THE OFFICIAL MAGAZINE OF THE OCEANOGRAPHY SOCIETY

Oceanography

EARLY ONLINE RELEASE

Posted April 26, 2013

CITATION

Urban, E.R. Jr., and R. Boscolo. 2013. Using scientific meetings to enhance the development of early career scientists. *Oceanography* 26(2), http://dx.doi.org/10.5670/oceanog.2013.16.

DOI

http://dx.doi.org/10.5670/oceanog.2013.16

Using Scientific Meetings to Enhance the Development of Early Career Scientists

BY EDWARD R. URBAN JR. AND ROBERTA BOSCOLO

ABSTRACT. Scientific meetings are important to the development of early career ocean scientists, yet little documentation exists regarding how meeting planners can develop activities that will be most useful to this group. Based upon the authors' experience gained through activities of the Scientific Committee on Oceanic Research and the World Climate Research Programme, as well as ideas offered by colleagues from other organizations, meeting organizers should take the following steps in planning early career activities: (1) form a subcommittee that will plan early career activities and include an early career scientist on it, (2) seek outside financial support for early career activities and for early career scientist travel support, (3) determine the criteria participants must meet to secure travel support, (4) design a registration form to collect information useful for designing activities for early career scientists, (5) plan oral and poster sessions with a variety of opportunities for early career scientists, (6) consider which social media will be best for communicating with early career meeting participants, (7) set aside a "career lounge" at the meeting, and (8) conduct a post-meeting survey. It is important to plan and announce all early career events and opportunities well before the meeting.

INTRODUCTION

The health of the ocean science community depends on the continual development of the next generation of scientists. Graduate students and postdoctoral fellows receive training and professional development from various sources, including their advisors, other faculty, and coauthors of papers, as well as through research, cruises, other fieldwork, and participation in scientific meetings. Scientific meetings play a special role in professional development not only because they focus on the presentation of research results but also because meetings offer opportunities to network, exchange ideas, collaborate, and gain a sense of what is required of scientists in terms of community service. Scientific meetings can provide early career scientists with experience in organizing and conducting scientific events and can feature special sessions for teaching skills that will be useful in their careers. Attendance at meetings is not only important for sharing research results but also for developing new research collaborations and making contacts with more senior scientists that might lead to postdoctoral fellowships or faculty positions.

Several ocean-related organizations have sponsored early career scientist activities at their meetings. For example, the Association for the Sciences of Limnology and Oceanography (ASLO) established the ASLO Minority (now Multicultural) Program (ASLOMP) in 1990 (Cuker, 2006) that includes mentoring, field trips, mixers for early career scientists, meetings with journal editors, and career workshops at ASLO meetings. About 600 undergraduates and graduate students have participated in ASLOMP to date. The American Geophysical Union (AGU) annual fall meeting includes a large number of Career Lounge talks and Career Guidance Workshops. The Earth Science Women's Network was formed to promote peer mentoring for women scientists online, via a listserv and more recently through its website. As the organization grew, it began to hold networking events and career-development workshops at major meetings, such as AGU, Geological Society of America, and European

Geosciences Union (EGU), and it maintains mentoring and networking activities between such meetings (Glessmer et al., 2012). The Association of Polar Early Career Scientists (APECS) includes members from all polar sciences as well as many members from marine sciences. APECS members organize formal career development workshops and informal gatherings for APECS members in conjunction with scientific meetings in which its members participate.

The Scientific Committee on Oceanic Research (SCOR) has sponsored various kinds of capacity-building activities since the early 1960s, mostly aimed at developing country scientists. In 2012, SCOR facilitated special activities for early career scientists at the Third Symposium on The Ocean in a High-CO_2 World (HighCO2III Symposium). Approximately one-third of 528 scientists attending were early career scientists, about 4% from developing countries. Following the meeting, we conducted a survey of the early career scientists and their mentors to assess the effectiveness of the activities in terms of levels of satisfaction with the matching process for mentors-mentees, the importance of the networking events, and any other issues the participants wanted to raise. One of the things we learned is that arranging specific activities for early career scientists at such meetings will increase their attendance and will benefit all participants and the scientific field itself.

The World Climate Research Programme (WCRP) makes special efforts to provide opportunities for early career scientists to attend training seminars and participate in WCRP-sponsored meetings, workshops, and conferences. The WCRP Open Science Conference held in Denver, Colorado, in October 2011 represented a large commitment to involve students and early career scientists in the development of the event; participation included 541 early career scientists, with about 300 of them from developing countries.

Based on our experiences with organizing and executing early career activities at SCOR and WCRP meetings, as well as input from colleagues in other organizations, we present ideas that meeting planners should consider when developing activities for early career scientists. The breadth and type of activities will vary, but the following steps could be adapted to any size meeting.

> “WHEN PLANNING SESSIONS FOR THE MEETING, PAIR AN EARLY CAREER SCIENTIST WITH A MORE SENIOR SCIENTIST TO CHAIR A SESSION.”

STEPS TOWARD ENGAGING EARLY CAREER SCIENTISTS AT MEETINGS

STEP 1. Form a subcommittee of the meeting planning committee to develop and execute activities for early career scientists, whatever the size of the meeting, and even if no funds are yet available for specific activities. The subcommittee should be led by an individual who has the time to devote to the process and is committed to the need for special activities for early career scientists. The subcommittee should include at least one early career scientist, one member from the meeting planning committee, and at least one person from the location where the meeting will be held. It is important that this subcommittee coordinate well with the overall planning committee to ensure that symposium activities and activities specifically geared toward early career scientists do not compete with each other. The subcommittee should develop a process to seek input from early career scientists who are likely to attend (e.g., through information gathered during the registration process) and should map out a roster of appropriate activities, depending on the size and purpose of the meeting and the budget available for early career scientist activities. Consideration should be given to seeking help from other appropriate organizations (e.g., the Earth Science Women's Network, APECS) and potential funding partners. Many of the activities described below can be accomplished at little or no

Edward R. Urban Jr. *(ed.urban@scor-int.org) is Executive Director, Scientific Committee on Oceanic Research, Newark, DE, USA.* **Roberta Boscolo** *is Communication Officer, World Climate Research Programme, Geneva, Switzerland.*

cost, and such activities should provide the core of the events planned.

One of the important tasks for planning events for early career scientists is to decide how to define this career stage. Some organizations (e.g., ASLO) tailor their activities to undergraduates and graduate students. Both the HighCO2III Symposium and the WCRP Open Science Conference included within their definitions graduate students, postdoctoral fellows, and assistant professors—anyone within five years of earning a PhD. Some potential activities will be applicable to all of these career stages (e.g., networking), whereas other activities could be customized to the different stages; for example, PhD students might be more interested in how to find postdoctoral fellowships and assistant professor positions, and postdocs and assistant professors may be more interested in subjects like career-life balance and project management.

STEP 2. Seek specific funding to support the travel expenses of early career scientists to participate in the meeting, as well as for activities at the meeting. Participation by early career scientists will increase if there is an offer of at least partial support. (Offering partial funding, particularly to developed country applicants, can help increase the number of early career scientists who can attend the meeting by spreading the funds among a greater number of participants. However, even partial support may not be enough for applicants from developing countries, who often require full support.) If possible, funding for early career scientists should be built into the funding requests for the meeting; the subcommittee for the early career scientist program should make the case to include its activities in the overall meeting budget. The subcommittee also should be active in raising specific funds for the early career program.

Special funding for the WCRP Open Science Conference provided full support for 180 early career scientists and partial support for about 70[1]. For the High-CO2III Symposium, approximately 60 early career scientists received partial or full support; the funds were offered to individuals from any country who met the career-stage requirements[2]. Some sponsoring organizations will fund participants from any nation, but national sources also can be approached to support early career scientists from their country. For the HighCO2III Symposium, the UK Ocean Acidification Research Programme provided partial support for nine early career scientists from UK institutions participating in its research program. Special efforts should be made to arrange funding for early career scientists from developing countries to participate in the meeting, as these individuals might have difficulty funding their attendance from their own institutions or nations. Organizations focused on different parts of the world provide travel support for early career scientists from their regions. The Asia-Pacific Network for Global Change Research and Inter-American Institute for Global Change Research should be approached to provide support for individuals from their regions.

STEP 3. Determine what application materials will be requested from individuals seeking travel support, how the selection process will be designed, important deadlines, and who will be involved in the selection process. For the HighCO2III Symposium, the subcommittee decided that each early career scientist who requested travel support would be required to submit his/her CV, an abstract, a letter of interest, and a letter from his/her advisor supporting the application. For the WCRP conference, the subcommittee decided to restrict support to applicants who had submitted an abstract as first author for either a poster or an oral presentation. Meeting planners should make clear to all early career scientists that they are welcome to participate in all early career meeting activities even if they do not receive travel support and/or do not plan to make a presentation at the meeting.

STEP 4. Design a registration form to collect information useful for designing activities for early career scientists. Questions such as the following can be included:

1. Is travel support requested?
2. Does the early career scientist want to participate in networking activities?
3. Does the early career scientist want to have a mentor assigned?
4. Does the early career scientist want to share a hotel room?

[1] For the WCRP Open Science Conference, funds were raised from national and regional funding agencies (US National Oceanic and Atmospheric Administration, US National Aeronautics and Space Administration, European Space Agency, European Organisation for the Exploitation of Meteorological Satellites, Canadian Space Agency), and from international organizations with a focus on capacity building (Asia-Pacific Network for Global Change Research and Global Change System for Analysis, Research and Training).

[2] Support from the US National Science Foundation and the Gordon and Betty Moore Foundation and encouragement from program managers were instrumental in SCOR's activities for early career scientists at the HighCO2III symposium.

5. For post-PhD early career scientists, how many years have passed since the PhD was earned?
6. Is family care required?
7. Is the registrant interested in helping plan and/or conduct events for early career scientists?
8. What kind of specialized career professional development is desired?
   a. Career-life balance
   b. Nonacademic careers—industry, government, nonprofits
   c. Proposal writing and grant administration
   d. Communicating your science
   e. Project management
   f. Other

The registration form also can be used to identify scientists who are interested in serving as mentors. It is helpful to remind all meeting participants periodically of the existence of activities planned for early career scientists and about opportunities to serve as a mentor.

STEP 5. Plan oral and poster sessions with a variety of opportunities for early career scientists. When planning sessions for the meeting, pair an early career scientist with a more senior scientist to chair sessions. Co-chairing sessions alongside more senior scientists can provide valuable learning experiences for early career scientists and will improve their abilities to chair sessions at future meetings. In addition to serving as session co-chairs, early career scientists can be enlisted as session rapporteurs, preparing oral and/or written summaries of the sessions. This assignment of specific roles in the conference organization forges a sense of ownership and ensures active contribution in future events.

Oral Sessions. When planning oral sessions, specifically invite some early career scientists (including women and developing country scientists) to give oral presentations and schedule these during prime times. Although early career scientists often fare well in merit-based selections of oral presentations, planners should nevertheless reserve some presentation slots in each session for early career scientists.

Figure 1. Poster session at the WCRP Open Science Conference.

Poster Sessions (Figure 1). Give significant thought to how the poster session(s) can be used to create networking and mentoring opportunities. It is important that the sessions are long enough and structured well, and that there are no competing events. For early career scientists who are not making oral presentations, poster presentations can be an important mechanism for showcasing their work and for meeting other conference participants. For small meetings, "round robin" poster presentations can be a good way for all the poster presenters to present to each other sequentially.

Awards. Awards should be made for best poster and oral presentations by early career scientists. Recipients can be selected by voting among all meeting participants, by a special awards committee that includes early career scientists, or by each poster being assigned two or three judges who are provided specific criteria for judging the posters. If the same group will not be judging each poster or oral presentation by an early career scientist, it will be necessary to establish a procedure to normalize scores among judges. Such awards can be important for the career advancement of early career scientists. For example, the WCRP conference gave special awards for the best papers and posters among the more than 500 presentations by early career scientists. The awards included complimentary memberships and books generously provided by AGU, the American Meteorological Society (AMS), and the EGU. Five grand-prize winners each received an iPad courtesy of WCRP, the World Meteorological Organization, the International Council for Science, the Intergovernmental Oceanographic Commission, and the Science and Technology Corporation. The High-CO2III Symposium awarded prizes for the four best poster presentations. The winner for the best oral presentation by an early career scientist at the HighCO2II Symposium was selected

as a session chair at the HighCO2III Symposium four years later.

Special Sessions Designed for Early Career Scientists. It may be appropriate at some meetings to provide special sessions on career-related issues. Specific topics might include funding and proposal writing, teaching at the university level, engaging in policy issues, managing research projects and people, communicating science, and nonacademic careers (see Jagodic et al., 2013, for additional ideas). At the WCRP conference, a luncheon session, sponsored by AMS, was organized for more than 150 early career scientists on the importance of communicating climate science to the public and the media. A panel of professional science communication experts presented their views and advice, followed by a question-and-answer period. ASLO, AGU, the Earth Science Women's Network (Glessmer et al., 2012), and the Society of Wetland Scientists have used the approach of special sessions.

STEP 6. Consider how social media and Internet connectivity during the meeting can be used to meet the goals of the program for early career scientists, which platforms are best suited for early career scientists, and how social media can be used to engage and communicate with early career scientists before, during, and after the meeting. The most-used social media platform can change in a relatively short time, and could differ from meeting to meeting. A local early career scientist set up a Facebook page for the HighCO2III Symposium, and this page was communicated to all self-identified early career scientists. Based on results from a post-meeting survey, we learned that 74% of the early career scientists accessed the page. Some used this Facebook page to communicate before the meeting, although the page has not been used after the meeting to continue communication. At the symposium, 92% of the early career scientists had access to the Internet through an electronic device, so had the potential to be connected to social media. There was significant Twitter activity during the symposium, much of it by media representatives, but only 10% of the early career scientists are regular Twitter users and only 16% followed the tweets at the symposium. Overall, only 30% of early career scientists thought that social media was an important aspect of the symposium for them. Perhaps the importance of Facebook and Twitter will increase in the future, but early career scientists also mentioned ResearchGate, LinkedIn, Yammer, Instagram, WordPress, and Google+ as other social media platforms they use.

STEP 7. Set aside an area of the conference facility as a "Career Lounge" where early career scientists can meet with senior scientists and each other. At this location, jobs can be posted, interviews and mentoring can take place, and other formal or informal networking can be conducted.

STEP 8. After it occurs, evaluate the effectiveness of all aspects of the meeting, including the activities for early career scientists. Survey questions must be designed to quantify how well the desired outcomes were achieved, as well as to help gather information for planning future events. Evaluation can be done through online surveys, such as the free SurveyMonkey platform (http://www.SurveyMonkey.com).

ACTIVITIES MEETING PLANNERS SHOULD CONSIDER

ACTIVITY 1. Include a mentoring program for early career scientists. Mentoring programs can enhance the meeting experience for early career scientists, as well as those serving as mentors. The effectiveness of the mentoring program depends on the matching process, the instructions given to mentors and mentees, and the provision of some structured activities as part of the program. Cuker (2006) gives advice based on the successful Multicultural Program run at ASLO meetings. MentorNet (see http://mentornet.net) is a potential source of ideas for mentoring at scientific meetings.

Matching. For the HighCO2III Symposium, we posted the CVs and abstracts of each mentee on a nonpublic website and asked each mentor to identify at least three potential mentees. In most cases, mentors selected mentees who had similar research interests. To the extent possible, we matched mentors and mentees of the same gender, although there were more female mentees and more male mentors. Most mentors had only one mentee, but some mentors had two mentees. After the first round of matching was completed, there were still some mentees who needed mentors, so we matched them based on keywords in their abstracts. This process continued into the meeting, as some early career scientists only learned of the mentoring program at the meeting. Ninety percent of mentors believed that the mentoring program was an important aspect of the symposium, 75% expressed that it enhanced their experience at the symposium, and

100% expressed a willingness to serve as a mentor at future meetings. Seventy-five percent of mentees felt that their mentors helped them extend their professional networks. The same percentage anticipated having future contact with their mentors.

Even though some postdoctoral fellows are willing to be mentors, it might be better to help them pass on their knowledge through networking rather than mentoring. For example, postdocs might plan a special panel on the postdoctoral fellow career stage for graduate students to attend. The matching procedure might be improved by asking the mentees to identify their top three mentor choices and use this information together with the selections from the mentors.

Instructions. For the HighCO2III Symposium, the early career subcommittee sent each mentor-mentee pair an email to introduce them to each other and to offer some suggestions for interacting, including attending networking events together (see below) and attending each other's poster or oral presentations. Survey responses from both mentors and mentees after the meeting indicated that they needed additional guidance about how the process might work. It is important that mentors and mentees agree in advance to a schedule of activities together. At some time after the meeting, it is also important to remind mentors and mentees to reconnect.

Structured Activities. No matter how good the instructions are for the mentoring process, most mentors and mentees benefit from some structured activities. Some mentors at the HighCO2III Symposium requested more guidance and/or training on how to carry out their responsibilities. ASLOMP requires mentees to critique two oral papers and two poster presentations and provides a workbook to facilitate this process. Mentors and mentees may decide on a series of oral presentations to attend together, posters to discuss, daily get-togethers, and other activities that would create opportunities for contact.

ACTIVITY 2. Host a "speed networking" reception at the beginning of the conference where early career scientists can meet both each other and more senior scientists. Networking is very important for stimulating future scientific interactions and for helping students move into jobs after their degrees, and also for meeting people from different academic institutions, government agencies, nongovernmental organizations, industry, and other potential future employers. Networking is an important aspect of meetings because not all graduate students will remain in academia (Wendler et al., 2012). Much networking occurs naturally at meetings, but it can be stimulated by creating events that get the early career scientists together with each other and with their mentors. Topics/questions for such a reception can be provided attendees to stimulate discussion, and a limited time period should be allotted for each interaction. It is helpful to have the local member of the planning committee take charge of these special events.

Two networking events were held at the HighCO2III Symposium—an ice-breaker barbecue before the symposium began (Figure 2) and a whale-watching cruise after the end of the symposium. On the post-meeting survey, many of the early career scientists responded that they benefitted from the networking events, and more than 55% have kept in contact with new colleagues they met at the symposium. The early career scientists who participated in networking and mentoring considered these activities to be equally important. Nineteen percent of the early career scientists made contacts at the meeting that resulted in finding a postdoctoral fellowship or other position. Early career scientists asked for more structured mid-meeting events, not just before and after the meeting. At several major WCRP conferences and events, the planning committee organized a lunch or a breakfast to facilitate interaction between early career scientists and world leaders in climate science. ASLOMP gets its participants together at a special dinner before the meeting and at meals during the meeting, with high-profile scientists invited to participate. *It is important to plan and announce any events well before the meeting, before interested individuals have made their travel plans.*

Figure 2. Ice-breaker barbecue before HighCO2III Symposium, held at the Hopkins Marine Station of Stanford University.

Figure 3. Participants in the WCRP/NCAR Workshop on Regional Climate visited the NSF airborne facilities near Boulder, Colorado, USA. *Courtesy of NCAR*

ACTIVITY 3. Organize a two-day interdisciplinary workshop before or after a major conference or event for early career scientists. Some organizations use the opportunity of large meetings to plan smaller scientific events for early career scientists. These workshops require funding for food and room rental, but they leverage the planned travel of a large number of early career scientists to the major events. WCRP held a successful interdisciplinary workshop prior to the WCRP conference (Tilmes et al., 2012). The Early Career Scientist Assembly and the Advanced Study Program of the National Center for Atmospheric Research (NCAR) invited 35 early career scientists from nearly 20 countries to attend a three-day workshop at the NCAR Mesa Laboratory in Boulder, Colorado (Figure 3). The goal of the workshop was to examine a range of regional climate challenges in developing countries. These workshops allowed young researchers to develop new collaborators from their own fields and also to learn about new fields of study. A variety of stand-alone workshops, such as the Dissertation Initiative for the Advancement of Limnology (DIALOG) and Dissertations in Chemical Oceanography (DISCO; Weiler, 2007), could provide models for types of events that could be linked to major ocean science meetings. APECS usually organizes career development workshops alongside larger conferences that attract a critical mass of APECS members.

We hope that these suggestions are useful, and we welcome ideas from others who have experience with planning meeting activities for early career scientists.

ACKNOWLEDGEMENTS

We greatly appreciate comments provided by Tosca Ballerini (Marseille Université and Association of Polar Early Career Scientists), Benjamin Cuker (Hampton University), João M.F. de Morais (Swedish International Development Agency), Mirjam Glessmer (Earth Science Women's Network), Gisèle Muller-Parker (Program Director, Graduate Research Fellowship Program, US National Science Foundation), and C. Susan Weiler (Whitman College). Thanks also to the scientists who contributed their time to make the events for early career scientists at the HighCO2III Symposium and the WCRP Open Science Conference a success, including those who planned local events, those who reviewed applications for travel support, those who judged presentations, and those who served as mentors.

REFERENCES

Cuker, B.E. 2006. Programmatic approaches to building diversity in the aquatic sciences. *Marine Technology Society Journal* 39:13–16, http://dx.doi.org/10.4031/002533205787465869.

Glessmer, M.S., Y.V. Wang, and R. Kontak. 2012. Networking as a tool for Earth science women to build community and succeed. *Eos, Transactions, American Geophysical Union* 43(41):406, http://dx.doi.org/10.1029/2012EO410011.

Jagodic, M., P. Stridh, A.K.B. Gad, A. Paine, K.I. Udekwe, L.K. Sjöholm, M. Svensson, and Q. Pan-Hammarström. 2013. Nurture your scientific curiosity early in your research career. *Nature Genetics* 45(2):116–118, http://dx.doi.org/10.1038/ng.2527.

Tilmes, S., A. MonaGhan, and J. Done. 2012. Addressing climate challenges in developing countries. *Eos, Transactions, American Geophysical Union* 93(14):145, http://dx.doi.org/10.1029/2012EO140008.

Weiler, C.S. 2007. Meeting PhD graduates' needs in a changing global environment. *Eos, Transactions, American Geophysical Union* 88(13):149–151, http://dx.doi.org/10.1029/2007EO130002.

Wendler, C., B. Bridgeman, R. Markle, F. Cline, N. Bell, P. McAllister, and J. Kent. 2012. *Pathways Through Graduate School and Into Careers*. Educational Testing Service and Council of Graduate Schools. Available at http://pathwaysreport.org.