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## Comments

Several contributions to vol. 5 no. 2 of *Oceanography* are reflections on the present debate about the future functioning of the Oceanography Society and on the state of oceanography generally. While I agree with much of what is being said I feel that a comment from someone who is not immersed in the teaching and research environment of the USA might have some value.

If Chris Mooers' recollection that "TOS emerged . . . to provide an independent, unified focus for oceanography in the USA which could help . . . project our views and priorities on the national policy and funding scene" is correct, I must confess that I joined TOS under false expectations.

There can be no doubt that any oceanographic society can only serve its members well if it can be heard at government level when it comes to the formulation and implementation of science policy. I also admit that recent changes in Washington will require efforts by TOS to assess and influence their impact on the professional prospects of oceanographers in the United States. However, what sets TOS apart from other professional societies in marine sciences is (or so I believed) its international outlook and member-

ship, which can easily be jeopardized if TOS is defined solely on the basis of what in the USA could be called domestic needs.

You have to realize that to strike the correct balance requires more than oceanographic skills. On the other hand, no one can deny that if you are looking for scientific leadership most scientists would look towards the USA. On the other hand, acknowledging scientific leadership does not necessarily imply identification with the problems and political positions of the USA. Scientists outside the USA will have to be motivated by more than a focus on purely domestic needs of United States oceanographers, which does not offer them any membership benefits, if TOS wants them to join.

In my view, the fact that "a significant fraction" of TOS' membership is international (Chris makes it sound almost like a negative argument) is one of TOS' best achievements. I joined TOS because I had the impression that the Society was taking a fresh approach to the idea of a US-based *international* society. I have used and continue to use journals published by so-called "American" societies but I cannot see myself joining a society which usurps the name of a continent for a country. (For similar reasons, I did not join the Royal Meteorological Society, Australian Branch, before it reformed itself into the Australian Meteorological and Oceanographic Society.) I urge our members to work towards enhancing TOS' international profile. I look forward to TOS sponsoring meetings outside the USA.

My second comment relates to Joseph Pedlosky's valuable assessment of graduate education in physical oceanography. I agree with his description of the *status quo*. As head of a discipline of meteorology and oceanography in a school of earth sciences, I give my full support to statements such as "for physical oceanographers breadth in education demands preferentially the study of meteorology, mathematics, engineering, and advanced topics in other branches of physics." I am not so convinced about the conclusions, which look more like a blueprint for a better teaching environment in geophysical fluid dynamics.

Physical oceanography cannot thrive without geophysical fluid dynamics, but it is more than that. This is evident in many of the large and expensive projects currently funded by the National Science Foundation (NSF) in the USA, the Australian Research Council (ARC) in Australia, and their equivalents in other countries. The World Ocean Circulation Experiment (WOCE), for example, combines a massive observational field program with an equally massive geophysical modelling effort.

My reading of Joe Pedlosky's review gave me the conclusion that the teaching of geophysical fluid dynamics may require some new structures and initiatives but is essentially healthy. I am not so sure whether the same can be said of the other component, for want of a better name often referred to as regional oceanography for nearly a decade now and am constantly amazed by the lack of knowledge of the most basic facts about the geography, circulation and water mass structure of the oceans; and this is true not only for students but also for some of my distinguished colleagues who are modelling the oceans and the atmosphere numerically or analytically.

There are other symptoms that suggest the teaching of regional oceanography is not in good

shape. The fact that any in-depth study of regional oceanography still has to rely on the oceanographic classic *The Oceans* (Sverdrup *et al.*, 1942), written half a century ago, speaks for itself. In comparison, lecturers teaching geophysical fluid dynamics have a choice of excellent modern textbooks on ocean dynamics. In my view, the vastly increased oceanic database of today makes an update of Sverdrup's contribution to *The Oceans* a very high priority for physical oceanography teaching. (This view appears to be shared regularly by reviewers of new so-called introductory texts for marine sciences aimed at the undergraduate college market, none of which comes close to Sverdrup's work.)

Large international programs such as WOCE or TOGA-COARE (Tropical Ocean, Global Atmosphere-Coupled Ocean-Atmosphere Response Experiment) are increasing the demand for experienced sea-going oceanographers, and some institutions are finding it difficult to meet this demand. A year ago I received a phone call from Germany and was surprised to learn that a country with a high profile in atmospheric and oceanic modelling and an impressive track record of field research, where just over two decades ago Günter Dietrich used his valuable text *General Oceanography* (Dietrich *et al.*, 1980) to train a generation of students, had difficulties keeping one of its research vessels occupied because of a lack of regional oceanographers.

These comments are by no means an in-depth analysis of regional oceanography today. All I want to point out is that an assessment of teaching physical oceanography is incomplete if the state of affairs in regional oceanography is not addressed. In my view, it is worse than the situation in geophysical fluid dynamics.

Finally, though I agree that the idea of a marine science curriculum as suggested by the breadth of Sverdrup *et al.* (1942) is no longer tenable, let us not forget that for quite a few of us the attraction of physical oceanography is its position at the crossroads between two areas of science. On the one front we work with meteorologists, mathematicians, and engineers, tackling problems such as climate change, air-sea interaction, or environmental management of the shelf and coastal zone; on the other we talk to biologists, chemists, and scientists from other branches of marine sciences assisting them with ecosystem modelling or larval recruitment studies. When teaching physical oceanography, I have to keep in mind my students who work in our interdisciplinary programs with marine scientists in the School of Biology. This guarantees a place for an elementary textbook on all marine sciences in any curriculum for physical oceanography.

## References

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