

THE EARTH SCIENCE WOMEN'S NETWORK (ESWN)

Community-Driven Mentoring for Women in the Atmospheric Sciences

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The mentoring philosophy and activities of the Earth Science Women's Network's (ESWN) have reduced some barriers that female atmospheric scientists may face in career advancement.

Membership surveys of the American Meteorological Society (AMS) indicate that women remain a minority in the atmospheric science community (LeMone and Waukau 1982; Hartten and LeMone 2010; MacPhee and Canetto 2015). The greatest gender disparity occurs in senior positions, with the percentage of women in tenure-track faculty positions in atmospheric science departments decreasing significantly with

rank, from 30% of assistant professors to 12% of full professors (MacPhee and Canetto 2015). The shortage of senior female faculty and the lack of retention along the career trajectory is not unique to the atmospheric sciences and is observed in many science, technology, engineering, and mathematics (STEM) fields. A report by the National Research Council (2006) found that the number of women in science and engineering decreases at every educational transition, and the consequences of inaction will be detrimental to the nation's competitiveness. Within the geosciences, the atmospheric science and meteorological community has the lowest percentage of female faculty at doctorate-granting institutions (Holmes and O'Connell 2008). The observed gender disparity in STEM fields is not fully understood but has been attributed to gender bias, harassment, marginalization and isolation, attitudes about career choice, work-life balance challenges, and lack of role models (National Research Council 2006).

To increase the representation of women in STEM and specifically the atmospheric sciences, the community needs to achieve an array of challenging goals, including improving work climates, removing gender biases, increasing role models, and offering more mentoring to women. Mentoring is a mechanism that can potentially overcome some of the gender disparity

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in STEM and may serve to increase the number of women at higher ranks. Here we define a mentor as one who actively engages with mentees to provide guidance and support for their professional development. We distinguish this from a role model, whose career serves as an example or blueprint that others wish to emulate in their own careers. While a number of role models and mentors may have some overlap in responsibility, they each serve unique functions.

The paucity of women in senior positions leads to a shortage of female mentors and role models, which may influence the retention of women in the STEM fields. One of the roles of a mentor is to help the mentee fit into the institution, and being the “only one” can be viewed as not fitting the norm. Thus, senior minorities in a department are often perceived as unable to help potential mentees even when the potential mentee is also a minority (Chesler and Chesler 2002). Holmes et al. (2008) suggest women need to compose 15%–30% of a department or organization before they start having institutional effects, thus implying that adding a few representatives will not be sufficient. Avallone et al. (2013) point out that in atmospheric science, all but one department at U.S. schools and universities have less than 25% women faculty, and the majority have below 15%. As of 2009, 53% of atmospheric science departments had two or fewer female tenure-track or tenured faculty (MacPhee and Canetto 2015). In departments lacking female faculty, female students have a harder time believing that their presence in the major is “normal” (Seymour and Hewitt 1997). MacPhee and Canetto (2015) found a higher percentage of female graduate students in atmospheric science departments that had a higher percentage of female faculty, yet this correlation was not statistically significant. While cross-gender mentoring is an important component of mentoring and can be very successful, Kram (1985) points out that these relationships are more complex because of the potential for the adoption of stereotypical gender roles.

Formal discussions within the atmospheric science community about the representation of women have occurred for decades. The creation of the AMS Committee on the Status of Women and the AMS Committee on the Status of Minorities in 1974 grew into the formation of the AMS Board on Women and Minorities in 1975. AMS currently hosts an annual women’s luncheon at the AMS annual meeting. Within the atmospheric science community, mentoring has been established in several programs, including the Significant Opportunities in Atmospheric Research and Science (SOARS) program, the AMS Enterprise Commission mentoring program, and

Atmospheric Science Collaborations and Enriching Networks (ASCENT). While SOARS is focused on all underrepresented groups [women; racial minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ) community; among others] at the undergraduate to graduate level and the AMS Private Sector Mentorship Program is industry focused, these programs show the growing momentum within the atmospheric science community to include mentoring as a component of career development. Despite these efforts, resources for women navigating their careers in the atmospheric sciences remain limited.

A grassroots organization, the Earth Science Women’s Network (ESWN), has contributed to the mentoring of women in the atmospheric sciences over the past decade. The ESWN, established in 2002 by six early career atmospheric chemists, has increased to an international membership of over 2000 women in the Earth sciences spanning a geographical extent of more than 50 countries. In 2014, ESWN was formally established as a nonprofit organization. While atmospheric scientists are the largest group in the ESWN membership, women from many disciplines in the Earth sciences are members (Fig. 1). The mission of the ESWN is to promote career development, build community, provide opportunities for informal mentoring and support, and facilitate professional collaborations. ESWN has traditionally focused on providing support for early career women scientists; however, the membership includes women at all career stages. Results from a 2013 membership survey showed that respondents comprise 31% graduate students, 19% postdoctoral researchers, 25% in higher education instructional positions (defined as postsecondary education), and 17% in research positions. Respondents under the age of 40 totaled 85%. At the time of this survey (2013), 45% of respondents reported that the most important type of professional growth needed to advance their careers was to build more extensive networks with others in their field, which is the primary goal of ESWN.

ESWN’s growth is in large part due to its activities, which are guided by a self-defined mentoring philosophy that has developed over the past decade. The following section of this paper will provide background on different types of mentoring and the obstacles that women can face under different mentoring strategies. A description of the ESWN’s mentoring philosophy and its techniques for addressing the challenges women face in traditional mentoring structures is presented, followed by specific examples of how ESWN’s mentoring philosophy is executed and how those activities relate to member gains reported

ESWN Membership by Discipline

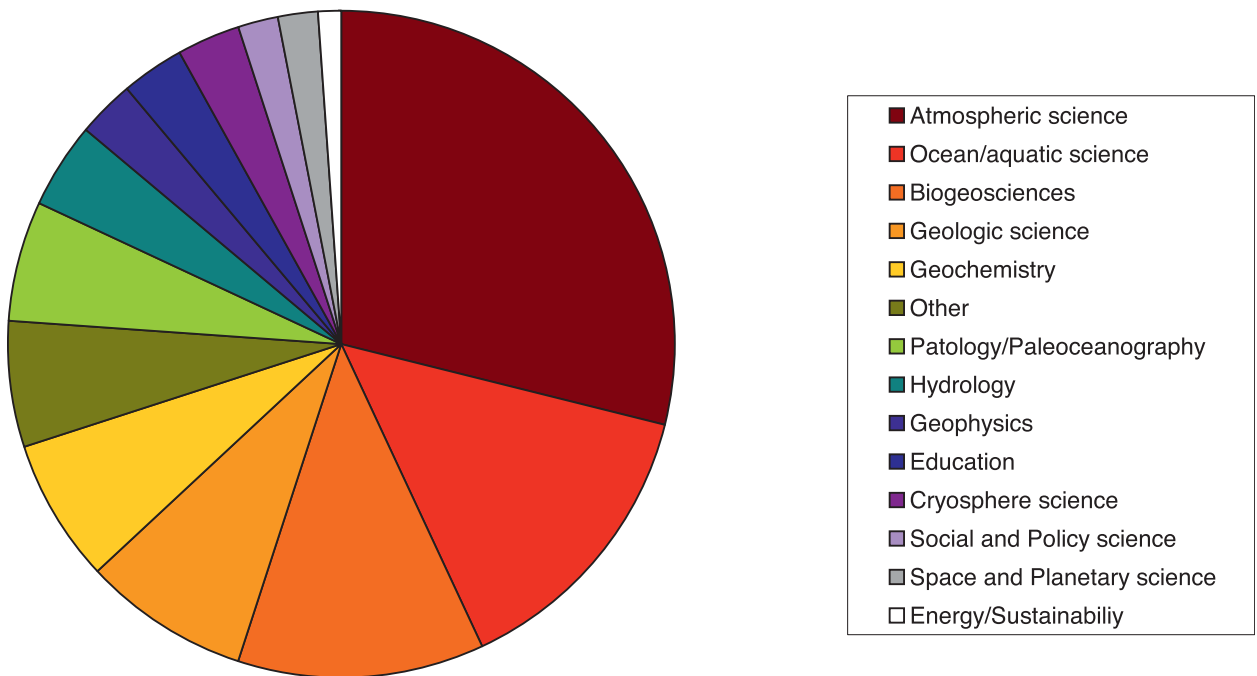


FIG. 1. ESWN membership by discipline, adapted from Archie and Laursen (2013b) based on 2013 member survey.

in a survey of the ESWN. The final section of this paper offers suggestions for the broader atmospheric science community to meet the mentoring needs of women based on the lessons learned from the ESWN.

UNDERSTANDING TYPES OF MENTORING. Mentoring seeks to provide the protégé, or mentee, with career development and psychosocial development (Ragins and Cotton 1999), both of which are important for building a successful career. Mentors can provide a mentee with coaching, professional exposure, protection, and sponsorship (Kram 1985). Additionally, the interpersonal nature of mentoring relationships provides mentees with psychosocial development, which helps mentees develop the personal skills necessary to navigate the social interactions in their careers and increases their sense of competence, self-efficacy, and personal development (Ragins and Cotton 1999).

Mentoring has tangible and intangible benefits for both mentors and mentees, even though the mentoring process is often focused on the needs of the mentee. Mentoring has been linked to positive metrics for mentees, such as increased promotions (Scandura 1992), higher incomes (Chao et al. 1992; Dreher and Ash 1990), and more mobility (Scandura 1992). Intangible benefits to mentees include increased

self-confidence (Eby et al. 2007) and greater career satisfaction (Fagenson 1989). Mentors often report benefits, such as psychological gratification and gaining a sense of guiding the next generation through mentoring (Levinson et al. 1978; Ragins and Scandura 1994). Hansford et al. (2004) found that the most commonly reported outcomes from educational mentoring studies by mentees were related to support, empathy, encouragement, counseling, and friendship. The positive consequences of mentoring, especially promotion and higher income, align with results needed to help women in STEM attain high-level positions and begin to close the wage gap between genders. Additionally, if more women were engaged in positive mentoring relationships, then greater career satisfaction, combined with support, empathy, and encouragement, may help more women remain in the science “pipeline.”

Mentoring can take on many different forms: formal mentoring (set program with defined roles), informal mentoring (mutually selected relationship outside of a formal program), one-on-one mentoring, multiple mentoring (single mentee benefits from multiple mentors), peer mentoring (individuals at the same career stage mentor each other), or collective mentoring [mentor(s) accepts responsibility to mentor a collection of mentees together]. Mentoring

commonly includes one-on-one informal relationships and relies on a mutual self-selection of the mentor and mentee to enter into a mentoring relationship. With that self-selection comes a level of trust that is necessary for the relationship to provide gains. For the mentors, this is often based on a view of their mentees as younger versions of themselves (Ragins and Cotton 1999), which can pose a challenge for young women in a male-dominated field. The issue of gender is further complicated for women because mentees will often look for mentors that have faced similar challenges, and the lack of women in senior positions makes it more difficult for junior women to find and identify mentors with the relevant experience (Holmes and O'Connell 2003).

Many institutions have implemented formal mentoring programs as one strategy to complement informal mentoring and provide equal mentoring opportunities. While formal mentoring programs offer many benefits (Murray and Owen 1991), they may create additional challenges. For example, formal relationships often have a shorter time frame (e.g., one to several years), while informal mentoring relationships may span the mentee's career (Ragins and Cotton 1999). As a result, informal relationships can bridge career transitions, whereas formal relationships are often tied to an institution and thus do not help the mentees as their careers progress. Formal mentors may view their mentees as at-risk performers who need the mentoring because they underperform, which is in stark contrast to development in informal mentoring relationships based on the mentee's potential (Ragins 1997). This perception may occur because of the opt-in nature of many formal mentoring programs, which may self-select from underrepresented groups who may lack informal mentoring opportunities. Finally, formal mentors may not participate in mentoring activities, such as sponsorship, for fear that it may be construed as favoritism (Ragins and Cotton 1999). Hansford et al. (2004) pointed out the most common problems reported by formal mentees include 1) lack of mentor time; 2) professional expertise or personality mismatch; and 3) mentors being critical, out of touch, defensive, and/or untrusting. The professional expertise/personality mismatch is more common in formal mentoring relationships than informal because the pairs are often assigned rather than self-selected. Mentors' lack of time can also be more problematic in formal mentoring relationships, as the mentors can be entering the relationships out of obligation rather than a sense of mutual benefits. Additionally, many formal mentoring programs target a specific career stage (i.e., graduate student, postdoctoral researcher,

new faculty), but those mentoring programs can then fail to help mentees transition career stages in the way informal mentoring does.

In light of the challenges of the formal mentoring model, new mentoring models have been developed to provide career support to women and underrepresented minorities. Chesler and Chesler (2002) cite new techniques, such as 1) multiple mentoring, 2) peer mentoring, and 3) collective mentoring. Multiple mentoring is an approach where mentees contact several different mentors for specific aspects of their careers. In this approach, individual mentors take responsibility for a specific component of mentoring and thus may have no knowledge of any other mentors working with the same mentee. Peer mentoring relies on the mentees to receive and simultaneously provide career support and advice to their peers. In this method, there may be no distinction in professional level or field, and the focus may be on overcoming psychosocial issues. A benefit of peer mentoring is that it allows women to reject outdated ideas of what a successful culture of science entails (Ginorio 1996). Collective mentoring is institutional in nature, with a collective group of mentors accepting responsibility to mentor a mentee or group of mentees. This type of mentoring does not rely on the one-on-one relationship but still utilizes formal relationships. For example, an academic department may mentor an incoming class of graduate students as a whole, where multiple faculty members work together to mentor students and take collective responsibility for the mentoring. Within the atmospheric science community, several of these mentoring models have started to appear. For example, SOARS utilizes multiple mentoring, where the protégés in the SOARS program are assigned a writing mentor, a science mentor, and a community mentor. The SOARS program also enables informal peer mentoring between the program participants.

To address mentoring gaps for women in the Earth sciences, the ESWN has taken aspects of peer mentoring, multiple mentoring, and collective mentoring to create a network that aims to address some of the mentoring gaps for women in the Earth sciences. Here we call this multipronged approach "community-driven mentoring." Research indicates that that early inclusion into a peer network provides a jump start to a scientific career (Etzkowitz et al. 1994; Ginorio 1996). Cain and Leahey (2014) found that women had higher levels of career success and greater career retention as a result of informal relationships with colleagues. The flexibility and informality of network-based mentoring allows for women to engage in the mentoring in a way that best fits with their personal

needs at varying career and life stages (Sorcinelli and Yun 2007; Rockquemore 2013). In the following section, we describe this approach in greater detail.

MENTORING PHILOSOPHY OF THE ESWN. Over the past decade, the ESWN has initiated, promoted, and organized various activities to provide members with a multipronged approach to mentoring. As a result of these activities, we have developed a mentoring philosophy based on the following five principles:

- 1) Support community-driven mentoring
- 2) Encourage diverse mentoring approaches for diverse individuals
- 3) Facilitate mentoring across career phases
- 4) Promote combined personal and professional mentoring
- 5) Champion effective mentoring in a safe space

Here, these five principles are described, followed with specific examples of implementation.

Support community-driven mentoring. The ESWN organization has adopted a grassroots, member-driven approach that evolves to respond to the ESWN community needs. Specifically, the ESWN has taken a nontraditional method to mentoring by intentionally *not* providing structured mentoring partnerships or groups. Instead, the ESWN enables informal interactions among members to develop a broader, meaningful professional network for each individual. The mentoring within ESWN includes peer-to-peer mentoring for women at all levels of careers and positions, hence using portions of the peer mentoring approach. An online network provides access to advice, feedback, and career-relevant information from any member, regardless of career level, who would like to contribute to the online conversation. This follows the “multiple mentor” system and allows women to tap into a range of advice from peers. Finally, collective mentoring occurs through small, informal groups that discuss specific topics and issues. In the collective mentoring that occurs online, interactions between members range from passive (e.g., observing conversations of others) to active, including the development of more robust personal and professional relationships. Overall, this community-driven approach overcomes several issues with formal mentoring programs, as it allows members of the community to respond to questions and concerns from other network members on their own time, thereby eliminating problems with finding time from mentors as well as scheduling in-person

meetings. Further, this technique works to eliminate professional and personal mismatches between mentors and mentees, as the large community provides a range of professional and personality types.

Encourage diverse mentoring approaches for diverse individuals. ESWN offers different mechanisms to develop potential mentoring relationships. Our primary approach is an online forum, previously in the form of an e-mail listserv (2005–13) and more recently in a social networking platform (<http://eswnonline.org>) launched in February 2013. The online network provides a place for women to post questions, concerns, solicitations for advice, and successes to all members. There are several advantages to this approach. Women who feel isolated at their institutions have a virtual support group they can turn to for advice. Further, women who respond best to passive mentoring can read advice and use the network to inform their own career decisions. While passive mentoring is difficult to quantify, it can be very powerful, as it identifies women’s unique career challenges and develops solution strategies in a safe, nonconfrontational setting. By allowing our members to self-select their participations in online discussions, they can choose the level of contact that best works for them.

Another mechanism of the ESWN to enhance mentoring within its membership is in-person meetings. To date, this includes receptions at professional society meetings, informal meetings at smaller conferences and workshops, regular get-togethers in cities with large ESWN membership, small on-site writing groups, workshops at academic institutions and professional meetings, and multiday professional development workshops funded by the National Science Foundation (NSF). These in-person meetings are essential for building relationships for those in specific geographical regions or in small subdisciplines. Face-to-face connections also enable members to solidify the relationships they establish online. Receptions, such as the one hosted at the annual fall meeting of the American Geophysical Union, allow our members to network with a large number of women and provide an opportunity to be the gender majority in the room. Additionally, ESWN members have hosted discussion forums at the American Meteorological Society’s women’s luncheon to raise awareness of ESWN in the AMS community and discuss relevant issues.

By allowing members to opt in for the resources and support that they need, either online or in person, ESWN offers an alternative to more rigid, formal mentoring structures. Further, it allows members of the community to develop resources for peers.

Facilitate mentoring across career phases. ESWN recognizes that a mentor's effectiveness is not necessarily based on career rank but rather life experience. Knowing that women at all career stages have valuable insight into various issues, our approach to mentoring allows all members to have an equal voice. One of the unique aspects of our membership is that the ESWN attracts members who self-identify as "nontraditional" for the Earth sciences; this may be due to members' age relative to their career stage, sexual orientation, or chosen career and life paths. As a result, our online discussions are open to a wide range of voices, which leads to diverse feedback and a greater likelihood of mentoring effectiveness. Our open philosophy empowers our members by helping them realize that their voices and experiences offer value to other women, regardless of where they are in their career. This also enables members to act in the capacity of a mentor for some occasions and a mentee for others. Additionally, mentoring across career phases and Earth science disciplines builds members' professional networks by opening up opportunities for new collaborations, research ideas, and experiences.

Promote combined personal and professional mentoring. The ESWN recognizes that career mentoring of women in the Earth sciences should not be separate from mentoring on personal issues (e.g., work-life balance). Women in the Earth sciences face all of the typical problems of women in academia, such as the juxtaposition of graduate school and the tenure clock with the biological clock. Family and career balance is viewed as the major career challenge by female graduate students in the atmospheric sciences (Canetto et al. 2012). Further, the importance of fieldwork in the Earth sciences adds complexity to this balance. For women with high demands at home, it is particularly challenging to spend weeks or months in remote locations collecting data that are crucial for their career success. The ESWN recognizes that career advice alone is not sufficient, and that this should be accompanied by advice and support for the balance between personal life and work, which is done continuously through the online and in-person resources that ESWN provides. While some formal mentoring relationships may be able to provide this balance, it is contingent upon the availability of mentors who have had similar work-life balance challenges.

Champion effective mentoring in a safe space. Surveys of the ESWN membership suggest that members find the ESWN forums to be safe places to discuss challenges and successes of their careers without

judgment or repercussions. To date, the membership of ESWN has grown almost exclusively by word of mouth. The personal connection that occurs when joining ESWN creates a safe space for career and personal discussions. By refraining from formal, structured roles of mentor and mentee, the feeling of equality and of every member being valued is emphasized. The undefined power differential helps our members to feel that the environment is secure, reliable, and protected.

EXECUTION OF THE MENTORING PHILOSOPHY. Here, three examples of the execution of the ESWN mentoring philosophy are discussed and results from membership surveys are presented. Several surveys of the ESWN and affiliates have been conducted over the past several years, including 1) the full membership in 2010 and 2013 (Kogan and Laursen 2010; Archie and Laursen 2013b); 2) ESWN workshop attendees before and after 2-day workshops (Archie and Laursen 2013a; Archie et al. 2012; Kogan and Laursen 2011a); and 3) the ES_JOBS e-mail list in 2010, which also included ESWN members, men, and non-ESWN-member women (Kogan and Laursen 2011b; Archie and Laursen 2013b). The surveys requested information about the level of participation in the ESWN as well as gains on a variety of career-development-related skills. Results from these surveys provide insight into the contribution of the ESWN to the professional development of women in the Earth sciences.

Online forum discussions. The online network is at the core of the ESWN membership and addresses all aspects of the ESWN mentoring philosophy. It is built on a community model that includes women across career phases and diverse backgrounds, addresses both personal and professional issues, and provides a safe space for women to discuss their discipline-specific concerns and share career resources. The ESWN originally began as an online discussion in 2005 through a listserv hosted by the National Center for Atmospheric Research (NCAR). In 2013, with support from the National Science Foundation's Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers (ADVANCE) program and the American Geophysical Union, the ESWN migrated to a new, online social networking platform built to enhance online interactions and discussions. With the new platform, members can develop and manage individual profiles, create and join subgroups that are professional and/or personal in nature, and follow

discussions among the ESWN membership. Overall, the high level of trust among the group and presence of a “safe” space remains important to our members. Archie and Laursen (2013b) found the online forum to be an important component of member involvement and member-reported career gains.

Most importantly, the online forum allows members to receive informal mentoring on an array of professional and personal questions. Between September 2009 and December 2012, the most active threads each month on the ESWN e-mail list have included general career topics (30% of months), female-specific topics (33% of months), and maternity and child care topics (15% of months; Archie and Laursen 2013b), highlighting the fact that women seek and require mentoring on both professional and personal matters. General career topics include funding opportunities, job opportunities, and other career resources (e.g., books, webpages, discussion articles). Archie and Laursen (2013b) defined female-specific topics as those that refer to career topics specific to women, such as gender discrimination, underrepresentation of women, sexual harassment, and name changes as a result of marriage. While gender certainly plays a role in the discussion, a large fraction of the active threads categorized were focused on nongender-specific issues.

This analysis of top threads from online discussion shows that members are using the ESWN for both gender-specific topics and general career advice. We infer that the prevalence of nongender specific topics suggests that the ESWN’s community-driven mentoring provides an alternative mechanism for women to engage in mentoring and receive career advice that supplements current mentoring or compensates for a lack of formal mentoring. Many women in atmospheric science feel isolated across career phases (Avallone et al. 2013), and the online discussion forums may circumvent the perception of isolation and provide the psychosocial skills that were previously shared in other mentoring forms. In fact, Archie and Laursen (2013b) found that the largest gain reported by ESWN members in both 2010 and 2013 surveys is the “recognition that you are not alone,” and these respondents ranked the online network as the most helpful activity in making these and other gains. While members reported gains through a variety of involvement in the ESWN, members who participated more online and attended in-person events reported higher gains. Results of the 2013 member survey reported that the sense of community provided by the ESWN was appreciated across career stages, which suggests that our mentoring philosophy and framework can support women across career transitions.

In-person networking events at national meetings and workshops. In addition to the online activities, the ESWN has supported in-person networking events that reinforce online mentoring and bring new members to the ESWN. An in-person networking event at the fall American Geophysical Union (AGU) meeting has occurred over the history of the organization, first in 2003 and has continued with support from NCAR, the journal *Environmental Research Letters*, the U.S. NSF, the Association for Women Geoscientists (AWG), and AGU. This annual event allows long-term members to reconnect as well as bring first-time AGU attendees into the peer network. At other professional workshops and meetings, member-led get-togethers develop discipline-specific connections and peer support. At AMS meetings, ESWN in-person opportunities have occurred at the annual meeting, at smaller discipline-specific conferences, and at a promotional booth at the AMS Graduate and Career Fair.

As noted above, ESWN membership evaluation surveys showed that members who had attended in-person ESWN events showed higher gains from the network than members who only participated online (Archie and Laursen 2013b). This suggests that personal relationships and connections are strengthened by face-to-face contact and can lead to more worthwhile and meaningful experiences for members. Additionally, members who participated in any sort of in-person activity reported a better sense of community within the ESWN than members who only interacted online.

Professional development workshops. Through funding from the National Oceanic and Atmospheric Administration (NOAA), the NSF ADVANCE program and the NSF Geosciences Directorate, and the University of Bergen (Norway), the ESWN has developed a series of professional development workshops that identify and develop specific skills necessary for career success. While the workshop topics are not gender specific, the ESWN aims to provide a series of specific resources to its members that they may otherwise not receive as part of their academic training. These annual events have targeted different skills for a variety of career levels (see Table 1). For example, at the 2013 management skills workshop, content was developed for all attendees and included breakout sessions with specific discussions by career level (e.g., graduate students, research scientists, and professors). The ESWN has also focused on including women from outside traditional academic careers and ensuring workshops are applicable to all women Earth scientists.

TABLE 1. List of professional development training developed by ESWN. Intensive workshops are focused 1- to 2½-day meetings and have traditionally been held for women only. Workshops at professional meetings are short (1–3 h) workshops held for attendees at the AGU and the Association of Polar Early Career Scientists (APECS) and have been open to all genders and career stages.

Workshop title	Year	Sponsorship
Intensive workshops		
Building Leadership Skills for Success in Scientific Organizations	2008	NOAA
Developing Your Research Identity	2011	NSF
Skills for Networking and Communication	2012	NSF
Building Leadership and Management Skills for Success	2013	NSF
Writing an Op-Ed	2013	University of Bergen
Workshops at professional meetings		
Navigating the National Science Foundation	2009–14	NSF/AGU
Publishing Tips	2010	NSF/AGU
Getting Out in the Field	2013	NSF/AGU/ APECS
Success on the Tenure Track	2012–14	NSF/AGU
Careers beyond Academia	2014	AGU

Surveys of workshop participants confirm that the workshops are a positive experience. Participants reported gains in areas specific to each workshop topic (Archie and Laursen 2013a; Archie et al. 2012; Kogan and Laursen 2011a). Additionally, participants also reported gains in more general areas, including reductions of feelings of isolation, development of new career knowledge, and acquisition of new resources that will support their careers (Archie and Laursen 2013b). Some postworkshop gains are similar to benefits that result from traditional one-on-one mentoring relationships, such as preparedness to navigate a path to their career goals and psychosocial improvements, such as confidence in professional identity and confidence in building professional relationships. This suggests that despite their short duration, these focused workshops can provide members an alternative mechanism to gain the skills normally obtained through traditional mentoring.

FINAL THOUGHTS AND SUGGESTIONS FOR THE BROADER COMMUNITY. As ESWN continues to grow in its second decade, its history, accomplishments, and member base suggest that it is making a positive contribution to mentoring women in the atmospheric and Earth sciences. The ESWN provides a unique way to supplement existing mentoring programs and relationships. There are several lessons that can be learned from

our framework and mentoring philosophy, including the following:

- Connecting women can reduce feelings of isolation.
- Capitalizing on social networking technology allows women to opt in to mentoring on their own terms.
- Creating a safe space provides opportunities to discuss issues of importance and relevance to women.
- Participation, either online or in person, is key toward seeing the benefits of the network.

Many aspects of the ESWN can be carried over to individual academic departments and governmental institutions. Based on the ESWN experience, recommendations to other organizations include the following:

- Encourage women and minorities to seek out multiple avenues of mentoring early in their careers and at new career stages. Immediate encouragement to find mentoring resources will avoid giving the impression that mentoring is being suggested because the individual is perceived as failing to succeed.
- Recognize and acknowledge that some issues may be gender specific, and encourage peer mentoring when possible.
- Recognize that the perception of viable role models and mentors for women and other minorities can differ.

- A diverse group of mentors can be valuable, and both men and women have a critical role to play in mentoring the next generation of atmospheric scientists.
- Provide links to resources, connections to other women, and exposure to potential role models/mentors across campus or the organization.
- Recognize that individuals can mentor on certain aspects of their careers without having to take responsibility for mentoring *all* aspects of their careers.

Overall, these strategies can improve the climate for women in the atmospheric and Earth sciences and work to change the face of the atmospheric science workforce.

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