

Evaluation of the Atmospheric Science Collaborations and Enriching NeTworks (ASCENT) Conference, July 14-16, 2010

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ASCENT



ATMOSPHERIC SCIENCE COLLABORATIONS AND ENRICHING NETWORKS



Table of Contents

List of Figures	4
Executive Summary	5
Introduction	8
Program Description	8
Research Design and Methodology	8
Analysis methods	9
Demographics of survey respondents	9
Findings	10
Obstacles faced by women in atmospheric science	10
<i>Work-life balance and family issues</i>	11
<i>Isolation</i>	12
<i>Stereotypes/bias</i>	13
<i>Not being taken seriously</i>	13
<i>Lack of support</i>	14
<i>Lack of confidence</i>	14
<i>Harassment</i>	14
Strategies for overcoming obstacles faced by women scientists	15
<i>The importance of senior mentors</i>	15
<i>Female peer mentors</i>	16
<i>Family</i>	17
<i>Persistence and determination</i>	17
<i>Hard work</i>	17
<i>Denial</i>	17
<i>Confronting issues</i>	18
<i>Learning about women in science issues</i>	18
How participants found out about ASCENT	18
Participants' motivations for attending ASCENT	19
Conference design	20
<i>Conference schedule and mix of activities</i>	20
<i>Participants' suggestions for strengthening the workshop design</i>	22
<i>Professional Development Outcomes</i>	23
<i>Conference Topics</i>	23
<i>Participants' suggestions for future topics</i>	24
<i>Outcomes from the break-out sessions</i>	24
<i>Senior scientist talks</i>	25
<i>Keynote address</i>	26
<i>Poster session</i>	26
<i>Informal socializing and relaxation</i>	26
<i>Mentor pairing</i>	27
Conference outcomes	27
<i>Gains in networking</i>	28
<i>Gains in research collaborations</i>	29
<i>Gains in knowledge</i>	30
<i>Personal gains</i>	30

<i>Sharing the ideas and networks gained at ASCENT with colleagues</i>	31
<i>Sustaining networks among participants</i>	32
Conclusion	32
References	33

List of Figures

Fig. 1 Comparison of obstacles faced by 2009 and 2010 cohorts

Fig. 2 2010 cohorts' solutions to obstacles

Fig. 3 Comparison of 2009 and 2010 junior scientists' motivations for attending ASCENT

Fig. 4 Comparison of means for workshop design survey items for 2009 and 2010 cohorts

Fig. 5 Comparison of means for professional development outcomes for 2009 and 2010 cohorts

Fig. 6 Comparison of means for workshop outcomes for 2009 and 2010 cohorts

Executive Summary

Introduction

While women have made advances in some scientific disciplines, their advancement in atmospheric science has lagged. The Atmospheric Science Collaborations and Enriching NeTworks (ASCENT) workshop aims to help women overcome obstacles to their career advancement by developing professional relationships and collaborations among scientists of varying career stages. This report will focus on findings from the post-workshop survey administered at the 2010 ASCENT conference. Responses from the 2009 and 2010 ASCENT cohorts are compared and discussed.

Demographics of survey respondents

The ASCENT 2010 post-workshop survey sample consists of 18 junior scientists and six senior scientists. All survey respondents were Caucasian, with the exception of one Asian-American scientist, and two multi-racial scientists. Among junior scientists, 33% were assistant professors, 39% were postdoctoral researchers, and 28% were research scientists. Junior scientists primarily came from research universities and national laboratories. Only four (22%) junior scientists had previously participated in training similar to ASCENT. In contrast, 50% of the junior scientists in the 2009 cohort had previously participated in similar training. Therefore, the current cohort may have had less prior knowledge of the issues and obstacles facing women in science.

Findings

Obstacles faced by women in atmospheric science

Participants in the 2010 workshop cited similar obstacles to those identified by the 2009 cohort. Work-life balance and family issues were still the most frequently cited career obstacle by ASCENT 2010 participants, yet they were not mentioned as often as by the 2009 cohort. Women also noted isolation, not being taken seriously by others, lack of institutional support, “tokenism” and stereotypes, and, in the worst cases, intimidation and harassment.

Strategies for overcoming obstacles faced by women in science

Professional and personal support networks were the key strategies that women used to address the challenges they face as women atmospheric scientists. Senior mentors, whether women or men, were cited as particularly important. Women peer mentors were also significant sources of support. Persistence and determination helped women to succeed in their careers while strong effort and high-quality work helped them to earn recognition and respect from colleagues. A few women also noted that learning about the issues faced by women scientists, in forums such as the ASCENT workshop, helped them to gain strategies for addressing these obstacles. A few women reported that they were in denial about the barriers faced by women scientists.

Conference design and logistics

Overall, participants were very satisfied with the workshop schedule and the variety of formal and informal activities. In fact, 100% of 2010 participants agreed or strongly agreed that they were satisfied with the overall design of the conference. Additionally, 87% of all participants agreed or strongly agreed that the mix of activities within the institute met their needs. Finally, all participants were satisfied with the amount of activities per day: 100% of participants agreed or strongly agreed that the conference days had “the right amount of activities.” In contrast, only 80% of the 2009 cohort agreed or strongly agreed that the days had the right amount of activities.

Break-out sessions

Overall, the conference topics met participants’ expectations and needs. Break-out sessions were reported as the most useful aspect of ASCENT: 87% of participants agreed or strongly agreed that the break-out session topics were helpful to their professional development—an increase of 15% over the 2009 cohort. All of the break-out sessions were highly regarded by participants. Many participants reported that they received valuable, concrete tips and strategies from the break-out sessions that they plan to use in their careers. The grant writing break-out session had the most mixed responses. Women with more grant-writing experience felt the material was too general, while women with less grant-writing experience received helpful advice for getting started with proposal writing.

Suggestions for future topics

Although most participants were satisfied with the break-out session topics, they still had a few suggestions for future topics. These include: communication skills/styles (particularly negotiation skills and conflict resolution), alternative career paths, and teaching and mentoring.

Senior scientist talks

Overall, 100% of participants (including the senior scientists themselves) agreed or strongly agreed that the senior scientist talks were helpful to their professional development. Attendees commented that the presentations were motivating, inspiring, and thought-provoking. Most participants felt that the most valuable aspects of the talks were the discussion of career paths and personal stories. Thus they requested that the talks focus more on the personal aspects of the speaker’s career and less on research activities.

Keynote address

The keynote address provided useful content and information: 100% of workshop participants agreed or strongly agreed that the keynote address was helpful to their professional development.

Poster session

The poster session helped junior scientists to share their research with others and build potential research collaborations. Five attendees reported that the poster session was the most valuable part of the ASCENT workshop. In contrast to last year when women reported the poster session was too short, a few women thought that this year’s poster session was too long. However, these

women did not share research interests with other participants and thus gleaned less value from participating in the poster session.

Workshop outcomes

Women reported a variety of gains from participating in the ASCENT workshop. The most frequent gain cited by both junior and senior participants was enhancing their professional network. In fact, almost all participants (91%) *strongly agreed* that their network had been enhanced by ASCENT. Participants also gained knowledge about the issues faced by women in science and access to resources to help them overcome these obstacles. Almost three-quarters of ASCENT participants—both junior and senior scientists—anticipated that they will collaborate with someone that they met at ASCENT. As with the 2009 cohort, women who were not atmospheric chemists had greater difficulty in finding research collaborators.

Conclusion

As an underrepresented group in atmospheric science, women face a variety of barriers to their advancement and success in the field. The ASCENT workshop provided a forum for women to discuss these issues and to develop professional and personal networks among atmospheric scientists at varying career stages. Attendees reported that they enhanced their professional networks, formed personal support networks of women scientists, and gained knowledge and access to resources that will help them in their careers.

Introduction

While women have made advances in some scientific disciplines, there is still a considerable lack of women in atmospheric science, particularly in academic positions. In 2002, women comprised 29% of all bachelor's degrees and 26% of all doctoral degrees awarded in atmospheric science (NSF, 2006), yet only 10% of atmospheric science faculty at Ph.D. granting institutions (Holmes, Connell, Frey & Ongley, 2003). In recent years, women in atmospheric science have not increased their representation on university faculties; in fact, their numbers have stagnated (Winkler et al., 1996).

Program Description

The Atmospheric Science Collaborations and Enriching NeTworks (ASCENT) conference seeks to help women overcome obstacles to their retention and advancement in the atmospheric sciences by encouraging professional networks and research collaborations among women scientists of varying career stages. ASCENT is a two and a half day program, with follow-up reunion events, to foster connections and mentoring relationships among women atmospheric scientists and meteorologists. The program involves a mix of structured and unstructured activities to help women form professional networks and identify research partners, enhance their knowledge about issues faced by women in science, and establish mentoring relationships between junior and senior scientists. ASCENT activities include break-out sessions for participants to explore topics integral to women's advancement in the sciences, a poster session, a keynote address, guest speaker talks by senior scientists, and opportunities for informal socializing, dinners, field trips, and relaxation.

Research Design and Methodology

This mixed-methods evaluation study was designed to provide feedback to program organizers on the conference design and logistics, and to gather information on short- and long-term participant outcomes. The study focuses on the personal and professional gains that attendees made from their participation in ASCENT, their satisfaction with the program and its offerings, and the influence of their participation in ASCENT on their professional networks, confidence, knowledge, skills, and career path. Particular activities, such as break-out sessions, informal socializing, and guest speaker sessions, were also explored, to better understand the processes through which specific outcomes arise.

This study was conducted through the use of survey instruments, in-depth individual and focus group interviews, participant observation at ASCENT workshops and events, and document analysis of participants' applications to ASCENT. The evaluation seeks to identify both the short- and long-term career, personal, and professional outcomes to participants from their experience at ASCENT. This report will focus on findings from the post-workshop survey from the 2010 cohort. Responses from the 2009 and 2010 cohorts will be compared and discussed.

Data collection procedures

Participants completed a survey at the end of the ASCENT workshop. All junior and senior scientists, with the exception of ASCENT organizers, were invited to complete the survey on the final day of the program. Twenty-four participants completed the survey. Additionally, twenty-two ASCENT attendees participated in two focus group interviews during the conference. Findings from the 2009 and 2010 focus group interviews will be forthcoming. The study procedures were approved by the Human Research Committee of the University of Colorado at Boulder.

Analysis methods

The quantitative survey data were entered into the statistical software package SPSS where descriptive statistics were computed. Frequencies are reported for most of the ratings items, and means for some of the multiple-choice items. Items are rated on a 5-point Likert scale (1=strongly disagree, 5=strongly agree). Independent samples t-tests to test for statistical significance were conducted to compare responses from the 2009 and 2010 cohorts. Other tests of statistical significance, (e.g. to compare differences according to career rank, institution type, etc.) were not conducted because the small size of these sub-samples precluded meaningful statistical analyses of group differences.

Write-in responses to the open-ended questions were entered into NVIVO qualitative analysis software and coded as follows. Each new idea raised in a written response was given a unique code name. As these same ideas were raised by later respondents, a tally was added to an existing code reflecting that idea. At times the write-in answers were brief and represented a single category, but more frequently, responses contained ideas that fit under multiple categories, and these were coded separately. Frequencies of responses to open-ended items were calculated and reported.

Demographics of survey respondents

The 2010 cohort survey sample consists of 18 junior scientists and six senior scientists. All survey respondents were Caucasian, with the exception of one Asian-American scientist, and two multi-racial scientists. Among junior scientists, 33% were assistant professors, 39% were postdoctoral researchers, and 28% were research scientists. Junior scientists primarily came from research universities and national laboratories: nine from doctoral-granting universities, seven from government laboratories or research institutes, one from a primarily undergraduate institution (PUIs), and one from a master's degree-granting institution. Only four (22%) junior scientists had previously participated in training similar to ASCENT. In contrast, 50% of the junior scientists in the 2009 cohort had previously participated in similar training. Therefore, the current cohort may have had less prior knowledge of the issues and obstacles facing women in science.

Findings

The findings section is organized as follows. First, the obstacles faced by women atmospheric scientists are discussed because these issues frame the goals of ASCENT and shed light on participants' experiences and outcomes. Next, participants' feedback about the conference design, logistics, and activities is addressed. Finally, participants' self-reported outcomes at the end of the conference are discussed.

Obstacles faced by women in atmospheric science

Women in science face a multitude of obstacles to their advancement and success in the field. One of the objectives of ASCENT is to provide a forum for women to discuss barriers they have faced and to learn about issues faced by women in scientific disciplines. In response to an open-ended survey question, women described facing a variety of challenges in their careers, many of which have been documented in the literature. The obstacles and barriers reported by the 2010 cohort were quite similar to those reported by the 2009 cohort. Figure 1 illustrates the barriers faced by both junior and senior female atmospheric scientists. The figure compares open-ended survey responses from the 2010 and 2009 ASCENT cohorts.

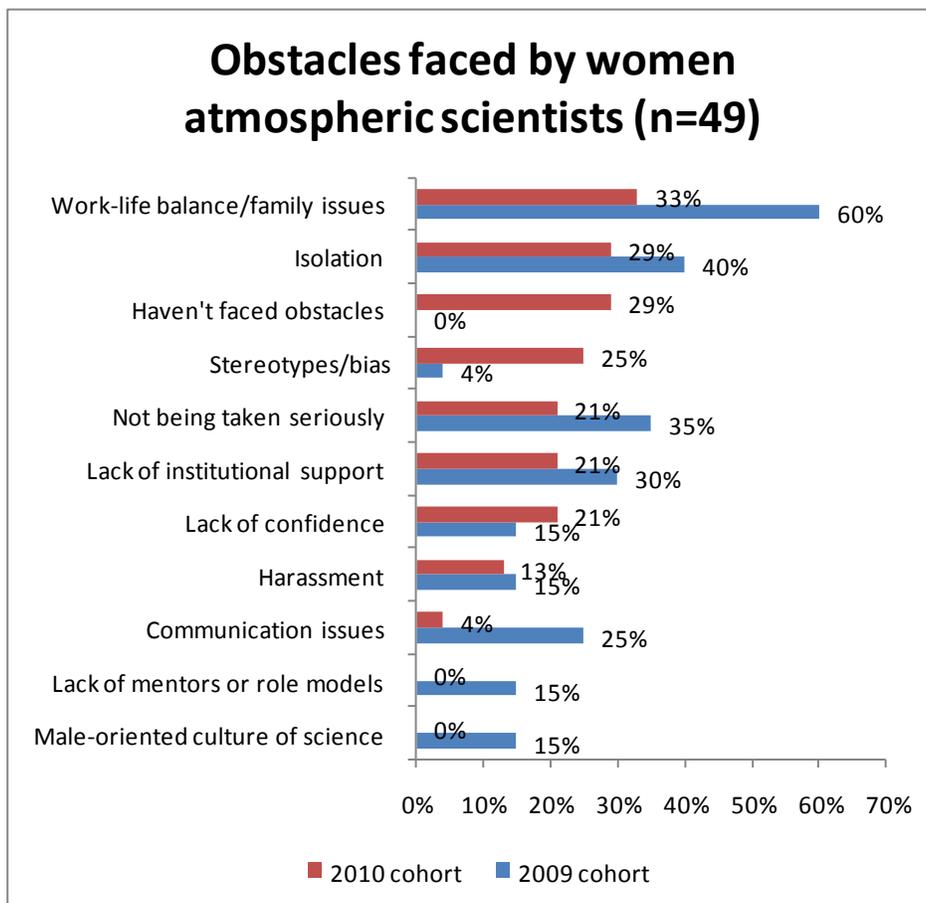


Fig. 1. Comparison of obstacles faced by 2009 and 2010 cohorts

Work-life balance and family issues

Work-life balance and family issues, particularly for junior scientists raising young children, were still the predominant obstacles cited by ASCENT participants. Fewer women in the 2010 cohort reported these issues than in the 2009 cohort. There were fewer parents among the junior scientists in the 2010 cohort and this may have been a reason that these issues were not quite as prominent for them. Nevertheless, a full third of 2010 ASCENT participants noted the challenges of balancing personal life, family, and work. Clearly, many ASCENT participants—particularly junior scientists—were grappling with issues such as childcare, maternity leave, dual-career relationships, and balancing the workload and lifestyle of a scientist with family life and personal interests. In contrast to the 2009 cohort, none of the women in the 2010 cohort noted that a lack of resolution to these issues had made them less committed to their career.

Some women felt that it was difficult to balance work and family, but it was possible.

Juggling having a child with a career has certainly been a bit of a struggle, but not insurmountable.

Other women felt that they had to sacrifice family or personal life in order to achieve success in their careers.

The big challenge I am facing is the time on family and work. My husband and I have conflicts on that, and he wants the second baby and thinks I spend too much time on work. But it requires a lot of time for me to make achievements in [my] work as a junior scientist.

Isolation

Isolation was still the second most common obstacle cited by ASCENT participants in the 2010 cohort. Some ASCENT participants were the only women in their departments or had been the only woman in their research group at some point during their scientific career. As with the 2009 cohort, women in the current cohort found it difficult to be in the minority.

Some women felt that isolation was only a minor challenge which they compensated for by outperforming their male colleagues.

I was often one of only a couple of women in my classes, but it never bothered me that much, and I didn't feel like I was treated any differently (maybe because I often scored higher than all the men in the class).

Like the participants in the 2009 workshop, 2010 participants felt that isolation impeded their ability to network and to gain recognition and success in their careers. Women often felt that they had to work harder than their male colleagues to gain recognition for their efforts.

As a minority you need to work harder to obtain the same goals. I have very seldomly experienced harassment, but it is all in the little things. For example, it is easier to network with a person that you can mirror yourself in, so men tend to network more closely with men and vice versa. It is also more comfortable for me to network with other women, but there are so few women in the field, so I need to work harder with this than the men do. I must more actively overcome obstacles and actively initiate networking.

Postdoctoral researchers felt that isolation inhibited their ability to receive the same mentoring and advising that their male colleagues receive.

In my current group, even though overall the group is gender balanced, I am the only female of the five people I work directly with. I often feel like an outsider amongst these men when we have group meetings. These men have more in common with each other like past educational institutions, making it harder to 'bond' with them. So, I think this makes the relationship I have with my advisor more formal than it is with the other men.

Stereotypes/bias

More women in the 2010 cohort than the previous cohort described incidents of stereotypes, bias, and “tokenism.” These more subtle forms of harassment and bias had negative impacts on women’s self-confidence.

I do notice more of the micro-inequalities: snide comments about why women scientists need to have their own meetings, condescending questions or statements about how much of my work is my own, inappropriate jokes in presentations, assuming I'm the administrative assistant rather than the professor. I have a faculty position, so, obviously my department thinks highly of my work. But I think these little comments do have subtle effects on self-confidence.

I have several times experienced that colleagues (both male and female) would suggest that many of my achievements as a scientist came easier to me because I am a woman. I already tend to doubt myself and my own abilities, and such comments certainly don't help.

Not being taken seriously

The perception that their ideas and contributions were not taken seriously by male colleagues was also a significant obstacle. This perception was also shared by the 2009 cohort although some women in the 2009 cohort felt that they also were not taken seriously by senior female colleagues. Few women in the 2010 cohort reported difficulties with senior female colleagues.

A senior scientist reported that she has not faced obstacles recently in her career but she was not taken seriously when she was a junior scientist.

I haven't faced obstacles recently, but I began as being 'the girl - isn't she cute to try to work with us too' attitude.

As with 2009 participants, junior scientists in the current cohort felt that they were not taken seriously by students.

Students sometimes seem like they want to challenge women authority figures more and I feel my teaching evaluations are lower than my male colleagues because of it; I am also more likely to be called by my first name or Miss than Dr./Professor.

Women reported that low expectations and not being taken seriously started early in pre-collegiate schooling.

I can vividly remember my high school chemistry teacher refusing to write me recommendation letters for college, because he thought I would never be a scientist, despite the fact I out-performed all other students in his class.

Lack of support

Comments about lack of support differed in the two cohorts. Women in the 2009 cohort often noted a lack of institutional support in terms of leave policies, support for hiring and retaining women scientists, dual-career couple hiring, etc. Women in the 2010 cohort often described a lack of personal support from their supervisors or advisors. This type of personal support is critical in helping women to establish successful careers as scientists.

I have had some challenges with my career path, and I need more support (e.g. to have some scientific discussion, to write proposals together, etc.) from my supervisors.

Lack of confidence

ASCENT participants, particularly junior scientists, described a lack of confidence in their ability to be competent and successful in their careers.

In a nutshell, the main challenge throughout my career has been external perceptions and internal doubts about whether I'm a "real" -- technically rigorous -- scientist.

Some women also expressed a lack of confidence in their communication skills.

I often think my natural style of communication lacks confidence, perhaps due to my gender. An all male (senior scientist) comprehensive exam committee was quite challenging to face. Though the exam went fine, I think it was an added stressor to the experience.

Harassment

Perhaps most egregiously, as with the 2009 cohort, a few women in the 2010 cohort recounted episodes of sexual harassment or inappropriate behavior from male colleagues.

*The overt situation that I've faced was dealing with a vendor during my postdoc. It was a horrible experience that I've yet to fully deal with. The bottom line was that I received extremely inappropriate emails from the vendor. And the other bottom line was that I largely ignored the situation. One thing I would like to have is training on how to handle overt issues *from a range of perspectives*. I do not have a confrontational personality. I do not want to be the person to say, that joke was inappropriate, etc.*

During this first year of my faculty position, I was harassed by a senior male colleague. This senior colleague sent an e-mail to myself and the chair of my department that was supposed to be a "joke" but that stated things like "she would be better suited to be a pastry chef than a faculty member" and that I had been known to "hang outside of pubs with strange looking older men."

Therefore, ASCENT participants—like many women in science—faced numerous obstacles to their retention and advancement in atmospheric science. A few of these obstacles, such as family and child-rearing issues, seemed to be more acute for junior faculty and postdoctoral researchers because of their current stage of life. However, both junior and senior scientists recounted numerous other obstacles, including isolation, lack of support, not being taken seriously by other scientists, “tokenism,” and, in the worst cases, intimidation and sexual harassment.

Strategies for overcoming obstacles faced by women scientists

In an open-ended question, 2010 ASCENT participants were asked about the strategies that they had used to overcome obstacles they had faced by women scientists. There are no comparative data for this question because it was not asked of the 2009 cohort. The evaluation initially focused only on the obstacles faced by women but the findings did not seem complete without solutions for overcoming these barriers. Thus the question about supports was added to the 2010 post-workshop survey.

Figure 2 illustrates responses to the open-ended survey question. Clearly, networks, mentors, and peer and familial support were the key strategies that women used to overcome career challenges.

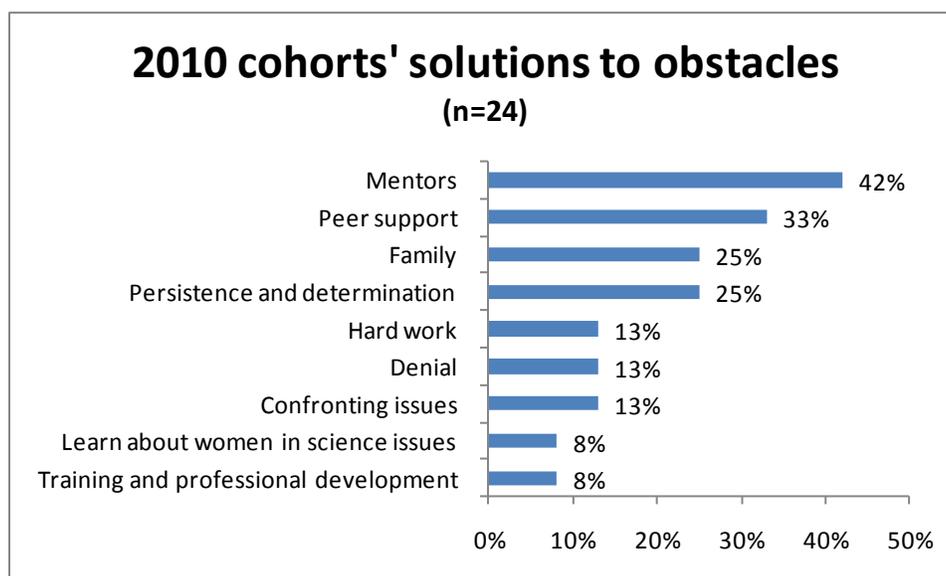


Fig. 2 2010 cohorts' solutions to obstacles

The importance of senior mentors

Mentors were the most common support used by women to overcome the barriers they face in atmospheric science. Just as some women recounted that teachers or supervisors had discouraged their participation in science, many women noted that they had had influential mentors that encouraged them to pursue or remain in science. Women referred to both male and female mentors that had supported their careers.

I've had really great mentors, both men and women. The reason I'm in science is because my male astronomy teacher in college told me he thought I would make an excellent scientist and that he thought I would excel at physics- an area I had hated in high school. I had a great woman mentor in college in my field, who really taught me to love research and to pursue a graduate degree. And then my graduate advisor was really the best teacher I've ever had, in both research and in regards to how to be a moral and responsible member of the scientific community.

Some mentors also supported women's struggles to achieve work-life balance.

I had great advisers for my Master's and Ph.D. that truly supported my work, my need to have a "life", and pushed me forward in my career,

Many ASCENT participants, particularly junior scientists, referred to mentors during their undergraduate or graduate years that encouraged them and contributed to their retention in their studies. Mentoring during these critical transition points may be helpful in keeping women “in the pipeline.”

A supportive research group in graduate school was very important in helping me successfully pass exams and complete graduate school.

Female peer mentors

ASCENT participants also noted the importance of peer mentors in helping them to overcome career challenges. Peer networks of women scientists were very important during graduate school.

It's empowering to have people believe in you and see your potential. I had a great support system from women in my lab group in grad school.

Women also mentioned that networks of women scientists within their organizations contributed to their ability to face many challenges, such as family issues or work-life balance. Just as the ASCENT workshop provided a forum for women to share their problems and offer solutions, it was helpful for women to have such a network within their own institutions or departments.

Talking and being around other women in similar situations has helped a lot. There are 2 other female faculty in my department that have a child about the same age as mine - and that has been very comforting. We don't get together all that often, but we exchange emails quite a bit and it's just nice to know I can go talk to them if need be.

Family

Personal as well as professional support networks were also important in helping women to face challenges. Family, in particular, was an important source of support for some ASCENT participants.

My husband has always been my biggest fan and he is who reassures me that I can do this.

Having a supporting family, and especially a husband that is proud of me, also means a lot to me.

Persistence and determination

Some women also commented that they had personality traits, such as persistence and determination, which contributed to their retention in atmospheric science. These traits helped some women to persevere despite multiple obstacles and challenges.

My mom would be the first to tell you that I have the personality that as soon as someone tells me I can't do something, it makes me more determined to do it.

Hard work

As noted previously, some women felt that they needed to work harder than their male colleagues to gain recognition and respect. Hard work and career achievement helped women to gain confidence and confront obstacles they face in their career paths.

I found that working hard and giving the best product possible, and following through on commitments, overcomes the attitude. People recognize a good product, regardless of the source.

Denial

Some women simply ignored the challenges they faced specifically as women or denied that women face unique obstacles in scientific fields. However, a few of these women had begun to realize that they may need different strategies as they advance in their careers.

My strategy to this point has been blinders! There are no obstacles as a women, so I've done nothing to overcome them. I credit my parents, teachers, PhD and postdoc advisors for never letting me think that I couldn't do anything a man could do. I think I'll need a more refined approach as I advance.

Confronting issues

Some women described instances in which they had directly confronted challenging people or situations. These women felt that taking action was a better approach than simply being frustrated or angry.

I have learned to try to change things instead of being frustrated. One example was when I recently felt overlooked (again) in a manuscript under preparation, so instead of just being frustrated I called the author and offered my help and contribution with the paper. It was gladly accepted.

Learning about women in science issues

A few women also reported that they had faced challenges in their career by learning more about the issues faced by women scientists. Greater knowledge of the issues provided women with tools and strategies for facing obstacles and also helped them to realize that many of their barriers are not due to personal faults, but are the result of deeper social and cultural issues.

After many years of frustration I read a book on the challenges women face in society and working life. At first it was very depressing to realize that I belong to a minority and I had to work harder to obtain the same goals as men, but it was good to discover that it was not something about me as a person, but some issues in the society in general. The book also taught me some tricks to work on: networking, getting feedback and mentoring. So I try to use this actively.

In sum, women noted a variety of methods for overcoming the obstacles they face as women atmospheric scientists. Professional relationships with supportive colleagues, such as senior mentors or peer networks, were the most common means of overcoming obstacles. Women also relied on the support of their families. Some women mentioned that specific personality traits are helpful and that hard effort and high-quality work can foster greater recognition and respect among unsupportive colleagues.

How participants found out about ASCENT

Participants learned about the ASCENT workshop through a variety of means. Some women cited several ways that they learned about the ASCENT workshop. Following are the ways in which junior scientists heard about ASCENT:

- Earth Science Women's Network (ESWN) listserv (44%)
- From a 2009 ASCENT participant (33%)
- From their department chair or postdoctoral advisor (28%)
- From the organizers (22%)
- From a colleague (17%)

- CLIMLIST (5%)

Participants' motivations for attending ASCENT

Similar to 2009 participants, almost all 2010 participants—both junior and senior scientists—were motivated to attend ASCENT to develop personal and professional networks of women scientists, to gain support, and to learn about and discuss issues related to women in science. The 2009 cohort appears to be slightly more politically motivated than the 2010 cohort as several of the 2009 participants noted that they “want to make a difference for women scientists” while none of the 2010 cohort listed this as a motivation for attending ASCENT. 2010 participants also demonstrated less general awareness of the issues facing women scientists and were less likely to have previously participated in training similar to ASCENT. As junior scientists are the target audience of the ASCENT program, their motivations for attending ASCENT are detailed in Figure 2. The figure compares junior scientists' responses from the 2009 and 2010 cohorts.

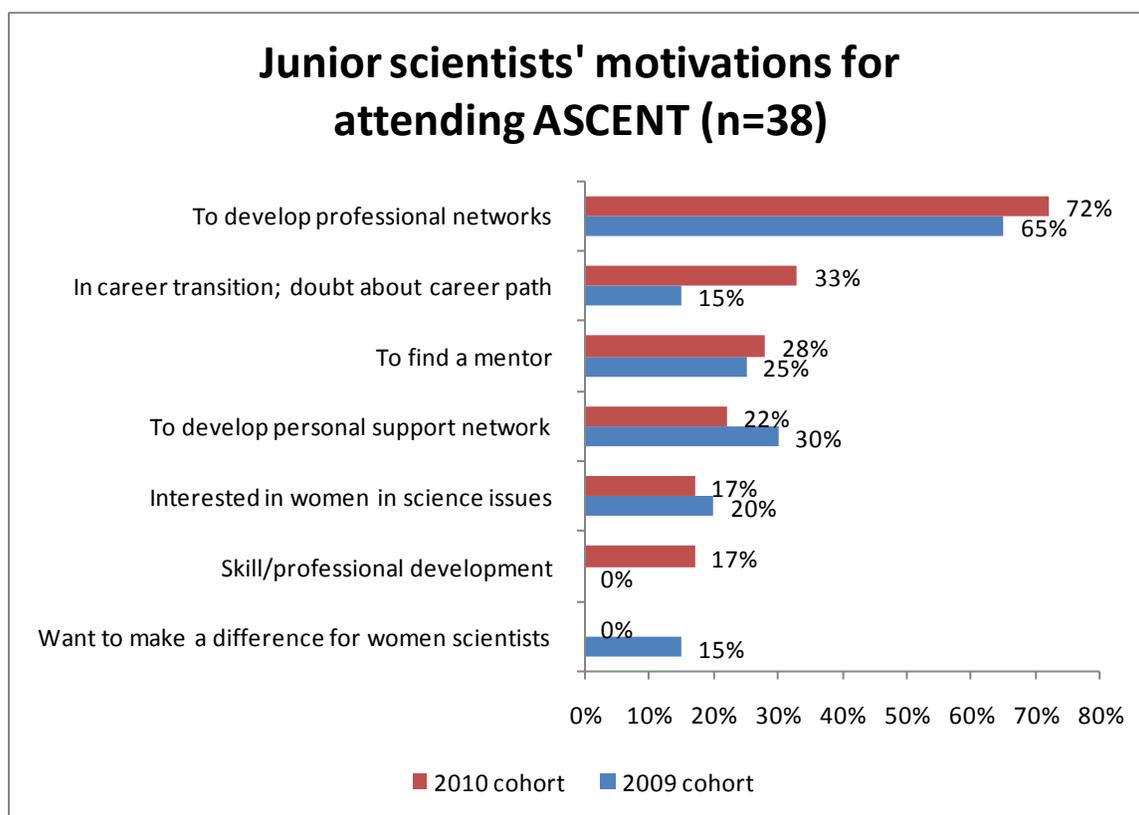


Figure 3. Comparison of 2009 and 2010 junior scientists' motivations for attending ASCENT

The most common motivation for attending the conference for both the 2009 and 2010 cohorts was to build a network of women scientists. Many of the junior scientists were isolated intellectually, not just because of their gender, but also because some of them were the only atmospheric scientist in their department. For these women, the opportunity to expand their professional networks was essential to their career success.

I wanted to maintain/increase connections to scientists at the same stage in their career. I also wanted to have a support base in the future for career developments, such as having a family, changing positions, writing proposals, etc.

Some women also felt that enhancing their network of women might help motivate them to remain in the field of atmospheric science. Thus, opportunities for women to network with each other might be vital for their retention in the field.

Needing to make connections for future research collaborations with others in the atmospheric sciences (outside my department); Keeping myself motivated to continue in the discipline.

The focus of ASCENT on women atmospheric scientists was very important to most participants.

I wanted to network - make connections with other people in the field, but especially with other WOMEN in the field. Women have always been a strong support group for me, and I don't have enough of them around right now. I am lacking the professional and social female support that I love so much.

Some women were undergoing career transitions or harbored doubts about their chosen career paths. They hoped to gain perspective and to share and discuss their stories with other ASCENT participants.

I am in what can be considered a postdoctoral position and am thinking about my career path now with the added variables of small children, to get information/training/discussion on issues related to being female in a male dominated/structured field.... I've recently had thoughts of leaving the field and was hoping to find positive stories, paths, and strategies to remain engaged in a topic I love and am now quite well trained in!

In conclusion, ASCENT participants cited a variety of motivations for attending the workshop. Most frequently, women wanted to develop a professional network of other female atmospheric scientists. They also sought a safe environment in which to discuss personal and professional challenges and to weigh important career decisions.

Conference design

Conference schedule and mix of activities

Overall, participants were very satisfied with the workshop schedule and the variety of formal and informal activities. In fact, 100% of 2010 participants agreed or strongly agreed that they were satisfied with the overall design of the conference. Additionally, 87% of all participants agreed or strongly agreed that the mix of activities within the workshop met their needs. Finally,

most participants were satisfied with the amount of activities per day: 100% of participants agreed or strongly agreed that the conference days had “the right amount of activities.” In contrast, only 80% of the 2009 cohort agreed or strongly agreed that the days had the right amount of activities. Thus the 2010 cohort clearly felt that ASCENT workshop met their needs. They also felt that the schedule was more flexible and relaxed than the 2009 cohort.

In open-ended items, women reported that the specific mix of workshop activities helped to foster both professional collaborations and personal friendships and support networks.

I was very happy with the mix of "business and pleasure"! Sessions and talks felt like pleasure and intrigued my curiosity. Activities time allowed me to socialize and get to know better other female scientists, and to even learn more about my field of research.

Overall, then, 2010 participants' satisfaction with the workshop design was similar to or higher than the satisfaction ratings of the 2009 cohort. Figure 4 below compares the means of the 2009 and 2010 cohorts on all survey items related to the design of the workshop. In fact, several items had statistically significant increases. Women's satisfaction with the overall design of the workshop significantly increased ($t=-2.948$, $df=36$, $p=.005$). Additionally, women were significantly more satisfied with the amount of time given for the poster session ($t=-3.083$, $df=46$, $p=.003$).

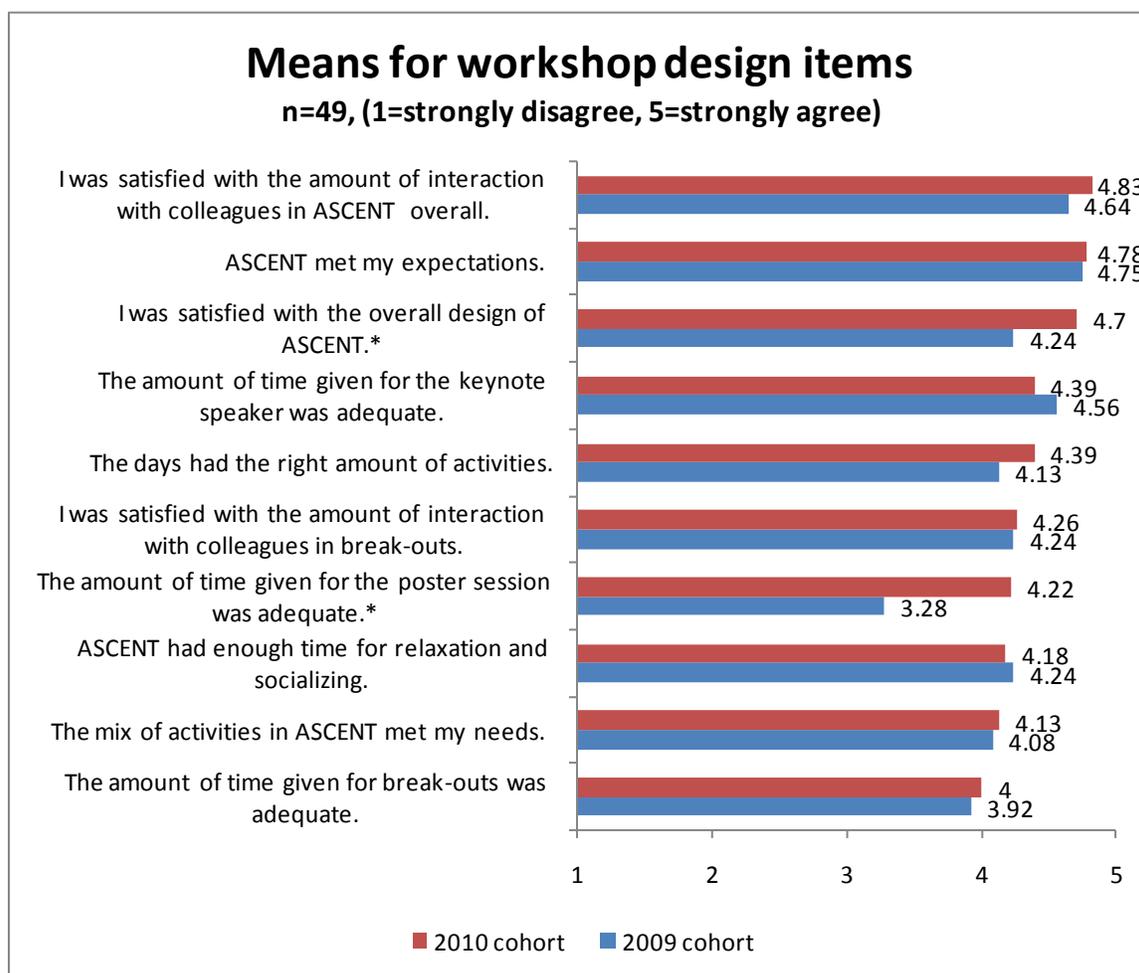


Fig. 4. Comparison of means for workshop design survey items for 2009 and 2010 cohorts

Participants' suggestions for strengthening the workshop design

There were very few suggestions for revisions to the workshop design, schedule or logistics. Unlike the 2009 cohort, there were no suggestions about the amount of activities or the inclusion of ice-breaker activities. Thus, these suggestions from last year seem to have been addressed. One participant noted that she would like more food at the opening reception after travelling all day. Two women also requested more “outside time,” such as short walks, hikes, or outside sessions incorporated into the workshop schedule.

The other suggestions regarding the workshop design and schedule are as follows. Four women felt that the poster session was too long. These women did not share research interests with most of the other attendees and subsequently the poster session was less productive for them. Four women requested that the senior scientist talks focus less on research and more on their career paths and personal stories. Two women requested that there be fewer atmospheric chemists and more diversity among sub-fields in atmospheric science. Finally, two women requested more discussion of alternative career paths.

Professional Development Outcomes

Women also rated the impact of different ASCENT activities on their professional development. Figure 5 compares the means of these survey items for the 2009 and 2010 cohorts. As demonstrated in the figure, the means for all items were similar to or higher for the 2010 cohort, although none of these differences was statistically significant. Participants in the current cohort rated the keynote speech and the senior scientists' talks as more professionally beneficial than the 2009 cohort. They also rated the topics of the break-out sessions quite a bit higher than the 2009 cohort. However, the 2010 participants rated their interactions with their mentors as slightly less beneficial. None of the responses to open-ended questions gave indication as to why these ratings might have slightly changed.

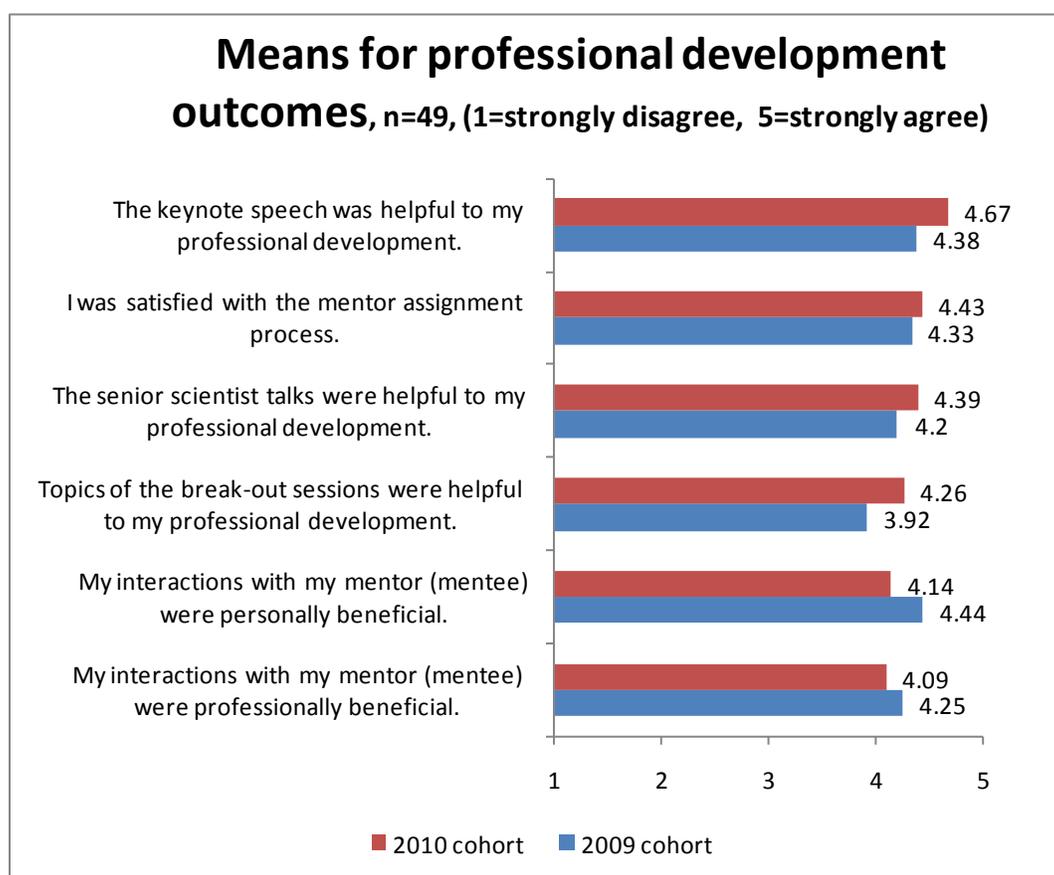


Fig. 5 Comparison of means for professional development outcomes for 2009 and 2010 cohorts

Conference Topics

For the most part, the conference topics met participants' needs. Overall, 87% of participants agreed or strongly agreed that the break-out session topics were helpful to their professional development. In contrast, only 72% of the 2009 cohort reported the same.

In the 2009 cohort, postdoctoral researchers felt that the workshop was more geared to junior faculty and did not necessarily feel that the topics at hand addressed their needs. None of the postdoctoral researchers in the 2010 cohort felt that the workshop was more geared toward faculty needs.

All of the break-out session topics were highly regarded by attendees. For instance, the communication session was highly rated. Women enjoyed being able to share their success stories and felt that they gained valuable communication strategies from their peers. The time management and gaining tenure sessions were also very well-received. Women felt they gained valuable advice that they will use in their own careers. Responses to the grants session were slightly mixed. Postdoctoral researchers seemed to appreciate the advice and felt that they had strategies for getting started with grant-writing. On the other hand, assistant professors or other women with more grant-writing experience felt that they were already familiar with most of the information presented and that the focus of the session was too broad. As with last year's cohort, women appreciated the open discussions and the safe, supportive environment of the break-out sessions.

Participants' suggestions for future topics

Although participants were largely satisfied with the break-out session topics, they had a few suggestions for future topics. These include (in order of significance):

- Communication skills/styles, specifically conflict resolution and negotiation skills
- Alternative career paths
- Mentoring and teaching
- Career decision-making processes

Outcomes from the break-out sessions

As already noted, most participants were satisfied with the topics of the break-out sessions. The break-out sessions also had many other benefits for participants. In fact, 63% of the 2010 cohort reported that the break-out sessions were the most useful activity within the ASCENT workshop. The nature of the gains from break-out sessions reported by 2010 participants was also slightly different from the 2009 cohort. The 2009 cohort primarily noted that they gained knowledge about the issues facing women in science and a sense that they were not alone from break-out sessions. In contrast, the 2010 cohort did not report as many of these affective, personal gains from the break-out session. Instead, they found the break-outs useful for providing concrete tips, tools, and strategies for enhancing their career success. Thus, the break-out sessions seemed to be more personally beneficial for the 2009 cohort and professionally beneficial for the 2010 cohort. The following comments are representative of open-ended survey responses from the 2010 cohort about the break-out sessions:

The breakout session on how to write a successful proposal was useful and insightful. The tips provided by both the presenter and the others in the session will likely be of use in the future.

I got a few great tips from the two breakout sessions I attended. I found communication to be particularly useful, because everyone has a slightly different style and so it is good to hear/see different examples.

Discussions on tenure process and time management [were the most beneficial]. I personally did not know many details on the tenure process before the workshop, plus hearing experiences of other women was extremely beneficial. Time management discussion provided some very good advice that I hope to follow.

In addition, participants had few suggestions for strengthening the break-out sessions. In the only reference to modifying the break-out sessions in open-ended survey questions, several women requested longer break-out sessions. As noted previously, some women felt that the grant writing session was too broad and general, while other women with less grant-writing experience gained valuable tips, advice, and strategies for proposal writing.

Senior scientist talks

Senior scientists served as guest speakers during the ASCENT conference, sharing their research interests, personal career paths, and challenges and successes that they have experienced as women scientists. These personal and professional stories were very meaningful to junior scientists. Overall, 100% of junior scientists agreed or strongly agreed that the guest speaker sessions were helpful to their professional development—in contrast, 85% of the 2009 cohort reported the same. Likewise, in response to an open-ended question, 58% of 2010 participants reported that the senior scientist talks were the most useful aspect of ASCENT. In open-ended comments, participants noted that the presentations were motivating, inspiring, and thought-provoking.

Hearing the senior scientists talk about issues they had overcome and their advice was also useful because it gives some perspective about how even these great scientists had hard choices to make and struggles to deal with. This is encouraging- it means that I shouldn't get too down or quit when things get hard.

I loved the talks of senior female scientists, they were highly inspirational with its combination of personal and professional stories.

I very much enjoyed the presentations by the senior scientists. It was particularly encouraging to me to see the very different career paths they had all taken, and that the traditional path is not necessarily the right one for everyone.

However, some participants felt that some of the senior scientists' talks were too focused on research and did not include enough personal stories and career path discussion. In contrast, Linnea Avallone's and Beth Holland's talks were highlighted as incorporating the right amount of personal and career path information.

Keynote address

The keynote address performed many of the same functions as the guest speaker talks in motivating and inspiring junior scientists. Overall, 100% of junior scientists agreed or strongly agreed that the keynote address was helpful to their professional development—in contrast, 90% of junior scientists in 2009 reported the same. However, there were no comments about the keynote speech in women's open-ended comments so it is difficult to discern how the talk helped women's personal or professional development.

Poster session

The poster session helped junior scientists to share their research and build potential research collaborations. The poster session also helped senior scientists to learn about the research interests and activities of junior scientists, potentially enhancing mentoring relationships. In an open-ended question, 21% of 2010 participants reported that the poster session was the most useful aspect of ASCENT.

I thought the poster session were great as well because this gave each individual a chance to show off their research. All did a fantastic job.

A senior scientist commented:

I also liked the poster sessions - it was great to see what the "junior" women were working on and provided a good basis for further discussion.

The 2009 workshop schedule had to be revised because of inclement weather on the day of the trip to the Storm Peak Lab. Subsequently, many 2009 participants did not feel that there was enough time for the poster session. In contrast, the majority of 2010 participants (78%) felt that there was adequate time for the poster session. Indeed, four current participants commented that the poster session was too long. These four participants did not share research interests with other participants and, therefore, the poster session was not as professionally beneficial for them as it was for others.

Informal socializing and relaxation

The opportunity for informal socialization and relaxation also contributed to participants' networking gains. There were multiple opportunities each day for women to interact informally. Indeed, 100% of participants agreed or strongly agreed that "I was satisfied with the amount of interaction I had with colleagues in the ASCENT conference overall." In fact, 33% of 2010 participants reported that informal socializing was the most useful part of ASCENT.

In response to open-ended items, participants reflected on the benefits of socializing and relaxing with other women scientists during the conference. Informal socializing allowed participants to get to know one another in a casual environment while building personal and professional bonds. Women also appreciated the small size of the workshop in which they were able to talk with and get to know all of the participants during the course of the workshop.

The dinners and breaks were nice opportunities to get to talk to people on a more personal level.

I really liked the "free time" (coffee breaks, dinners) in which we were able to get to know each other better and when I was able to make a real connection with some of the other ladies in the workshop.

I also really enjoyed the meals and sitting with different people every time in order to get to know everyone. Everyone who was present has been incredibly inspiring.

Mentor pairing

Some junior scientists were motivated to attend ASCENT because they were seeking mentors and role models; therefore, the mentoring component of the conference was important for their professional development. Many junior scientists, in survey comments and from participant-observation, were appreciative of the mentoring and role modeling provided by the senior scientists. However, only eight percent (two participants) noted that the mentor relationship was the most useful aspect of ASCENT.

The mentor/mentee breakfast [was the most useful aspect of ASCENT]. I felt in these activities I really got to know a handful of people really well, found some potential collaborators, and were more likely to remember these people (and the information provided).

As mentioned previously, mentoring interactions were rated slightly lower by the 2010 cohort than the 2009 cohort. However, there was little mention of the mentor relationship in open-ended comments; thus, it is difficult to know why the current cohort might have rated mentoring slightly lower than the 2009 cohort.

Conference outcomes

Conference attendees, especially junior scientists, noted an array of personal and professional gains from their participation in ASCENT. Women reported that they enhanced their networks and developed potential research collaborations. They also stated that they gained knowledge, skills, and access to resources that could help them in their careers and career decision-making. Finally, some participants also reported that they gained confidence, formed friendships, and developed a supportive network of women scientists.

Figure 6 compares the means for all survey items related to conference outcomes for 2009 and 2010 ASCENT participants (1=strongly disagree, 5=strongly agree). 2010 participants rated all workshop outcomes higher than 2009 participants, with the exception of "I gained mentoring skills." This one difference may be because the 2009 workshop included a break-out session on mentoring and the 2010 workshop did not. A few of these increases were also statistically significant. The 2010 cohort seemed to have less awareness than the 2009 cohort of the obstacles

and challenges faced by women scientists. Therefore, they rated their gains in knowledge and resources in this area as significantly higher than the 2009 cohort. The increases in the means for the following two items were statistically significant: “I gained new resources to help me navigate obstacles” ($t=-2.517$, $df=46$, $p=.015$) and “I learned about obstacles faced by women in science” ($t=-2.258$, $df=44$, $p=.029$).

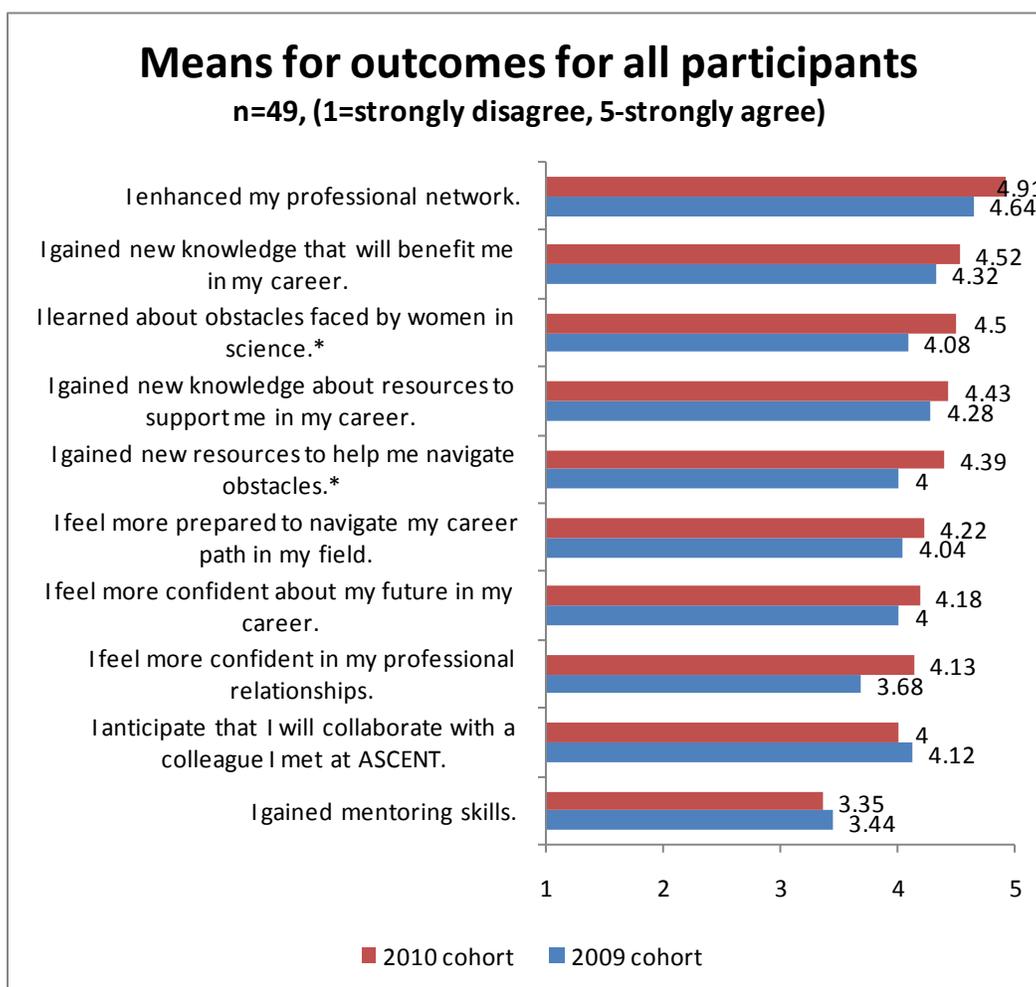


Fig. 6 Comparison of means for workshop outcomes for 2009 and 2010 cohorts.

Gains in networking

The strongest outcome reported by all participants was developing networks and professional collaborations. In fact, 100% of 2010 participants agreed or strongly agreed that “I enhanced my professional network.” Moreover, 91% of 2010 participants *strongly agreed* with the above statement. Therefore, the mean for this item for the 2010 cohort was 4.91 on a 5-point scale.

In response to an open-ended question, participants also cited networking as their strongest gain from the conference. Both junior and senior scientists noted the benefits of developing potential research partnerships and collaborations. Junior scientists also commented on the benefits of meeting senior scientists and hearing their career stories.

The networking was very useful and I really appreciated all the senior scientists for sharing their stories with us and being very honest. It was nice to hear that other scientists at my career level are struggling with many of the same issues that I am.

Some junior scientists also noted the sense of support they received from other women at the workshop. Women were able to form new collegial relationships and strengthen existing ones.

ASCENT gave me way more than anything I have expected. ASCENT is a very unique workshop for it gave me a sense of freedom, support and honesty. I met many, many wonderful ladies and have deepened the friendships that already existed. I learned A LOT about a number of issues I had questions on.

The workshop emphasis on young scientists in the early stages of their careers was also a useful aspect of networking. Junior scientists shared stories about their career issues and struggles and offered each other support and advice.

I have met and talked to many women who are at a similar point in their life / career and I learned a lot about from how they deal with the demands from their employing university. It was very motivating to meet all the successful senior scientists and learn of the different pathways that brought them to where they are now and about obstacles on the way and how these were overcome. I think that I take away from this workshop not so much specific instructions of how certain problems should be addressed but rather a general certitude that I am not alone and that it can be solved even if it is not easy.

Finally, participants noted that their networks were personally as well as professional beneficial.

I feel I have a new pool of support and will turn to it for professional and / or personal help when it will be needed (e.g. for a proposal review or for an encouragement when I will feel I need it).

Gains in research collaborations

Participants also forged new relationships that may lead to potential grant proposals or research collaborations. The rates at which 2010 participants reported that they may collaborate with a colleague were similar to those reported by the 2009 cohort. Eighty percent of the 2009 anticipated that they may collaborate with a colleague that they met at ASCENT, while 74% of 2010 anticipated potential research collaborations.

I met at least one other scientist who I'm hoping has work close enough to mine that at some point we might be able to collaborate.

A few women developed concrete, specific plans for research collaborations.

One of the senior scientists actually sought me out to ask about some of my data! We will now most likely collaborate by using my data to help interpret hers. That is a wonderful (unexpected) concrete result of this meeting.

Gains in knowledge

Attendees reported that they gained knowledge, advice, and access to career resources from their participation in ASCENT. One-hundred percent of 2010 participants agreed or strongly agreed that they “gained new knowledge about resources that will support me in my career.” In contrast, 2009 junior scientists reported strong gains in knowledge, though senior scientists did not feel that they gained new knowledge or resources. In the 2010 workshop, both junior and senior scientists felt that they gained valuable knowledge and resources for career success.

2010 participants noted that they gained strategies, resources, and advice for achieving success in their careers. Many participants described concrete tips and strategies that they plan to implement in their professional lives. Many of these tips and strategies came from discussions during the break-out sessions.

I'll be using advice from the proposal writing session immediately, and the rest will likely be kept in mind as I go forward.

The break out session on communication was very useful, though I wish it were longer. It was useful because it was good to get suggestions on how to overcome fears about (for example) introducing yourself to others at conferences or talking on the phone.

2010 participants were also appreciative of the resources provided and the reference list of publications related to women in science.

I want to read some of the books and understand how to deal with issues facing women.

I will definitely read some of the books that were suggested.

Participants also learned about the barriers faced by women in science and gained knowledge of how to overcome these barriers. Ninety-five percent of the 2010 cohort agreed or strongly agreed that they learned about obstacles faced by women in their field, and 100% of 2010 participants agreed or strongly agreed that that they “gained resources for helping to overcome the obstacles faced by women in science.” These gains in knowledge and resources were higher than those reported by the 2009 cohort.

Personal gains

Women also noted personal gains from their participation in ASCENT, including increased confidence and a sense of support. Eighty-seven percent of 2010 participants agreed or strongly agreed that “I feel more prepared to navigate my career path in my field.” And 91% of the current cohort agreed or strongly agreed that “I feel more confident about my future in my career.”

Although most junior scientists gained general confidence about their abilities to navigate their career paths, they were less likely to report gains in confidence about their professional relationships, particularly pertaining to specific skills. For example, 78% of 2010 participants agreed or strongly agreed that they “feel more confident in their professional relationships (e.g. ability to negotiate, collaborate, etc.). This finding corroborates women’s reports that they would like more specific training in communication, negotiation, and building professional relationships.

Sharing the ideas and networks gained at ASCENT with colleagues

One-hundred percent of participants planned to share the ideas and knowledge that they gained from ASCENT with others, although a few participants added caveats about what they would share and with whom. Most attendees mentioned that they planned to share their learning with other women scientists, although a few women also reported that they planned to share their experience at ASCENT with male colleagues or department heads. Some women also felt empowered to be more pro-active in their professional workplaces and to address issues or problems with which they have been struggling. The following comment from a participant illustrates many of the aforementioned ways that women planned to share their experiences at ASCENT with others.

I do plan to have a discussion with a particular male colleague that often alludes to the fact that women get things just because they're women. Previously, I've just ignored the comments, but now I feel prepared to address them the next time a comment like this surfaces.

The majority of women reported that they would share resources or knowledge with other early-career female colleagues or graduate students.

Yes, I plan to meet with female students at my department and tell them about ASCENT and what I learned there

Some women also planned to present their knowledge that they gained from ASCENT to colleagues in their research groups.

I will make an overview of the workshop and the main points I gained from it, and present it at our group meeting.

One woman planned to form a support group of women scientists at her workplace.

I'm hoping to form a group of women scientists at my workplace so that we can also meet regularly to discuss issues common to women in science (perhaps open this to any men that want to attend as well!). I'm hoping the list of resources I've gained at ASCENT will help facilitate our discussions.

Finally, one woman reported that she did not feel safe in sharing her participation in ASCENT with colleagues. Ironically, the comment below demonstrates the need for a workshop like ASCENT.

It is generally seen as a weakness if women need special help, so I have not told any of my colleagues or my students that this is a workshop for women - and maybe it is not relevant? So I will only share what I have learned in more general terms.

Sustaining networks among participants

The primary outcome from the ASCENT conference was the development of professional and personal networks among participants. Subsequently, almost all participants anticipated that they would like to maintain contact and build research collaborations with their fellow participants. 2010 participants offered the following suggestions for helping to maintain networks and support among former ASCENT participants:

- Social media (Facebook, Twitter, etc.) 63%
- Reunion meetings at national conferences 33%
- Email listserv for ASCENT participants 13%
- Email newsletter updates 13%

Conclusion

As an underrepresented group in atmospheric science, women face a variety of barriers to their advancement and success in the field. The ASCENT conference provided a forum for women to discuss these issues and to develop potential professional and personal networks of support among scientists of varying career stages. The majority of ASCENT participants reported that they enhanced their professional networks, developed potential research collaborations, formed personal support networks of women scientists, and gained knowledge and access to resources that will help them in their careers. Unlike the 2009 conference in which junior scientists reported much stronger gains than senior scientists, both groups reported strong benefits from the 2010 workshop. In fact, the 2010 cohort reported higher personal and professional gains from ASCENT than 2009 participants. Most participants in the 2010 workshop planned to use their new knowledge in their careers and to share it with colleagues. In conclusion, the ASCENT conference fulfilled the goals of developing professional and personal networks of women atmospheric scientists, and providing access to knowledge and resources that may bolster career success.

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