

ACTIVITIES REPORT: JANUARY 1 – DECEMBER 31, 2015

General Description of HRC

The Hydrologic Research Center (HRC) is a publicly-supported non-profit research corporation. HRC was established in July of 1993 in San Diego, California. In October 1998, the Internal Revenue Service affirmed the non-profit status of HRC beyond the advanced ruling period of 5 years. HRC's purpose is to advance the science and engineering of hydrology through research and science cooperation, and to provide technology transfer and hydrologic training services. The National Science Foundation and the National Oceanic and Atmospheric Administration have served as HRC's Oversight Agencies.

HRC utilized the following methods of performing its mission:

- Publishing research and development results in technical reports, refereed journal papers, monographs, books, and written accounts of technical national and international meetings, and through the internet.
- Developing and participating in demonstration projects concerning science-based prototype observation and prediction systems in collaboration with universities, government agencies, and private industry.
- Organizing short courses and workshops on hydrologic and meteorological topics for government agencies, graduate and undergraduate university students and teachers of science.
- Providing research training for graduate and undergraduate students of collaborating universities.
- Offering post-doctoral research positions for advanced training of new Ph.D.s.
- Accepting visiting scholars from U.S. institutions and other countries, and establishing collaborative research and exchange programs with research institutions in the U.S. and abroad.

HRC's Board of Directors:

Dr. Konstantine P. Georgakakos

HRC and Scripps Institution of
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Department of Mathematical Sciences,
University of Wisconsin - Milwaukee

HRC's Officers of the Board:

Mr. Jason Sperflage, Treasurer

Mr. Robert Jubach, Secretary

Dr. Konstantine P. Georgakakos, President

Areas of research, development, and technology transfer include:

Hydrologic Science and Engineering

- (a) Floods, Flood Warning and Flood Control
- (b) Droughts
- (c) Processes of the Global Hydrologic Cycle
- (d) Remote Sensing of Hydrologic State Variables and Fluxes
- (e) Hydrology of Environmental Pollution and Restoration
- (f) Energy Production by Hydrologic Systems
- (g) Hydrologic Applications of Artificial Intelligence

Hydrometeorology

- (h) Precipitation and Surface-Runoff Processes

Hydroclimatology

- (i) Land-Surface/Atmospheric Interactions
- (j) Hydrology of the Interaction of Land and Ocean
- (k) Hydrologic and Water Resources Impacts of Climate Variability and Change

Disaster Management Protocols

Ocean Wave Modeling and Prediction Systems

Personnel

Dr. Konstantine P. Georgakakos, Director and Senior Research Scientist

Mr. Robert Jubach, General Manager

Dr. Nicholas E. Graham, Climate Applications Manager, and Senior Research Scientist

Dr. Rochelle C. Graham, Meteorologist II

Ms. Barbara Hansen, Administrative Associate

Dr. Theresa Modrick, Hydrologic Engineer II

Dr. Ari Posner, Postdoctoral Associate

Dr. Eylon Shamir, Hydrologic Engineer III

Mr. Cristopher Spencer, Computer Programmer/Analyst II

Mr. Jason A. Sperflage, Computer Programmer/Analyst II

Ms. Sheila Ragan, Ocean Point Financial Systems, HRC Senior Accountant (contractor) beginning 10/3/06.

Projects Funded or Ongoing

Autoridad del Canal de Panama (ACP): *Regular Maintenance 2015 and Chagres Distributed Ensemble Forecasting.*

Autoridad del Canal de Panama (ACP): *Regular Maintenance 2016.*

California Department of Water Resources (DWR): *Implementation of Stand-Alone INFORM System for DWR*, completion date: 1 April 2017 (with Georgia Tech as a subcontractor).

NOAA Climate and Society Interaction Sectoral Applications (SARP) in collaboration with the Water Resources Research Center, University of Arizona: *Incorporating Climate Information and Stakeholder Engagement in Groundwater Resources Planning and Management*, 8/1/12 – 7/31/15.

NSF, Hydrologic Sciences, in collaboration with the Laboratory of Tree Ring Research, University of Arizona: *Tree ring signal for interannual and seasonal variability of snow pack in the Sierra Nevada*, 5/1/15 – 4/30/18.

NWS/Office of Hydrologic Development, Indefinite Delivery/Indefinite Quantity solicitation, teamed with Lynker Technologies, Deltares, LEN Technologies, Ace Info, and AMEC: *Hydrologic/Hydrometeorologic Modeling*, 9/26/13 – 9/25/18.

South Africa Weather Service (SAWS): *Upgrade and modification of the South Africa Flash Flood Guidance (SAFFG) System*, 1/31/14 - 3/31/15.

Sultanate of Oman: *Implementation of a Flash Flood Guidance System for the Sultanate of Oman*, 5/19/15 – 6/1/16.

UCAR: *Sensitivity Analysis Assessing the Impact of Gabion Dams and Vegetation on Flood Flows in the Ravine Millett in Haiti*, 9/1/15 – 4/30/16.

UCAR: *Coordination with the Turkish State Meteorological Service (TSMS) to present a four-day workshop at the TSMS in Ankara, Turkey*, 3/30/15 – 9/30/15.

UCAR: *Flash Flood Early Warning System Applications, Kankai River Basin, Nepal and Urban Flash Floods*, 9/26/14 – 5/31/15.

UCAR: *Landslide Hazard Forecast Upgrade for Flash Flood Guidance Systems, Central America Flash Flood Guidance System*, 3/26/15 – 8/31/16.

UCAR: *Enhanced Flash Flood Guidance System Capability to Ingest and Display Multiple Mesoscale Model Precipitation Forecasts, Black Sea Middle East Flash Flood Guidance System*, 11/12/15 - 8/31/16.

UN International Organization for Migration (IOM): *Modelling and Reporting on the Evaluation of the Effectiveness of Check Dams in Ravines Millett & Trouchat in Haiti Using Hydrologic/Hydraulic Modeling*, 10/15/14 – 04/15/15.

Universiteit Gent, Belgian Federal Scientific Policy Office (Belspo): *Patterns and Mechanisms of Climate Extremes in East Africa*, 1/10/13 – 12/31/17.

University of Arizona Board of Regents, on behalf of its Water Resources Research Center with funding from the Arizona Department of Water Resources, Santa Cruz Active Management Area Augmentation and Conservation Fund: *Optimization of Water Resources Management in the Upper Santa Cruz River*, 1/29/15- 11/30/16.

Vietnam Institute of Meteorology, Hydrology and Climate Change (IMHEN): *Development of Flash Flood Guidance Systems to Support Flash Flood Warning in Vietnam*, 10/9/15 – 4/15/16.

West Consultants, *Peer Review of USACE Report on GAO Recommendations*, 10/20/15 - 10/31/15.

WMO: *Development and Implementation of a Flash Flood Early Warning System for the State of Chiapas, Mexico*, 2010 – 2016.

WMO: *Development and Implementation of International Regional Flash Flood Guidance and Early Warning Systems*, Phase II, 2012 – 2017.

WMO: *Haiti Workshop*, 6/10/15 – 8/10/15.

Publications

Research Papers in Journals

Modrick, T.M., Georgakakos, K.P., 2015: The character and causes of flash flood occurrence changes in mountainous small basins of Southern California under projected climatic change. *Journal of Hydrology Regional Studies*, 3, 312-336.

Modrick, T.M., Georgakakos, K.P., Shamir, E. and C Spencer, 2015: Operational Quality Control of Radar Data to Support Regional Flash Flood Warning Systems. *Journal of Hydrologic Engineering*, (in press).

Osuna-Orozco, R., and K.P. Georgakakos, 2015: Assimilation of satellite standing water estimates into an operational soil water model, A Kalman Filtering approach. *Journal of Hydrology*, (in review).

Osuna-Orozco, R., and K.P. Georgakakos, 2015: Review paper, Storm triggered shallow landslides modeling and prediction. *Journal of Hydrology* (in review).

Peleg, N., Shamir, E., Georgakakos, K.P., and E. Morin, 2015: A framework for assessing hydrological regime sensitivity to climate change in a convective rainfall environment: a case study of two medium-sized eastern Mediterranean catchments, Israel. *Hydrology and Earth System Sciences*, 19, 567-581.

Posner, A.J. and K.P. Georgakakos, 2015: Soil moisture and precipitation thresholds for real-time landslide prediction in El Salvador. *Landslides*, DOI 10.1007/s10346-015-0618-x.

Posner, A.J. and K.P. Georgakakos, 2015: Normalized landslide index method for susceptibility map development in El Salvador. *Natural Hazards*: Vol. 79(3), 1825-1845.

Shamir, E., Megdal, S.B., Carrillo, C, Castro, C.L., Chang, H., Chief, K., Corkhill, F.E., Eden, S., Georgakakos, K.P., Nelson, K.M., and J. Prietto, 2015: Climate change and water resources management in the Upper Santa Cruz River, Arizona. *Journal of Hydrology*, 521, 18-33.

Shilo, E., Ziv, B., Shamir, E., and A. Rimmer, 2015: Evaporation from Lake Kinneret, Israel, during hot summer days. *Journal of Hydrology*, 528, 264-275.

Abstracts

Dong-Jun Seo¹, James Brown², **Theresa Modrick**³, **Konstantine Georgakakos**⁴, Sunghee Kim⁵, Hossein Sadeghi⁶, Minxue He⁷, Brett Whitin⁸, Arthur Henkel⁹ and Robert Hartman¹⁰, (1)University of Texas at Arlington, (2)Hydrologic Solutions Limited, (3)Hydrologic Research Center, (4)Hydrologic Research Center, (5)University of Texas at Arlington, (6)University of Texas at Arlington, (7)California Department of Water Resources, (8)NOAA/NWS California-Nevada River Forecast Center,(9)NOAA/NWS California-Nevada River Forecast Center, (10)NOAA/NWS California-Nevada River Forecast Center: On improving ensemble forecasting of extreme precipitation using the NWS Meteorological Ensemble Forecast Processor (MEFP). *2015 AGU Fall Meeting.*

John R Gyakum¹, Barney N Austin², David C Curtis³, Michael Anderson⁴, Holly Alpert⁵, Sarah Young⁶, Al Herson⁷, Andrew Schwarz⁴, ML Levent Kavvas⁸, Ruth Langridge⁹, Elissa Lynn⁴, Jamie Anderson⁴, Kelly T Redmond¹⁰, Michael D Dettinger¹¹, Matthew Correa⁴, Guido Franco¹², Dan Cayan¹³ and **Konstantine Georgakakos**¹⁴, (1)McGill University, Montreal, QC, Canada, (2)Aqua Strategies, Dripping Springs, TX, United States, (3)WEST Consultants, Folsom, CA, United States, (4)California Department of Water Resources, Sacramento, CA, United States, (5)Inyo-Mono Integrated Regional Water Management Program, Lafayette, CO, United States, (6)Santa Clara Valley Water District, San Jose, CA, United States, (7)The Sohagi Law Group, PLC, Sacramento, CA, United States, (8)University of California Davis, Civil, Environmental Engineering, Davis, CA, United States, (9)University of California Santa Cruz, Santa Cruz, CA, United States, (10)Desert Research Institute Reno, Western Regional Climate Center, Division of Atmospheric Sciences, Reno, NV, United States, (11)U.S. Geological Survey, Scripps Institution of Oceanography, La Jolla, CA, United States, (12)California Energy Commission, Sacramento, CA, United States, (13)Scripps Institute of Oceanography, La Jolla, CA, United States, (14)Hydrologic Research Center, San Diego, CA, United States: Producing Scientific and Strategic Guidance for California Department of Water Resources: The Climate Change Technical Advisory Group. *2015 AGU Fall Meeting.* Poster by K.P. Georgakakos: Toward Effective Decision Maker-Scientist Interactions III.

Presentations

E. Shamir: “Vulnerability assessment of precipitation extremes: Water resources and disaster management,” Asia-Pacific Economic Cooperation (APEC) Climate Symposium 2015, Manila, Philippines.

HRC Technical Reports

Limited Distribution Reports

Spencer, C.R., Sperflage, J.A., Shamir, E. and K.P. Georgakakos, 2015: Mexico Mozotal Flash Flood Guidance System (MMFFG) User's Guide. *HRC Limited Distribution Report No. 38*. Hydrologic Research Center, San Diego, CA, 142pp.

Technical Notes

Georgakakos, K.P., 2015: Technical Review of USACE Response to GAO-14-741, Missouri River Flood and Drought Evaluation of the Pros and Cons of Using Probabilistic Forecasting Techniques in Water Management. *HRC Technical Note #81*. Hydrologic Research Center, San Diego, CA. 12pp.

Georgakakos, K.P., Modrick, T.M., and C.R. Spencer, 2015: Climatological bias analysis of remotely-sensed precipitation forcing for regional flash flood guidance systems. *HRC Technical Note No. 80*. Hydrologic Research Center, San Diego, CA. 23pp.

Modrick, T.M., Georgakakos, K.P., Graham, N.E., and J.A. Sperflage, 2015: Evaluation of short-term PANWRF system forecasts. *HRC Technical Note No. 79*. Hydrologic Research Center, San Diego, CA. 43pp.

Georgakakos, K.P., Modrick, T.M., Sperflage, J.A., and C.R. Spencer, 2015: Real-time high-resolution distributed modeling and ensemble forecasting for the Panama Canal upper watershed. *HRC Technical Note No. 78*. Hydrologic Research Center, San Diego, CA. 57pp.

Posner, A.J. and K.P. Georgakakos, 2015: Gabion impact study: Ravine Millet, Port-au-Prince, Haiti. *HRC Technical Note No. 77*. Hydrologic Research Center, San Diego, CA. 43pp.

Georgakakos, K.P., Graham, R., Modrick, T.M., Spencer, C., and J. Sperflage, 2015: Toward a program for rain-induced urban flash-flood warning systems (UFFWS). *HRC Technical Note No. 76*. Hydrologic Research Center, San Diego, CA. 37pp.

Modrick, T.M. and K.P. Georgakakos, 2015: SAFFG system threshold runoff evaluation and update. *HRC Technical Note No. 75*. Hydrologic Research Center, San Diego, CA. 79pp.

Georgakakos, K.P. and R. Osuna-Orozco, 2014: The HRC layered hydrologic soil moisture model (HRC-SML). *HRC Technical Note No. 73*. Hydrologic Research Center, San Diego, CA. 39pp.

Technical Communications

Georgakakos, K.P., Modrick, T.M., Graham, R., Spencer, C.R. and R. Jubach, 2015: Utility of the Flash Flood Guidance System Total Soil Water Saturation Fraction for Agriculture Normalized Deviations from Monthly Climatological Values. *HRC Technical Communication 20150423*. Hydrologic Research Center, San Diego, CA, 12pp.

Posner, A. and Alfaro, R. (NOAA/UCAR), 2015: Summary Report on the Data Collection Trip for the UCAR Landslides Project, 6/7-16/15: San Salvador, El Salvador; Tegucigalpa, Honduras; Panama City, Panama; Guatemala City, Guatemala. *HRC Technical Communication 20150626*, Hydrologic Research Center, San Diego, CA, 10pp.

Posner, A., 2015: Summary Report on the Landslide Hazard Guidance Product Workshop for the UCAR Landslide Project, 9/22-24/15: San Salvador, El Salvador. *HRC Technical Communications 20150930*, Hydrologic Research Center, San Diego, CA 8pp.

Posner, A, 2015: Summary Report on the Data Collection Trip for the UCAR Haiti Project, 11/17-19/15, Port-au-Prince, Haiti, *HRC Technical Communication 20151123*, Hydrologic Research Center, San Diego, CA, 5pp.

External Technical Reports

California Department of Water Resources, Climate Change Technical Advisory Group (K.P. Georgakakos, co-author), 2015: *Perspective and Guidance for Climate Change Analysis*. California Department of Water Resources, Sacramento, California, 92pp. + 2 Appendices. (On line:
http://www.water.ca.gov/climatechange/docs/2015/Perspectives_Guidance_Climate_Change_Analysis.pdf)

Educational, Science Cooperation, and Technology Transfer Activities

January

- R. Graham and R. Jubach traveled to Kathmandu, Nepal to meet with USAID, NGOs, and GoN agencies and then developed a roadmap for application of the SAsiaFFG with a community-based EWS in Nepal, 1/8-17/15.
- K. Georgakakos gave a presentation to HRC staff: Towards Urban Flash Flood Prediction, 1/14/15.
- C. Spencer and J. Sperflage traveled to CHMR Offices in Tuxtla Gutierrez, Chiapas, Mexico for the onsite installation of the Mexico Mozotal Flash Flood Guidance system and training of hosting staff in administration and sustainability of the system, 1/18-24/15.

February

- K.P. Georgakakos led a workshop on Black Sea Middle East FFG and Urban Flash Flooding in Ankara, Turkey, 2/3-6/15.
- HRC held its annual Board of Directors Meeting on 2/16/15.
- T. Modrick gave a presentation to HRC staff regarding the climatological precipitation bias analysis we've recently done for Mexico (and the method is to be applied to all FFG systems), 2/27/15.

March

- E. Shamir gave a presentation to HRC staff on FFG and frozen ground in Central Asia, 3/10/15.
- R. Graham, with the assistance of K.P. Georgakakos and R. Jubach, produced the ninth Flash Flood Guidance Gazette.
- E. Shamir conducted operational workshops at CONAGUA CHMR Offices in Tuxtla-Gutierrez Chiapas, Mexico for Mozotal-Mexico FFG system, 3/22-26/15.
- K.P. Georgakakos and T. Modrick traveled to Skopje, Macedonia to participate in and present technical/development background on the Southeast Europe FFG System for WMO-coordinated workshop with participants from countries ((Albania, Bosnia-Herzegovina, Croatia, Macedonia, Romania, Serbia, Slovenia), Regional Center, and WMO), 3/28/15 - 4/4/15.

April

- K.P. Georgakakos hosted the American Meteorological Society Meeting at HRC and gave a presentation titled Demonstration of Integrated Climate-Weather-Hydrology Forecast and Reservoir Management for Northern California – the INFORM System, 4/14/15.
- E. Shamir gave a presentation at the Santa Cruz River Workshop in Nogales and attended a meetings at the ADWR and Bureau of Reclamation in Phoenix, 4/21-24/15.
- R. Jubach attended a NOAA Financial Assistance Workshop in San Diego, 4/28/15.
- K.P. Georgakakos and T. Modrick traveled to Ankara, Turkey to conduct training workshop on BSMEFFG System for the Turkish State Meteorological Service (TSMS) forecasting division, 4/29/15 – 5/4/15.

May

- T. Modrick and K.P. Georgakakos participated in a planning workshop and presented technical/development background on the Central Asia Regional FFG (CARFFG) System for WMO-coordinated workshop with participants from Central Asia countries (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan), WMO, USAID, RosHydromet, and BSMEFFG/SEEFFG Regional Center, in Ankara, Turkey, 5/5-7/15.

June

- A. Posner traveled to San Salvador, Tegucigalpa, Panama City, and Guatemala City for data collection and workshop preparation in regard to the UCAR Landslides project, 6/7-16/15.
- R. Graham and E. Shamir traveled to Reno and Sacramento for initial field work in regard to the NSF Tree Ring project, 6/7-10/15.
- R. Jubach and E. Shamir traveled to Phnom Penh, Cambodia to participate in a workshop to engage Burma to participate in the MRCFFG program, 6/21-28/15.
- R. Graham and T. Modrick traveled to Port-au-Prince, Haiti to conduct a three day training workshop for 15 participants on the technical background, development and use of the HDRFFG System for the national meteorological service (CNM) and national hydrologic service (SNRE) of Haiti, 6/23-27/15.

July

- Twelve forecasters and hydrologists from Slovenia, Moldova, Albania, Jordan, Croatia, Turkey, Bosnia and Herzegovina, Serbia and the Former Yugoslav Republic of Macedonia came to the Hydrologic Research Center advanced operations training on the South East Europe Flash Flood Guidance (SEEFFG) system, 7/6-8/7/15.
- K. Georgakakos and R. Jubach traveled to Geneva for meetings at WMO, 7/19-24/15.
- K. Georgakakos traveled to Oman to meet with the Department of Meteorology of Oman, 7/24-29/15.
- T. Modrick and J. Sperflage traveled to Oman for Oman FFG Kick-off Workshop, data collection, and IT coordination, 7/23-30/15.
- R. Graham traveled to Reno to collect information for the NSF Tree Ring project, 7/31 – 8/8/15.

August

- C. Spencer traveled to CHMR Offices in Tuxtla Gutierrez, Chiapas, Mexico for supplementary training of the Mexico Mozotal Flash Flood Guidance system for the administrative staff, 8/2-5/15.
- E. Shamir conducted an operational workshops at CONAGUA CHMR Offices in Tuxtla-Gutierrez Chiapas, Mexico for Mozotal-Mexico FFG system, 8/2-5/15.
- E. Shamir traveled to Reno to collect information for the NSF Tree Ring project, 8/5-8/15.
- R. Graham and E. Shamir met with Yoav Freund of UCSD with regards to the NSF project, 8/25/15.

September

- Nine forecasters from South Africa, Malawi, Zambia, Mozambique, Botswana, Zimbabwe, Swaziland, Lesotho came to the Hydrologic Research Center for advanced operations training on the South Africa Region Flash Flood Guidance (SARFFG) system, 9/8 - 10/2/15.
- R. Jubach and T. Modrick traveled to Astana, Kazakhstan to participate in a Steering Committee Meeting and present development and technical background information for CARFFG System. Meeting attended by participants from 3 countries (Kazakhstan, Kyrgyzstan, Tajikistan; Turkmenistan and Uzbekistan not represented), RosHydromet, World Bank, USAID, BSMEFFG Regional Center, and WMO, 9/11-18/15.
- A. Posner conducted a CAFFG Landslide Workshop in El Salvador, San Salvador, 9/21-25/15.

October

- R. Jubach traveled to Pretoria, South Africa to be a presenter/facilitator for a Regional Technical Meeting and User/CONOPS Workshop, Delivery of Warnings for Hydrometeorological Hazards – South Africa Region, and meetings with WMO, USAID/OFDA and nine South African countries, 10/26-30/15.

November

- R. Graham traveled to South Africa. This is the first year of the Twinning Project between the Severe Weather Forecast Development Program and the FFG Program funded by WMO. She trained the participants in the use of the SARFFG system, 11/6-13/15.
- T. Modrick and E. Shamir conducted a Vietnam Operational Flash Flood Systems Initial Workshop in Hanoi, Vietnam, 11/9-11/15.
- A. Posner traveled to Port-au-Prince, Haiti to meet with project partners and gather additional data, 11/16-19/15.
- E. Shamir and J. Sperflage conducted a workshop to present the initial development of the web-portal for the ADWR Climate Project. The workshop was conducted for stakeholders in Nogales, Arizona, 11/30/15.

December

- Two scientists from Vietnamese agencies, Mr. Tuan Le Nghia of IMHEN and Mr. Doan Van Hai of NCHMF, worked together with HRC Staff on understanding the Vietnam Operational FFG System (VNOFFG), and on development and model parameterizations. They worked with precipitation quality analysis, high resolution soils databases for the hydrologic model parameterization, satellite precipitation bias analysis, and stream channel characteristics toward parameterization of threshold runoff for the VNOFFG System.
- HRC leadership and staff held a planning meeting facilitated by Ms. Maria Keckler to develop the basis of a strategic plan for HRC.

Community Outreach Activity

February

- E. Shamir participated in a meeting of the Groundwater Users Advisory Council (GUAC) Santa Cruz Active Management Area, Nogales, AZ, 2/20/15.

April

- R. Jubach arranged for an American Meteorological Society Local Chapter Meeting to be held at HRC, 4/14/15.
- E. Shamir attended a public workshop conducted by the San Diego River Conservancy to get public input for the SDRC Proposition 1 Grant Program, 4/17/15.
- E. Shamir presented a seminar entitled “Water resources planning and climate change: A case study from the Santa Cruz River, Southern Arizona,” at California State University - San Marcos: College of Science and Mathematics, 4/30/15.

August

- E. Shamir attended a meeting regarding San Diego County Flood Control, 8/26/15.
- R. Graham met with Dr. Michael Burin and Dr. Gerardo Dominguez at CSU – San Marcos to discuss collaboration on future projects and development of courses, 8/21/15.
- R. Graham gave a presentation as part of the San Diego Foundation STEAM leadership series. The STEAM (science, technology, engineering, arts and math) Leadership Series, sponsored by The San Diego Foundation, Intellectual Capital, Kids Eco Club, the San Diego Unified School District (SDUSD) and the Education Synergy Alliance, aims to motivate students through a series of lectures from community leaders in the region to think about their dreams, opportunities and future achievements in STEAM-oriented careers, 8/28/15.

September

- E. Shamir was invited to participate in a panel discussion on “Arid Regions Extreme Hydrology: Raining Hard & Heavy – Really?” at the Flood Plan Management Conference in Rancho, Mirage, CA, 9/10/15.

October

- R. Graham mentored an undergraduate student in hydro-ecological project (California State University – San Marcos), Oct – December 2015.
- E. Shamir attended a meeting at Scripps for Kosta on NSF Geosciences structure, Current Emphasis & How it Works by Donna Blackmann, 10/9/15.
- E. Shamir was invited to lecture at the Global Leadership Institute at the School of Global Policy and Strategy, UC San Diego. Lecture title: “Water resources management under future climate uncertainty in the Santa Cruz River, Southern Arizona.” 10/21/15.
- E. Shamir and R. Graham met with Julia Richards and Dustin Harrison, San Diego River Conservancy and Nathaniel Reynolds, CSU - San Marcos to discuss an undergraduate project to research the origin of the Sycamore creek water using oxygen and hydrogen isotopes, 10/26/15.

November

- R. Graham met with Julia Richards and Dustin Harrison, San Diego River Conservancy to provide hydro-ecological expertise (in the form of a site visit and proposal review) for a proposal submitted to Proposition One funding, 11/23/15.

December

- R. Graham worked with California State University – San Marcos to develop an extended learning hydrology program, December 2015.

Throughout the Year

- R. Graham peer reviewed 5 journal manuscripts for: Global and Planetary Change, Tree Ring Research, Trees – Structure and Function, and Plant Ecology. She also reviewed PhD in Forest ecology and Forest Management for Wageningen University and Research Centre, Netherlands.
- R. Graham is acting as advisor to the staff of the College Career and Technology Education for the San Diego Unified School District in the development of project-based learning for grades 7 – 12.
- A. Posner peer reviewed 6 journal manuscripts for: Journal of Hydrology, Geomorphology, Remote Sensing, and Journal of Hydrometeorology.
- E. Shamir was a Guest Editor together with Dr. Megdal from the University of Arizona for the journal of Water Special Issue on Water Governance, Stakeholder Engagement, and Sustainable Water Resources Management. The special issue is planned to be published in October 2016.
- E. Shamir peer reviewed more than 10 journal manuscripts for: Journal of Hydrology, AWRA, Climate, Hydrologic Engineering, JGR-Atmosphere, Water, Remote Sensing, Remote Sensing of Environment, and Stochastic Environmental Research and Risk Assessment.
- K.P. Georgakakos served in a California Department of Water Resources (DWR) Technical Committee that was tasked to define strategies for coping with climate variability and change for the design and sustainability of water resources projects in California (the Committee members received a recognition award from DWR, and he served as the lead author for the final report chapter on recommended future development).
- K.P. Georgakakos served in the San Diego Water Policy Implementation Task Force to guide development of water projects in the City of San Diego.
- K.P. Georgakakos continued to serve as the Chief Editor for the Journal of Hydrology, which ranks among the top influential hydrologic publications worldwide.
- K.P. Georgakakos advised a UCSD Ph.D. Candidate (Mr. Rodrigo Osuna-Orozco) in the area of landslide diagnosis and prediction.
- K.P. Georgakakos continued to serve as a member on the Climate Change Technical Advisory Group (CCTAG) organized by the California Department of Water resources.

Visitors

January

- Dr. Alon Rimmer, Israel Oceanographic & Limnological Research Ltd., The Kinneret Limnological Laboratory (November 2014 – February 2015)

February

- Kevin McKernan, San Diego River Conservancy

April

- American Meteorological Society Local Chapter

July

- WMO S E Europe FFG Training at HRC. Trainees:
 - Klodian Zaimi, Albania
 - Azra Babic and Milica Djordjevic, Bosnia and Herzegovina
 - Toni Jurlina and Petra Mutic, Croatia
 - Dafi Alryalat, Jordan
 - Vasko Stojov, Macedonia
 - Gherman Bejenaru, Moldova
 - Jelena Jerinic, Serbia
 - Andrej Golob and Saso Petan, Slovenia
 - Murat Karackaya, Turkey

September

- WMO FFG SARFFG-SWFDP Training at HRC, 9/8 – 10/2/15. Trainees:
 - Sacrasta Nchengwa and Alice Oabile, Botswana
 - Kuroane Phakoe, Lesotho
 - Yobu Ezra Kachiwanda, Malawi
 - Claire Jacqueline Sendela, Mozambique
 - Christina Thaele, South Africa
 - Buhle Z. Simelane, Swaziland
 - Bathsheba Musonda, Zambia
 - Natasha Chibaura, Zimbabwe
- Nathaniel Reynolds, California State University – San Marcos
- Jim Purpura, WeatherExtreme Ltd.

October

- Dr. Enrique Vivoni, Arizona State University, currently on sabbatical at CICESE (Centro de Investigacion Cientifica y de Educacion Superior de Ensenada)

November

- Gerardo Dominguez, Associate Professor in Physics and Major Advisor, California State University, San Marcos
- Michael J. Burin, Associate Professor of Physics, California State University, San Marcos
- Viet Nam Institute of Meteorology, Hydrology and Climate Change (IMEHN), Hanoi, Viet Nam, 11/22-26/15. Delegates:
 - Mr. Duong Hong Son, Viet Nam Institute of Meteorology, Hydrology and Climate Change (IMEHN), Hanoi, Viet Nam
 - Mr. Hoang Minh Tuyen, Center for Hydrology and Water Resources, IMEHN, Hanoi, Viet Nam
 - Ms. Nguyen Thi Hai, Department of Public Expenditure, Ministry of Finance, Hanoi, Viet Nam
 - Mr. Nguyen Xuan Truong, Department of Finance, Ministry of Natural Resources and Environment, Hanoi, Viet Nam
 - Mr. Pham Trung Luong, Department of Planning, Ministry of Natural Resources and Environment, Hanoi, Viet Nam
 - Mr. Nguyen Duy Binh, Office of Ministry of Natural Resources and Environment, Hanoi, Viet Nam
- Viet Nam FFGS Training at HRC, 11/22 – 12/20/15. Trainees:
 - Mr. Le Tuan Nghia, Center for Hydrology and Water Resources, Viet Nam Institute of Meteorology, Hydrology and Climate Change (IMEHN), Hanoi, Viet Nam
 - Mr. Doan Van Hai, Center for Hydrology and Water Resources, Viet Nam Institute of Meteorology, Hydrology and Climate Change (IMEHN), Hanoi, Viet Nam