

Proposal of Comprehensive Sea Water Utilization and Its Evaluation for Countermeasures against the Global Warming

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Summary

Focusing on the fertilization technique as one of the countermeasures against the global warming using the ocean, the effects of fertilization of ocean with nutrients, such as nitrogen and phosphate, are examined on the propagation of the plant biota, and on the decrease in the surface-ocean partial pressure of CO_2 , which enhances the drawing down CO_2 from the atmosphere.

In the present study, we evaluated the validity of this countermeasure from the view points of mass balance, energy balance and dynamics. By using the two box model, we numerically simulated the time-varying effects of fertilization for several ways of fertilization, considering recirculation of the inorganic /organic carbon and nutrients and carbon fixation by plant biota, where the desired amounts of nutrients were determined on the bases of PNC ratio in the plant biota in ocean.

The results indicated that this technique possibly have an expected effect on the restraint of the increase in atmospheric CO_2 within a few years, while its effect on the oceanic organic carbon in the surface is only doubling the present thin concentration for hundredyears' fertilization. The energy evaluation also indicated that the amount of CO_2 produced from the manufacture and transportation of the fertilizer of both N and P is no more than 9 % of the amount that is expected to be taken up into the ocean from the atmosphere.