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multidimensional trajectory that requires a breadth of knowledge sufficient to make connections between distant disciplines, and establishment of a global network of colleagues from divergent backgrounds. The historic divide between the natural and social sciences must often be bridged as well. On top of all this, outreach is increasingly expected along with research, and work must be placed in a context relevant to, and understandable by, managers and policy makers as well as colleagues and educators (Avila, 2003). At the same time, the entire biosphere, from the top of the atmosphere to the bottom of the oceans, is changing at an alarming rate due to human as well as natural impacts. As if this wasn't bad enough, research budgets are not keeping pace with the potential of new technologies, and we have not adequately provided for our human resources. Why on Earth would anyone in their right mind want to get involved with the study of these complex environmental systems (NSF 2003, 2005)? As Timothy E. Killeen noted in a 2005 plenary address to NSF Biocomplexity in the Environment awardees in Washington, D.C.: "What we do in *this* generation will determine the destiny of life on our planet." So the question is really not whether to pursue such careers, but how best to succeed?

One proven strategy for success is to facilitate the process for those who have recently completed the in-depth training required for the Ph.D. degree and who are embarking on interdisciplinary careers. These graduates are intellectually prepared to take the next step – development of dynamic collegial relationships that transcend disciplinary, institutional, regional and national boundaries. While this process can and should begin during the pre-graduate years, and will continue throughout the professional lifetime, programs that target the transition from student to professional can have a catalytic impact.

Begun in 1978 and now planning its 19<sup>th</sup> event, DISCO, the Dissertations Symposia in Chemical Oceanography, (Green & Sackett 1988; <http://www.DISCOsymposium.org>) is the progenitor of several Earth-science symposia that address the transition from Ph.D. to professional. There are two related initiatives that are currently funded through NASA, NOAA, NSF and ONR, and sponsored by ASLO and other scientific societies: DIALOG, Dissertations Initiative for the Advancement of Limnology and Oceanography and DISCCRS, Dissertations Initiative for the Advancement of Climate-Change Research. DIALOG covers the full range of aquatic sciences with a focus on questions relevant to biology/ecology, while DISCCRS brings together graduates from the natural and social sciences around the theme of climate change and impacts.

DIALOG and DISCCRS Symposia provide forums where recent Ph.D. graduates can present their research and gain an overview of the latest research in other fields, discuss emerging research, professional and societal issues, and forge lasting collegial bonds with their peers. Participation is by application and limited to 40. Selection is by an interdisciplinary review committee. Applicants with strong interdisciplinary and collaborative interests as well as

#### **THE RIGHT STUFF: PREPARING PHD GRADUATES FOR THE CHALLENGES POSED BY COMPLEX ENVIRONMENTAL SYSTEMS**

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*"As our technological and research capacity increases, we face both the promise of understanding the environment and our relationship to it, and the responsibility of making wise decisions about managing the complex relationships among people, ecosystems and planetary processes." (NSF 2003)*

The NSF report quoted above goes on to say that scientists must be prepared to cross disciplines, integrate diverse information, and collaborate with each other and with resource managers and other professionals beyond the research community to solve environmental problems. Furthermore, it says dynamic partnerships that cross national and regional jurisdictions and international boundaries can be the most effective means of addressing multi-scale challenges. Institutional and academic transformation is a large part of this.

We tend to think of the PhD as the end of the educational cycle. Yet for many grads, and especially those working on interdisciplinary questions involving the study of complex environmental systems, the roller coaster ride of professional training is far from over (<http://marcus.whitman.edu/~weilercs/biocomplexity/>). After years of specialization, today's graduates increasingly find themselves on a

excellence in research and other professional accomplishments are favored. In addition to the symposia, these two initiatives use electronic resources to cost-effectively reach a broad global audience. ASLO has graciously provided space on its server for the DIALOG/DISCCRS webpage. The portal both programs is <http://aslo.org/phd.html>.

The symposia all have some common elements: oral and poster presentations by each participant in plenary sessions, discussion of emerging research, professional and societal issues, presentations by Federal agency representatives, and perspectives provided by established scientists who serve as mentors. Despite the similarity, the format is flexible and each symposium has unique features incorporated to respond to changing needs. New symposia are shaped based on recommendations from the previous symposium and the results from a 2003 Workshop supported by NSF's Biocomplexity program (<http://marcus.whitman.edu/~weilercs/biocomplexity/>).

Please inform your students, post-docs, and other colleagues about the opportunities provided by the

DIALOG and DISCCRS initiatives. The webpage, <http://aslo.org/phd/phdsymphelp.html>, is available to a global audience and provides resources that are relevant to students, student advisors, and recent Ph.D. graduates.

#### **DISCCRS II Symposium**

March 26 - April 2, 2006, Asilomar, California

Eligibility: Ph.D. completed Oct. 1, 2002 - Sept. 30, 2005 in any field related to climate change/impacts

Application Deadline: October 2, 2005

#### **DIALOG VII Symposium**

Autumn, 2006 (Contingent on new funding and location to be announced)

Eligibility: Ph.D. completed April 1, 2004 - March 31, 2006 in any field relevant to biologically oriented aquatic sciences

Application Deadline: May 1, 2006

Support for symposium travel and on-site expenses will be provided for the successful applicants.

Last night at the DIALOG VI Symposium, held Oct. 30 - Nov. 6, 2004 at the Dauphin Island Sea Lab.



Eleven programs in NSF, NOAA, ONR and NASA have consistently supported DIALOG since 1993, with current support through the following grants to Whitman College, C.S. Weiler PI: NSF #OCE-0217506, NOAA #/NA-160P1435 and ONR #N00014-98-1-0590 with inter-agency support from NASA. DISCCRS is funded through grants from NSF and NASA through grants to Whitman College (EAR-0435728, C.S. Weiler PI) and University of Oregon (EAR-0435719, R.B. Mitchell PI).

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