

CLIMATE PROGRESS

Exclusive: Chief sponsor of landmark climate manipulation conference maintains close financial ties to controversial geo-engineering company

Goodell: "Is this conference about advancing the science and governance of geoengineering or about advancing and raising the profile of the Climate Response Fund?"

March 18, 2010

[UPDATE: Sometimes blog posts have pretty immediate impacts -- see [here](#).]

I am not comfortable with the the idea that a meeting set up to create guidelines governing geoengineering field tests might be used to help raise funds for geoengineering field tests, without the informed consent of meeting participants. I am also concerned with possible conflicts of interest related to the profit motive.

That's from an e-mail that climatologist and geo-engineering expert Ken Caldeira sent me this week.

I had heard last week that Caldeira was not going to the star-studded "Asilomar International Conference on Climate Intervention Technologies" — the "Woodstock" of geo-engineering. I asked him why. I reprint his full email below, along with concerns raised to me by geo-engineering expert David Keith.

Frankly, **I think all of the conference attendees (and they include some of the biggest names in climate, [full list here](#)) need to ask themselves whether they are helping to legitimize — and thereby ultimately helping to raise funds for — a nonprofit that will not unequivocally forswear funding geo-engineering experiments, a nonprofit that is closely tied to the financing efforts of a for-profit company that has already started pursuing dubious geo-engineering schemes.**

This Asilomar conference, which begins next week, proclaims its lofty goal "to develop norms and guidelines for controlled experimentation on climate engineering or intervention techniques." That's one reason why, as journalist Jeff Goodell put it to me, it "needs to be purer than pure."

My Monday post pointed out that it appeared to fail that test because its [Sole "Strategic Partner" is Australia's "dirty coal" state of Victoria](#). Goodell, author of the forthcoming book, [How to Cool the Planet](#), said of that sponsorship, "I think it looks awful."

But a far bigger issue, according to many leading experts I spoke to, is that the "developer" of the entire conference is the Climate Response Fund, which has close ties to a very controversial geo-engineering firm, Climos. As [Science magazine's Eli Kintisch reported](#) in November:

Critics of the Response Fund and its conference worry about its ties to Climos, a geoengineering startup company started in 2005 by entrepreneur [Dan Whaley](#), Leinen's son. With Leinen as its chief scientific

officer, Climos [sought](#) to perform ocean [iron fertilization](#) experiments and sell carbon credits it could show it earned.

Facing international opposition to the idea of selling credits for the controversial technique, the firm decided last year to morph into an ocean logistics company, with scientists doing the ocean experiments funded by charity, presumably through Leinen's nonprofit, or other means. Whaley said he helped conceive of and launch the nonprofit, introducing Leinen to its fundraiser, Danielle Guttman. "Since then I've had no role," he said of the Response Fund. **Leinen said she no longer had "any financial interest" in the company, and Whaley agreed.**

The situation is a tad more complicated than that. Climos and the Climate Response Fund still have a very close financial relationship, as we will see. Also, if Climos is no longer pursuing research into ocean fertilization, you'd never know that from its [FAQ](#) or the [rest of its website](#), for that matter. The *Science* story continues:

Since geoengineering involves techniques that could have global repercussions, say experts, it's particularly important that any discussions about regulating the new technologies avoid the appearance of possible commercial interests or conflicts. These issues are particularly [acute](#) with commercial ocean fertilization.

"It would be better for people with less of an appearance of a conflict of interest [to] play this role," said Ken Caldeira of the Carnegie Institution for Science in Stanford, California, when discussing the Response Fund's role. "There's a perception that you've got a fox in the henhouse—for-profit companies or their nonprofit surrogates looking at governance of geoengineering." Physicist David Keith of the University of Calgary in Canada "welcomes" the effort but called Leinen's nonprofit "nontransparent and appears to be closely tied to Climos, which was conceived to do ocean fertilization for profit.

Goodell told me that he thinks the meeting could be an important turning point in thrashing out key issues of governance. But **Goodell posed to me the key question: "Is this conference about advancing the science and governance of geoengineering or about advancing and raising the profile of the Climate Response Fund? That's what a lot of the scientists I talked to are worried about."**

Goodell who interviewed many of the leading geo-engineering players for his book told me that Caldeira and Keith "have thought about the ethical issues of geo-engineering longer than most," so their concerns "have to be taken seriously." I have new comments from both of them below, but first let's look closer at Climos.

One of the few remaining non-aerosol strategies still taken seriously by some is ocean fertilization, yet a recent [Nature](#) article argued that strategy for geoengineering "should be abandoned."

The idea of selling carbon credits — i.e. offsets — to fund such projects was truly dreadful, as I discussed by in 2007 (see "[Rule Three of Offsets: No Geo-engineering](#)"). It was such a dubious idea that 18 leading experts from 13 countries, who comprise [the Scientific Steering Committee of the Surface Ocean–Lower Atmosphere Study \(SOLAS\)](#)—a leadin group studying the ocean-atmosphere system—went to the trouble of issuing a "[Position Statement on Large-Scale Ocean Fertilisation](#)":

Given our present lack of knowledge, the judgement of the SOLAS SSC is that ocean fertilisation will be ineffective and potentially deleterious, and should not be used as a strategy for offsetting CO2 emissions.

Ouch.

Indeed, a press release from the *Proceedings of the National Academy of Sciences* about a brand new study [notes](#):

A design scheme to engineer microalgae blooms in the world's oceans to reduce atmospheric CO₂ levels could contaminate the oceans with a neurotoxin, according to a study. Charles Trick and colleagues report that fertilizing the ocean with iron, a strategy proposed to boost the number of CO₂-consuming organisms living in the ocean's surface waters, would likely favor the growth of *Pseudo nitzschia*, a genus of phytoplankton that produces a component of the neurotoxin that causes Amnesic Shellfish Poisoning. The naturally occurring toxin could potentially cause human health risks if fish that feed on the algae, such as anchovies and sardines, were consumed, and may harm marine mammals and seabirds that feed on these fishes.

This I suspect we'll be the kind of thing will be reading more about — the unanticipated negative consequences of geo-engineering schemes. Indeed, it's easy to like geo-engineering when you don't know anything about it. Then it's just a magic panacea.

Certainly no company should have been proposing to do large-scale iron fertilization experiments funded by selling carbon offsets before there was far more data about the safety of such an approach and before their were established norms and guidelines. As Dr. Keith put it in an email to me:

“Driving iron fertilization by the carbon offset market combines two marginal ideas that are both subject to gaming, **its among worst ways one could imagine to govern geoengineering.**”

So having Climos set up and bankroll the Climate Response Fund, which in turn has set up and helped bankroll this landmark geo-engineering conference on governance is just a bad idea. Keith emailed me:

Given the diversity of views around geoengineering, such as **the sense that links to experimentation and commercialization with solar radiation management technologies set a very dangerous precedent, it's important that the meeting set the right precedent by being as divorced from commercial interests as possible.** As the sole sponsor for the meeting (as I understand it) **I would like to see the Climate Response Fund make a formal and unequivocal statement that they will not fund experiments** nor will they fund any for-profit organization with a substantial interest in geoengineering technologies.

I haven't been able to get such an unequivocal statement. But first, let me reprint Caldeira's full email in response to my question about why he wasn't going to this historic conference:

I have learned that the Asilomar geoengineering meeting is expected to play an important role in legitimizing and helping raise funds for Margaret Leinen's Climate Response Fund.

I have not seen any statement from Margaret Leinen or her Fund saying that the Fund will not support geoengineering field tests nor have I seen a statement saying that the Fund would not directly or indirectly transfer resources to for-profit companies like Climos.

I am not comfortable with the the idea that a meeting set up to create guidelines governing geoengineering field tests might be used to help raise funds for geoengineering field tests, without the informed consent of meeting participants. I am also concerned with possible conflicts of interest related to the profit motive.

Guidelines governing such tests should be developed as a product of an ongoing process involving established professional societies and organizations, established major non-profit institutions, intergovernmental institutions, or others who do not have an apparent stake in specific outcomes.

Margaret Leinen can obviate my concerns by stating clearly (1) that the Fund will not support

geoengineering field tests and (2) that the Fund would not directly or indirectly transfer resources to for-profit geoengineering companies like Climos (or other for-profit companies with significant financial participation by members of Margaret Leinen's family).

Without such statements, I cannot be confident that I am not being used without my consent for purposes of which I do not approve. Thus, I cannot attend the meeting.

I am also busy and have plenty of other things I need to do.

1. Funds made available by Bill Gates support several post-doctoral researchers in my lab, as well as access to computational facilities. Some, but far from all, of this research was geoengineering-related. (I attach the most recent paper supported by these funds, showing that about 1/4 of Chinese CO₂ emissions support consumption, primarily in the developed world.)
2. David Keith and I have used some of these funds to support meetings at which geoengineering was discussed. The flow of money was uniformly out and not in. All of the participants at these meetings were fully informed of their nature. No funds were ever raised in activities surrounding these meeting.
3. I am listed as an inventor on patents related to vertically pumping water in the ocean and related to storing carbon dioxide in the ocean by dissolving carbonate minerals. I have publicly stated that if any of these patents are used for climate modification purposes, I will donate my share of the proceeds to non-profit charities and NGOs.

When some of these concerns were first brought to my attention late last week, I emailed Dr. Leinen. Based on my interviews, there is some disagreement about whether a dinner immediately after the conference was ever going to be used for fundraising or not. But Leinen assures me in an email that it "is not, nor was it ever intended to be a fundraising dinner."

I also asked her the question that Caldeira had raised with me, "**Will the Climate Response Fund assert that it will not fund geoengineering field tests?**" At the time, the CRF had basically a one-page website, but Sunday night they put in place a comprehensive website. Dr. Leinen directed me to the "[About Us](#)" tab, which lists all of their goals and ends:

CRF is dedicated to this work and has no plans for funding field experiments.

As someone who lives in Washington DC and follows politics closely, the phrase "no plans" leaped out at me. For instance, FoxNews [reported](#) in May 2002, "The United States has no plans to invade Iraq or any other country, Defense Secretary Donald H. Rumsfeld said Friday." Doh!

Since CRF is based in Alexandria, VA (i.e. inside the DC beltway), I asked Dr. Leinen:

Many people have stressed to me the need to separate issues of governance from support/funding for actual tests. The optics issue is, according to some, especially significant for CRF given your personal connection to Climos.

The phrase on the website: CRF "has no plans for funding field experiments" is not a very definitive statement, at least in Washington DC, where politicians are constantly asserting they have "no plans" to do things that they in fact end up doing.

Q: Will the Climate Response Fund simply assert without hedges that it will not fund

geoengineering field tests now or in the future?

Her full reply:

Dear Dr. Romm,

None of us has a crystal ball for the future. But I think I understand the thrust of your question and want to respond fairly and not with wording that you would interpret as a “DC statement”. This requires thinking about whether there were any future conditions under which CRF would consider changing out plans.

Geoengineering field experiments are not in our current strategic plan. Our focus is on the norms and guidelines for research. Others are also focused on governance and see the norms and guidelines as an element of that governance. If in the future norms, guidelines and national/international governance were in place that made geoengineering field research acceptable and the scientific research community called on CRF to serve as a research funding entity, we might consider changing our plans.

Margaret Leinen

That is obviously not an unequivocal statement and disappointing to those who wanted a very bright line

Just yesterday, I was sent information that will be even more disappointing to those who wanted a bright line between nonprofit work to establish norms and guidelines for geo-engineering governance and for-profit work into geo-engineering strategies. The November *Science* article leaves the distinct impression that there is no financial connection between CRF (run by Leinen) and Climos (founded by Leinen’s son, Dan Whaley, with Leinen as its chief scientific officer):

Whaley said he helped conceive of and launch the nonprofit, introducing Leinen to its fundraiser, Danielle Guttman. “Since then I’ve had no role,” he said of the Response Fund. Leinen said she no longer had “any financial interest” in the company, and Whaley agreed.

But yesterday I was sent the “[Conference Attendee Biographies](#)” list and who is on the list under “CLIMATE RESPONSE FUND and CLIMATE INSTITUTE STAFF”:

Bill Kohrs
VP. Finance and Administration
Bio: Financial advisor to Climate Response Fund

Who is Bill Kohrs?

You’ll find his bio on the Climos [website](#):

Bill Kohrs holds the position of VP Finance and Administration and Head of Operations for Climos, Inc.

So the VP for Finance at Climos is The financial advisor to CRF. Again, here is what Climos does, according to its website:

We are in active collaboration on the scientific, technical and regulatory steps necessary to bring a next generation Ocean Iron Fertilization (OIF) project to realization. Our focus is providing services to enable these larger more complex field trials to be conducted, including legal, regulatory, environmental impact

work, communications, iron distribution and overall project management and logistics.

It's bad enough that the "Asilomar International Conference on Climate Intervention Technologies" has as its sole "Strategic Partner" Australia's "dirty coal" state of Victoria.

But I think it is just absurd that the landmark conference whose goal is "to develop norms and guidelines for controlled experimentation on climate engineering or intervention techniques" is so closely tied to a company that clearly wants regulatory freedom to pursue an extremely dubious geo-engineering scheme for profit.

I think CRF needs to make an unequivocal statement that they will not support geo-engineering field experiments — in order to remain a credible nonprofit in the arena of developing norms and guidelines for geo-engineering experiments.

I think all of the conference attendees need to ask themselves whether they are helping to legitimize — and thereby ultimately helping to raise funds for — a nonprofit that will not clearly forswear funding geo-engineering experiments, a nonprofit that is closely tied to the financing efforts of Climos, a for-profit company that has already started pursuing dubious geo-engineering schemes.

UPDATE: The CRF board has issued a statement of new policy [here](#) that addresses many issues raised here. Sometimes blog posts do have an impact.

Related Posts:

- [Science: "Optimism about a geoengineered 'easy way out' should be tempered by examination of currently observed climate changes"](#)
- [Caldeira calls the vision of Lomborg's Climate Consensus "a dystopic world out of a science fiction story."](#)
- [British coal industry flack pushes geo-engineering "ploy" to give politicians "viable reason to do nothing" about global warming.](#)

This entry was posted by [Joe](#) on Thursday, March 18th, 2010 at 2:48 pm and is filed under [Geoengineering](#). You can follow any responses to this entry through the [RSS 2.0](#) feed. You can skip to the end and leave a response. Pinging is currently not allowed.

25 Responses to "Exclusive: Chief sponsor of landmark climate manipulation conference maintains close financial ties to controversial geo-engineering company"

1. *johna* says:

[March 18, 2010 at 3:51 pm](#)

The namesake conference considered DNA manipulation and is said to have consisted of biologists, lawyers and doctors. This conference features scientists, policy experts, NGOs and some businesses.

Geoengineering today is fraught with potential conflict between the world's 'haves' and 'have-nots' and certainly with issues of intergenerational justice. So where are the experts in ethics? I don't see even one of those among the attendees.

[*JR: Martin Bunzl is one.*]

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2. [*Lou Grinzo* says:](#)
[March 18, 2010 at 4:18 pm](#)

This is not meant as a comment specifically about CRF and Climos, but about our situation in general: Am I the only one who thinks this feels like very long, very steep, and decidedly slippery slope?

Perhaps part of my perception stems from my conclusion that the timing of our situation makes it so urgent (even if not widely enough recognized as such) that we're virtually assured of having to rely on one or more geoengineering techniques to try to avoid Really Bad Stuff in the coming decades.

Someone, anyone, PLEASE show me where I'm wrong.

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3. [*Dicynodont* says:](#)
[March 18, 2010 at 10:53 pm](#)

Joe,

I'll show you where you are wrong. Can you please explicitly state how we can prevent 'climate catastrophe' without geoengineering at this point? Will the Arctic Methane Time Bomb be defused if we simply count on reducing our CO2 emissions? Please explain... I would love good news in that regard.

But if you can't answer that, then please explain why you would be against geoengineering field experiments? Or would you prefer that we rely only upon computer models up until the point of global deployment of geonengineering?

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4. [*Leif* says:](#)
[March 18, 2010 at 11:31 pm](#)

Dicynodont, #3: Some geo-engineering that look OK to me, at least until further information comes in. Sustainable geo-engineering options?

A. Serious conservation measures. Stop digging the hole!

B. Planting trees.

C. Bio-char production appears to be benign.

D. Force capitalism and corporations to pursue sustainability and long term survivability first and foremost and shareholder profits secondary. It is unconscionable that capitalism and corporations are at cross purposes with humanities long term survivability. Lawyers, where are you when we need you?

In my view none of the other geo-engineering proposals have any hope of solving both CO2 build up and ocean acidification. All of the above suggestions would go a long way toward mitigation. And be far less expensive. Will they be enough???

Without the above nothing else will come close, IMO.

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5. [*Logic Deferred* says:](#)
[March 18, 2010 at 11:59 pm](#)

Per #3, and what's wrong with "Geoengineering field experiments"?

The test cannot be limited to anything other than the planet.

Technology never works out the way you hope it will.

"Oops" is not the word you want to hear when the planet is at stake.

We've a relatively sound understanding of what we are up against by concretely altering the existing forms of actions, as well as what we are up against if we do not.

The “miracle of technofix” introduces uncontrollable variables into the equation with no way out of the experiment(s) once we’ve abandoned responsible behavior for “what could possibly go wrong?” philosophies of technology.

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6. [Dan Miller](#) says:
[March 19, 2010 at 1:09 am](#)

I am co-author of a paper published this month in Oceanography Magazine that concludes that more geo-engineering research is needed because we likely cannot avoid dangerous climate change without it. Here is the press release (with link to the paper):

Study Shows Emission Reductions Alone Are Unlikely to Avoid Dangerous Climate Change
 Calls for Increased Geoengineering Research

March 1, 2010 (Ithaca, NY) — Even if all man-made greenhouse gas emissions were stopped tomorrow and CO₂ levels stabilized at today’s concentration, by the end of this century the global average temperature would increase by ~2.4°C (~4.3°F) above pre-industrial levels, which is significantly above the level which scientists and policy makers agree is a threshold for dangerous climate change, according to a new study published in the March issue of Oceanography Magazine. Of course, greenhouse gas emissions will not stop tomorrow, so the actual temperature increase will likely be significantly larger, resulting in potentially catastrophic impacts to society unless other steps are taken to reduce the Earth’s temperature.

The scientists also conclude that the United Nation’s Intergovernmental Panel on Climate Change (IPCC) 2007 report likely underestimates the potential dangerous impacts that man-made climate change will have on society. Furthermore, while the oceans have slowed the amount of warming we would otherwise have seen for the level of greenhouse gases in the atmosphere, the ocean’s thermal inertia will also slow the cooling we experience once we finally reduce our greenhouse gas emissions. This means that the temperature rise we see this century will be largely irreversible for the next thousand years.

The study, “A Very Inconvenient Truth,” by Charles H. Greene of Cornell University, D. James Baker of the William J. Clinton Foundation, and Daniel H. Miller of The Roda Group, concludes that because the risks of climate change cannot likely be mitigated solely by reducing greenhouse gas emissions, society should significantly expand research into so-called geoengineering solutions that are meant to either reduce the amount of solar energy that reaches the earth or removes and sequesters greenhouse gases that are already in the atmosphere. Geoengineering solutions must be in addition to, not replace, dramatic greenhouse gas reductions if society is to avoid the most dangerous impacts from climate change.

For the full report, see http://www.tos.org/oceanography/issues/issue_archive/issue_pdfs/23_1/23-1_greene.pdf

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7. [Anne](#) says:
[March 19, 2010 at 7:12 am](#)

I think I would say that the supersaturation of the atmosphere with CO₂ is itself a geo-engineering experiment on the planet, and that we already have the data showing where it’s leading us.

The major point here is not against geoengineering per se, but to put a firewall between setting guidelines that include strong ethics and science, and those who would profit from geoengineering applications. Kind of like the Nuclear Regulatory Commission, but not as dysfunctional.

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8. [Adam Sacks](#) says:
[March 19, 2010 at 8:47 am](#)

To add to Leif's suggestions about "bio-engineering" options (#4) and to respond to Dan Miller's statement (#6) that "we likely cannot avoid dangerous climate change without it [geo-engineering]":

Soils hold vast amounts of carbon, mostly as organic compounds created by living organisms. Aside from carbon sequestration, restoring soils has many other benefits as well, including improved hydrological and nutrient cycles, expanded biodiversity, flood control, and food production. Carbon stored deep in the soils is far more stable than forests. So of course we should restore forests, but the primary emphasis should be on soils (and certainly reducing our emissions to zero).

Humans have turned over ten billion acres of healthy land into deserts and scrub, and we have released millions if not billions of tons of carbon into the atmosphere in the process. We can retrieve that carbon with proper management of damaged soils, and if we decide to do so we can return to pre-industrial levels of atmospheric carbon, quite possibly within forty years or less.

Yes, it sounds "too good to be true" (well, geo-engineering never sounds like that), but it's a solution that's right in front of our collective noses. Nature knows how to do this, but right now needs our help (we must strictly adhere to her rules, however).

We have several decades of experience restoring soils, known as holistic management, or managed grazing. Thirty million acres are under such care in Australia, Africa and the U.S. Briefly, it's done using the evolutionary relationship between grazing animals and grasslands. Contrary to over-simplified current dogma, ruminants are not a problem, they are a solution – when properly managed.

Of course they are a carbon source when kept in factory farms or allowed to range freely and widely over millions of acres. But this is not how nature does it. In nature grazing animals move in tight groups as protection against predators. They graze, fertilize and "till" the soil for brief periods, and, not wanting to tarry in their own waste, move on. They eat grass enough to stimulate it, and leave before overgrazing. It's an elegant system, well designed over the millennia by the extraordinary forces of nature.

While we're learning more all the time, we know today how to implement managed grazing full well. It is entirely beneficial as far as anyone can tell (perhaps there are negative unintended consequences of healthy soils, but they're not apparent yet), is very low-tech and affordable for even poor of farmers (Heifer International is teaching these techniques when giving people farm animals), and has a net cost of less than zero, since local food is produced and land is restored to productivity.

The odd part of this story is that climate activists are so resistant to it. Since it challenges current belief, especially our worship of technology and profit, there is a reflexive retreat to assumptions without taking time to reflect or investigate. This is most unfortunate, since we all agree that there is little time to waste.

More on holistic management, including numerous references, in my recent post on Grist (<http://www.grist.org/article/the-climate-solution-got-cows>).

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9. [Adam Sacks](#) says:
[March 19, 2010 at 9:05 am](#)

Sorry, a parenthesis and period got mixed up in that link. Here it is:

<http://www.grist.org/article/the-climate-solution-got-cows>

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10. [Leif](#) says:
[March 19, 2010 at 10:38 am](#)

Good points all, #5,6,7,8: Humanity has been in a continuing fight with capitalism and corporations since the beginning of the industrial revolution. One only needs to look at the treatment of the workers by corporate management one or two hundred years ago years to see that corporate management has not

changed all that much. i.e. Complete disregard for the health and well-being of the bottom tier of humanity. (To be sure there are exceptions). Where as in the past you had children and laborers working in horrific conditions and doomed to early death and disfigurement, today the survivability of humanity is at stake at the very same alter of profit before all else.

It does not have to be that way! Capitalism and corporations are a product of the human intellect and as such can be changed to work for humanity as opposed to against it. I contend that the world has quite enough billionaires. It is long past time for capitalism to function for the well-being of humanity. At least long enough to get us out of our current predicament. We can always go back if we like. In the mean time I say we must have capitalism, corporations and humanity all pulling in the same direction.

Einstein said: "I do not know the weapons of WW III but WW IV will be fought with sticks and stones." I for one hope WW III will be fought with reason and scientific understanding and humanity will be victorious.

Perhaps we can skip WW IV all together as it to is not written in stone.

11. *John McCormick* says:

[March 19, 2010 at 10:54 am](#)

Geo-engineering is moving towards center stage because we failed to make the connection between its menu of Rube Goldberg *experiments* and their total disconnect from preventing further ocean acidification.

The crazy right wingers stick to their messages passionately and slowly public opinion begins to reflect their demands for lower taxes, smaller government, anti-Obama. Had we attacked geo-engineering as a bandaid on a tumor, we might have gotten the attention of the public that geoengineering cannot counter ocean acidification which reduces ocean uptake of CO2 and thus accelerates atmospheric concentrations.

But, maybe no message is sufficient to turn venture capitalists away snake oil salesman who promise investors can get rich off geo-engineering and the public will love them for it.

John McCormick

12. *Leif* says:

[March 19, 2010 at 11:14 am](#)

Humanity has been on a century long quest of geo-engineering and has proven itself quite successful at the endeavor. The problem is that we have been ignorant of it's success and effects to the degree that humanity is poised to step across the door step of doom. Any other attempts must be made with a "fail safe" provision built into them before implementation. Given that I suppose that I would say "go for it".

Of course it is still early out here in the west and my first coffee is not even finished yet. I am willing to entertain better solutions.

13. *Dicynodont* says:

[March 19, 2010 at 11:19 am](#)

To all who responded to my earlier post about the need for field research into geoengineering, thank you, and think about this...

1. Human CO2 emissions are already a vast uncontrolled geoengineering experiment with astounding negative consequences. Humans are emitting CO2 at a rate that is 1000 times faster than has ever happened in the

geological past. But that's not all. Humans are dominating every other major biogeochemical cycle on the planet. We emit more fixed nitrogen and phosphorous each year than the Earth does itself (through fertilizer). We also erode ten times more earth than the earth does itself (through agriculture and construction), etc...

2. Small scale scientific experiments in geoengineering are trivial compared to the scale of the above. Absolutely trivial. But scientists need to see the actual field response of ecosystems to small scale manipulations in order to understand how both large and small manipulations work. Field trials are necessary if we think geoengineering even *might* be necessary. Without field trials, we won't know whether and how geoengineering could work to solve the problem. Not even if Bill Gates gives Ken Caldeira his entire fortune to build the biggest, baddest computer simulation ever made.

3. Joe Romm himself has recently made the link to large sudden CO₂ emissions and mass extinctions in geologic history. We could be causing another Permo-Triassic Extinction, where 95% of all life died out 250 million years ago. We even have the same initial conditions as the Permian (low CO₂, low temperatures, glaciers, high oxygen). We also know why those initial conditions are important for magnifying the extinction event compared to other events during the Mesozoic and early Cenozoic eras (see my next point).

4. The Arctic methane 'time bomb', which Joe also talks about, contains enough methane in terrestrial permafrost to emit more than 1000 times the historical total of human CO₂ emissions. It is actually a lot more than that, since the total amount of sub-seabed methane is unknown and probably just as large. Also, large pulses of methane overwhelm the atmosphere's natural methane removal mechanism (ozone), so the lifetime of methane is extended 5-6 times. This is what I call the "Game Over Scenario".

5. The only way to prevent the Arctic Time Bomb is to save the Arctic sea ice, because once the ice is gone, then the permafrost melt will be unstoppable. It seems likely that the only way to save the sea ice now is through some kind of solar radiation management in the Arctic (see Joe's posts on the rapidly declining sea ice). Yes, that means geoengineering is already necessary regardless of how much it gives us all the 'willies'.

6. And finally.. think about where the majority of CO₂ exists in the carbon cycle. 93% of it is in the deep ocean. A vast amount of CO₂ regularly moves into and out of the deep ocean during every 100,000 year glacial cycle. The magnitude of this exchange is roughly three times the historical total of CO₂ emissions. So we need to think about using the ocean as the primary carbon removal mechanism from the atmosphere, because that is what it does best. Geoengineering's goal is to speed up these natural removal mechanisms to match the unnatural speed of human CO₂ emissions.

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14. [Dan Miller](#) says:
[March 19, 2010 at 12:54 pm](#)

To clarify, I count all ways to artificially control the climate under the term "Geo-engineering". This includes both albedo management as well as atmospheric CO₂ capture and sequestration. I know that some people only think of "smoke in the atmosphere" when they hear geo-engineering.

I believe that reforestation is a no-brainer, and I also think bio-char and "air capture" of CO₂ are quite promising. I do think that putting smoke in the atmosphere is fraught with peril but, like chemotherapy, the alternative (the melting of the Arctic) is not really acceptable, so I can imagine us doing it while scrambling to reduce CO₂ using the other methods.

BTW, I discuss geo-engineering in my talk on FORA.tv. You can get a link to the talk (and download slides) on my climate web site, www.ClimatePlace.org.

15. *Fire Mountain* says:

[March 19, 2010 at 1:15 pm](#)

Having a geoengineering “Woodstock” without Caldeira or Keith is like having the original Woodstock without Hendrix or The Who. They are the real stars who are taking the most thoughtful approach, that the only reason to study geoengineering is as a backup, and not as an excuse to dump more fossil emissions in the air. It’s still a risky business to open the door, but having it done by people with economic interests in promoting geoengineering is out of bounds.

16. *Fire Mountain* says:

[March 19, 2010 at 1:19 pm](#)

Okay, so it looks like Keith is going. They still don’t have Hendrix.

17. *Dicynodont* says:

[March 19, 2010 at 2:16 pm](#)

Keith and Caldeira are hardly the only ‘real stars’. Yes they get a lot of attention, but they play favorites and have a financial stake in a number of ways. There are reports that David Keith is starting his own geoengineering company to capture CO₂: “physicist David Keith of the University of Calgary will launch his air capture company, which uses amines to extract CO₂, in October.” (from <http://e360.yale.edu/content/feature.msp?id=2197>). Caldeira has several patents on geoengineering which have no value other than for commercial benefit (for someone).

18. *adrian* says:

[March 19, 2010 at 3:54 pm](#)

“O Prometheus will you never learn?”

Beware of “engineers” bearing gifts to profit humankind. The list is long, and tragic. Where does one start? The discovery that oil can serve as a fuel and going with it without considering the consequences? The removal of mountain tops and mining of tar-sands? The 900-plus endocrine disrupting chemicals that are currently causing fish and whales to display hermaphroditic traits? The production and use of synthetic fertilizer that wrecks the soil and contributes to the dead zone in the Gulf of Mexico? The Round-up ready crops that now require the use of other broad-spectrum pesticides in order to keep Round-up resistant weeds at bay?

Oh I know, this time it’s “different,” this time we’ll “be careful,” but to me geo-engineering sounds like more of the same, especially when one hears of “stars” in the field.

I think I’m with Leif and Adam Sacks and the farmers practicing FMNR techniques in the Sahel. Beware excessive ὕβρις all you brave citizens.

19. *Lewis Cleverdon* says:

[March 19, 2010 at 11:45 pm](#)

Dan Miller –

it is most heartening to see your cogent scientific affirmation of the inevitable need of geo-engineering techniques. While the majority of comments here seem supportive of this conviction, those which are not fail either to challenge the inevitability of that need or to provide any alternative solution. On a previous thread there was one poster who’d rather “trust to Mother Nature” – but I hope that we’ll not see much more of green

rejection of the science.

With regard to the afforestation option, I'd point out (with some expertise, having been a consultant on UK forestry policy as far back as the '80s) that the potentially available gigahectare of mostly non-farm land worldwide could be used for various forestry regimes.

These range from self-regenerative forest reserves, whose annual net carbon intake is slow to gain volume and is very small after maturity is reached;

through conventional exotic cohort forestry with its well-documented disbenefits,

to a sustainably productive native coppice forestry, whose carbon sequestration is optimised by the silviculture itself, and by the moderate cycle harvests' use for Biochar & coproduct syngas-based fuels, and by the perpetual nature of coppice forestry. (The UK's oldest known surviving coppice, at Ashford in Kent, was planted in Roman times).

The rapidity, scale and permanence of the annual sequestration yield of the latter strategy makes the first look like a mere indulgence – and one the urgency of our predicament cannot tolerate. The fact that the 'Coppice & Biochar' option is not only a potentially self-funding mode of geo-engineering prior to a carbon price being paid, but that it can also be applied worldwide with very basic technologies of (accredited) village-scale wood-refineries served by people with ox-carts and machetes,

indicates that no manufactured alternative, such as mass-production of 'artificial trees,' is ever going to approach its efficacy.

Yet even this option applied on a global scale, in conjunction with both soil-carbon building by graziers and more radical GHG output cuts than we've yet seen tabled, cannot reliably reduce global warming in time to prevent the feedbacks running amok. Thus while it is plainly necessary as a carbon recovery program it is demonstrably not sufficient:

only the rapid research, development and deployment of one or more of the albedo enhancement options looks capable of controlling the feedbacks while the carbon recovery programs take effect.

It is to be hoped that your very timely paper will help to alert society to the urgent need of research of the best geo-engineering options, as well as that of the stringent oversight of the integrity of potential deployments' intention, planning and execution.

Regards,

Lewis

20. [Leif](#) says:

[March 20, 2010 at 11:51 am](#)

Lewis, #19: Thank you for your insights. There is no doubt in my mind that humanity is painting itself into a corner, my fear is that too much emphasis on Geo-E will give false expectations of success and prevent meaningful up front mitigation, without which all else will be meaningless. Currently pine bark beetle is taking a serious toll out of large areas of western forests when we need the trees the most. Replanting will be dubious at best as the species of tree which will do the best in the conditions available is most likely the very same pine trees.

I would call your attention to Cyclone Power Technologies, (No personal affiliation,) as a power source that can use local bio-mass to run anything from chippers to tractors, even cars. Recently signed a production contract with, guess who, China.

21. [Lewis Cleverdon](#) says:

[March 20, 2010 at 5:04 pm](#)

Leif – you're very welcome to any veiws I happen across.

I entirely share your concern re the misrepresentation of Geo-E as a means to avoiding stringent mitigation.

Yet my greater concern is that Geo-E will be blocked from application when it is becoming clear that it is not only essential, but that the window of opportunity for its reliably successful application is already declining. The afforestation program, even at the swiftest feasible rate of establishment, will take decades to begin showing significant effect: any delay thus raises our early dependence on 'novel' albido enhancement techniques.

We missed the window for resolving GW simply by controlling our GHG outputs : Reagan's legacy that was. If we miss this one, by tolerating prevarication over GHG cuts or over the launch of the requisite global programs of afforestation for biochar and the operational research of benign albido enhancement techniques, there are no further solutions available.

As an old farmer, thinking about the maze of lanes within the area of country that he knew, once told a lost traveller :

"Well, if I were you, I wouldn't start from here . . ."

Regards,

Lewis

22. *Margaret Leinen* says:

[March 20, 2010 at 6:25 pm](#)

Dear Dr. Romm,

The Board of Directors of the Climate Response Fund has posted a statement on the CRF website that answers the questions that you have raised. It can be accessed at the following web address:

http://www.climateresponsefund.org/index.php?option=com_content&view=article&id=147&Itemid=87

Margaret Leinen
CEO, Climate Response Fund

[*JR: Dr. Leinen. Thanks for this. I have appended it to the post.*]

23. *Rabid Doomsayer* says:

[March 20, 2010 at 7:35 pm](#)

I fear that in the not too distant future an air of panic will ensue and that we will reach for the geoengineering solutions, knowing that the results will be catastrophic.

We need to know how the various proposals will work, how they will interact and how effective they will be.

If we successfully contain CO₂ emissions, then the required geoengineering might only have to have disastrous consequences. By using a number of techniques we may be able to avoid thresholds that greatly magnify problems.

Our margin for error grows dangerously thin.

24. *HR* says:

[March 21, 2010 at 8:04 am](#)

It's funny that the State of Victoria, where I live, now seems to be part of the anti-global climate change conspiracy. I guess if whole countries such as China and India can be held up for aspiring to a wealthy future then why not a state. Which other parts of the world are on your list?

[JR: Not what I said, of course. But interesting to see how you frame it. Destroying a livable climate is a "funny" way to aspire to a wealthy future. Of course, if you're already wealthy....]

25. [john dunham](#) says:

[March 21, 2010 at 11:23 am](#)

It would service your unbiased posture well to place your "UPDATE" at the top rather than bottom of such a long post.

[JR: I appreciate your apparent concern for my posture. I intend to do a separate post Monday. The problem with putting the update at the top is that it would make no sense to the general reader. I can put a pointer to the update up front.]

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