

New research discredits \$100B global warming 'fix'

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Virginia Key, Fla. -- Scientists have revealed an important discovery that raises doubts concerning the viability of plans to fertilize the ocean to solve global warming, a projected \$100 billion venture.

Research performed at Stanford and Oregon State Universities, published in the Journal of Geophysical Research, suggests that ocean fertilization may not be an effective method of reducing carbon dioxide in the atmosphere, a major contributor to global warming. Ocean fertilization, the process of adding iron or other nutrients to the ocean to cause large algal blooms, has been proposed as a possible solution to global warming because the growing algae absorb carbon dioxide as they grow.

However, this process, which is analogous to adding fertilizer to a lawn to help the grass grow, only reduces carbon dioxide in the atmosphere if the carbon incorporated into the algae sinks to deeper waters. This process, which scientists call the "Biological Pump", has been thought to be dependent on the abundance of algae in the top layers of the ocean. The more algae in a bloom, the more carbon is transported, or "pumped", from the atmosphere to the deep ocean.

To test this theory, researchers compared the abundance of algae in the surface waters of the world's oceans with the amount of carbon actually sinking to deep water. They found clear seasonal patterns in both algal abundance and carbon sinking rates. However, the relationship between the two was surprising: less carbon was transported to deep water during a summertime bloom than during the rest of the year. This analysis has never been done before and required designing specialized mathematical algorithms.

"By jumping a mathematical hurdle we found a new globally synchronous signal," said Dr. Lutz.

"This discovery is very surprising", said lead author Dr. Michael Lutz, now at the University of Miami's Rosenstiel School of Marine and Atmospheric Science. "If, during natural plankton blooms, less carbon actually sinks to deep water than during the rest of the year, then it suggests that the Biological Pump leaks. More material is recycled in shallow water and less sinks to depth, which makes sense if you consider how this ecosystem has evolved in a way to minimize loss", said Lutz. "Ocean fertilization schemes, which resemble an artificial summer, may not remove as much carbon dioxide from the atmosphere as has been suggested because they ignore the natural processes revealed by this research."

This study closely follows a September Ocean Iron Fertilization symposium at the Woods Hole Oceanographic Institution (WHOI) attended by leading scientists, international lawyers, policy makers, and concerned representatives from government, business, academia and environmental organizations.

Topics discussed included potential environmental dangers, economic implications, and the uncertain effectiveness of ocean fertilization. To date none of the major ocean fertilization experiments have verified that a significant amount of deep ocean carbon sequestration occurs. Some scientists have suggested that verification may require more massive and more permanent experiments. Together with commercial operators they plan to go ahead with large-scale and more permanent ocean fertilization experiments and note that potential negative environmental consequences must be balanced against the harm expected due to ignoring climate change.

During the Ocean Iron Fertilization meeting Dr. Hauke Kite-Powell, of the Marine Policy Center at WHOI, estimated the possible future value of ocean fertilization at \$100 billion of the emerging international

carbon trading market, which has the goal of mitigating global warming. However, according to Professor Rosemary Rayfuse, an expert in International Law and the Law of the Sea at the University of New South Wales, Australia, who also attended the Woods Hole meeting, ocean fertilization projects are not currently approved under any carbon credit regulatory scheme and the sale of offsets or credits from ocean fertilization on the unregulated voluntary markets is basically nothing short of fraudulent.

'There are too many scientific uncertainties relating both to the efficacy of ocean fertilization and its possible environmental side effects that need to be resolved before even larger experiments should be considered, let alone the process commercialized,' Rayfuse says. 'All States have an obligation to protect and preserve the marine environment and to ensure that all activities carried out under their jurisdiction and control, including marine scientific research and commercial ocean fertilization activities do not cause pollution. Ocean fertilization is 'dumping' which is essentially prohibited under the law of the sea. There is no point trying to ameliorate the effects of climate change by destroying the oceans - the very cradle of life on earth. Simply doing more and bigger of that which has already been demonstrated to be ineffective and potentially more harmful than good is counter-intuitive at best.'

Indeed, the global study of Dr. Lutz and colleagues suggests that greatly enhanced carbon sequestration should not be expected no matter the location or duration of proposed large-scale ocean fertilization experiments.

According to Dr Lutz "The limited duration of previous ocean fertilization experiments may not be why carbon sequestration wasn't found during those artificial blooms. This apparent puzzle could actually reflect how marine ecosystems naturally handle blooms and agrees with our findings. A bloom is like ringing the marine ecosystem dinner bell. The microbial and food web dinner guests appear and consume most of the fresh algal food."

"Our study highlights the need to understand natural ecosystem processes, especially in a world where change is occurring so rapidly," concluded Dr. Lutz.

The findings of Dr. Lutz and colleagues coincide with and affirm this month's decision of the London Convention (the International Maritime Organization body that oversees the dumping of wastes and other matter at sea) to regulate controversial commercial ocean fertilization schemes. This gathering of international maritime parties advised that such schemes are currently not scientifically justified.

Strategies to sequester atmospheric carbon dioxide, including the enhancement of biological sinks through processes such as ocean fertilization, will be considered by international governmental representatives during the thirteenth United Nations Framework Convention on Climate Change conference in Bali next month.

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