Ocean Iron Fertilization and Carbon Sequestration:
Can the Oceans Save the Planet?
2008 AAAS Annual Meeting
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Synopsis

Over the past decade, the issue of global climate change has moved from a scientific possibility to a political reality. As scientific evidence of climate change has mounted, so has the political pressure to consider approaches to help mitigate the magnitude and rate of change and to reduce the scale of environmental impacts. In this session we will summarize the state of the science with respect to carbon sequestration in the oceans, including addressing the capacity of the oceans to absorb additional carbon dioxide, highlighting recent advances in carbon dioxide injection technology, and discussing the broad ethical implications of geoengineering the Earth's climate.

Advances in Our Understanding of Iron Fertilization in the Oceans: What comes next?

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1. Large-scale experiments have demonstrated that iron availability limits phytoplankton production in parts of the oceans and that external iron addition can increase production, resulting in short-term decreases in atmospheric CO_2.
2. The efficacy of iron-induced sequestration of atmospheric CO_2 to the deep sea, however, remains poorly constrained, and we do not yet understand the full range of intended and potential unintended biogeochemical and ecological impacts.
3. Carbon mitigation approaches based on iron fertilization, including carbon offsets, are premature until it is better demonstrated that fertilization effectively removes CO_2, retains that carbon in the ocean for a quantifiable amount of time, and has acceptable and predicable environmental impacts. Adequate scientific information to enable a decision regarding whether credits should be issued would require targeted research programs on larger and longer scales than previously conducted.

Engineered Storage on the Abyssal Plain: Prospects for a new approach to ocean carbon storage, and some thoughts about geoengineering

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1. Ocean carbon mitigation approaches involve both geoengineering efforts that extract existing CO_2 from the atmosphere and CO_2 capture efforts that sequester carbon prior to atmospheric emission.

2. The abyssal plain is a particularly promising location for CO_2 storage because the CO_2 is negatively buoyant. Confinement is required to prevent mixing and the use of engineered structures, in the form of giant bladders, may prove surprisingly feasible and cost-effective.
3. Geoengineering exists in a dangerous middle world, with much talk but little serious research. Given the slow pace of emission reduction efforts, a modest research program on geoengineering is warranted, to understand the technical potential, to identify risks, and to explore the social and economic dimensions.

Even If We Can Do It, Should We?: Ethical implications of geoengineering the climate

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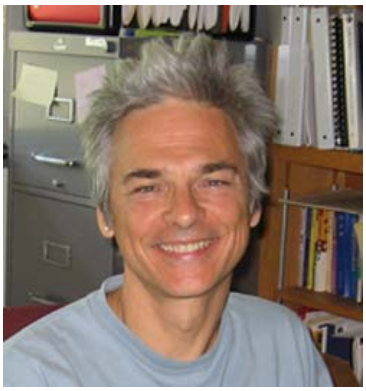

1. Geoengineering poses important questions of justice and ethics, including those concerning democratic legitimacy, the possibility of irreversible changes, and the importance of living with nature.
2. Recent proposals that involve using the oceans for iron fertilization and carbon sequestration also raise questions about the role of profit-making firms in addressing global environmental problems.
3. The difficult question to which we must respond is the challenge of the climate change version of the "ticking bomb" case (i.e., when, by hypothesis, catastrophic climate change is imminent and geoengineering is the "lesser evil").

Discussant for moderated panel – Brief overview of the international legal issues related to ocean iron fertilization and ocean carbon sequestration

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1. Ocean iron fertilization poses unique legal challenges under the law of the sea and international environmental law, including the application and relevance of the precautionary principle.
2. Several recent events on the international scene, including decisions of the parties to the 1972 London Convention and its 1996 Protocol, are setting the stage for developing the current legal climate on iron fertilization and ocean carbon sequestration more broadly.
3. The legal climate in terms of carbon credits is also maturing, under the regime of the 1992 UN Framework Convention on Climate Change and its 1997 Kyoto Protocol.