

## **Tess Alethea Russo**

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### **EMPLOYMENT**

- 2017– Research Fellow, Global Good, Intellectual Ventures, Bellevue, WA
- 2017– Assistant Research Professor, The Pennsylvania State University, PA
- 2014– Adjunct Associate Research Scientist, Columbia University, NY
- 2016–17 Rudy L. Slingerland Early Career Professor in Geosciences
- 2014–17 Assistant Professor, Department of Geosciences, Pennsylvania State University, PA
- 2012–14 Postdoctoral Fellow, Earth Institute, Columbia University, NY
- 2008–12 Graduate Student Researcher, University of California, Santa Cruz, CA
- 2006–07 Technical Consultant & Project Manager, Green Building Services, OR
- 2003 Physical Science Technician, Harvard-Smithsonian Center for Astrophysics, MA

### **EDUCATION**

- 2012 Ph. D. Earth and Planetary Sciences, University of California, Santa Cruz, CA
- 2005 B.S.M.E. Mechanical Engineering, Tufts University, MA
- 2003–04 Study abroad, Mechanical Engineering, University College London, UK

### **HONORS AND AWARDS**

- 2016 RL Slingerland Early Career Professorship
- 2016 Penn State Wilson Research Initiation Award
- 2012–14 Earth Institute Postdoctoral Fellowship, Columbia University
- 2010 Charles A. Lawson and Jennifer Denny Lawson Student Award
- 2009–12 National Science Foundation Graduate Fellowship
- 2005 *Summa cum laude*, Tufts University
- 2004 Tau Beta Pi, National Engineering Honors Society

### **PUBLICATIONS** (+Advisee)

- Russo, T. A., K. L. Tully, C. P. Palm, and C. Neill. 2017. Nitrate leaching losses from Kenyan maize cropland receiving different fertilizer treatments. *Nutrient Cycling in Agroecosystems* 108(2):195-209
- Sahoo, S.<sup>+</sup>, T. A. Russo, J. Elliott, and I. Foster. 2017. Machine learning algorithms for modeling groundwater level changes in agricultural regions of the United States. *Water Resources Research* 53(5):3878–3895
- Hoagland, N. E.<sup>+</sup>, T. A. Russo, X. Gu, L. Hill, J. Kaye, B. Forsythe, S. L. Brantley. 2017. Hyporheic zone regulates concentration-discharge relationships in headwater sandstone stream. *Water Resources Research* 53(6):4643–4667
- Alfredo, K. A. and T. A. Russo. Sustainable water-quality in the United States: Urban, Agricultural, and Environmental Protection practices. 2017. *WIREs: Water* 4(5)
- Russo, T. A., and U. Lall. 2017. Depletion and response of deep groundwater to climate induced pumping variability. *Nature Geoscience* 10(2):105-108
- Mirochnick, N.<sup>+</sup> and T. A. Russo. 2016. Successful local adoption and management of a community water system in rural Uganda. *International Journal of Water* 10(4):359-374

- Ho, M., V. Parthasarathy, E. Etienne, T. A. Russo, N. Devineni, and U. Lall. 2016. America's Water: agricultural water demands and the response of groundwater. *Geophysical Research Letters* 43(14):7546-7555
- Sahoo, S. <sup>+</sup>, T. A. Russo, and U. Lall. 2016. Comment on “Quantifying renewable groundwater stress with GRACE” by A. S. Richey et al. *Water Resources Research* 52, DOI:10.1002/2015WR018085.
- Brantley, S. L., R. A. DiBiase, T. A. Russo, Y. Shi, H. Lin, K. J. Davis, M. Kaye, L. Hill, J. Kaye, A. L. Neal, D. Eissenstat, B. Hoagland<sup>+</sup>, A. L. Dere. 2016. Designing a suite of measurements to understand the critical zone. *Earth Surface Dynamics* 4:211-235
- Russo, T. A., N. Devineni, and U. Lall. 2015. Assessment of agricultural water management in Punjab, India using Bayesian methods. In ‘*Sustainability of Integrated Water Resources Management: Water Governance, Climate and Ecohydrology*’. Edited by Shimelis G. Setegn and Maria C. Donoso, Springer.
- Harpold, A. A., J. A. Marshall, S. W. Lyon, T. B. Barnhart, B. Fisher, M. Donovan, K. M. Brubaker, C. J. Crosby, N. F. Glenn, C. L. Glennie, P. B. Kirchner, N. Lam, K. D. Mankoff, J. L. McCreight, N. P. Molotch, K. N. Musselman, J. Pelletier, T. A. Russo, H. Sangireddy, Y. Sjöberg, T. Swetnam, and N. West. 2015. Laser vision: lidar as a transformative tool to advance critical zone science, *Hydrology and Earth System Sciences*, 19:2881-2897, doi:10.5194/hess-19-2881-2015
- Russo, T. A., A. T. Fisher, and B. S. Lockwood. 2015. Assessment of Managed Aquifer Recharge site and influence using GIS and numerical modeling. *Groundwater*, DOI: 10.1111/gwat.12213 (In Press)
- Russo, T. A., K. A. Alfredo, J. Fisher. 2014. Sustainable water management in urban, agricultural, and natural systems. *Water*, 6:3934-3956. DOI: 10.3390/w6123934
- Russo, T. A., A. T. Fisher, and D. Winslow. 2013. Increases in extreme precipitation intensity in the San Francisco Bay Area, California between 1890 and 2010. *Journal of Geophysical Research – Atmospheres*, 118:3392-3401. DOI:10.1029/2012JD018231
- Mankoff, K. D. and T. A. Russo, 2013. The Kinect: A low-cost, high-resolution, short-range, 3D camera. *Earth Surface Processes and Landforms*, 38:926-936. DOI: 10.1002/esp.3332
- Russo, T. A., A. T. Fisher, and J. Roche, 2012. Improving riparian wetland conditions based on infiltration and drainage behavior during and after controlled flooding. *Journal of Hydrology*. 432:98-111. DOI: 10.1016/j.jhydrol.2012.02.022
- Di Stefano, R., F. A. Primini, A. K. H. Kong, and T. A. Russo, 2004. Quasisoft X-Ray Sources: Unusual States of Stellar-Mass Objects, or Intermediate Mass Black Holes? *Astrophysical Journal*, arXiv:astro-ph/0405238v1
- Di Stefano, R., A. K. H. Kong, J. Greiner, F. A. Primini, M. R. Garcia, P. Barmby, P. Massey, P. W. Hodge, B. F. Williams, S. S. Murray, S. Curry, and T. A. Russo, 2004. Supersoft X-Ray Sources in M31. I. A *Chandra* Survey and an Extension to Quasi-soft Sources. *Astrophysical Journal*, 610:247-260.

#### **PUBLICATIONS IN REVIEW AND PREPARATION (<sup>+</sup>Advisee)**

- Russo, T. A., U. Lall, K. Vatta, and R. S. Sidhu. Reversing groundwater depletion in Punjab, India: an analytical framework for sustainable management through agricultural reforms. *Water International* (In Review)
- Tully K. L., T. A. Russo, J. E. Hickman, C. Neill, and C. P. Palm. One size does not fit all: Green Revolution recommendations must be tailored to soil type to prevent nitrogen losses from African soils. (Submitting to *Proceedings of the National Academy of Sciences*)
- Dzwonczyk, J. <sup>+</sup>, T. A. Russo, and K. Calvert. Water use and consumption in the hydraulic fracturing process. (Submitting to *Energy*)
- Nguy-Robertson, A., J. May, S. Darteville, S. Griffin, J. Miller, R. Tetrault, C. Birkett, E. Lucero, T. Russo, M. Zentner. Using multispectral imagery from Google Earth Engine to monitor the elevation of water bodies: Calibrating with altimeter and in situ data. (Submitting to *Remote Sensing of Environment*)

## GRANT SUPPORT

- 2017 (Co-PI) Multilevel methods for numerical modeling with applications in hydrogeology (\$195,275)
- 2017 (Co-PI) STTR Phase I: Smartphone Sensor for Crop Health Assessment and Reduction of Environmental Contamination (\$225,000)
- 2016–18 (Co-PI) Predicting the effects of agricultural intensification on water quality and quantity in the Department of Vichada, Colombia (\$1,200,000)
- 2015–16 (Lead-PI) Water Resource and Economic Benefits of Floodplain Restoration (\$24,456)
- 2014–17 (Senior Personnel) America's Water – The Changing Landscape of Risk, Competing Demands, and Climate (\$2,016,098)
- 2014–16 (Co-PI) Parched Earth: Climate Change, Groundwater Depletion, and the Future of Food Production in North America (\$190,000)
- 2014–15 (Co-PI) Assessing Environmental Risk, Human Rights Impacts, and Community Perceptions in Mining-Affected Areas at the Watershed Scale in Papua New Guinea (\$34,020)
- 2014–19 (Co-PI) Using the Susquehanna – Shale Hills CZO to Project from the Geological Past to the Anthropocene Future (\$4,900,000)
- 2013–14 (Lead PI) The Role of Water in Sustainable Human Development (\$7,880)

## PROFESSIONAL AFFILIATIONS

- 2016 AGU Hydrology: Groundwater Technical Committee Member
- 2016 International Association of Hydrogeologists
- 2015 National Groundwater Association, Scientists and Engineers Board of Directors, Board Member
- 2014 National Groundwater Association, Member
- 2014 Association of Women Geoscientists, Member
- 2008 American Geophysical Union, Member
- 2006 LEED Accredited Professional, U.S. Green Building Council

## FIELD RESEARCH

- 2017 *Morne Bossa, Haiti*

- Collecting surface, spring, and groundwater samples from the vicinity of a planned gold mine  
Quantifying water quality conditions and projecting quality impacts given increased groundwater pumping and effluent discharge associated with the mine
- 2015 *Vichada, Colombia*  
Developing monitoring stations along major tributaries to the Orinoco in areas of agricultural development  
Measuring efficacy of riparian forests as nutrient buffers in tropical system with fire impact and high stage variability
- 2015-17 *Cosumnes River, CA, USA*  
Collecting soil cores for mesocosm experiments to measure relative importance of three different nitrogen cycling pathways  
Estimate water quality benefits of levee removal
- 2015-16 *Porgera, Papua New Guinea*  
Measuring heavy metals in streams near a gold mine  
Modeling metal mobilization based on expected changes when mine stops treating stream water pH
- 2014-17 *Shale Hills Critical Zone Observatory, PA, USA*  
Quantifying controls on stream solute concentration – discharge relationships, including varying flow paths, lithology, and land use
- 2012 *Punjab, India*  
Modeling groundwater availability under current and possible crop scenarios  
Measuring groundwater age to determine recharge dynamics  
Quantifying relationship between groundwater fluctuation, redox changes due to fertilizer leachate, and uranium contamination
- 2009–12 *Pajaro Valley, CA, USA*  
Measuring performance of managed aquifer recharge (MAR) projects  
Modeling impacts of MAR scenarios on groundwater level and seawater intrusion
- 2009–11 *Scott Creek, CA, USA*  
Measuring changes in streambed hydraulic conductivity following fire
- 2008–09 *Yosemite National Park, CA, USA*  
Modeling flood scenarios to increase wetland benefit while conserving water

#### **ORAL PRESENTATIONS** (selected)

- Russo, T. A., S. Sahoo, J. Elliott, T. Troy, I. Foster. Future climate impacts on crop water demand and groundwater longevity in agricultural regions. American Geophysical Union Fall Meeting, San Francisco, 2016.
- Russo, T. A. Agricultural management practices and impacts on groundwater: Two methods for Agricultural-Hydrological assessments. National Groundwater Association, Groundwater Week, Las Vegas, NV, 2016. (*Invited*)

- Russo, T. A. Time series and machine learning methods for groundwater – climate connections. Computation and Applied Mathematics Colloquium, Department of Mathematics, Penn State, PA 2016. *(Invited)*
- Russo, T. A. New agricultural procurement and subsidy programs to sustain food security in India. Food Security and Sustainable Supply Chains, Center for the Economic Analysis of Risk (CEAR), Robinson College of Business, Georgia State University, Atlanta, GA, 2016. *(Invited)*
- Russo, T. A., A. T. Fisher, B. Lockwood, and P. C. Larrauri. MAR site suitability using GIS and modeling: Case studies in coastal California, US and Guanajuato, Mexico. 9<sup>th</sup> International Symposium on Managed Aquifer Recharge, Mexico City, Mexico, 2016.
- Russo, T. A. Agricultural management impacts on groundwater quantity and quality: Root zone to continental scale. Department of Ecosystem Science and Management, Penn State, PA, 2016. *(Invited)*
- Russo, T. A. Groundwater levels, extraction, and climate connections in the United States. Pennsylvania Groundwater Symposium, State College, PA, 2016. *(Invited)*
- Russo, T. A. Extended Learning Session: Agricultural management practices and impacts on groundwater, National Groundwater Association Summit, Denver, CO, 2016. *(Invited)*
- Session Organizer, 16<sup>th</sup> National Conference and Global Forum on Science, Policy and the Environment: The Food-Energy-Water Nexus, National Council for Science and the Environment, Washington D. C., 2016.
- Russo, T. A. Desarrollo Agrícola e hidrología en Vichada: Precauciones, Monitoreamiento, y Proyecciones (Agricultural development and hydrology in Vichada: Lessons, monitoring, and projections). Vichada Department of Agriculture Conference, Puerto Carreño, Colombia, 2015 *(Invited)*.
- Russo, T. A. Is recharge the right metric for sustainable groundwater use? Department of Geosciences, Penn State, State College, PA, 2015 *(Invited)*.
- Russo, T. A. Groundwater levels, extraction, and climate connections in Punjab, India and the United States. School of Engineering, University of Guelph, Canada, 2014. *(Invited)*
- Russo, T. A. Groundwater Depletion in the United States: Mapping, Modeling, and Restoration. Penn State Department of Geography Seminar, PA, 2014. *(Invited)*
- Russo, T. A., A. T. Fisher, and B. S. Lockwood. Assessment of managed aquifer recharge site suitability using a GIS and modeling. 14<sup>th</sup> Biennial Symposium on Managed Aquifer Recharge, 2014. (Presented by Andrew Fisher).
- Tully, K. L., T. A. Russo, J. E. Hickman, C. A. Palm. The effects of African Green Revolution on nitrogen losses from two contrasting soil types in sub-Saharan Africa. American Geophysical Union Fall Meeting, San Francisco, CA, 2013. (Presented on behalf of Katherine Tully)
- Russo, T. A. Managing groundwater depletion: Mapping, modeling, and restoration. Department of Geosciences, Penn State, PA, 2013. *(Invited)*
- Tully, K. L., T. A. Russo, J. E. Hickman, C. A. Palm. The effects of African Green Revolution on nitrogen losses from two contrasting soil types in sub-Saharan Africa. Ecological Society of America Annual Meeting, 2013.

- Russo, T. A. Pt 1. Regional changes in extreme precipitation and Pt 2. Climate data in hydrologic models. Punjab Agricultural University, Ludhiana, India, 2013.
- Russo, T. A., A. T. Fisher, D. M. Winslow. Observations Indicate Regional and Local Increases in Storm Intensity in the San Francisco Bay Area, USA, Between 1890 and 2010. GC11E-05, American Geophysical Union Fall Meeting, 2012.
- Russo, T. A., A. T. Fisher and B. Lockwood. Spatial analysis of suitability for managed aquifer recharge in a groundwater basin in Central coastal California. California Groundwater Association Annual Meeting, Sacramento, CA, 2011.
- Russo, T. A., A. T. Fisher, M. Los Huertos, N. Jacuzzi. Suitability for managed aquifer recharge (MAR) projects within the Pajaro Valley: Update on GIS analysis and percolation evaluation for MAR potential. Pajaro Valley Community Water Meeting, Watsonville, CA, 2011.
- Russo, T. A., A. T. Fisher., and N. Finnegan. Stream channel surface water – groundwater interactions in a fire impacted watershed. Scott Creek Research Symposium, CA, 2010.
- Russo, T. A., A. T. Fisher, and N. Finnegan. Monitoring the impact of fire on stream channel exchange processes and geomorphology. University of California, Santa Cruz, Graduate Research Symposium, 2010.
- Russo, T. A., A. T. Fisher and J. Roche. Development and maintenance of wetland conditions in association with controlled flooding on the Tuolumne River. Upper Tuolumne River Ecosystem Workshop, CA, 2009.
- Russo, T. A., A. T. Fisher and J. Roche. Development and maintenance of wetland conditions in association with controlled flooding on the Tuolumne River. Yosemite Hydroclimatology Conference, CA, 2009.

#### **POSTER PRESENTATIONS (Selected)**

- Russo, T. A., K. Alfredo, and J. Fisher. Sustainable water management in domestic, agricultural and natural systems. American Water Works Association, Sustainable Water Management Conference, 2015.
- Russo, T. A. and U. Lall. Irrigation, Climate, and Groundwater Depletion in Agricultural Regions of the US. GC21B-0531, American Geophysical Union Fall Meeting, 2014.
- Russo, T. A. and U. Lall. Groundwater trends, use, and climate connections in the US. National Science Foundation, Water Sustainability and Climate meeting, 2014.
- Russo, T.A., N. Devineni, U. Lall. Assessment of agricultural water management in Punjab, India using Bayesian methods. H31C-1182, American Geophysical Union Fall Meeting, 2013.
- Russo, T.A., D. Winslow and A.T. Fisher. Extreme precipitation events increasing in the San Francisco Bay Area, CA, USA between 1890 and 2010. EGU2012-964, European Geosciences Union General Assembly, 2012.
- Russo, T. A., A. T. Fisher, R. T. Hanson, and B. Lockwood. Spatial analysis of suitability for managed aquifer recharge in a groundwater basin in central coastal California. H13E-1259, American Geophysical Union Fall Meeting, 2011.

Russo, T. A. and A. T. Fisher. Managed aquifer recharge project suitability in the Pajaro Valley: Future impact on aquifer overdraft and seawater intrusion. University of California, Santa Cruz, Graduate Research Symposium, 2011.

Russo, T. A. and A. T. Fisher. Stream channel surface water – groundwater interactions in a fire impacted watershed. H41G-1183, American Geophysical Union Fall Meeting, 2010.

Russo, T. A., A. T. Fisher, and J. Roche. Improving riparian wetland conditions through evaluation of infiltration and drainage behavior during and after a controlled flood event. H53G-1019, American Geophysical Union Fall Meeting, 2009.

### **TEACHING EXPERIENCE**

2016	Water: Science and Society	Penn State
2015,16	Hydrogeology	Penn State
2015	Karst Hydrogeology	Penn State
2014	Water Systems Analysis, Instructor	Columbia University
2010	Introduction to Geophysics, Teaching Assistant	UCSC
2009	Geology of National Parks, Teaching Assistant	UCSC
2005	Computer Curriculum, Teacher	St. Joseph School, Hilo, HI
2004	“How things work and what they’re made of”, Instructor	Tufts University

### **GRADUATE STUDENT ADVISEES**

2016-	Kalle Jahn	PhD, Penn State	Advisor
2016-	Callum Wayman	MS, Penn State	Advisor
2016-	Kenneth Roop-Eckart	MS, Penn State	Co-Advisor
2015-	Virginia Marcon	PhD, Penn State	Committee member
2015-	Curtis Kennedy	MS, Penn State	Advisor
2014-	Beth Hoagland	PhD, Penn State	Advisor
2014-	Jennifer Estrada	MS, Penn State	Co-Advisor
2016	John Dzwonczyk	MS, Penn State	Committee member
2016	Christopher Ahams	MS, Penn State	Committee member
2014	Hui Wen	MS, Columbia University	Committee member
2014	Aleena Farishta	MS, Columbia University	Committee member

### **UNDERGRADUATE ADVISEES**

2017	Patrick Duggan	Penn State, Honors College
2017	Cecilia Cullen	Penn State
2017	Adam Lewis	Penn State
2016	James Delflumeri	Penn State
2016-18	Madeline Nyblade	Penn State, Honors College
2016	Aaron Seidel	Indiana University, PA
2016	Rochelle Linsenbigler	Penn State
2016	Craig Pezak	Penn State
2015	Molly Cain	Penn State
2015	Kenneth Weiss	Penn State
2013	Kevin Smith	Columbia University

2013	Tamara Harris	Columbia University
2013	Rebecca Winter	Columbia University
2013	Ivan Duschatzky	Columbia University
2013	Antonia Aglialoro	Columbia University

## REVIEWS

*Ecological Indicators*  
*Hydrologic and Earth System Sciences*  
*Journal of Hydrology*  
*Journal of Hydrometeorology*  
*Water*  
*Water Resources Management*  
*Water Resources Research*  
Danish Council for Strategic Research  
US National Science Foundation

## UNIVERSITY COMMITTEE SERVICE

2015-16 Department Chair's Executive Committee  
2015 Department of Geosciences, Faculty Search Committee  
2014-16 Graduate Program Committee  
2014-16 Graduate Admissions Committee

## MEDIA AND PUBLIC PRESENTATIONS

2016 Interviewed for a documentary on Nestle water bottling plant in Pennsylvania  
2015 Isaac Asimov Memorial Debate  
American Museum of Natural History, New York City, NY  
2015 Behind the Science podcast  
2014 Startalk Radio Show with Neil DeGrasse Tyson, Live: Water  
Taped live at the Beacon Theater, New York City, NY  
2014 Presenter, Irrigation.org Webinar  
2014 Scientific American: All the Food, Using Half the Water [Video]  
[http://www.scientificamerican.com/article/all-the-food-using-half-the-water-video/?&WT.mc\\_id=SA\\_BS\\_20140620](http://www.scientificamerican.com/article/all-the-food-using-half-the-water-video/?&WT.mc_id=SA_BS_20140620)  
2014 Green Sense Podcast: Depletion of the US Groundwater Supply  
<http://greensenseshow.com/ways-to-listen/Show.aspx?ShowNum=202>

## INTERNATIONAL COLLABORATIONS

Guelph, Canada	University of Guelph
Bogota, Colombia	Instituto Humboldt
Puerto Carreño, Colombia	Governor and Secretary of Agriculture
Ludhiana, India	Punjab Agricultural University
Delhi, India	Centers for International Projects Trust
Sauri, Kenya	Millennium Villages Project
Guanajuato, México	Comisión Estatal de Aguas de Guanajuato
México City, México	Universidad Nacional Autónoma de México
Mérida, México	Centro de Investigación Científica de Yucatán



Port Moresby, Papua New Guinea  
Lausanne, Switzerland  
Mbola, Tanzania  
Ruhira, Uganda

University of Papua New Guinea  
École Polytechnique Fédérale de Lausanne  
Millennium Villages Project  
Millennium Villages Project