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MILITARIZATION OF THE ANTHROPOCENE THROUGH SOLAR GEO-ENGINEERING APPLICATIONS

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ABSTRACT: While currently living in the geological epoch of the Anthropocene, mankind is consequently fighting against climate change and other hazardous environmental issues. Although solar geoengineering has been proposed as a promising solution, the universal fear regarding its military misuse is still prominent and widely existent. It is believed that this fear could lay the foundation for the concept of a militarized Anthropocene – the manifestation of preset temporal aspects of humanity's destructive influence regarding climate change for military use. Contrastingly enough, there are a multitude of factors which manifest unrealistic expectations in relation to this concept. While emphasizing the importance of the military as the most suitable governmental institution for developing and utilizing solar geoengineering techniques, this paper aims to address such presumptions through anthropological, ethical, legislative, as well as argumentative approaches. Misleading public opinion, particularly, as a biased perception fails to recognize that military-aimed solar geoengineering methods does not represent a risk by itself, but rather the interference between the belligerent nations and should be concerned as national security. Moreover, the emergence of the slippery slope argument manifested by global psychology and international awareness causes military-related disadvantages concerning the utilization of solar geoengineering as a method of weather warfare. The concept of a militarized Anthropocene, although seemingly controversial, would only enhance the benefits of military-conducted solar geoengineering methods that will be felt by humanity for centuries to come.

KEYWORDS: *solar geoengineering, military, ethics, policy, anthropocene, weather warfare*

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INTRODUCTION

Solar geoengineering applications represent promising scientific methods to prevent the disastrous consequences of climate change. However, the universal fear of military misuse is still present among the public, which is a significant issue that discourages the concept and benefits of a militarized Anthropocene.

Regarding the context of climate change, solar geoengineering might be humanity's best option to protect planet Earth and it is in our particular interest to properly analyze the abovementioned issue. Previous studies from aspects of logistics, anthropology, ethics, as well as international legislation have analyzed the utilization of solar geoengineering applications and the possibilities of weather warfare. While such studies have managed to examine the possibilities of weaponization and the conduct of warfare, they all represent separate notions, which in relation to solar geoengineering, have shown that the militarization of the Anthropocene can be appropriately justified in the fight against climate change.

The research methodology, on the other hand, primarily relies upon the analysis of data in relation to anthropology, legislation and ethics, with a particular emphasis upon the Slippery Slope argument as a logical fallacy in relation to misleading public opinion with the purpose of proving that its logical structure, as a pattern of reasoning, is invalid. The reason why these particular fields and approaches have been chosen is because it is relevant to analyze and understand the non-technical aspects of the militarization of the Anthropocene through solar geoengineering applications. Being regarded as irrational factors manifested by the global community, it is important to better understand and justify the non-technical aspects of solar geoengineering. Scientific developments in response to climate change, although seemingly controversial, manifest either a destructive or a constructive correlation with international or global psychology. Consequently, all arguments contained within this paper are supported by relevant literature such as international conventions, department of defense documents, geoengineering researches, prominent books on weather warfare, etc. The aim of this paper, through its chosen research methodology and literature, is to examine and resolve such irrational, unsupported and biased fears in order to present realistic expectations about the proposition of a militarized Anthropocene through solar geoengineering applications being effective against climate change and other harmful environmental issues that we are currently facing.

The main research findings, consequently, have proven to conclude that the technological evolution of warfare does not have to necessarily represent a parallel notion with non-hostile scientific development, especially when considered a public good. Additionally, predetermined applications of climate change techniques do not necessarily imply weather warfare perceived by an unethical manner, but instead proposes an appropriate severity-based classification and, therefore, it is necessary to properly regulate solar geoengineering applications as both military and non-military dimensions.

MILITARY-ORIENTED CLIMATE CHANGE AND IMPACTS: A LEGAL ANALYSIS

While currently facing harmful consequences of climate change and other serious environmental issues, it is generally believed that mankind manifests its existence within the parameters of the Anthropocene – a proposed term for the present geological epoch (from the time of the Industrial Revolution onwards), during which humanity has begun to

have a significant impact on the environment. (Dictionary, 2012)

The indication of human actions having a significant impact upon climate and ecosystems, particularly since the beginning of the Industrial Revolution has created the assumption that the Anthropocene would eventually succeed the Holocene, being identified as the current officially acknowledged epoch, which manifests great climate stability. And while global warming has occurred prior to the Holocene its cause originate from strictly natural contributions, as it occurred after the last ice age. Hence, the identification of the human factor regarding climate change appears after various technological developments that affect our environment. However, history has shown us that selected segments of such advancements simultaneously address climate change more deliberately, which is perceived as if humanity almost forcefully aims to further emphasize its dominant position and manifestations of control concerning climate change. The Anthropocene is not formally acknowledged within scientific parameters, though it plays a relevant role when discussing climate change, while lacking specific scientific attributes. Predetermined climate change technique applications could lay the foundation for the concept of a militarized Anthropocene – the manifestation of preset temporal aspects of humanity's destructive influence regarding climate change for military use. Despite military-oriented weather modification applications representing a scientific taboo, the utilization of weather warfare, explicitly described as weather modification techniques for military purposes, cannot be considered as an unfamiliar notion, scientifically and legally speaking. Military strategy has always opted to take advantage of climate change for various leverages in the battlefield. Rarely acknowledged in the debate on global climate change, the world's weather can now be modified as part of a new generation of sophisticated electromagnetic weapons. Both the US and Russia have developed capabilities to manipulate the climate for military use. (Chossudovsky, 2018)

Despite a vast body of scientific knowledge, the issue of deliberate climatic manipulations for military use has never been explicitly part of the UN agenda on climate change. Neither the official delegations nor the environmental action groups participating in the Hague Conference on Climate Change (CO6) (November 2000) have raised the broad issue of "weather warfare" or "environmental modification techniques (ENMOD)" as relevant to an understanding of climate change. Furthermore, a simulation study of future defense "scenarios" commissioned for the US Air Force calls for:

"US aerospace forces to 'own the weather' by capitalizing on emerging technologies and focusing development of those technologies to war-fighting applications... From enhancing friendly operations or disrupting those of the enemy via small-scale tailoring of natural weather patterns to complete dominance of global communications and counterspace control, weather-modification offers the war fighter a wide-range of possible options to defeat or coerce an adversary... In the United States, weather-modification will likely become a part of national security policy with both domestic and international applications. Our government will pursue such a policy, depending on its interests, at various levels." (Chossudovsky, 2002)

Military-oriented climate change and its impact, being perceived as national security, are likely regarded as governmental activities, aiming to protect a certain State and its national aspects. Therefore, the weaponized concept of climate change should be ordinarily utilized to justify the State's right of protection against military attack through its military power as an ultimate measure. Concerning the de-

velopment of climate change-based security policy, such a controversial type of warfare occurred prior to the 1978 Environmental Modification Convention, being ratified by the UN General Assembly, prohibits the utilization of weather warfare, as stated in Article I:

"Each State Party to this Convention undertakes not to engage in military or any other hostile use of environmental modification techniques having widespread, long-lasting or severe effects as the means of destruction, damage or injury to any other State Party." (Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, 1976)

Weaponized climate change methods of technological and scientific background lead to significant environmental damages, whose effects wouldn't be limited within the State's territory that applied such military-oriented methods upon its own or a foreign nation. Consequently, the international convention further manages to explicitly describe the meaning of "environmental modification techniques" due to reasons of clarification. According to Article II:

"The term "environmental modification techniques" refers to any technique for changing - through the deliberate manipulation of natural processes - the dynamics, composition or structure of the Earth, including its biota, lithosphere, hydrosphere and atmosphere, or of outer space."(Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, 1976)

While discussion of the post-Cold War military applications of weather warfare is a taboo, the US Air Force has nonetheless acknowledged the strategic importance of ENMOD techniques in the modern battlefield of non-conventional warfare and intel ops, including the conduct, without the enemy's knowledge, of "covert" weather modification operations. While the US Force acknowledges that ENMOD weapons are part of military arsenal, there is no formal proof or evidence that ENMOD techniques have been used by US military against a foreign country or enemy of the US. (Chossudovsky, 2018)

Furthermore, there have been past attempts to legally regulate environmental modification utilization for military application. For instance, the Weather Modification Operations and Research Board had been previously created with an identical purpose;

A bill requiring the creation of the board was introduced in the U.S. Senate on two occasions by Texas Senator Kay Bailey Hutchinson, the first on March 4, 2004, and the second on March 3, 2005. However, the bill did not become law on either occasion, and the board was never created. Notwithstanding, the inter-operational geo-engineering, weather modification, and "global warming mitigation" efforts of corporations and institutions involved with the proposed board have been exceedingly designative of a large-scale unofficial program, which has long involved such dictatorial entities as the Department of Commerce, and thereby, the Federal Reserve system and Federal Taxation monetary allocation. (Academic n.d.)

As noted from the excerpt above, ENMOD techniques potentially address multiple environments of atmospheric, marine, terrestrial and even extraterrestrial nature. Compared to current climate change issues, various suggestions have emerged for scientific and legal analysis. Solar Geoengineering, also known as Solar Radiation Management (SRM) proposals have offered scientists, politicians, scholars, legislators and ordinary civilians, various ranges of methods that address climate engineering intending to reduce global warming. Although solar geoengineering possesses many benefits, such as low financial costs, technological

efficiency and direct climate change reversibility, most SRM proposals are regarded as hypothetical, meaning that the majority of proposals have not been practically applied and only manifest theoretical effectiveness. Still, hypothetical traits should not represent the main concerns regarding SRM proposals, but rather the high potentiality of their weaponization and concerning ethical questions. Contrastingly, one may ask how it is even possible for currently theoretical climate modification techniques to be considered as potential components in the arsenal of weather warfare, as the concept itself seems rather far-fetched. Specifically, among the recognized SRM proposals is the concept of Stratospheric Aerosol Injection (SAI), which represents one of the most promising atmospheric forms of SRM proposals in the scientific community. By rationalizing artificial control of the global temperature by spreading tons of sulfur dioxide into Earth's stratosphere, its only existing governance is identical to solar radiation management governance. The international mechanisms most applicable to geoengineering methods and their impacts have not been developed for the purpose of regulating geoengineering, and for some methods there are as yet no regulatory mechanisms in place. (The Royal Society, 2009)

MISLEADING PUBLIC OPINION AND THE SLIPPERY SLOPE FALLACY

Public attitudes towards geoengineering, and public engagement in the development of individual methods proposed, will have a critical bearing on its future. Perception of the risks involved, levels of trust in those undertaking research or implementation, and the transparency of actions, purposes and vested interests, will determine the political feasibility of geoengineering. If geoengineering is to play a role in reducing climate change an active and international programme of public and civil society dialogue will be required to identify and address concerns about potential environmental, social and economic impacts and unintended consequences. (The Royal Society, 2009)

Solar geoengineering, primarily constituted by SAI, has been universally presented as a promising climate engineering technology currently undergoing rigorous technological research conducted by civilian scientists. While the weaponization of ENMOD techniques is generally banned by the Environmental Modification Convention, this does not entirely eliminate risks of military misuse. International legislation may contribute for SAI's rigorous utilization in weather warfare however its immediate application as an environmental action could inevitably lead towards its weaponization. In other words, the utilization of SAI itself represents an exertion of devious influence specifically for military advantages. This legal consequence seems unintended by the public and is simultaneously influenced by the amount of trust in the military regarded as the potential undertaker of SAI implementation, as well as its explicit motivations of undertaking such actions. The military is addressed as the highest rated and most trusted governmental institution. Therefore, the public opinion of militaries, particularly in the US, is an extremely relevant factor. The American armed forces are dependent upon public opinion in several ways. First, the services must secure funding through the federal appropriations process. Without strong public support for the military, members of Congress will have less incentive to increase or to maintain funding. Second, the all-volunteer military requires thousands of young Americans to "vote" every year with their feet. This requires the active support of not only these young people but also the relatives, teachers, counselors, and others who influence them. If growing segments of the

population are less enthusiastic about the military, the result could be future recruiting difficulties. (Leal, 2005)

Public opinion concerning military activities, however, is fairly variable depending on divided political supports surrounding the war in question. The public would either manifest favorable or less favorable perceptions of its military forces, generally speaking. For instance, public opinion regarding the US military was very low during its engagement in the Vietnam War. American Air Force veteran Jason Nulton, on one particular occasion, had stated: *"Historically, Americans have been fairly kind, but the country reached a low point during the Vietnam War, which left scars on our national psyche that remain today."* (Nulton 2015)

Despite the importance of public opinion of the militaries, it cannot be equally applied regarding potential solar geoengineering and weaponized SAI utilization concerns. Public opinions represent a national perspective for engaged military operations. Any utilized methods of warfare should be the main concern of the belligerent nations. Climate change, on the other hand, represents a global issue for mankind whose effects cannot be entirely limited. Consequently, politics do not represent the main contributor, playing a less significant role in the weaponization of the Anthropocene. The potential application of any climate engineering techniques could trigger potential side effects, problems and risks, including human health. Nevertheless, military forces opting to apply solar geoengineering techniques in the future would be prominently perceived to benefit from those side effects and use them in their ultimate advantage to win any war they are engaged in. However, it is also important to notice that this concept represents a biased and one-sided perception. What the majority of the public fails to recognize is that the development and existence of military-aimed solar geoengineering techniques, including the weaponization of SAI, does not represent a risk by itself, but rather the interference between the belligerent nations. If one State considers using weather warfare through solar geoengineering upon the enemy's territorial environment, as a result, that military activity may inflict unintentional damage on States, either its environment's stability or the wellbeing of its civilians and beyond. This perception may result in the emergence of the slippery slope argument, often recognized as a logical fallacy manifested by global psychology and international awareness, which could potentially cause certain military-related disadvantages concerning the utilization of solar geoengineering as a method of weather warfare.

If **A** then **B**; If **B** then **C**; If **C** then...**Z**

In this case, the development of assumed military-aimed solar geoengineering techniques represents the "small event" (**A**) that would lead to consequentially negative and unintended effects that would have a global impact upon Earth's environment (**Z**). The weaponization of solar geoengineering techniques, as an exaggerated logic of this ultimate result is not necessarily perceived as the beginning step, but rather its reference as a "weapon of mass destruction", derived from the dilemma of weaponizing solar geoengineering applications still being debatable and under rigorous suspicions, in order to prevent the military, as the most suitable governmental institution, from having the privilege and obligation of developing solar geoengineering techniques as promising methods in regards to climate change issues. At the same time, it can be noticed in the above-mentioned setting, that the only recognized events are "A" and "Z", reflecting the misleading public opinion that regard the issue in question. The public opinion would not necessarily perceive the

weaponization of solar geoengineering techniques as a complicated, conditional process, but rather as a straight-forward cause-effect notion, more likely to be logically presented in the simple manner: If **A** then **Z**, with the impression of going over the entire alphabet, starting from the letter "A" and ultimately reaching the letter "Z", while skipping the alphabet letters in-between, which further generates the following question: Where are the events B, C, D, E, etc. in the first scenario, and more importantly, what do they represent in practice?

The international phenomena that manifests a global rationalization of climate change, addressed as an universal issue, through the argument logic of "A to Z", from a psychological standpoint, excludes the original concept of the slippery slope – the beginning event "A" would only imply the ultimate event "Z" through the intermediate events B, C, D, E, etc. Mislead public opinion in this case proves that it is not required to follow this pattern. Even without the occurrence of the intermediate events B, C, D, E, etc, the supposed weaponization of solar geoengineering techniques under military development contributes enough for its identification as a slippery slope for the immediate consequence of "mass destruction". This is the part where the non-plausibility factor appears to discredit the slippery slope logical fallacy. Namely, in order for the "A to Z" argument logic to effectively apply in practice, every intermediate event should be in its favor. However, in the case of weaponizing solar geoengineering techniques, the notion of favorable intermediate events is non-existent. Contrarily, we acknowledge the replacement of the term "events" with "advantages", specifically referring to the military's superiority as a governmental institution. What could be considered as "intermediate advantages" are for instance, the military's notable experience regarding development and deployment of advanced climate engineering methods (**B**), equipped aircraft and missiles, particularly the utilization of military aircraft as a delivery technique for aerosol precursor gases in the case of SAI application (**C**), Large-scale deployment activity (**D**), funding capacity for solar geoengineering research and development (**E**), etc. The existence of these advantages, decrease the probability of the occurrence of the assumed "A to Z" argument logic – promising solar geoengineering proposals to represent a weapon of "mass destruction", resulting in irreparable environmental damages. It is concluded that there is no occurrence of event "Z" for the completeness of the slippery slope argument. Misleading public opinion disregard the "intermediate advantages", them being the opposite of plausible intermediate events which simultaneously leads to the infeasible characterization of the slippery slope.

MILITARIZATION OF THE ANTHROPOCENE: AN ANTHROPOLOGICAL APPROACH

Apart from the misleading public opinion argumentation, weather warfare does not represent a contemporary concept, when perceived objectively. The military successfully acknowledges the reality of climate change, including its role and influence upon the Anthropocene. Therefore, concerning strategic military planning, two recent reports, the "2014 Climate Change Adaptation Roadmap" and the "Strategic Sustainability Performance Plan FY 2014", detail the military's thinking about climate change, how changing environmental conditions will impact its ability to carry out missions, and how the DoD will also create new forms of missions and operations stresses and challenges. (Bickford 2015)

One of the main goals established within the "2014 Climate Change Adaptation Roadmap" concerns plans and opera-

tions, which *"include the activities dedicated to preparing for and carrying out the full range of military operations. Also included are the operating environments in the air, on land, and at sea, at home and abroad, that shape the development of plans and execution of operations."* (Department of Defense, 2014)

Adequately enough, solar geoengineering includes a wide variety of techniques for the military that include the above-mentioned environments for research development and practical application. The most discussed SRM proposals involve injecting sulfate aerosols into the stratosphere and brightening sea clouds. To date, no geoengineering proposal has been researched to the point of becoming a policy option. (Scott, 2012)

Furthermore, the Federal Trade Commission (FTC), concerning within the Climate Change Resilience goal of whether it incorporates climate preparedness and resilience into planning and implementation guidelines for agency-implemented projects, the report stated that *"the climate change adaptation plan specifies actions to take. The plan will be used if there is the possibility of climate change or a severe weather event that impacts an agency project."* (Robbins and Mantiply, 2014)

Pragmatically, military forces should explicitly rationalize the utilization of solar geoengineering techniques in regards to climate change. Mankind is currently living in the Anthropocene as a particularly different epoch. How the military plans for and responds to climate change will have an impact on how we conduct anthropology. This is a broad claim, and hopefully not as straightforward and mechanical as it appears, but the new global political and military realities brought on by the Anthropocene will have an impact on how we do our work. We need to think about, theorize, and study the impacts of climate change, and we need to think about how the military is responding to it as well. (Bickford 2015)

The comprehensive solution to this issue would be for policy-makers to address SRM proposals with the intention of manifesting global consent, but not necessarily through international treaties and agreements, although that would be more favorable during wartime. Simply put, policy makers—those who control the purse strings for funding and procurement—can get behind climate change as long as it's framed as a national security issue, a framing that fits a worldview of protection, power projection, and profit. (Bickford 2015)

However, even when identified as a national security issue, solar geoengineering proposals would need to be categorized on a severity-of-utilization basis, additionally provided by military research development. For instance, the "Weather as a Force Multiplier: Owning the Weather in 2025" research paper contains an identical categorization regarding the notion of weather modification: *"In the broadest sense, weather modification can be divided into two major categories: suppression and intensification of weather patterns. In extreme cases, it might involve the creation of completely new weather patterns, attenuation or control of severe storms, or even alteration of global climate on a far-reaching and/or long-lasting scale. In the mildest and least controversial cases it may consist of inducing or suppressing precipitation, clouds, or for short times over a small-scale region. Other low-intensity applications might include the alteration and/or use of near space as a medium to enhance communications, disrupt active or passive sensing, or other purposes."* (United States Air Force, 1996)

Following this categorization, promising SRM proposals should undergo identical organization, primarily depending on applicatory purposes and the severity of its environmental efficiency. Additionally,

such classification should serve as a foundation for national/international policy and governance. While the *2025* study is not officially US policy, it was drafted with the intent that it would provide a platform to build policy (and weapon systems) on. (Smith, 2006)

This change in the military's thinking about the world and its climate will have an impact on anthropology. If the military is developing militarized responses to climate change, we'll need to think about how these militarized—or at least military-influenced—responses will potentially result in a militarization of climate change research, and how that in turn will impact an anthropology of the Anthropocene and the military. (Bickford 2015)

MILITARY ETHICS REGARDING SOLAR GEOENGINEERING APPLICATIONS

Until recently, high-level scientific and policy discussions about geoengineering research have been largely off the table. There is a consistent concern that significant research efforts could cause some leaders to see geoengineering as a cheap solution to the climate crisis. This attitude might undermine efforts to get at the root of the problem. In addition to this potential "moral hazard," numerous ethical issues have been raised. The two most extensive treatments of ethical issues to date are by the philosophers Dale Jamieson (Jamieson 1997) and Stephan Gardiner (Gardiner 2010). In his early essay, Jamieson lists a set of conditions that any geoengineering proposal would need to meet in order to be morally permissible. These conditions set a high bar, and it would be very difficult for any geoengineering proposal to meet them. In his essay, Gardiner exhaustively analyzes the argument that geoengineering might be the lesser of two evils. More specifically, that it would be morally prudent to arm future generations with these technologies in case some day they are faced with a choice between catastrophic climate change or geoengineering. (Scott, 2012)

The ethics of geoengineering discussed in literature commonly address solar geoengineering proposals, however all of these ethical frameworks have one thing in common – they refer to environmental ethics, under the assumption of solar geoengineering methods being primarily developed by civilian scientists. Undertaking large scale solar geoengineering would require capabilities (logistics, aviation and particularly security) and delivery systems (rockets, artillery, aircraft) that are now mainly held by the military and their contractors. The military are also less constrained than scientists by international law because of their national security exemptions. Solar geoengineering therefore has an inherent potential to be controlled by defense establishment institutions. (Geoengineering Governance Research n.d.)

If the military intends to develop SRM proposals to be developed specifically, it is essential to replace the concept of environmental ethics with military ethics, respectively. However, the term "military ethics" simultaneously covers a wider range of aspects and is often regarded as an oxymoron, since the nature of military force and its application gives rise to contexts in which the requirement to act ethically can be very challenging. (Baker, 2015)

When addressing solar geoengineering applications, military ethics would exclude questioning ethics of climate change methods, while emphasizing their development and application for public good and warfare. The utilization of solar geoengineering would ultimately change the character of wars held in the future, as well as the levels of scientific development and utilization during peacetimes, for climate change purposes. In such situations, military ethics cannot

be regarded by standard, but rather individually divided for both weaponized and non-weaponized climate change methods. Hence, SRM proposals would only be partially included as warfare, mainly shaped by aspects of science and national/international legislation. Although weaponized solar geoengineering methods are not entirely excluded, the benefits of the military-conducted solar geoengineering applications would reflect for military ethics to not be perceived as much of an oxymoron.

CONCLUSION

The importance of simultaneous military-developed and military-conducted solar geoengineering methods emphasized throughout this paper contribute for the emergence of a militarized Anthropocene, even though predetermined applications of climate change techniques do not necessarily imply weather warfare perceived by an unethical manner, but instead proposes an appropriate severity-based classification. Many irrational factors manifested by the global community, particularly derived from the slippery slope argument fallacy, contribute for the military to be perceived in a rigorously destructive manner, instead of a potential of scientific and technological advantage against climate change. Simply put, the technological evolution of warfare does not have to necessarily represent a parallel notion with non-hostile scientific development, especially when considered a public good. However, military-aimed utilization of environment modification techniques, rationalized otherwise, can be rightfully regarded as national security that represents the duty of the military as the most trusted and highest ranked governmental institution, generally speaking. Hence, it is necessary to properly regulate solar geoengineering applications as both military and non-military dimensions.

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