

Newsletter

July 2019

Hydrology Section

**AGU
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ADVANCING EARTH
AND SPACE SCIENCE

FALL MEETING

San Francisco, CA | 9–13 December 2019



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Hydrology

From the Section President

Scott Tyler (University of Nevada, Reno)



It is an honor and pleasure to welcome you to the Hydrology Section and this, my first Newsletter as Section President. I can begin with a heartfelt thanks to the outgoing leadership team: Efi Foufoula-Georgiou completing her role as Past-President, Megan Smith finishing her leadership of

the Fall Meeting Program Committee and Jeff McDonnell moving over to serve as Past-President and chair of the Section's Nominating Committee. Jeff has been both an inspiration and an educator to me; and I really appreciate his leadership, wisdom and giving of time to communicate the intricacies (and frustrations at times!) of leadership. I hope that I can keep up the standards that he has set.

I also want to give a tremendous thanks to Jaiveme Evaristo, who has served as the Section's Newsletter editor and Website manager for the past 2.5 years. I also want to thank our outgoing Technical Committee chairs, and all of the volunteers that have served on Section committees over the past few years. And a special thanks to outgoing Union Fellows Committee member Hoshin Gupta. The UFC is a very intense and time consuming position and Hoshin has done an outstanding job there and in providing feedback and suggestions to nominators for future submissions. We are a volunteer organization, and it has been an inspiration to see the commitment and energy you have all given. The Section owes its success to each of you and we are recognized within AGU as one of the most organized, energized and successful Sections of the Union.

With this first article, I want to update you on those new faces of your Section leadership, congratulate our recent award winners and to discuss some of the plans and activities that have begun or are planned in the next six months. And finally, as part of AGU's

Centennial year, this issue of the Newsletter is showcasing our "Grand Challenges" in Hydrology, as developed by our Technical Committees and our colleagues at IAHS. Our technical committee chairs have reviewed the list of proposed sessions for the 2019 Fall meeting and linked those to the challenges recognized by each of the subdisciplines of our Section. I hope that as you prepare your abstracts for the Fall meeting that you use these summaries to help guide your submission and session selection.

Section Leadership: I have invited the Section leadership and volunteers to contribute to the summer newsletter and it is my pleasure to introduce them here. I first want to congratulate and welcome Ana Barros as Section President-elect for 2019 and 2020. Ana just completed the important leadership of the Section Fellows committee and we have been working closely together already on a number of projects. Charlie Luce has graciously agreed to serve for another term as Section Secretary. Charlie has an amazing knack of never saying no to any assignment and his contributions to the Section are critical to both a) keep the train on the track and b) keep the train moving in a very forward and progressive trajectory. Laura Bowling is our 2019 Fall Meeting Program Committee Chair, and as you read her updates, you will recognize what an incredibly challenging role it is to work through the submissions and develop the smooth running program that we are all used to having the Fall Meeting. Adam Ward serves as our AGU Centennial Coordinator and has been helping to organize sessions at both the 2018 and 2019 meetings highlighting the past and future 100 years of Hydrologic Sciences. Caitlyn Hall is the chair of the Hydrology Section Student Subcommittee (denoted as H3S) and in the short time that I have known her and her team, it has been inspiring to witness the energy and commitment our students have for the Section. I have quickly realized that as Section President, my primary role is to simply clear the bureaucratic path for these students; they will do the rest!

I also want to welcome and thank our newest additions to the Section leadership, our new website manager Katarena Matos from Federal University

From the Section President (continued)

of Espirito Santo in Brazil and Theresa Blume as our Executive Committee Liaison from GFZ-Potsdam. By the time you read this, AGU and Katarena should have completed migrating the Section website over the new AGU Connect platform. The new site will look a bit different, but allow us more flexibility to reach the Section membership and also give our Technical Committees an easy place to develop and host their websites. Theresa brings a European perspective to the Executive Committee as well as her past experiences in leading the Catchment Technical Committee.

The reason you are able to read this newsletter is thanks to our new Newsletter Editor, Antonio Meira. Antonio just completed his Ph.D. at the University of Arizona and is starting a postdoc position at the Federal University of Espirito Santo in Brazil. Antonio also serves on the AGU Council as an Early Career Representative. Katarena and Antonio really represent the heart of volunteering spirit, taking on these roles in the midst of a move from Tucson to Brazil and starting new positions. Congratulations to both of you and heartfelt thanks from all of us in the Section for your willingness to contribute!

And finally, I also want to recognize our 12 Technical Committees (TC's) and their leadership. The Section pioneered the development of Technical Committees and it is an incredible group of volunteers who help guide the technical programs and initiatives of the section. These are a great way to get involved in the section, and membership is as easy as contacting the appropriate chairperson. You will find short articles in this newsletter from our TC's and I encourage you to read their thoughts on grand challenges and become engaged.

Recent Awards: The 2019 Section awards have just concluded, and from all of us on the Section leadership, we wish to congratulate you on your outstanding achievements. In alphabetical order of the award: Early Career Award winners Megan Konar (University of Illinois), Di Long (Tsinghua University) and Keveh Madani (Yale University); Hydrologic Sciences Award, William Kustas (U.S. Department of Agriculture); Langbein Lecture, Efi Foufoula-Georgiou (University of California, Irvine); and the Witherspoon Lecture, Patrick Reed (Cornell University). We will celebrate

these awards publicly at the AGU Fall Meeting and during our HS Business Meeting. In the coming weeks, you will also be hearing from AGU about the 2019 Class of Fellows and Union-level awards, including the Horton Medal.

We had a very deep pool of nominations in all of the Section awards this year, thanks to the hard work of our Nominations Committee chaired by Jeff McDonnell. I want to also congratulate all of the nominees this year, and encourage

your nominators pursue these awards next year. The awards committees put together very clear evaluations of all of the nominees with suggestions for next year and I will be happy to share this information with you.

Section Initiatives for 2019 and Beyond: In addition to continuing and completing initiatives from 2018 involving Technical Committees, nominations process, website renovation and AGU Centennial activities, we are kicking off two major initiatives aimed at improving access for our membership to science. For each initiative, I have stood up Section Task Forces to evaluate the options and report back to the Section.

Development of a Section-focused Meeting: By now,



From the Section President (continued)

you should all be aware that the Hydrology Section leadership has been in discussion with AGU on the subject of a hydrology-focused meeting, similar in concept to the very successful Ocean Sciences Meeting held on even years. Given the size and growth of the Fall Annual Meeting, the Section Leadership saw this as an outstanding opportunity to offer a more focused experience in addition to the Fall Annual meeting on an every other year rotation, to experiment with new meeting formats for a more personal experience and to bring in other partner societies whose scientific focus can complement the Section. AGU has been very supportive of this concept, and to this end, I have charged the Meetings Task Force, chaired by Sally Thompson from the University of Western Australia and Julia Guimond

from the University of Delaware to survey the Section membership on their interest in this concept, to analyze possible partner organizations for such an experimental meeting and finally, to report their findings back to the Section. While there were some glitches at the AGU side in getting the survey out to all of our members, the preliminary results of the Section-wide survey suggest that ~60% of you think that trying such a meeting would be extremely or very useful to you. There were many good suggestions and input for the Section to consider and the overall interest in the meeting concept was ~90%. The Task Force reports their preliminary finds on page 16 and will continue to process the results in the next month to better judge what our membership would like to see at such a meeting. Based upon the support to date, I will be standing up a Section Meeting Planning Committee with the goal of designing our first sectional meeting for 2022. I will be calling for volunteers for the planning committee and I hope that you will join me in working on this exciting and new opportunity for the section. We will also keep the survey open through the year for additional input.

Future of Water Resources Research: Our second major initiative for 2019 focuses on the rapidly evolving publishing world and the challenges of Open Access for our flagship journal, Water Resources Research.

WRR currently runs in a hybrid model, with open access available to authors for an additional charge; similar to most other AGU journals. To maintain WRR as the flagship journal in hydrologic sciences, it will be important to address the needs of the community, which are changing as a result of funding source demands and competition from other modes of publication.

I have stood up a Task Force, headed by WRR Editor in Chief Martyn Clark to evaluate the options for WRR and open access. This Task Force will review the current status and seek

input from the community, AGU and its publishers to recommend a course for the future of access for WRR with the following specific tasks:

"... Approximately ~60% of our members considers a section-based meeting to be extremely to very useful..."

- Summarize the factors motivating changes to the current open access policy of WRR.
- Describe and report preliminary analysis of Open access publication models for WRR that can suit the needs of the AGU hydrology community.
- Develop a strategy for community engagement to gather input on these models.
- With help from the Section Exec Committee, implement that strategy for community input.
- Report back to the Exec Committee, for dissemination to the Section membership and AGU leadership, results of the analysis and engagement, including a set of recommendations for the path forward.

The Task Force will be working over the next 6 months gathering input from our community, and will also be hosting a Town Hall at the 2019 Fall Meeting to continue to gather information and to share their results to date. I anticipate that the Task Force's final recommendations will be made available to all Section members in early 2020, and we will proceed from those recommendations into 2020 and beyond.

From the Section President (continued)

In addition to the major initiatives outlined above, we are working on several other activities through 2019.

New Joint Section Technical Committee: As a result of discussions with the several other section leaders, the Hydrology Section is working with the SIPS, Geo-Health, and Biogeosciences sections to envision a Technical Committee on Convergent Science for Water and Health to help us cross disciplines effectively within AGU. Convergent science is often viewed as science addressing pressing societal problems, and we in Hydrology are well positioned to lead in this effort. As most other sections do not have a well-developed Technical Committee structure, we will be helping our colleagues develop this model while at the same time stimulating discussions across relevant sections. We need your help in moving this forward at Fall Meeting and beyond. If you are interested in learning more or volunteering for this committee, please contact me; we have already have quite a bit of interest from our technical committees and I see this as a great opportunity for enriching our fall meeting sessions.

Section and Union Fund Raising: The Section has always had a tradition of membership giving and I want to encourage you all to do what you feel appropriate. These funds are used primarily for student support, and the Section can receive a small incentive for various levels of member participation in annual giving although traditionally, the Hydrology Section has not met the minimum requirement (5% of members donating yields an additional \$1000 to the Section annual operating funds).

The most exciting opportunity is the Austin Challenge Grant, an up to \$1 million USD matching grant from Jamie Austin to be used specifically for student travel grants. Each year, AGU can only fund ~20% of student travel requests, and if we can match the full gift, we

can support up to 500 student applications for 2020. We are currently at ~25% match, and I do encourage all of our members to consider this for giving in 2019, as early career scientists are a cause that we all recognize as critical to the future of AGU and earth sciences. The AGU Board of Directors and the AGU Council are committed to the success of this grant and I encourage you look into the details at <https://giving.agu.org/austin-student-travel-grant-challenge/>. Note that gifts to this challenge also are counted towards the section level incentive program.

"I do encourage all of our members to consider this for giving in 2019 (to the Austin Grant), as early career scientists are a cause that we all recognize as critical to the future of AGU and earth sciences."

Closing Remarks: With the initiatives outlined above, I am very excited for the coming years for the Sec-

tion. When I first took on this position, past presidents Eric Wood and Dennis Lettenmaier gave me some sage advice: "Don't take on too many things, pick a few things and do them well!" This is easier said than done! We have a couple of major projects for the next year, but I want to encourage all of you to share your ideas and I welcome your input and concepts for where this section should be going. Some things we can do quickly, others may take more time to cook, but your ideas will be used! We have had outstanding leadership in the past and I will do my best to continue in that tradition, and look forward to working with all of you. For those who do not know me well, my door is always open to ideas and opinions, and I, along with the rest of the Section leadership team am devoted to listening to the membership and pursuing your goals and dreams. Have a great Summer!

Scott Tyler
University of Nevada, Reno

From the Section President-Elect:

Report from the Hydrology Section Fellows Committee (HSFC)

Ana Barros (Duke University)



The challenging job of the Hydrology Section Fellows Committee (HSFC) is to select the nominations put forward to the Union Fellows Committee. The HSFC received 39 very strong nominations in 2019. Among these 35 had primary affiliation with Hydrology, ~50% of nominations were from outside the US, and ~10% of nominees were female.

The HS was allocated twenty slots for consideration by the Union Fellows committee. This includes five “surplus” slots designed to encourage cross-disciplinary nominations endorsed by more than one AGU Section. The primary criteria used to guide the review process in the HSFC is as follows: **(1) Breakthrough or discovery** - *Fundamental and transformative developments in theory, observations/measurements, and modeling that change the way we think about, understand, and investigate hydrologic processes and systems;* **(2) Innovation** in disciplinary science, cross-disciplinary science, instrument development, or methods development - *Novel disciplinary and interdisciplinary*

approaches to experimental hydrology including measurements, sensors, design and deployment of observing systems, and model applications and evaluations; and **(3) Sustained scientific impact** - *Scientific discovery, leadership, and educational contributions that advance the hydrologic sciences, benefiting society and the environment.* Effective nominations unambiguously and specifically map individual contributions to one or more of these three criteria.

The number of HS nominations received in 2019 corresponds to less than 0.2% of the overall membership (less than 0.1% for female nominees). This is a very small number and I believe is not representative of the breath of excellence in our Section. On behalf of the HSFC, I urge you to consider nominating a colleague. (For reference, the Atmospheric Sciences Section received approximately twice as many nominations, and they are only 15% larger than we are.) Note that being a Fellow is not a requirement to lead a nomination. As President-Elect, I am considering the possibility of starting a separate arms-length canvassing committee targeting Fellow nominations as other AGU Sections already have, or alternatively to expand the province of the existing nominations committee to include Fellow nominations. Please share your thoughts and suggestions in this regard.

Thank you!

From the Section Secretary

Charlie Luce (United States Forest Service, Boise)



The 2018 Fall Meeting saw near record participation in the Outstanding Student Paper Award (OSPA) by students. This year 501 presentations were judged, just below the 510 from 2017! From this collection of presentations, 25 students were awarded. A list

of the winners is in this newsletter and is online at <https://membership.agu.org/ospa-winners/>. The 2018 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. Alicia and Rolf are rotating off after four years of service on the committee. Please thank them when you see them!! It is an intensive effort before, during, and after the meeting to ensure

From the Section Secretary (continued)

that all of the student presentations are judged.

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.

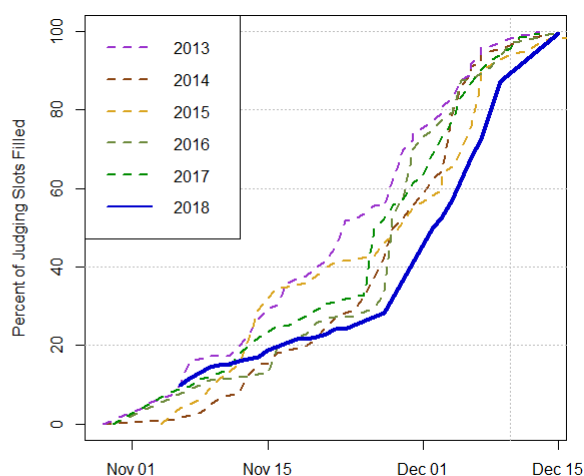
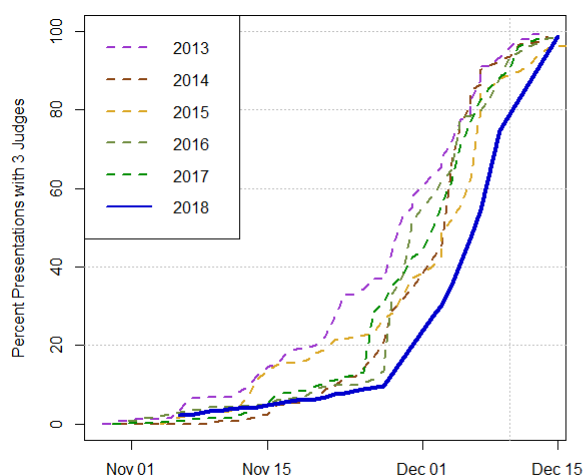
Some examples of useful comments from this year include:

“This was a really great talk and I think it should definitely be in consideration for a best talk award. It wasn’t the flashiest presentation, but it was clear and I think will have some real scientific impact.”

“Very good talk, good use of the slides and simplifying

the slide you commented on the potential of magnetic rock to alter with the results on your system it was mentioned and abandoned, after such a statement it would be better if you mentioned what would need to be done in such cases and as well what to do to be sure you are not in such case. Those tips would make your presentation even more solid. Other than that, it was a great talk and very well explained all the rest. Congrats!”

“You did a great job with the presentation - it was clear, logically laid out, and your presentation skills were great. The work itself was interesting and relevant. As more communities look to encourage or incentivize practices to reduce runoff, it is important to know which practices will be most effective and recognize that they might differ based on geographic location. Additionally, thinking about the residential plot level is important because many times communities are focusing on larger areas in public space when implementing green infrastructure approaches. Nice work, I look forward to reading the paper you referenced in your talk.”



Progress on judge recruitment for the 2018 meeting. The vertical grey line on Dec. 10 denotes the start of the meeting, against which the timing of signups for the historical meetings are normalized.

the equations to help the audience follow with him. I would recommend only two things: the first one, perhaps to explain a bit better how the system you used in the field is put in place, is it in the stream bed? is it in a boat? There was a picture of a boat, but also an image of a rod with something that looked like the electrodes but I missed if it was ever explained how it was placed in the field. The second thing would be on

“Exciting research. The poster and presentation were a bit dense and hard to follow for a non-noble gas geochemist, but nonetheless, I learned a lot from the presentation. Excellent job answering questions, excellent job providing context for the study, excellent job explaining background concepts. There were several key results that were explained a bit out of order for my taste. The presentation bounced around the entire

From the Section Secretary (continued)

poster. Perhaps in the future, consider a logical flow and position your results in a linear way with consistent terminology throughout. Overall, an excellent, albeit dense, presentation. Bravo."

"This was a very interesting poster. The only minor issues were 1) the font and symbols sizes and 2) that the student did not seem to have a completely clear idea of the general relevance of their work. However, the overall scientific content of the presentation and the ability of the student to present it and to answer questions were excellent."

Judging signups lagged what we have seen in previous years (Figure 1), and only 87% of judging slots were filed by the start of the meeting. We usually do better than that, but on the bright side, Friday signups were much better than usual! Thank you to

those willing to sign up for late in the week. Nearly all of the rest of the judging slots were filled during the meeting. Judging lagged a bit as well. Only 89% of score sheets were received by the deadline. All but one presentations had at least 1 scoresheet (even if just reporting the student was not present); 97% had at least 2 scoresheets, but only 70% had all three scoresheets. In outcomes nearly identical to last year, 96% of presentations received at least one numerical score, and 87% had at least two numerical scores. The majority of the lost judging opportunities were reported as the student not being present, particularly in the case of presentations with no numerical scores or only one.

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

Fall Meeting Updates

Laura Bowling (Hydrology Section Fall Meeting Committee Chair)



It is shaping up to be another excellent year for hydrology at the Fall Meeting, thanks to the huge interest from our community. To continue our celebration of AGU's 100th Anniversary, seven of our proposed sessions have been identified as Centennial Ses-

sions, with a specific focus on looking forward for the next 100 years. You can find these by checking the "SWIRL Themes" during abstract submission (see Adam Ward's article for more details on the Hydrology Section Centennial Programming). To encourage participation in Centennial Programming, abstracts submitted to Centennial Sessions do not count against an author's one contributed abstract limit. That's right, you can have two contributed abstracts (and three if you are an invited speaker to a non-centennial session)! In addition,

AGU is helping to celebrate the 40th Anniversary of the World Climate Research Programme (WCRP). Six of our hydrology sessions are being co-sponsored by the WCRP to recognize the strong linkages between AGU and WCRP over the last 40 years.

This spring, a record-breaking 190 session proposals were submitted for the Hydrology Section. This represents 13.5% of the total number of sessions proposed for the entire fall meeting (a 22.5% increase over last year). Because our section receives so many proposals, there is inevitably some overlap. For the last several years Hydrology has gone through a process of merging session proposals prior to abstract submission. Our Technical Committees take an active role in this process, to try to shape a diverse and relevant meeting program, while still maintaining the grass roots proposal process that makes the AGU meeting so responsive to current interests. This year, we refined, merged or deleted 67 of the proposals, to create a solid program of 155 sessions open to abstract submissions. I am very appreciative of the Technical Committee members and session conveners who engaged in many thoughtful discussions of how to organize their science to improve the meeting experience for everyone. Following the close of

Fall meeting updates (continued)

abstract submissions on July 31, we will be notified of how many oral timeslots are allotted to Hydrology, based on the total number of abstract submissions and the Fall Meeting Planning Committee (FMPC) will notify each session's Primary Liaison if they are likely to receive an oral time slot. There will be an opportunity to merge sessions that fall below the oral time slot threshold, but the window is very brief, so please make sure that your session's Primary Liaison is able to monitor email during the latter half of August!

I recognize that merging sessions can be a frustrating process. It is important for conveners to recognize that given the size of our community, the likelihood of being asked to merge is high, and conveners may be asked to drop out since there can only be four conveners on a final session. AGU strongly encourages that those proposing sessions consider all forms of diversity and career status when selecting conveners and session chairs. The FMPC continues to seek ways to improve communication during this process, and we can be reached at FMPC_H@agu.org if you have specific questions.

"This spring, a record-breaking 190 session proposals were submitted for the Hydrology Section. This represents 13.5% of the total number of sessions proposed for the entire fall meeting (a 22.5% increase over last year)"

The hydrology section FMPC is composed of four volunteers that serve a four year term, such that one member rotates off each year. Committee members serve as the Chair of the committee in year 3, and new this year, the Past Chair stays on as a consultant in year 4. The section secretary serves as an ex officio member and as a link to the section executive committee. Current members of the FMPC include Laura Bowling (Purdue University, 2019 Chair), Megan Smith (Lawrence Livermore National Lab, Past Chair), Sankar Arumugam (North Carolina State University) and Hang Deng (Lawrence Berkeley National Lab).

From the Section Student Subcommittee Chair

Caitlyn Hall (Arizona State University)



The 2018 American Geophysical Union Fall Meeting ringing in the organization's centennial year kept the Hydrology Section Student Subcommittee (H3S) bustling around Washington, D.C., in mid-December. We focused on facilitating opportunities for students and early career

scientists (ECSs) to speak on a variety of topics, as well as continue their professional development in a welcoming environment. Our four pop-up talk session topics ranged from "Building Communities through Shared Experiences and Bridging Science and Policy for Change" to "Big Ideas in Hydrology: The Next 100 Years." H3S's town hall events brought out experts in non-academic fields to share their experiences in research outside the university. However, since we still like to enthusiastically share our current research and learn from each other, workshops on new technolo-

gy, tools and concepts were presented and put to practice throughout the week. We also brainstormed with other ECS networks to pool our resources to create an active community and continue momentum beyond conferences and meetings. We certainly kept busy!

Even after a great 2018 and beyond the AGU Fall Meeting, we're excited for the coming year! We're planning on continuing our successful events held throughout the year like bringing scientists and science communicators of all levels together to share their research through poem via Haiku Your Research on Twitter (@AGU_H3S). We've also been highlighting great research done by our members on Twitter and Instagram (@AGU_hydrology) using #hydrosummer. Join in the conversation online to get ready for an amazing 2019 Fall Meeting! Speaking of our centennial celebration, we'll be hosting several events like a casual mixer for complete with trivia games and prizes. We will also be

hosting sessions on how to continue momentum in cross-disciplinary collaborations, overcoming obstacles and celebrating successes in academia, bringing science to action, and building dynamic presentations. H3S has also spearheaded a cross-section forum for ECSs, “Centennial Early Career Scientist

Forum”, with several sections and council members. We’re excited to hear your ideas for how H3S can add to the hydrology community and strengthen the international ECS network via Twitter or email (Caitlyn.Hall@asu.edu). Happy 2019!



Dr. Allison Goodwell, newly minted Assistant Professor at University of Colorado, Denver and recent H3S Committee member pop-up presentation "Sewing with the Flow: An Ode to a First-year Faculty Experience" at the 2018 Fall Meeting



H3S Member Matthew “Mac” Jones, a PhD student at University of Colorado, celebrating his field work in our Twitter and Instagram #hydrosummer showcase

From Water Resources Research Editorial Board

Open access under the open science paradigm: The Open Access Task Force

Martyn Clark (University of Saskatchewan) and Scott Tyler (University of Nevada, Reno)



Open science is perhaps the most important paradigm shift in the history of the hydrological sciences. We now routinely share our data

and our model source code; in fact, data/model availability is a requirement to publish in AGU journals. The FAIR initiative (data/models should be findable, accessible, interoperable, and reusable) reduces duplication of effort and is accelerating progress on key problems in hydrology.

The open science paradigm is dramatically changing the publishing landscape. There are new review requirements, including evaluating if the data and model source code well organized and well documented, if there is appropriate metadata, if the models have reproducible test cases, etcetera. Critically, there is now more attention given to where scientists publish. Many authors are now required (or at least strongly encouraged) to publish in open access journals. For example, Plan S, an initiative from major funding agencies in Europe, requires scientists to publish their work in open repositories or in open access journals. These developments suggest that the widespread transition of journals to open access may no longer be a matter of “if”, but rather when and how.

In the context of the open science paradigm shift, WRR and the Hydrology Section are collaborating to better understand the issues and opportunities with a possible transition to open access. Our primary motivation is to improve the accessibility to WRR for both readers and authors. Specifically, we want readers to be able to access WRR articles without a paywall, and we want authors to be able to publish in WRR under the new rules/incentives of their funding agencies. We want to improve how WRR serves the broader hydrology community; hence we are exploring if WRR should be the "guinea-pig" for big well-respected disciplinary journals to transition to open access.

"... we want readers to be able to access WRR articles without a paywall, and we want authors to be able to publish in WRR under the new rules/incentives of their funding agencies."

As a mechanism to address these issues, the Hydrology Section launched an open access task force. The membership of the task force has diverse representation of scientists in different geographical locations (and hence different funding environments) and different career stages. The task force members include Amir Aghakouchak (University of California at Irvine, USA), Wouter Berghuijs (ETH Zurich, Switzerland), Cedric David (NASA Jet Propulsion Lab, California, USA), Qinyuan Duan (Beijing Normal University, China), Shemin Ge (University of Colorado, USA), Ilja van Meerveld (University of Zurich, Switzerland), Chunmiou Zheng (Southern University of Science and Technology, Shenzhen, Guangdong, China), Charlie Luce (US Forest Service, Boise, USA – Ex-Officio representing the Hydrology Section Executive Committee), and Martyn Clark (University of Saskatchewan, Canmore, Canada – Chair).

The mandate of the task force is to review the current status of open access publishing, seek input from the community, AGU and its publishers, and to recommend a course for the future of access for WRR. The task force will complete its work over the coming months, including an open opportunity for community members to provide input during

a Town Hall to be held at the AGU Fall meeting.

Our discussions on open access will be framed by two important issues. First, how can we ensure that scientists without money for publishing costs have an opportunity to publish (e.g., by waiving publication fees in special cases). This can include scientists from developing countries, emeritus professors, and scientists needing to publish after the period of performance for their project has ended. Second, how can we ensure that the quality does not suffer. Open access journals are viewed by some as being lower quality (e.g., predatory journals), and it is critical that we maintain the same high publishing standards in the open access model. Since the revenue in an open access model is intimately linked to the number of papers published, it is important to cleanly separate the revenue aspects of publishing from the scientific aspects of publishing so that editors do not receive pressure to publish more (lower quality) articles. Underlying these two issues is the issue of funding – who pays, and how, and what can we do to improve the affordability of publishing.

The specific tasks are:

- 1. Summarize the factors motivating changes to the current open access policy of WRR.*
- 2. Describe and report preliminary analysis of Open access publication models for WRR that can suit the needs of the AGU hydrology community.*
- 3. Develop a strategy for community engagement to gather input on these models.*
- 4. With help from the Section Exec Committee, implement that strategy for community input.*
- 5. Report back to the Exec Committee, for dissemination to the Section membership and AGU leadership, results of the analysis and engagement, including a set of recommendations for the path forward.*

Please watch for the Town Hall announcement at the 2019 Fall Meeting and consider attending so your voice can be heard. We look forward to your input on how WRR should evolve in this rapidly changing publishing landscape.

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 importantly, 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

Ecohydrology

Shirley A. Papuga

Wayne State University



Over the last century and especially within the last twenty years, Ecohydrology has emerged as a relevant and continually growing interdisciplinary science. This is perhaps an inevitable acknowledgment that many hydro-

logic processes are tightly coupled to biology across a broad range of spatial and temporal scales as we are called to address the increasing portfolio of complex environmental issues associated with anthropogenic pressures and climate change.

As such, we increasingly see ecohydrology as a natural integrator that brings together not only biology and hydrology, but other physical and social sciences in addressing these issues. This is evident in the enthusiasm we have seen over the past year for the ecohydrologic community. To harness this enthusiasm, as a TC, we have invested considerable energy in building our ecohydrology “team” using social media and community-building activities at the Fall Meeting. Our **@aguecohydro** Twitter handle has over 1700 followers, with substantial growth since the Fall 2018 meeting. To help facilitate community interactions, we have also solicited for self-identified ecohydrologists to add themselves to a searchable open directory (<https://tinyurl.com/self-identify-ecohydro>). Weekly, since April 2018, we have been introducing an ecohydrology “leaf” on our blog (www.aguecohydrology.org/blog-adding-our-leaves) to highlight the diversity of the community in terms of research area, career stage and career trajectory. To date we have introduced 64 leaves ranging from established academic pioneers, to professionals, to graduate students who have all shared their ecohydrologic stories from equally valuable vantage points. This has resulted in

unique database of information including an honest list of papers that have shaped the community. We encourage you to visit the blog to see how you might fit in!

In line with the AGU Centennial Program, one of our main TC efforts has been focused on developing a community-driven holistic vision for ecohydrology looking back at where we have been and forward to the direction(s) we are headed under the canopy of the “biggest questions” we introduced last July. By bringing together such a diverse community we are well-positioned to make major interdisciplinary strides in scientific advancement. To further facilitate these strides, our TC-supported sessions include:

H048 - Ecohydrologic General Contributions and

H137 - Urban Ecohydrology: New Concepts, Observations, and Models

However, to help grow and advance our science, we encourage you to engage in any or all of the over 50 sessions at the Fall 2019 meeting that have an ecohydrology theme to them (<https://www.aguecohydrology.org/agu-sessions.html>). See you in San Francisco!



Wordcloud generated from the key words in our self-identified ecohydrologist directory, thanks our undergraduate member Alex Eklund

Precipitation

Pierre-Emmanuel Kirstetter

University of Oklahoma



Precipitation challenges knowledge because of its variability at all scales and its evolving interactions with the water, energy, and carbon cycles under a changing climate. It is a key hydrologic flux driving the atmospheric and surface storage, movement, and quality of water.

Precipitation not only is the primary source of freshwater, it is also a major driver of natural hazards, and a major component of uncertainty in weather predictions and climate projections. The AGU Precipitation Technical Committee gathers expertise in hydrology, atmospheric sciences, remote sensing and mathematics to address critical gaps in our knowledge of precipitation: (1) changes in precipitation arising from processes at convective and orographic scales and from anthropogenic influence, (2) consistent observations for accurate estimation and prediction on a global scale at sufficiently high spatial and temporal resolution, (3) cold season precipitation, and (4) precipitation uncertainty and closure of the water balance from headwater catchments to continental-scale river basins. In sessions proposed for the AGU 2019 Fall meeting (<https://agu.confex.com/agu/fm19/prelim.cgi/Session/>), key science questions addressed are:

- *How do precipitation processes and regimes interact with the Earth's water storages from local to global scales? (session 80996)*
- *How well do current observations and model predictions capture precipitation variability to meet application needs and effectively monitor the water cycle in remote regions? (sessions 75783, 76334, 80639)*
- *How do local and regional societies and ecosystems respond to precipitation variability and extremes? (session 75957, 82562)*

However, to help grow and advance our science, we encourage you to engage in any or all of the over 50 sessions at the Fall 2019 meeting that have an ecohydrology theme to them (<https://www.aguecohydrology.org/agu-sessions.html>). See you in San Francisco!

Uncertainty

Saman Razavi

University of Saskatchewan



Halley's Comet is predicted to visit the vicinity of the Earth on July 28, 2061. But, when will the next catastrophic flooding event occur on the Earth? Hard to predict with certainty, and the uncertainty is always big! One

may wonder why Hydrological Science may struggle with this question, whereas Space Science is capable of providing such predictions with minimal uncertainty even over long time horizons¹.

Uncertainty is intrinsic to the current state of Hydrological Science. Recognizing this fact, tremendous research efforts have been (and will continue to be) dedicated to address hydrological uncertainty, mainly around three major, inter-related 'how-to' questions, namely

- (1) how to improve the credibility and computational efficiency of approaches and tools for characterizing uncertainty in both natural and engineered hydrologic processes,*
- (2) how to reduce uncertainty in understanding, modelling, and predicting the future of coupled human-hydrologic systems, and*
- (3) how to better communicate about uncertainty in support of decision and policy making to best serve our society.*

Hydrological uncertainty persists and may even grow, as our water systems are in the throes of unprecedented climate and environment changes and new extremes. To capture such changes and non-stationarity, Hydrological Science is evolving towards a more holistic, transdisciplinary science that represents important linkages (feedback mechanisms) between hydrology, the climate system, ecosystem, water management, etc. Understanding and representing such linkages in predictive hydrologic models will improve the realism and credibility of these models. These advances, however, are introducing larger problem domains, in-

¹Example credit: Andras Bardossy

creased model complexity, and higher computational cost, potentially hindering a proper treatment of uncertainties involved. Equally importantly, these developments are necessitating more coordinated community efforts to focus on improved communication of uncertainty among researchers (science producers) across the scientific disciplines involved and with decision makers and the general public (science users), so as to build and maintain trust in the scientific enterprise.

As such, the need for improved approaches and tools to better ‘characterize’, ‘reduce’, and ‘communicate’ uncertainty is more urgent than ever.

Water Quality

Matthew Cohen

University of Florida



The physical, chemical and biological properties of water – together termed water quality – vary in space and time in response to interactions among weather, rocks and life. These interactions are increasingly influenced by the cumulative footprint of humanity, with water appropriation and

disposal, climate change, land use intensification, and a growing array of contaminants threatening water resources, ecosystem integrity and human health.

The Water Quality Technical Committee (WQTC) brings together researchers working on water quality issues across scales, issues, and processes to facilitate a cross-disciplinary conversation – along with colleagues across AGU – about grand challenges like eutrophication, plastic pollution, acidification, the growing use of nanomaterials, the sustainability of food production, and climate change. While there are many crucial questions, we focus on three that span our charge from theoretical to actionable, from local to global, and from analysis to synthesis:

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 these water quality trends?

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

The AGU Fall Meeting in 2019 promises to be an exciting venue to continue to grapple with these questions. Addressing the first big question, our community is focused on the status and dynamics of a wide array of contaminants from thermal and nutrient pollution (Sessions 77933, 79801, 82509) to metals, pharmaceuticals and microplastics (Sessions 71425, 78845, 85532). To address the second, sessions have been convened that focus on transport processes, contamination legacies and recovery trajectories, as well as the cross-scale inferences necessary to understand these processes (Sessions 77625, 78338, 82178). Finally, as a community we are committed to “operationalizing” this information – our third big question – to facilitate new and improved actions by individuals, managers, and policy makers (Sessions 76161, 80660, 85517). We look forward to seeing you all there!

Remote Sensing

Michael Durand (Ohio State University), Colin Gleason (University of Massachusetts Amherst), Toby Minnear (CIRES), Tamlin Pavelsky (University of North Carolina), Vinit Sehgal (Texas A&M University), Carrie Vuyovich (NASA Goddard Space Flight Center)



Michael Durand

Last year in this Newsletter, our technical committee wrote about the big picture goals that motivates hydrologic remote sensing: using observations to measure and understand the water cycle at large spatial scales. This year, we reflect on some of the ongoing efforts to realize these lofty goals. Before we begin, however, please let’s acknowledge that singling out a few particular missions and projects to provide detailed perspective in no way diminishes the many efforts we could not highlight in this short piece. Here we briefly touch on the GRACE follow-on mission to measure water storage via the Earth’s gravity field, soil moisture via the SMAP mission, surface water storage and river discharge via SWOT, and the efforts to focus on upcoming snow remote sensing mission.

The GRACE Follow-On mission recently reported that its first gravity field data are now available. The gravity field

From Section Technical Committee Chairs (continued)

data is precursor to what is often of primary interest to hydrology: the equivalent Terrestrial Water Storage data, which gives a picture of. GRACE-FO launched in May of last year, and will add to the timeseries of the GRACE mission which lasted fifteen years, from 2002 to 2017, providing an invaluable look at where and how water is stored on our planet, and how this is changing. The hydrologic community eagerly awaits data from GRACE Follow-On to continue this legacy.

Is remote sensing of surface soil moisture a challenge, or an opportunity? Or is it both?

Soil moisture plays a critical role in the global water cycle. Recently, NASA's soil moisture measuring satellite SMAP (Soil Moisture Active Passive) reached its fourth birthday, and is currently operating in the extended phase of the mission. Despite providing several opportunities to the hydrology and geosciences community, the necessity of understanding rootzone processes is ever increasing. With literally thousands of papers already published in the scientific community about expanding the scope of our knowledge about soil moisture dynamics at remote sensing scales, the community will have to keep pushing frontiers in going to deeper depths (in the soil profile) with the remote sensing of soil moisture.

NASA's forthcoming Surface Water and Ocean Topography (SWOT) mission, to be launched in 2021 jointly with France, Canada, and the UK, promises novel measurements of water surface height, width, and slope on rivers, lakes, reservoirs, and wetlands worldwide. These unprecedented measurements are prompting new science applications, and recent research has demonstrated the tangible scientific benefits of SWOT for hydrology. SWOT, however, presents a unique challenge for validation: Current field hydrology techniques for measuring height, width, and slope are best geared toward long-term observations at single sites. This is arguably appropriate for SWOT validation in the case of lakes and reservoirs, but high spatiotemporal variability of height, slope and width in rivers and wetlands poses a unique measurement challenge and requires new ways of thinking about measuring surface water, especially considering SWOT's synoptic spatial coverage.

Field work began on SWOT cal/val more than six years ago with the advent of AirSWOT, an airborne SWOT analogue, to prepare field techniques, protocol, and personnel for the intensive effort post launch.

Over these years, we have developed a 'standard suite' of measurements for 'Tier 1' validation sites- the most intensively studied and well-understood sites designed to thoroughly validate SWOT measurements. At the time of writing, the full suite of cal/val measurements has been tested on the Willamette, Sacramento, Sagavirktok, Yukon, Tanana, and North Saskatchewan Rivers, lakes in Canada, Alaska, and North Dakota, as well as over 2,000 km of channels within Canada's Peace-Athabasca Delta. Tier 1 sites involve 1) arrays of pressure transducers to measure variations in water surface elevation; 2) aerial collection of infrared photography, from either UAVs and airplanes, in order to delineate water surfaces, as well as lidar to provide additional measurements of water surface elevation, and airborne L-band SAR measurements, such as from NASA's UAVSAR, to enable water delineation under vegetation; 3) Long profiles of water surface elevation using survey-grade GNSS receivers and precise point positioning GNSS processing via watercraft; 4) ADCP discharge measurements. A cornerstone of SWOT's science measurements is its river discharge product, derived from SWOT height, width, and slope measurements. In addition to Tier 1 sites, approximately one hundred 'Tier 2' sites are planned, which consist of upgrading existing gage infrastructure by surveying the water surface elevation relative to the ellipsoid using GNSS techniques similar to those described for Tier 1 sites.

The SWOT mission relies on the precision of its water surface elevation measurements to achieve new hydrologic science, and it is of the utmost importance to validate that these stringent accuracy targets (e.g. spatially-continuous river slopes to an accuracy better than 1.7 cm/km for large reaches (100+ km) of river) are actually being realized. Thus the SWOT cal/val activities are essential for realizing the science impact of the forthcoming satellite mission, but are also pushing the boundaries of characterizing fluvial processes.

Over one sixth of the world's population relies on seasonal snow for water supply, and the earth's dynamic snow cover plays a major role in the global energy balance. However, monitoring SWE and snow albedo over large regions, especially in the mountains, remains one of hydrology's grand challenges. While the proposed NASA Surface Biology and Geology hyperspectral satellite mission would revolutionize measurement of snow albedo, a direct measurement

of snow water equivalent, especially in mountainous areas, has proven elusive. NASA's SnowEx is a multi-year effort to improve our ability to remotely monitor snow water equivalent (SWE) and albedo through extensive coincident airborne and field-based experiments, combined with modeling to determine the optimal approach for monitoring snow. These campaigns are community-wide efforts that will allow the development of a next-generation snow satellite mission concept, and demonstration of a global snow monitoring strategy using a fusion of remote sensing, modeling, and in-situ observations.

The NASA SnowEx 2020 Campaign consists of two coordinated airborne and field-based experiments in the Western U.S., from the fall of 2019, through the spring of 2020. The Time Series experiment will focus on calibration and validation of a new approach to SWE retrieval with UAVSAR, a mature L-band InSAR airborne sensor. At regular intervals, UAVSAR will fly over 13 sites across 5 states, chosen to span a range of snow climates and conditions, a range of elevations and vegetation, and with ongoing research projects, infrastructure, and experienced local field observers willing to perform a biweekly ground-based measurements. A detailed experiment on Grand Mesa, CO will occur in late-January to early-February to test and validate SWE retrieval from active and passive microwave sensors, and to quantify subpixel variability in thermal IR signatures. Grand Mesa is also part of the time series campaign, and therefore will also include airborne flights with an L-band InSAR, and airborne LiDAR. SnowEx 2020 is coordinating with several additional partners, for mutual benefit, including airborne gamma flights by NOHRSC, and UWB FMCW flights by the University of Alabama Remote Sensing Center.

and climate science in addressing contemporary challenges in water, climate, and food. A series of sessions proposed by the UZ committee is to discuss grand challenge problems.

Understanding **how small-scale processes and heterogeneities in the unsaturated zone influence and regulate fluxes within and across the UZ across multiple spatial and temporal scales** is one of the grand challenges of this community. A session proposed by the UZ technical community entitled "Experimental and theoretical strategies for quantifying the impact of small-scale heterogeneity on effective fluxes within the unsaturated zone and across interfaces with the atmosphere and saturated zone" aims at addressing this issue.

How resiliency and thresholds of UZ processes respond to anthropogenic disturbances, and how do they vary across climates, biomes, and geological settings is another grand challenge. A session entitled "Impacts of climate variability and anthropogenic disturbances on subsurface systems: hydrological, social and public health" will address this challenge.

The UZ community is also interested in **better harnessing 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**. A session entitled "Utility of Artificial Intelligence/Machine Learning approaches in soil hydrological processes and agriculture" will address this challenge.

Finally, an "Unsaturated Zone General Session" is proposed to advance our overall understanding of dynamic hydrologic and (bio)geochemical processes in the vadose zone.

Unsaturated Zone

Yusong Li

University of Nebraska-Lincoln



The unsaturated Zone (UZ) community is interested in fundamental processes that govern flow, transport, as well as bio-geo-chemical dynamics in the subsurface. The community is forming strong partnerships with biogeosciences and atmospheric

Water and Society

Y. C. Ethan Yang

Lehigh University



The three emerging science questions from Water and Society Technical Committee are:

1. *How to better characterize human activities and integrate those in the process-based water model-*

ing at different spatial scales?

2. *How to better communicate scientific results to the general public and inform policymaking?*
3. *What is the appropriate institutional structure to facilitate water governance and management?*

This year, several sessions have been proposed to address these questions. **Our TC-endorsed session: “Water and Society: Water Resources Management and Policy in a Changing World”** invite studies that address these three questions simultaneously. This centennial-focused session will summarize the water challenges that our society faced in the past century

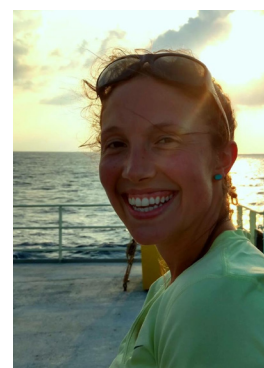
and suggest the path forward to a new era.

Sessions that specifically targets scale issue is “Water and Society: Dynamics and sustainability of multiscale human-water systems.” Sessions that address engagement issue are: “Water and Society: Communication, Decision Support and Stakeholder Engagement to improve Policy and Management in an Uncertain World” and “Water and Society: Enhancing and Communicating Hydroclimatic Forecasts for Water Resources Decision-making.” We also have sessions focus on data, urban and extreme event adaptation. The Water and Society Technical Committee welcome and encourage the submission of abstracts in all aspects of human-water interaction.

Meetings Task-Force report: Summary of Section Meeting Survey

Sally Thompson (University of Western Australia)
Julia Guimond (University of Delaware)

During the late spring – early summer, the AGU Hydrology Section sent out a survey asking members of the section to provide feedback on the concept of a Section Meeting. The broad parameters of this meeting were to complement the Fall Meeting with a smaller, more focused, biennial event, which would be jointly held by the AGU Hydrology Section with partner organizations that have overlapping interests in water science. A task force of AGU Hydrology Section members developed the survey, which was sent out by AGU centrally. Nearly 650 people responded to the survey. Respondents were distributed across career stages, with 25% coming from graduate student, post-doctoral or research associate positions; 20% assistant professor or early career scientists, 20% from mid-career, and 35% from senior professionals. Almost all respondents (~85%) were from North America, and the remainder from Europe, the Asia-Pacific, South Asia and South America.



"Nearly 650 people responded to the survey."

Of these respondents, 60% indicated that a section-

al meeting would be “extremely” or “very” useful to them. Almost all (97%) of respondents said they would attend such meetings, and a similar number would send students (96% of respondents who supervise students). Most respondents (77%) felt that a meeting of this nature would be different to those already on offer. Section members were attracted to a smaller meeting size (85% positive), to the potential to avoid overlapping poster and oral sessions (76% positive) or concurrent sessions (74% positive), and to a focus on networking (74% positive). A number of other potential innovations, ranging from providing travel grants to hosting non-traditional sessions or educational and training courses, also received broadly positive support (~65% positive).

"Most respondents (77%) felt that a meeting of this nature would be different to those already on offer."

The most common concern about a new potential meeting was the addition of another conference to the already over-crowded calendar of meetings. About 25% of respondents considered that a new meeting would conflict with existing meetings, and another 40% of respondents indicated that such a conflict was

possible. This was a common topic raised in written comments.

The survey taskforce will work further with the data from this survey to identify, for example, any breakdowns in the responses by career stage or demography. The aim of doing this is to consider how AGU Hydrology could tailor the conference design to promote equity and inclusion across all members. The taskforce will make a formal recommendation to the Section Leadership in the next month.

Twenty-three Unsolved Problems in Hydrology (UPH) – a community perspective

Günter Blöschl (Vienna University of Technology), and
Christophe Cudennec (French National Institute for Agricultural Research)

In the July 2018 Newsletter, the AGU-HS Technical Committees presented what they considered the main research questions for their committees. The goals were to appreciate how the committees relate to each other and how the grand challenges in hydrology are being addressed through the Fall Meeting sessions and other activities.

A related initiative of identifying research question by public consultation has been initiated by the International Association of Hydrological Sciences (IAHS) in July 2017. The outcomes have been recently published and are briefly summarised here.

The starting point of the initiative was the need for stronger harmonisation of research efforts and for a clearer articulation of the central research questions of the international hydrological community. In 1900 German mathematician David Hilbert launched a set of 23 unsolved problems which have greatly stimulated focused research in mathematics. It was suggested that a similar exercise could also invigorate research in hydrology. An open community process was initiated to identify unsolved scientific problems in hydrology (UPH) with the goals of increasing the coherence of the scientific process; energising the hydrological community through increasing the

awareness that we do not fully understand many hydrological processes; and speaking with one voice as a community to increase public awareness and enhance funding opportunities for community projects.

The idea was first aired at the IAHS Scientific Assembly in Port Elizabeth, South Africa, in July 2017. A video was published on YouTube in November 2017 outlining the purpose of the initiative and the vision. Subse-

"The starting point of the initiative was the need for stronger harmonisation of research efforts and for a clearer articulation of the central research questions of the international hydrological community."

quently, a LinkedIn group was established, and IAHS members, sister learned societies and all hydrologists were invited to propose and discuss potential unsolved problems through this group and through email. The AGU Hydrology Section, the EGU-HS SubDivision and the IAHS scientific commissions were actively involved to broaden the discussion basis. A total of 260 candidate problems were received through the LinkedIn group, email and a splinter meeting held in Vien-

Twenty-three Unsolved Problems in Hydrology (continued)



Figure 1: Symposium on 14 April 2018. Left: voting in a break-out group. Right: voting in the plenary session. From Blöschl et al. (2019)

na in April 2018, involving a total of 230 scientists. In a subsequent meeting in Vienna in April 2018, attended by about 110 scientists, the candidate questions were sorted, merged, split and reworded. The questions were then ranked into 'gold', 'silver', 'bronze' and 'remove' in order of decreasing importance, by majority voting of the participants of the meeting (Fig. 1). A small working group then synthesised the questions into a set of 23 questions (following Hilbert's example) and prepared a community paper which, after a final consultation process with all scientists involved, was published in *Hydrological Sciences Journal* in June 2019¹.

The individual questions, or UPH, are presented and discussed in detail in the full paper. The questions were organised into seven themes: Time variability and change; Space variability and scaling; Variability of extremes; Interfaces in hydrology; Measurements and data; Modelling methods; Interfaces with society. This contrasts with the more traditional organization by process (e.g., precipitation, groundwater) or method (e.g. field experimentation, remote sensing).

The consultation process revealed much about community priorities and the state of our science: a preference for continuity in research questions rather than radical departures or redirections from past and current work. Questions remain focussed on process-based understanding of hydrological variability and causality at all space and time scales. Increased attention to environmental change drives a new emphasis on understanding how change propagates across interfaces within the hydrological system and across disciplinary boundaries. In particular, the expansion of the human footprint raises a new set of questions related to human interactions with nature and water cycle feedbacks in the context of complex water management problems.

"Questions remain focussed on process-based understanding of hydrological variability and causality (...) Increased attention to environmental change drives a new emphasis on understanding how change propagates across interfaces within the hydrological system and across disciplinary boundaries."

There are similarities with the questions suggested by the AGU-HS Technical Committees in the July 2018 issue of the Newsletter. For example, environmental change and the human footprint feature prominently in both sets of questions. There are also differences. For example, the UPH put more emphasis on the importance of research across interfaces and across disciplinary boundaries.

The UPH, and their interpretation, point towards three future research directions:

- More high-risk/high-gain activities
- Generalisation and open data/models
- Activities around more integrated questions

These directions may help increase the coherence of the scientific process in hydrology, and thus accelerate progress, through increasing the critical mass of researchers working on any one science question and through increasing the scientific connectivity within hydrology. A number of activities are being planned to capitalise on the outcomes of this initiative. Among other things the UPH could be used to increase the structure and coherence of the sessions at IAHS, EGU,

AGU and IAH meetings by organising sessions on specific unsolved problems. In each of the seven themes, such as time variability, the focus of a symposium may be on the unsolved problems identified here. Publications could mention what question (out of the 23) they are a contribution to, which will help link individual papers to each other. At the July 2019 IUGG meeting in Montreal the discussion will be continued, in particular on selecting some of the unsolved problems and making them more specific. This may further increase progress on a few focused questions.

Finally, the positive response of the community to this initiative is reassuring in that this kind of broad

consultation process is actually feasible and considered useful. This is a consultation that could and should be repeated in the future for the benefit of our discipline.

References:

1. Blöschl, G. et al. (2019) Twenty-three Unsolved Problems in Hydrology (UPH) – a community perspective, *Hydrological Sciences Journal*, DOI: 10.1080/02626667.2019.1620507

2018 Outstanding Student Paper Award Winners

Let us congratulate our winners of the Outstanding Student Presentation Awards for the 2018 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 presentations for the honor. Please congratulate this year's winners! Some also have provided responses at <https://membership.agu.org/ospa-winners/>.

Emily Baker,
Syracuse University,
Title: Improving the Accuracy of Stream Temperatures Acquired through Ground-Based Time-Lapse Thermal Infrared Imagery

Abby Eurich,
Colorado State University,
Title: Combined Effects of Land Cover Change and Flow Modifications on Streamflow in Colorado

Eva Sinha, Stanford University,
Title: Impact of Changes in Land Use and Land Management on Nitrogen Loading Within the Continental United States

Noelle Patterson,
University of California Davis,
Title: Analyzing California Reference Streamflow with the Seasonally-based Functional Flows Calculator

Samantha Karpyschin,
University of Alberta,
Title: Transpiration Response of Residual Lodgepole Pine After Strip and Partial-cut Harvesting in Alberta's Southern Rocky Mountains

Thi Minh Thuy Nguyen,
University of Queensland,
Title: Thermohaline Flow in Seawater Intrusion in Shallow Coastal Aquifers

Jane Chui,
Massachusetts Institute of Technology,
Title: Impact of Motile Bacteria on Viscous Fingering

Amanda Campbell,
Syracuse University,
Title: Assessing the Natural Variability of Dissolved Methane in Groundwater over the Marcellus Shale in New York: Results from a Year of Monthly Sampling of Domestic Groundwater Wells

2018 Outstanding Student Paper Award Winners (continued)

William Jesse Hahm,
University of California Berkeley,
Title: Stable isotopes in oaks reveal progressive unexpected shift toward isotopically lighter rock moisture source during summer dry out of the critical zone

Amelia Nelson,
Ohio State University,
Title: Heterogeneity in River-Groundwater Mixing, Microbiology, and Geochemistry in an Alpine River-bed during Baseflow

Fleford Redoloza,
South Dakota School of Mines and Technology,
Title: Well Placement Design Using Extremal Optimization for Aberdeen, SD

liya Weldegebriel,
University of California Berkeley,
Title: What determines the success of soil and water conservation practices? A case study from the Tana and Beles sub-basins, Ethiopia

Gianluca Bergami, Swiss Federal Institute of Technology (ETH) Zurich,
Title: Surface Water-Groundwater Interactions in a Regulated Alpine Gravel-Bed Braided River

María Teresa Contreras Vargas,
University of Notre Dame,
Title: Modeling Rapid Flood Propagation in Andean Rivers: High-Resolution Simulations and Surrogate Models for Early Warning Systems

Kelly Flint,
San Diego State University,
Title: Using Dimensionless Scaling Parameters as Decision Metrics in a Heterogeneous Hydraulic Routing Scheme

Camille Vautier,
Other,
Title: Evaluating our Ability to Predict Future Nitrate Concentrations in Groundwater Based on a Few Key-Measurements

Atieh Alipour,
University of Alabama,
Title: Assessing pluvial flash flood hazard in south-east US (SEUS)

Marisol Dominguez,
University of Texas at El Paso,
Title: Global Analysis of the Hydrologic Sensitivity to Climate Variability using a Budyko Approach

Crystal Burgess,
Syracuse University,
Title: Hydrothermal Characterization of Urban Greenspaces: Determining the productivity of vegetated vacant lots

Emily Fedders,
Appalachian State University,
Title: Streambank Salt Plume Intrusion, Concentration, and Residence Times along a Dynamic, Urban Headwater Stream: Investigation of Development and Remediation Mechanisms

Anna Apostel,
Ohio State University,
Title: Assessing uncertainty in hydrological models within the Maumee River Watershed: are parameters or farm management assumptions the primary drivers?

Robert Moak,
Clemson University,
Characterizing the Subsurface Using Deformation from Pumping and Surface Loading Tests

Carolyn Voter,
University of Wisconsin Madison,
Title: Quantifying weather-driven differences in the hydrologic outcomes of low-impact practices for improved understanding of likely hydrologic behavior in different climatic settings

Collin Sutton,
Auburn University,
Title: Groundwater and Surface Water Responses to Climate Change: A Case Study in Georgia, USA

Bruno Aragon,
King Abdullah University of Science and Technology,
Title: Multi-temporal and spatial resolution water use retrievals over dryland irrigated fields

2018 Outstanding Student Paper Award Winners (continued)

OSPA Student Information, Fall Meeting 2019

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.

Hydrology Section Twitter board



Inform our community about your hydrology-related twitter account here!

Hydrology Section
Student Subcommittee:
[@AGU_H3S](#)

Ecohydrology Technical
Committee:
[@AGUecohydro](#)

Hydrologic Uncertainty
Technical Committee:
[@AGU_HU](#)

AGU Hydrogeophysics:
[@AGUhydrogeophy](#)



Fall Meeting venue: George R.
Moscone Convention Center
(Moscone Center), 747 Howard Street

<https://www2.agu.org/fall-meeting>