

# ASSOCIATE EDITORS (Continued)

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**"Iron, Liebig's Law and the Greenhouse,"** Feature article by J. Martin (*Oceanography* 4:2, p. 52-55).

## Comments

The author's main message is that an iron-fertilization experiment should be conducted in the open ocean. This experiment would help us understand how iron affects marine biology and geochemistry. I have reservations concerning an iron-enrichment experiment in the open ocean. There are too many unknowns, especially questions concerning the impacts of the experiment on marine ecology. We do not need to run the risks of major ecological impacts on our marine environment in order to learn how the ocean functions.

If greenhouse CO<sub>2</sub> gas is the reason for promoting the experiment, I think we definitely do not need to worry about iron fertilization. First-order model calculations show that no significant reduction of atmospheric CO<sub>2</sub> can be expected during the next century because of iron fertilization in nutrient-rich regions. The example of model CO<sub>2</sub> reduction from Joos *et al.* (1991) is misleading. If a 90-ppm reduction represents 60% of the increase expected over the next 100 years (under a constant-CO<sub>2</sub>-emission scenario), the increase would be only 150 ppm. If the atmospheric CO<sub>2</sub> concentration before iron fertilization in 1990 was 350 ppm, then atmospheric CO<sub>2</sub> would be only 500 ppm in year 2090. This value is much too low. If we can achieve this low level through emissions control, we need not consider iron fertilization in the Antarctic Ocean. By contrast, we should expect a value of about 800 ppm by then if emissions continue to increase under a business-as-usual scenario. The 90-ppm reduction would only be about 20% of the increase, or 11% of the atmospheric level in the year 2090. Furthermore, these projected values are obtained under the assumption that iron fertilization works with 100% efficiency; anything less would lead to a lower value of CO<sub>2</sub> reduction. Iron is not the way for mending the greenhouse problem.

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## Reply to Comments

I disagree with several points made by Tsung-Hung Peng in the preceding letter. First and foremost, it is difficult to image how the addition of less than 0.1  $\mu\text{mol}$  unchelated Fe/liter could result in: "... major ecological impacts on our marine environment." Concentrations far exceeding this regularly occur in nearshore waters; phytoplankton

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culture media often contain over 10  $\mu\text{mol}$ s of chelated Fe/liter. All in all, iron is pretty benign stuff. Furthermore, there is a great deal of interest in a well-designed and executed mesoscale iron-enrichment experiment. Obviously one of the most important aspects involves testing the Fe limitation versus zooplankton grazing hypotheses for high-nutrient, low-chlorophyll regions of the ocean. Without unenclosed experiments, the effects of zooplankton grazing will never be adequately assessed, because it is clear that these animals cannot function normally in bottles.

In regards to greenhouse CO<sub>2</sub> gas, Dr. Peng is right. Massive Fe fertilization is now a dead issue (horse) and we all should quit beating it. On the other hand, Fe plays a critical role in phytoplankton biochemistry. It is very scarce in many nutrient-rich regions of the global ocean. There can be little doubt that iron plays a keystone role in the biogeochemical ocean-atmosphere cycling of carbon, sulphur and other elements that directly affect global climate change.

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**"Meeting, Societies, and Critical Masses,"** Quarterdeck editorial by Charles A. Nittrouer (*Oceanography* 4:2, p. 50).

## Comments

As a person who has been nibbling at interdisciplinary science over the past decade or so, I share membership in several societies with Chuck Nittrouer. I replace his ASLO with AMS. We share membership in AGU and TOS, and probably AAAS, Sigma XI and maybe others.

I attend several big meetings, some limited topic workshops, and lots in between. I enjoy the workshops best, but, alas, attend the fewest number of them. Examples of the in-between include TOS, AMS Conferences. Common examples of big meetings are the AGU Fall meeting (in San Francisco) and the AMS Annual Meeting (varied locations). For me, these are wonderful opportunities for meeting people, but not much good for scientific exchange. They are sometimes called Circuses. With so many people in attendance, I spend most of my time in the halls and little time in actual sessions. Hallway meetings are valuable and can result in much scientific exchange (albeit informal), but I somehow feel guilty not listening to as many of the papers as I would like. Additionally, when I do get a chance to attend a session, there is often more than one I would like to attend at the same time. I can find myself jumping around, thereby losing continuity.

The only real value I can see in big meetings is the involvement of more than one discipline. These are best when sponsored by more than one society. I hope that is what Chuck had in mind for his large jointly sponsored technical meeting. Maybe a few papers in one discipline might catch the interest of a scientist from another. Maybe scientists from varied disciplines might meet at one of the social events.

One example of such a dual meeting is the recently terminated bi-annual Ocean Sciences meeting sponsored by AGU and ASLO. I would love to see a similar joint meeting co-sponsored by TOS and AMS. I realize both have officially co-sponsored common meetings. However, one has been the lead and the other has not done much more than lend its name as co-sponsor. What I have in mind is true co-sponsorship. That is co-promotion. I realize that also means sharing the proceeds. I hope that such

financial sharing will not stand in the way of scientific sharing.

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**Editor's Note:** In the jargon of the specialists, Alan's "true co-sponsorship" is termed joint sponsorship.

## Comments

In response to the Editor's request for commentary on "Meetings, Societies, and Critical Masses," I wish to share some strategic perspectives (from the rank-and-file) on the present and future functions of The Oceanography Society (TOS). It is my recollection that TOS emerged from years of preliminary discussions to provide an independent, unified focus for oceanography in the USA which could help foster the membership's professional identity as well as project our views and priorities on the national policy and funding scene. In the four years of its existence, TOS has provided a remarkably fine multidisciplinary, general-interest magazine and two tremendous multidisciplinary overview meetings. (Never to be forgotten is the enormous, dedicated effort Jim Baker invested in bringing TOS to life competently.) However, today, TOS has a modest-sized (in fact, subcritical) membership, which was largely achieved within its first year, and a significant fraction of which is international. Frankly, other, pre-existing scientific and engineering societies have continued to grow and develop strong meetings and publication programs. Most of them offer hard science outlets, usually with multidisciplinary as well as disciplinary activities. Thus, is there a need (indeed, a future) for TOS?

Yes, we need a TOS, in my opinion. The real question is, "Which option should be pursued for TOS?" As I see it, there are four more or less distinct options. First, to provide a full service, scientific society, something akin to ASLO, or (on a larger scale) AGU, which would perpetuate the present competitive conflict with the other societies. Second, to provide an umbrella function in linking the ocean science-related societies: AGU, AMS, ASLO, ERF, MTS, etc., which would require their concurrence. Third, to provide an international ocean sciences society to link national societies, which may be needed, but which would preclude it playing the role as the USA lead society and would dictate the formation of an American Oceanographic Society (AOS) to provide the latter function. Fourth, to provide a full-service, scientific and professional society like AMS, which would serve the professional needs of practitioners as well as academic scientists; this would require a major change in TOS's constituency (and possibly merger with one or more societies), but it would give TOS (or AOS) a critical mass and robustness it sorely needs, and it would bolster the mission-oriented agencies, such as NOS/NOAA, which may develop to become vital to our community.

I think the first option is inconsequentially untenable. The second option is a default option, but possibly financially non-viable. The third and fourth options are not mutually exclusive and would be the most consequential on the long term. (Indeed, if we cannot find a way to encompass the scope of the fourth option, either our field will never reach its next stage of maturity or some other society will be induced to provide us with the opportunity.) To explore thoroughly the merits and pitfalls of these (and possible other) options, and to produce a new charter and action plan, I recommend that the TOS Council convene a "continental congress" of ocean-related societies, soon.

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