

The Business of Ocean Science

BY MARGARET LEINEN

I'VE HAD AN OPPORTUNITY to watch ocean science develop over the past 30 years from the standpoint of student, researcher, faculty member, academic and government administrator, and now, from the business perspective. Although the ocean science research community has had limited interaction with the business community to date, I believe that this situation will change dramatically during the next 10 to 15 years. Other than ocean scientists who study fisheries or important food fish species, those whose fields are of interest to the oil industry, and most recently those who study marine organisms that may have bioprospecting payoffs, few of us have had our work lead to commercial development. But the demands of the economy and environment, as well as the interest of ocean scientists in contributing to society in new ways, are combining to open new opportunities with the private sector.

As new technologies developed that permitted us to characterize the ocean synoptically, remotely, and with many of the tools used in other fields (e.g., genomics), our field has moved from description and parameterization

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to process understanding and emerging predictive capability. Our studies have highlighted the many ways in which the ocean influences weather, climate, resources, transportation, hazards, and human health. This new knowledge emerged at the same time the commercial world learned that sophisticated environmental analysis can reduce risk, improve competitiveness, and increase economic growth. For example, improvements to forecasts of hurricane strength and direction of movement save \$40M per hurricane by avoiding unnecessary closures (*Online Journal of Space Communication*, 2003). Modern business now demands these environmental knowledge products. The commercial sector has begun to interact with ocean science and our closely related fields of atmospheric science and climate. Emerging fields are ocean tidal energy, marine biofuels, and coastal prediction. These are appropriate and productive opportunities with a private sector space that is growing rapidly. *Barron's* (Pointer, 2008) recently reported that the 390 companies in the climate-change sector of the US economy represent \$300B in annual income.

The interest of the private sector in closer interaction with the ocean sciences community comes at a time when there is a growing desire on the part

of many ocean scientists to move in this direction as well. Some scientists have a fundamental desire to put their knowledge to use—as well as to develop new knowledge that has its roots in environmental stewardship. Others simply see an opportunity to put their new instruments or methods to work. These tools can be used to generate knowledge and knowledge products, but can also be important products in themselves.

Because for so long our field has had a basic-research focus, as opposed to an applied orientation, students with entrepreneurial inclinations have generally neither been attracted to ocean science nor recruited. We have few examples of fellow faculty or graduates who have been successful in the private sector, and some of those who are successful moved to other fields to apply their quantitative training. This paucity of role models means that few of us understand how to balance education for future basic research with education for development research, application, and commercial activity. Students complain about our lack of sophistication with the private sector and our rejection of ambitions other than basic research. Faculty interested in developing commercial applications note the lack of support from institutions and colleagues. I think that our ocean science academic institutions must

consider how to provide more balanced opportunities. It may be time for us to look to models from other departments/colleges—for example, chemistry, the biomedical sciences, and engineering—to bring new life into our curricula, to provide opportunities to intern in the private sector, and to understand which interactions have proven productive and which cause problems. Our colleagues across campus have been doing this for years.

Finally, collaboration with the private sector has the potential to bring significant new resources to ocean science. Our field has traditionally depended on a few sources of funding for research. In the post-WWII days, the US Navy provided the lion's share of funding for US research—both through Office of Naval Research grants and through the Navy's institutional support of ten oceanographic institutions to stimulate the development of the field. During the 1960s and 1970s, the growing National Science Foundation (NSF) began to play an increasingly important role. The National Oceanic and Atmospheric Administration's Sea Grant program provided an opportunity to fund basic research related to important ocean management issues. But, as our knowledge and capabilities increased—as well as our needs—funding did not keep

pace. Navy funding for basic research has been constrained from a broad landscape to a few strategic areas related to the Navy's special interests; NSF funding has not been able to fill the gap. I want to emphasize that the commercial sector will never be a replacement for federal

solution of problems, as well as enhance basic understanding, are coming together. I think they will change the face of our field. Appropriate relationships with the private sector can play a positive and complementary role without compromising the integrity of basic research.

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basic research funding. Instead, it is a source of important additional funds for different types of research—research focused on solving specific problems. While these will be problems of commercial interest, they are also dominated by problems of societal interest: decreasing climate and environmental risk and improving coastal environments, marine transportation, and ocean and human health, in addition to traditional marine business interests in resources.

The natural evolution of our science, the dramatic needs for ocean science knowledge, and the desire of ocean scientists to actively participate in the

And, those new relationships will be an important part of the development of ocean science from a field that the public has associated primarily with SCUBA diving and fisheries, to a more mature field with powerful connections to the economy, as well as to the security of the nation and our quality of life.

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