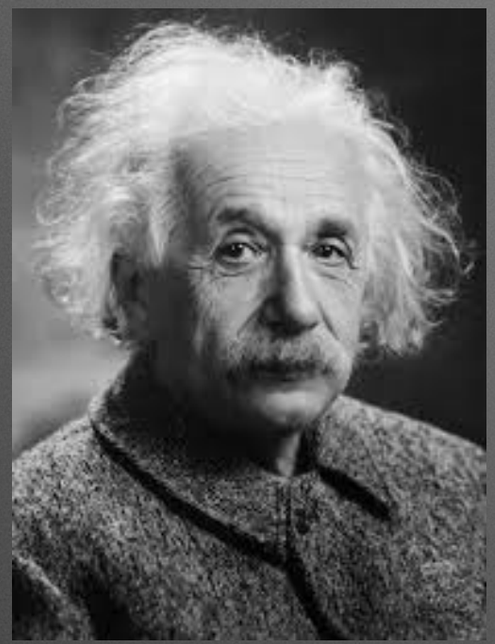
A Scientist and A Teacher Squeeze into a Tent

or A Scientist and a Teacher walk into a bar…

In the beginning…

The Fantastic Five



When money didn't matter…

Paying the Bills…

www.scar.org

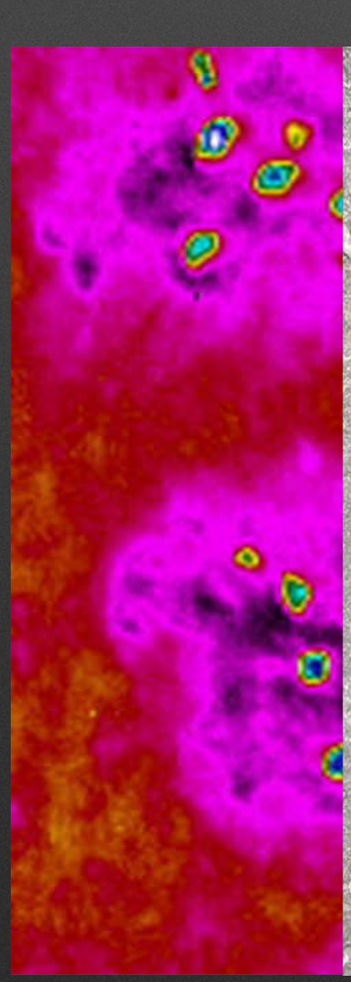
SCAR Mission

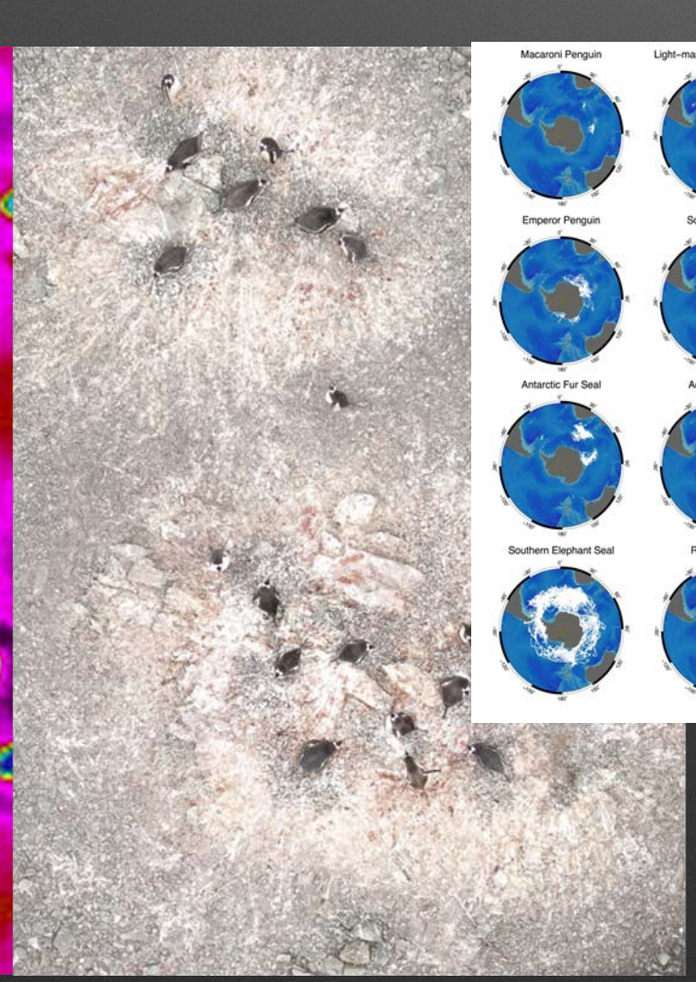
Created in 1958
by the International Council for Science
during the International Geophysical Year

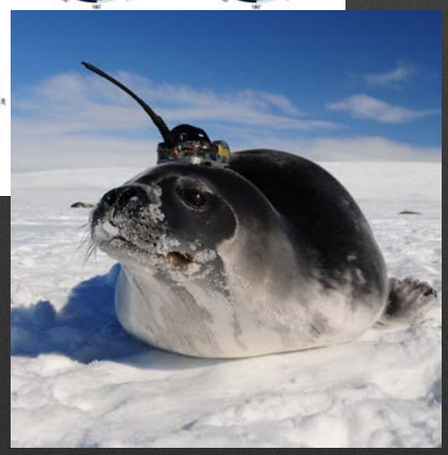
- Science Leadership - initiate, develop and coordinate high quality international scientific research in the Antarctic and Southern Ocean region

- Scientific Advice - provide objective and independent scientific advice to the Antarctic Treaty System and other bodies, such as the IPCC

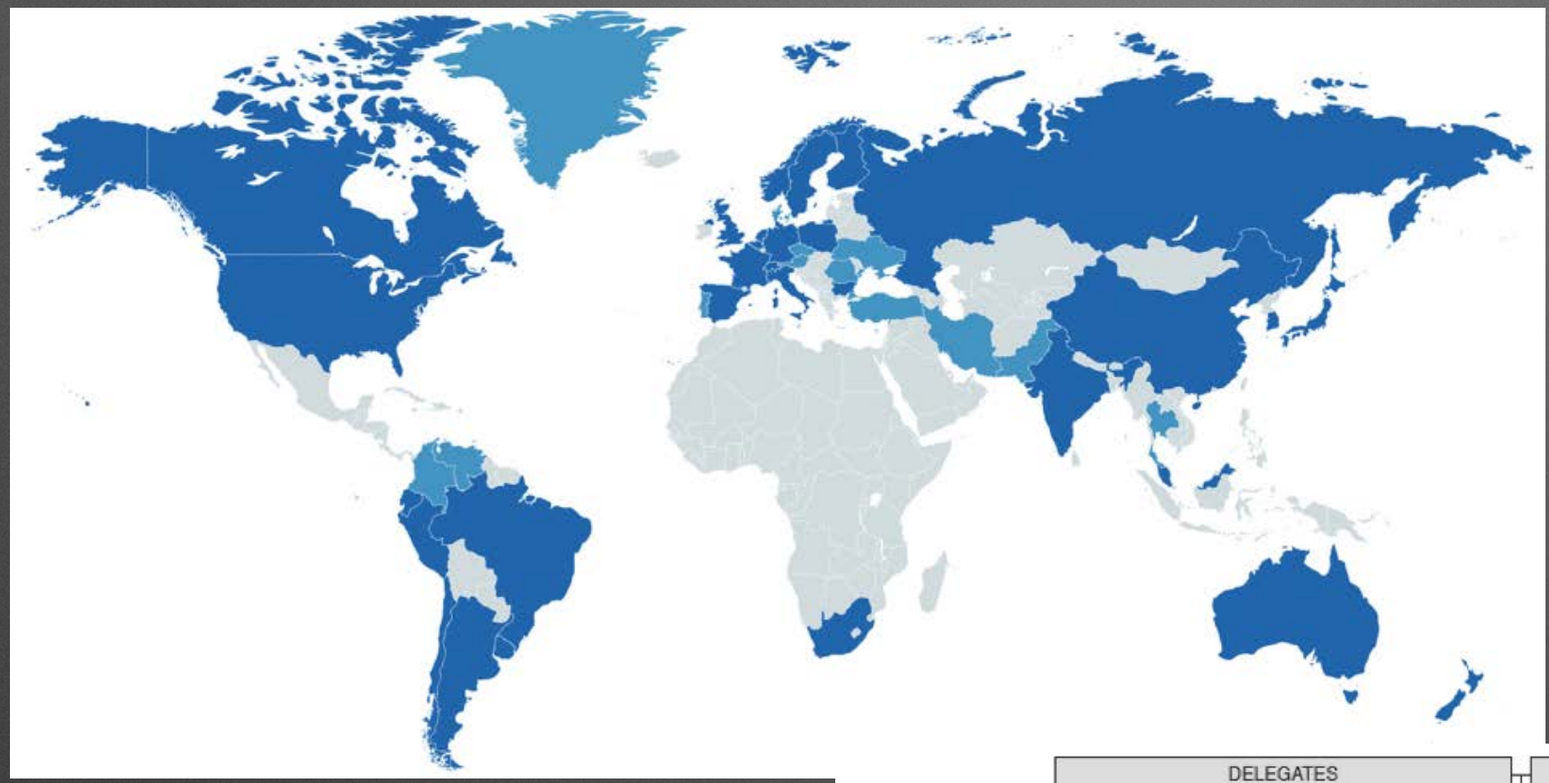
What does that *really* mean…





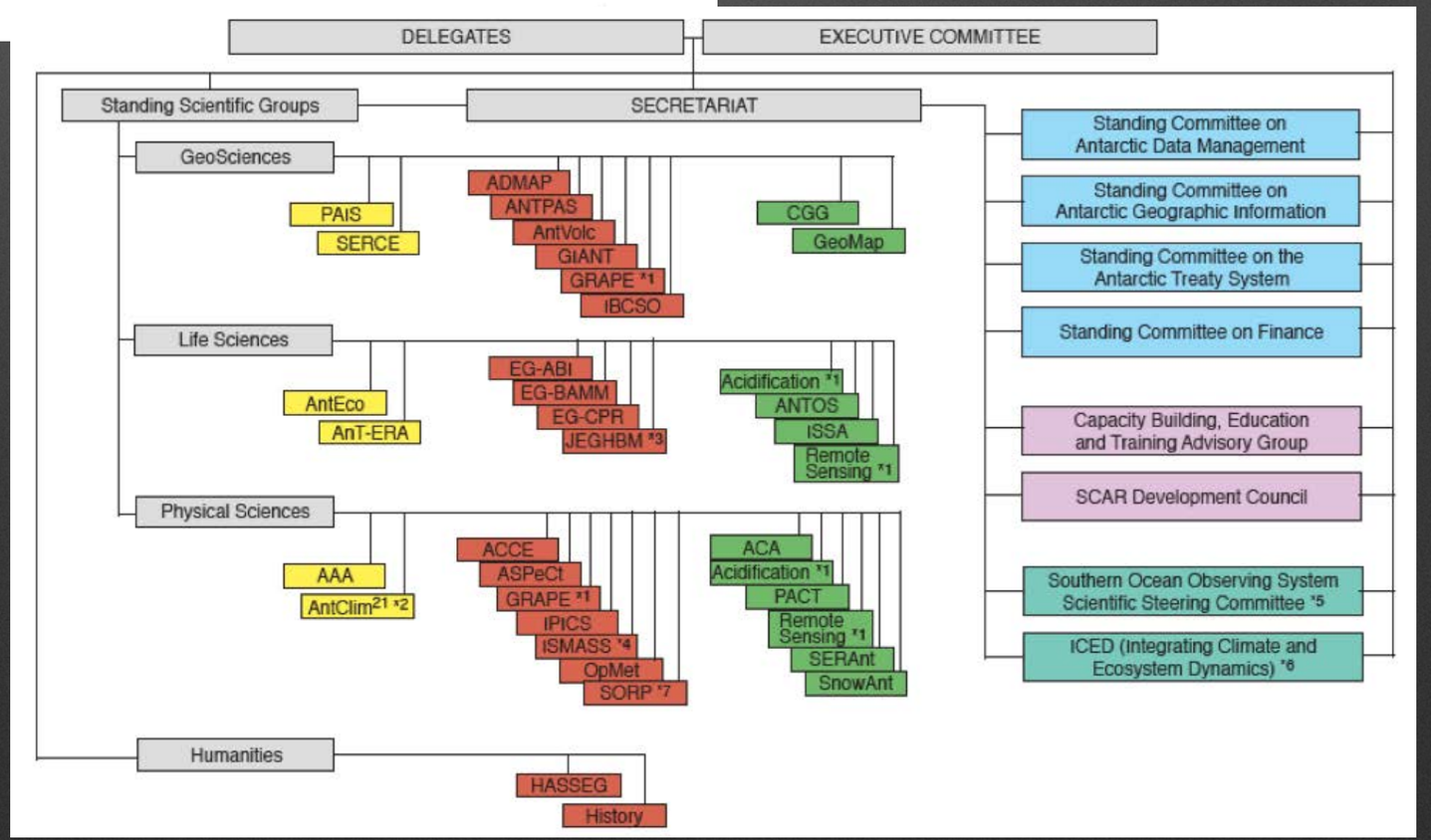


Who’s involved…



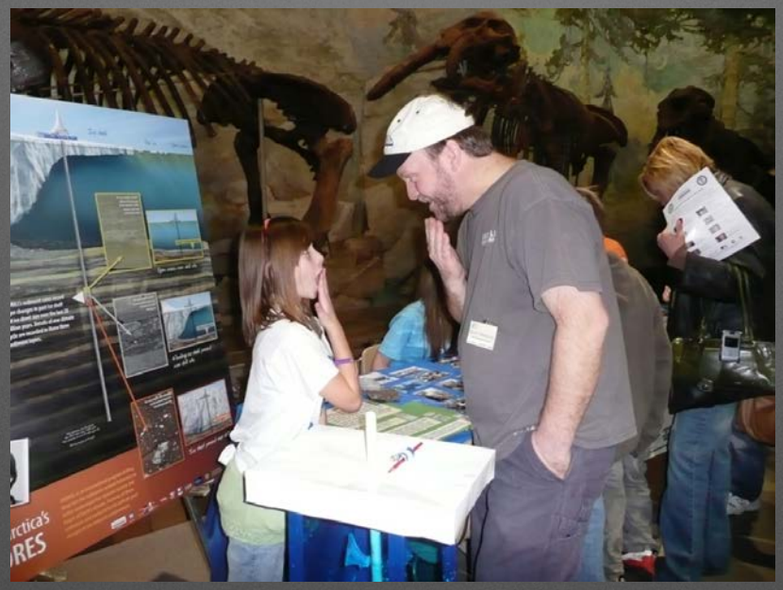
43 Countries

37 Groups



Why should *Educators* care…

- 37 groups x ~100 people* / 43 Countries =



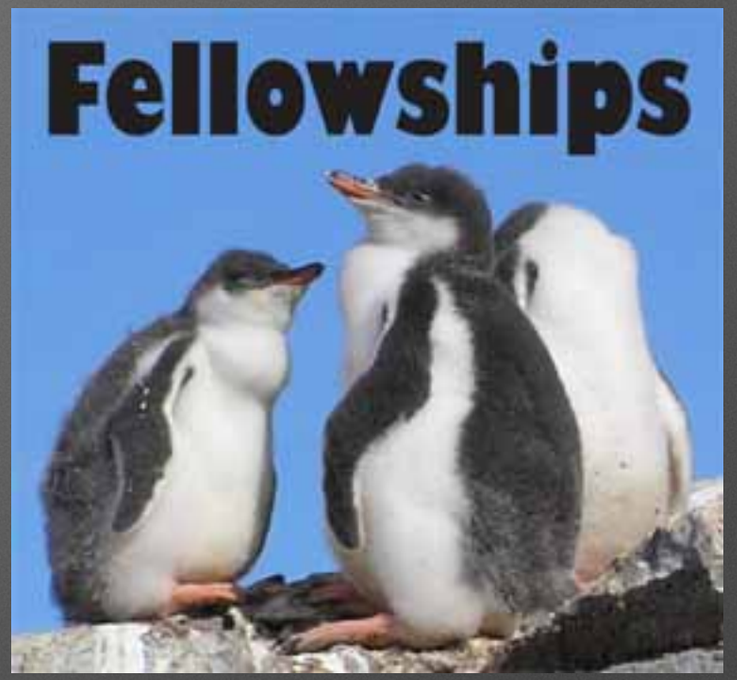
COMMENT

Six priorities for Antarctic science

Mahlon C. Kennicutt II, Steven L. Chown and 23 colleagues outline the most pressing questions in southern polar research, and call for greater collaboration and environmental protection in the region.

Why should the *World* care…

What is SCAR doing now…



- Early career training opportunities
- Travel funding (Silvia and Anant!)
- Outreach sessions at conferences
- Initial stages of a PEI collaboration
- Capacity Building Education Award

APECS
Association of Polar Early Career Scientists

POLAR EDUCATORS INTERNATIONAL

If we didn't have to pay the bills…

Polar Resource Book

Match Making

match.com

no.match.com

www.polarmatch.com

Take an Educator to Work...

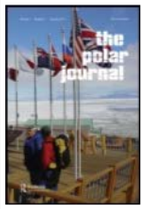
POLAR TREC

Student Opportunities

Communications

But we do have to pay the bills…

Use the Currency of Science



The Polar Journal
Publication details, including instructions for authors and subscription information:
http://www.tandfonline.com/loi/rpol20

Education, outreach and communication during the International Polar Year 2007-2008: stimulating a global polar community

Rhian A. Salmon [a b], David J. Carlson [a], Sandra Zicus [c], Margarete Pauls [d], Jenny Baeseman [e], Elena Bautista Sparrow [f], Karen Edwards [g], Miriam Hebling Almeida [h], Louise T. Huffman [i], Tove Kolset [j], René J.H. Malherbe [k], Mark S. McCaffrey [l], Nicola A.L. Munro [a], Jean de Pomereu [m], Jennifer Provencher [n], Khadijah Abdul Rahman-Sinclair [o] & Melianie Raymond [p]

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[b] now at Gateway Antarctica, University of Canterbury, New Zealand
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[d] Alfred-Wegener-Institut für Polar- und Meeresforschung, Bremerhaven, Germany
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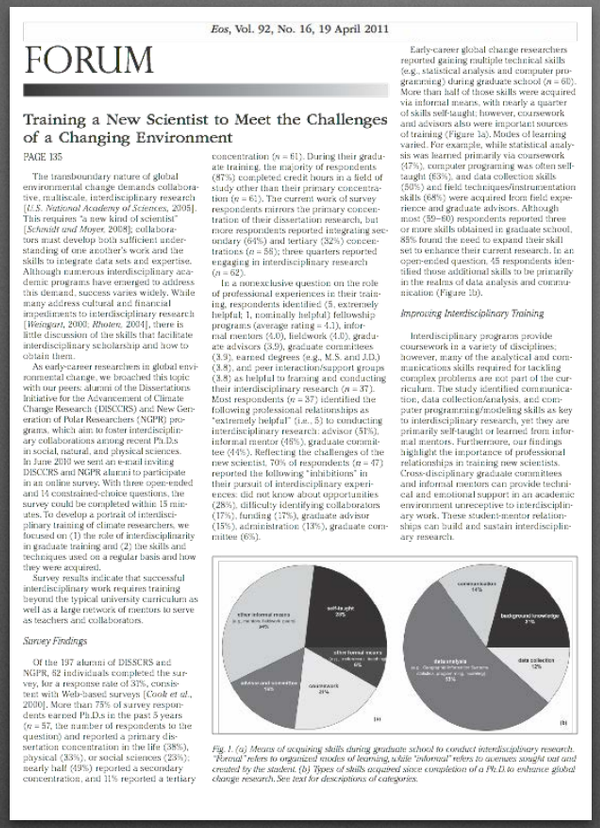
[g] University of Alberta, Edmonton, Canada
[h] Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
[i] ANDRILL Science Management Office, University of Nebraska-Lincoln, USA
[j] CICERO Center for International Climate and Environmental Research, Oslo, Norway
[k] Malherbe Educational Communication BV, Herten, Netherlands
[l] University of Colorado at Boulder, USA
[m] International Polar Foundation, Brussels, Belgium
[n] Association of Polar Early Career Scientists, University of Victoria, Canada
[o] YAWA, Malaysia
[p] University of Otago, Dunedin, New Zealand



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FORUM

Training a New Scientist to Meet the Challenges of a Changing Environment

The transboundary nature of global environmental change demands collaborative, multiscale, interdisciplinary research [*U.S. National Academy of Sciences*, 2008]. This requires "a new kind of scientist" [*Schmidt and Moyer*, 2008]; collaborators must develop both sufficient understanding of one another's work and the skills to integrate data sets and expertise. Although numerous interdisciplinary academic programs have emerged to address this demand, success varies widely. While many address cultural and financial impediments to interdisciplinary research [*Weingart*, 2000; *Rhoten*, 2004], there is little discussion of the skills that facilitate interdisciplinary scholarship and how to obtain them.

As early-career researchers in global environmental change, we broached this topic with our peers: alumni of the Dissertations Initiative for the Advancement of Climate Change Research (DISCRS) and New Generation of Polar Researchers (NGPR) programs, which aim to foster interdisciplinary collaborations among recent Ph.D.s in social, natural, and physical sciences. In June 2010 we sent an e-mail inviting DISCRS and NGPR alumni to participate in an online survey. With three open-ended and 14 constrained-choice questions, the survey could be completed within 15 minutes. To develop a portrait of interdisciplinary training of climate researchers, we focused on (1) the role of interdisciplinarity in graduate training and (2) the skills and techniques used on a regular basis and how they were acquired.

Survey results indicate that successful interdisciplinary work requires training beyond the typical university curriculum as well as a large network of mentors to serve as teachers and collaborators.

Survey Findings

Of the 197 alumni of DISSCRS and NGPR, 82 individuals completed the survey, for a response rate of 37%, consistent with Web-based surveys [*Cook et al.*, 2000]. More than 75% of survey respondents earned Ph.D.s in the past 5 years ($n = 57$, the number of respondents to the question) and reported a primary dissertation concentration in the life (38%), physical (33%), or social sciences (23%); nearly half (49%) reported a secondary concentration, and 11% reported a tertiary concentration ($n = 61$). During their graduate training, the majority of respondents (87%) completed credit hours in a field of study other than their primary concentration ($n = 61$). The current work of survey respondents mirrors the primary concentration of their dissertation research, but more respondents reported integrating secondary (64%) and tertiary (32%) concentrations ($n = 58$); three quarters reported engaging in interdisciplinary research ($n = 62$).

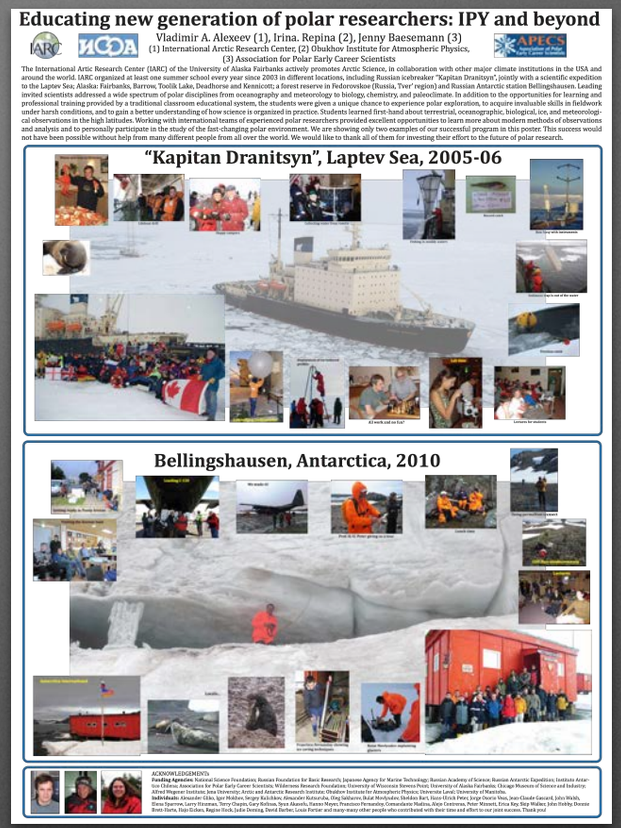
In a nonexclusive question on the role of professional experiences in their training, respondents identified (5, extremely helpful; 1, nominally helpful) fellowship programs (average rating = 4.1), informal mentors (4.0), fieldwork (4.0), graduate advisors (3.9), graduate committees (3.9), earned degrees (e.g., M.S. and J.D.) (3.8), and peer interaction/support groups (3.8) as helpful to framing and conducting their interdisciplinary research ($n = 37$). Most respondents ($n = 37$) identified the following professional relationships as "extremely helpful" (i.e., 5) to conducting interdisciplinary research: advisor (51%), informal mentor (46%), graduate committee (44%). Reflecting the challenges of the new scientist, 70% of respondents ($n = 47$) reported the following "inhibitions" in their pursuit of interdisciplinary experiences: did not know about opportunities (28%), difficulty identifying collaborators (17%), funding (17%), graduate advisor (15%), administration (13%), graduate committee (6%).

Early-career global change researchers reported gaining multiple technical skills (e.g., statistical analysis and computer programming) during graduate school ($n = 60$). More than half of those skills were acquired via informal means, with nearly a quarter of skills self-taught; however, coursework and advisors also were important sources of training (Figure 1a). Modes of learning varied. For example, while statistical analysis was learned primarily via coursework (47%), computer programing was often self-taught (63%), and data collection skills (50%) and field techniques/instrumentation skills (68%) were acquired from field experience and graduate advisors. Although most (39–60) respondents reported three or more skills obtained in graduate school, 88% found the need to expand their skill set to enhance their current research. In an open-ended question, 45 respondents identified those additional skills to be primarily in the realms of data analysis and communication (Figure 1b).

Improving Interdisciplinary Training

Interdisciplinary programs provide coursework in a variety of disciplines; however, many of the analytical and communications skills required for tackling complex problems are not part of the curriculum. The study identified communication, data collection/analysis, and computer programming/modeling skills as key to interdisciplinary research, yet they are primarily self-taught or learned from informal mentors. Furthermore, our findings highlight the importance of professional relationships in training new scientists. Cross-disciplinary graduate committees and informal mentors can provide technical and emotional support in an academic environment unreceptive to interdisciplinary work. These student-mentor relationships can build and sustain interdisciplinary research.

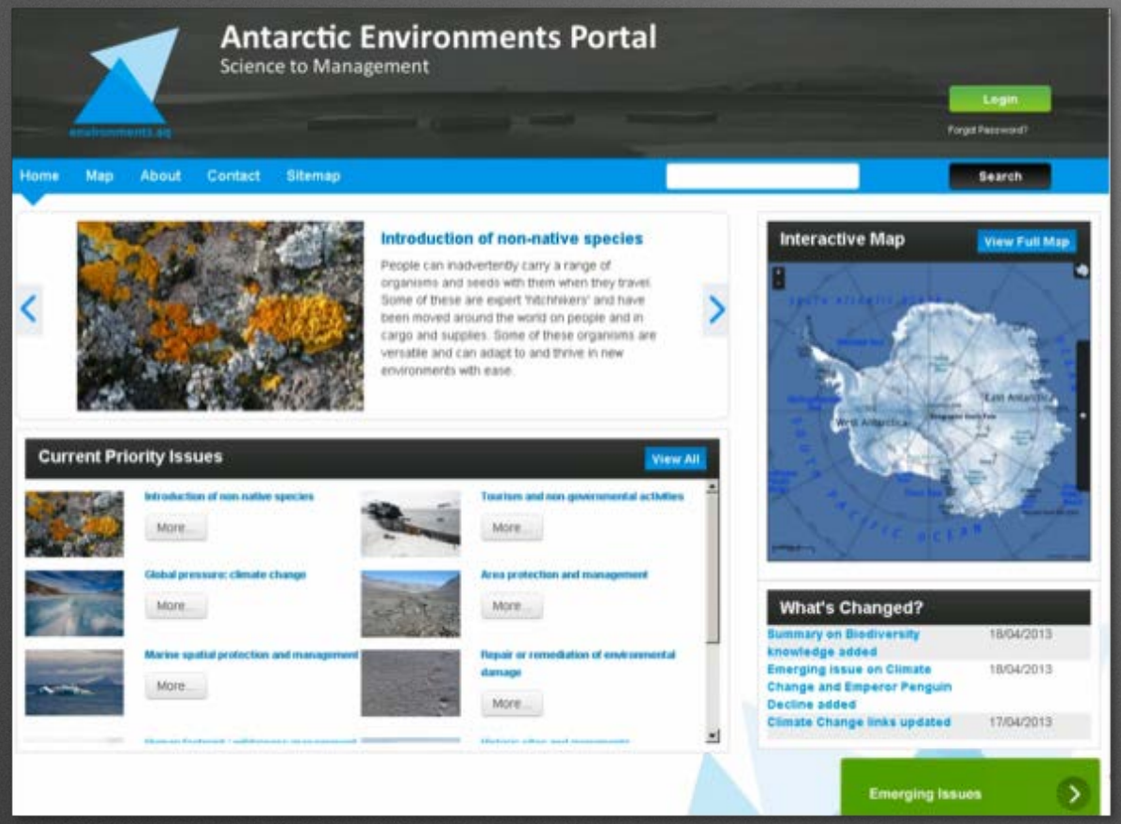
Fig. 1. (a) Means of acquiring skills during graduate school to conduct interdisciplinary research. "Formal" refers to organized modes of learning, while "informal" refers to avenues sought out and created by the student. (b) Types of skills acquired since completion of a Ph.D. to enhance global change research. See text for descriptions of categories.

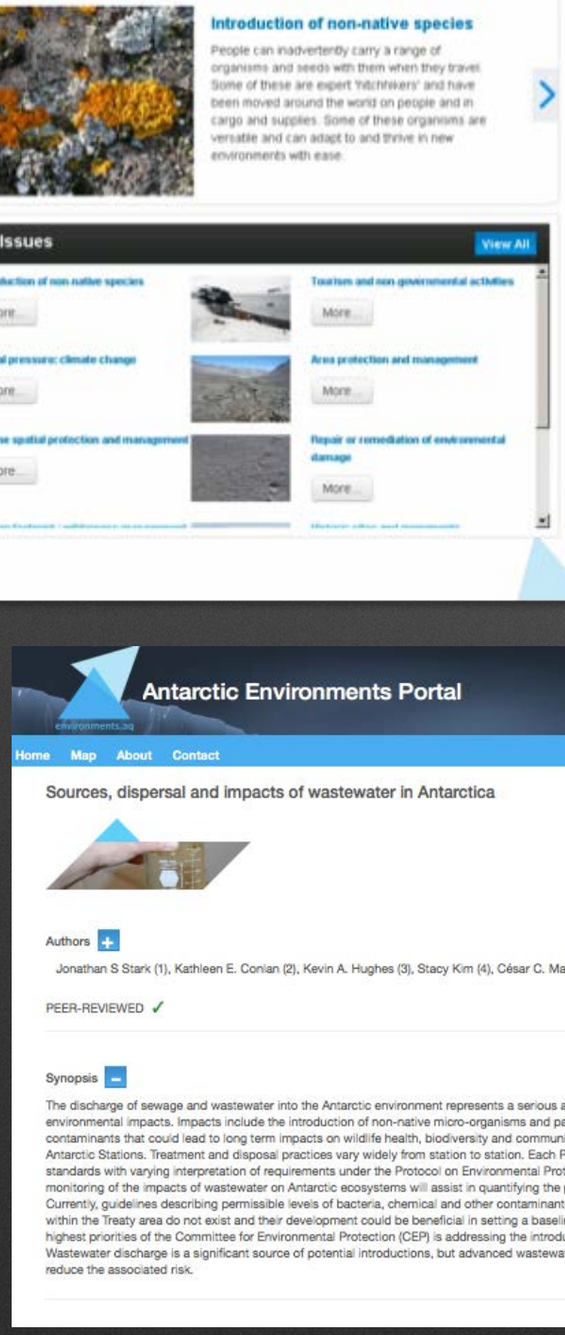


- More peer-reviewed literature about the importance and impact of outreach
  - Help funders to see the value
  - "Reward" scientists for their CVs

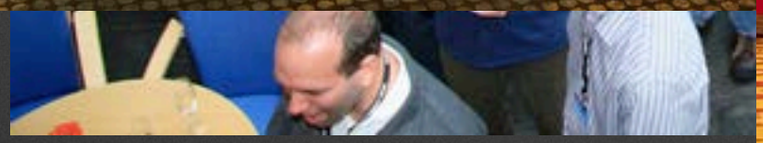
Inspiring Examples and Best Practices

Science that can be *used*???





Educators at Conferences



Training and Motivating Scientists

POLAR EDUCATORS INTERNATIONAL

Where do we go from here…

- Give up because we have limited resources
- Retire so money doesn’t matter
- Convince [*Insert Rich Person Here*] that Polar Science and Education partnerships are the solution to all the World’s problems
- Use traditional energy solutions
- Combine with Alternative fuels…

Sometimes you just gotta gun it…