Ocean Macronutrient Fertilisation –An enhanced natural carbon sink?

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In order to meet the goal of limiting global average temperature increase to less than 2 ˚C, it is increasingly apparent that anthropogenic CO_2 sinks of up to 10 Pg C yr^{-1} will be needed before the end of the century. Ocean iron fertilization, although controversial has been shown to be one of the few technologies with a large capacity for removing CO_2 from the atmosphere. Here I present the findings of a study to assess the capacity of an alternate form of ocean fertilization, Ocean Macronutrient Fertilisation (OMF). Sufficient phosphate exists outside the iron limited surface ocean to support once-only sequestration of up to 3.6 Pg C by fertilization with nitrogen. Ongoing sequestration using nitrogen fertiliser is estimated at 1.07±0.27 Pg C yr-^{1}. If N and P were used in combination to fertilise the ocean, the size of the CO_2 sink thus created is limited by societies willingness to utilize phosphate resources. Doubling current phosphate production would allow an additional 0.9 Pg C yr^{-1} sequestration and consume 0.07% yr^{-1} of known global resources. Environmental risks have received little quantitative evaluation; however it is likely they could also limit the scale of implementation.

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