ray Dorough Speaker Series, held at Bankhead Theater, Livermore, CA.

October 2017. “Water Security in a changing climate”. Water Boards Water Quality Coordinating Committee Meeting, Sacramento CA.

September 2017. “Comments on 21st Century Water Infrastructure”. Meeting of the California Water Commission, Sacramento CA.

April 2017. “Water Security in a changing climate”. The Association of Water Agencies of Ventura County 25th Annual Water Symposium. Oxnard CA.

Academic talks (invited)

Note: R. Bales has given many invited talks. Examples from the past 5 years listed.

April 2020. “Predicting mountain-ecosystem response to disturbance through scaling subsurface water-storage capacity”. UC Davis seminar hosted by Department of Land, Air and Water Resources, online.

April 2020. “Predicting mountain-ecosystem response to disturbance through scaling subsurface water-storage capacity”. NSF Critical Zone Observatory Webinar series, online.

October 2019. “Achieving California's water security given growing demands, diminishing snow, and increasing wildfire“. UC Berkeley, Department of Civil and Environmental Engineering.

August-September 2018. R. Bales presented 10 invited talks on 3 different topics while on sabbatical in China. Seminar hosts:

- Institute of Soil Science, Chinese Academy of Sciences, Nanjing.
- International Institute for Earth System Science, Nanjing University.
- The Institute of the Earth Environment, Ecology & Environment Division, Chinese Academy of Sciences, Xi’an .
- Northwest University, College of Urban and Environmental Sciences, Xi’an.
- Northwest Institute of Eco-Environment & Resources, Chinese Academy of Sciences, Lanzhou.
- Lanzhou University, School of Earth and Environmental Sciences.
- Institute of Botany, Chinese Academy of Sciences, Beijing.
- Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing.
- Institute of Geographic Sciences and Natural Resources Research, Key Lab of Ecosystem Network Observation and Modeling, Chinese Academy of Sciences, Beijing.
- College of Urban & Environmental Sciences, Dept. of Ecology, Beijing (Peking) University.

December 2017. “Making up for lost snow: lessons from a warming Sierra Nevada: A water-resources & climate-solutions perspective”. Nye Lecture, Cryosphere Section, American Geophysical Union Meeting, New Orleans.

November 2017. “Strategic communications to achieve carbon neutrality within the University of California”, UC President’s Global Climate Leadership Council Meeting, San Diego.

April 2017. “Drought Resilience & Water Security: Observations from the Sierra Nevada”. NSF U.S. Critical Zone Observatory Network, Critical Zone and Society Webinar Series.

February 2017, “Water Security in a Changing Climate: Observations from Drought in the Sierra Nevada”, University of California Irvine, Water-UCI Colloquium Series.

February 2017. “Observations from drought in the Sierra Nevada: evapotranspiration, climate & regolith weathering”. UC Berkeley, Environmental Engineering Seminar.

Scientific meetings

R. Bales and co-authors have made over 300 presentations at national and international scientific meetings, including the annual fall meeting of the American Geophysical Union, the annual spring meeting of the European Geophysical Union, and various specialty meetings and workshops.

MAJOR FIELD PROGRAMS

2013-present. American River Hydrologic Observatory, PI. Built and operated basin-scale, spatially distributed continuous measurements using 140-node wireless-sensor network (plus over 100 repeater nodes), making it the largest off-grid wireless-sensor network. Some nodes continue, and some are being upgraded for long-term operational use. Handed off responsibility to others in 2020.

2007-2021. Southern Sierra Critical Zone Observatory, Principal Investigator and Director. Community platform for critical-zone research. Served dozens of investigators & was core program used by many UC Merced faculty in leveraging other grants. Provided data and field support for many dissertations and high-impact journal papers. Partially replaced by NSFs NEON program, and part transferred to Pacific Southwest Research Station, US Forest Service.

2016-2020. Feather River Hydrologic Observatory, Co-PI. Built and operated sub-basin-scale, spatially distributed continuous measurements using 50-node wireless-sensor network, aimed at improving hydrologic predictions for hydropower operations. Currently being upgraded by DWR for long-term operational use.

2005-2015. Sierra Nevada Adaptive Management Project, Co-PI. Role: Built and operated spatially distributed continuous hydrologic measurement program in 2 sets of paired catchments in the Sierra Nevada, as part of a larger, multi-disciplinary assessment of forest-thinning effects on forest health.

2003-2014. Summit Greenland Baseline Measurement program, PI. NSF-supported measurement program at GEOSummit, for community data.

1999-2011. Greenland Environmental Observatory, Summit (GEOSummit), Founding Director. NSF-supported research facility and one of NOAAs global atmospheric observatories. Continues in operation as Summit Station.

2008-2009. West Antarctic Ice Sheet (WAIS) Divide Ice Coring Program, Investigator. Role: atmospheric chemistry measurements and analysis of shallow cores to establish past atmospheric oxidation capacity.

1995-2007. Program on Arctic Regional Climate Assessment (PARCA), Investigator. Role: drilling, retrieving, and analyzing ice cores across Greenland Ice Sheet to establish multi-century accumulation patterns.

1999-2002. West Antarctic traverse, Investigator. Role: atmospheric-chemistry measurements across West Antarctica and analysis of shallow cores to establish atmospheric-snow transfer function for interpretation of deeper ice cores.

2000. South Pole Ice Coring, PI. Series of shallow ice cores to reconstruct past atmospheric oxidation capacity, and accompanying measurements of atmospheric chemistry.

1996-1998. Siple Dome Antarctic Ice Coring program, Investigator. Role: Sampling and analysis to establish atmosphere-snow transfer function for hydrogen peroxide and formaldehyde.

1996-98. Greenland Ice Sheet 2 (GISP2) Ice Coring Program (3-km core to bedrock), Investigator. Responsibility: atmospheric measurement program and analysis of multi-century cores (100 m depth) to reconstruct past atmospheric oxidation capacity.

1989-1996. Mammoth Mountain Snow Observatory, Investigator. Role: helped to establish long-term research site for snow science and carried out a variety of measurements and experiments at the site (Site managed by UCSB, Sierra Nevada Aquatic Research Laboratory).

1989-1994. Glacier Lakes Ecosystem Enhancement Program (Wyoming), Investigator. Role: helped to establish long-term research site for watershed science and carried out a variety of measurements and experiments at the site (Site managed by Rocky Mountain Forest and Range Experiment Station, U.S. Forest Service).

1991. Borden, Ontario Research Site, Investigator. Role: Set up and carried out field experiments on virus and bacteria transport in a sandy aquifer (managed by University of Waterloo).

1990. Toxic Substances Hydrology Research Site, Cape Cod, investigator. Role: Set up and carried out field experiments on virus and bacteria transport in a sandy aquifer (managed by U.S. Geological Survey).

RESEARCH GRANTS

Current grants

California Strategic Growth Council (Co-PI) 5/19-3/23 (PI: M. Goulden, UCI; 4 Co-PIs) $4,604,000.

California Wildlife Conservation Board, Streamflow Enhancement for the French Meadows Watershed Restoration Program (PI) 4/18-12/22 (2 Co-PIs) $1,020,470.

California Wildlife Conservation Board, Advancing Flow Measurement Capabilities from Forest Restoration in Northern California (Co-PI) 6/20-4/24, $93,744 (UC Merced portion, sub from Pepperwood Foundation).

NSF, Southern Sierra Critical Zone Observatory (PI) 10/13-5/22 (collaborative research, 6 Co-I’s) $6,905,084.

NSF, Facilitating Restoration of Natural Infrastructure Using Uncertainty Communication (co-PI) 8/21-8/23, (PI: Lace Padilla) $300,000.

California Dept. Water Resources & U.S. Bureau of Reclamation, Defining the Rain-Snow Transition Zone

in the Northern Sierra Nevada (PI) 8/20-8/23, $599,697.
USDA, Sustaining California's Food Production Through Integrated Water and Energy Management (Co-PI) 1/18-12/22 (PI: Martha Conklin), $1,343,262.
California Department of Forestry and Fire Protection, Valuation of water and carbon benefits of forest restoration (PI) 4/22-3/25, $99,939 (Graduate support for Han Guo).

Completed grants

California Department of Water Resources, Assessment of Climate Change Effects and Impacts on the Hydrology of Southern Sierra Nevada Basins (PI) 11/17-6/19 (1 Co-PI) $104,433.
Pacific Gas and Electric, Resilient Communities Grant (PI) 9/17-9/19 (2 Co-PIs) $100,000.
Bureau of Reclamation, Hemlock Forest-Restoration Project (Co-PI) 8/17-9/20 (PI: M. Conklin, UCM; 2 Co-PIs) $800,000.
California Energy Commission, improving hydrological snowpack forecasting for hydropower generation using intelligent information systems (co-PI), $499.060 (UC Merced portion).
UCOP, Water security and sustainability research initiative (PI) 1/15-12/18 (collaborative research, 5 Co-I's) $3,529,749.
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)
NSF. Development of a Basin-scale Water-balance Instrument Cluster for Hydrologic, Atmospheric and Ecosystem Science (PI) 7/11-6/15, $1,995,156.
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.
NSF, Continued core measurements at Summit, Greenland Environmental Observatory. 09/09-08/14, (Co-PI. collaborative with DRI), $500,000 UCM budget.
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.
NPS. Vulnerability of sequoia groves to moisture stress under a changing climate (Co-PI) 9/11-1/13, $37,078 (Bales budget)
NPS. SEKI natural resources condition assessment. (PI) 4/11-7/12, $14,375.
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.
NSF. Atmospheric, snow & firn chemistry studies for interpretation of WAIS-divide cores (Co-I) 9/07-8/12, $341,344.
NSF. Sierra Nevada Research Institute Informatics and Data Visualization Center in Yosemite National Park (Co-PI) 01/10-12/11, $411,000.
CA-DWR. Water and climate measurement program, (PI) 1/10-12/11, $300,000.
CA-SNC. Sierra Nevada Watershed Ecosystem Enhancement Program (PI) 5/08-11/11, $47,847.
NSF. Science coordination office for Summit, Greenland Environmental Observatory (PI. collaborative project with UNH), 8/05-7/11, $480,511 Bales budget.
NSF, Core measurements at Summit, Greenland Environmental Observatory. 09/03-02/10, (PI. collaborative with DRI and UC Davis), $939,126 total budget.
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.
NSF. Science planning for WATER and environmental research system network (PI) 5/08-8/09, $56,280.
NASA. Multi-resolution snow products for the hydrologic sciences (Co-PI. subcontract from UCSB) 03/05-12/09, $704,195 Bales budget.
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.
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.
NSF. Technician Support: Phase I: A Multi-purpose Environmental Analytical Laboratory at UC Merced (Co-PI) 12/05-05-10, $149,986.
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.
NSF. Development of a Water-Balance Instrument Cluster for Mountain Hydrology, Biochemistry and Ecosystem Science (PI) 8/06-7/10, $578,171.
LLNL. Integrated measurements and modeling of Sierra Nevada water balance (PI), 2/06-5/08, $99,993.
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.
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.
NSF. Hydrologic investigations within the GLOBE program, (Co-PI) 8/02-7/08, $424,000.
NSF. Antarctic Troposphere Chemistry Investigation (ANTCI) (Co-PI; collaborative research with 16 others), 03/03-03/05, $105,880 Bales budget.
NSF. Record of atmospheric photochemistry at South Pole (PI. collaborative research with DRI), 01/00-12/04, $166,233 Bales budget.
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.
NSF. Science coordination office for Summit, Greenland Environmental Observatory (PI. collaborative project with UNH), 1/00-12/05, $292,137 Bales budget.
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.
NSF. Greenland ice sheet accumulation variability, 8/02-12/04 (PI), $97,899.

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.
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.
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.
NASA. Southwest Regional Earth Science Applications Center (PI. 5 Co-I's), 2/99-12/02, $1,500,000.
NSF. Development of a high-resolution continuous flow analysis system (PI), 6/01-12/02, $113,685.
NSF. Hydrologic investigations within the GLOBE program (PI. 3 Co-PI's), 6/98-8/02, $723,017.
NSF. Snow-atmosphere transfer function for reversibly deposited species in West Antarctica (PI) 6/98-7/03, $345,000.
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.
NOAA. Variability, Social Vulnerability, and Public Policy in the Southwestern U.S. (PI. 6 Co-PI's), 2/98-5/02, $1,611,571.
NASA. Analysis of Ice Cores for Estimating Annual Accumulation in Greenland. (PI. 1 Co-PI), 1/98-12/01, $365,000.
NSF. Transfer function for photochemically produced chemical species in Greenland snow, firn and ice (PI), 1/99-12/01, $270,000.
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.
NSF. Collaborative Research, Biochemical and hydrologic controls on solutes and flowpaths in alpine watersheds (PI) 9/95-8/99, $72,000.
NSF. General education course development for earth system science and global change (PI) 4/95-1/99, $100,001.
NSF. Relationships between air and snow chemistry in winter at Summit, Greenland (PI) 9/96-6/00, $19,404.
NSF. Snow-Atmosphere Transfer Function for Reversibly Deposited Chemical Species (PI), $268,054. 7/93-12/96.
NSF. Distribution of Reactive Chemical Species in Snow and Ice (PI), $190,000 7/92-12/94.
NSF. Modeling Snowmelt Runoff and Chemistry in Alpine Basins (PI) $191,337. 1/93-1/96.
NSF. Scientific Basis for Modeling Snow Distribution and Melt in Alpine Catchments of the Chilean Andes (PI) $22,308. May 1994 to April 1996
NSF. Modeling snowmelt runoff and chemistry in alpine basins of the Sierra Nevada (PI) 8/93-6/98, $30,837.
NIEHS. Effect of Cosolutes on Hydrophobic Contaminant Transport (PI) 4/92-3/95, $452,800.
NIEHS. Subsurface Transport of Biocolloids (Co-I) 3/92-3/95, $360,000.
NSF. Undergraduate Laboratory Improvement for Earth System Science and Global Change (PI) 6/93 to 12/95, $33,215.
NATO. Snow- Atmosphere Transfer Exchange of Chemical Species, Reversibly Deposited to Snow (PI) 10/93-10/94, $7,000.
USDOE. Transport of Subsurface Biocolloids in Porous Media (PI) 8/91-8/94, $292,835.
NSF. Solute Transport in Seasonal Snowpacks. (PI) 1/91-12/93, $236,802.
USEPA. Microscale Kinetic Effects and the Subsurface Transport of Volatile Contaminants (PI) 10/90-9/93, $218,963.
USEPA. Delineation of Wellhead Protection Zones: Considerations of Virus and Bacteria Transport (PI) 9/91-9/93, $199,447.
NSF. Workshop on Processes of Snow- Atmosphere Chemical Exchange (PI) 2/92-8/93, $13,690.
USFS. Development and Application of Snowmelt Modeling for GLEES (PI) 9/91-12/93, $25,000.
Arizona WRRC. Underground Fate and Transport of Microorganisms (PI), 6/90-5/92, $66,735.
NASA. Hydrology, Hydrochemical Modeling and Remote Sensing in Seasonally Snow-Covered Alpine Drainage Basins (Co-I), 7/89-12/90, $21,000.
NIEHS. Subsurface Transport of Biocolloids (PI) 3/90-3/92, $193,947.
NIEHS. Effect of Cosolutes on Hydrophobic Contaminant Transport (PI) 3/90-3/92, $220,205.
USEPA. Sorption and Partitioning of Hydrophobic Ionizable Organic Compounds (PI) 6/97-6/90, $256,803.
USGS. Surface-Chemical Factors Affecting Transport of Bio-colloids in Subsurface Media (PI) 9/87-6/90, $128,873.
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.
USFS. The Transport of Tracer Pollutants through a Layer of Natural Snow Melting in a Controlled Environment (PI) 5/88-5/89, $18,000.
USFS. SO_2 Fumigation of Natural Snow in a Controlled Environment (PI) 3/88-5/88, $5,000.
Salt River Project, Subsurface Removal of Volatile Organic Compounds Using Forced Ventilation (PI) 8/87-9/88, $45,330.
ACS PRF. Effect of Binding Mechanisms on Sorption Kinetics (PI) 9/85-8/87, $15,000.
NSF. Kinetics of Sorption Reactions in Groundwater, (PI) 6/85-12/87, $64,880.
USEPA. Coagulation and Nucleation of Submicron Particles (PI) 6/85-12/87, $94,305.
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.
Federal Water Resources Research Program, Biodegradation of Organic Contaminants in Groundwater (PI) 5/85-6/87, $21,316.
USFS, Fumigation of Snow with SO_2 and NO_2 (PI) 4/85-6/86, $60,000.

PROFESSIONAL SERVICE *(selected)*

Note: In 2011 I made the transition away from serving on national advisory committees, especially those requiring significant travel, to working locally with state agencies

and regional partnerships on within-California priorities. This included providing leadership from my UC position, rather than from advisory-committee membership, on addressing the state's climate and water-resources challenges. For me this as much more impactful service, and accommodated my family obligations.

Note on Critical Zone Observatory (CZO) Network, 2007-2021. As Director of the Southern Sierra CZO, I was heavily involved in CZO network activities, serving the professional community, including significant travel to other CZO sites, to NSF, and to other meetings. One goal, which has seen considerable success, was to engage the research community in better integrating disciplinary research, using the framework of the Earth's Critical Zone. In 2020 NSF launched the Critical Zone Collaborative Network.

2006-2012. Member, Board of Directors, Great Valley Center, Modesto, CA. This non-profit focused on capacity building and other programs to improve institutions and the quality of life in the Central Valley.

2007-2010. Member, science leadership team, WATERS Network (NSF).

2003-2012 Greenland Summit Environmental Observatory, Scientific Director (NSF).

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 that planned and formed the 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.S. 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.

RECENT CONSULTING

2017-present. Blue Forest Conservation, Science Advisor; and development of water-resources data and tools to help increase the pace and scale of forest restoration.

2018-2022, The Nature Conservancy, Tahoe-Central Sierra Initiative (forest restoration and water resources).

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

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

2013-2014, Scott River Watershed Cooperative Planning Group, forest management and water resources.

2009 - 2010, Tetratech, 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.

COURSES TAUGHT

UC 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: Environmental systems, Water Resources, Environmental Systems Seminar (AY 20-21 focus on Environmental Justice).

UC Berkeley

Graduate Level: Water Resources.

U. 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 Hydrology,

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

RESEARCH SUPERVISION

Current Ph.D.: Han Guo.

Current Postdoctoral: Min Gon Chung, Guotao Cui, Weichao Guo (co-supervise), Max Erickson (co-supervise).

Completed, Postdoctoral Researchers

J. Acker (co-supervise), M. Anklin, F. Avanzi (co-supervise), R. Banta (co-supervise), C. Brown-Mitic, J. Burkhart, D.W. Cline (co-supervise), S.R. Fassnacht, R. Ghanbari (co-supervise), M. Glueck, M. Hutterli, H. W. Jacobi, Z. Klos, M. Knifffen (co-supervise), Q. Ma (co-supervise), F. Liu, J. Morrill (co-supervise), R. Ray (co-supervise), D. Rheinheimer, R. Rice, A. Seth (co-supervise), D. Shen, B. Tobin (co-supervise).

Completed Ph.D.

T. Maurer. Development of novel data applications for improving precipitation-runoff modeling in headwater catchments (co-supervise), 2020.

S. Malek. Alpine sensor network system for high-resolution spatial snow and runoff estimation (co-supervise), 2019.

J. Rungee. Estimating plant-accessible water storage through evaluating evapotranspiration in the semi-arid western United States using eddy-covariance, remote sensing, and spatially distributed data. 2019.

Q. Ma. Quantifying forest structure parameters and their changes from LiDAR data and satellite imagery in the Sierra Nevada (co- supervise), 2018.

Z. Zheng. Multi-spatial-scale observational studies of the Sierra Nevada snowpack using wireless-sensor networks and multi-platform remote-sensing data, 2018.

Y. Su. The Use of LiDAR in multi-scale forestry applications (co-supervise), 2017.

Z. Zhang. Basin-scale hydrologic experiment by means of a wireless-sensor network system (co-supervise), 2016.

J. Roche. Evaluating water balance components in the Sierra Nevada: Snowpack sensitivity to climate warming and forest evapotranspiration reduction potential. 2015.

P. Saksa. Forest management, wildfire, and climate impacts on the hydrology of Sierra Nevada mixed-conifer watersheds (co- supervise), 2015.

B. Harrison. Skill evaluation of water supply forecasts in western Sierra Nevada and Colorado River basins, 2015.

S. Masclin, Contribution of sources and sinks to the photochemistry of the present and past atmosphere of West Antarctica based on air, snow and ice-core records. 2014.

P. Kirchner. Snow Distribution over an elevation gradient and forest snow hydrology of the Southern Sierra Nevada, California, 2014.

B. Kerkez. A cyberinfrastructure for the measurement and estimation of large-scale hydrologic processes (co-supervise), 2012.

M. Frey. Hydrogen peroxide and formaldehyde in West Antarctic atmospheres and ice, 2006.

K. Dressler. Estimating the spatial distribution of snow water equivalent and simulated snowmelt runoff modeling in headwater basins of the semi-arid Southwest, 2005.

J. Burkhart. Variability of nitrogen deposition and preservation over the Greenland Ice Sheet, 2005.

N. Molotch. Estimating the spatial distribution of snow water equivalent and snowmelt in mountainous watersheds of semi-arid regions, 2003.

A.M. Kramer-Huth. Geochemical and isotopic mixing models: two case studies in a snow-dominated and semi-arid environment, 2003.

T. Meixner. Alpine biogeochemical modeling: case studies, improvements, and parameter estimation, 1999.

J.R. McConnell. Investigation of the atmosphere-snow transfer process for hydrogen peroxide 1997.

R. Harrington. The release of meltwater and ionic solute from melting snow, 1997.

R.H. Galarraga-Sanchez. Scale effects in determining snowmelt from mountainous basins using a distributed approach for snow water equivalence and radiation, and a point snowmelt model, 1995.

S. Li. Modeling biocolloid transport in saturated porous media, 1993.

R.A. Matzner. Characterization of aza-arene transport in saturated porous media, 1993.

R.A. Wolford. Integrated hydrogeochemical modeling of an alpine watershed: Sierra Nevada, California (co-supervise), 1992.

Z.K. Chowdhury. Coagulation of submicron colloids in water treatment (co- supervise), 1988.

D.L. Pardieck. Biodegradation of phenols in aquatic culture by soil-derived microorganisms, with reference to their fate in the subsurface (co-supervise), 1988.

J.E. Szecsody. Sorption kinetics of hydrophobic organic compounds on organic modified surfaces, 1988.

M.P. Valdez. The incorporation of sulfur dioxide into snow and depositing ice (co- supervise), 1988.

Completed M.S.

M. Pickard. Influence of within-stand tree spatial arrangement on snowpack distribution and ablation in the Sierra Nevada, CA, 2015.

S. Welch. Sensor placement strategies for SWE estimation in the American River basin (co-supervise), 2012.

S. Martin. Erosion in Southern Sierra Nevada headwater catchments, 2009.

C. Peters. Hydrologic resource assessment of Upper Sabino Creek Basin, Pima County, Arizona, 2000.

J. Clemmons. A comparison of water quality methods and data: Globe Program vs. United States Geological Survey, 2000.

J.F. Burkhart Sorption behavior of formaldehyde to ice grains, 2000.

A.M. Kramer. GLOBE water quality data in context: A comparative study of volunteer and governmental agency databases, 1998.

B.D. Wolaver. Comparison of snow distribution methods in the Echaurren Basin, Chilean Andes, 1999.

J.A. Rohrbough. Spatial variability of snow chemistry in a seasonal snowpack, Southeastern Wyoming, 1998.

J.R. Shaw. Modeling of silicate mineral weathering reactions in an alpine basin of the southern Sierra Nevada, California, 1997.

B.J. Cadle. Application of snow distribution models within the Laguna Negra basin, Chile, 1996.

J.R. Winterle. Sorption kinetics of H_2O_2 to snow grains, 1996.

S.M. Carroll. Evaluation of virus removal by sandy soils during soil-aquifer treatment using indigenous bacteriophage as indicator organisms (co-supervise), 1996.
D. McCaulou. Bacteria transport through soil columns, 1993.
T. Kinoshita. Effects of pH and hydrophobicity on the transport of viruses and bacteria in saturated media, 1991.
C.E. Petersen. Ion flux through a shallow snowpack: effects of initial and melt conditions, 1990.
S. Hinkle. Modeling colloid transport in saturated porous media, 1990.
J.G. Van de Water**,** Physical and chemical processes affecting forced ventilation of benzene and p-zylene in a desert soil, 1989.
K. Stocking. Adsorption of MS-2 bacteriophage to silica. Master's thesis, 1989.
K.G. Pill**,** The use of a multiparameter bacterial aquatic toxicity test (co-supervise), 1989.
E. E. Hopkins**,** Characterization of the dissolution of hornblende with application to natural waters, 1989.
D. Hunter. Influence of pH and counterion concentration on the sorption of acridine to unbonded silica, 1989.
T. W. Kroeger. Hydrophobic partitioning of the bacteriophage MS-2, 1989.
P.A. Noppe. Nitrogen cycling at Emerald-Lake watershed, Sequoia National Park. 1989.
J. H. Davis, Sorption and desorption of benzene and p-xylene on an unsaturated desert soil, 1989.
G.E. Kupillas, Development and investigation of a multiparameter microbial toxicity test using the bacterium Salmonella Typhimurium (co-supervise), 1988.
D.G. Kebler. Coagulation of submicron colloids by supramicron silica particles, 1988.
P.W. Lawson. Sorption of fulvic acid on aluminum oxide and desert soil, 1988.
K.L. McClellen. Biodegradation of trichloroethylene by bacteria indigenous to a contaminated site (co-supervise), 1987.
D.A. Stanley. Atmospheric and aqueous flux of sulfur in snow, 1987.
T.W. Whitehead. Sorption and desorption of volatile alkyl halides in a desert soil, 1987.
A. Klein. Sorption reactions of 1,d-Dichlorobenzene in low organic carbon soils, 1986.

ACADEMIC SERVICE

UC Systemwide

2014-present. Member, UC President's Global Climate Leadership Council (GCLC). Current role: As a systemwide Senate appointee, R. Bales has been working with Academic Council to increase communication and engagement of faculty in addressing UCs carbon-neutrality goals, and the further path to our larger goal to help create a more sustainable, equitable, resilient and healthy world. This Council is very active.
2014-present. Member, GCLC Applied Research Working Group (ARWG). This working group was regularly active before the pandemic, in convening UC researchers with state officials, developing research opportunities and looking forward to research that could contribute to meeting UC and state decarbonization goals. Renewed activity planned in fall 2022.
2018-present. Steering Committee Member, California Collaborative for Climate Change Solutions (C4S). An outgrowth of the ARWG, C4S brought together UCs, National Labs, other universities, the private sector, and state officials to develop strategic research opportunities that would contribute to California's energy-transition goals. Discussions are underway about restarting this initiative, as it was less active during the pandemic.
2015-2020: Director, University of California Water Security and Sustainability Research Initiative (MRPI).
2016-2018. Chair, Working Group on Strategic Communication to Achieve Carbon Neutrality within the University of California (TomKat Foundation support).
2012-2016. Researcher and water-initiative co-leader, Center for Information Technology Research in the Interest of Society (CITRIS), UC Berkeley
2009-2013. Member, UC Natural Reserve System Advisory Committee.
2009-2010. Member, .Advisory Panel, Water Resources Center Archives and Berkeley Water Center, Water Data Management Project.
2007-2008. Member, Planning Group for California Climate Solutions Institute (proposal to California Public Utilities Commission and State Legislature.
2006-2008. Member, Academic Senate Committee on Planning & Budget.
2004-2006. Member, Academic Senate Board of Admissions and Relations with Schools (BOARS).
2003-2007. Convener, Multi-campus ad hoc planning group for Sierra Nevada Hydrologic Observatory.

UC Merced

Director, Sierra Nevada Research Institute, 2007-2020. Note that this ORU appointment provided teaching release and precluded senate service at campus level. SNRI Director still has a very high service load.
Director, UC Merced Natural Reserve System, 2008-2013.
Director, Yosemite Field Station, Sierra Nevada Research Station, 2008-2013.
Director, Environmental Analytical Laboratory, 2008- 2013.
National Parks Institute, Steering Committee, Member, 2009-2013.
Academic Surge Building Advisory Committee, Member, 2010.
School of Management planning committee, Member, 2008-2016.
Search Committee, Dean of Engineering, 2009-2010.
Great Valley Center Director Search Committee, 2007-2008.
Senate Committee on Academic Planning and Resource Allocation, 2004-2008. Chair. 2005-2007.
UCM Division Council (2004-2008). Vice-Chair, 2005; 2007-2008.
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 2004-2005.
Undergraduate Council 2003 - 2005.Chair 2004-2005.

UC Merced School of Engineering

Search Committee, Ecological Engineering, Chair. February – June 2014.

Search Committee, Management, Chair. July 2010 - June 2011.

School of Engineering Faculty, Chair, August 2006 - August 2008.

Air pollution faculty search committee, Member 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.

U. Arizona (selected)

2000-2003: Deputy Director (co-leader), NSF Science and Technology Center for the Sustainability of Semi-Arid Hydrology and Riparian Areas, University of Arizona

1998-2003: Lead Investigator, Climate Assessment for the Southwest Project, University of Arizona (stepped down upon leaving to join UC Merced).

2000-2003: Member, Committee on Remote Sensing and Spatial Analysis.

1999-2003: Director, NASA Regional Earth Science Applications Center.

1994-2003: Member, Interdisciplinary Committee for Global Change, Chair 1994-1997.

2002-2003. Advisory committee on focused excellence initiatives for the university, University of Arizona, Provost.

2000-2003. Advisory Committee, Vice President for Research.

1999-2003. Department of Hydrology and Water Resources, Graduate Policy Committee

2000-2003. Faculty Senate, Member.

2000-2002. Faculty status committee, College of Engineering and Mines, Promotion and Tenure.

1997-1999: Acting Director, Institute for the Study of Planet Earth, (organized research unit)

1997-1999. Flandreau Science Center, Science and Technology Working Group (planning for new science museum).