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LIMNOLOGY AND OCEANOGRAPHY
BULLETIN

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BOOK REVIEWS

PUGH, DAVID. 2004. **Changing Sea Levels: Effects of Tides, Weather and Climate.** Cambridge University Press. ISBN 0-521-53218-3 (paperback). xiii + 265 p. US $50.

Reviewed by ***Gary T. Mitchum****, College of Marine Science, University of South Florida, St. Petersburg, Florida 33701 USA; mitchum@marine.usf.edu*

The number of people interested in sea-level variations, and the variety of their backgrounds, has greatly increased over the past 20 years, largely because of societal concern about sea-level rise associated with greenhouse warming. At the same time, our understanding of sea-level variations has changed rapidly since satellite altimetry evolved into a fully developed technique, concomitant with advances in numerical models that assimilate its new observations. Two examples serve to illustrate this point. First, for the ocean tides we now have global maps accurate to a few centimeters in the open ocean. Second, in the case of low-frequency sea-level change, we now can determine the globally averaged rate of sea-level rise to a precision of a few tenths of a millimeter per year.

While these advances are impressive and exciting, they have led to a more definitive understanding of tides than of sea-level rise. For the tides, the precision of the new analyses has allowed order-of-magnitude improvement in our understanding of the tidal-energy balance, an unsolved problem for over a century. In the past 20 years, we have gone from 50-100% uncertainties in calculating the rate at which the Moon does work on the Earth via the tides, to uncertainties of less than 10%. The associated realization of internal tides' importance has opened the possibility of making fundamental advances in our understanding of ocean mixing, essential to further progress in studies of low-frequency ocean circulation.

For sea-level rise, the story is equally exciting, but with a very different outcome. By the mid-1980's, studies of sea-level change based on the global tide-gauge network had converged on a global rise rate of 1.5–2 mm/yr, which was attributed to roughly equal contributions from ocean warming and the melting of grounded ice. Over the past decade, however, rates based on satellite altimetry have been found to be 3 mm/yr and estimates of the ocean-warming contribution are generally thought to be significantly less than 1 mm/yr. Has the rise rate really increased this much in recent years? Were the historical tide-gauge estimates biased low? Are the altimeters wrong? Is the ice melt contribution much larger than previously thought? These questions and others are topics of spirited debate at present. In the case of sea-level rise, one might say (somewhat facetiously) that in the past 20 years we have gone from a rather comfortable state of relative ignorance to a much better-informed state of confusion. One hopes the next step will be enlightenment.

Changing Sea Levels: Effects of Tides, Weather and Climate is intended to introduce processes that control sea-level variations and to be accessible to undergraduate students in a variety of disciplines. Given the broadened interest in this field and the interdisciplinary nature of these studies, such a book will address a pressing need. The book is very well written and has several features that make it attractive as a supplement to many undergraduate courses, to some graduate courses, and in fact, to many oceanographers beyond graduate school as well. Each chapter begins with a clear summary of what will be covered, which provides a roadmap essential for students. There are study questions at the end of each chapter that range from straightforward to somewhat difficult, and answers to these questions are given at the end of the book. Each chapter ends with suggestions for further reading. Finally, special-topic boxes in each chapter make the book very entertaining as well as informative. I especially enjoyed the sidebar explaining why the highest tides and largest tidal bores are observed near Easter each year.

My major reservation with the book is the balance amongst the topics. The title and the author's introduction suggest sea-level variations due to tides, weather, and climate will be discussed on a relatively equal footing. Approximately half of the book, however, is concerned with tides, while the weather and climate chapters together make up only about 20%. This apportionment will be disappointing to some, but I would not consider it a fatal flaw. The material on tides is excellent, and I

The Limnology and Oceanography
Bulletin

The American Society of Limnology and Oceanography is a membership-driven scientific society (501(c)(3)) that promotes the interests of limnology (the study of inland waters), oceanography and related aquatic science disciplines by fostering the exchange of information and furthering investigations through research and education. ASLO also strives to link knowledge in the aquatic sciences to the identification and solution of problems generated by human interactions with the environment.

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The *L&O Bulletin* publishes brief, peer-reviewed articles of broad interest to the ASLO membership, Letters to the *Bulletin* (typically responses to articles), as well as ASLO News on a quarterly basis. Information on the preparation and submission of articles and letters can be found on the ASLO web site (www.aslo.org). It is recommended that you contact the editor before preparing an article or letter.

intend to use it in my own graduate-level course in physical oceanography. The weather and climate chapters will need to be supplemented, but with nearly any textbook some portions of the material need enhancement. A more minor criticism is that only eight of the figures make use of color, and these are in a color-plate section in the book's center. This choice was undoubtedly necessary to control the price of the book, and it is not a serious problem, but it is a bit disappointing given how useful color figures can be, especially for the undergraduates who are the target audience.

The heart and strength of this book are Chapters 2–5, which contain the discussion of the tides. This section begins with a mathematically undemanding presentation of the tide-producing forces, and Appendix 1 supplements this information with an excellent mathematical treatment. These forces are then used to qualitatively account for the major observed features of the tides. Chapter 3 describes tidal analysis and prediction with an emphasis on the harmonic-analysis method, an emphasis entirely proper given the target audience. Chapter 4 introduces various topics in tidal dynamics, briefly discussing long waves, effects of rotation, internal tides, continental shelves, and tidal energetics. Chapter 5 is especially useful, giving a description of how the tides are modified near coastlines. This topic is often neglected in oceanographic texts, and this material would be useful in many graduate courses.

Chapters 1, 8, and 9 do not deal directly with sea-level variations due to tides, weather, or climate, but are all strong additions to the book. Chapter 1 includes a wonderful tutorial on how sea level is measured, ranging from tide staffs (or poles) to satellite altimeters. Although others might say this material is not essential, I would disagree. Students need to learn where the data come from, after all. Chapter 8 is concerned with methods for measuring and predicting sea-level extremes. For coastal engineers, this material will be crucial, and oceanographers will find the discussion of these methods interesting. Because of the societal impact of coastal sea-level extremes, the inclusion of this material is a strong point in the book's favor. Chapter 9 returns to tides, but from the point of view of tidal influences on sediment movements and biological phenomena. As a physicist, I found the biological material very interesting, and I believe many in the target audience will as well.

Chapters 6 and 7 discuss sea-level variations due to weather and climate, respectively. As mentioned above, these sections are relatively brief and the instructor should probably view these two chapters as starting points for the presentation of additional material. Also, I suspect many oceanographers will find some material in Chapter 6 problematic. For example, the author concludes, based on a highly smoothed spectrum at one tide gauge, that there is no evidence for enhanced energy in the weather-frequency band. This reasoning will be quite controversial. The material on mean sea level in Chapter 7 is excellent, albeit more brief than some might like.

The present broad interest in sea-level change demands that students in a wide range of disciplines have some exposure to the processes controlling sea-level variations. This book, aimed at undergraduates with disparate backgrounds, will be very useful for this purpose. Its strength is its presentation of the variations due to tides, and while I do not find the balance amongst topics ideal, there is nonetheless sufficient introduction to the weather and climate signals to recommend the text.

MARTIN, SEELYE. 2004. **An Introduction to Ocean Remote Sensing.** Cambridge University Press. ISBN 0-521-80280-6 (hardcover). xxvii + 426 p. US $75.

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This is not a coffee-table book for those wanting a "big picture" notion of remote sensing with eye-catching imagery. Instead, it is the most complete textbook I have seen on the subject. Although others have published related books, in *An Introduction to Ocean Remote Sensing,* Martin takes the next step and consolidates the areas of altimetry and infrared and visible observations of the ocean surface, giving us a timely account of each of the derived ocean parameters such as sea-surface temperature (SST), sea level, ocean color, and sea-

surface winds. He also brings us up-to-date on issues of radar scatterometry and microwave imagery, including the Synthetic Aperture Radar (SAR).

This is a "must-have" book for anyone interested in remote sensing of the ocean, inclusive of the student, researcher, and professional. I highly recommend it for those teaching the subject as an upper-level, undergraduate-physics course or as a graduate course. Prerequisites would include a couple semesters of calculus and probably, because of the chapter on electromagnetic radiation, a course on differential equations or wave mechanics. The book would also benefit the researcher needing expertise in a particular field of interest, whether that be altimetry, SAR, infrared detection, microwave, or their application to the calculation of sea level and sea-surface temperature.

For someone unfamiliar with the topic of remote sensing, the introductory chapters (1–5) will provide sufficient background and concepts to understand later material dealing with sensor-specific details. Concepts such as significant wave height, for example, have direct applications to altimetry and oceanography. Indeed, these chapters could stand alone as a course on electromagnetic and wave theory as applied to oceanography. Later chapters on SAR, microwave, altimetry, and SST can be read independently, but their understanding will be limited without first considering these introductory chapters.

The novice, however, might find the reading tedious, in part because the book's organization requires skipping between the beginning chapters and the specialized topics. This process can be cumbersome, but well worth the effort for a complete appreciation of the material. Chapters 1 (Background) and 3 (Electromagnetic Radiation) are especially useful for the reader who wants the minimum amount of information needed to understand an area of interest, whether that is altimetry, infrared observations, or synthetic-aperture radar.

Chapter 2 (Ocean Surface Phenomena) introduces the concept of geostrophic velocity and its effects on sea-surface height. Of course, these ideas are related later to properties the altimeter measures as changes in sea-surface height. Section 2.4 discusses sea ice, background material necessary for an understanding of measurements made by the synthetic-aperture radar. Chapter 3 reviews concepts critical in understanding vertical and horizontal polarization of electromagnetic waves. These concepts are especially important in the description of reflected electromagnetic energy found in section 3.4. Although not easy reading, this chapter also introduces absorption and emission, with respect to the interaction of electromagnetic radiation, of a reflecting and blackbody surface.

Chapter 4 builds on the first three chapters to examine the effects the atmosphere has on the transmission and absorption of electromagnetic radiation. These effects are significant for understanding measurements such as sea-surface temperature, in which clouds, water vapor, and aerosols all are important in determining the calibrated-brightness temperatures at the satellite. Section 4.7 focuses on radiative-transfer theory, which considers both the reflectance and absorption of the atmosphere. This topic is directly applicable to measurements of sea-surface temperature, because the effects of the atmosphere must be taken into consideration in determining the infrared energy received at the satellite.

Chapter 5 deals with the general properties of reflection, transmission, and absorption at the atmosphere-ocean interface. I found this chapter particularly illuminating in summarizing how different sea states reflect, transmit, and absorb electromagnetic energy. Figure 5.4 and the accompanying description of these surfaces is most useful in understanding the concept of scattering and its relationship to surfaces with increasing roughness (wave activity). The manner in which Martin takes these difficult concepts and builds on them, from the simplest theory to the more complex, is impressive.

The true oceanographic application of satellite measurements begins in Chapter 6, which specifically deals with ocean color. The theory behind the measurements concerns how inorganic and organic matter, dissolved and particulate (plankton), change the absorption and scattering (with respect to pure water) of the visible part of the electromagnetic spectrum. After developing the basic theory, Martin applies it to the algorithms used in the different ocean-color sensors, ranging from SeaWIFS to MODIS. He follows the same formula in succeeding chapters as he describes approaches to microwave measurements (Chapters 8 and 9), radar measurements (Chapters 10 and 11), altimeter measurements (Chapter 12), and synthetic-aperture radar (Chapter 13).

Chapters 7 (Sea-Surface Temperature) and 12 (The Altimeter), both within this reviewer's area of expertise, are impressive in their scope of knowledge and completeness. Martin's description of calculating sea-surface temperature (SST) is an excellent example; it is obvious Martin has done both his research and homework. He takes the reader through the many SST algorithms, including ones used for the Advanced Very High Resolution Radiometer (AVHRR), the Moderate Resolution Imaging Spectroradiometer (MODIS), the Along-Track Scanning Radiometer, and the microwave instruments. Each algorithm is unique to the problem of calculating a sea-surface temperature, and Martin explains clearly their differences. These distinctions are important to the reader who wants to understand how remote sensing contributes to the science of climate change, in which SST is a critical parameter.

Microwave imagers are introduced in Chapter 8 and coverage continues in Chapter 9. Three imagers can be used to determine both wind speed and SST. The big advantage of passive-microwave imagery is its indifference to atmospheric conditions. This characteristic is especially crucial to the derivation of SST; unlike infrared sensors, microwave imagers can detect ocean-surface temperatures through clouds. Chapter 10 begins a focus on active-radar measurements of the ocean surface, while Chapters 11 and 12 consider their applications to scatterometry (wind measurements) and altimetry (sea-surface height). Chapter 13 provides an

excellent survey of synthetic-aperture radars. Examples of applications with respect to the detection of ocean swell and internal waves are given. Once again, Martin's simple and illustrative diagrams (such as figure 13.7) take complicated concepts, such as internal waves, and allow the novice reader to understand their detection with respect to the sensor technology.

The book ends (Chapter 14) with an overview of planned remote-sensing satellites. Martin describes future missions such as the NPOESS (National Polar Orbiting Environmental Satellite System), along with new technology efforts such as the salinity mapping Aquarius mission and the Ocean Surface Topography Mission (OSTM). Let us hope future cooperation between federal agencies such as NASA and NOAA allows for the continuation of a viable ocean remote-sensing program.

ASLO NEWS

MESSAGE FROM THE PRESIDENT

***Jonathan J. Cole**, Institute of Ecosystem Studies, 65 Sharon Turnpike, Millbrook, New York 12545; colej@ecostudies.org*

Together Again. The Ocean Sciences Meeting will once again, and for the foreseeable future, be a joint meeting between

ASLO and AGU. The Oceanography Society (TOS), which has had a joint meeting with ASLO, will be part of the new Ocean Science Meetings, meaning that for the first time AGU and TOS will meet together. This is good news because ASLO members will not have to choose between differently-sponsored Ocean Meetings. Since attendance will not be split among competing venues, attendance will likely be higher and more predictable. A tremendous amount of work from all three societies went into the negotiations to produce an agreement for the future joint Ocean Sciences Meetings. Pete Jumars and Russ Moll, who worked on ASLO's behalf, deserve the enduring gratitude of ASLO members for their efforts. We have now a Memorandum of Understanding signed by the President of ASLO (me), the President of TOS (Larry Clark) and the Executive Director of AGU (Fred Spilhaus). Ellen Druffel (President of the Ocean Science Section of AGU) and both Eric Hartwig and John Kinder of TOS, as well as Mike McPhaden and John Orcutt of AGU, were also key in making these negotiations successful. Why was it so difficult? Pete Jumars, in several of his "Messages from the President" in the *Bulletin* outlined the basic difficulties in prior essays, so I will not dwell on them here. Structure and culture at AGU, on the one hand, and TOS and ASLO on the other are significantly different, and the societies do not look at meetings in the same financial light. ASLO is committed to revenue-neutral meetings; AGU traditionally uses meetings to generate some revenue and sought some consistency in financial structure with other AGU meetings. Lapses in program planning and coordination precipitated the events in 2004 that gave rise to two separate oceanographic meetings at nearly the same time of year, but the differences in financial perspectives made reconciliation difficult. The new arrangements represent a reasonable compromise of approaches, and the field of oceanography is the beneficiary. The MOU leaves room and procedures for other societies to join the agreement. Ocean Sciences Meetings will be held every other year. The society leading the meeting will rotate, first on a fixed basis and thereafter by a rolling average of society-based attendance. The next Ocean Sciences Meeting will be in Honolulu in February 2006 with AGU in the lead. ASLO will lead the one in 2008, but the time and venue have not yet been set. AGU leads in 2010 and TOS in 2012. Fairly concrete plans for the joint Ocean Science Meeting lead well into the future.

A major question to answer yet is how the ongoing Ocean Sciences Meeting will fit into ASLO's plan and schedules for other meetings. With input from the member questionnaire that some 960 of you filled out (thank you), the Board and the Meetings Committee have the feedback they need to make the next set of difficult decisions. Many of you preferred the option of an annual meeting in the winter that served the entire society (as the biennial Aquatic Science Meeting does now). A significant number want to keep the biennial summer meeting, and lots of folks want more international meetings. The Board will try to balance the needs and requests represented in the questionnaire.

Are we international yet? The call for papers for the upcoming ASLO meeting in Spain in June 2005 has incurred mostly positive, but also a few negative, comments about ASLO's role as a quasi-international society. Although ASLO is incorporated in the United States, the "American" in the title paid homage to North America broadly almost from the get-go. Canadians have consistently made up a significant part of ASLO's membership and leadership. ASLO annual meetings have frequently occurred in Canada. Further, ASLO is in no way an agency of the US Government. What has happened over the past 20 years is that ASLO has increasingly been joined by scientists outside of North America. Europeans dominate this non-North American membership, and there are small groups of members from many other countries. About 30% of ASLO's membership comes from outside of the US. Nearly 60% of the articles published in recent volumes of *Limnology & Oceanography* have authors affiliated with institutions outside of the US. A quick look at the list of

Associate Editors for *L&O* shows that about 20% are from outside of North America. In the March 2003 issue of the *Limnology and Oceanography Bulletin* (Volume 12(1), pp 11-13) Carlos Duarte provided a thoughtful analysis of ASLO's international position. This article is available on the web site (http://aslo.org/bulletin/03_v12_i1.pdf) and is a fascinating read. Whereas the case is clear that ASLO is not an American society (*sensu* US, particularly) neither is it truly international. Up to this point ASLO has simply been a society open to membership from anywhere and members from most everywhere have found it attractive to join. This internationalization of ASLO has clearly benefited both the society itself and, I feel even more strongly, the fields of limnology and oceanography themselves. We now need to decide where we go from here. The level of internationalization that ASLO has now attained requires that we serve a partly international membership. This representation affects the make-up of committees, who gets elected to the Board, where some meetings are held, and how we construe the role of our Policy Office. Do we now self-consciously try to be more fully international, at what costs or obligations, and how do we go about it? One of the ideas the Board has discussed is to, by asking members to vote on a possible change the ASLO By-laws, allow the Board to elect a board member in addition to the regularly membership-elected ones. This approach would compel the Board to look at itself and ask in what direction (international, field, gender, ethnicity) the Board would need to be expanded to provide needed diversity. It would provide an opportunity, perhaps, to attract new members from regions (South America, Africa) for example, where membership in ASLO is sparse. But the question of remaining simply an open society with members from many countries versus truly internationalizing under the ASLO banner or some other is a tough judgment to make.

One issue that comes up in these discussions is that there is already a truly international society for limnologists, SIL. SIL (The International Society for Applied and Theoretical Limnology, of which I am also a member) is self-consciously international, meets all over the world on a triennial schedule, and has a governing structure, like the United Nations, with representatives from the member countries and a Secretariat General (Robert Wetzel, also an ASLO member and prior ASLO President in 1980-81). SIL, unlike ASLO, does not include oceanography, and the missions of ASLO and SIL are distinctly different. Clearly we do not want multiple societies competing for membership or attendance at meetings. When aquatic scientists speak out on issues of concern they need to be able to do so with a loud and coordinated voice. To accomplish these goals, what we need are strong partnerships that are mutually beneficial.

Recently I met with Gene Likens, who is President of SIL and Fabio Roland, who is President of the Brazilian Society of Limnology (SBL) to begin a discussion of these issues. At this meeting we agreed to a proposal from Carlos Duarte to have a larger discussion about ASLO's international front and cooperation with other societies, fresh and salty, at the meeting in Spain. Watch the meeting announcements for the time and place for this discussion. We will be inviting members and representatives of many societies to participate and anticipate an open and lively discussion. We envision this as an open meeting and hope that you will attend it and participate actively.

The other major issue that comes up is political. Many of the activities of the current US administration are unpopular, to put it mildly, in a lot of countries. Some of our international colleagues feel frankly uncomfortable belonging to an American (again *sensu* US) organization. My personal view is that such discomfort is misplaced. As a US citizen who has openly opposed some recent administration actions, belonging to ASLO does not taint me as a supporter or detractor of any US governmental policies. Nevertheless, the Board is sensitive to these concerns and does not want to lose international members. Is it as simple as a name change? If ASLO is already partially international, should the "A" stand for something else? Again, you were asked in the membership survey to comment on this. Although the analysis is incomplete, about 60% said ASLO should consider a name change. Some favorites that were proposed numerous times were ISLO (*International* Society of Limnology and Oceanography), SLO or SOL (Society for Limnology and Oceanography and vice versa) ASLO (but *Association* for the A and S), and SIAS (Society for the Integration of the Aquatic Sciences). Some names like SIAS or the Association for Limnology and Oceanography take a neutral stance on the

Shown above are Jon Cole with Gene Likens (President of SIL) and Fabio Roland (President of the Brazilian Society of Limnology) discussing the international cooperation of limnology at a meeting at the Institute of Ecosystem Studies.

international question. Others, like ISLO, are perhaps aggressively international. On the other hand, is the concern deeper than the name of the society? Will our international colleagues look at ASLO as usurping an international role rather than living up to one if it changes its name but not its fundamental structure?

Open-access publication – be careful what you wish for. Readers of the *Bulletin* have heard a lot about the conundrum that ASLO and nearly every other scientific society is in regarding free access publication (FAP). A FAP publication is one that anyone can access on the web at no cost. For *L&O*, for example, when you as author pay to have your paper "unlocked" it becomes FAP. If you do not pay to unlock it the access is restricted to subscribers for a period of three years. As scientists, whether you have thought about it or not, we have conflicting goals regarding FAP. As authors we want our publications to be widely available to all other scientists and to the interested public as well. As teachers we want our students to have full access to the scientific literature. As researchers we ourselves want full-text publications no further than the screens of our laptops. As taxpayers we feel that we owe the public free access to the science that they (and we) after all paid for. FAP means widely available. As members of a scientific society that collectively owns scientific journals, we are in conflict with our own FAP-py impulses. If *L&O*, for example, were entirely FAP there would be little incentive for either individuals or libraries to pay for subscriptions. Those subscriptions, and the author charges that pay to unlock papers, ultimately pay for the real cost of producing *L&O*. The real costs include the running of the editorial office, copy editing, layout, the running of the web site, printing and distribution, to name a few. These are real costs and sum to about $2,000 (USD) to produce an *L&O* paper or *L&O Methods* e-missive, soup to nuts. The cost is comparable for many scientific societies and much lower than the cost for commercial, profit-making journals, and somewhat higher than some society journals that depend more heavily on voluntary effort (or as in the case of the European Geosciences Union's *Biogeosciences* – a strongly volunteer *and* computer-automated effort) in the editorial office. If *L&O* were to be entirely FAP, where would the $2,000 come from? A higher charge to authors is the standard answer, with its associated difficulties.

The above is just background. The National Institutes of Health (NIH), motivated by the idea of making science more publicly available, has proposed that all papers produced with NIH funds be deposited as pdf files in a common and universally available database within some months after publication. Sounds great to our FAP-py side but this approach has the potential to kill the goose that laid the golden egg, the scientific society journals. While NIH likely funds a small portion of the research at ASLO, sometimes one agency follows another. If NSF or NASA made similar requirements, we would have to change the way we fund L&O. The ASLO Board has commented on the NIH proposal and has written to NSF about it. We pointed out the problems that this model has for scientific society journals and asked both NIH and NSF to consider the impact of such a move before doing it. At least, societies like ASLO (and most others) need some time to change their funding model before FAP becomes a universal requirement. What do you think? Would you still be an ASLO member and journal subscriber if all papers were FAP? What, besides higher author charges would you propose as revenue to support the production of the journal? Some of theses questions were asked on the survey but my crystal ball says they will be hot topics of debate during the next few years.

Jon Cole, Institute of Ecosystem Studies

MESSAGE FROM THE BUSINESS OFFICE

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Dear ASLO Members:

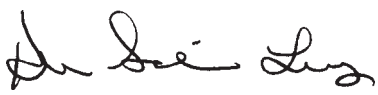
We hope that by the time you receive your December Bulletin you have sent in your renewal for 2005! If you are a new member, WELCOME to ASLO! If you haven't received your renewal notice yet or if you have questions, please be sure to contact us at the ASLO business office (business@aslo.org).

It's great time to be a member of ASLO! ASLO remains strong and very active. Your board of directors is dedicated to providing value for your membership dollar and maintaining the integrity of your science. As a board, we are busy accessing the state of publishing in today's environment, serving our International members and making sure we meet the needs of all of our members. Your survey comments are very valuable!

The upcoming year will provide several opportunities to network and meet with fellow ASLO members at the two meetings being held in 2005: The Aquatic Sciences Meeting February 20-25 in Salt Lake City, Utah; and the summer meeting June 19-24 in Santiago de Compostela, Spain. This will be ASLO's second meeting held outside of North America.

Please let us know if there is anything that the business office can do to be of help to you. If you will be attending any of the upcoming meetings, be sure to stop by the ASLO booth and introduce yourself. We love meeting our ASLO members!

Regards and best wishes for the holiday season!



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LIMNOLOGY & OCEANOGRAPHY: METHODS

ASLO'S NEW ELECTRONIC JOURNAL

Attention ASLO Members: As a current ASLO member you will receive a complimentary subscription to this new, all-electronic journal in 2003!

Limnology and Oceanography: Methods is intended as a companion journal to ASLO's top-rated journal *Limnology and Oceanography,* and papers submitted for publication will be reviewed and published according to the same high standards. Readers of *L&O* will be equally interested in receiving this journal.

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For more information on how your library or organization can subscribe to *Limnology and Oceanography: Methods* journal, please contact the ASLO business office at business@aslo.org.

Editor-in-Chief: Paul Kemp
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For more information on submitting manuscripts and other general inquiries, please contact the Editorial Office at lomethods@aslo.org.

ASLO 2005 Aquatic Sciences Meeting

Co-Sponsored by The American Society of Limnology and Oceanography, The National Conservancy, the North American Benthological Society and The Geological Society of America

Organizers of the ASLO 2005 Aquatic Sciences Meeting have designed this meeting to be interactive and to encourage discussion of new and cutting-edge research and applications in the aquatic environment. We invite you to participate through submissions to specific topical oral or poster sessions or general oral or poster sessions as well as to actively exchange ideas and information as a registered participant. We hope that you will leave this meeting with a broader understanding of what is currently going on in the aquatic sciences, learn about new work that is being done, and make contact with new colleagues as you participate in this interactive process.

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For more information on the ASLO 2005 Aquatic Sciences Meeting, please contact:

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February 20-25, 2005 · Salt Lake City, Utah

Abstract Submission Deadline: October 1, 2004
www.aslo.org/slc2005

ASLO Summer Meeting 2005 in Spain!

June 19-24, 2005 · Santiago de Compostela, Spain

A Pilgrimage Through Global Aquatic Sciences

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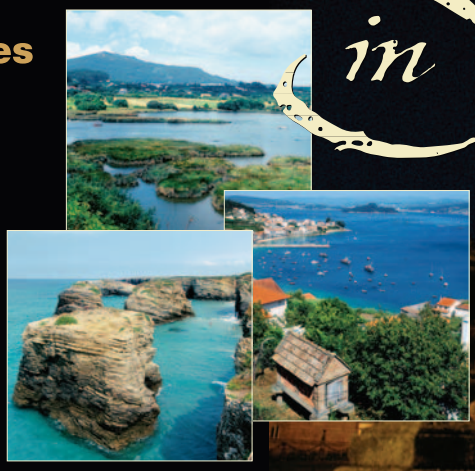

Sponsored by the American Society of Limnology and Oceanography

http://www.aslo.org/santiago2005

ASLO-STARS – A NEW HIGH SCHOOL OUTREACH PROGRAM

*Contributed by **Lesley K. Smith**, Cooperative Institute for Research in Environmental Sciences, University of Colorado, UCB 216, Boulder, CO 80309-0216; Lesley.Smith@colorado.edu*

The ASLO Education Committee is pleased to announce ASLO-STARS (Students Active in aquatic science ReSearch), a new ASLO-sponsored outreach program in which local high school students participate in aquatic science research and report their findings during a student-led poster session. With your support ASLO-STARS, modeled on successful programs implemented by AGU and ESA, will become a regular outreach program at the winter meetings. The students' agenda includes a discussion of local watershed issues, a field trip, and a roundtable discussion of careers, and it will culminate with their poster session. We encourage all members to stop by the student poster session on Thursday evening, February 24th (runs concurrent with regular poster session), and talk to the students about their research. We need scientists to moderate the poster session and talk about career paths. If anybody is interested in helping, please contact Jeremy Long (j.long@neu.edu) or Lesley Smith (smithlk@cires.colorado.edu).

L&O FEATURED ARTICLE

***Everett Fee**, Limnology & Oceanography Editorial Office, 343 Lady MacDonald Crescent, Canmore, AB T1W 1H5, Canada; lo-editor@aslo.org*

Beginning with the May 1999 issue of *Limnology and Oceanography*, selected articles have been made freely available for reading or download on the *L&O* Website a few weeks in advance of when the printed issue is mailed. Featured Articles receive no special attention in the printed issue. A paper may be featured for different reasons (e.g., to draw attention to an exceptional piece of research or to promote an area of research that the Associate Editor feels *L&O* readers should be more aware of). Each Featured Article is announced in the *Bulletin*, as well as to the LO-Feature Mailing List, and is accompanied by an introduction to the article by the Associate Editor who handled the paper discussing its significance.

The featured article in the November 2004 issue of *L&O* is:

LARNED, SCOTT T., VLADIMIR I. NIKORA, AND BARRY J. F. BIGGS. 2004. MASS-TRANSFER-LIMITED NITROGEN AND PHOSPHORUS UPTAKE BY STREAM PERIPHYTON: A CONCEPTUAL MODEL AND EXPERIMENTAL EVIDENCE. LIMNOL. OCEANOGR. 49: 1992-2000.

Introductory Comments by Joe Ackerman (L&O Associate Editor)

Benthic vegetation (ranging from periphyton, aquatic and wetland plants, seagrasses, and kelps) is attaining a more prominent position in limnological and oceanographic circles, as aquatic scientists have begun to realize the important roles that these attached algae and macrophytes play. In addition to being primary producers, these organisms modify local and regional flow, are sinks for nutrients, are locations of biogeochemical activity, trap and stabilize particulate matter, create important habitats for myriad other organisms, and among other things, are drivers of benthic environments.

The featured *L&O* article by Larned, Nikora, and Biggs examines the processes that control nutrient acquisition by stream periphyton. Periphyton productivity is affected both by the mass transfer of nutrients from the surrounding fluid, and by the kinetics of cellular uptake. There has been considerable interest in the dichotomy between mass-transfer (and hence the role of fluid dynamics) versus kinetic control. The situation is complicated by the unfortunate tendency to view periphyton as a "thin layer" rather than a 3-dimensional "forest" of "filaments, diatom chains, and clusters [of algal cells]". Hoping to resolve this dichotomy, Larned et al. studied the controls on the uptake of nitrate and dissolved reactive phosphorous both empirically and by using a conceptual model that incorporated the morphology and location of the "periphyton elements" within the periphyton canopy and benthic boundary layer (BBL). Their experimental results demonstrate that the periphyton canopy was as tall as or taller than the height of the diffusive sublayer of the BBL, even at the lowest velocities. Consequently, mass-transfer control occurs in the diffusive sublayer surrounding the individual periphyton elements.

This research is important because it quantifies parameters that are used quite loosely in the literature. It also provides experimental evidence for mass-transfer control in oligotrophic periphyton systems, and provides a general conceptual framework for investigating nutrient uptake by benthic producers. It should serve as the basis for investigations of more complex stream periphyton systems, and may also prove useful for understanding similar issues in freshwater and marine macrophyte canopies.

The featured article in the January 2005 issue of *L&O* is:

DE BEER, DIRK, FRANK WENZHÖFER, TIMOTHY G. FERDELMAN, SUSAN E. BOEHME, MARKUS HUETTEL, JUSTUS E. E. VAN BEUSEKOM, MICHAEL E. BÖTTCHER, NICULINA MUSAT, AND NICOLE DUBILIER. 2005. TRANSPORT AND MINERALIZATION RATES IN NORTH SEA SANDY INTERTIDAL SEDIMENTS, SYLT-RØMØ BASIN, WADDENSEA. LIMNOL. OCEANOGR. 50: 113-127.

Introductory Comments by Samantha Joye (L&O Associate Editor)

Permeable sandy sediments are an important habitat found in estuaries and along the continental shelf across the globe. Such sediments were long assumed to play minor roles in coastal biogeochemical cycles because the low organic content and lower numbers of microbes observed in these sediments were assumed to equate with low (potential) rates of metabolism. Recently, however, that view has changed and permeable sands are now viewed as dynamic environments that support high rates of metabolism. We now realize that waves and tides accelerate flow through sandy sediments, providing a constant source of high-energy electron acceptors,

such as oxygen and nitrate, as well as a steady input of reactive organic matter via sand filtration of material suspended in the circulating fluid.

In permeable sediments, physical processes generate environmental complexity at multiple scales, making it necessary to conduct *in situ* studies in conjunction with laboratory studies in order to understand the dynamics of the system. The featured *L&O* article by de Beer, Wenzhöfer, Ferdelman, Boehme, Huettel, van Beusekom, Böttcher, Musat, and Dubilier presents results from a comprehensive, interdisciplinary study of transport processes, geochemistry, microbial activity and microbial distributions in the sandy intertidal environments of the Sylt-Rømø Basin (North Sea). de Beer et al. applied a diverse suite of tools from a variety of disciplines, including hydrodynamics, *in situ* sensor technology, *ex situ* rate measurements, geochemistry, and molecular biology, to provide important insight into the physical, geochemical and microbial dynamics of the habitat. Using this approach, de Beer et al. estimated flow rates through the sediments of 160-500 L m^{-2} d^{-1} and concluded that the entire water body of the Wadden Sea can pass through can pass through the sandy sediments within 3-10 days. These high rates of flow through the sediment result in high rates of aerobic respiration (~105-175 mmol O_2 m^{-2} d^{-1}), primary production (≤35 mmol O_2 m^{-2} d^{-1}), and sulfate reduction (~0.8-13.7 mmol m^{-2} d^{-1}). Variation in the amount of microbial rRNA closely tracked patterns in activity.

This paper makes several significant contributions to our understanding of the biogeochemistry of sandy tidal flats. First, the paper documents the dynamic interplay between physical factors and the pore water oxygen regime. The combination of *in situ* and *ex situ* O_2 microprofiling provided a powerful method for determining rates of fluid flow through the sediments. Second, advective inputs of oxygen and organic matter are shown to stimulate microbial activity significantly in these sandy sediments. Third, high oxygen fluxes maintain the sandy sediments in a high-energy oxidizing state, preventing the accumulation of reduced metabolites like hydrogen sulfide despite high rates of microbial primary production. Such interdisciplinary studies are required to advance our understanding dynamic sedimentary systems.

OUTSTANDING *L&O* REVIEWERS

Peer review is a crucial component of modern science. The fact that *L&O* is able to utilize the services of the best scientists as reviewers allows it to be a leading journal in the aquatic sciences. However, these individuals seldom get the recognition they deserve for this selfless work. Therefore, each issue of the *Bulletin* will cite two outstanding reviewers that Everett Fee, *L&O* Editor, feels deserve special recognition for their overall reviewing efforts. The ASLO membership extends its sincerest appreciation and thanks to these two outstanding scientists.

ERIK JEPPESEN

Erik Jeppesen is a Research Professor in Lake Ecology in a joint position at the National Environmental Research Institute and University of Aarhus, Denmark. His current work focuses on ecology and palaeolimnology of shallow lakes. Jeppesen and his colleagues are especially interested in changes in interactions between nutrients and food-webs (from bacteria to fish) along gradients in nutrients (N, P) and climate (High Arctic to the tropics) in the past, at present and to occur in the future. They are also studying chemical and biological resilience and are developing tools to enhance ecosystem resilience and to restore degraded lakes. He is now highly engaged in large-scaled European (EUROLIMPACS: www.eurolimpacs.ucl.ac.uk) and Danish (CONWOY: www.conwoy.ku.dk) climate change projects and is also looking forward to newly formed initiatives with research teams in China and fast-developing countries in South America.

STAN VAN DEN BERG

Stan van den Berg is professor in the Department of Earth and Ocean Sciences of the University of Liverpool, England, where he has been located for 25 years. His research interests are in the area of metal speciation and its detection using electroanalytical techniques. He and his collaborators have developed methods for, and determined the chemical speciation of, iron and other metals in seawater and lakes, and looked at possible feedbacks between the production of ligands by phytoplankton and additions of copper and iron to cultures.

GETTING TO KNOW YOUR L&O ASSOCIATE EDITORS

***Everett Fee**, Limnology & Oceanography Editorial Office, 343 Lady MacDonald Crescent, Canmore, AB T1W 1H5, Canada; lo-editor@aslo.org*

The next time that you pick up an issue of *L&O*, I hope that you will take a moment to peruse the list of Associate Editors (AE) on the inside of the front cover. These are the people who decide what is published in L&O. ASLO acknowledges the important work that these people do for the society; AEs are featured in each issue of the *Bulletin*.

The role of the AE is that of an impartial judge — to fairly assess the reviewers' comments and guide the author's next

steps. About every two weeks an AE is assigned a new manuscript. His or her first task is to select reviewers; this delicate job requires profound knowledge of both science and politics (the often conflicting relationships among people in a society). When the reviews are received, the AE digests that input along with his or her own assessment of the manuscript to arrive at a decision. It is unfortunately quite common for reviewers to recommend very different fates for a paper, which puts the AE in the uncomfortable position of having to make at least one of the reviewers and perhaps the author unhappy. If a paper is accepted, the AE's final job is to edit the manuscript, suggesting wording and organizational changes to improve clarity.

L&O AEs work at the highest level of our profession. Being an AE is a very demanding job, and we are extremely fortunate that these people devote so much time to the ongoing challenge of making *L&O* the leading journal in the aquatic sciences.

ROBERT R. BIDIGARE

Bob Bidigare is a Professor with the Department of Oceanography and the Hawaii Institute of Marine Biology at the University of Hawaii. Recently he became director of the Center for Marine Microbial Ecology & Diversity (CMMED – "*sea medicines*"). Bob's research interests include biological-optical interactions in the upper-ocean, phytoplankton pigment biochemistry, intermediary metabolism in marine plankton, regulation of algal photosynthesis, controls on carbon isotopic fractionation by marine phytoplankton, and pelagic trophodynamics. Recently, Bob and his colleagues received funding from the NIEHS, NSF and NOAA to establish the Pacific Research Center for Marine Biomedicine. The goal of this center is to study ocean and human health interactions, with an emphasis on marine pathogens, harmful algal blooms, and marine natural products chemistry and drug discovery. As an AE, Bob typically handles manuscripts relating to phytoplankton photophysiology and ecology.

MEMBER HIGHLIGHTS

ALEXANDRA WORDEN NAMED GORDON AND BETTY MOORE FOUNDATION YOUNG INVESTIGATOR IN MARINE SCIENCE

Excerpted from a University of Miami, Rosentiel School of Marine and Atmospheric Sciences news release of September 2004

Dr. Alexandra Z. Worden, an ASLO member and assistant professor of Marine Biology and Fisheries at the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences, was named a Gordon and Betty Moore Foundation Young Investigator in Marine Science. The award comes in the form of an $875,000, three year grant. Dr. Worden and five

other investigators were selected as part of a 10-year, $145 million marine microbiology initiative that the Gordon and Betty Moore Foundation recently launched. As a part of this grant, Dr. Worden, a marine microbiologist, will be pursuing innovative approaches to understanding the function and ecological roles of picophytoeukaryotes.

The Gordon and Betty Moore Foundation launched a 10-year Marine Microbiology initiative in April 2004, with the goal of attaining new knowledge regarding the composition, function, and ecological role of microbial communities in the world's oceans. Funding strategies are directed to supporting Gordon and Betty Moore Foundation Investigators, linking scientists in related fields, establishing intern programs, and supporting select research projects that will affect ocean science as a whole. The Foundation was established in September 2000 by Intel co-founder Gordon Moore and his wife Betty to create positive outcomes for future generations.

FROM THE EDITOR'S IN-BOX

OPPORTUNITIES TO COMMENT ON NEON

*Contributed by **Dan Johnson**, NEON Project Office, American Institute of Biological Sciences, 1444 Eye Street, NW, Suite 200, Washington, DC 20005 USA; djohnson@aibs.org*

Planning for the NSF-funded National Ecological Observatory Network (NEON) is on a fast track. A distinguished body of scientists, engineers, and educators has been selected to serve on the committees that will shape the blueprint for NEON's implementation. Members of the biological community will have a number of opportunities to review and comment on draft materials as the NEON Design Consortium produces documents early in 2005.

In September 2004, AIBS finalized a cooperative agreement with the National Science Foundation to develop a detailed NEON planning document by June 2006. The NEON Design Consortium — with more than 150 committee and subcommittee members — formally begins its work with meetings in January, March, and June of 2005. The committee reports will identify which continental-scale science questions NEON will address, what kinds of sensor technology and cyber infrastructure will be required, and how to realize NEON's potential for educating new generations of scientists.

The eight Subcommittees of the Science and Human Dimensions Committee will focus on invasive species, land use, biodiversity, biogeochemical cycles, climate change, infectious disease, hydrology, and emerging issues. Additional subcommittees will develop NEON's approaches to research infrastructure, IT and communication, and sensors and sensor networks. Education subcommittees will address NEON opportunities for K-12, the graduate and postdoctoral level, and informal education.

Members of the bioscience community can find the latest news about NEON at www.neoninc.org, including a full roster of NEON's Design Consortium members. Draft documents will be posted online for peer review shortly after each of the three meetings scheduled in 2005: January 4-6, March 15-17, and June 7-9.

HARRY POTTER AND THE ECOLOGIST'S THESAURUS: DIACES 2002

***Filip J.R. Meysman**, The Netherlands Institute of Ecology, Korringaweg 7, 4401 NT Yerseke, The Netherlands; f.meysman@nioo.knaw.nl; **Linda M. Campbell**, National Water Research Institute, Environment Canada, 867 Lakeshore Road, Burlington Ontario L7R-4A6, Canada, linda.campbell@cciw.ca; and **Lynda C. Chasar**, US Geological Survey, WRD, 2010 Levy Avenue, Tallahassee, FL 32310 USA; lchasar@usgs.gov*

There is a strong similarity between the wizarding world of Harry Potter and the world of ecologists. In her Potter novels, J.K. Rowland has invented an astonishing vocabulary for the magical spells that endow Harry with supernatural powers (Encylopaedia of Spells, ES). As shown by the latest book of the series, the author's creativity for new enchantments remains unrivalled. As it happens, the same mesmerizing creativity can be found in the ecological literature, hinting at a deeper connection between magic and ecology. In the last 50 years, the discipline has been teeming with novel concepts, and as a result a compelling parade of new terms has entered the ecological lexicon. According to this eco-speak, ecosystems are governed by "drivers" and "stressors", while ecologists investigate their "resilience" and "stability", assess their "health" using "ecological indicators", and occasionally subject them to "restoration" and "rehabilitation" efforts. Clearly, some of these terms are as captivating and mysterious as Harry Potter's charms.

There is, however, one crucial difference. In Rowling's realm, each charm or curse is supposed to have an unambiguous meaning and perpetrate a well-defined effect. When hungry Harry visits the kitchen and utters "ALOHAMORA" (ES), the refrigerator door will swing by itself. In the world of ecology however, the case is rather different. When we ecologists try an "ALOHAMORA" equivalent, chances are slim the fridge will open up and produce its bounty. In fact, the effectiveness of an ecologist's abracadabra will be highly dependent on the type, brand and manufacturing year. In other words, ecological terms like "drivers" and "stressors" seem deceptively simple and logical when first encountered, giving the impression of having a well-defined, universal meaning. Yet, when we leave the comfort and safety of our own ecological research niche – say, when an entomologist discusses ecosystem management with a sediment biogeochemist – we're headed for trouble. Organize a debate on the "health of an ecosystem" with a multi-disciplinary group of ecologists, and it takes only one devil's advocate questioning the "ecosystem health" concept to create

a flourishing Tower of Babel within minutes. Rather than fostering fruitful discussion, our eco-jabber tends to promote confusion and outright controversy.

The perplexing power of this Multidisciplinary Babel of Ecology was nicely illustrated during the recent DIACES experiment (DIACES, Dissertation symposium for the Advancement of Coastal, Estuarine and Great Lakes Science, http://aslo.org/phd.html). Forty dedicated, eager and promising ecologists (all recent Ph.D. recipients) were carefully selected to represent the broad field of estuarine, coastal and great lake ecology. Participants were isolated in the remote geographical setting of Guanica (a small village on the southern coast of Puerto Rico) and divided into four replicate groups. Each group was subjected to the same treatment, which consisted of forcing these inquiring minds (1) to define their pet ecosystem in terms of "boundaries", "drivers" and "stressors", (2) to find suitable, cross-system "ecological indicators" and (3) to report on their conclusions. Remarkably, the outcome was similar for all four replicate groups — no end product was obtained whatsoever. Rather than taking the definitions for granted and forging ahead with their assignment, each group erupted into fierce and existential discussions about the basic meaning of the concepts themselves. It was readily apparent that "ecosystem disturbance" could mean something very different, depending on a scientist's perspective and background, not to mention the perspective and scale of the ecosystem under consideration. Basically, what followed was a highly exciting week of late-night discussions on ecological semantics, multidisciplinary chat sessions and peer networking.

In conclusion (and in all seriousness), the DIACES experiment confronted our group of young scientists head-on with the Multidisciplinary Babel of Ecology, which we identified as a real and undervalued problem within present-day ecological research. Dealing with this Babel requires the fundamental recognition that *ecological concepts are inherently fuzzy*. At present, ecology does not have the clear-cut laws or the same axiomatic structure as thermodynamics. As a consequence, ecological concepts tend to be more ambiguous than thermodynamic ones. Terms like "ecosystem health" appear to reside within the same league as the word "love". For thousands of years poets have struggled to harness the concept of "love" into words, and they are still trying. Moreover, everyone seems to have a rather well defined and highly personal idea what "love" is, yet no one shares exactly the same meaning. The same appears to be true for ecological terms - most scientists have an intuitive understanding, but individual interpretations may differ significantly in their details.

This is not to argue that all ecological jargon should be thrown straight out of the window. Our intention is simply to point out the strenuous, energy-soaking fashion in which communication takes place in a discipline that is becoming increasingly multidisciplinary. When "talking ecology" with peers from not-so-closely related fields, the message does not always cross disciplinary boundaries ungarbled, and as a result, we are often confronted with the same frustration as Harry when his charms let him down. Nevertheless, fuzzy concepts are not by definition worthless; the fact that the concept of "love" can't be harnessed into a discrete and consistent definition doesn't make it useless. Ecologists should be aware of the inherent fuzziness of the ecological terms they are employing, and hence, the associated dangers (e.g., knowing that our own interpretation of the term "restoration" does not necessarily coincide with the ideas of our colleagues). We should take care when coining terms and try to carefully convey the context in which our terms are employed.

The group discussions that erupted from the DIACES experiment proved a good illustration of the possibility of success in the face of dogged persistence. One quite diverse group that included scientists studying nutrient cycling, contaminant biogeochemistry, marine phytoplankton, sediment geochemistry, coral reefs and bacteria discussed "ecological indicators" and the attributes of "good" indicators. After acknowledging that we were all looking at indicators from different scale perspectives, we agreed that communicating the results from studying a "good" ecological indicator would not only involve scientists, but also managers, policy makers and the general public (talk about brewing the ultimate Babel!). During freewheeling discussions and brainstorming, it was also concluded that a good, sensitive ecological indicator would have to be more than good – it would have to be "groovy". In other words, understandable and attractive to all targeted

audiences: interesting to the general public, important to policy makers, manageable to managers, while still meaningful to scientists. This idea of a "groovy" indicator resulted from comparing and contrasting each of the scientists' research systems, finding strong commonalities, and attempting to gain a deeper understanding of how scientists in other fields approached their research. In a final (and rather unexpected) eruption of consensus, it was decided that our resort's logo (the coquí, a diminutive tree frog endemic to Puerto Rico) effectively qualified as a groovy ecological indicator.

Unlike Harry Potter, however, the DIACES participants did not ultimately succeed in their quest for philosopher's stone of ecology (i.e., a set of unambiguously defined and universally applicable ecological concepts). Fuzziness is inherent, and as a consequence, it takes time and energy to come to terms with ecological terminology. The less we communicate across disciplines, the higher the semantic barrier. The most important conclusion from the DIACES experiment, then, is that multidisciplinary contact between young scientists should be strongly encouraged and facilitated at every opportunity. It is only by grinding ecological concepts through the mill of interdisciplinary contacts that the fuzziness will be dispelled and deeper understanding emerges. And it is only by looking over these interdisciplinary barriers, by scrutinizing radically different ecosystems, governed by radically different processes over radically different temporal and spatial scales, that ecologists might eventually rival Harry Potter's success.

ACKNOWLEDGEMENTS

This paper results from the discussions our working group II during the DIACES workshop in October 2002, Guanica, Puerto Rico. We thank our fellow group-members (Kelton L. Clark, Daniel N. Conde, Patricia Delgado, Tek B. Gurung, Sarah B. Griscom, Cecily C. Natunewicz, David M. Nemerson, and Joseph D. Warren) for the enlightening table and poolside arguments, as well as the other participants for the enjoyable week. Big hugs to Susan Weiler for the extraordinary organization, and many thanks to the DIACES / DIALOG sponsors for making this fantastic experience possible: National Oceanic and Atmospheric Administration (Grant NA160P1435 to Whitman College) and the Inter-American Institute for Climate Change Research (travel subsidies). DIACES was sponsored by Whitman College and the Estuarine Research Federation, and is part of the overall DIALOG Program (http://aslo.org/phd.html)

REFERENCE

The Encyclopaedia of Spells, The Harry Potter Lexicon, http://www.i2k.com/~svderark/lexicon/

DIALOG VI

Dissertations Initiative for the Advancement of Limnology and Oceanography

Program for Recent Ph.D. Recipients across the Aquatic Sciences and Related Disciplines

The DIALOG goal is to catalyze interactions and understanding across the aquatic sciences. Recent PhDs are targeted to introduce new graduates to the community, forge lasting collegial bonds across peer groups and foster early career development.

Ph.D. DISSERTATION REGISTRY

The registry encompasses *all* aquatic science disciplines. Dissertation abstracts are posted on-line in a fully searchable format, providing a concise overview of the field and highlighting individual accomplishments.

Graduates completing PhD requirements after April 1, 2003 are invited to register. Citations submitted within 3 months of PhD will be published in the *L&O Bulletin*. Participants will receive an abstract book, peer directory and a demographic report on their 2-year cohort.

ELECTRONIC COMMUNICATION

Once registered with DIALOG, graduates are placed on an e-mail list to foster cross-institutional communication and distribute job and other information. Anyone may submit job and other announcements for posting. Submissions should be sent to **dialog@whitman.edu**. Brief summaries are encouraged, with web addresses for details. Please do not send attachments.

Submit job and other announcements to

dialog@whitman.edu

SYMPOSIUM

"I suspect that, in years to come, the familiarity with distant specialties and connection to the top young scientists in diverse fields will greatly impact my own research and teaching."
Past DIALOG participant

The DIALOG symposia catalyze early career development with a focus on interdisciplinary understanding and peer networking across the full spectrum of aquatic sciences.

DIALOG VI will bring together 40 recent grads from around the world. Both oral and poster sessions will be used to relate each participant's dissertation research and current interests. Working groups will discuss emerging aquatic-science research, education, career and societal issues. Agency representatives will describe interdisciplinary and international aquatic science research opportunities. While the format is intense, there will be time for informal as well as formal interactions. Past participants agree this opportunity for information exchange and developing an international peer network should not be missed:

"I am positive that my perspective of science was changed by this meeting. It has already proven to be a milestone in my career."

"This is exactly the sort of thing we need to bring the newest generation of aquatic scientists together."

Symposium Eligibility

DIALOG VI+ is open to PhDs completed
April 1, 2003 - March 31, 2005
in any subject *within* or *relevant to* the biologically oriented aquatic sciences. Selection will favor applicants who plan to engage in interdisciplinary aquatic science research. Graduates from all nations are eligible. A committee will select 40 participants based on the application materials submitted. Travel subsidies are available for most countries

SYMPOSIUM Dates & Location

Fall, 2005
Check website below for details

Application Deadline

May 1, 2005

HOW TO PARTICIPATE

Abstract Registration Forms
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Symposium Application Instructions
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PhD Dissertation Registry

http://aslo.org/phd.html

Questions

C. Susan Weiler, Ph.D.
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*DIALOG is sponsored by the **American Society of Limnology and Oceanography** (**ASLO**) and **Whitman College**. Co-sponsoring societies: American Geophysical Union (**AGU**), Ecological Society of America (**ESA**), Estuarine Research Federation (**ERF**), International Society of Limnology (**SIL**), North American Benthological Society (**NABS**), North American Lake Management Society (**NALMS**), Society of Canadian Limnologists (**SCL**) The Oceanography Society (**TOS**) and Western Society of Naturalists (**WSN**).*

*DIALOG V and VI are supported by **NSF**, **NASA**, **NOAA** and **ONR**.*

L&O BULLETIN

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ASLO