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The Case for a “Sea Change” in Graduate Education in the Ocean Sciences

In *The Leopard*, di Lampedusa’s novel set in nineteenth century Sicily, the prince’s nephew assuages his uncle’s unease with recent social and political change by remarking, “If we want things to stay as they are, things will have to change.” Admittedly, it is a far stretch from nineteenth century Sicily to twenty-first century America, but the sentiment expressed by the prince’s nephew succinctly captures the view, expressed by the many authors who have contributed to this special issue of *Oceanography*, of how graduate education in ocean sciences should evolve. Namely, in order for our delivery of an excellent graduate education to remain constant, our approach to that delivery must adapt to intellectual, cultural, economic, and social shifts in the academy and in society at large.

Such adaptation has been demonstrated by the response of ocean science graduate programs over the past couple of decades to a shift in our appreciation of the multitude of disciplines required to tackle pressing ocean research questions. Today, as articulated in the special issue articles, we are facing other shifts—in workforce needs, in ocean science research priorities, in society’s expectations for federally funded research—that again call for changes in how we deliver excellent graduate education. Such changes are manifest in the programs described in this volume, some of which have been in place for decades. However, the fact remains that for the bulk of our current graduate students, there is a mismatch between the skills they are learning and the skills needed outside the academy, and a mismatch between the careers they are trained for and the careers available to them upon graduation. These mismatches rightly motivate a community discussion on the future of ocean science education.

The Oceanography Society was chartered as a professional society with a mission “to promote communication among oceanographers, and to provide a constituency for consensus building across all the disciplines of the field.” Consistent with this mission, TOS seeks to facilitate and promote the current dialogue on graduate education. Additionally, given that students currently constitute some 46% of our membership, TOS is increasingly aware of its responsibility toward this younger generation of oceanographers: we can think of no better way to serve them than to pay attention to their futures. Toward that end, in addition to this volume dedicated to graduate education, TOS hosted a Town Hall at the 2016 Ocean Sciences Meeting last

month in New Orleans for an exploration of “What’s Right and What’s Wrong with Graduate Education in Ocean Sciences?”

In order to gather background material for the Town Hall discussion, TOS administered a two-minute survey with questions on the type of training students have had and are currently receiving, on the type of training current students would *like* to receive, on career opportunities students would like to pursue, and on career opportunities that those already in the field *think* students want to pursue. Clearly, we were interested in exploring differences in perception among community members. A look at the survey results from ~400 respondents (http://tos.org/pdfs/grad_education_survey_results.pdf) shows that some of those differences indeed emerged. However, most interesting to me was the degree of consensus on two questions: (1) How confident are you that recent graduates in ocean sciences will easily find employment in the field of ocean sciences? and (2) Do you agree that current graduate students in ocean sciences are receiving the appropriate training for the current job market? As for the first question, less than 10% of students, early career scientists, and those in later career stages said that they were “very confident,” while ~30% of the same group of respondents said they were “not confident at all.” For the second question, again less than 10% strongly agreed, while ~20% did not agree. The vast majority of respondents were “neutral” on this question. Surely this collective shrug from the community is itself an indication that we have work to do.

On that Wednesday evening in New Orleans, about 130 oceanographers gathered for the TOS Town Hall. After small group discussions focused on the question posed in the Town Hall’s title, participants offered their thoughts on how graduate education should change. For the most part, the ideas voiced that evening—by current students, faculty members, and oceanographers with careers outside of academia—echo those advocated within these pages. From my view, the solutions offered fall into two categories. On the one hand is a call for programmatic changes—in curriculum, degree offerings, professional development skills, mentoring, and so forth. On the other hand is a call for structural changes in how graduate education in ocean sciences is funded. A contemplation of structural changes would include an examination of questions such as: Should master’s education be funded in addition to doctoral

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education? Should more graduate support be shifted toward fellowships and away from research assistantships? What is the appropriate balance between graduate student, postdoctoral, and early career support?

My own view is that in order to have broad-scale success in the proposed programmatic changes, we need to take a hard look at the structural barriers that may be impeding those changes. Readers may recall that one year ago this month, *Sea Change: 2015–2025 Decadal Survey of Ocean Sciences* was released (<http://www.nap.edu/read/21655/chapter/1>). That report focused on ocean research priorities for the decade ahead and made recommendations for the needed balance between infrastructure and science to achieve those priorities. In the wake of that report, on behalf of the contributors to this special issue of *Oceanography*, I am arguing that a “sea change” in graduate education is also needed. Just as a community of oceanographers, selected and organized by the National Academies, spent the better part of 18 months deliberating the future of ocean sciences and then making recommendations to the National Science Foundation, we need a commitment from the community, and from all federal agencies that fund ocean sciences graduate education, to chart the future of graduate education in the ocean sciences—a future that will meet our social contract with our graduate students and with society. TOS leadership will continue to push in this direction because, frankly, if we want things to stay as they are, things will have to change.



M. Susan Lozier, TOS President

TOS Activities at OSM

The Oceanography Society sponsored several activities during the February Ocean Sciences Meeting in New Orleans, Louisiana, providing opportunities for members to meet and share experiences and ideas.

TOS Town Hall

In preparation for the TOS-sponsored Town Hall on “What’s Right and What’s Wrong with Graduate Education in the Ocean Sciences?” TOS compiled the nearly 400 responses it received from members who took the TOS graduate education survey. TOS President Susan Lozier presented the survey results at the Town Hall. During the evening event, the ~130 participants formed small groups to discuss features of graduate education that should be retained and ideas for possible changes. A concluding open mike session gave participants an additional opportunity to share even more ideas and experiences. Survey results are available at http://tos.org/pdfs/grad_education_survey_results.pdf.

TOS Breakfast

Over 340 members rose early to attend the TOS Breakfast where new TOS Fellows Mark Cane, Rana Fine, and Arnold Gordon were honored, as well as the most recent recipient of the Munk Award, Carl Wunsch. TOS thanks Sea-Bird Scientific for their generous support of this event.

Munk Award Lecture

The audience for the society awards plenary session listened intently while Walter Munk reflected on his own experiences and many collaborations with his “life-long” friend Carl Wunsch. Theresa Paluszkiwicz of the Office of Naval Research then presented Dr. Wunsch with the award certificate bearing the signature of the Secretary of the Navy before Dr. Wunsch gave a compelling lecture on the “The Imperative of Global Oceanography.” Dr. Wunsch’s lecture, along with all award, keynote, and plenary lectures are available for viewing at <http://osm.agu.org/2016/oceans-on-demand> to learn more.