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OCB-OA: Ethics

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Why shouldn't we let the oceans just continue taking up CO_2 and buffering climate?

Basic: It is possible that allowing CO_2 to dissolve in the ocean might slow atmospheric warming. However, what ocean acidification research is telling us is that such benefit to the climate comes at a cost to the ocean and the ecosystems. It is important for societies to weigh those costs and benefits to make an informed decision whether the potential damage to marine ecosystems is justified..

Intermediate: Ocean acidification and climate change are two sides of the same coin. Both are direct consequences of anthropogenic CO_2 emissions and occur simultaneously. The oceans currently take up about one quarter of anthropogenic CO_2 emissions, and this service slows the rate of climate change. In the long term, on time scales of tens of thousands of years, the majority of anthropogenic CO_2 emissions (80–90%) will end up in the ocean, but over shorter time scales (centuries to several thousands of years), most of the CO_2 will remain in the atmosphere. It is also important to point out that impacts on the oceans affect the functioning of Earth's ecosystems. The oceans provide vital roles in biogeochemical cycles, not only in the regulation of CO_2, but in the production of oxygen, the cycling of nitrogen and other important nutrients, and the production of gases that affect such things as cloud formation. Many species use both land and ocean habitats, and many humans rely on healthy oceans for their food and livelihoods. The oceans are an integral, interconnected part of the Earth system, and cannot be realistically considered as a separate entity. — U. Riebesell, J. Kleypas, C. Turley, M. O'Donnell

Why is ocean acidification important enough to justify large government expenditures?

Basic: We have a lot to learn before we know as much about ocean systems as we do about land systems. Unfortunately, ocean research tends to be relatively expensive because it covers such a large portion of the planet, and many of the areas are very harsh. But we know ocean acidification exists, and it will probably have consequences that reach across all planetary systems, and even through human society. Now we need to find out exactly what those consequences will be and what solutions are available.

Intermediate: The oceans and their ecosystems are poorly understood compared to the terrestrial environment. Our knowledge is rapidly growing, however, we still have much to learn. Scientists need to give policymakers the best possible information so that they can make informed decisions regarding ocean acidification. That requires research, and in the open ocean, that research is expensive. Scientists have clear evidence that ocean acidification can impact marine species (including species extinction within decades) but most of the science is based on single-species experiments. How this translates at the ecosystem level is poorly understood and requires complex (and expensive) experimental design. However, it is the only way to answer the question and obtaining and distributing that knowledge takes considerable effort. Maintaining clear, open communication among researchers, leaders, and citizens is critical.

Scientists have answered the question "Is ocean acidification real?" with a definite "yes." Now we must address the questions: "How bad will the consequences be?" and "What are the solutions?" The first of these is the most difficult question to answer, because we already know that CO_2 levels will continue to rise for the foreseeable future and consequently ocean acidification will increase. Because of the impacts of ocean acidification on marine species and ecosystems that provide food and other services, many scientists are focused on what CO_2 concentration is considered dangerous to the planet and to society. In answering the question "What are the solutions?" most scientists agree that reducing greenhouse gas emissions is the best solution. Yet because atmospheric CO_2 concentrations continue to rise, the emphasis on ocean acidification has necessarily shifted from what can be done about the cause of the problem (rising CO_2) to what can be done about its consequences. This is a huge challenge. —J. Kleypas, C. Turley, R. Key, R. Feely, P. Williamson, S. Dupont

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