

Mark Seres

Senior Division Environmental Sciences

Optimization of the Amount of Iron for the Enhancement of Phytoplankton Blooms

One of the major geoengineering project, a project to provide an immediate counter-balance to climate change, proposals up for consideration is the enhancement of phytoplankton populations in the oceans with iron dust. Phytoplankton produces large amounts of oxygen and dimethyl sulfide (DMS), a cloud nucleation enhancer, while consuming carbon dioxide, a major greenhouse gas. Increasing phytoplankton populations would then theoretically also enhance the production of oxygen and DMS and the reduction of carbon dioxide out of the atmosphere, although the amounts of gas increase/decrease are still debated. The purpose of this experiment is to determine the optimum level of iron dust to be deposited into oceans. The apparatus setup consisted of five cylindrical containers which all had simulated seawater accompanied with phytoplankton. Differing amounts of iron dust were then inserted into four of the five containers, the last of the containers remained as a control. The containers were swirled daily to ensure that the iron dust does not merely settle to the bottom of the container. The contents of the containers were examined every other day through light spectrometry in order to quantitatively determine changes in density in the container. This experiment was repeated with slightly varying iron powder amounts. The results of the experiments suggested that overall the container with 0.2 g of iron powder had the highest increase in phytoplankton blooming. Extrapolation of this data may help the determination of allocative efficiency for this geoengineering project when it will be further considered.