July 2020

Newsletter

Hydrology Section

American Geophysical Union | Hydrology Section | July 2020 Newsletter

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From the Section President

Scott Tyler (University of Nevada, Reno)

The past 7 months have been challenging and tragic, and from the leadership of the Hydrology Section, I want to express our condolences to those who have lost family and friends, our support to all of those in the midst of the pandemic, and our firm commitment to equality and inclusion of all peoples in science. It is my belief that we can come out the other side stronger and wiser. In so many ways, the pandemic and its consequences have profoundly changed how we view the world, and it is my hope, that in spite of some nation's and leader's misguided rhetoric that we can learn the global tools and skills that will be critically needed to work through the next challenges of a changing world climate. behalf of the leadership of the AGU's Hydrology Section, it is my pleasure to report to you on the state of the Section. In this newsletter, we focus on activities over the past year, remind you of activities at the upcoming 2019 Fall meeting in San Francisco, celebrate some of our award winners as well as hear from our recently elected class of Hydrology Fellows.

"... The pandemic has had a profound impact on how we live and how we work (...) (However) The section's activities have continued without significant impact.

The pandemic has had a profound impact on how we live and how we work, and the AGU and the Hydrology Section have been working on short and long term planning. The Section's activities, such as award and fellow nominations, committee evaluations, task forces and meeting planning have continued without significant impact. I really appreciate the volunteer efforts of all of you to keep the section activities on track. The AGU Council has recently approved a new 5 year Strategic Plan, putting the focus on bringing our science to the communities of users. As hydrologists, we are well aware that our science is put into practice daily, and AGU's now stated recognition of the importance of engaging science with policy and decision makers falls in line with what many of our Section's members are already doing. This is only one aspect of the new plan, and you can read the synopsis and entire plan in the April 23 "From the Prow" post. Our new AGU Executive Director, Randy Fiser has a strong background in sustainability, and I think he will be very capable of carrying out this new mission for the Union.

However, the most obvious impact of the pandemic is the planning for 2020 Fall Meeting. As you will see in Sankar Arumugam's article, the Section's session proposals, Town Halls and workshops are slightly down this year, reflecting the uncertainty of the Fall Meeting but still very healthy. The Section leadership has been working with our own volunteers and AGU to develop alternatives and back up plans as we work through the options for the 2020 Fall Meeting.

Updates on the 2020 Fall Meeting

After significant discussion by the AGU Board of Directors, the 2020 Fall Meeting will now be held primarily virtually, with some options left open for small regional gatherings if possible.

While challenging, this shift in meeting format was already coming as a result of the desire of the membership to "walk the walk" on carbon emissions. In the long run, hybrid meetings with both in-person and real time online presence are the future, and the pandemic is only forcing our hand in a more sudden manner. We are planning to provide additional back up to session conveners to make the sessions more interactive and offer better opportunities for speaker/audience exchange. I will also be tasking our Technical Committees to become more involved in sessions and session moderating. And finally, we are pursuing the design of smaller, moderated chat rooms or Slack channels to simulate the environment of the Poster Hall and the interactions that are key to our science.

From the Section President (continued)

"... Fall Meeting will now be held primarily virtually, with some options left open for small regional gatherings if possible."

Our named lectures and awards announcements will continue to be a major portion of the meeting. To accommodate our world audience, I am proposing that the Langbein and Witherspoon lectures be presented twice during the day, the first via live stream, and the second via taped lecture, but with live questioning of the lecturers. It will be a tough day for our lecturers, but will provide our colleagues from the eastern hemisphere with a richer and fairer experience. We will also share the recorded lectures immediately following the meeting.

We will recognize our awardees as we always do at the Langbein Lecture and at our Business Meeting. I am hoping to run the business meeting also at two time slots for better worldwide participation. At this year's Business Meeting we will, for the first time, recognize those section members that we have lost in 2020. While I am aware of some close colleagues who have passed away this year, there are many I may not be aware of, and ask that you contact me directly with any news. We are also working on ideas for recognition of section members' losses, close family, friends, etc. as a way of community healing. This may take the form of a virtual memorial wall but feel free to give me your feedback on other approaches.

Over the next few months, we will be challenging you to help design a meeting that works for all, and I encourage you to contact Sankar (sankar_arumugam@ncsu.edu) or me (styler@unr.edu) with your ideas.

Updates on the 2022 Joint Hydrology Meeting

Planning for the 2022 Joint AGU/CUAHSI Hydrology meeting is accelerating. We have held several meetings with section and CUAHSI volunteers to craft an organizational structure and a set of operational themes. A steering committee, comprised of section and CUAHSI leadership, volunteers, staff and the Program committee will serve to guide the meeting. The Program Committee, comprised of paired Co-Chairs, Vice Co-Chairs, Early Career Representative and Student representatives will be responsible for developing the scientific agenda of the meeting. On the Section side, we are conducting a formal search for the four Program Committee positions. These are very important and exciting roles, and I hope that you have considered applying.

We have developed a tentative theme for this meeting, "Frontiers in Hydrology: Addressing a Changing Earth", with the goals of both highlighting our new advances, but also to challenge our discipline's readiness to respond to climate change. We have just launched the 2022 Joint Meeting website (https://www.agu.org/Hydrologic-Sciences-Meeting). The Program Committee will work with our Technical Committees to build a program around this general theme that is inclusive of hydrologic sciences many sub-disciplines. We also are reaching beyond our traditional membership to attend this meeting, tailoring the events to encourage participation by public policy professionals, non-academics and NGO's working water; including a significantly enhanced virtual presence.

On-going Activities Updates

We have just wrapped up the nominations process for our section and Union awards, and my thanks to all of you who have made the significant effort to nominate your peers. Thanks to your efforts, and the efforts of the Section's Nomination Committee headed by past-President Jeff McDonnell, we had very deep pools of nominations in almost all of our Section awards, and record number of Fellows nominations. The two-step process is working well, and our awards committees will be providing feedback to me on all the nomination packages, which I will be sharing with nominators after the awards are made.

As of this writing, our Section Awards Committees have finalized their recommendations, and the official announcement of most of the awards is still pending at AGU. I will be announcing these and all of the Union awards via the website as soon as they are available, rather than hold up this issue of the newsletter.

However, I am happy to announce and congratulate our Horton Research Grant awardees for 2021. The Horton Research Committee, headed up by Josie Geris had an outstanding pool of proposals to work with and appreciate all who submitted this year. The

Horton Research Fund can support up to three $20K awards each year, and my congratulations this year go to:

- **Molly Cain**, Indiana University Bloomington: Dynamic hydrologic connectivity controls transport of water and solutes

- **Quincy Faber**, University of Florida: Glacier Algae in Supraglacial Weathering Crust Ecosystems

- **Hyunglok Kim**, University of Virginia: Integration of Existing Satellite Systems to Produce an Observation-Based Diurnal Cycle of Soil Moisture Data on a Global Scale

While the nomination pools were deep, we still need to work on broadening the diversity of nominations. From the Section awards, of the ~40 nominations received, ~34% were female, only 22% were from outside of North America and the ethnic diversity was also quite limited. We are an international and diverse organization, yet our recognition of our colleagues continues to lag behind.

The WRR Open Access Task Force
The Task Force has just completed their review and analysis of survey data and their report can be found on page 7. As you will see, the community that responded was relatively split between continuing in the current hybrid model of WRR and flipping completely to open access. The Task Force recognizes this split as driven primarily by costs, but also recognizes open science will lead to better science, and lead to more equitable and diverse scientific community. The Task Force also notes that any publishing decision needs a solid financial understanding; an understanding that is not generally available to the membership of AGU. The Section leadership will be carrying this report on to the AGU Council and the Publications Committee with the goal of carrying out their recommendations, increasing transparency, and leading AGU towards a more equitable and sustainable publishing model.

"... the community twas relatively split between continuing in the current hybrid model of WRR and flipping completely to open access.

2020 Hydrology Section Elections
The Hydrology Section will be electing its next slate of officers in 2020 and I am very excited to have an outstanding slate of candidates for President-elect and Section Secretary. Due to the delaying impacts of the pandemic, the process will be pushed back this year but I am happy to announce our slate of candidates below:

Hydrology Section President-Elect Candidates:

Praveen Kumar
Department of Civil and Environmental Engineering
University of Illinois, Urbana- Champaign

John Selker
Department of Biological and Ecological Engineering
Oregon State University

Hydrology Section Secretary Candidates:

Shirley (Kurc) Papuga
Department of Environmental Science and Geology
Wayne State University

Matthew Rodell
Earth Sciences Division
NASA Goddard Space Flight Center

We will be posting our candidates' biographies and statements along with the timeline for elections on the **Election's website** and via Twitter. AGU is anticipating releasing all election candidate information by the time that you are reading the newsletter, with their full bio's and statements coming out hopefully by early September. Elections should be held in October with results released in mid November if all goes as planned.

The leadership of the Section is both critical and a significant commitment of time and energy, and from the Section's Executive Committee, I want to thank Praveen, John, Shirley and Matt for stepping up. Your commitment of time and energy is truly appreciated and win, lose or draw; your service to the community represents all the best in our community of Hydrologic Sciences.

From the Section President (continued)

WRR Editor in Chief

The search for the next Editor in Chief of Water Resources Research is underway and several nominations have been received. President-Elect Ana Barros is chairing the search committee and I have full confidence that Martyn Clark will be able to reduce his espresso consumption by the end of the year. He and his entire team of editors and associate editor have done an outstanding job in leading our flagship journal and, if you haven't already, thank them for their service as it is a significant time and energy commitment.

WRR is not the only place in AGU where we publish and I want to highlight the work of our section's science advisors to EOS, Adam Ward and Kerstin Stahl who, on **page 31** are recruiting you make your science heard to the wider audience of AGU and beyond. EOS has significantly broadened its scope and readership recently, and Adam and Kerstin are your ambassadors to help. Hydrology is also a bit underrepresented in AGU's newest high impact (and open access) journal, AGU Advances. President-elect Ana Barros and past Langbein Lecturer Tissa Illangesakare both serve on the editorial board and asked that I encourage you to submit your cutting edge hydrology work to Advances where it will be welcome.

TC articles

This edition, I have asked our Technical Committee Student Representatives to write their TC's column. I have asked them to tell us a bit about themselves, where they see their futures and what about the Fall Meeting sessions that really excites them. While we often may say that our student members of the Section are our future leaders, the reality is that they are leading already, as you will in Leila Saberi's H3S updates on **page 23**.

And Finally...

In closing, I know this has been and will continue to a very difficult time for all of us. In many ways though, we are the fortunate ones; we work in a science that we are passionate about, our work is generally recognized as important and we receive positive recognition for our work. Many in the world are not so lucky, either because of where they live, the color of their skin, their gender or any other factors that unfairly discriminate. As we pull through this crisis, let us commit to use our skills and fortunate positions to reduce the impacts of the next crisis on those less fortunate than we are.

Please stay healthy, safe and productive!

From the Section Secretary

Charlie Luce (United States Forest Service, Boise)

For four years, now, I've filled the July newsletter with statistics about the Outstanding Student Presentation Award (OSPA) and then gone on to add a few words about why the program is important and encourage judges to sign up in November. Recent events and conversations prompt me to focus this year's report with more emphasis on why this program, and related efforts by the section to increase student support, are important. The change to a virtual meeting this year will prompt some innovations, adding to the relevance of reflecting on the values that we want to advance with all of our efforts.

The key values enhanced by enhancing student experiences at the meeting, including OSPA, are the culture and composition of our scientific community. These values tend to move hand-in-hand, where a more diverse community is one that arcs toward being inclusive and equitable, and an inclusive and equitable community more readily grows its diversity. If our composition and culture are to change to become diverse, inclusive, and equitable, the people in early career stages are the ones who will lead that change and be that change. Recruiting and retaining this cadre in a way that maintains, or even enhances, their diversity and commitment to inclusivity and equitable treatment is a priority. OSPA is one among many ways we can help to realize our goals.

Engaging and involving students in the broader community is part of how we build their enthusiasm for a career in science. Every student coming to AGU and presenting has a supportive community at their institution, and they come to the meeting to connect to the broader community, to see emerging areas of understanding, AND to share their work in its larger context. The most important thing we can do is listen, authentically and with heart.

"OSPA is about more than recognition (...) To listen to students and to engage them in conversation is to include them in the broader process of science."

OSPA is about more than recognition. Very often conversations about the value of OSPA turn toward recognition as a primary function. It is perhaps important here to contrast engagement and recognition, and how they support the values that we wish to advance. To listen to students and to engage them in conversation is to include them in the broader process of science. This is a direct action to participate in the very values we want to encourage in our community. In contrast, recognition, by its very nature, must be rationed to have meaning. Recognition can be a strong instrument to express inclusion, but it can equally cut through any sense of inclusion if not carefully managed. The OSPA committee can help with this, but it is the willingness of the many people who volunteer to judge to visit with our full community of students and listen to them, that is the foundation of both a thorough engagement of students and equitable recognition of their efforts.

It's a challenge every year, and an increasingly strong challenge, to have judges attending every presentation. At a time when many are realizing the distinction between verbal support and actions that they can personally take to increase inclusivity, I'd like to offer the perspective that OSPA is an opportunity to do something meaningful at the level of individuals, to BE inclusive. We all know that everyone IS welcome here, but I hope we can all embrace the importance of communicating that message to ALL of the students. I'd encourage an effort to visit students from universities and colleges that are not major research institutions, where they may have fewer local colleagues. My vision would be to see that all of the students attending the meeting understand that their contributions are important to the advance of science.

It's a unique year, and the details of what "visiting" might look like are not at all clear. The Fall Meeting will be virtual in nature, so some innovation is going to be needed in how we engage and recognize students. Session formats are still taking form, and people are being creative in proposing new ideas for how sessions might proceed. As a result, it is not entirely clear what OSPA will look like, but I hope the messages above will promote some thought about the kinds of value that flow from OSPA and what we can do to sustain some of the more fundamental outcomes. Without attention, a virtual setting could lead to a more distant stance, judging from afar, and now more than ever we need to set aside that temptation and make a concerted effort to converse with our student presenters.

"I'd encourage an effort to visit students from universities and colleges that are not major research institutions, where they may have fewer local colleagues."

I am confident that we will meet the challenge. Some of the innovation will to come from the section and Technical Committees, as it has in recent years. Last year, the Technical Committees expanded the student involvement program. The TCs wanted to do more, and Scott Tyler offered $500 to each committee to increase support and recognition of students. The TCs responded with a range of activities from travel support to further presentation recognition, and the feedback from students was moving. The Hydrology Section Student Subcommittee led a multi-section effort to connect new AGU Fellows with students. Again, students let the section know how valuable the experience was for them. With leaders like this, we can expect continued thoughtful and energetic organization. I hope this message will help to recruit enthusiastic volunteers to increase the success of their efforts!

Please see the announcement of the 2019 Hydrology Section Outstanding Student Presentation Awards in the newsletter.

2019 OSPA Winners

The 2019 Fall Meeting saw record participation in the Outstanding Student Paper Award (OSPA) by students with 564 student presentations! It was an increase of about 10% over the previous record of 510 in 2017. The 2019 OSPA committee included Heidi Asbjornsen (University of New Hampshire), Anne Jefferson (Kent State University), Di Long (Tsinghua University), Charles Luce (US Forest Service), and Matthew Weingarten (San Diego State University).

Winners are selected based on a combination of score and comments. Comments that explain how their presentation stood out from among the others were 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.

From all of the Section Leadership, our congratulations to our 2019 award winners and to all of our student presenters!

2019 Outstanding Student Presentation Awardees

Aspen Anderson, Simon Fraser University, Influence of heterogeneity in the preservation of subsurface saline paleowater in coastal deltas

Richard Barnes, University of California Berkeley, Modeling hydrology at the largest and longest scales

Carolina Bieri, University of Illinois at Urbana Champaign, Investigating the Impacts of Large-Scale Soil Moisture Anomalies on Regional Hydroclimate in Southeastern South America Using Reanalyses and Modeling-Based Approaches

Win Cowger, University of California Riverside, Estimating Riverine Microplastic Flux by Accounting for Transport Dynamics

Julianne Davis, Syracuse University, Assessing the Effects of Beaver Dam Analogues on Channel Morphology using High-Resolution Imagery from Unoccupied Aerial Vehicles (UAVs)

Quercus Hamlin, Michigan State University, Connecting Landscape Nitrogen Loads to Groundwater Nitrate Concentrations

Mitchell Hastings, University of South Florida, Gravity anomalies reveal volcano-tectonic interaction in an active distributed volcanic field, Blackfoot Reservoir volcanic field (ID)

Xander Huggins, University of Victoria, Human dimensions of changing global freshwater availability

Sky Jones, Middle Tennessee State University, A Scalable Strategy for Riparian Vegetation Assessment Using LiDAR

Bolette Badsberg Jensen, University of Copenhagen, Accounting for modeling errors in linear inversion of cross-borehole georadar amplitude data – exemplified for detection of sand lenses in clayey till.

Elena Leonarduzzi, Swiss Federal Institute of Technology (ETH) Zurich, Resolution Matters: Numerical Analysis of the Effect of Subgrid Heterogeneities on Soil Moisture Distribution with a Physically Based Hydrological Model

Hyunglok Kim, University of Virginia, Assimilation of GPS soil moisture data from CYGNSS into land surface models

Cécile Kittel, Technical University of Denmark, A multi-mission satellite altimetry water surface elevation monitoring network in the Zambezi

Ruth Maier, University of Tübingen, Choosing Between Heterogeneity and Anisotropy – What's in the Data and What Do Your Purposes Require?

Samar Minallah, University of Michigan, Role of Moisture Flux Divergence in Mid-summer Precipitation Decrease over the Great Lakes Region

Justine Molron, A field assessment of the ability of Ground Penetrating Radar to detect fractures in very low permeable crystalline rock.

Jennifer Pensky, University of California Santa Cruz, Linking Physical Infiltration Processes to Changes in Water Quality and the Potential to Address Legacy Contaminants during Flood-Managed Aquifer Recharge

Rich Pauloo, University of California Davis, Gradient-based Travel Path Dependency of Non-Point Source Contaminant Transport

Stefan Ploum, Hidden interactions between riparian groundwater and boreal streams in Sweden

Charles Scaife, University of Virginia, Evolution of Stormflow Thresholds in Long-Term Instrumented Catchments

Joel Singley, University of Colorado at Boulder, Delimiting Hyporheic Area and Sub-Compartments Using Electrical Resistivity Inversions and Time Series Clustering Algorithms

Brandon Sloan, University of Minnesota Twin Cities, When is Plant Hydraulics Necessary for Predicting Soil Water Stress in Land Surface Models?

Danielle Tijerina, Colorado School of Mines, CHIP – Continental Hydrologic Intercomparison Project: A Conceptual Evaluation Framework for Large-Scale Hydrology Model Comparisons

Charlotte Le Traon, Effective Kinetics of Chemical Gradient Reactors

Tommaso Trentin, University of Padova, Design of a monitoring network to assess the contamination risk in the high Venetian plain regional aquifer

Jian Wu, Queen's University, Bubble-facilitated Mobilization of Trapped Dense Non-aqueous Phase Liquid (DNAPL) at Residual Saturation

Guo Yu, University of Wisconsin Madison, The Upper Tail of Precipitation in Convection-Permitting Regional Climate Models and Their Utility in Nonstationary Flood Frequency Analysis

Ian Zeng, North Dakota State University, Modeling of Dynamics of Runoff Contributing Areas in Depression-Dominated Areas

Report from the AGU Hydrology Section Open Access Task Force

Martyn P. Clark[1*], Charles H. Luce[2#], Amir Aghakouchak[3], Wouter Berghuijs[4], Cédric H. David[5], Qinyuan Duan[6], Shemin Ge[7], Ilja van Meerveld[8], and Chunmiao Zheng[9], and Marc Parlange[10$]

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* CHAIR # EX-OFFICIO REPRESENTING THE HYDROLOGY SECTION EXECUTIVE COMMITTEE $ EX-OFFICIO REPRESENTING THE AGU PUBLICATIONS COMMITTEE

1 Motivation

Open science is perhaps the most important paradigm shift in the recent history of scholarly publishing. 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 and other sciences. Critically, open science is not just underpinned by open data and open models, but by open publications as well – open science is arguably a moral imperative that requires openness in all aspects of what we do.

The open science paradigm is dramatically changing the publishing landscape. There are new review requirements, including evaluating if the data and model source code are well organized and well documented, if there is appropriate metadata, and if the models have reproducible test cases. More attention is also given to open access publishing policies, and many funding agencies now require (or at least strongly encourage) publishing 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.

In the context of this open science paradigm shift, Water Resources Research (WRR) and the AGU Hydrology Section are collaborating to better understand the challenges and opportunities associated with a possible transition of WRR to open access. The primary motivation of this effort is to provide recommendations on improving accessibility to WRR for both readers and authors. Changes should account for the evolving rules/incentives of funding agencies for some researchers and avoid new barriers to scholarly publishing for others. More generally, this initiative strives to improve how the WRR publishing

model best serves the broader hydrology community. As a mechanism to address these issues, the AGU Hydrology Section launched an open access task force. The mandate of the task force is to examine 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 WRR publications. To this end, the task force (1) reviewed the status of open access publishing models, including debates on open access publishing; and (2) gathered input from the community through (a) the Town Hall "Planning for the future of WRR" held at the 2019 AGU Fall meeting and (b) a survey sent to members of the AGU Hydrology Section.

The recommendations in this report are based on the synthesis of the task force activities during Fall 2019 and Spring 2020. This report includes discussion on the context for open access publishing, with both a review of open access publishing models, and a summary of the open access debate. It also includes a summary of community input from both the AGU Town Hall meeting and the AGU Hydrology Section open access survey. Finally, this report defines the additional work that is necessary to define a publishing model for WRR, namely, analysis of the financial feasibility of different cost models, and weighing this financial feasibility against the imperative to advance open science.

2 Context

2.1 The status of open access publishing

The publishing landscape is becoming increasingly diverse. The major publishing models are:

1. **Gold, fully open.** In this model, the article processing charges (i.e., publication fees) are paid by authors, institutions, or funders for all published articles, and articles are freely accessible to all.
2. **Hybrid, open access is optional**. In this model, authors, institutions, or funders pay limited fees (e.g., excess page charges) if the article is not openly accessible, or they pay a fee to allow open access for all.
3. **"Publish-and-read"** agreements. In this publishing model, consortia of institutions or libraries negotiate pooled funding for open access publishing. An example of such a publish-and-read agreement is Projekt DEAL in Germany.
4. **Green.** In this model authors deposit articles into open preprint servers or institutional repositories that make them openly available (e.g. arXiv, ESSOAr, EarthArXiv, university repositories).
5. **Bronze.** This model is rolling open access, where journals agree to open materials to non-subscribers after a window of time (e.g., after two years).

AGU currently has 21 peer-reviewed journals – 15 journals offer hybrid subscription + open access options, and six journals are fully open access. WRR currently fits the hybrid model where it is possible for authors, institutions, or funders to pay $2500 USD to allow open access for all. WRR also fits into the bronze publishing model as articles are open to all after a time of two years. Moreover, WRR fits the Green model where depositing article pre-prints into preprint servers is allowable and encouraged. Hosting a published version of the article on an institutional repository is allowed after six months.

Open Access does not only include free to read ("gratis open access") but also often includes free to use ("libre open access") articles within specified copyrights, both of which are outlined here. Open Access publications are typically licensed for sharing and reuse via a Creative Commons (CC) or similar. A CC license is used when an author wants to give other people the right to share, use, and build upon work that they (the author) have created. CC provides an author flexibility (for example, they might choose to allow only non-commercial uses of a given work) and protects the people who use or redistribute the author's work from concerns of copyright infringement, as long as they abide by the conditions that are specified in the license.

2.2 Debates on open access publishing

The debate on open access is framed by the issue of publishing costs – who pays, and how, and what can be done to improve the affordability of publishing. In many respects, the shift to open access represents a shift from a "reader pays" system to an "author pays" system, with the publish-and-read agreements being the intermediate ground between these two financial models.

There are several concerns surrounding the potential transition to open access. A key concern is that the "author pays" system is a pay-to-play system, which can discriminate against those without funds to support publishing costs (e.g., scientists from developing

countries, emeritus professors, unfunded students, and scientists who want to publish after their project has ended). It is hence necessary to identify innovative ways to ensure inclusiveness in these pay-to-play publishing models, such as by waiving publication fees in special cases. Another concern is that the shift from "reader pays" to "author pays" is often accompanied by a decrease in journal subscriptions from institutional libraries. The costs saved on journal subscriptions does not necessarily translate to an increase in the institutional funds available to pay for open access publishing costs. In fact, where institutional funds for open access publishing exist they are often woefully insufficient, to the extent that some authors are only able to publish in open access journals in the first part of the financial year before all of the institutional funds are spent. Even for institutions or countries where funding is currently sufficient for open access publications, it is to be seen if funding will increase at the same rate as the number of publications.

The debates on the affordability of publishing are inextricably linked to the revenue from scientific publishing. Many in our community react negatively to news of large corporate profits from scientific publishing endeavors. Scientific societies naturally find themselves at the centre of these debates when they partner with a private "for-profit" publishing house (as is the case in the relationship between AGU and Wiley). Scientific societies also rely on revenue from scientific publishing (e.g., in the past, up to 40% of AGU's budget came from publications). These debates have led to increased scrutiny of scholarly publishing – there is now much more guidance available on the reasonable costs for open access publishing, and there is a push for greater transparency and monitoring of publication costs and fees.

3 Community input

3.1 Town Hall on "Planning for the Future of WRR"

We gathered input from the community through a Town Hall "Planning for the future of WRR" held at the 2019 AGU meeting. Charlie Luce (AGU Hydrology Section) provided an overview of the open access landscape, Matthew Giampoala (Vice President, AGU Publications) provided information on AGU's vision for open access, and Martyn Clark (WRR Editor-in-Chief) discussed changing preferences for open access publishing. The Town Hall also included an "open mic" session to provide an opportunity for members of the AGU Hydrology Section to make their voice heard. The main points expressed at the Town Hall meeting are as follows (the notes from the discussion are combined and re-ordered for clarity):

1.Increased transparency in the revenue from publications. Given that AGU receives ~40% of its revenue from publications, how much of that is spent on journals and how much is spent on subsidizing other activities? *Response: Difficult to separate costs for journals because the budgets and groups are intertwined. AGU is non-profit – while expenses are high, operating costs are also high.*

2. Explain the contractual arrangement with Wiley. Are AGU journals still society journals? We need to know more about the AGU-Wiley deal and the ramifications to AGU for changes to the budget model. *Response: We often talk about Wiley being a partner, but AGU owns its journals. AGU used to have in-house production, but there is no economy of scale there. The deal with Wiley lets them act as a vendor for us: They host our platform, do production and sales for us, but we own the journal. We have a contract with them that we can break/end/renegotiate.*

3. Cost of publishing. Impression is that cost of publishing in WRR is quite high. EGU also receives 40% of its revenue from publications, all EGU journals are open access, and EGU publishing costs are much lower than AGU (in follow-up personal communication between Martyn Clark and Theresa Blume [25 May 2020], it was confirmed that the average publication cost for a paper in HESS is currently ~1500 euros or ~$1700 USD). It was recommended that we work together with publishers to make production cheaper. *Response: Publishing fees vary across AGU Journals – open access publishing costs for WRR are $2500. Publishing costs for most open access journals are $1800; open access publishing costs for most AGU subscription journals are $3500.*

4. Consider the option to flip all AGU journals to open access at once. EGU changed to gold open access back in 2000, and changed across the board, all their journals at once, which is different from AGU who is approaching it more piecewise. Perhaps AGU is not taking the right approach. Universities need to band together to work for OA deals and changes at funding agencies.

5. Support publication costs from low income

countries. It is difficult to find money for low income countries to cover publication fees, and so covering some open access fees from low-income countries (LIC) could help. Waivers should be done at submission so that publication costs are not a deterrent. *Response: This is already done. Most journals have discounts for LIC, but it has to expand beyond that for other authors who don't have the capacity to pay.*

3.2 Open Access survey

We also held an open access survey to gain more quantitative information on the constraints and preferences for scientific publishing (the survey questions and responses are provided in Appendix A). The survey was sent to the AGU Hydrology Section membership, as well as authors who had previously published in WRR. We received over 1000 responses. Comparisons between survey demographics and the available author information suggest that the survey respondents were representative of past WRR authors. However, it is unclear if these results reflect the preference of the respondents in their role as authors or readers (e.g., some government scientists may indicate a preference for "Gold" open access because their library facilities are worse than those at universities). In terms of career stage, we received fewest responses from students, possibly because few students make decisions on how to pay for publication costs. We received more responses from mid-career authors than from early-career and late-career authors. In terms of institutional affiliation, we received more than four times the number of responses from academics than from government scientists. We received very few (<50) responses from authors in the private sector. Similar to the WRR submission statistics (500-600 submissions per year from North America; 200-300 submissions per year from Europe), we received almost double the number of responses from North America than from Europe.

The main conclusions from the survey are as follows (see the Appendix for the survey results):

1. Preference for a publishing model. Participants expressed the strongest preference for the hybrid and gold open access publishing model, and least preference for publish-and-read deals. Participants in Europe had a stronger preference for gold open access than participants in North America and Asia. Government scientists also had a stronger preference for gold open access than academics.

2. Embargo period. Most participants expressed preference for an embargo period of one year or less. The strongest preference was for an embargo period of six months. The preference for the embargo period did not depend strongly on region, institutional affiliation, or career stage.

3. Impact of institutional changes. The greatest proportion of participants indicated that institutional changes had no impact on the difficulty or desirability of publishing in open access journals. A greater proportion of participants from Europe are required to publish in open access journals. Participants from Europe indicated that it was becoming less difficult to publish in open access journals; participants from North America and Asia indicated that it was becoming more difficult to publish in open access journals.

4. Impact of higher publishing costs. The greatest proportion of participants indicated that they would be less likely to publish in WRR if publishing costs increased. The importance of publishing costs was higher in North America and Asia than in Europe, and higher among academics than government scientists.

5. Sources of funding. The greatest proportion of participants indicated that they primarily used grant funding to pay for publication costs. Government scientists used institutional funding more than they used grant funding. A greater proportion of participants in Europe used institutional funding than participants in North America and Asia.

6. Extent that funding supports open access fees. The greatest proportion of participants indicated that they could only support open access fees for one or a few publications per year.

7. Factors considered when deciding how much to pay for open access. Sources of funding and journal reputation emerged as the most important factors that affect the decision on how much to pay for open access. Related to journal reputation, the journal impact factor and the quality of the editorial board were also important. In Europe and Asia, the journal reputation was more important than the sources of funding. The availability of press and promotion was consistently the least important factor when deciding how much to pay for open access.

4 A path forward

4.1 Situational assessment

The path forward for AGU Publications (and WRR) requires reconciling our value for open science with the capability of institutions and individuals to pay for publishing in an open-access journal. The decision to flip to open access is hence framed by a mix of finances and values – on one hand, the challenge is to define who pays, and how, and what can we do to improve the affordability of publishing; on the other hand, the challenge is to increase the extent to which science is open and accessible. The key challenge for the AGU leadership is to bridge the gap between individual preferences and the common good.

Balancing individual preferences with the common good becomes more difficult as more of the responsibility for open science is devolved to individuals. The transition to open access is a transition away from a system where institutions pay (i.e., institutional libraries pay journal subscriptions on behalf of its readers) to a system where the financial responsibility is increasingly devolved to individuals (i.e., many authors are responsible for paying article processing charges). While institutional funding for publication costs is available in some cases, and more "Publish-and-read" agreements are signed, this is not the norm (yet). Many authors depend on their grant funding to pay for publication costs.

These shifts in financial responsibility create dissonance between individual self-interest and the common good. Open science and thus open access are seen to benefit the common good because the science is freely available. However, publishing preferences are shaped by the limited capability or willingness to pay. Such dissonance naturally raises questions on the governance of AGU publications (e.g., publication costs and transparency), and also questions on what is best for the community. While not all of the solutions must arise from changes in AGU, AGU should provide the leadership to bring others along in the journey toward more accessible science.

4.2 Recommendations

The decision to flip to open access depends, in large part, on the financial feasibility of the open access model. Flipping WRR to open access would be more desirable if (i) publication costs were competitive with WRR's main competitors (e.g., HESS); (ii) publication fees were waived for authors without funds for publishing costs; and (iii) authors received subsidies for open access. The task force hence recognizes the importance of the following related initiatives to better understand the financial feasibility of open access publishing:

1. **Explore trade-offs in open access publishing.** The information in the survey provides information on author's willingness to pay, along with the factors that influence author's decision to publish in a specific journal. These survey results now need to be combined with financial analyses to better quantify the trade-offs in open access publishing.

2. **Define options to reduce publication costs.** The community is puzzled by the high publication costs in AGU journals compared to other hydrology journals by similar societies (e.g., WRR costs are much higher than HESS). The task force recommends that AGU analyses and explains how it can reduce publishing costs, and the impact that reduced publication costs will have on the publication process, the published articles, and on AGU as an organization.

3. **Improve organizational transparency.** AGU Publications have partnered with a "for profit" publishing house. As a scientific society, it is necessary for AGU to have greater transparency in the governance of its publications. The task force recommends that AGU fully disclose the details of their business relationship with Wiley, the operating costs for AGU Publications (including staff costs at both AGU and Wiley), the revenue from publications, where the publication revenue is spent within AGU, and how much money AGU requires from its publications in order to function effectively.

4. **Explore avenues to increase institutional support for open access.** The varying architecture of publication funding yields varying strategies for authors to publish. National-level institutional subsidies for publishing in open access journals influence where authors choose to publish. Furthermore, since some articles are completed after the "end" date of a given grant, low-cost publishing outlets (subscription based) are necessary for those articles. If open access is considered an important component of open science, then some effort needs to be made to explore to what degree current funding for publishing is an artifact of historical contract and grant language, and whether or how current funding arrangements could be changed to encour-

age increased use of open access publishing options.

Care needs to be taken regarding how different research and education institutions would be affected by changing large scale institutional funding models. These initiatives will help AGU justify its publication costs and increase community support for AGU publications. It will also prompt the scientific community to critically evaluate its increasing shift toward individual responsibility for publication costs.

4.3 Final thoughts

There is time available to consider the possible transition to open access in a thoughtful and deliberate way, and to discuss what is best for the community. In contrast to the rapid changes in the publishing landscape, there does not appear to be an overwhelming community desire for AGU/WRR to immediately modify its publication model and to flip to open access. In fact, the community survey suggests that "gold" and "hybrid" models are almost equally preferred by the survey participants (there is a slight preference for the hybrid model in North America and for the Gold model in Europe). Furthermore, the survey participants indicated that currently institutional changes have a limited impact on the difficulty and desirability of publishing in open access journals.

Since the decision to flip to open access is also a moral imperative, the path forward to define a publishing model for WRR requires balancing finances and ideals. The necessary financial analysis entails examining the feasibility of alternative cost models, including the opportunities to reduce publishing costs and analysis of the trade-offs among alternative cost models. This financial analysis is only possible through greater organizational transparency (see the recommendations above). The ultimate decision requires weighing the financial feasibility of alternative cost models against the common good of open science. The inherent value of open science should frame any open access decision.

Acknowledgments. We appreciate the efforts of Caroline Aubry-Wake, Anne Jefferson and Wouter Knoben to take notes during the Town Hall meeting. We also appreciate the efforts of Scott Tyler and Antonio Covington to administer and collate information from the open access survey. Members of the AGU Hydrology Section Executive – Section President Scott Tyler and President-Elect Ana Barros – provided comments on this report. C. H. David was supported by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Appendix A. The open access survey Participants were asked to answer the following questions:

1. Identify your preference for a publishing model.

a. Gold, fully open, processing fees are paid (by authors, institutions, or funders) for all published articles.
b. Hybrid, open access optional, pay limited fees (e.g., excess page charges) if not open, or pay a fee to open access to all.
c. "Publish and read" agreements (e.g., projekt deal), where consortia of institutions or libraries negotiate pooled funding for open access publishing.
d. Green, authors deposit accepted articles into open preprint servers or institutional repositories that make them openly available (e.g. arXiv, ESSOAr, EarthArXiv, university repositories).
e. Bronze, rolling open, journals agree to open materials to non-subscribers after a window of time.
f. I do not have enough information to make an informed decision.
g. Other (please specify)

2. What is an acceptable time period for embargo of journal articles before they are free-to-read?

a. None
b. Six Months
c. One Year
d. Two Years

3. Have recent institutional changes (e.g., preference for open access by funders, ability to pay for open access) made it more or less desirable/difficult to publish in open access journals?

a. More Difficult
b. Less Difficult
c. No Difference
d. I have to publish in open access journals.

4. Would a move to open access and thus a potential increase in publication cost make it more or less likely that you will publish your work in WRR?

a. More Likely
b. Less Likely
c. No Difference

5. What sources of funding do you have to pay for open access fees? (Multiple answers are acceptable)

a. Grant Funding
b. Institutional Funding
c. I am prohibited from paying open access fees if a less expensive publishing option is available
d. Other (please specify)

6. To what extent can your funding support open access fees?

a. I can publish all of my articles in OA publications
b. My funding may support one or a few OA publications/year only
c. I do not have any support for OA fees

7. What factors do you consider in choosing how much you are willing to pay for open access fees? (Multiple answers are acceptable)

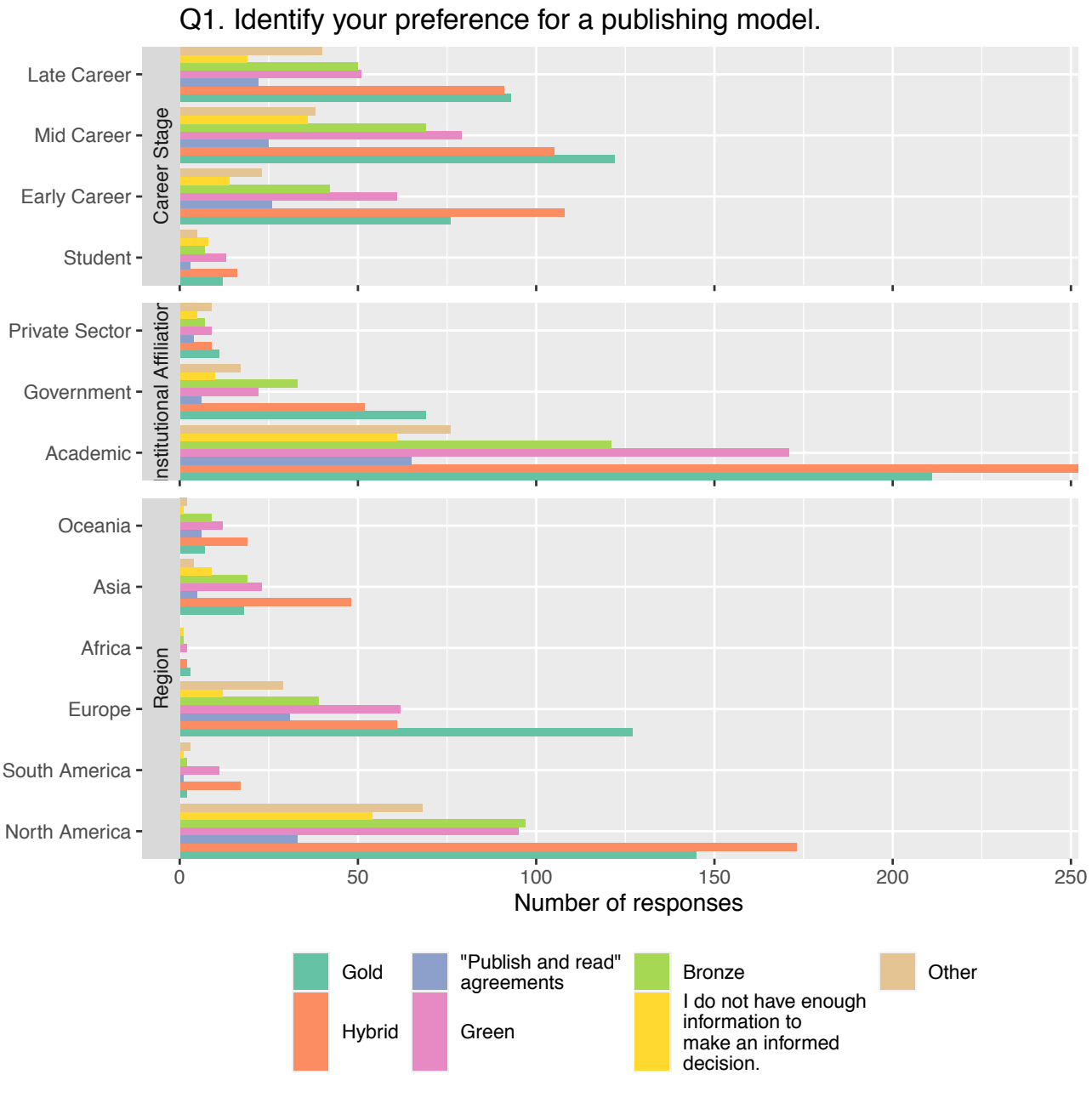
a. Sources of Funding
b. Mandate from Institution or Grant Funder
c. Journal Audience
d. Journal Reputation
e. Quality of Editorial Board
f. Availability of Press and Promotion
g. Impact Factor
h. Other (please specify)

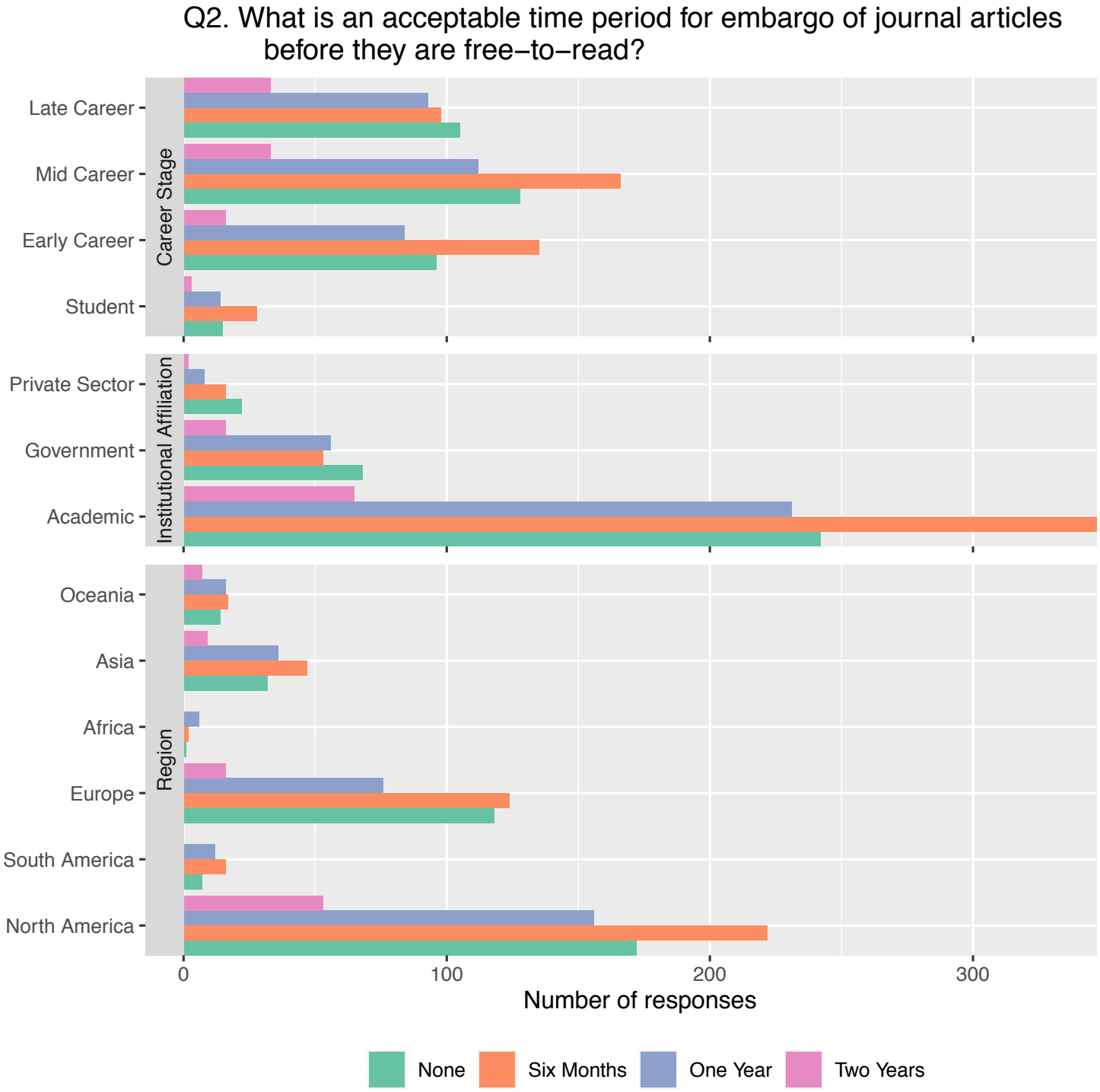
8. What is your Career Stage?
a. Student
b. Early Career
c. Mid Career
d. Late Career

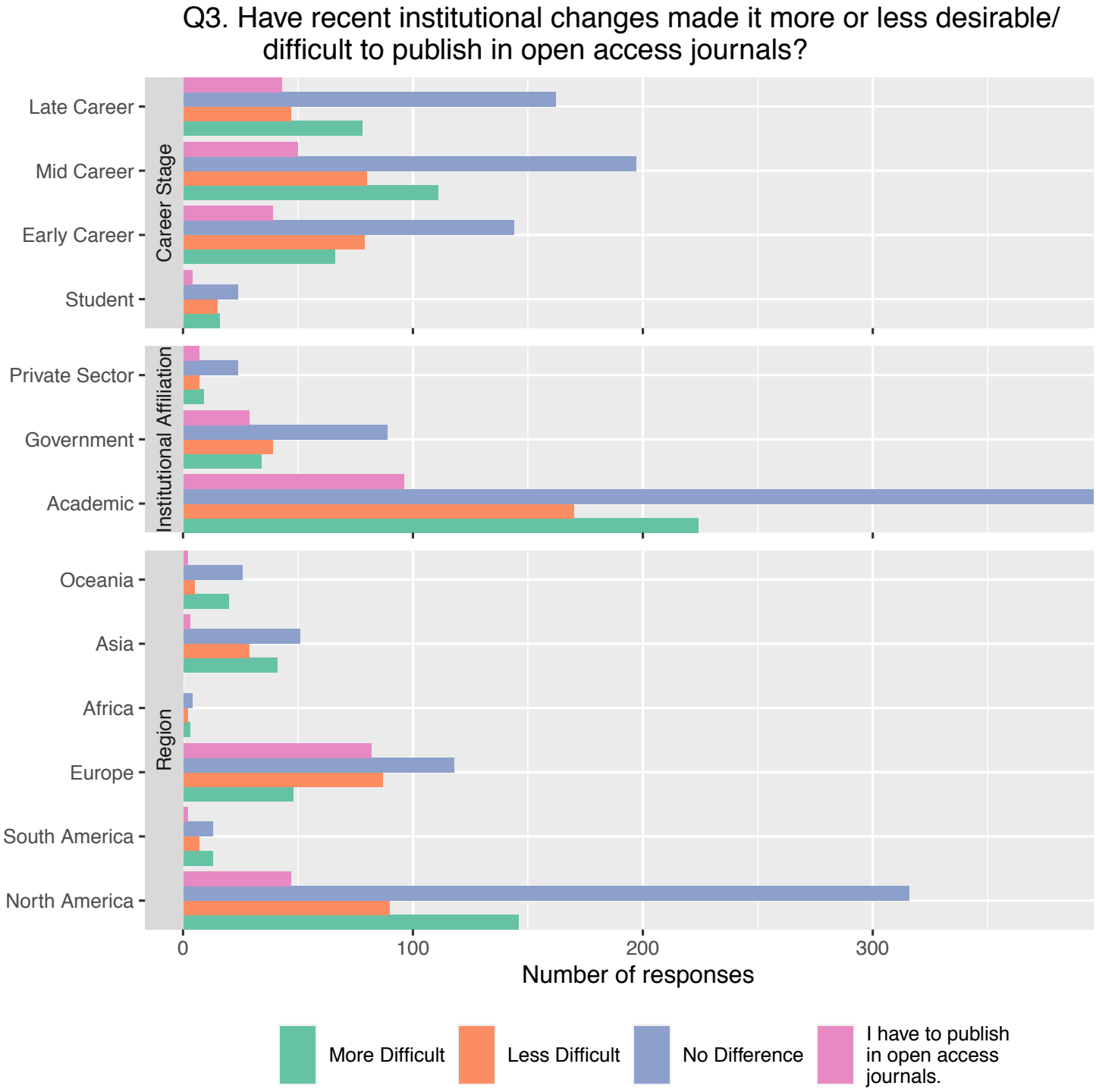
9. At what type of institution are you employed?
a. Academic
b. Government
c. Private Sector
d. Other (please specify)

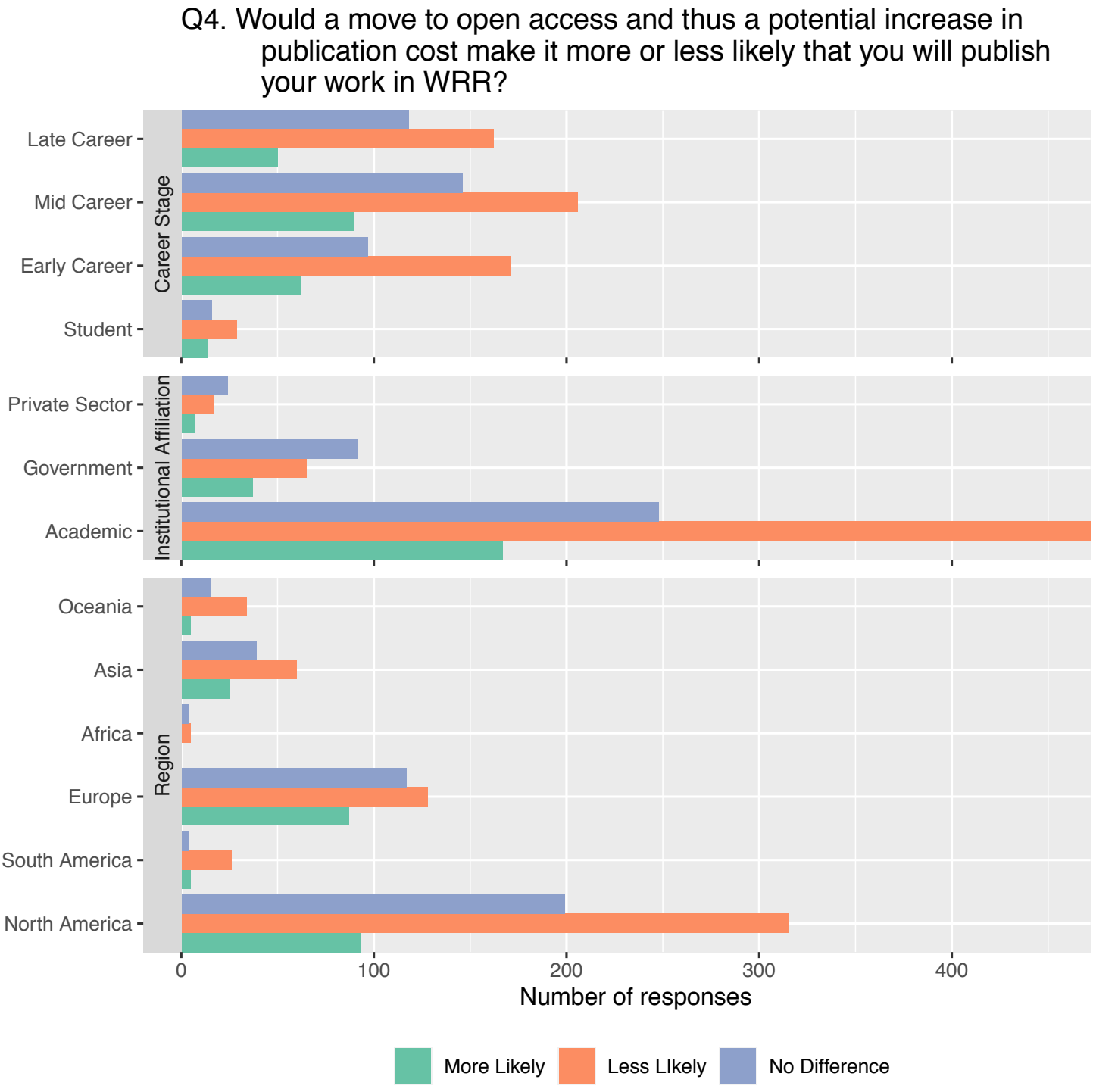
10. Where do you primarily Work?
a. North America
b. South America
c. Europe
d. Africa
e. Asia
f. Oceania

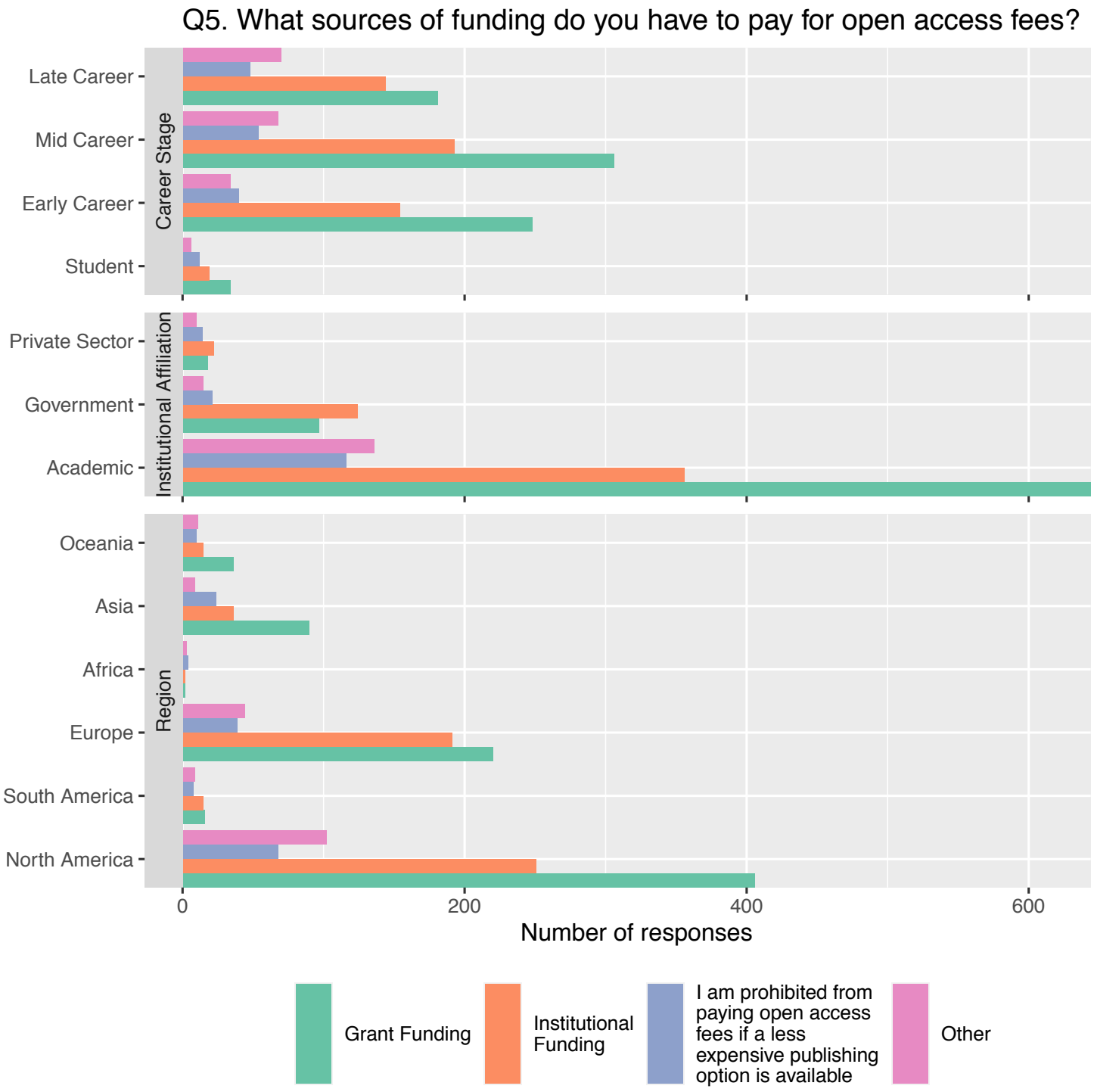
Survey Results

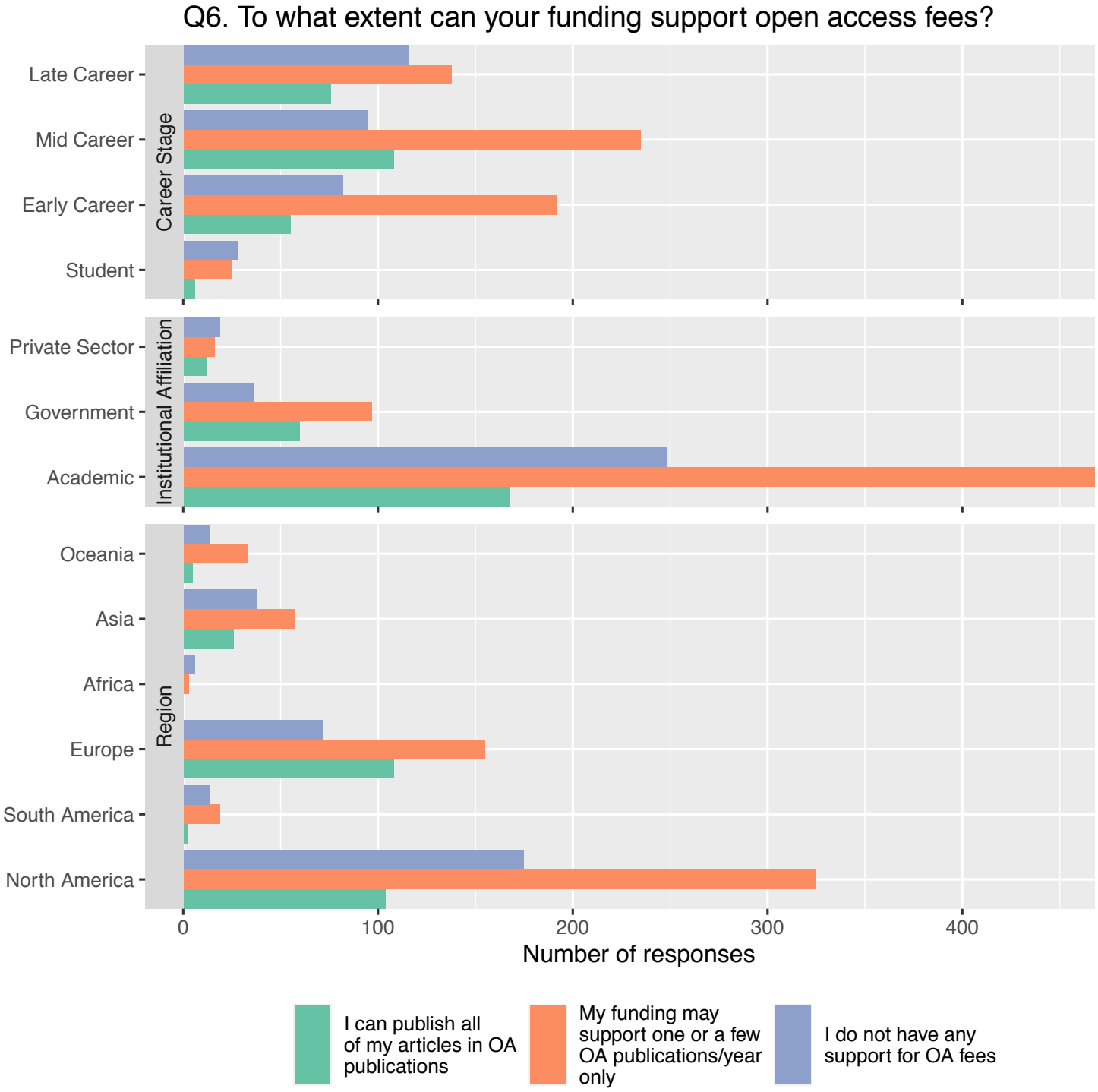



Q2. What is an acceptable time period for embargo of journal articles before they are free–to–read?
Career Stage
Late Career
Mid Career
Early Career
Student
Institutional Affiliation
Private Sector
Government
Academic
Region
Oceania
Asia
Africa
Europe
South America
North America
0
100
200
300
Number of responses
None
Six Months
One Year
Two Years

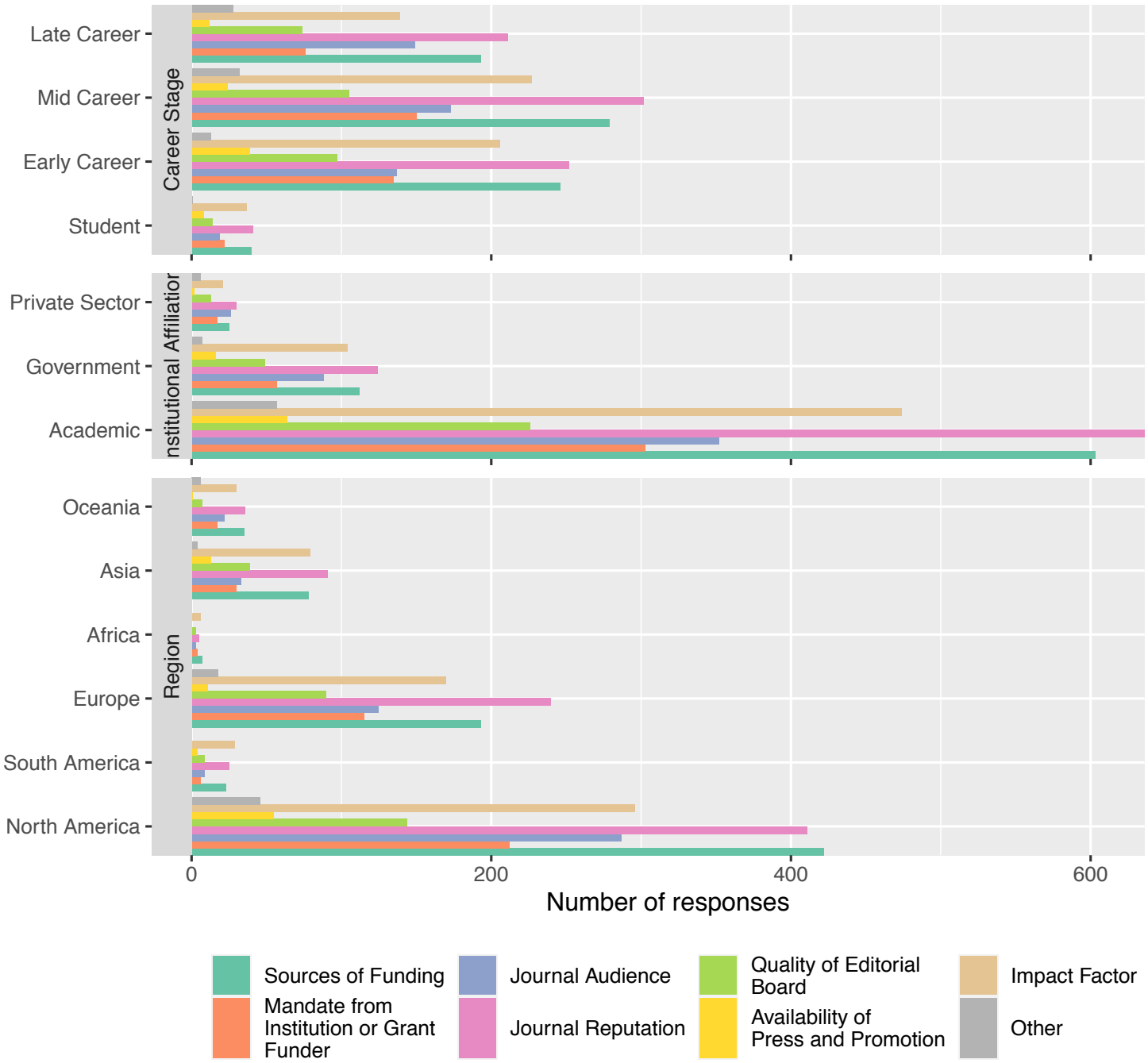

Q3. Have recent institutional changes made it more or less desirable/ difficult to publish in open access journals?
Career Stage
Late Career
Mid Career
Early Career
Student
Institutional Affiliation
Private Sector
Government
Academic
Region
Oceania
Asia
Africa
Europe
South America
North America
0
100
200
300
Number of responses
More Difficult
Less Difficult
No Difference
I have to publish in open access journals.

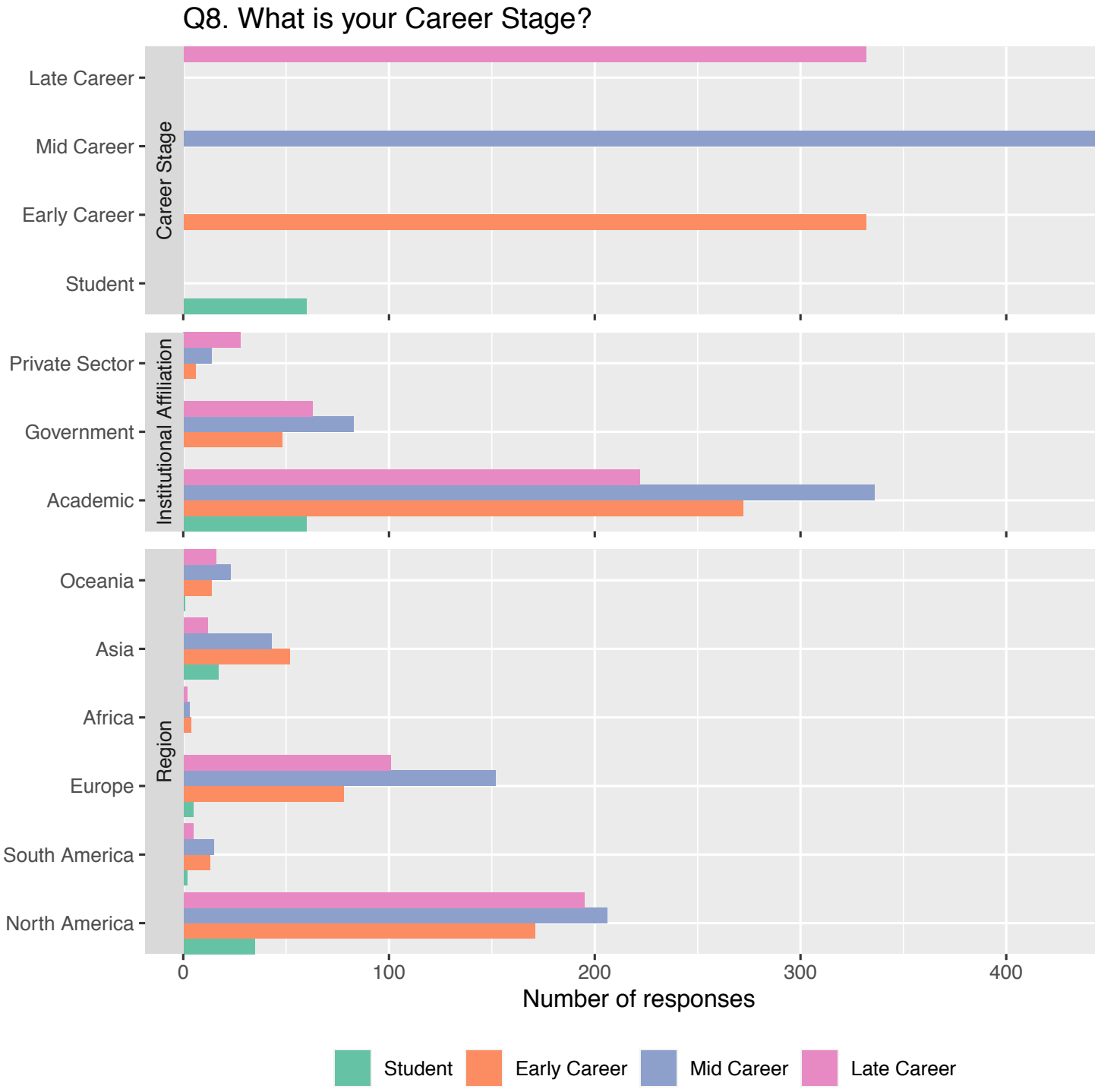

Q4. Would a move to open access and thus a potential increase in publication cost make it more or less likely that you will publish your work in WRR?
Career Stage
Late Career
Mid Career
Early Career
Student
Institutional Affiliation
Private Sector
Government
Academic
Region
Oceania
Asia
Africa
Europe
South America
North America
0
100
200
300
400
Number of responses
More Likely
Less LIkely
No Difference

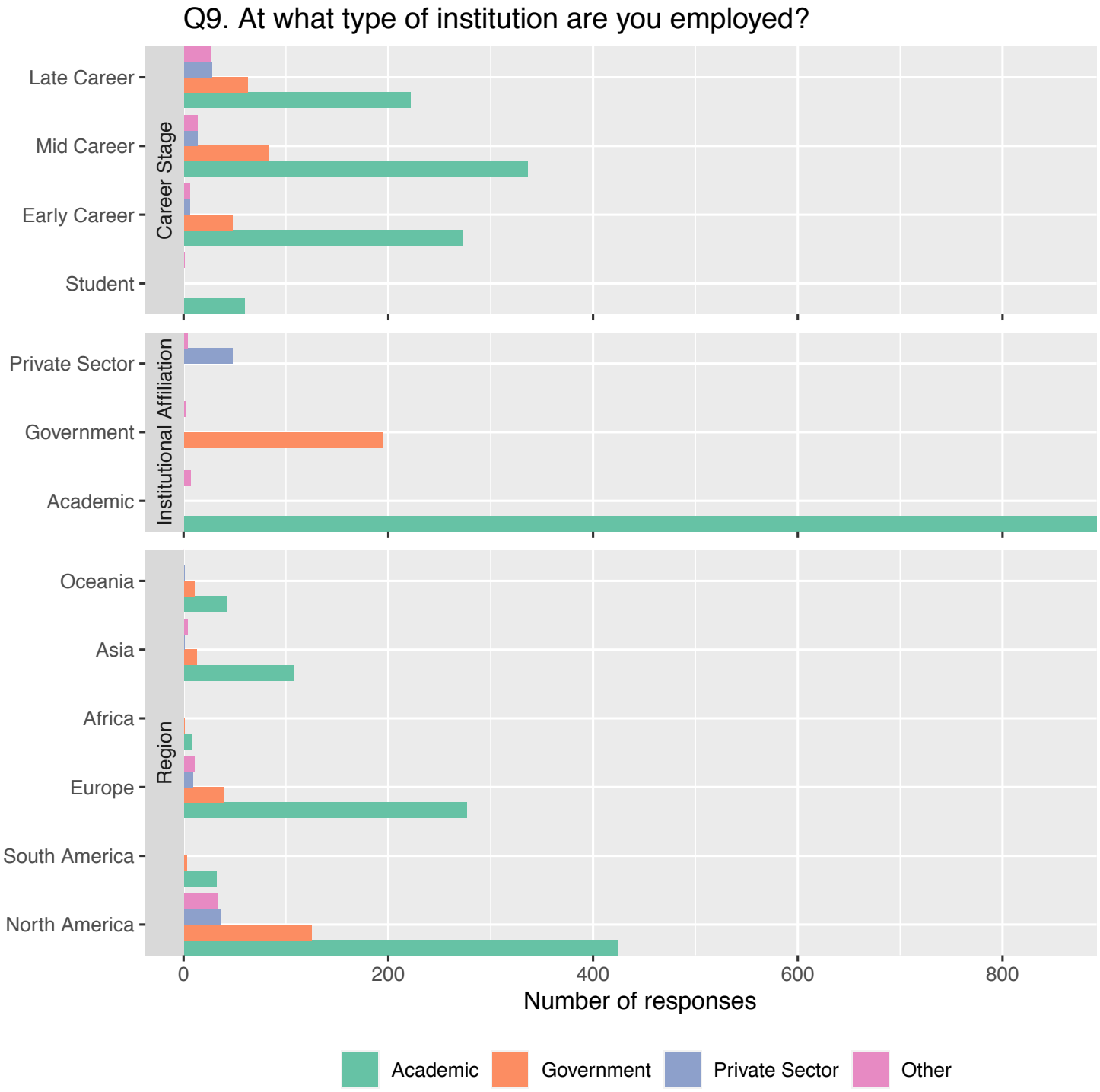

Q5. What sources of funding do you have to pay for open access fees?
Career Stage
Late Career
Mid Career
Early Career
Student
Institutional Affiliation
Private Sector
Government
Academic
Region
Oceania
Asia
Africa
Europe
South America
North America
0
200
400
600
Number of responses
Grant Funding
Institutional Funding
I am prohibited from paying open access fees if a less expensive publishing option is available
Other

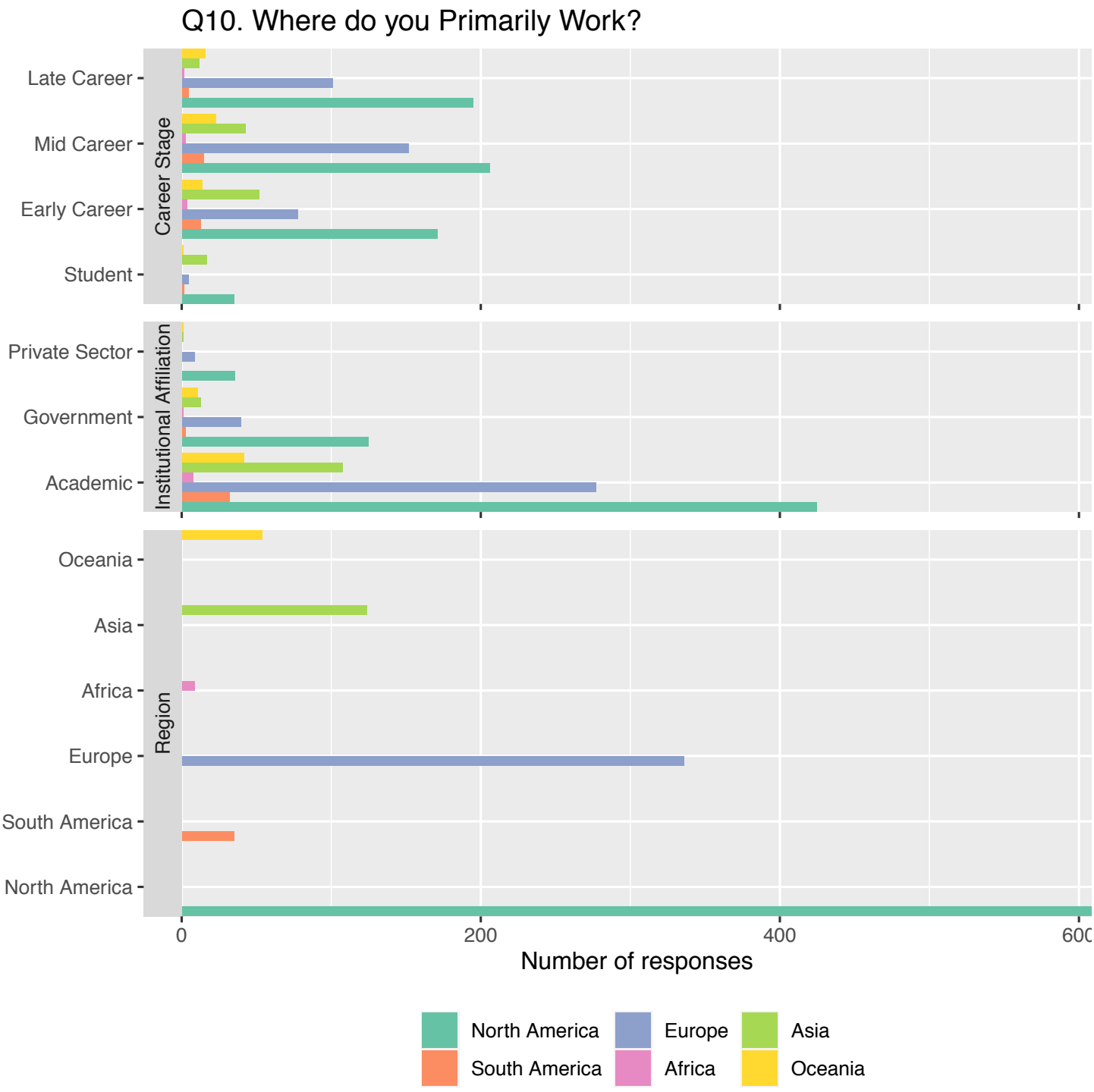

Q6. To what extent can your funding support open access fees?
Career Stage
Late Career
Mid Career
Early Career
Student
Institutional Affiliation
Private Sector
Government
Academic
Region
Oceania
Asia
Africa
Europe
South America
North America
0
100
200
300
400
Number of responses
I can publish all of my articles in OA publications
My funding may support one or a few OA publications/year only
I do not have any support for OA fees

Q7. What factors do you consider in choosing how much you are willing to pay for open access fees?




Q8. What is your Career Stage?
Career Stage
Late Career
Mid Career
Early Career
Student
Institutional Affiliation
Private Sector
Government
Academic
Region
Oceania
Asia
Africa
Europe
South America
North America
0
100
200
300
400
Number of responses
Student
Early Career
Mid Career
Late Career


Q9. At what type of institution are you employed?
Late Career
Mid Career
Early Career
Student
Career Stage
Private Sector
Government
Academic
Institutional Affiliation
Oceania
Asia
Africa
Europe
South America
North America
Region
0
200
400
600
800
Number of responses
Academic
Government
Private Sector
Other


Q10. Where do you Primarily Work?
Late Career
Mid Career
Early Career
Student
Career Stage
Private Sector
Government
Academic
Institutional Affiliation
Oceania
Asia
Africa
Europe
South America
North America
Region
0
200
400
600
Number of responses
North America
Europe
Asia
South America
Africa
Oceania

Fall Meeting 2020 updates

Sankar Arumugam (North Carolina State University)

It is a difficult year with COVID-19 and AGU is taking extra measures in preparing for the Fall-2020 meeting (FM-20) to be successful. AGU announced on June 11 that FM-20 will be "mostly" a virtual meeting. It is "mostly" virtual as AGU is planning for a regional gathering in San Francisco. Decision regarding this will be made by August. Further, AGU encourages miniAGU gatherings as allowed by the local regulations and expects to provide guidance regarding this. Irrespective of all this, AGU is planning to make the virtual meeting as real as possible with real-time sessions and poster hall time that work for multiple time zones around the world. All sessions will also be available "on demand" and AGU is testing various application platforms and tools for making the networking more successful. AGU is planning to release these tools in advance for the attendees to be familiar with the tools. I will provide a detailed update about the tools for the virtual meeting in the next newsletter in the Fall. Stay tuned!

"AGU is planning to make the virtual meeting as real as possible with real-time sessions and poster hall time that work for multiple time zones around the world"

For the FM-20, AGU received 986 proposals (30% decrease compared to 2019) and the Hydrology section received 137 proposals (28% decrease) for technical sessions. After the initial merger in April, we are currently at 131 proposals for the Hydrology Section. We have 13 proposed panel sessions and 18 co-organized sessions from hydrology with other sections. Certainly, this is a healthy set of sessions to create a solid program for FM-20 abstract submissions. I really thank the Technical Committee Chairs for coordinating the mergers of the overlapping sessions. Few other announcements regarding FM-20:

- Conveners will have the flexibility to choose different formats – oral (if it meets the threshold on abstract submission), poster, eLightning– for scheduling the submitted abstracts. Conveners can also consider short talks and panels if the session receives an oral slot.
- AGU is replacing the centennial sessions with "Innovative Sessions". You will be able to look for innovative sessions under "SWIRL theme".
- Abstract submission will open in the week of June 22 and will close by July 29.
- Abstracts can be matched with the right sessions based on the searchable "SWIRL theme" and index terms.
- Registration fee for FM-20 will be about 50% less than the in-person rate and will also be lower for graduate students and other groups.

Depending on the abstract submissions in our section, AGU will assign the total number of oral sessions for the hydrology section in August. We will also have an opportunity to merge sessions with overlapping topics and with limited abstract submissions. As proposal session conveners, please consider early career scientists, students, and minority groups for invited talks in your sessions. **Please remember the AGU policy that conveners cannot give an oral talk in their own session.** AGU Fall Planning Meeting Committee (FMPC) will meet in person or virtually in September to finalize the program for our section.

The hydrology section is composed of four volunteers serving a four-year term. The section secretary serves as an ex officio member. Current members of the FMPC include Sankar Arumugam (North Carolina State University, 2020 Chair), Laura Bowling (Purdue University, Past Chair), Hang Deng (Lawrence Berkeley National Lab) and Hamid Moradkhani (University of Alabama). Hydrology section FMPC can be reached at FMPC_H@agu.org.

From the Section Student Subcommittee Chair

Leila Saberi (University of Minnesota)

First off- in the light of the recent events, the Hydrology Section Student and Early Career Scientists Subcommittee (H3S) pledges to take actionable steps to promote the justice, diversity, inclusion, and equity (JDEI) within and beyond the hydrology community. To achieve this goal, the H3S is planning on holding an all-hands forum, inviting the AGU DEI committee members and the Hydrology Section leadership to define actionable items and measure our progress moving forward. More will come soon on this event.

Besides, the H3S launched their website (https://agu-h3s.org/) recently, with the intention of providing students and early-career scientists with the online resources on professional development and online teaching and learning, as well as promoting their research. We feature cutting-edge research conducted by students and early-career hydrologists to make it accessible for broader community. We encourage students and early-career members of the HS community to reach out to us via email (h3s.agu@gmail.com), if they are interested for their research to be highlighted by the H3S and we will provide them with further details.

The H3S also hosted several cyber-panels during spring and summer 2020, in collaboration with CUAHSI, on differetn topics ranging from " Managing Manuscripts: Writing Manuscript Reviews and Responding to Reviewers" to "Discussing Data: Effectively using and ethically sharing open data". The cyber-panels are recorded and available online if you missed them: **https://www.youtube.com/user/CUAHSI/videos.**

We're excited to hear your ideas for how H3S can add to the hydrology community and strengthen the international ECS network via Twitter (**@AGU_H3S**) or email (**Saber017@umn.edu**).

From Section Technical Committees' Students

*The TC Chairs ask their **students** to write a short article discussing which sessions they saw for the 2020 Fall Meeting that would address the **big challenges** in the TC sub disciplines.*

Ecohydrology

Cynthia Gerlein-Safdi, (University of Michigan)
Aurora K. Kagawa-Viviani, (University of Hawaii at Mānoa)

Cynthia Gerlein-Safdi

Finding each other in a crowd of 27,000 people, can be difficult, even for self-identified ecohydrologists! At the AGU 2019 Fall Meeting, the Ecohydrology Technical Committee (TC) offered new opportunities for ecohydrologists to network: the TC's sponsored sessions were a rallying point for science, while ecohydrologists from around the world got a chance to meet in person at our very first happy hour and share a meal and more in-depth discussions on work and career during our new ecohydrology lunches. Finally, the TC led the way in providing financial support (assisted by the Hydrology Section) to early career ecohydrologists with the first four Tiny Grants awardees.

This year, the Ecohydrology TC continues to grow its online presence through both the Twitter account that now counts 2400 followers, and the Adding our leaves blog, which features a different ecohydrologist every week (since April 2018). Over the past year, Christina Tague led the TC in leveraging the information contained in the blog posts to take the pulse of the ecohydrology community: what are the fundamental papers researchers look up to and the new directions that the field is go-

ing towards? What are the new methods that people are using and ecosystems that are raising new questions? The results of this informal survey were published in January 2020 as a Commentary in Hydrological Processes (DOI: 10.1002/hyp.13693).

To continue helping ecohydrologists connect with each other, "Frontiers in Ecohydrology" will be the single TC-sponsored session at the AGU Fall Meeting 2020. With this single, umbrella session, we aim to bring the whole community together, regardless of differences in methods, scale, or geographical focus. However, the TC specifically aims to emphasize novel research directions and techniques, promoting areas where researchers are truly pushing the boundaries of our field of knowledge. Other contributed sessions in ecohydrology focus on processes (for example: Precipitation Partitioning by Vegetation and Groundwater-Surface Water Interactions: Integrating Physical, Biological, and Chemical Patterns and Processes Across Systems and Scales) and new methodologies (such as Hydrologic Modeling Leveraging High Performance Computing or Advances in Quantifying Impacts and Extents of Land-use/Land-cover Change on Hydrology), bridging the gaps that sometimes arise from working in different geographical locations or at different scales.

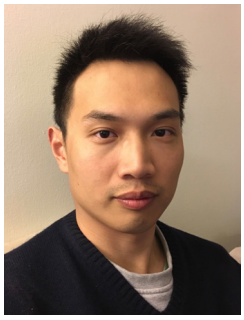
Convening our ecohydrology community at the Fall Meeting will be even more crucial in the wake of the COVID-19 pandemic and its widespread impact on research, researchers, teaching, and funding. This impact is not uniformly affecting ecohydrologists: early-career (EC) scientists are more likely to have young children therefore more likely to have seen their work hours sharply downsized. Within that group, women are more likely than men to shoulder the load of closed schools and day care, exacerbating the existing gender gap. In addition, many scientists have suspended their field campaigns because of travel bans, or have been unable to access their laboratories to run experiments. Within AGU members, this is especially true for ecohydrologists, for whom fieldwork and data collection is often a large component of the workload.

As summer conferences around the world have been cancelled or turned into virtual meetings, the Ecohydrology TC has been providing a new platform for its community to connect: initiated by Sam Zipper, the Ecohydrology Virtual Meetups spanned discussions from challenges of disrupted fieldwork plans to job market woes given hiring freezes. Since launching in early May, six meetups have brought together 20 graduate students and faculty. Exchanges indicated that advisor expectations and local policies shaping field site and lab access are affecting researchers in different ways. The small group sessions, generally 5 participants, have also enabled new connections, with many participants grateful for the peer-to-peer interaction and ability to connect across time zones. In the wake of the global protests for Black Lives Matter, a special meetup was offered to students and EC scientists from underrepresented minorities to discuss, share stories, and offer mutual support.

Both our disciplinary community and the 2020 Fall Meeting will undoubtedly be affected by the events of 2020. Given the changes in our way of working: will abstracts be shifted towards tools and methods that have remained accessible, such as remote sensing or modelling? Will scientists turn towards long-term datasets, such as Ameriflux sites to probe the issues they were meant to explore during their own, now cancelled field campaigns,or will they revive old, local field sites? How will the uneven impact of both COVID-19 and the BLM protests on the well-being and research activities of members

Hydrogeophysics

Chen Wang (Rutgers Univeristy)



Hydrogeophysics involves the use of geophysical measurements for estimating parameters and monitoring processes that are important to hydrological studies, such as those associated with water resources, contaminant transport, ecological and climate investigations. Similar to medical imaging, hydrogeophysicists send various geophysical signals (e.g., electrical, magnetic, seismic signals) to the subsurface to non-invasively image and diagnose the Earth. Improved characterization and monitoring using hydrogeophysical techniques can lead to improved management of our natural resources, understanding of natural systems, and remediation of contaminants. As a graduate student in

hydrogeophysics, every year's AGU Fall Meeting is the most exciting scientific event that brings me numerous excellent opportunities to attend presentations and network. This year, there are four sessions in hydrogeophysics interest me, spanning laboratory, field and numerical studies from pore to catchment scale.

First of all, the general hydrogeophysics session **"H087-Advances in subsurface characterization and monitoring using ground-based and remote geophysical, hydrogeological methods"** will bring together novel geophysical techniques and fantastic applications. This classic session has been successfully organized for more than five years, and always inspires us to think about which research areas in hydrology can benefit from geophysical methods. This year, the most exciting change of this session is that it incorporates researches on remote sensing. This new direction will increase connections among different communities and provide insight into new research opportunities for integrating ground-based and remote methods to understand the surface/subsurface processes from different views.

A more specific session, **"H074-Interdisciplinary Advances in Subsurface Characterization and Monitoring for Remediation Using Geophysical, Geochemical, and Hydrogeological Methods"**, highlights hydrogeophysical studies in subsurface remediation, one of the most critical area in hydrology. Coupled with conventional geochemical/hydrogeological measurements, geophysical methods will provide robust tools to efficiently monitor the remediation processes and performance.

The successful applications of geophysical methods in hydrological studies rely on thorough understandings of the linkage between geophysical signals and subsurface biogeochemical properties. What does a specific geophysical signal mean? What would be the most efficient geophysical technique for a specific subsurface investigation? The answers can be found in the petrophysics session **"H008-Advances in petrophysics for geophysical characterization and monitoring of a dynamic subsurface"**. This session will decipher the fundamental mechanisms of various geophysical signals and establish solid petrophysical relationships.

Finally, like all other research areas in Hydrology, numerical studies play a vital role in hydrogeophysical studies. How can we efficiently process/invert the geophysical data? How to integrate various data sources to improve our prediction of hydrological processes? The hydrogeophysics modeling session **"H002 - Advances in Data Integration, Inverse Methods, and Applications of Machine Learning in Hydrogeophysics"** will be the home gathering numerical simulations and novel data processing methods.

Precipitation

Lisa Milani (Unversity of Maryland)*
Noah Brauer (University of Oklahoma)*

**with the contribution of the Precipitation Students and Early Career Scientists (PrecipECS) sub-committee*

The Hydrology – Precipitation Technical Committee started this year a brand-new sub-committee entirely dedicated to Students and Early Career Scientists. The PrecipECS sub-committee consists of students and early career scientists interested in different aspects of precipitation processes with the goal of putting together their experience and ideas and connecting with other students and early career scientists.

"The main difficulty when starting a career in research is to find what is already out there, create connections, get involved. The PrecipECS sub-committee wants to promote a network for facilitating connections between new scientists and between new and more experienced scientists to spread new work and publications among the community, to help new enthusiastic researchers to get involved." (Lisa Milani, Assistant Research Scientist at UMD-ESSIC/NASA-GSFC, chair of the PrecipECS sub-committee)

"As part of the ECS sub-committee of AGU Precipitation TC, I got to know other students or early career scientists who are working on similar topics. It was a great opportunity to see how TC groups are involved in the organization of such a big conference like AGU. I'm looking forward to working

with ECS sub-committee members on various social media activities to spread interesting research related to precipitation." (Yoonjin Lee, PhD student at Colorado State University, future postdoc at Cooperative Institute for Research in the Atmosphere)

"I am a Ph.D. student at the University of Oklahoma studying precipitation microphysics in tropical cyclones using ground-based radar observations and satellite-borne radar retrievals. The ECS sub-committee is working to facilitate an open and collaborative environment for students and young scientists in the field to discuss topics such as career opportunities, and diversity and inclusion. Additionally, there are plans to develop a mentorship program for ECS who are looking to foster connections in the various sectors of meteorology and hydrology." (Noah Brauer, Ph.D. student at the University of Oklahoma, co-chair of the PrecipECS sub-committee)

"My research focuses on the use of physics enhanced artificial intelligence for understanding how weather phenomena affect infrastructure reliability in past, current and future climate. The AGU Precipitation Technical Committee allows me to coordinate with researchers from around the world to organize events and manage sessions in which pressing scientific questions are discussed by the international community. Engaging in this group allows all the members to grow as persons and as researchers." (Diego Cerrai, Assistant Research Professor at the Department of Civil and Environmental Engineering at the University of Connecticut, and Manager of the Eversource Energy Center)

"The primary focus of my research is geared towards the sustainability of the interconnected Food-Energy-Water (FEW) system. I am currently working on my PhD topic, which aims to derive adaptive reservoir operation in the transboundary Nile river basin using satellite remote sensing. I have been a student member of the AGU precipitation technical committee since 2018. I found it a great opportunity to enlarge my circle of professional networking by connecting to scientists in my research field. In addition, I was able to participate in organizing the AGU fall meeting by reviewing precipitation session proposals. This year, I am part of the Students and Early Career Scientists Sub-committee and I am highly passionate about providing service to our research community, especially students and fresh PhD graduates." (Hisham Eldardiry, graduate research assistant (PhD Candidate) in the Department of Civil and Environmental Engineering at the University of Washington, Seattle)

"I'm studying raindrop size distributions over the Southern Ocean and how to best represent them in satellite retrieval algorithms. I'm hopeful that the Precipitation Technical Committee will help connect me with successful researchers in the field, point me towards new and exciting findings, and provide professional development opportunities." (Rick Schulte, Ph.D. candidate at Colorado State University)

"I am currently working on developing/improving precipitation retrieval algorithms from latest generation geostationary satellites (GEO) such as GOES-R. My major interest is to understand and model precipitation processes from the view point of GEO satellites through the use of advanced machine learning techniques. I am excited to be part of the AGU Technical Committee and Early Career Scientist (ECS) Sub-committee. I believe this is a great platform to show-case your research and interact, collaborate with the international experts in your domain. The ECS sub-committee is working towards making this process simpler by organising several career development events and reaching out to students and early-career scientists around the world." (Shruti A. Upadhyaya, Postdoctoral research associate at Cooperative Institute for Mesoscale Meteorological Studies, Norman, Oklahoma)

As a first step to create connections, The Hydrology - Precipitation TC just opened a Facebook page (AGU Precipitation Technical Committee - @AGUPrecip), a Twitter account (@AGUPrecip) and an Instagram account (@agu_precipitation). The PrecipECS sub-committee also has a Facebook group (Precipitation Early Career Scientists) that will be used as an informal meeting/sharing platform for students and early career scientists who would like to connect, share, get involved in the precipitation community.


@AGUPrecip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Remote Sensing

Akash Ahamed (Stanford University)
Andrew Feldman (Massachusetts Institute of Technology)
Vinit Sehtal (Texas A&M University)

Akash Ahamed

Vinit Sehtal

Andrew Feldman

An increasing demand for freshwater resources in conjunction with climate change has catalyzed recent scientific and technological innovations in order to better address contemporary grand challenges in hydrological science. These critical research objectives include understanding the drivers of water, energy and carbon cycles, developing the next generation of remote sensing instruments, and characterizing geohazards such as extreme drought and flood events. The remote sensing hydrology community stands in a unique position to help address these urgent challenges by leveraging a suite of innovative, remotely-sensed observations. As student members of the Remote Sensing Technical Committee, we are excited about both ongoing remote sensing missions and several planned developments (e.g. SWOT, NISAR, GRACE-FO, UAVs, Cubesats) that globally monitor components of the water, energy and carbon cycles, and provide novel opportunities to address hydrology's grand challenges. A number of promising sessions at AGU's 2020 Fall meeting highlight these potential advancements:

A)Remote Sensing and Modeling of the Terrestrial Water Cycle

B)Remote Sensing to Support Investigations in Plant-Climate Interactions

C)Evapotranspiration (ET): Advances in In Situ ET Measurements and Remote Sensing-Based ET Estimation, Mapping, and Evaluation

D)The Surface Water and Ocean Topography (SWOT) Mission: Hydrology, Oceanography, and their Interaction at the Estuaries

E)Ecosystems Studies from SAR Time-series Observations Including Results from the NISAR/UAVSAR AM/PM and NASA's ABoVE Campaigns

These sessions address a broader understanding of the terrestrial water, energy, and carbon cycles (see A, B, and C). Sessions on recent and future missions, and their applications (see D and E), will highlight the use of novel observations to characterize surface water bodies and terrestrial ecosystems (biomass, soil moisture, and groundwater) at unprecedented spatial resolution and extent. These sessions, and many others not mentioned here, will further explore the use of remotely-sensed observations in applications related to land-atmosphere interactions, the food-energy-water nexus, and climate-human interactions. The sessions will also highlight methodological progress in data assimilation, sensor fusion, hydrologic modeling, and hydrologic forecasting as well as advances in machine learning applications as related to terrestrial hydrology.

We hope you share our enthusiasm for the potential scientific contributions that will be inspired by these sessions during the 2020 Fall Meeting. With the ever-evolving avenues of scientific research and methods, we hope the true power of interdisciplinary and creative workmanship will be on display in these sessions. After all, we are only as innovative as our wildest imagination.

Hydrologic Uncertainty

AGU's Technical Committees: a place for the professional development of students and early careers scientists

Sina Khatami (University of Melbourne)

In December 2017, when I first attended AGU in New Orleans, I was very eager to learn about the AGU community. In conversation with some new friends, I heard that Hydrology Section has technical committees (TCs) with student members. I googled and found out that there is a TC for Hydrological Uncertainty (HU), which has been my own research area. I knew many of committee's members from their

papers and research. I was very excited, and sent an email to Mary Hill and Ming Ye, previous chairs of the HU-TC: "I'm very interested to join the Hydrologic Uncertainty Committee, and I was wondering what is the process for that, and what are the expectations from the (student) committee members." I was invited to the annual TC meeting chaired by Saman Razavi, and then they encouraged me to apply to join the committee. From this very beginning everyone was encouraging and welcoming. I got to know different members of this committee who are leading researchers in this area. Being included in the TC communications and decision making processes has been a great learning experience: to know what topics and issues are of interest to this community, how an international technical committee is coordinated, how they discuss and make decisions, how the conference sessions are structured, etc.

Working with Saman Razavi and Xingyuan Chen, current chair and co-chair of the TC, has been a delight. They are both very energetic and methodic in their leadership roles. To reach out to a broader audience we have upgraded from the TC's older blog http://aguhu.blogspot.com/ to a new website http://hydrouncertainty.org/, with regular updates on news and workshops in the area of uncertainty. Particularly, we developed and continuously update a library of publications on uncertainty, led by our other student committee member, Kasra Keshavarz from University of Saskatchewan. This has been a great reference point for those who are interested to dive into the uncertainty literature. Since September 2018, we're active on Twittersphere https://twitter.com/AGU_HU as well.

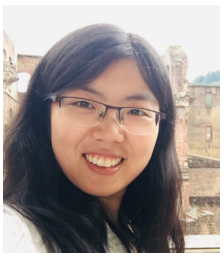
I'm very grateful for this opportunity to be a member of HU-TC. I feel that I now have an extended network of mentors that contribute to my professional development, even if they don't know it themselves. And this all started because I dared to ask. I know from experience that many students and early career scientists (ECS), as much as they are eager to be active, are hesitant or unsure to reach out. They may perceive established scientists or such committees as intimidating, fear rejection or judgement, or feel incompetent. This is even more challenging for those from minority cohorts, e.g. women, people of color, LGBTIQA+, non-native English speakers, etc [see our study on gender (in)equality in the Earth and space sciences as an example https://doi.org/10.1029/2019EA000706]. I certainly acknowledge such fears and feelings, as I personally belong to a few minority groups. Yet I promise we can make it through to the other side of anxiety and fear, where we find excitement, self-confidence, and new colleagues and friends. While many established scientists may come across as too smart, too busy to bother, or even arrogant, they usually have a lot of room at the bottom. They care and like to nurture the next generation. They would see their younger selves in us, when we hit the right buttons.

So, I'd like to encourage my peers, students and ECS, to be proactive about their involvement in professional communities such as AGU's TCs. This may seem a bit more challenging during a global pandemic with less chances of face-to-face interactions and networking. That said, most technical communities are active and accessible through online platforms e.g. email and Twitter. There is no shame nor harm in approaching (e.g. emailing!) people you don't know to express your interest in community service, to help and to learn. If they say no, just try other opportunities. Of course, it is important to be professional and strategic about what you say, and how you say it. But the bottom line is that sometimes we – as students and ECS – should create our own opportunities. I'd like to think that a genuine intention, to help the community and learn from its leaders, is easy to read.

Unsaturated Zone

Shahab Karimifard (University of Nebraska-Lincoln)
Zhen Li (Colorado School of Mines)
Bo Gao (Colorado School of Mines)

Shahab Karimifard



Zhen Li

Bo Gao

The Unsaturated Zone (UZ) Technical Committee works towards synergizing research activi-ties on the various topics related to the unsaturated (vadose) zone, and to highlight key is-sues, solutions, results, and researchers. The unsaturated zone is critical in the parti-

tioning of incident precipitation into run-off, storage, recharge, or evaporation. It is also the zone mainly impacting agricultural operations. The UZ community is interested in the fundamen-tal processes that govern flow, transport, biological and geochemical dynamics in the sub-surface, as well as subsurface - surface interactions. The community is forming tighter part-nerships with other disciplines to address contemporary challenges in water, climate, and food.

In accordance with the three critical questions that are of relevance to UZ community, three sessions are picked as follows:

1)Question: 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?
Session: *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*
Description: This session considers that the unsaturated zone is intrinsically heterogeneous, while a full resolution of the unsaturated zone's heterogeneity and pore-scale activities is impossible. Thus, establishing a link between small scale heterogeneity with practical scale dynamics is necessary.

2)Question: How do resiliency and thresholds of UZ processes respond to anthropogen-ic disturbances, and how do they vary across climates, biomes, and geological settings?
Session: *Groundwater Response to Climate Change and Variability*
Description: This session proposed that climate variability could directly affect groundwater quantity and quality, and human responses to climate variability is also crucial to the man-agement of groundwater resources. Advancing our understanding of the effects of natural climate variability and the response to human activities on all spatial and temporal scales is a grand challenge.

3)Question: How can we harness the full potential of rapid advances in data science as well as communication and measurement technologies in developing predictions and deci-sion support tools that benefit society?
Session: *Utility of Artificial Intelligence/Machine Learning approaches in soil hydrological processes*
Description: This session discussed studies involving the applications using artificial in-telligence, machine learning and/or other data science-based techniques towards under-standing and predicting the flow of water and nutrients in the vadose zone across space and time scales, and its impacts on water resources management.

Water Quality

Frederick Cheng (University of Waterloo)

So much has happened since the last AGU Fall Meeting, and it is important, more than ever, to stay connected with our communities. We'd like to take this opportunity to highlight what the Water Quality Technical Committee (WQTC) has in store in the next several months.

If you're still considering where to submit your abstract, or trying to decide what to attend, consider one of our WQTC's annual sessions such as: **Frontiers in Water Quality (ID: 105211)**, which showcases cutting-edge research at the interface of hydrology and water quality, or **Water Quality and Watersheds: From Scientific Innovations to Actions (ID: 102908)**, which highlights how researchers have been translating big research ideas to real world solution and actions. These two 'umbrella sessions' aim to bring together the water quality community and showcase the amazing breadth of techniques, scales, and issues that we are working on. A timely emphasis in our sessions is the invitation and contribution of submissions related to environmental justice; we highly encourage research that highlights the importance of water quality in the context of environmental justice and equality.

Other great upcoming sessions that may be relevant to the water quality community include:

- Food-Water Linkages and Nonpoint Source Fluxes (102475),
- Metabolism of Aquatic Ecosystems (102712), Un-

certainty Analysis in Water Quality (103010),
- Artificial Intelligence through Remote Sensing (104435),
- Legacy Effects of Land Use on Ecosystem Function (104542),
- High-Frequency Sensing in Human-Disturbed Ecosystems (104594),
- Impact of Climate Change Variability (105107),
- Balancing Agricultural Expansion and Eutrophication (105449), and
- Issues and Dimensions of Salinization (105491).

Water and Society

Dol Raj Chalise (North Carolina State University)

I am a doctoral candidate at North Carolina State University. The focus of my dissertation is developing a national assessment of reservoir impacts on ecosystem health and also using that information to develop optimal water allocation strategies that specify water for human needs and ecosystem needs (aka designer flows) under changing climate and development scenarios. I was very excited to present my findings at the 2019 AGU Fall Meeting and meet the researchers around the world who are working on cutting edge water problems that are critical from a Water and Society perspective.

While there are many critical areas, here are my three suggestions that are of relevance to water and society: a) cyberinfrastructure for decision-support models, b) water governance and c) research communication.

By 2050, the global population will increase by two billion or more, and the urban population will double, accounting for an increase of 20 to 30% above the current level of water use (United Nations DESA, 2019). As the water demand grows, the effect of climate change could further increase water stress levels worldwide (United Nations WWDR, 2019). This highlights that population growth and climate change will combine to pose a challenge to water resources management (Brown at. al., 2019). The research community has developed several statistical, process-based, and socioeconomic models to address water issues. However, these stand-alone models are not effective to solve increasingly complex real-world problems that involve human-environment interactions. We need to improve the spatio-temporal resolution of the existing models and also integrate the process-based, statistical and socioeconomic models to better characterize the human activities and climate. Studies have also reported that hydro-climatic forecast models have had limited use in the water resources allocation and decision-making process (Sankarasubramanian et. al., 2009), motivating a need for the models to be user-friendly. Therefore, we need to move towards building high-resolution integrated models in cyberspace that are easily accessible by everyone to support decision making (NSF, 2003).

Despite technology and infrastructure advancement, water allocation is critical to optimizing the benefits of water uses across local and basin levels (USAID, 2017). One issue is interbasin transfer issues, data sharing, and lack of past data. We often heard in the international forum that water is the next "gold" and governance is fundamental to improve water management. Thus, research communities should focus on water rights transfer, new technology diffusion, data sharing, and coordination of trade-offs between individual and institutional levels. Scientists need to better communicate scientific findings to the general public and policymakers. AGU can provide a platform to bridge some level of communication gap between scientific communities and the general public. If there are many AGU 2020 sessions online, we would miss face-to-face communication but may also have the ability to expand our reach to many stake-holders worldwide. A conscious effort to bridge this communication gap should be addressed for the 2020 Fall Meeting. Before the fall meeting begins, I would suggest adding a few webinars in advance that can engage all virtual audiences.

Last but not least, students and budding researchers are having an extremely difficult time finding a job during this COVID-19 crisis. I would suggest AGU organize few specific networking events that can connect students to potential employers in their field.

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Help Eos highlight important advances and societal relevance of hydrologic science

Adam S. Ward* (Indiana University) & Kerstin Stahl* (University of Freiburg)
*EOS Science Advisers for Hydrology

Are you doing research with an impact? Should more people know about your findings and their importance? Want to improve your science communication skills? Please consider submitting an article proposal to **Eos!**

In the past few years you have likely noticed Eos transition from a publication whose audience was mainly AGU members to an external-facing publication providing science news and perspectives to a broad audience. To that end, we are actively seeking researchers and their accomplishments to highlight in Eos. Formats include staff-written news and features, and scientist-written science updates and opinions.

"Please consider submitting an article proposal to Eos!"

As the science advisors representing the largest section within AGU, our goal is to have Eos tell us that we've identified too many leads. Until we hit that point, we need your help generating leads including:

(1)Important findings to feature. Each month, Eos features articles written by Eos staff that cover research advances by AGU members. You are welcome to **submit ideas** that would highlight an individual article (e.g., "Xi et al. made an amazing advance"), an area of interest (e.g., "machine learning in hydroscience"), or any topic. You need not be the researcher nor lead the writing – we are seeking leads that we can follow-up on, which might start by a phone call with you to understand why this is worthy of highlighting.

(2)Upcoming newsworthy events. One promising area for articles is to let Eos writers get out ahead of news events. For example, Eos might prepare a comprehensive article in advance of an **upcoming Supreme Court decision** or global meeting (e.g., an IPCC meeting). This allows Eos to be prepared with a complete treatment of the event including expert perspectives when other news outlets are scrambling.

(3)Scientist-led articles. As always, Eos welcomes individuals or groups of authors to **propose articles for publications.** These begin with a proposal, around 400 words in a form, from the author(s) rather than a finalized, polished article to submit – just a strong concept. Science advisors and Eos writers work with authors to shape their arti-

cle for clearly communicating to a broad audience.

Please keep these opportunities in mind as you read journals, attend conferences, and browse your twitter feed. Eos is also making an effort to expanding its coverage of non-U.S. based research, so your ideas for covering work especially in Asia, South America, and Africa are especially appreciated. In coming months, we will work with the technical committees to help solicit leads, feature articles, and scientist-led articles from across the hydrology section.

Our thanks, and we look forward to featuring the science our section is doing in Eos.

Hydrology Section Twitter board

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

Hydrology Section:
@Hydrology_AGU

Hydrology Section Student Subcommittee:
@AGU_H3S

AGU Hydrogeophysics:
@AGUhydrogeophy

Ecohydrology Technical Committee:
@AGUecohydro

Precipitation Technical Committee:
@AGUPrecip

Hydrologic Uncertainty Technical Committee:
@AGU_HU

Catchment Hydrology Technical Committee:
@AGUCatchHydro

* Tweet-request us through @Hydrology_AGU to have your account added!

AGU Hydrology Section July 2020 Newsletter prepared and edited by Antonio Meira