News and Notes

SSA Task Force on Diversity, Equity, and Inclusion: Toward a Changing, Inclusive Future in Earthquake Science

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Introduction

In the United States, a wide variety of studies show that the geoscience community does not reflect the broader societal makeup (e.g., Velasco and Jaurrieta de Velasco, 2010; Dutt, 2020; Howley, 2020). In fact, only about 10% of all Science, Technology, Engineering, and Mathematics (STEM) Ph.D. degrees are awarded to people of color, although they represent more than a third of the population (Dutt, 2020). These numbers have changed little over the past 40 yr (e.g., Bernard and Cooperdock, 2018; Dutt, 2020). Recent events in the United States have again raised awareness of this discrepancy in many fields; similar divergences may be present throughout the world. This discrepancy represents a tremendous loss of talent and contributes to ongoing bias and racism.

As the premier international seismological professional society, Seismological Society of America (SSA) is committed, as stated in its ethics policy, to "freedom and transparency in research and education, which should be conducted in a supportive, inclusive, and respectful environment, free from any discrimination, harassment or bullying." SSA convened the SSA Diversity, Equity, and Inclusion (DEI) Task Force to identify specific and actionable recommendations that the Society can take to start to address the significant issues surrounding the systematic underrepresentation in seismology and related geosciences by marginalized groups on both short- and long-term time horizons. This report, written by the Task Force, outlines actionable items that SSA can undertake as well as a framework by which progress can be measured to help guide the Society and its members forward as a community to make earthquake science more just, equitable, diverse, and inclusive. We recognize that this document cannot address the multiple individual, cultural, and historical barriers that some members may face (e.g., Núñez *et al.*, 2020), nor can it reflect all possibilities or all recommended practices (e.g., Ali *et al.*, 2021). What this document does represent, however, is the beginning of what we hope to be a significant cultural change in how we conduct earthquake science as an organization, not the end of this process as the Task Force fulfills its charter. As a note, some of the recommendations that the Task Force has outlined here have already been implemented within SSA or are actively being considered. For completeness, we still include them here because this highlights the commitment to change that SSA leadership has embraced.

Terminology and Charter

Diversity within SSA refers to having many different people with different ideas and perspectives. Equity within SSA refers to making sure our members get the tools that they need to be successful. Inclusion within SSA refers to making sure that all members have both a "seat at the table" and a say in the running of SSA as an organization. To accomplish all of this, we include Justice—the removal of barriers that prevent DEI. Our work is therefore broadened to include Justice, Equity, Diversity, and Inclusion (JEDI).

Furthermore, we refer to minority-serving institutions (MSIs), which are classified as such based on either historical origin or enrollment criteria (typically the percentage of enrolled minorities at a particular school).

The specific charter given to the Task Force includes the following questions:

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- What steps should SSA take to increase the diversity and inclusion of its membership?
- How can SSA-sponsored meetings be made more welcoming to members of under represented minorities?
- What policies should SSA adopt and/or recommend to increase diversity within the ranks of geoscientists?
- What incentives can SSA establish that encourage diversity and inclusion in its membership and the geosciences?
- Is there a role for SSA to create ongoing training opportunities for its membership to address issues related to implicit bias?
- What role should SSA play in the training of scientists to increase the diversity in the composition of geoscientists and better reflect the composition of society at large?

Instead of answering the questions directly, we chose to outline the areas within SSA in which JEDI activities can occur, which could then ultimately help address these issues. In this fashion, the specific actions and accountability framework that we are recommending can address the questions in practical, concrete, and holistic terms. We revisit these questions in the Discussion section at the end to emphasize the links that we envision between our recommendations and the original questions. Here, we outline our initial recommendations that stem from the work of the Task Force.

Recommendations

The Task Force met on a regular basis, reviewed literature, reviewed current practices of other organizations, met with SSA leaders of different efforts, and developed a series of recommendations based on the charter questions. We summarize the recommendations into 10 different categories that relate to how SSA is structured in its business practices, leadership, and various activities that it executes. These recommendations are meant to bring about significant changes to how SSA operates in terms of JEDI to help address the lack of diversity in the field of seismology.

The Task Force recognizes that many of the recommendations may require further work to be finalized and, in fact, encourages creating a permanent JEDI committee (recommendation 2) to continue finalizing some of the recommendations in this document. We also recognize that SSA has limited resources and that other societies and organizations are working in parallel or collaboratively to address issues related to JEDI. As much as possible, we encourage SSA to use and adapt the policies, guidelines, trainings, and resources that are being developed in the broader seismology, geoscience, and STEM communities, so funding and time can be directed toward priorities specific to the SSA community.

Commitment toward a cultural change

We first recommend that the Society commits to working toward cultural change and JEDI within SSA. This document presents some possible initiatives that are intended to promote JEDI within SSA that could foster a more inclusive climate in earthquake science, thus transforming the field by better supporting diverse and creative perspectives. With a significant increase in the number of women participating in SSA membership, activities, and leadership over the past 30 yr, we know changes can occur within our organization that create a more inclusive and welcoming environment. When addressing the issue of racial and ethnic diversity, however, the geosciences must also come to terms with the historic perspective of exclusion and exploitation of natural resources that had been foundational since its inception (Núñez *et al.*, 2020). Change must come from within SSA and be rooted in its membership, and the burden of change cannot fall on the shoulders of the few minorities who are currently in the field. To initiate and sustain change will take every member, every committee participant, every editor, every reviewer, and every mentor to commit to changing the culture of SSA and earthquake science. We recommend therefore that SSA should state and support a commitment toward creating a cultural change within our organization that will have roots at every level. Our recommendations here notwithstanding, we recognize that years of neglect on racial and ethnic minority participation cannot be overcome with a brief document and that this will be very much a work in progress as the needs of our Society continue to evolve over time.

Organizational changes

We recommend that a permanent committee that is specifically chartered to address JEDI within SSA be formed. To make this committee successful, the committee should function independently, have the support of the Board of Directors to suggest and implement recommended practices, and have the ability to evaluate the progress of JEDI efforts within SSA. Forming this permanent committee allows SSA to systematically (1) integrate JEDI within all aspects of operations, meetings, publications, and communication; (2) evaluate JEDI efforts with regularity using traceable metrics; (3) stay current on issues related to JEDI; (4) provide a mechanism for SSA to engage other organizations to share and partner with other JEDI efforts; (5) enable programming specifically targeted to improve JEDI within SSA; (6) facilitate training of the SSA Board, editors, committee members, and membership on JEDI; and (7) develop a robust and meaningful JEDI strategic plan, based on the previous six points that will be periodically reviewed. The committee should be encouraged to seek partnerships and internal and external funding opportunities to execute these efforts. The formation of the committee and how it functions should be openly shared with the membership with a statement from the Board to announce this new effort. SSA leadership will determine membership of the committee, and we suggest that it includes an SSA Board member, SSA members from diverse background, members from the majority population, and a social scientist studying JEDI issues.

Leadership

SSA leadership should support the development of JEDI within the Society. SSA leadership should continue to increase diversity in the Board and other leadership positions. SSA leadership should commit to fully implementing the JEDI strategic plan and devote necessary resources to its implementation. SSA leadership should encourage candid communication between members, the Board, and others in positions of power within the Society. Members should clearly hear the message that SSA leadership is interested in their opinions and suggestions for how to move the Society forward and that these recommendations will be seriously considered.

Membership

SSA membership includes nearly 3000 members. SSA supports its members' careers and seismology through international scientific conferences, premier peer-reviewed seismology journals, and ongoing professional development opportunities. In terms of JEDI, we propose the following activities to enhance membership experiences and to encourage an increase in membership from students and professionals from diverse backgrounds.

Demographics. To assess progress on JEDI, SSA should track membership demographics, which may include ethnicity, socioeconomic information, years since degree, and so on. This information provides a foundation for measuring progress by tracking the current and future diversity of the membership, early-career members, and other potential gaps in membership. Furthermore, this information can be used for strategic planning purposes, so JEDI is integrated into the mission and vision of SSA, along with any action items needed for SSA to reach its goals.

Training. SSA has recently embarked on training to address JEDI issues. We encourage continued training for the general membership and for all leadership and committee positions within SSA. Training on JEDI can include topics such as implicit bias, bystander intervention, de-escalation, creating or modifying code of conduct and laboratory, group, and/or department policies, leading or facilitating discussions about racism and discrimination, and risk assessment and safety plans (see Appendix, for a preliminary list of training resources). These trainings can occur periodically throughout the year on a regular basis (perhaps once quarterly) and would allow the membership to stay connected for year-round programming. We also encourage the sharing of resources and training experiences, perhaps as part of a community "challenge" or ongoing virtual discussions that can be promoted and leveraged by the JEDI committee.

Surveys. Staying connected to membership on a regular basis can be key to making sure membership concerns are addressed. We recommend polling membership through surveys on issues related to JEDI on at least an annual basis. This mechanism can be used to learn more about other issues that members believe are important and, thus, will strengthen SSA's sensitivity to current issues facing the community.

Annual meeting

A major activity of SSA is to organize an annual meeting, for which many different JEDI efforts can be developed and implemented. The meeting, in general, must include elements of JEDI in its planning and programming, outlined as follows.

Code of conduct statement. The #MeToo movement spurred a Code of Conduct to be developed and implemented at the 2018 SSA Annual Meeting. We propose that the Code of Conduct be updated to reflect JEDI concepts and emphasize the need to create an inclusive environment for all participants at the next annual meeting. The statement should be developed in parallel with a clear JEDI policy statement from SSA leadership, membership, and the newly formed JEDI committee.

Site selection. A number of factors go into site selection of any scientific meeting. For example, SSA must consider costs associated with the venue, local support, and travel, always keeping its members in mind when making its decisions. In addition, we encourage the SSA Board to hold meetings and events only in states that have not passed discriminatory legislation and/or failed to consider criteria on police conduct (Voss, 2020). Such an action would reinforce the Society's firm commitment to support all members.

Welcoming reception and safe space. Recent literature has highlighted that a sense of belonging is critical to creating an inclusive environment for minorities in STEM fields (e.g., Fisher *et al.*, 2019). In many aspects, SSA has been a leader by creating specific receptions for early-career professionals and for women members, however there have been lessons learned along the way. We propose extending the current welcoming reception for early-career students and professionals to include students and professionals of color and designating a "safe space" at the conference to allow for informal gatherings to take place during the conference. The execution of the reception and the safe place should be developed with the new JEDI committee and SSA leadership, in consultation of best practices as illustrated by recent research on these topics.

Fee structure and travel awards. The Society should explore the possibility of reducing fees and registration costs, which may be barriers to entry for diverse populations, especially students who may be coming from MSIs. This recommendation should be finalized with the permanent JEDI committee along with SSA leadership to understand the economic impact of a changed fee structure.

We also recommend including diversity in students and institutions as part of the rubric that is used for the evaluation

of travel awards. The evaluation criteria and the success rate of awards relative to the total number of applications should be publicly available on the website to demystify the selection process. We also recommend tracking the total number of applications and awards and the demographics of recipients, which would allow for tracking the success of this program.

Mentoring program. We propose building upon current mentoring efforts at SSA to explicitly include mentoring of underrepresented students and early-career members. The program should include orientation and training for both mentors and mentees prior to the conference (see the Training section, for further details). To help with recruiting, SSA should consider rewards and incentives for mentors (e.g., special recognition, SSA swag, etc.). Mentors and mentees can be assigned prior to the meeting, and SSA should facilitate a preconference breakfast, a sponsored lunch, and/or a reception at the meeting to encourage mentor and mentee interaction.

Programming elements. SSA has a long-standing conference luncheon intended for the presentations of awards. We propose modifying the format of these luncheons. One such change could be shortening the awards ceremony and including a plenary session on JEDI as SSA begins these efforts. In the out years, different topics that relate to the membership could be considered for the plenary, which may include JEDI or any other important societal issues that may arise. Special sessions and workshops that focus on challenges, barriers, and unconscious biases against underrepresented minorities could also be encouraged from the membership.

Standards for session coordinators should be set such that the selection process for panels and invited speakers encourages and facilitates the identification of diverse participants. If a panel could not meet this standard, a follow-up process with session coordinators and moderators could allow for the identification of any issues that should be solved in time for the next meeting.

Member support. We recommend that SSA provides presentation and public-speaking training for students and early-career researchers prior to the conference (which could be an element of the mentoring program). In addition, currently SSA offers childcare at its meeting, and we encourage strengthening this service by including family zones that offer services such as play areas and affordable snacks for children. Sponsorship could be sought for these services, so they can be offered for free or minimal cost to participants and to SSA. Other services, such as interpreter and translation services, could enable limited English-language members to fully participate in the meeting, and closed captioning should be offered for any online meeting hosted by SSA. Finally, we recommend having gender-neutral bathrooms at the conference.

Local outreach. During the annual meeting, there may be opportunities to reach out to the local host community, so students from diverse populations may have the opportunity to learn more about earthquake science. Local MSIs and community colleges could be contacted. Such MSIs could include local Tribal Colleges and Universities (TCU), Native American Non-Tribal Institutions (NANTI), Alaskan Native- or Native Hawaiian Serving Institutions (ANNHI), Historically Black Colleges and Universities (HBCU), Predominantly Black Institutions (PBI), Hispanic-Serving Institutions (HSI), and Asian American- and Native American Pacific Islander-Serving Institutions (AANAPISI). Community colleges, in particular, are widespread over the United States and overall have a majority population of minority students (Ma and Baum, 2016). Outreach activities could include contacting local STEM undergraduate (community college to university) students, teachers, and faculty to specifically invite them to attend the conference through advertising in physics, math, and geology classes. In addition, a proposed "student day" could have a significant local impact and inspire a new generation of earthquake professionals. To extend this idea further, SSA could promote a community day on a weekend to invite local communities into the conference. To execute a program such as this may require additional funds and effort from the local organizing committee. External funds may be sought to pay for registration and for the costs of hosting students for a day (i.e., extra staff, transportation, lunch, etc.) We encourage the local organization committee to work with the proposed permanent JEDI committee to strategize further on ideas to accomplish this goal for each meeting.

Vendors. SSA should consider offering vendor space at a significant discount to nonprofit organizations that focus on diversity and traditionally do not attend the conference, such as the National Association of Black Geoscientists (NABG), the Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), and the American Indian Science and Engineering Society (AISES). These groups have a long history in advocating for minority issues, and an invitation to the annual meeting may be incentivized with either a special session or talk about their respective organizations. Furthermore, other groups have formed in recent times and may be interested in having a voice at the conference, such as GeoLatinas and/or Society of Latinxs/Hispanics in Earth and Space Science (SOLESS). These groups could be engaged prior to the conference to impact its programming, and extending these invitations would allow for building long-term partnerships with these organizations.

Assessment. To assess whether these initiatives have positively impacted the annual meeting, an assessment will need to be made and likely reviewed by the permanent JEDI committee. The assessment should use approved tools for this analysis, such as surveys, and should include demographic information.

Postmeeting questions should be geared toward addressing problems affecting underrepresented minorities.

Target programming, incentives, and awards

Targeted student programs aimed at engaging diverse audiences have proved successful in overcoming certain barriers to entry into geoscience fields. The Society may seek to create incentives for both students and mentors to become engaged in Society functions, especially the annual meeting and publications. These incentives can include financial incentives as well as formal recognition. For example, as mentioned previously, a targeted travel scholarship can be awarded to underrepresented graduate students to attend the conference, as well as a joint faculty and student award focused on teams from MSIs to attend the conference.

JEDI efforts by individual members often go unrecognized in professional societies. By developing an award mechanism, there would be a formal recognition by the Society that these efforts are appreciated and supported by the broad seismological community, helping the Society's culture to become more inclusive. Some societies have different types of awards to recognize women and minorities in the geosciences. For example, the Geological Society of America has the Randolph W. Bill and Cecile T. Bromery Award and the Doris M. Curtis Outstanding Woman in Science Award, which are meant to recognize outstanding contributions by African American and women geologists. The U.S. Geological Survey (USGS) recently created the Rufus D. Catchings Diversity Outreach Award, which recognizes outstanding collaboration between a USGS employee or team and a partnering organization to share and encourage interest in science with minority or underserved students. Current SSA awards include the following:

- The Harry Fielding Reid Medal—honors individuals for outstanding contributions in seismology or earthquake engineering.
- Charles F. Richter Early Career Award—honors outstanding contributions to the goals of the Society by a member early in her or his career.
- The Frank Press Public Service Award—honors outstanding contributions to the advancement of public safety or public information relating to seismology.
- The Distinguished Service Award—honors individuals who have made outstanding contributions to the work of SSA.

The Society can take several approaches to giving awards that help achieve its JEDI goals. One approach is to expand the pool of candidates to be considered for any SSA award by actively seeking nominations for diverse SSA members. Another is to use the current mechanism of awards, but broaden the scope of the awards, such as expanding the Public Service and Distinguished Service awards to include Society individuals working toward JEDI goals.

Finally, a new award could be developed that would recognize individuals and/or groups working to diversify seismology. An award such as this should be open to all who work on JEDI goals, with no race or gender designation, making it an inclusive award that is supported by the membership. We recommend that the newly formed JEDI committee work with leadership and the Awards Committee to design the best strategy moving forward.

Publications

SSA publications have maintained a strong reputation of scientific excellence in part by fostering and supporting a strong peer-review process. A strong, unbiased peer-review process ensures scientific integrity, and SSA relies on its reviewers to provide robust, constructive, and critical review of all published articles. Our recommendations align with this philosophy, and we propose some simple actions that will make the publication process sensitive to JEDI and strengthen the scientific integrity of all SSA publications. Along with these recommendations, we suggest tracking demographic information of authors and reviewers, with an aim of evaluating progress in JEDI for SSA publications.

Guiding principles for scientific excellence. Peer review is the cornerstone of scholarly publishing, and current literature on bias in peer review in different STEM fields has shown varied results, with some suggesting little gender bias in the review process (Lee *et al.*, 2013), that female reviewers are underrepresented in the review process and that female and male reviewers both operate with same-gender preferences (Helmer *et al.*, 2017), and that double-blind reviews (with both author and institutions hidden from reviewers) positively increase participation from female authors (Budden *et al.*, 2008). Little research exists on the impact on minority authors in the review process. Regardless, other organizations are recognizing the need to address implicit and unconscious bias. For example, the National Institutions of Health now posts a guide for minimizing unconscious bias in the review process. We recommend that a set of guiding principles be developed that (1) ensures scientific integrity; (2) promotes constructive, critical reviews; (3) eliminates implicit bias, and (4) fosters equal representation (gender balance, diversity, and early career) in all elements of peer review. The guiding principles will create an environment of inclusion that will ensure scientific excellence in the years to come. As part of the guiding principles, we recommend investigating if the current fee structure contributes to an environment of exclusion, such that investigators at MSIs are being excluded from publishing.

Training. Training remains a key element to address JEDI throughout any organization, and we recommend training be a key element that will solidify the guiding principles toward science excellence. Training should initially focus on

addressing implicit bias in all aspects of publishing and could be expanded to other topics. Implicit bias can include different performance standards, confirmation bias, racial and ethnic bias, gender bias, age bias, institutional bias, culture and geographic bias, language bias, and scientific area bias (see Data and Resources). To address possible implicit bias in the SSA publication process, a change in how the review process is conducted may be required. In addition, we believe that some simple steps can be taken in the short term to make a significant impact. For example, we recommend training for all editors and associate editors (AEs) that includes recognition of implicit bias in their own choices in seeking reviewers, assessing reviews, and responding to reviews.

Review of reviews. We recommend that editors and/or AEs have the ability to reject reviews or send them back for revision at their discretion if reviews do not comply with the Code of Conduct, especially reviews that contain racially coded language (terms with a seemingly race-neutral tone that can promote explicit and/or implicit racial hostility). To protect all editors, any rejected review should be managed through the chair of the Publication Committee and editors. Double-blind reviews have been instituted by several geoscience publications (e.g., Geophysics); these hide the identity and institutions of the authors of a journal article. Although double-blind reviews might be a long-term goal, this type of system may not be necessary, given proper training and a mechanism for editors and AEs to reject reviews.

Recruitment of AEs. We recommend that editors expand the pool of AEs to include a more diverse pool of editors and that the demographics of the editorial pool be regularly evaluated. To accomplish this, we recommend that the website includes a clear articulation of both the opportunity to serve as an AE and the benefits of that service. We also recommend a quick survey of members who have declined serving as an AE to understand current constraints preventing participation. Recognizing that non-White faculty at academic institutions may have a greater service load (e.g., they may have greater student demands for mentoring, role modeling, and counseling; Rucks-Ahidiana, 2019), we recommend that there be a clear articulation of the advantages of accepting AE positions. This can include incentives, such as a reduction of registration fees at the annual conference. Finally, we recommend that SSA has regular workshops focused on how to serve as an AE, how to peer review, and helpful strategies for publishing for early career and diverse members. The workshops can address possible misconceptions and offer time management strategies.

Invitation for articles on JEDI. We also recommend that SSA invites articles that address JEDI issues in the geosciences from scholars who study the topic. Articles from social scientists who specifically address diversifying the field can expose members to recent studies and results that may not typically be read as part of their scientific work. For example, a recent study by Núñez *et al.* (2020) provides a unique look at the culture of inclusion and exclusion in geoscience fieldwork. If not a full article, a plain-English summary of this research can be highlighted in a section of SSA journals (e.g., a JEDI spotlight). In this fashion, SSA members can be informed of the current issues related to JEDI.

Joint programming

SSA already has established ties with other organizations with joint programming, such as the Incorporated Research Institutions for Seismology (IRIS) and SSA Distinguished Lecture Series that has been running for the past 15 yr. Speakers give nontechnical talks about earthquake science topics, with venues from very large public audiences to department seminars. Traditionally, the lecture series has not focused on specific venues that have large minority populations. With coordination with IRIS, we propose that at least 30% of the presentations in the next 3 yr focus on venues that will attract large minority audiences. Such venues may include MSI seminars and/or public events at these institutions (e.g., science festivals, Earth Science Week, and Earth Day). Other candidate host institutions could be community colleges, which generally have large minority student populations. We encourage reaching out to faculty, department chairs, and academic deans to build partnerships in which speakers can serve multiple audiences during each visit. Developing these long-term partnerships will ensure venues that will reach diverse audiences in the future. It should be noted that many MSIs do not have geoscience departments, and thus, we recommend reaching out to physics and math departments and/or colleges of sciences. This program can be a model for engaging MSIs for future programming efforts (such as those associated with the annual meeting). Finally, other venues could include science centers in urban cities, which serve multiple public audiences. To execute this element, we suggest the new JEDI Committee should work closely with the IRIS team to further develop and implement this recommendation.

Government relations

SSA actively engages in the legislative process to impact policy that involves earthquake science. For example, SSA actively participates in the Congressional Hazards Caucus Alliance, the National Earthquake Hazards Reduction Program Coalition, the USGS Coalition, the Coalition for National Science Foundation, and the Geo-Policy Working Group. We therefore recommend that the Government Relations group, the committee responsible for this activity, evaluates opportunities for SSA to contribute to advancing JEDI goals with input from the JEDI committee. We further recommend that the Board considers making a public policy statement on JEDI that would be posted on the website along with the other policy statements.

Public media

Earthquake science has an advantage in reaching the public, given the nature of earthquakes, volcanic eruptions, and tsunamis that excite a local population after an event. Furthermore, promoting earthquake science as a viable career could also serve as a general entry point for diverse students to become aware of this unique field. SSA could leverage current social media outlets to keep SSA at the forefront of earthquake science and, in doing so, potentially reach new, younger, diverse audiences that would normally be unaware of SSA. For example, the current SSA Twitter account does not regularly flag other societies in their posts (e.g., NABG, GeoLatinas, BlackInGeoscience [BIG], etc.). This is a simple mechanism to increase awareness of the activities offered by SSA to nonmembers, as well as announcing new earthquake discoveries and promoting events, such as the proposed "College Day" or "Community Day." Other forms of social media could be explored, and new ties to different organizations that already have a strong social-media presence could be developed. Any significant social and web-media presence would require assigned staff for its management.

Discussion

The charter given to the Task Force included a series of questions that were intended to provide clear focus areas by which SSA could address JEDI issues. The abovementioned recommendations, instead of directly answering the questions, were structured to give concrete actions and provide an accountability framework within the SSA organizational and leadership structure, which the Society could consider when addressing the original questions. For completeness, here we summarize the recommendations in the context of the original questions:

- What steps should SSA take to increase the diversity and inclusion of its membership?

We focus recommendations to address all aspects of SSA operations and activities, including forming a new JEDI committee that would assist the organization in the years to come. The committee would also be tasked with reviewing efforts regularly and making recommendations to the Board and to the membership.

- How can SSA-sponsored meetings be made more welcoming to members of underrepresented minorities?

Specific recommendations for JEDI activities at the annual meeting have been outlined and include updating the current Code of Conduct, expanding the current student mentoring program, creating a reception and safe place for people of color, providing programming support for members, developing special sessions or workshops relating to JEDI issues, and creating outreach activities with the local host community. Furthermore, recent studies have shown that working with community-based organizations makes a larger impact on the communication of earthquake safety and awareness (e.g., Amini Hosseini and Izadkhah, 2020). These recommendations generally present low-cost, high-impact practices that could create a new, inclusive environment at the conference. Furthermore, these principles can guide all smaller, topical meetings and workshops.

- What policies should SSA adopt and/or recommend to increase the diversity within the ranks of geoscientists?

Although much of the recruitment of new geoscientists occurs outside the realm of SSA activities, earthquakes do excite the public. Developing local outreach efforts in conference cities and through joint programming with other geoscience organizations could therefore have long-lasting recruitment impact. Change does not happen overnight, and we emphasize that any efforts should also have a long-term evaluation framework. The permanent JEDI committee could help maintain consistency and energy in this area.

- What incentives can SSA establish that encourage diversity and inclusion in its membership and the geosciences?

Incentives that could encourage diversity within the Society include the creation of a new award pathway that would specifically highlight member contributions to JEDI efforts, thereby fostering and encouraging a broader effort among SSA members. To encourage inclusion through mentoring, SSA could offer a small token of appreciation (such as free SSA swag) or award recognition to mentors. Incentives can also be provided to encourage diversity in the publication process, such as prominently advertising incentives and benefits associated with AE positions, thereby encouraging the recruitment of more AEs from diverse backgrounds.

- Is there a role for SSA to create ongoing training opportunities for its membership to address issues related to implicit bias?

SSA is currently providing training that relates to JEDI issues to its members, and we recommend continued training for members, editors, AEs, and Board members (see Appendix, for a comprehensive list). We also recommend training for students and early-career professionals on publishing in peer-reviewed journals to promote inclusion.

- What role should SSA play in the training of scientists to increase the diversity in the composition of geoscientists and better reflect the composition of society at large?

The main vehicle in which SSA can impact diversity is to integrate JEDI into all its activities. This document has

highlighted many of the activities that SSA could execute. However, careful consideration needs to be taken on the budgetary aspect of these recommendations, and we encourage SSA to fund and/or seek external funding for these initiatives. In addition, SSA should take advantage of the resources developed by other societies and leverage collaborations with geoscience organizations such as American Geophysical Union, IRIS, UNAVCO, Southern California Earthquake Center, American Geosciences Institute (AGI), Geological Society of America (GSA), and others outside seismology and the geosciences in the larger STEM community.

Summary

This document represents the efforts that SSA leadership initiated to address JEDI in earthquake science. The SSA Board of Directors created a Task Force on DEI, which met to develop specific, concrete actions and an accountability framework that the Society could execute to address JEDI in our field. In this document, we address the charter by developing a set of recommendations that encompasses all of the activities that SSA undertakes. It is not intended to be a comprehensive list of actions needed to address all of JEDI but focuses on current SSA activities and actions. Some of these recommendations are already being implemented, and we are excited to see SSA take such a strong leadership role in addressing the future of earthquake science by making sure that we recruit and retain an inclusive and diverse earthquake science workforce.

Data and Resources

Data about implicit biases are available at https://www.niaid.nih.gov/grants-contracts/unconscious-bias-peer-review (last accessed March 2021).

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Appendix

Trainings can include the following:

- **Implicit bias**—attitudes or stereotypes that affect our understanding, actions, and decisions in an unconscious manner:
  - in writing (Berhe and Kim, avoiding racial bias in letter of reference writing, https://aaberhe.files.wordpress.com/2019/03/avoiding-racial-bias-in-reference- writing.pdf);
  - in behavior (https://serc.carleton.edu/advancegeo/workshops/topics.html#bias and https://gradschool.cornell.edu/diversity-inclusion/faculty-resources/implicit-bias- resources/); and
  - in selection committees—also known as how to achieve true diverse representation and identify perspectives not at the table or in the candidate pool.
- **Bystander intervention**—recognizing a potentially harmful situation or interaction and choosing to respond in a way that could positively influence the outcome:
  - https://serc.carleton.edu/advancegeo/workshops/
  - https://www.ihollaback.org/bystanderintervention/

- **De-escalation**—using nonphysical skills to prevent a potentially dangerous situation from escalating into a physical confrontation or injury:
  - https://www.crisisprevention.com/Blog/De-escalation-Tips
  - https://vividlearningsystems.com/safety-toolbox/conflict-de-escalation-techniques
- **Code of conduct and lab/group/department policies**—developing general guidelines on how members should act on a day-to-day basis, reflecting the organization's core values and overall culture to create a more welcoming environment:
  - Chaudhary and Berhe (2020), Ten simple rules for building an antiracist lab (https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1008210)
- **Leading or facilitating discussions about race and discrimination**—education on racism and discrimination, especially within geosciences and STEM, to better understand the lived experience of Black, Indigenous, Latinx, and other minoritized peoples; discussion of strategies that can be used to be actively antiracist; facilitate speakers, reading pods, and discussion groups; share active listening and other communication strategies to increase comfort when discussing uncomfortable topics and provide resources to learn how to handle power dynamics in teams during these discussions:
  - http://www.sparqtools.org/raceworks/
  - http://sparqtools.org/diversity-inclusion-collection/
  - https://teaching.cornell.edu/programs/faculty-instructors/lets-get-real- conversations-about
- **Risk assessment and safety plans**—as part of the process in planning field work:
  - ten steps to protect Black, Indigenous, and People of Color (BIPOC) scholars in the field (https://eos.org/opinions/ten-steps-to-protect-bipoc-scholars-in-the-field);
  - safe fieldwork strategies for at-risk individuals, their supervisors, and institutions—Demery and Pipkin (2021). All websites in the appendix were last accessed in March 2021.

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