Changing the Culture of Fieldwork in the Geosciences

The need to address harassment in field campaigns is growing more urgent. A new workshop provides scientists with a broad set of tools to create more inclusive, safe, and functional field teams.

During a trip to Utah's White Canyon area in October 2018, a field team works on understanding each other's individual leadership tendencies and group function to better perform and support each other in remote field environments. Credit: Scott Christy

By Alice F. Hill, Mylène Jacquemart, Anne U. Gold, and Kristy Tiampo 6 May 2021

Field-based investigations are an integral part of university-based research programs in the geosciences and frequently take scientists to near and far corners of the globe, from populated urban

environs to remote wilderness areas and all types of locations in between. As a result, scientists find themselves in situations that can be both empowering—allowing them to succeed in challenging environments through synergistic teamwork—and intimidating, such as when unfamiliar surroundings or conditions push comfort zones or when one's colleagues in the field pose unexpected or unwelcome hazards (https://eos.org/features/women-in-oceanography-still-navigate-rough-seas).

Organized studies and anecdotal reports alike suggest an uncomfortable reality: that sexual and nonsexual harassment during field research campaigns is a significant problem. In a survey of field scientists at all levels and from 32 disciplines, *Clancy et al.* (https://doi.org/10.1371/journal.pone.0102172) [2014] found that roughly 70% of women and 40% of men have experienced harassment during fieldwork and that about 25% of women and 6% of men have been assaulted during a field campaign. The cumulative result of this prevalent harassment and discrimination (https://eos.org/opinions/how-to-combat-bullying-and-discrimination-in-the-geosciences) is significant damage to research integrity and a costly loss of talent from academia [*Marín-Spiotta et al.* (https://doi.org/10.5194/adgeo-53-117-2020), 2020].

Although harassment prevention training is becoming more prevalent on college campuses, few such programs are tailored to the unique circumstances of fieldwork.
A report from the *National Academies of Sciences, Engineering, and Medicine* (https://doi.org/10.17226/24994) [2018] revealed that harassment and gender discrimination in academic workplaces can lead to declining motivation and productivity, interrupted or deficient learning, and loss of expertise from science and academia. The report's authors concluded that organizational climate is the most important factor in determining whether harassment is likely to occur (https://eos.org/opinions/eight-ways-to-support-women-in-science) and recommended that organizations strive to create diverse, inclusive, and respectful environments that combine antiharassment training with programs aimed at civility and culture building.

Additional studies suggest that field-based harassment often coincides with challenges and stresses common to many fieldwork situations, including intense working environments, social and physical isolation, difficult physical conditions, and differing social and scientific cultures [*John and Khan* (https://doi.org/10.1038/s41561-018-0219-0), 2018]. Although harassment prevention training is becoming more prevalent on college campuses, few such programs are tailored to the unique circumstances of fieldwork.

We recently developed a risk management workshop for field scientists (RMWFS) in academia, adopting established methods from outdoor education. RMWFS is intended to educate these scientists about strategies that recognize the importance of emotional safety and inclusivity

(https://eos.org/opinions/building-a-culture-of-safety-and-trust-in-team-science) and that reduce harassment by promoting respectful, equitable, and discrimination-free environments in the field.

These topics are covered in a series of three modules, described below, and are delivered using active learning techniques, scenario-based role-playing, and discussions meant to empower and prepare participants for different situations encountered during fieldwork.

Learning to Do Better

RMWFS has been offered twice so far, in 2019 and early 2020, each time comprising three 3-hour modules held over the course of a month at the University of Colorado Boulder (CU Boulder). A total of 36 participants have completed the course: 17 from a single research institution in the 2019 series and 19 from various organizations across CU Boulder in 2020. Modules were team taught by pairs of instructors, most of whom had backgrounds that combined academic and outdoor education experiences.

In addition to covering risk management regarding objective hazards common to field campaigns, such as bad weather and treacherous terrain, RMWFS focuses on developing knowledge and interpersonal skills that can help scientists prevent harassment and mitigate conflict situations (https://eos.org/articles/seven-ways-pis-can-counteract-systematic-bias-right-now) in isolated field environments.

To advance the goals and learning outcomes of RMWFS, participants, whether full field teams or individuals, are trained on the following topics and skills:

using debriefing techniques to promote clear group communication and monitor group “temperature”
strategies for recognizing group characteristics or behaviors that can lead to unsafe spaces and knowing how and when to intervene to recover safe spaces
developing working knowledge of tools for incident response, providing in-field support, and confronting uncomfortable situations within small groups
developing self-awareness about leadership styles and shared leadership
increasing familiarity with field safety protocols and emergency response planning and facilitating the development of a positive field culture contract (PFCC) specific to their fieldwork environment.

Additional tools delivered through the workshop include methods to deliberately build positive group culture and support programs, techniques for de-escalation and bystander intervention, and the appropriate use of assertiveness and empathy around difficult conversations.

Debriefing is an especially critical tool for field researchers because unsafe or exclusive spaces often result from, or are exacerbated by, inadequate communication and group awareness. Debriefs provide

explicit venues for daily, open communication among team members, and workshop facilitators have modeled different forms that debriefs can take depending on the situation (e.g., formal versus informal, brief versus long, group versus one-on-one) throughout the modules.

Tools for Success

Researchers (left to right) Matthias Leopold, Lia Lajoie, and Mylène Jacquemart carry field equipment up a rocky slope in an isolated part of Wrangell–St. Elias National Park and Preserve in Alaska. Remote field environments exacerbate many of the challenges faced during regular field campaigns: Even a minor incident, such as a sprained ankle from walking over uneven terrain, can quickly jeopardize an expedition. Such factors require additional planning to ensure that a physically and emotionally safe environment will allow the team to succeed. Credit: Ethan Welty

The first workshop module in RMWFS focuses on the backdrop of traditional field risk management

topics, including those involving physical hazards like rockfalls, swift water, weather, and more (i.e., objective hazards), and how individuals or teams interact with those hazards given their level of competency and self-awareness (i.e., subjective hazards).

Decisionmaking in a group environment is a subjective hazard and is often the skill upon which successful risk management hinges.

Decisionmaking in a group environment is a subjective hazard and is often the skill upon which successful risk management hinges. In the workshop, several all-group activities are geared toward learning about different decisionmaking tools for varying field scenarios. In one of these activities, for example, participants work through a series of scenario-specific questions intended to support situationally appropriate decisionmaking in the field based on the urgency of a situation and the level of group buy-in needed to move the team through the situation.

These considerations may, for example, guide a group to try to reach consensus among all participants or to opt for a more efficient, directive method. In the field, a team could use this approach as a real-time decisionmaking tool for, say, route selection, considering that team members may have different comfort levels traversing steep, loose terrain.

Although a particular terrain navigation decision may seem like an isolated transaction, group communication and decisions facilitated by processes like this question sequence often set the tone of group culture in the field and can have positive or negative feedback on group culture. If decisionmaking is poorly managed, individuals can be left feeling disenfranchised or unsupported by the group, which may lead to later conflicts or problems. If done well, however, individuals are more likely to feel valued and bolstered, thus likely improving group morale and productivity.

The second module focuses further on building a positive culture among field teams, which is the backbone of a safe field environment for every team member. The framework presented in RMWFS requires several elements: creating a high-functioning and inclusive team, recognizing the group behavior that can lead to unsafe spaces, embracing leadership as a shared responsibility, and fostering shared experiences and cultural knowledge. Discussion topics in this module include team communication strategies, positive masculinity (using a position of male privilege to empower others), and self-awareness of how one's strengths, limitations, and values may unconsciously affect the group. Activities in the module demonstrate how to foster desired outcomes.

In the culminating activity for this module, for example, groups develop a PFCC or code of conduct specific to their fieldwork and circumstances. Such efforts are most effective when there is a high level of buy-in from all participants. Yet discussions about codes of conduct can be challenging when there

is a lack of full participation or when especially loud or strong opinions dominate the conversation. Considering this challenge, instructors demonstrate how to facilitate discussions around specific behaviors and norms needed for individuals to feel safe, engaged, and empowered.

This process may start with each team member anonymously writing descriptions of an actual space where they feel comfortable and growth oriented and one where they feel limited or threatened. These attributes are then shared on a whiteboard, where they serve as prompts for further discussion and the beginning of the group's PFCC document. The specific character of the discussion depends on the nature of the group and its fieldwork site and time frame.

Mitigating interpersonal risk within field teams requires calling out and stopping behaviors that lead to toxic group culture, disenfranchisement of team members, and lost productivity.
If a full field team is present at the workshop, the results of this session can be immediately implemented to develop a draft code of conduct for the team or to begin a team discussion that will shape a PFCC. In turn, these documents can serve as baselines for group culture expectations in an upcoming field season.

The final module of RMWFS was developed in conjunction with ADVANCEGeo (https://serc.carleton.edu/advancegeo/index.html), a partnership of organizations focused on addressing exclusionary practices in STEM (science, technology, engineering, and mathematics) settings through bystander intervention training programs, and it concentrates on skills for mitigating interpersonal risk within field teams as an observer, leader, or victim. This mitigation requires calling out and stopping behaviors that lead to toxic group culture, disenfranchisement of team members, and lost productivity; it also requires bystander intervention and managing interpersonal conflict through allyship to recover safe spaces.

After reviewing historical data related to harassment in the geosciences to provide context for the various shades of harassment and exclusivity, the crux of this module is practicing several intervention strategies. Intervening is a naturally uncomfortable space for many people and feels more confrontational in real time without thoughtful preparation. The training in this module is intended to help people develop familiarity with the different approaches through role-playing and to empower participants to use these approaches in the field.

Participants divide into small groups to practice techniques for de-escalating interpersonal conflict through a variety of fieldwork-relevant scenarios ranging from subtle and perhaps unintentional microaggressions to clearly offensive behaviors. In one example scenario, we workshopped responses to intervene against language demeaning to women among an all-male subgroup of a field team, even when members of the subgroup do not perceive that what they are saying is demeaning. We explore

both formal multistep resolution approaches and simpler models like using allyship with offenders, and we reinforce concepts of self-awareness and communication raised in the first module. Practicing such interventions led to larger discussions of group culture and the toxic effect that even unintentionally disparaging language and word choices can have.

Maximizing Gains for Participants

The RMWFS program was designed to be customizable to meet the needs of different groups and to be adaptable on the basis of the skill sets of individuals involved while still fostering broader team development. Topical scenarios are selected for their applicability in training skills and approaches relevant for particular hazards that pertain to field sites (e.g., blizzard conditions in alpine or arctic environments) or group dynamics (e.g., a culture of sexual innuendo or advances within a male-dominated remote field team isolated from larger support systems).

While keeping the workshop content consistent, we ran the first workshop with all participants from a single research organization, whereas the second workshop was open to individuals from research clusters and organizations across CU Boulder.

Physically and emotionally unsafe field environments are typically rooted in inadequate leadership, and leadership in field expeditions is a shared responsibility of every team member.
The challenge for a single person or a small group who participates is to get their full research or field group to buy in without everyone having attended the workshop. Yet these individuals have subsequently reported bringing the energy and tools they learned back to their respective groups, facilitating the broader reach of the workshop content across campus. One participant, for example, shared with us that their entire research group participated in bystander training as a direct outcome of this person's participation in RMWFS. Another modified the field safety plan and code of conduct module to implement as an exercise in their undergraduate field methods class.

Complete team participation in the workshop is preferred, because physically and emotionally unsafe field environments are typically rooted in inadequate leadership, and leadership in field expeditions is a shared responsibility of every team member, not just the most senior individuals. Participation of senior scientists signals to other team members that a positive culture is important, it sets a tone of equity, and it can help reveal blind spots in interpersonal skills not uncommon to seasoned academics. Furthermore, engaging students and younger scientists as well as women and people of color in culture building early on within field teams empowers these individuals and perpetuates best practices going forward.

Continuing to Improve

Prior to both workshops to date, participants completed surveys and shared their fieldwork experiences and workshop expectations, allowing the instructors to modify content to meet participants' needs and to select appropriate scenarios and examples. We followed up by distributing daily and final reflection surveys to all participants and held follow-up interviews with a subset of participants and instructors. Twenty-seven participants provided responses (74% identified as female and 26% as male; all but one identified as Caucasian).

Only half the respondents said that their teams had field safety protocols or a code of conduct in place prior to the workshop. About a third of respondents reported that they had experienced harassment in the field, reinforcing the need for the type of training provided by RMWFS. After the workshops, all but one respondent said their participation was worth their time, and all respondents said they felt better prepared for their upcoming fieldwork season. Participants highlighted the significance of learning about allyship and described how the workshop exercises had sharpened their awareness of mental health challenges, such as isolation during fieldwork and navigating subtle harassment, that team members might face. Participants also frequently mentioned the workshop's positive and safe environment for sharing experiences and opinions, learning different perspectives, and role-playing.

Meanwhile, instructors agreed that discussions about group dynamics, leadership, and codes of conduct were especially powerful during the workshops and that the scenarios highlighted were authentic and effective ways to engage participants. They suggested that in future iterations, it would be beneficial to break large full-group scenarios (e.g., an Arctic all-camp polar bear response incident) into multiple scenarios that relate specifically to small teams to make them even more realistic and to increase the focus on team communication issues.

Ongoing workshop development is focused on creating new in-person and online modules that can be adapted for individual research groups and larger research centers. These modules and materials can serve as the basis not only for future RMWFS presentations but also for similar workshops aimed at reducing harassment and increasing inclusivity in fieldwork and, ultimately, at improving retention of talented researchers in geosciences and other STEM fields.

Acknowledgments

The RMWFS workshop was developed at the Earth Science and Observation Center (ESOC (http://cires.colorado.edu/esoc/)), Cooperative Institute for Research in Environmental Sciences (CIRES), University of Colorado Boulder, in partnership with ADVANCEGeo. Funding was provided by a NOAA Cooperative Agreement with CIRES (NA17OAR4320101ESOC) and a National Science Foundation (NSF) workshop award (N1928928). Please contact ESOC (mailto:esocadmin@colorado.edu) to

learn more.

References

Clancy, K. B. H., et al. (2014), Survey of Academic Field Experiences (SAFE): Trainees report harassment and assault, *PLoS ONE, 9*(7), e102172, https://doi.org/10.1371/journal.pone.0102172 (https://doi.org/10.1371/journal.pone.0102172).

John, C. M., and S. B. Khan (2018), Mental health in the field, *Nat. Geosci., 11*, 618–620, https://doi.org/10.1038/s41561-018-0219-0 (https://doi.org/10.1038/s41561-018-0219-0).

Marín-Spiotta, E., et al. (2020), Hostile climates are barriers to diversifying the geosciences, *Adv. Geosci.*, *53*, 117–127, https://doi.org/10.5194/adgeo-53-117-2020 (https://doi.org/10.5194/adgeo-53-117-2020).

National Academies of Sciences, Engineering, and Medicine (2018), *Sexual Harassment of Women: Climate, Culture, and Consequences in Academic Sciences, Engineering, and Medicine,* 312 pp., Natl. Acad. Press, Washington, D.C., https://doi.org/10.17226/24994 (https://doi.org/10.17226/24994).

Author Information

Alice F. Hill, University of Colorado Boulder; now at New Zealand National Institute of Water and Atmospheric Research/Taihoro Nukurangi, Auckland; and Mylène Jacquemart, Anne U. Gold, and Kristy F. Tiampo (kristy.tiampo@colorado.edu (mailto:kristy.tiampo@colorado.edu)), University of Colorado Boulder

Citation: Hill, A. F., M. Jacquemart, A. U. Gold, and K. Tiampo (2021), Changing the culture of fieldwork in the geosciences, *Eos, 102,* https://doi.org/10.1029/2021EO158013. Published on 06 May 2021.