Geoengineering Our Climate?

Ethics, Politics and Governance

Opinion Article
1 October, 2013
www.geoengineeringourclimate.com

Is Geoengineering a National Security Risk?

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earthscan from Routledge
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Citation Information

Briggs, C.M. "Is Geoengineering a National Security Risk?" Opinion Article, Geoengineering Our Climate Working Paper and Opinion Article Series. Available at: http://wp.me/p2zsRk-8U

A growing number of discussions on geoengineering risks and politics pose the question of how solar radiation management (SRM- or other means of abrupt climate forcing) might be of interest to security and military planners. Scenarios have also introduced discussions of deliberate actions to disrupt the climate for military or terrorist goals, and/or military responses to geoengineering policies.[1] Despite the history of military attempts to control weather and environmental conditions, it is important not to simplify geoengineering security concerns, nor to overstate potential military responses.[2]

Climate and environmental changes affect security at both the strategic and operational level, but do so by potentially destabilizing underlying, vulnerable systems (whether ecological, economic, geophysical or social). Like cyber security, there are no clear thresholds for what constitutes a 'threat', or what a proportional response might involve. Many militaries have a keen interest in mapping out potential cascading impacts from climate change as they affect security missions, but in general these risks are seen as indirect, and that the role of planning is to adapt to potentially shifting conditions.[3] This piece briefly describes two security-related points within solar radiation management: that SRM does pose security risks that are of interest to military planners and may result in security impacts, but that within the US security community the issue is so legally and politically sensitive that the US Department of Defense has no interest in pursuing concrete actions in this field.

SRM can produce security-related impacts for the same reasons that climate change is considered a 'threat multiplier' in the 2010 Quadrennial Defense Review (QDR), in potentially destabilizing social, economic and environmental systems upon which state security relies. National security consists not only of planning for direct military actions between states, but is a much broader concept that takes into account when background conditions (in military war-game vocabulary, 'environmental' systems) change with indirect but unexpected results for international or state stability. For example, although Somalia poses little direct threat to the United States, instability in the region can be considered an accelerant for increases in terrorism, piracy, and human-related disasters (e.g. famine), risks which the US security community must address at one level or another. SRM contains two differences: firstly, impacts from SRM are the result of intentional human actions to change environmental conditions; secondly, the effects of very large deployments are intended to manifest quickly. SRM also shares one parallel: even the deployment of methods that aim primarily to cool a particular region (e.g. marine cloud brightening) will still have knock-on effects on wider environmental and human systems. Indeed, the deployment of other SRM techniques, such as sulphate particle injections, will have necessarily global impacts. These characteristics are significant for gauging the perspective of security planners.

Abrupt environmental changes are far more worrying from a security perspective than gradual change, as abrupt changes are less predictable, offer less chance for systems to adapt and/or recover from changes, and are more likely to result in disaster situations.

[1] For example, during the SECURENV scenario workshop in Stockholm, Sweden, 3-4 November 2010.
[2] Fleming 2012
[3] CNA Corp. 2007

Disasters in this perspective refer to combinations of events that overwhelm vulnerable points in related systems, and where resilience is not high enough to prevent negative, cascading impacts that can spread far from the original disaster. The 2011 Tohoku earthquake, for example, revealed that general urban resilience of Japan was high enough to cope with the magnitude 9.0 quake, but a critical vulnerability in the Fukushima Daiichi nuclear power plant (the backup diesel generators) resulted in a disaster with cascading impacts not only on Japan and its economy, but energy flows and systems across the globe. Likewise with local flooding events, a city can cope with a certain amount of rainfall averaged over months, but receiving the same amount in a short period of time general results in disasters (and where the military is often called to provide relief).[4]

The security concern with SRM is therefore that related heating or cooling will result in non-linear stresses on environmental systems, where vulnerable parts of the system will be damaged or collapse, resulting in cascading impacts which may in turn destabilize vulnerable social, political, and economic systems which rely upon a steady-state environment. As these systems are often globalized, failure in one area may create cascading impacts. An attempt to cool, for example, glacial highlands in Peru may unintentionally result in non-linear shifts to precipitation patters in the Amazon basin of Brazil, with second and third-order effects on rainforest health, food security, and the global carbon cycle.

[4] The concept of fragility was taken from engineering concepts, and refers to a system's risk of 'phase shift', or reverting to a different and perhaps lower order of stability. See Wisner et al. 2005.

Despite the difficulties mentioned above, military planning does offer some guidance as to how geoengineering might be considered a security risk, and how to assess such complex risks. If direct causality is difficult to determine, groups can still conduct comprehensive risk assessments from environmental changes and cascading impacts on complex systems. Rather than take a traditional security view of militaries and violent conflict (in military terms, 'kinetic operations'), the focus is on stability and well-being of communities and the ecosystems, socio-economic and infrastructural systems upon which they rely. And in contrast to scenario methods that either combine two driving forces into four alternative futures (Shell or GBN), or which combine a set of drivers and projects into the future (RAND or Hudson Institute), new energy-environment scenarios in the US military do not attempt to describe a complex world of social, economic, political and technological changes.[5]

Instead of traditional scenario methods, security planners can take a given set of starting conditions (often geophysical variables, set 5-10 years in the future), and recognize that the affected systems, themselves, already contain significant complexity. By tracing multiple pathways of impact/response, expert groups can map out alternative futures for a given region. These futures can then help identify where additional monitoring is needed, where critical intervention points might exist, and where secondary or tertiary impacts create security concerns. For example, the loss of meltwater from Tibetan glaciers is not, itself, a security risk. But the significant impacts and resulting actions (downstream flows to Southeast Asia, loss of food security

[5] Wack 1985; Kahn and Wiener 1967

and energy resources, etc) can spark humanitarian or political crises requiring outside intervention.[6]

The US military considers environmental conditions to be important background considerations for long-term strategic and short-term operational planning; yet despite its desire for such systems to remain stable over time, this does not translate into any desire to pursue SRM-related projects.[7] The first reason for this is the highly questionable legality of military-related actions designed to affect climate, as reflected in both internal and domestic regulations, the 1977 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD), and the 2010 Convention on Biological Diversity.[8] ENMOD specifically forbids weather modification or related activities, and therefore research in this direction is also highly circumscribed. Politically, these restrictions follow decades of negative experiences in attempting to alter environmental conditions during/around conflict, most notably USAF's use of Agent Orange in Vietnam. The Agent Orange program to defoliate Vietnamese jungle and therefore reduce cover for Viet Cong and North Vietnamese troops resulted in long-term health concerns not only in Vietnam, but among US military veterans who had been exposed during their service. It is little coincidence that US adoption of ENMOD closely followed Agent Orange debates in the US during the 1970s.

[6] Briggs 2010

[7] In fact, during this author's time directing the USAF Minerva program on energy and environmental security, geo-engineering was the one area deemed too sensitive to include in the team's research portfolio.

[8] See: http://www.icrc.org/ihl.nsf/INTRO/460

A general view in the US security community holds that geoengineering (and in particular, SRM) projects are not tightly controllable, and therefore are analogous in some ways to biological or chemical agents. Militaries tend to dislike platforms that are not tightly controllable and predictable, one reason why biological weapons were used so rarely in history.[9] Although a disease like weaponized smallpox could easily defeat one's adversaries, officers understand that viruses do not discriminate and that casualties may spread very far from the intended targets, including their own troops and civilians. Security planners in the US traditional also rely upon a concept called 'proportional response' in planning, where intentional attacks upon one side are met with a similarly destructive (or restrained) response from the other. With general climate change there is no intent involved to change the environment, and therefore climate change exists as a background risk, and no direct agency is involved. Yet if the change is intentional, what then is the appropriate response? And if SRM technologies are used by one state against another for with hostile intent, what are the thresholds for response, and by what means? The intentionality of action question is further complicated in cases where corporations or private individuals (and not states) are the actors.[10]

As long as militaries remain uninvolved in geoengineering (and there is nothing to say that some countries may not try), SRM is not a *prime facie* security risk, and the US military will likely steer clear of the issue for at least the near future. However, any actions taken to alter the climate may have significant im-

[9] Steinbruner 1997

[10] US Air Force 2000

pacts that could translate- even unintentionally- to legitimate security concerns. Research communities can help to identify potential risks well in advance, by establishing what changes might be possible with given SRM technologies, and what cascading impacts this would have on a given region.[11] This effort can in turn help discussions of necessary governance and research, by identifying both potential impacts and critical uncertainties. Given the near-irreversible nature of environmental changes, a good measure of caution and foresight should easily be justified.

[11] For methodological reasons, global assessments lack necessary detail and resolution, requiring impacts to be assessed regionally.

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