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I am working on an idea to reset the earth's CO2 level back to normal. Currently, I'm seeking support from geologists and related disciplines. Here is the idea-- /Ernie Rogers

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Stating the Problem

The world is currently using 408 quadrillion BTUs of energy per year. Eighty percent of that energy is obtained by burning fossil fuels and releasing carbon dioxide into the atmosphere. Global emissions are estimated to be 3x10^13 kg of CO2 per year. While experts tell us we should cut emissions by 80% by 2050, so far there has been no slowing, but rather further increases. The CO2 level in the atmosphere continues to rise. CO2 in the atmosphere is now at 390 ppm molar concentration at mountaintop level, or just a little less. This translates to about 3x10^15 kg of CO2 in the global atmosphere. Climatologists are telling us that the atmospheric concentration must be lowered to 350 ppm if we are to avoid catastrophic climate change.

That means the atmosphere must lose about 3x10^14 kg of CO2, a 10% reduction. The CO2 must be removed by some purposeful process since just waiting for it to dissipate could take a thousand years.

At present, there is no obvious way to achieve even this modest goal—but that isn't enough. There is very nearly a chemical equilibrium between atmospheric CO2 and the CO2 dissolved in the top 200 meters of the oceans, with a relaxation time believed to be less than one year. (Need a reference here.) For every kilogram of CO2 removed from the atmosphere, another 1 to 1.5 kilograms of CO2 will have been given up and removed from the oceans (because of the equilibrium reaction). With this added burden, the amount of CO2 to be removed is about 7x10^14 kg of CO2, and it doesn't matter whether the CO2 is removed from the atmosphere or from the top layer of the oceans, the effect is the same. Whatever the removal process is, to work in the near-term it will have to be rapid, of the order of 1x10^14 kg per year, or it will be overwhelmed by the rate of emissions, which will not drop significantly in the near term, more likely it will increase.

Conclusion: We need a way to remove about 1x10^14 kg of CO2 from the (air or ocean) every year for at least 10 years. Our lives may depend on it. It is proposed that we seek an engineering solution involving the purposeful release of basic materials (e.g., magma) into the deep ocean basins.

Forward

Andrew Lockley  View profile  More options  Feb 4, 4:34 pm

That's a nice theory but what possible method is there to make a big hole in the ocean crust. Even if you could drop an oil rig on the ocean floor, drill a big hole in the crust, drop the world's biggest nuclear bomb in the hole and then blast it - would that be enough? I don't think it would....

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Even if you could get the rock out of the mantle, there's nothing to suggest it would come out in an easily-reactive form. Adjusting the weathering of existing rock - for example by promoting frost shatter - may be a more successful approach. However, this has also been analysed and has been...
I speculate that if we could remove 1X10^{14} kg of CO_2 in one year or even half that amount for one year it would be extremely valuable as a scientific tool. We need a way to determine the temperature change associated with an increase in CO_2. There is no doubt adding CO_2 will increase global average temperature but no one knows for sure how much because there are other related parameters and some fundamental parameters like sunspots; and the net dependence of temperature on CO_2 concentration is the critical issue in climate science. Feedback is another issue being debated. If that basic relationship can be determined in a scientifically acceptable manner by a credible experiment it would essentially end the debate and it would be clear what must be done. So the issue is how to do such an experiment. It must be done rapidly so that all other phenomena that impact global average surface temperature but are also sensitive to changes in global temperature do not have a chance to respond and influence. This would confirm the basic greenhouse relationship since all the other parameters that influence temperature would not have time to change and modify the temperature. Then by following the temperature changes after the CO_2 level is stabilized one can determine the influence of the other parameters even if it is not clear exactly what and how much is actually changing. In the end the relationship independent of sunspot changes emerges.

-gene

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Conclusion: We need a way to remove about $1 \times 10^{14}$ kg of CO2 from the (air or ocean) every year for at least 10 years. Our lives may depend on it. It is proposed that we seek an engineering solution involving the purposeful release of basic materials (e.g., magma) into the deep ocean basins.

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Hello, Andrew,

Well, I can't disagree with your observations. I was hoping to get some advice somewhere on how to trigger an eruption of sufficient size. Lacking such information, I went ahead and calculated the size of eruption that would be needed to reach the desired scale of absorbing $1 \times 10^{14}$ kg of CO2. Result: It would require triggering of hundreds of volcanoes of medium size, all discharging ultrabasic magma. OR triggering of one supervolcano.

A supervolcano is roughly one scoring a volcanic eruption index of VEI-8,
which discharges at least 1000 cubic kilometers of magma. The density of the desired magma is about 3000 kg/cu.meter. From this, the mass of magma from a supervolcano eruption is about 3x10^15 kg. I estimated the base equivalent weight of ultrabasic magma to be 100 kg (assuming 20% MgO composition). Dividing gives 3x10^13 kilogram equivalents from the eruption. That compares to a desired amount of 5x10^12 to absorb the CO2 -- that's a pretty good match considering the process will be very inefficient.

OH, MY! I guess I didn't fully realize the magnitude of the problem! Eruption of a supervolcano, even at the bottom of the ocean, carries as much risk of annihilating us as does the atmospheric CO2.

Still, the "solution," even if totally impractical, at least has the quality of being nearly big enough to do the job. And it's a reminder that we are playing a risky game on a planetary scale.

Ernie Rogers

In a message dated 2/4/2010 5:34:47 P.M. Mountain Standard Time, andrew.lock...@gmail.com writes:

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A

On 4 February 2010 19:31, <_Arcolo...@aol.com_ (mailto:Arcolo...@aol.com) > wrote:

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Peter L Ward View profile More options Feb 5, 2:11 pm

CO$_2$ is second most voluminous gas erupted by volcanoes after water. The volcano Pinatubo erupted in 1991 up to 921 Mt water, 234 Mt CO$_2$, and only 19 Mt SO$_2$. The rate of increase in the atmospheric concentration of CO$_2$ actually slowed temporarily after the eruption because of global cooling for three years and therefore slight cooling of the ocean. But warming resumed as did the rate of increase in CO$_2$ helped very slightly by the newly added CO$_2$.

Secondly, the colder the ocean, the more CO$_2$ it can hold. If you heat the ocean via large submarine volcanic eruptions, you increase atmospheric CO$_2$.

Peter

On Feb 4, 10:43 pm, Arcolo...@aol.com wrote:

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Mike MacCracken View profile Translate to English More options Feb 6, 11:46 am

Aside from the triggering issue, it would be interesting to know if the formation of something like one of the Hawaiian islands or the ongoing formation of Iceland took out carbon at a rate that is near to what is being discussed. Related to removing carbon now as a result of island formation, it would be interesting to know if there might have been effects from this in the past. That is could island formation be something that should be considered an occasional factor in the carbon budget.

Mike MacCracken

On 2/5/10 12:43 AM, "Arcolo...@aol.com" <Arcolo...@aol.com> wrote:

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