

GeoRestoration – a new concept

This article is to introduce a new term into climate-politics. « GeoRestoration ».

Climate-politics become increasingly aware of the fact that the current strategy will not achieve the goal set by the Paris agreement 2015 ¹ to keep global warming under 1.5 or 2.0 °C. This causes a deep crisis in climate-politics.

The current strategy of IPCC and the Western world is : Emission reduction (mitigation) of CO₂ and other Greenhouse Gases (GHG) to reach [net zero](#) emissions by 2050. Phaseout of fossil-fuel powered energy and simultaneous buildup of renewable energy, accompanied by electrification of all power consumption, is the main strategy. However it becomes more and more clear that mitigation will not work fast enough to avert catastrophic global warming, including sharp rise of sea-levels, within a very foreseeable future. The damage caused by climate change endangers not only our well-being, but also the strategy of mitigation itself, which needs trillions of investment to be earned from the current economy.

Instead of concentrating on mitigation only, methods which address global warming directly by manipulation of the global atmosphere are being called for.

At this stage these methods are being labelled, and dismissed, by many climate scientists as «GeoEngineering» (GE). The main arguments against GE run as follows:

- Unknown risks.
- Unproven efficiency.
- If they work, the world would give up mitigation.

The third argument, which is often dubbed «moral hazard», is the most efficient, since it is very often used to block all research for resolving the first two obstacles. It is therefore, that we need to address this assumption.

Mitigation is a strategy which aims at a reform of virtually all economic processes. Our economy is supposed to become sustainable, which means that all material consumed is either endless (e.g. sunlight) or recyclable. This would in fact terminate all emissions and end the addition of further GHG to the atmosphere. It could be called GeoSustainization, if «mitigation» is too weak to evoke the feeling of a grand scheme, which it certainly is. It is our strategy for the future, and it will take more than a century to realize.

However there is one factor of Global Warming which is not addressed by mitigation. We already have millions of tons of GHG in the atmosphere, which have been added to it in the past 170 years, since the Industrial Revolution began around 1850. Mitigation does nothing to remove these. Even if we could stop all emissions tomorrow, the atmosphere would still suffer under an overload of GHG, and Global temperatures would remain above pre-industrial levels for hundreds of years. This would result in further ice-loss, sea-level rise and consequential floodings, extreme weather events and on-going desertification. To put it simple: Mitigation does not remove Global Warming.

This means : The «moral hazard» argument can be dismissed with respect to all GeoEngineering methods inasfar as they address the historical load of GHG. These methods do not interfere with mitigation.

All of this is not completely new. IPCC has accepted the inclusion of some GE methods into the portfolio, especially the growing of forests as well as CO₂ removal (CDR) by Direct Air Capture (DAC). These are labelled « climate restoration » methods in IPCC report No 6³. IPCC still maintains that the

Paris goals of 1.5 or 2.0 °C can be reached, and it includes the measures above mentioned under their mitigation efforts as « negative emissions ». This has caused widespread skepticism, especially regarding DAC, which is considered to be non-scalable, or simply too expensive, by many engineers and scientists. Also reforestation has shown its drawbacks, since the world experiences a series of wildfires which destroy more forest than ever before. Several scientists and authors have published their criticism and said, that it is a bad idea to include negative emissions in the IPCC's forecasts².

It is at this point in the debate that the term GeoRestoration is introduced. GeoRestoration is a basket of large-scale GeoEngineering methods, which aim at removing the legacy of anthropogenous Greenhouse Gases already in the atmosphere. Unlike GeoEngineering, GeoRestoration is limited in its goals to the restoration of the former, pre-industrial climate. Unlike «climate restoration» as it is used by IPCC, GeoRestoration includes methods like Enhanced Atmospheric Methane Oxidation (EAMO), Marine Cloud Brightening (MCB) and Ocean Iron Fertilization (OIF), inasfar as these methods are limited to restoring the pre-industrial climate.

An example of the limitation of GeoRestoration can be made with methane removal by EAMO. Current atmospheric methane levels are at 1.9 ppm, pre-industrial levels were at 0.7 ppm. Reducing methane levels to 0.7 ppm would reduce the average global temperature by 0.5 degrees. Theoretically it is possible to reduce methane levels even further, which would cool our planet by say another 0.3 degrees, but that would be over the limits of GeoRestoration and should be called GeoEngineering. The same holds true for the complete concept of Solar Aerosol Injection (SAI). SAI does not aim at restoring the former climate, and is therefore a GeoEngineering, but not a GeoRestoration method.

GeoRestoration is similar in many ways to the concept of «negative emissions». However the term negative emissions creates the expectation that the more negative emissions we produce the less emission reduction will be needed. This is true «moral hazard», and it is very urgent that we get away from this concept. We need mitigation to remove all GHG emissions so our economy becomes fully sustainable, and we need GeoRestoration to deal with the damage already done. Both efforts are urgent, but need to be decoupled in order to get away from the discussion regarding «moral hazard»

GeoRestoration is limited in scope and time. The limitation of scope has been described above. The limitation in time is the same - GeoRestoration ends when the job is done. It is not a concept for the future, but an urgent effort for the next 20 - 50 years. The climate crisis requires urgent action, we must stop to quibble about bookkeeping. Action is required to cool the planet as fast as possible, and should not be hindered by an intellectual hypocrisy named «moral hazard» which is neither moral nor useful.

GeoRestoration is a call for research and development of global cooling methods, with the limitation to restoration of a safe and known climate. There are many honest concepts being developed by a growing number of engineers and entrepreneurs which can be labelled GeoRestoration. It is time to leave the labs and scientific circles, go out and try the best ideas, and start cooling the planet.

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Literature :

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- 6) https://en.wikipedia.org/wiki/Solar_geoengineering