

# Newsletter

July 2018

## Hydrology Section

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ADVANCING EARTH  
AND SPACE SCIENCE

## FALL MEETING

Washington, D.C. | 10-14 Dec 2018



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Hydrology

# From the Section President

Jeffrey J. McDonnell (University of Saskatchewan)



Welcome to the Hydrology Section (HS) and our bi-annual newsletter! My term as president is nearing a close, and my successor Scott Tyler

is preparing himself for the transition in 6 months. We have a lot going on at the Union and section level that I hope to cover in this action-packed newsletter. We have statements from our Executive team and our Technical Committee chairs as well as a report by our Ad Hoc Committee on the Future of the HS Technical Committees. We also have candidate statements from our two president-elect candidates: Ana Barros and Larry Band.

**Words of Appreciation:** As always, I first want to thank some key people who have been working hard these past 6 months: Scott Tyler (president-elect), Charlie Luce (secretary), Megan Smith (Program Committee chair), Megan Brown (student chair) and the Technical Committee chairs (Holly Michael, Joseph Alfieri, Marc Kramer, Kaveh Madani, Shirley Papuga, Saman Razavi, Ming Ye, Nandita Basu, Theresa Blume, Sander Huismann, Pierre-Emmanuel Kirstetter, Michael Durand, and Teamrat Ghezzehei). Our WRR editor in chief Martyn Clark has been leading an excellent team and performing Herculean efforts on behalf of our community. In addition, the past 6 months have seen much work by the members of various awards committees. While space limits me from thanking each individually, I do want to thank each of the committee chairs: Scott Tyler (Fellows Section Committee), Dara Entekhabi (Hydrological Sciences Award), Brad Wilcox (Early Career Award), Crystal Ng (Horton

Research Grant Committee), Sally Benson (Witherspoon Lecture Committee), Efi Foufoula-Georgiou (Nominations Committee), Peter Troch (Langbein Lecture Committee), and Charlie Luce (Outstanding Student Paper Award Committee). I also want to thank Jaivime Evaristo again for his outstanding and continued newsletter and website production efforts and Adam Ward for agreeing to chair the new HS Centennial Activities Committee.

**Congratulations:** Congratulations to the newly announced winners of the 2018 Hydrology section awards! (with awards listed alphabetically): Early Career Award, Yoshi Wada (IIASA, Vienna); Horton Research Grants, Brianna Pagán (Ghent University); Caio Reis Costa Mattos (Rutgers University); Frederick Cheng (University of Waterloo); Hydrologic Sciences Award, Bridget Scanlon (UT Austin); Langbein Lecture, Dani Or (ETH Zurich); and the Witherspoon Lecture, Beth Boyer (Penn State University). We will celebrate these awards publicly at the AGU Fall Meeting and during our HS Business Meeting. You will hear much more about the Fellows and Union-level award winners in the coming weeks when AGU makes its announcements. But in the meantime, if you know any of these winners, do drop them a line of congratulation as we all celebrate their accomplishments and contributions to our section!

**The Hydrology Section and the Union:** AGU is an incredible organization with more than 130 dedicated employees. Our Union continues to be a beacon for science leadership and collaboration, talent pool development, organizational excellence, and societal engagement. The Union's ethics policy was recently updated—see the new document at <https://ethics.agu.org/files/2013/03/Scientific-Integrity-and-Professional-Ethics.pdf>.

Planning for the Centennial is in full swing. Check out the Union's Centennial page at <https://centennial.agu.org/> where you will find information on the many planned Union-level activities: field trips and town halls, traveling lecture series, StoryCorps app interviews, engagement with the African Network of Earth Science Universities, Blue Technology clusters around the world, new energy industry highlights, etc. AGU is indeed a terrific home and the future is

“Planning for the Centennial is in full swing.”

# From the Section President (continued)

generally very bright.

But as with any organization, there are challenges from time to time. One such challenge for the Hydrology section is our student funding model within the Union. The money that flows to our section is not scaled to membership size. We are one of three large sections, and our overall membership is ~7,500 of the total 60,000 AGU members. Last year's stats show that the Hydrology section represented 14% of AGU Fall 2017 abstract submissions—more than any other section! But despite this, our student funding is the same as all other AGU sections--\$5,000 per year for their student activities. This model disadvantages the few large sections like Hydrology, where on a per capita basis our student support is a small fraction of what other smaller sections receive, many with ~10 times fewer members. I have been pushing this issue the past year at Council meetings. I will continue to fight for our fair share of resources but I need your help. It would be very useful if each of you could voice your concerns about the current student funding model to the AGU president, Eric Davidson ([edavidson@umces.edu](mailto:edavidson@umces.edu)), and/or the AGU executive director/CEO Chris McEntee ([CMcEntee@agu.org](mailto:CMcEntee@agu.org)). The message is this: All sections should indeed enjoy some base funding for student support. But there should be an additional amount scaled to section size to create per capita fairness across the union.

**Memorandum of Understanding Signed with IAHS:** The AGU Hydrology section has signed an MOU with the International Association of Hydrological Sciences (IAHS) to pursue:

- An exchange of information and possible co-organization or reciprocal support to research initiatives and programs

- An exchange of information and possible co-organization of scientific conferences and workshops
- An exchange of information and possible joint activities concerning educational opportunities, student programs, and professional services
- An expansion of membership of both organizations through networking activities and possible joint programs

I took part in the Vienna, post-EGU Saturday event focused on the 23-Questions initiative and hosted by Günter Bloeschl and the IAHS. You will see engagement of our technical committees in this effort later in the newsletter as they seek to define their main research questions for their sections. I hope this will clarify how the sections relate to each other and how our new members can find kindred spirits within the Hydrology section in terms of research interest similarities. And more important, we can begin to understand how the grand challenges in our field are being addressed by our technical committees through their planned Fall Meeting sessions and activities.

**Hydrology Section Technical Committees:** The Hydrology section has continued our quarterly meetings with the Technical Committee (TC) chairs and Exec Committee over the past 18 months. My main objective with this structure is to better engage the TCs and by association, each of our Hydrology section members, by integrating TCs more into Fall session planning. This was a key recommendation from the Ad Hoc Committee on Fall Meeting planning that I led 2 years ago.

Things are working very well. The Program Committee now liaises with the TC chairs on session development, curation and coordination, and mergers. Some TCs are doing great work and providing a

template for others to follow. One great example is the Ecohydrology Technical Committee (chaired by Shirley Papuga), where they have 27 active members and





## From the Section President (continued)

involvement and engagement of active subcommittees within their TC: an AGU Sessions Subcommittee to help stimulate, promote, and coordinate sessions; an Awards Subcommittee to help stimulate nominations for section awards; a Social Media Subcommittee where their [@aguecohydro](#) account now has more than 1,045 followers; a Student/Postdoc Relations Subcommittee to help with the activities focused on Early Career members; a Centennial Subcommittee focused on AGU 2019 in San Francisco; and a Big Questions in Ecohydrology Subcommittee to help connect their TC to the 23-Questions initiative and other AGU-wide activities related to the Centennial. This really is a terrific model that I encourage other sections and working groups to follow. As a section we are working to find ways to implement such a model more widely and equally across our TCs.

The Rodell Ad Hoc Report on Hydrology Section Technical Committees (see later in this newsletter) will further help to guide the way forward over the coming years. I encourage all to contact a TC and offer up your participation and involvement. We can accommodate up to 30 people for each TC breakfast meeting at the upcoming Fall Meeting in D.C. I hope to see each meeting room filled with enthusiastic volunteers.

**AGU Fall Meeting in Washington, D.C.** We will again try several new things at the next Fall Meeting given the opportunity to experiment in our 2-years away from San Francisco:

**1. An All-Fay Event for our Section.** To continue to try and build community among members during a week with 20,000+ participants and ~100 Hydrology section sessions, we will again run the all-day "Catchment Science Symposium" on the Wednesday of AGU week, led by Jim Kirchner. This will be an opportunity for a large number of our section mem-

bers to spend a day, within the Fall Meeting, in the same room with a larger-than-normal group of colleagues. The goal of the symposium is to be as broad as possible and link to as many of the Technical Committee themes as possible.

**2. Hydrology Section Business Meeting** We will again shift the Langbein Lecture to commence late afternoon on the Tuesday of AGU week (the Witherspoon Lecture will occur on the Thursday). The

Langbein Lecture will then segue to our HS Business Meeting. This event will again be cosponsored with CUAHSI and will be the main networking event of the week. We will have beer and finger food on hand (hopefully this year it will

last longer than last year!) and after our business meeting (with presentation of the Horton Research Grants, WRR Editors Reports etc). We'll then transition into mixing and mingling. Again we encourage graduate students and postdocs to bring their advisors to the gathering, with the hope of using the event as an activity for PhD students, postdocs, and potential advisors to find each other and to get to know one another and build community.

**3. Centennial Session** 100 Years of Progress in Hydrologic Science: This session will be led by Adam Ward (our Hydrology section Centennial Committee chair) along with other colleagues in the section. The session will feature a slate of invited speakers highlighting key advances and changing paradigms in hydrologic science, and the role of our evolving scientific methods and techniques (measurement, modeling, conceptualization, and experimentation) in advancing hydrologic science. The discussion will focus on the difficulties encountered as new ideas develop, surprises, controversy, and the value of science advances for humanity.

“..the Hydrology section represented 14% of AGU Fall 2017 abstract submissions—more than any other section! But despite this, our student funding the same as all the other AGU sections--\$5,000 per year for their student activities.”

## From the Section President (continued)

Our goal for the Hydrology section is to put on a Fall Meeting that causes you to change your research when you return home. Many of our members are working hard to make this happen, and I encourage all who wish to get involved to contact your relevant TC chair and express your interest to him or her for getting involved in next year's meeting.

### Gender Issues Within our Section and Hydrology

**Section Awards Revisited:** In my July 2017 newsletter remarks and my oral remarks at the 2017 Fall Business Meeting in New Orleans, I spoke about some of the ongoing gender diversity challenges within our section, focused specifically on awards. As you know, we mounted an action plan to address this directly, with the assumption that the limited number of total nominations resulted in a lack of diversity in our awards. This year, we focused on increasing the number of nominations to allow excellence to be recognized more widely across our section. The hypothesis was that an increase in the number of nominations would lead naturally to an increase in the number of excellent and diverse candidate nominations.

I am happy to report that our new nomination process netted more nominations than ever before in our history; Hydrologic Sciences Award, up 55%; Early Career Award, up 62%; Langbein Award, up 56%; and the Witherspoon, up 154%. I am also (mostly) happy to report the following stats re: gender within our award nominations. Of the total number of nominations, the following were made up of women candidates: 20% Hydrologic Science Award; 20% Early Career Award; 0% Langbein Award; and 50% Witherspoon. These numbers are now getting closer to our Union demographics where women make up 27% of the total AGU membership and break down across age groups as 43% 20-29 yrs; 31% 30-39 yrs; 23% 40-49 yrs; 18% 50-59 yrs; and 10% 60 yrs and older.

Using excellence as our principal goal and priority for award selection, this greater representation across our membership naturally led to awards being given to excellent scientists of both genders. While I do not pretend that we have solved all of our gender equi-

ty problems, I think this has been a step in the right direction, and I thank everyone for working with me through the process. I know that some of the nomination aspects were cumbersome and some AGU Web information was confusing at times. We are striving to further streamline and improve this process for 2019, when we will repeat this new experimental nomination process.

Last, I have had many discussions with the AGU president, president-elect, and Council along with my fellow section presidents about recognition for our early-career scientists who make up more than half our section membership. In consultation with the Early Career Award chair, Brad Wilcox, I have submitted a proposal to AGU for a change to our bylaws where we increase the number of Hydrology Early Career awards from one to up to three. There is precedent for this in the Atmospheric Sciences section where

“..our nomination process netted more nominations than ever before in our history!”

one of their awards is given up to several people. Of course, we do this too in the Hydrology section with our Horton Research Grant.

The rationale for this change in the number of Early Career Awards is that with the explosion in growth of our early-career members, we need some mechanism to recognize and celebrate their contribution. Up to three awards in any given year helps to achieve this and doesn't diminish the importance and impact of the award(s). Last, in consultation with the Early Career Award chair and committee, starting next year we will enforce our current bylaw stipulation that the Early Career Award is for someone within 6 years of the completion of their PhD. Of course, exceptions to this timeline do exist and can be found in the AGU nomination rules.

As always, I welcome your critical comments and feedback on my remarks and indeed on anything related to our section. I remind everyone of our great good fortune to be part of such a scientific union and to consider donating to the AGU cause—giving back to support the next generation of hydrologists.

Best wishes for a productive and fun summer.

# From the Section President-Elect

Scott Tyler (University of Nevada, Reno)



After a year and a half in the job, I think I am finally getting the hang of it, only to realize after watching Jeff McDonnell that the throttle goes to floor in less than 6 months! It has been an amazing opportunity and I encourage you all to consider becoming a part

of the section leadership. My thanks and encouragement go to Larry Band and Ana Barros, our two outstanding candidates to lead the section starting in 2019. The Hydrology section is a participatory democracy (is there any other kind of democracy?) so get out there and vote, and then get out there and lead!

In this space, I want to review several things that have come before the AGU Council and the Council Leadership Team, of which I am a member. A major focus for all of AGU has been devoted to the Centennial activities that kick off formally at the 2018 Fall Meeting in Washington and finish at our return to San Francisco in 2019. At the 2018 Fall Meeting, the focus will be on accomplishments over the past 100 years and the “Grand Challenges” that face Earth science and scientists. All of the AGU journals will be highlighting these challenges, and I am very happy to report that the editorial board of WRR has really been a leader in developing novel publications. We will also be running special Union-level sessions at the Fall Meeting, including two from Hydrology focusing on (a) Reflections from the past 100 years and (b) Grand Challenges for the future. AGU will be relaxing the rules for first author presentations for these sessions, so it is a tremendous opportunity for both senior AND early-career scientists to participate.

Our Water and Society Technical Committee is partnering with AGU to host a reception at the newly renovated AGU Building in Washington, following an interactive science and policy forum aimed to improve the transfer of knowledge into policy, and the transfer of policy needs down to the research scientist. You will also be seeing a call for Centennial-related proposals to fund creative activities throughout 2019 that can serve to

highlight 100 years of Earth science research. I have already heard several great ideas from our technical committee calls and I expect this call to come out later this summer.

The 2018 and 2019 Centennial meetings will also feature new approaches for scientific engagement, including short (30 minute) tutorials and workshops aimed at the broad AGU audience to introduce issues or techniques to the community. These short sessions will be great opportunities to expand your horizons, and also to give us novel ideas that we can bring back to the classroom. I will try to keep our section membership posted on these and other activities as they come forward.

From the AGU Board of Directors (the group responsible for fiduciary and management matters of the Union), there has been significant discussion over the past few years regarding the Fall Meeting location. Last year, the Board voted to return to San Francisco in 2019 and 2020, but after time, begin a rotation of the Fall Meeting with an anchoring in San Francisco every third year with consideration of other cities in intervening years. Based upon surveys, input from members, and costs, the Board has reaffirmed that rotation, and has also chosen to return to New Orleans in 2021. AGU is in the process of securing bids for host cities in 2022 and 2024. So, for those of you planning your travels well in advance, I summarize these changes below:

2018: Washington, D.C.  
2019: San Francisco, Calif.  
2020: San Francisco, Calif.  
2021: New Orleans, LA.  
2022: To Be Determined  
2023: San Francisco, Calif.  
2024: To Be Determined

And finally, I serve as the chair of our section-level

**“It is critical that we continue to recognize those in the community who have truly made a difference!”**

Fellows Committee, and we have just completed our review of 40 nominations! We had a very efficient and effective committee, Larry Band, Gia Destouni, Praveen Kumar, Alberto Montanari, and Jean Bahr, who put in a great deal of time, including over 8 hours of telephone conference calls to give each of our nominees a thorough evaluation and report. The quality of the nominations was amazing, and it was very good to see that many of the nominators from previous years were able to incorporate suggestions and comments from our committee into their letters and packages. It is always a challenging task given how outstanding all of the candidates were, and this year we were again limited to a total of 20 nominations that we could forward to the Union Committee. Our committee worked closely with other sections and focus group

committees to support our joint nominees, and I am quite optimistic that this will prove to be very successful this year. From all of us on the Hydrology Section Fellows Committee, we want to congratulate all who were nominated this year, and while the competition at the Union level is intense, you should all take pride in being recognized by your section. As I did last year, I will reach out to all the nominators later this summer whose candidates did not make it through the narrow “jet” of the Union Committee to offer guidance and suggestions for the future. And do not hesitate to contact me if you have any questions about the process or seek guidance on how to nominate. It is critical that we continue to recognize those in the community who have truly made a difference!

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## From the Section Secretary

Charlie Luce (United States Forest Service, Boise)



The 2017 Fall Meeting saw an all-time high participation in the Outstanding Student Paper Awards (OSPA) by students. This year 510 presentations were judged, a 19% jump over 2016! From this collection of presentations, 25 students were award-

ed. For a list of winners, see [https://membership.agu.org/ospa-winners/?keyword\\_search=&sectionfocus\\_group\\_or\\_subject\\_matter=22&year-2=1816](https://membership.agu.org/ospa-winners/?keyword_search=&sectionfocus_group_or_subject_matter=22&year-2=1816). The 2017 OSPA committee included Rolf Hut (Delft University), Alicia Kinoshita (San Diego State University), Matthew Weingarten (Stanford University), Heidi Asbjornsen (University of New Hampshire), and the section secretary. The same team will work on OSPA for FM 2018.

Winners are selected based on a combination of score and comments. Comments that explain how their presentation stood out from among the others are particularly helpful for decisions. Good comments provide critical feedback to the student presenters whether they win an award or not. OSPA judging not only has value for recognizing outstanding work; it is a part of how we let students know they are welcome at the meeting, that we are interested in what they

came to say, and that we care about their professional development.

Some examples of useful comments from this year include:

*“As Convener of the [subject] session I can report that all oral student presentations were either very good or outstanding. However, the presentation given by [student] excelled in clear motivation of the topic, the originality of the experimental setup and the great handling of questions.”*

*“You did a great job explaining the poster and responded well to questions. One thing you can do in the future is start out right away explaining the significance of your research in the context of why it matters in the real world.”*

*“Excellent poster! Student was very knowledgeable and willing to answer all of my questions. Excellent figures that broke down the methods and results without having to use an excess amount of text to explain. Excellent job making eye contact, pronunciation, and general explanation of work.”*

*“EXCELLENT talk! Great use of time, clear evolution of ideas. Strong scientific contribution. Clear mastery of your techniques. I am highly impressed*



## From the Section Secretary (continued)

*with the clarity of this talk! If I have a very minor suggestion it is that the talk required following a few mathematical equations. Having read the papers, this was no problem for me, but in the future I personally favor conceptual explanations to help those who don't see the mathematics as you do."*

*"The poster was well organized and offered a pleasing combination of figures, text, and white space. The explanation was engaging but it would be best to start at a higher level (less specific detail) for a general geoscientist."*

The 2017 Fall Meeting was a bit of a nail-biter for sign-ups, but 92% of judging slots were filled by the start of the meeting. We usually do a bit better. The rest of the meeting slots were filled during the meeting. Ninety-three percent of score sheets were received by the deadline. All presentations had at least one

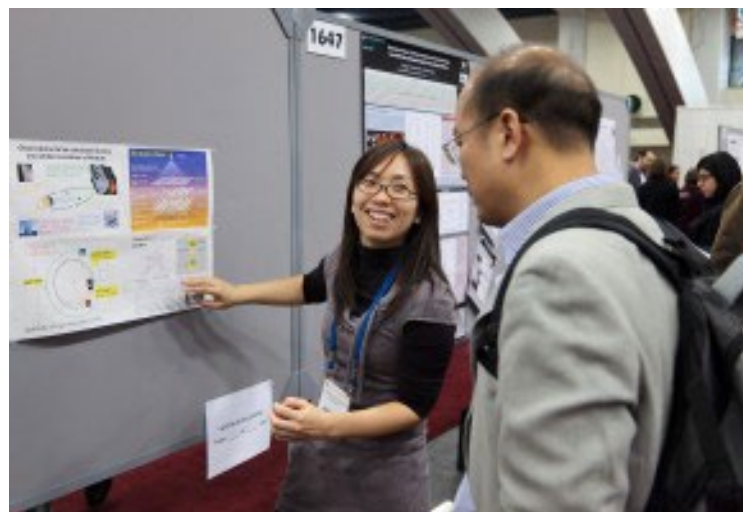
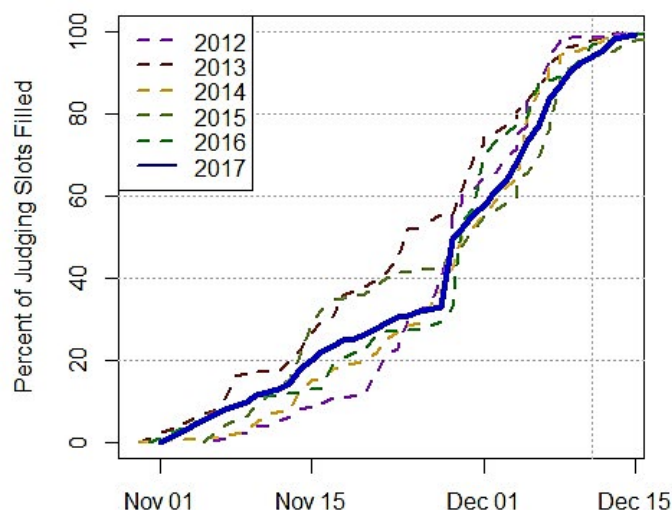
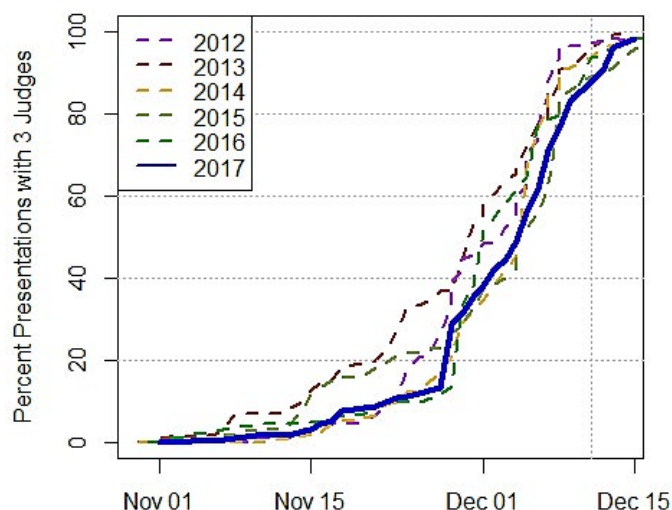


Photo credit: [AGU OSPA](#)

score sheet (even if just re-reporting the student was not present); ninety-eight percent had at least two score sheets, but only 82% had all three score sheets.



Progress on judge recruitment for the 2017 Fall Meeting. The vertical grey line on 33<sup>rd</sup> Dec. denotes the start of the meeting, against which the timing of sign-ups for the historical meetings are normalized.

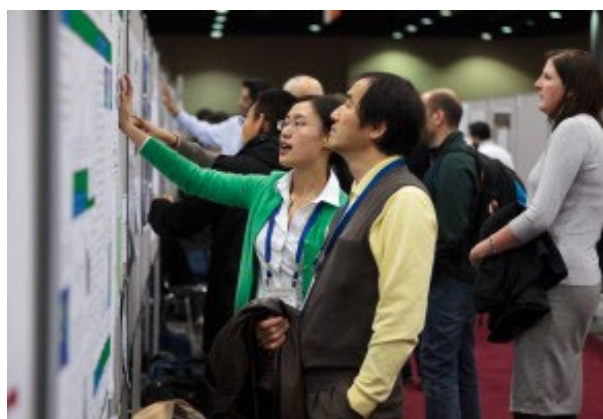


Photo credit: [AGU OSPA](#)

This was not our best outcome as a section, and we will be putting in more efforts to have judges report their scores. Ninety-six percent of presentations received some numerical score, 87% had two numerical scores, and 9% had one. The majority of the lost judging opportunities were reported as the student not being present, particularly in the case of presentations with no scores or only one.

We will be seeking judges again in the fall. Please consider signing up early!



# Section Presidential Election

## Candidate Statements



**Larry Band**  
University of Virginia

I was an assistant professor at Hunter College when I attended my first AGU meeting in Baltimore in 1986, giving an invited talk in a session on “Computer Graphics in Hydrology.” My first paper in WRR had been published in January of that year, following a delay while I traded letters (paper, not email) with editors debating whether pattern recognition of stream networks and watershed structure from newfangled digital elevation models was actually hydrology. I had moved (or blundered) laterally into hydrology, and was certainly not in the mainstream. With prior research and papers in hillslope geomorphology and canopy energy budgets/photosynthesis, I refocused my trajectory to hydrology only after realizing that I needed water as the common currency connecting geomorphology and ecosystems (a manifestation of what I like to refer to as the “centrality” of water). Since that time the Hydrology section has grown rapidly in numbers and scope, and was until recently the largest section at AGU. This growth and evolution occurred at least partially due to similar in-migration of people who saw the light and found a welcoming intellectual home in a section that recognized the strength and opportunity in the intellectual diversity of its members. A glance at the sessions at our meetings shows that the interdisciplinary nature of our community is robust and continue to evolve. While primary membership has remained stable over the past few years with the addition of focus groups and other sections to the Union, we should continue to foster our interdisciplinary culture, while maintaining the centrality of water as our identity. Within the Union this involves promoting our science, nominating leading members for important awards, while building and maintaining strong collaboration with other sections, ranging from jointly sponsored sessions and Chapman Conferences, to the identification of cross-disciplinary AGU Fellow and award nominees.

I have attended almost every AGU meeting over the last 30 years, and have contributed professionally by organizing and chairing sessions, serving as a member and then chair of the Surface Water Committee, as deputy editor of WRR, and on the Hydrology Section Fellows Committee. I was also a member and then chair of the Board of Directors of CUAHSI and had the opportunity to work with a creative group of scientists to generate a strategic plan blending a vision for fundamental science, science translation, and community infrastructure. Prior to my recent move to the University of Virginia, I was director of the Institute for the Environment at the University of North Carolina. The IE integrated hydrologic, atmospheric, and ecosystem scientists, engineers, social scientists, and educational/outreach personnel both within the institute and across campus. We had strong student involvement and an active, NSF-funded water-themed STEM diversity initiative from high school through graduate school. While the Hydrology section has benefited significantly from the diversity of our disciplinary backgrounds and is making good progress in gender and cultural diversity, we have a good deal more to do. Achieving diversity goals requires the development of educational opportunity and equity from prior to university through graduate and postdoctoral ranks, in addition to hiring and promotion in professional ranks. Through my previous positions I learned that we require strong partnership with educational and outreach professionals. As president I would work with the AGU diversity and educational programs to build water-themed initiatives to interest, mentor, and recruit a more representative community of hydrologists.

The Hydrology section is currently strong, benefiting from forward looking leadership, an involved community, and effective communication channels to facilitate the circulation and debate of our science and policy. Promoting and communicating water science as a community is our highest priority. Whoever is the new president-elect and then president will be fortunate to build on active and current initiatives in diversity, communications, and the facili-

## Candidate Statements (continued)

tation of mentorship and networking for students and early-career professionals. To say we live in interesting times is an understatement. Our understanding of the global to local dynamics, feedbacks and trends of water as part of the Earth system and society needs to be facilitated to accelerate fundamental discovery and effective communication well beyond our community. As the premier scientific organization working in the realm of water science, we have a responsibility to provide effective, careful, and properly pitched information, advice, and alerts to existing and potential future states of water availability, extremes, and quality. Interestingly, when properly pitched, the centrality of water can be recognized across the political spectrum as it is acutely present with increased and visible extremes. Our messaging should come directly from our

science, and be facilitated by, but not be the exclusive domain of, the leadership. Working with technical committees, and other standing and ad hoc committees to identify and craft important messaging on our developments in hydrologic science and policy implications, is an important task requiring close communication between our membership and leadership.

It is an honor to be asked by my colleagues to stand for Hydrology section president, something I never expected when I started exploring AGU as an assistant professor. It is also an honor to stand for election with such an excellent colleague and friend, Ana Barros.



Ana P. Barros  
Duke University

I am honored to have been asked to stand as president-elect candidate. In early December of 1989, I took the night train for the

long ride from Portland to San Francisco to attend my first AGU meeting. I did not have a paper to present. My goal was to “see” what it was all about, and learn as much as possible. What I remember from that first meeting is that the whole Hydrology section membership seemed to be packed in the same room most of the time. There weren’t enough chairs, so many of us sat on the floor. I loved it. I went out for dinner with a mix of senior and junior colleagues who didn’t know me but welcomed me anyway, and I am grateful still. EOS proudly reported that 4,618 members registered and 3,300 papers were given at 1989 AGU Fall Meeting. Attendance in 2016 was 24,000 with more than 20,000 oral and poster presentations. The AGU Fall Meeting has become the largest (and greatest) Earth and space science meeting in the world, and there is indeed so much

to celebrate and be proud of in anticipation of the AGU Centennial celebrations in 2019.

The Hydrology section is now 7,000+ members strong. We have been privileged by outstanding leadership in all capacities who stewarded the section through past growth by rethinking and evolving technical committees, reinvigorating WRR, publicizing and elevating the profile and engagement of the membership in the number and types of awards, and in supporting our younger colleagues. It is imperative that we continue forward in the same spirit. Because the current state of the Hydrology section is strong, it seems the next 6 years might be the right time to ask how the Hydrology section can best serve science, its members and society at large beyond what it already does and in preparation for the future. My priority areas for new activities would be as follows:

- (1) To increase participation of the membership in Hydrology section activities, and to foster service entrepreneurship. I should like to work toward improving significantly the fraction of our membership who has been active in one way or another within the section over some reference period of time such as the current election cycle timescale of 6 years. This would include systematically reaching out for volunteer for existing activities, and encouraging and

## Candidate Statements (continued)

supporting grass-root proposals for new targeted activities that may have a limited timespan. One such activity would be the development of an inclusive and proactive membership engagement model. Another could be targeted fund-raising to support special initiatives, such as a Traveling Lecture Series in coordination with ongoing Union efforts.

2. To establish a working group with rotating members focusing on outward communication to enhance the profile of hydrological sciences within and outside AGU, to articulate the strategic needs and aspirations of hydrologic sciences among our many constituencies, and relentlessly monitor and engage opportunities to bring science to the table on water matters in the national and international stages. This working group and/or sub-groups would also engage in strategic thinking to address a broad range of issues from the technological remaking of our computational and data infrastructures in the next decade, the role of robotics in environmental cybersensing, the role of hydrology in the coming of age of environmental and population health sciences; to rethinking the education and career development of the next generation of hydrologists.

joy and growth over the last 25+ years. I have been privileged to serve in many committees within AGU and the Hydrology section in particular, including recently as chair of the College of Fellows Task Force in 2017. Outside of AGU, I was among a small group of idealists who were involved in the architecting and gestation of CUAHSI under the leadership of Doug James and Marshall Moss, and I was elected to the AMS Council and the AAAS Atmospheric and Hydrospheric Sciences Section W. I served as chief editor of the AMS Journal of Hydrometeorology, and I was member of the Space Studies Board as well as many other NRC and national agency panels and committees, including cochairing with Jeff Dozier the hydrology panel of the most recent Decadal Survey. This has given me a deep understanding of the challenges and needs facing our science and our community. Currently, I chair the ASCE Committee on Adaptation to a Changing Climate through fall 2018, and am chair-elect and then chair of AAAS Section W through 2019. Thus, the timing is that I would be available to take on new obligations should I be elected. I thank you for considering me.

Service has been a most treasured source of personal

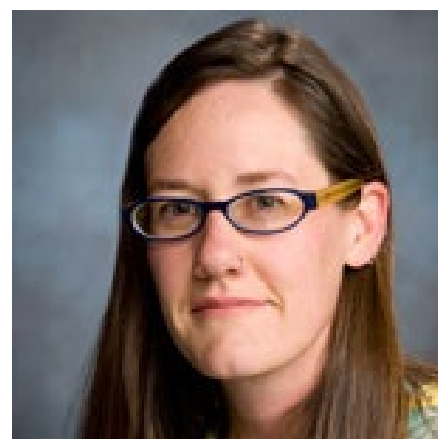
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## Fall Meeting Updates

Megan Smith (Hydrology Section Fall Meeting Committee Chair)

From all of us serving as the Hydrology section's representatives to AGU's Fall Meeting Program Committee, we wish you a great kickoff to this year-long Centennial celebration of the geosciences. The 2018 Fall Meeting will be held close to AGU's headquarters in Washington, D. C. , and we have already been working to shape a meeting that does justice to the breadth and depth of hydrologic science as it has evolved over this past century. Our responsibilities include providing suggestions to continually improve our Fall Meeting, as well as soliciting, reviewing, allocating, and scheduling the scientific sessions (including each and every poster and oral session) that fall under the aegis of the Hydrology section. This year's meeting will bring a range of alternative presentation formats, including more panel-format

and short talk sessions; more available On-Demand content; new Tutorial Talks, intended to provide expert overviews of selected topics for nonexperts from different fields; and the interactive eLightning poster presentation format, now available at no additional registration cost. We are all excited to promote the section's "Centennial Session: 100 Years





## Fall Meeting Updates (continued)

of Progress in Hydrologic Science” session, which should be of interest to scientists at all stages of their careers. Also, be on the lookout for more “pods” this year scattered throughout the meeting space, which should provide convenient spaces to meet with new scientific collaborators or to continue discussions beyond the traditional oral session rooms. And get prepared for the Fall Meeting by keeping current with AGU’s “100 Facts and Figures” campaign and the [#AGU100](#) Twitter feed.

AGU’s abstract submission portal is open and can be accessed [here](#) – those who submit before 25 July are eligible for a \$100 gift card – and the site will remain open until 1 August, with scheduling notifications sent by 1 October. This year the Hydrology section received 156 initial proposals for sessions and we expect to be able to schedule about 100 oral sessions (to

be determined after abstract submissions close).

We on the Fall Meeting Planning Committee have been excited to be part of the planning and

**“We are all excited to promote the section’s Centennial Session: *100 years of progress in hydrologic science* session”**

preparations for this kickoff to AGU’s Centennial year, and look forward to seeing you all in the Nation’s capital.

2018 Fall Meeting Hydrology Program Committee: Megan Smith (LLNL); Laura Bowling (Purdue); Sankar Arumugam (North Carolina State).

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## From the Section Student Subcommittee Chair

Megan Brown (University of Colorado Boulder)



The Hydrology Section Student Subcommittee (H3S) strives to provide a voice and professional development opportunities to students and early-career scientists in our section. We are dedicated to a number of ideas

and values within the geosciences that align well with those highlighted by the larger Hydrology section, including increasing diversity and reaching out beyond the extent of our professional community to the public. In 2017, we organized a number of events in an effort to meet these goals.

During summer 2017, we held an online town hall via our Twitter account, [@AGU\\_H3S](#), where we

asked the community for their thoughts on topics including: how communication in the section can be improved; which activities would be most useful to early-career scientists at the Fall Meeting; and what would improve the Fall Meeting experience for students and early-career scientists. We received some great responses that helped inform our decisions moving forward.

At the 2017 Fall Meeting, H3S was very active. We had several members assist with organization of the Student and Early Career Scientist Conference held on the Sunday before the meeting. We also

organized three workshops on topics ranging from pronouncing unfamiliar names and respectfully introducing oneself to panels on careers in and out of academia. We also organized a poster session fea-

**“We are dedicated to...increasing diversity and reaching out beyond the extent of our professional community to the public.”**

## From the Section Student Subcommittee (continued)

turing different perspectives on increasing diversity, science communication, and outreach. In addition to our workshops and poster session, we co-organized a town hall on publishing with the editors of WRR which was well-received with over 100 attendees and stimulated great conversation on the publishing process. Beyond the official events, H3S also hosted a “Hydro Hunt” scavenger hunt on Twitter for students, early-career scientists, and anyone in the community who was up for the challenge. We had new challenges each day, and prizes!

Looking forward, H3S is planning activities to be organized over the summer and at the Fall Meeting. We will be coordinating a “Haiku Your Research” challenge on Twitter starting in mid-July – so start working on your poetry skills! We are also teaming up with the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI)

to host a cyberseminar in September to discuss how best to organize professional development and other relevant opportunities for the early-career folks. At the Fall Meeting, we plan to host several workshops on professional development skills and career opportunities. In addition, we will be organizing multiple Pop-up Sessions, back in the original format of 5-minute pitch-like talks. Watch for a call for abstracts in early fall!

As we continue to reach out via social media to the members of our growing community, we are always looking for new and improved ways of staying in [touch](#). We share research and professional development opportunities through our Twitter account, [@AGU\\_H3S](#). We have been highlighting our subcommittee members in profile features on the [AGU Tumblr site](#). We hope you reach out to us and participate in our activities this summer and at the Fall Meeting!

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## From Water Resources Research Editorial Board

Martyn Clark (in photo), Jean Bahr, Marc Bierkens, Jim Hall, Charles Luce, Jessica Lundquist, D. Scott Mackay, Ilja van Meerveld, Harihar Rajaram, Xavier Sanchez-Vila, Peter Troch (Editors)

We all love an excuse for a good party. AGU’s 100th birthday is as good an excuse as any – and somewhat fortuitously, AGU’s Centennial occurs during a challenging time for environmental science in the United States, giving us the excuse to celebrate our accomplishments and define a bold vision for hydrologic science over the coming decades. The AGU Centennial provides a wonderful opportunity for us to rise up and proudly share what our science offers to society.

AGU’s Centennial enables us to celebrate what hydrologic science has become and where it could be heading. We will celebrate how our science is used to address critical societal problems, including reservoir design, carbon capture and storage, watershed remediation, streamflow forecasting, increasing food and water security, adapting to a changing climate, and many other problems. We will celebrate the interdis-

ciplinary nature of hydrologic science, and our effectiveness in integrating knowledge and tools from different disciplines to understand and resolve water-related environmental problems. We will celebrate that

better understanding of the hydrological system is key to better understand and predict the Earth system as a whole. We will look forward to the unsolved problems in hydrology, and we will define bold new research strategies to accelerate advances in hydrologic science.



## From Water Resources Research Editorial Board (continued)

As mentioned above, AGU's Centennial celebrations are catalyzed by the current challenges for environmental science in the United States. While changes in society's respect for science may cause us to grieve - e.g., we may be frustrated that some politicians may not share our value for science - there is no need for us to accept that the shift in values in some sections of society is any kind of a "new normal." We need to recognize that the challenge to science constitutes an invitation to step up and share our passion and enthusiasm for science, and for us to rebuild societal value for the benefits of science and scientific discoveries and the rigor of the scientific process. The AGU Centennial is an opportunity for us to stand up and make ourselves heard.

WRR will be celebrating the AGU Centennial with a special section on "game changers in hydrology." Our intent is to focus attention on the evolution of

new ideas and capabilities in the past century. We're interested in the process of discovery - what was the original scientific motivation and science question, what were the difficulties encountered as the research developed, what were some surprises, what were the major controversies, how were science questions refined, how were our historical discoveries/capabilities used in unexpected ways, and how did the research benefit society? We welcome submission of "game changers" presentations to

Session [H030: Centennial Session: 100 Years of Progress in Hydrologic Science](#) at the AGU Fall Meeting, and subsequent submission of papers to WRR either as a commentary or review article. The WRR "game changers" section will focus squarely on research processes and outcomes and highlight what our science offers to society.

The Centennial is just around the corner. Get ready!

### Water Resources Research

AN AGU JOURNAL

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## From Section Technical Committee Chairs

*We asked the technical committees, led by respective chairs, to identify the main research questions for their committees. The goals were to appreciate how the committees relate to each other and how new members can find kindred spirits within our section in terms of research interest similarities. More important, to begin to understand how the grand challenges in hydrology are being addressed by our technical committees through their planned Fall Meeting sessions and other activities.*

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### Ecohydrology



**Shirley A. Papuga**

Wayne State University

Ecohydrology looks at the relationships between biology and water, acknowledging that many hydrologic processes are tightly coupled to biology across a broad range of spatial and temporal scales. It is inherently interdisciplinary, involving not only hydrology and biology but also geology, atmospheric sciences, and increasingly social science research on how society influences and is influenced by ecohydrology. Over the past year our TC has focused on reflecting on the interdisciplinary progress we have made while at the same time growing and broadening our community through social media (e.g., our Twitter handle is [@AGUecohydro](#)). In the spirit of the Centennial cele-

bration, our TC has been introducing a "leaf" on our ecohydrology tree each week to highlight the diversity of our community through our blog: [www.aguecohydrology.org/blog-adding-our-leaves](http://www.aguecohydrology.org/blog-adding-our-leaves). Through this active engagement we were able to conduct an informal survey of the ecohydrology community to arrive at the following "biggest questions":

- 1. How will changes in climate and atmospheric carbon dioxide concentrations influence vegetation-water resources interactions and when and where will we go beyond historical variability?**
- 2. How do the impacts of land use/land cover change, disturbances, climate change, and atmospheric composition on organisms interact to modify the water cycle and its feedbacks within the critical zone?**
- 3. How do organisms adapt in response to water availability and excess - at all timescales - from minutes to a century?**



# From Section Technical Committee Chairs (continued)

These questions reflect key societal concerns about climate change and fossil fuel burning impacts in questions 1 and 2. They reflect a progression from studying pristine landscapes to landscapes where human impacts as part of land cover and disturbance play a key role (question 2). The questions also reflect the bidirectional nature of ecohydrology – e.g., examining not only how vegetation influences the water cycle but also how vegetation responds to changes in water availability. Big questions in ecohydrology will move beyond thinking of vegetation as a static component and accounting for how plant physiology and ecology lead vegetation to adapt to changing conditions, including water availability (question 3).

These “big questions” proposed by our diverse community are necessarily broad. However, many of us are also motivated by more specific questions, some of which may be initially compelling for a subset of the community only, before becoming “the” big question in the future. While there are advantages to offering some “big community” questions, it is perhaps the questions that we don’t even know yet to ask that are most critical. In other words, “big questions” can be sometimes limiting! The diversity of the ecohydrology community is in many ways its strength - and leads to an ever-evolving set of “little” to “big” questions.

## Hydrogeophysics

Hydrogeophysics is the use of geophysical measurements to estimate parameters and monitor processes important for hydrological studies, such as those associated with water resources, contaminant transport, ecological, and climate investigations. The key advantage of hydrogeophysical methods is that they provide spatially continuous or integrated information on the opaque subsurface in a noninvasive manner. However, the relationships between the measured geophysical properties and the hydrological parameters and processes of interest are always indirect and uncertain. For this reason, we are always looking for better ways to extract accurate information from our measurements.



**Sander Huismann**  
Forschungszentrum Jülich

Our method-oriented technical committee is not focussed strongly on fundamental questions about the functioning of hydrological systems, although we all hope and believe that geophysical methods may play a role in addressing some of the challenging open questions for hydrology. In the following, three (partly technical) questions have been formulated that illustrate key challenges to the field of hydrogeophysics. It is important to realize that hydrogeophysical methods are part of a larger toolbox, which has observational tools (remote sensing, point measurements, samples) and analytical tools (models, data mining tools, statistics). However, there is a lack of fundamental agreement on how these tools should be used together. Therefore, a first key question is:

### **1. How can we define a unifying framework for the consistent integration of models with data of varying origin, scale, and uncertainty?**

Hydrogeophysical methods are also increasingly used in critical zone and ecosystem-scale studies that incorporate both below- and aboveground processes, and this has the potential to considerably expand the horizon of traditional hydrogeophysical studies. This new avenue of research poses the following important question:

### **2. What is the role of hydrogeophysics in critical zone and ecosystem-scale studies, and how can hydrogeophysical tools best be used in this larger context in terms of both scales and complexity?**

The third key question is perhaps more provocative. As hydrogeophysicists, we have no problem convincing people that we can provide beautiful images for the covers of reports. However, can we make the point that hydrologists need geophysics? In other words:

### **3. Are geophysical surveys worth the price in hydrological investigations?**

#### Abstract Deadlines



Early Abstract  
Submissions



Final Abstract  
Submissions

## Precipitation



**Pierre-Emmanuel Kirstetter**  
University of Oklahoma

Precipitation is a key hydrologic flux controlling the coupling between the water and energy cycles and their response under a changing climate, as well as the storage, movement, and quality of water across space-time scales. However, precipitation

is challenging to characterize and estimate because of its wide spatiotemporal variability in quantity, intensity, duration, physical state, and processes. The AGU Precipitation Technical Committee brings together hydrologists, atmospheric scientists, and mathematicians to collectively address critical gaps in our knowledge of precipitation processes, as a primary source of freshwater and a driver of natural hazards, its impacts on hydrology and related uncertainties in weather predictions and climate projections. These gaps include: (1) accurate and consistent observations and model estimates of precipitation characteristics on a global scale and with sufficiently high spatial and temporal resolutions, (2) the detection and quantification of phase and process changes at convective and orographic scales at which precipitation triggers natural hazard, (3) estimation of snowfall accumulation and its spatial distribution in mountainous regions, and (4) closure of the water balance from headwater catchments to continental-scale river basins. Key science questions are:

1. How does a changing climate impact the physical processes related to precipitation and, in turn, its space-time distribution, rates (including extremes), and phases?
2. How does precipitation interact with other Earth system processes in the water and energy cycles?
3. How do local and regional society and ecosystems respond to precipitation variability and change?

## Catchment Hydrology

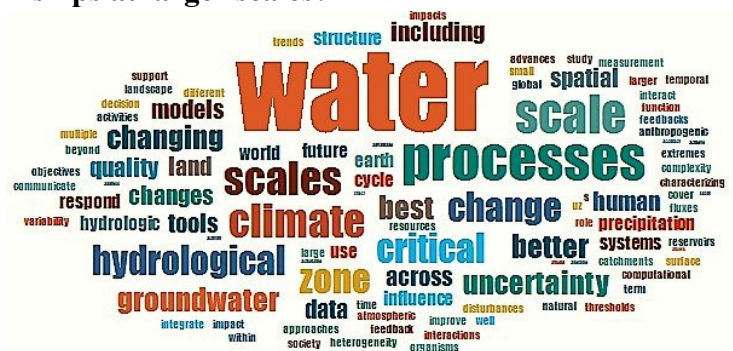


**Theresa Blume**  
GFZ German Research  
Center for Geosciences

Over the last century, catchment hydrology first centered on observational and operational science and then developed a strong modeling focus as computers became more and more powerful and data more available. These models were often

calibrated to observed discharge an integral measure of the catchment response with inherent assumptions of stationarity. Models, in situ measurements, and remote sensing have made technological leaps in recent decades that have led to a more integrative hydrological science, but as global change and its regional impacts have become more pressing, it has become clear that more process understanding is needed to anticipate the hydrological repercussions of these changes. Therefore, the technical committee sees the following questions as central to our field:

1. How will changes in climate and land use or other anthropogenic influences affect our hydrologic systems? What cascading/feedback processes will initiate, and where do thresholds exist and when will they be passed? Is the threshold or feedback behavior alterable?
2. Why do catchments and hillslopes in different regions of the world respond differently to change in climate, disturbance, or land use?
3. Why do small-scale natural heterogeneity and complexity lead to simple patterns/relationships at larger scales?



Word cloud of all TC research questions (by J. Evaristo)

### Uncertainty

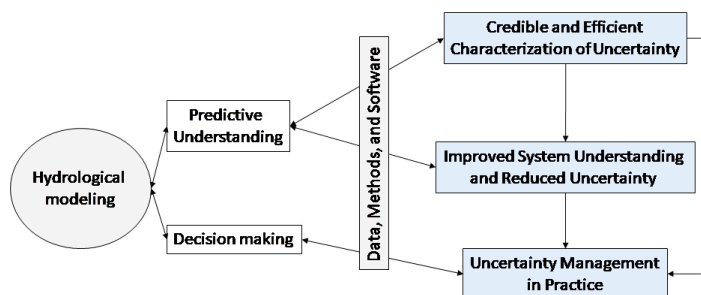


**Ming Ye**  
Florida State University

The Technical Committee (TC) on Hydrologic Uncertainty is transdisciplinary, as uncertainty is an intrinsic property of a wide range of modern hydrological sciences and beyond.

Therefore, this TC is focused on bringing together research efforts that tackle uncertainty from various areas

and promoting them at an overarching level. In particular, this TC addresses methodological issues to handle uncertainty in support of modeling (process understanding, forecasting, and prediction), and decision making (scenario analysis). Its big research questions have already had substantial attention, but still need substantial efforts to obtain widely accepted and sufficiently nuanced answers.



#### 1. How do we improve the credibility and computational efficiency of approaches and tools for characterizing uncertainty in both natural and engineered hydrologic processes?

The challenge for characterizing uncertainty in hydrologic systems is twofold. First, a core concern is adequate representation of what is known and unknown to enable effective reasoning about uncertainty. This becomes more complicated and sometimes intractable in the presence of "deep" and "epistemic" uncertainties, requiring frameworks for representing highly uncertain factors and unknown unknowns in human-water systems. Second, uncertainty in real-world problems typically has to be addressed numerically, which can be computationally intensive, requiring highly efficient algorithms and

software programs. Such problems are often high-dimensional, with a multitude of uncertain factors that need to be characterized. These challenges become further complicated when considering human interventions into natural systems and the resulting collective human-hydrologic behaviours. Therefore, the identification and characterization of dominant controls of uncertainty are key to advancements in hydrologic sciences, thereby reducing uncertainty.

#### 2. How do we reduce uncertainty in understanding, modeling, and predicting the future of coupled human-hydrologic systems?

Research toward reducing uncertainty, informed by efforts for characterization of uncertainty and its dominant controls, faces major challenges due to lack of adequate data and information in support of process understanding and modeling. More effective data-model integration is needed for improved data-informed model development (reducing uncertainty in model structure) and model-informed experimental design (obtaining more useful data). On this basis, development and implementation of more systematic strategies for data collection and unification that target the "right" types of data on dominantly controlling variables of both natural and human-driven processes are essential. This should include identifying new and overlooked data sources (including citizen science) and integrating them across scales. Better data will improve the representation and incorporation of hydrologic and human-hydrologic processes and their feedback mechanisms into models, thereby reducing predictive uncertainty on the future of water resources that can more effectively support decision making.

#### 3. How do we better communicate about uncertainty in support of decision and policy making to best achieve societal objectives?

Uncertainty management in practice makes use of methods for characterization and reduction of uncertainty, but differs in approaches between different subdisciplines of Earth sciences and different policy making contexts. Communication particularly needs work in mixed science-management-stakeholder settings. This would benefit from better integration of uncertainty measures in decision support software as well as better handling of deep uncer-



## From Section Technical Committee Chairs (continued)

tainties and epistemic uncertainty. It also requires greater awareness of the need to reconcile differences in the paradigms guiding uncertainty management in different contexts in science and practice. As such, proper communication and consideration of uncertainty are essential in helping us minimize regrets in decision making when the future deviates from the assumptions we typically hold about it.

### Water Quality

Water quality research seeks to better understand interactions between physical, chemical, and biological processes at all scales, and importantly, to use such understanding to provide resource managers and policy makers actionable solutions to help protect and improve the quality of our surface and groundwater resources under rapidly changing climate, land use, and land management practices. The Water Quality Technical Committee (WQTC) is committed to bringing together researchers working at the intersections of chemistry, biology, and hydrology from the scale of the global landscape down to that of a single soil particle. The WQTC also aims to facilitate research and discussion across disciplines regarding the major issues currently facing the water quality community, including but not limited to urbanization, eutrophication, plastic pollution, acidification, the growing use of nanomaterials, food production, and climate change. Finally, a specific goal of WQTC is to provide opportunities for connection among this diversity of interests and to serve as a bridge between the AGU Hydrology section and the AGU Biogeosciences section.



**Nandita Basu**

University of Waterloo

The three big science questions:

**1. What are the key emerging trends in environmental water quality and water quality assessment?**

**2. How do changing landscape cover and connectivity, as well as changing climate and landscape legacies, impact water quality trends?**

**3. What tools and techniques are necessary to provide actionable inference about water quality improvement?**

### Groundwater

The Groundwater Section encompasses fields within hydrology that deal with subsurface water, including physical, chemical, biological, and geological aspects. The science and its applications are diverse and include the quantity and quality of groundwater supply and its



**Holly Michael**

University of Delaware

sustainability, maintenance of ecosystems, geologic processes such as heat flow, oil and gas production, and geochemical cycles. Groundwater is a vital, integral part of the hydrologic cycle and significantly affects water and solute dynamics in the terrestrial environment. We therefore take a holistic perspective to understanding how groundwater interacts with surface waters, soils, and the atmosphere to shape water and solute movement and fate in landscapes. The many connections between groundwater and other aspects of hydrologic and environmental systems promote interdisciplinary interactions with other AGU sections within Hydrology, including Ecohydrology, Hydrogeophysics, Water Quality, Surface Water, and Water and Society. The research methods deal with the special challenge of access to the subsurface and an always-incomplete knowledge of its properties. As such, we are closely linked to the Hydrologic Uncertainty section. We also interact across AGU disciplines, with linkages to Biogeosciences, Global Environmental Change, Cryosphere, and Atmospheric Sciences. The Groundwater Technical Committee maintains a website (<http://agugroundwater.nmsu.edu/>) with information on activities and contact information for those interested in learning more. Our goal is to foster a collaborative exchange of ideas and promote the development of our understanding of groundwater processes.

## From Section Technical Committee Chairs (continued)

While there are many open and important questions in groundwater hydrology, we put forward three that we consider vital to moving the science forward and protecting our vital resources.

**1. How can we improve the capability of groundwater flow and (reactive) transport models, including characterizing ubiquitous heterogeneity and quantifying uncertainty, moving beyond empirical to more mechanistic models, and taking advantage of computational advances?**

**2. What will be the impacts of climate change and human activities on groundwater into the future, including extreme events, sea level rise, and considering frontier areas such as offshore and the Arctic?**

**3. How can we synthesize processes across diverse spatial and temporal scales and through the groundwater-surface water continuum to understand large-scale groundwater systems and the role of groundwater in shaping and modulating water and solute fluxes from catchments?**

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## Large-Scale Field Experimentation

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Field experiments have long played a key role in advancing the science of hydrology. Observational studies have enhanced our understanding of physical processes, underpinned the development and evaluation of modeling systems, and led to the answers to practical questions posed by the scientific community, industry, and society as a whole.

Today, as the questions driving hydrological research become increasingly complex, there is growing need for large, highly collaborative field campaigns that bring together scientists from a broad range of disciplines and institutions. However, large multifaceted field experiments are not without their own challenges. With this in mind, the Large-Scale Field Exper-



**Joseph Alfieri**  
USDA-ARS

iments Technical Committee, which is tasked with promoting field studies and the discussion of both the outcomes and application of observational research, has identified several key questions that need to be addressed to ensure that the hydrological and broader scientific communities continue to move forward.

The first of these challenges, or questions is: **How do we best integrate research objectives and approaches that span multiple disciplines into a single field study?** As the underlying questions driving research become increasingly complex, there is a growing need to take an interdisciplinary approach to answering them. Interdisciplinary research requires scientists with differing backgrounds and expertise to understand the unique objectives, methods, and needs of all of the members of the research team. It also requires them not only to identify both shared goals and areas of potential conflict, but also to develop a synergistic experimental plan that will satisfy the needs of the entire research team.

Large multidisciplinary field experiments also produce large amounts of diverse data. **The second question is: How do we best organize, manage, analyze and visualize the large complex data sets?** This is the classic “Big Data” question. There are number of issues inherent to the rich data sets collected as a part of large interdisciplinary field experiments. Beyond just the volume of data, the data sets collected as a part of large field campaigns often contain a range of data types, sometimes with incompatible formats and structures, that represent multiple spatial and temporal scales. Additionally, the information stored within the metadata files can vary significantly depending on the historical practices and needs of research community collecting the data. In order to correctly analyze the data, understand the results, and answer the questions motivating the research, the difficulties of managing and working with such large and complex data sets need to be addressed.

While the first two questions focus on the logistics of fieldwork, the final question focuses on expanding the value and utility of the data sets that took so much time, resources, and effort to collect in the field. The final question is: **How do we best scale data (either up-scale or downscale) from the measurement scale to the scale of the analysis or application?** Hydrological processes take place over a range of spatial

## From Section Technical Committee Chairs (continued)

scales from less than a meter to hundreds of kilometers and temporal scales from minutes to decades. Moreover, the interplay of these processes across scales is often strongly nonlinear. Thus, translating a measurement, which represents a specific spatial domain and time period, from one scale to another is not a trivial task. Robust scaling methods are key to maximizing the value of the data sets collected as a part of field experiments.

### Remote Sensing



**Michael Durand**  
Ohio State University

The Remote Sensing Technical Committee is interested in measuring hydrological processes from spaceborne and airborne remote platforms. And data from sensors mounted on satellites, aircraft, and UAVs show tremendous promise: They

allow inspection of spatial and temporal processes across a wide range of spatial scales, and enable us to ask new questions (or to revisit old questions) about how the water cycle works. But remote sensing data are usually a bit complicated: They might come at spatial or temporal resolutions very different than those measured in the field, or they might be of a quantity that is only somewhat related to what a researcher is interested in. As a result, the remote sensing community has been on a decades-long journey to explore new sensors, develop new methods to relate remotely sensed quantities to fundamental quantities (i.e. fluxes and storages) of interest, and to show the way forward in doing new science and applications with the data.

Much of the history of hydrologic remote sensing science is driven by opportunism: What sensors might be of use in understanding hydrological processes? To address this pragmatic question, we study how to employ the measurements currently available from governmental and commercial remote sensing platforms, as well as emerging sensing technologies and data fusion methodologies, in order to better understand the water cycle. We are also forward-looking: We explore what future remote sensing platforms are needed in order to better compensate for the failings

of our current sensors. We spend a great deal of time perfecting our methods: How can we best extract information about hydrological processes from remotely sensed quantities? To answer this, we develop “retrieval algorithms” to estimate hydrological quantities from remotely sensed information. Then we work to characterize the accuracy, precision, and spatial and temporal resolution at which hydrological processes can be resolved using various sensors and retrieval algorithms.

Exploration of new sensors and development of new retrieval algorithms are always in service of the big questions, which motivated us in the first place. Here are some examples:

- 1. How much water is there in the world, and how is it distributed among various reservoirs (soil moisture, groundwater, surface water, and snow)? Mapping these quantities allows us to study processes that control the water cycle at the largest spatial scales.**
- 2. In what ways and in what locations is the hydrological cycle changing, and what are the causes of these changes? Humans are increasingly a part of the equation, e.g., via regulation of river flows in reservoirs.**
- 3. To what accuracy can hydrological processes be predicted and forecast, including hydrological extremes, and future long-term hydrological changes? We believe remote sensing data can help better address both the practical requirements of short-term hydrological forecasts, and the far-reaching consequences of global change on water resources.**

### Water and Society



**Y.C. Ethan Yang**  
Lehigh University

In the Water and Society Technical Committee, we study how human water systems affect and are affected by the natural system, and we have been focused on the technical side of ultimate water management practices, but lately we’ve realized that effective engagements with stakeholders at different levels is



## From Section Technical Committee Chairs (continued)

the key to persuading a better water decision-making, so therefore we've amended our research focus toward the following three emerging science questions.

### 3. How can we better characterize human activities and integrate those in process-based water modeling at different spatial scales?

This question intends to address the quantification of human activities (including implicit changes such as return flow) and couple that into the evaluation and modeling of water resources and water-related disasters. The spatial scale can be as large as the global scale land surface hydrologic model or as small as the urban/city scale water infrastructure model. The utilization of qualitative data from social science (interview or focus group discussion) is a notable concern.

### 2. How can we better communicate scientific results to the general public and inform policy-making?

This question addresses the fundamental purpose of any scientific research, which is improving human well-being in our society. In the Water and Society field, the possibility of future disasters, the uncertainty of hydro-climatic forecasts, and the commercial success of scientific research are three key aspects. As a scientific organization, how AGU can support these efforts is also highlighted by members.

### 3. What is the appropriate institutional structure to facilitate water governance and management?

This question targets the social/political/legal sides of the topic and tries to understand problems related to sectoral water rights transfer, new technology diffusion and adaption, and coordination of trade-offs at institutional and individual level.

## Soil and Critical Zone



**Marc Kramer**

UC Santa Cruz

Soils of the Earth's critical zone are both responders and drivers of critical environmental changes facing the Earth. The purpose of our technical committee

is to foster sessions addressing the Earth's critical zone

which address all aspects of the complexity of the soil system including erosion; dust production; soils

in water, transport, and chemistry; isotopic analyses; pedogenic processes affected by volcanism; physical, chemical, and biological composition; fertility; greenhouse gas production; and weathering.

### 1. How does human activity influence the structure and function of the Earth's critical zone?

### 2. What critical feedbacks drive interactions between the Earth's critical zone, the hydrosphere, and the atmosphere?

### 3. How can next generation global models be developed to better predict the structure and function of the critical zone in a changing world?

## Unsaturated Zone

The unsaturated Zone (UZ) community has been focused on the fundamental processes that govern flow and transport processes in the vadose zone and their engineering applications, but we are increasingly realizing that these processes play a vital role in regulating subsurface biological and geochemical dynamics



**Teamrat A. Ghezzehei**  
UC Merced

as well as land-surface processes, and therefore the community is forming tighter partnerships with biogeosciences and atmospheric and climate science in addressing contemporary challenges in water, climate, and food. Three critical questions that are of relevance to UZ are:

### 1. How do small-scale processes and heterogeneities in the unsaturated zone influence and regulate fluxes within and across the UZ across multiple spatial and temporal scales?

### 2. How do resiliency and thresholds of UZ processes respond to anthropogenic disturbances, and how do they vary across climates, biomes, and geological settings?

### 3. How can we harness the full potential of rapid advances in data science as well as communication and measurement technologies in developing predictions and decision support tools that benefit society?

# Report of the Ad Hoc Committee for Technical Committee Chair Terms of Reference

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## Background and Motivation

The Hydrology section is the only AGU section that has technical committees (TC). The duties of these TCs have changed over the years. Originally the TCs conceived session proposals within their topic areas, prioritized these sessions, and vetted and coordinated session proposals across the section to ensure quality and diversity. Around 9-years ago the open session proposal submission process was implemented and the sessions conceived by the TCs were no longer prioritized, thereby greatly diminishing the role of the TCs. However, by that time the TCs were recognized for perhaps their most important purpose: to serve as an entrée to AGU service.

While the TC chairs all meet with and report to the Hydrology section president each year at the Fall Meeting, oversight of the TCs is minimal and therefore many operate differently. The current Ad Hoc Committee – which comprises former TC chairs, one current TC chair, and two former Hydrology program chairs – was motivated by inconsistencies among the leadership of the TCs. The section president charged us with defining terms of reference for the TC chairs and formally documenting how the TCs can contribute to Hydrology section goals. The terms and other suggestions that follow build on the recommendations of the Ad Hoc Committee for Fall Meeting Improvements, which were published in the July 2015 section newsletter. Those recommendations are at various stages of implementation, and include instructing the TCs to (1) foster discussion on emerging and frontier session topics as well as standing sessions, (2) help the Hydrology program chair to merge sessions, (3) hold an inter-TC chairs meeting in December with the Hydrology section president, past pres-

ident, and program chairs to discuss emerging topic areas for future sessions, (4) hold conference calls with the program chair in November (preparation) and January (debrief), and (5) be active from January to May in leading session proposal development, including putting ideas on the TC websites. The current Ad Hoc Committee has discussed and iterated on the following terms of reference, which we propose for the Hydrology section president to implement and the TC chairs to accept when they begin their terms.

## Proposed Terms of Reference

### A. Core Duties of the Technical Committee Chairs

1. Prior to the Fall Meeting, announce the time and location of the next technical committee (TC) meeting to TC members and others who may be interested. Encourage them to (a) come bearing session ideas, and (b) invite students and early-career scientists. Participate in a conference call with the Hydrology program chair and the other TC chairs.

“The Hydrology section is the only AGU section that has technical committees”

2. During the Fall

Meeting, convene the TC meeting.

(a) Circulate a sign-in sheet to gather names and email addresses.

(b) Announcements: award nomination deadlines, AGU awards won by TC members, relevant upcoming events within and beyond AGU, etc.

(c) Every second year, solicit nominations (including self-nominations) for the next deputy chair. A vote may be held during the meeting or via email in the weeks following the meeting.

(d) Advise participants on what session proposals (and conveners) were discussed at the previous Fall Meeting, which of them actually became sessions, and how successful they were in terms of abstract submissions and session attendance.

(e) Solicit feedback from current session conveners.

(f) Discuss ideas for session proposals and conveners for the next Fall Meeting, including both standing

# Report of the Ad Hoc Committee.. (continued)

sessions and frontier/emerging topic sessions. Be sure to consider new ideas and encourage early-career scientists to copropose and coconvene sessions. Also encourage active participation by scientists from underrepresented groups. The majority of the meeting should be spent on this item.

(g) Discuss potential Chapman Conference ideas.

(h) Solicit ideas for increasing membership and engagement.

(i) Note any issues that should be elevated to the Hydrology section leadership.

3. No later than the end of January, distribute minutes from the meeting to the TC and to the section leadership. Add new participants to the mailing list and TC website using the sign-in sheet and remove the names of those who have not participated in the TC during the past 3 years. Ensure that this updated list is passed on to the incoming TC chair. Participate in a debriefing conference call with the Hydrology program chair and the other TC chairs.

4. Prior to the opening of the session proposal tool in the spring, send reminders to those who volunteered to propose sessions discussed at the meeting.

5. Remind session proposers to advertise their sessions.

6. Assist the Hydrology program chair with merging sessions during both the session proposal phase and abstract scheduling phase.

7. In the fall, request a time and location for the TC meeting (if it is not scheduled automatically).

## **B. Technical Committee Chair Selection and Succession Plan**

1. Each TC chair serves a 2-year term, ending in January of the second year after the meeting minutes have been distributed, and is succeeded by the

deputy chair, who also serves a 2-year term in that position. The chair is responsible for the completion of all duties, while the deputy chair assists the chair as needed and serves as chair in his/her absence. If the chair cannot complete his/her term for whatever reason, the deputy chair is promoted and a new deputy chair is selected at the next meeting (see below).

2. Nominations (including self-nominations) for the next deputy chair are solicited from TC members through an open process. Voting may be held during the meeting or via email in the weeks following the meeting. Only active members (those who have participated in a meeting of that TC during the

past 3 years) are eligible to be nominated and to vote. The current chair and deputy count the votes and recommend the nominee with the most votes to

the section president for concurrence. The new chair is announced after concurrence is obtained.

3. TC chairs and deputy chairs should encourage diversity of opinion and experience. They should avoid favoring their friends when it comes to supporting ideas for future sessions and conveners, nominations for their successors, or other suggestions from committee members.

4. The TC chairs serve at the behest of the section president. It is the responsibility of the president to ensure that the chairs are accomplishing their core duties and to remove any chairs that are delinquent in those duties. The president can stay apprised of TC chair dedication by ensuring that TC meeting minutes are circulated by January, through discussions with the program chair, and by soliciting feedback from TC members.

## **C. Technical Committee Membership**

TC membership should be open to all AGU members. To remain active, a TC member should attend

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# Report of the Ad Hoc Committee.. (continued)

a meeting of that TC at least once every 3 years. Due to the importance of the TCs as AGU service recruitment tools, there should be no limits on TC size or meeting attendance.

## Additional Recommendations

We advise that the notion of official TC membership be discarded. It was originally implemented to reduce the size of the TCs and to recognize those who served them. However, the TCs are valuable recruitment tools for various award and conference committees, task forces, student paper judging, and other forms of AGU service, so any limitation on membership is ill-considered (despite the expense of breakfast food). The reverse – insufficient interest and participation in the TCs – has never been a problem in our experience. Regarding recognition (on one's CV, for example), we have observed that official members don't necessarily contribute more to the TCs than unofficial members. Hence, some unresponsive members have benefited from the official TC membership label, while others who were active were not recognized. The most involved members are those who propose and convene sessions, activities that can be included on a CV. Finally, it is not clear that a fair system of official TC member selection was or could be established.

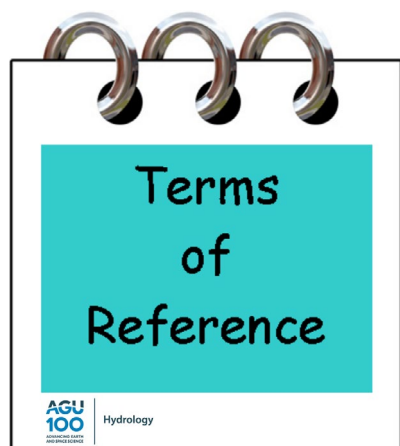
more than double the optimal number of sessions considering how many abstracts and sessions can be accommodated in the Fall Meeting venues. For example, in 2017 there were 167 sessions proposed. Consequences of this flood of sessions include topic redundancy and confusion during the abstract submission process; sessions near the bottom of the list, which may be equally or more meritorious, attracting fewer abstracts than those at the top because it simply takes too long to review the whole list when submitting an abstract; the Program Committee's unenviable tasks of identifying sessions to combine and compelling

proposers to do so; and a dizzying calendar of sessions at the Fall Meeting. If you have any doubt about this, count the number of session titles beginning with the letter A to gain advantage.

**“We hope that the aforementioned terms of reference and other recommendations will enhance that vibrancy by improving the consistency and effectiveness of the TCs.”**

We recommend that a hybrid approach be implemented. First, sessions conceived, discussed, and proposed by the TCs (no more than five from each) could appear at the top of the list during the abstract submission period or be labeled as being TC-endorsed. Second, every session proposer should be required to check a box, prior to uploading a proposal, indicating that he/she has reviewed the list of proposals that have already been submitted and declares that his/her proposal is not duplicative. Third, the Program Committee chair should enlist the help of the TC chairs in combining proposals while taking into consideration which sessions were submitted by the TCs. We believe these three adjustments will result in a smaller number of better conceived sessions while maintaining the ability of all AGU members to propose sessions.

The Hydrology section is large and vibrant in part because of the active engagement of its members, which often starts within the TCs. We hope that the aforementioned terms of reference and other recommendations will enhance that vibrancy by improving the consistency and effectiveness of the TCs.



While institution of the open session proposal submission process has proven valuable for ensuring broad participation in Fall Meeting session planning by the AGU community, the number of Hydrology section proposals is now

# 2017 Outstanding Student Paper Award Winners

Let us congratulate our winners of the Outstanding Student Paper Awards for the 2017 Fall Meeting. Their presentations are judged on content and displayed understanding of the science along with their skill in communicating their findings. The Hydrology section selects the top 5% of student papers for the honor. Please congratulate this year's winners!

Guadalupe Alvarez Rodriguez  
University of Texas at El Paso  
Title: Estimating groundwater discharge into the ocean in the Yucatán Peninsula

Elizabeth Phillips  
University of Toronto  
Title: Biodegradation of chlorofluorocarbons in a groundwater plume using compound specific carbon isotope analysis

Kristopher Darnell  
University of Texas at Austin  
Title: Phase and flow behavior of mixed gas hydrate systems during gas injection

Sabina Rakhimbekova  
University of Western Ontario  
Title: Impact of varying wave conditions on the mobility of arsenic in a nearshore aquifer on the Great Lakes

Mahta Gholizadeh Ansari  
University of Illinois at Urbana-Champaign  
Title: Prediction of magnesite dissolution rate in heterogeneous porous media using a numerical approach

Bonnie McGill  
Michigan State University  
Title: Complex interactions among climate change, sanitation, and groundwater quality: A case study from Ramotswa, Botswana

Matthew Kaufman  
University of Texas at Austin  
Title: Exploring the dynamic links between microbial ecology and redox state of the hyporheic zone: Insight from flume experiments

Farzaneh Mahmood Poor Dehkordy  
University of Connecticut  
Title: Investigating the development of less-mobile porosity in realistic hyporheic zone sediments with COMSOL Multiphysics

Shawn Lee  
University of Texas at Austin  
Title: Critical Zone structure inferred from multi-scale near surface geophysical and hydrological data across hillslopes at the Eel River CZO

Katherine Markovich  
University of California, Davis  
Title: Revealing the hidden water budget of an alpine volcanic watershed using a Bayesian mixing model

Sebastian Munoz  
University of Texas at Austin  
Title: Heat transport in the streambed of a large regulated river

David Byrne  
University of Oxford  
Title: Noble gases as tracers of fluid migration in the Haynesville shale and overlying strata

Rebecca Liyanage  
Imperial College London  
Title: Multi-dimensional imaging and characterization of convective mixing in a porous media

Anna Merrifield  
University of California, San Diego  
Title: Removing circulation effects to assess land-atmosphere interactions in observations and GLACE-CMIP5

Catherine Kuhn  
University of Washington, Seattle  
Title: Optical remote sensing algorithm validation using high-frequency underway biogeochemical measurements in three large global river systems

Bernardo Trindade  
Cornell University  
Title: Generalizable open source urban water portfolio simulation framework demonstrated using a multi-objective risk-based planning benchmark problem

## 2017 Outstanding Student Paper.. (continued)

Sarah Fletcher

Massachusetts Institute of Technology

Title: Urban water supply infrastructure planning under predictive groundwater uncertainty: Bayesian updating and flexible design

Sandra Pool

University of Zurich

Title: Improving Regionalization with a Limited Number of Strategic Runoff Measurements: An Evaluation Based on 668 U.S. Catchments

Yifan Cheng

University of Washington Seattle

Title: Climate Change Impacts on Stream Temperature in Regulated River Systems: A Case Study in the Southeastern United States

Dominic Demand

Albert Ludwig University of Freiburg

Title: Infiltration Processes and Flow Velocities Across the Landscape: When and Where is Macropore Flow Relevant?

Patricia Gonzales

Stanford University

Title: Drought, water conservation, and water demand rebound in California

Mejs Hasan

University of North Carolina at Chapel Hill

Title: How war, drought, and management impact water supply in the Tigris/Euphrates

Isabellah von Trapp

University of Montana

Title: Using Multiple Environmental Tracers to Investigate the Relative Role of Soil and Deep Groundwater in Stream Water Generation for a Snow-Dominated Headwater Catchment

Kyle Delwiche

Massachusetts Institute of Technology

Title: Methane Bubbles Transport Particles from Contaminated Sediment to a Lake Surface

Caitlin Rushlow

Idaho State University

Title: Idaho State University, Snowpack redistribution, vegetation feedbacks, and advective heat transport controls on ground thermal regimes and hydrologic response in zero-order hillslope drainage features

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## Announcement

### OSPA Student Information

Don't forget! If you indicated your interest in OSPA during abstract submission, you need to confirm your participation by 28 October! More information can be found [here](#)!

#### Eligibility

- AGU student member pursuing an undergraduate, masters, or doctorate degree
- Must be the lead author of the abstract presented
- Not eligible: High school students and postdoctoral researchers

#### Sign-Up

- During the abstract submission process, students must request to be considered
- Students cannot be added after the abstract submission deadline
- Must confirm participation by 28 October 2018 in the online system.



# FALL MEETING

Washington, D.C. | 10-14 Dec 2018

**AGU 100**  
ADVANCING EARTH  
AND SPACE SCIENCE



Fall Meeting Venue: Walter E. Washington Convention Center, 801 Mount Vernon Place, NW, Washington, DC 20001

<http://fallmeeting.agu.org/2018>



## Abstract Deadlines



Early Abstract Submissions



Final Abstract Submissions

Credits for photos on this page: AGU Fall Meeting 2018 website (<http://fallmeeting.agu.org/2018/>)

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[@AGUecohydro](#)



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