

Geoengineering Application Of Wave-Driven Ocean Upwelling Pumps

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A distillation of the many concerns regarding geoengineering expressed in abstracts submitted thus far (as of June 11) to this Workshop suggests that any technology ultimately deployed must at a minimum offer all these capabilities:

1. Be controllable
2. Be reversible
3. Closely mimic natural earth processes
4. Both development and eventual deployment be low cost
5. Should minimize any unintended consequences
6. Be safe, e.g. low risk of unknown consequences
7. Be available soon
8. Able to scale up quickly
9. Be acceptable to the major political, religious, economic, environmental and societal interest groups
10. Not pose ethical issues
11. Not present moral hazards
12. Able to be financed and insured
13. Be effective in maintaining a hospitable global environment for up to ten billion humans.

Fortuitously, at least one technology might pass muster. Wave driven ocean upwelling pumps (which only produce upwelling when wave conditions are sufficiently robust) can be remotely controlled to negate pumping action, and thus the effects can be closely monitored and if negative outcomes become evident, the pumps deactivated to allow the oceans to return to their previous state. They very closely mimic natural ocean upwelling which happens frequently across all the earth's oceans. Since the wave energy source is free, and the pump operates passively, this technology passes the low cost test. While there could be both unintended consequences, and risk of the unknown, a comprehensive testing effort should be able to quantify these elements and suggest strategies for minimizing unintended and unknown consequences. Based on our initial development and ocean tests of 21 prototypes ranging up to 1.1 meter diameter and 315 meter depth, we believe the technology is ready to begin elaborate testing. Since the pumps are deployed and operate as single units, they are eminently scaleable. Acceptability to a strong global majority may be a key favorable outcome of the testing program. It appears a strategy could be developed so this technology avoids ethical issues, and does not present moral hazards. Financing and insurance should be the logical outcome of the testing and acceptance. Finally, as suggested in the Workshop abstracts submitted by Wingenter and by Von Herzen, the technology could be effective in preserving an environment hospitable to the ten billion humans who possibly will live here by 2050-2075.