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# The Age of Geoengineering: Breaking the Sorcerer's Spell

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## Introduction

My first encounter with clandestine geoengineering was unexpected and unsettling. It happened ten years ago, when I awoke at 3 AM on a warm October night. Suddenly wide-awake, I decided to get up and stand outside in the moonlight that was flooding the house. I stood outside by our garage, looked up and beheld a gargantuan murky cloud. An unaccountable, horizon-to-horizon corrugated, scabrous serpent-cloud, inert and staggeringly immense, hung motionless aloft for as long as I stared at it. Illumined by grisly moonlight its sheer extraordinariness — its inexplicable garishness — created a visceral impression that has never left me. A year earlier an acquaintance had attempted to speak to me about aerial chemical spraying, chemtrails he called them, and I'd held up my hands reflexively, palms out, signaling him to cease and desist. I didn't want to hear about it. Standing in the moonlight I thought of that moment, reflecting, 'My god, he was right.'

It has taken me ten years to gird myself to undertake an exploration of that dark apparition, an investigation that uncorks as many questions as it answers. Science historian James R. Fleming has made it incontestably clear that geoengineering is a creature birthed and brought to life inside the military.<sup>1</sup> The reason so many questions about geoengineering remain difficult to answer is that military research and operations are typically classified, usually highly classified, and thus impenetrable to public view. The highly militarized national security state and its permanent war economy<sup>2</sup> that evolved ever since the end of World War II guards its secrets with ferocity and guile, and for the most part the public, certainly the US public and its corporate media, stays dutifully silent when confronted with claims that an issue cannot be broached due to reasons of "national security." This situation of complicit silence, enforced at the outset of the Cold War, has persisted despite the end of that war in 1989-1991, and has been magnified since September 11, 2001.

One of the most puzzling questions I've stumbled on is what I think of as the Jekyll-and-Hyde conundrum: it turns out geoengineers are a diverse but divided community, a profession that exhibits dissociative identity disorder — a split personality. Mr. Hyde, the "dark side" personality, sometimes referred to as a "weaponeer," has worked out of public sight for the military for many decades to weaponize the weather, the climate, and other Earth systems such as the ionosphere. One of Mr. Hyde's foremost redoubts has been the University of

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<sup>1</sup> James R Fleming, *Fixing the Sky: The Checkered History of Weather and Climate Control* (New York: Columbia University Press, 2010).

<sup>2</sup> Seymour Melman, *The Permanent War Economy: American Capitalism in Decline* (New York: Simon & Schuster, 1974) and Seymour Melman, "They Are All Implicated In the Grip of a Permanent War Economy," *Counterpunch*, March 15, 2003. Accessed on July 09, 2015, <http://www.counterpunch.org/2003/03/15/in-the-grip-of-a-permenent-war-economy/>.

California Berkeley's Lawrence Livermore National Laboratory (LLNL), co-founded in 1952 by the father of the H-bomb, Edward Teller.<sup>3</sup> Mr. Hyde's legacy stretches back seven decades; his work since the Vietnam War has continued out of public sight (and will do so for as long as the militarized national security state holds our allegiance). Dr. Jekyll, on the other hand, represents by and large the open and typically optimistic public, civilian face of the geoengineering community, the "good" scientist, oriented to solving the "climate problem." Ever since 2006 when Nobel laureate Paul Crutzen aired a new version of an old Hydean scheme to spray sulfur aerosols into the stratosphere to cool down the climate,<sup>4</sup> the good scientist (and geoengineer) has been scrupulously oriented to help humanity without regard to national identity. But not all the players are so oriented, as we shall learn.

Crutzen was the first to break the ranks of the climate scientists and initiate an open discussion about geoengineering, dragging the once-arcane notion out of obscurity and irrevocably linking climate *scientists* to climate *engineers*. The geoengineers emerged into the light as climate engineers and the term "geoengineering" entered daily public discourse for the first time. Located in universities, prestigious research institutes, and erstwhile nuclear weapons labs, the geoengineers have an even more obscure brotherhood inside the military, whose legacy they don't acknowledge.

One purpose of this essay is therefore perhaps unavoidably therapeutic: I wish to help promote an integration of two scientific communities, or more precisely, to persuade the cheery Dr. Jekyll to recognize his alter ego, the dark and mysterious Mr. Hyde, and to do so within plain sight of the entire global climate-change science and activist community. Why? Because until this self-reckoning happens no good will come of Dr. Jekyll's supposedly benign schemes to deal with Earth's climate. The clever and above all determined Mr. Hyde, an inveterate national security warrior, will use such schemes for his own anachronistic national security ends. He always has. And history demonstrates these ends do not serve the benefit of all humanity.

Unlike partisan warfare, climate change involves the entirety of the human family, the entire biosphere, the fate of a living totality, planet Earth. A partisan identity inevitably will subvert geoengineering efforts that impinge on a whole-Earth system like the climate.

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<sup>3</sup> Hugh Gusterson, *Nuclear Rites: A Weapons Laboratory at the End of the Cold War* (Berkeley, CA: University of California Press, 1996).

<sup>4</sup> Paul J Crutzen, "Albedo enhancement by stratospheric sulfur injections: A contribution to resolve a policy dilemma?" *Climate Change*, 77 (2006). Accessed June 04, 2015, [http://www.cogci.dk/Crutzen-albedo%20enhancement\\_sulfur%20injections.pdf](http://www.cogci.dk/Crutzen-albedo%20enhancement_sulfur%20injections.pdf).

## The road to Paris is full of snares

A wall of silence surrounds the subject of geoengineering past and present, even as geoengineering future now bubbles brightly in our ears. The disconnection between a fecund and little understood past and its presumed shortly-to-be-hatched, already wiggly progeny is an unsettling one. Neither party seems to recognize the other.

This odd paradox shadows the world climate negotiations due to resume in the Paris suburb of Le Bourget on November 30 to achieve, after over 20 years of trying, a legally binding universal agreement to reduce global greenhouse gas emissions and limit the rise of global temperatures to 2° C above pre-industrial levels. According to John Shepherd, chair of the Royal Society's 2009 geoengineering study that featured 'Plan B', "We are already staring 1.6° C in the face."<sup>5</sup> Six years later we are being told that Greenland and Antarctic ice melt is already so rapid that the 2° C increase limit is no longer reliable and that a "sea level rise of several meters" could render such coastal cities as London, New York, and Shanghai uninhabitable during this century, unless immediate countervailing global action is taken.<sup>6</sup>

The Royal Society begins its definition of geoengineering as "the deliberate large-scale manipulation of the planetary environment" and by itself this serves as a historically valid definition. The Society adds: "to counteract anthropogenic climate change," which serves to make the new but more narrow definition of geoengineering as climate engineering, or in its most current iteration, "climate intervention."<sup>7</sup> Broad or narrow, for nearly three-quarters of a century

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<sup>5</sup> Catherine Brahic, "Top Science Body Calls for Geoengineering 'Plan B' ", *New Scientist*, September 1, 2009. Accessed May 30, 2015, <http://www.newscientist.com/article/dn17716-top-science-body-calls-for-geoengineering-plan-b.html#.VZqbdbM6OZY>.

<sup>6</sup> James Hansen et al, "Ice melt, sea level rise and superstorms: evidence from paleoclimate data, climate modeling, and modern observations that 2° C global warming is highly dangerous," *Atmospheric Chemistry and Physics Discussion*, European Geosciences Union, July 23, 2015. Accessed July 30, 2015, <http://www.atmos-chem-phys-discuss.net/15/20059/2015/acdp-15-20059-2015.pdf>.

<sup>7</sup> The Royal Society, "Geoengineering the Climate: Science, Governance and Uncertainty," September 1, 2009. Accessed June 6, 2015, <https://royalsociety.org/policy/publications/2009/geoengineering-climate/>. See also Jeff McMahan, "Four Reasons to Study a Bad Idea: Geoengineering," *Forbes*, February 25, 2015. Accessed August 3, 2015, <http://www.forbes.com/sites/jeffmcmahan/2015/02/25/four-reasons-to-study-a-bad-idea-geoengineering/>.

geoengineering has been conducted for reasons that have little to do with the mandate to ameliorate climate change and much to do with war, and secondly with commerce.

We have been prepped to bite the new geoengineering bait for some time now. In 1997 Edward Teller popularized the idea of a “sunscreen” for planet Earth in the *Wall Street Journal*.<sup>8</sup> Two years later Dr. Teller’s protégé Ken Caldeira co-wrote the paper that “crunched the numbers” to show that indeed a stratospheric aerosol sunscreen could work to counteract the effects of sharply increasing CO<sub>2</sub>.<sup>9</sup> Ever since geoengineers and their funders<sup>10</sup> have inched their way toward a rough consensus, hedged about with caveats, that solar radiation management (SRM) — placing reflective aerosols in the stratosphere — is the best, and least expensive, solution currently available to “the climate problem.”

Earlier this year geoengineer Caldeira proclaimed, “There is a chance climate change will prove truly catastrophic, with people suffering and dying in many parts of the world....*The only thing politicians can do to cause Earth’s climate to cool within their terms in office* is to reflect more of the sun’s warming rays back into space” [emphasis added].<sup>11</sup> Though the movement toward consensus about climate intervention is not without serious debate and strenuous dissension, the repetitive warnings of imminent climate disasters sways the dialogue ineluctably toward eventual “intervention.” And this is likely the outcome the US and its NATO allies wish for, and perhaps as well the Russians, as it would serve as a perfect cover for what many believe are ongoing, classified geoengineering activities.

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<sup>8</sup> Edward Teller, “The Planet Needs a Sunscreen,” *Wall Street Journal*, October 17, 1997 (Reprint, *Hoover Digest*, January 30, 1998). Accessed June 06, 2015, <http://www.hoover.org/research/sunscreen-planet-earth-0>.

<sup>9</sup> Bala Govindasamy and Ken Caldeira, “Geoengineering Earth’s Radiation Balance to Mitigate CO<sub>2</sub>-induced Climate Change,” *Geophysical Research Letters*, 27, no.14 (2000). Accessed June 15, 2015, <http://onlinelibrary.wiley.com/store/10.1029/1999GL006086/asset/grl12200.pdf?v=1&t=ibs3tgvk&s=8e2d9b2fa79bdba3da5611794040ad0f2a55478b>.

<sup>10</sup> Marc Gunther, “The business of cooling the planet,” *Fortune*, October 7, 2011. Accessed July 29, 2015, <http://tech.fortune.cnn.com/2011/10/07/the-business-of-cooling-the-planet/>.

<sup>11</sup> Ken Caldeira, “One Known Way to Cool the Earth: Another View,” *USA Today*, February 15, 2015. Accessed June 15, 2015, <http://www.usatoday.com/story/opinion/2015/02/15/megadrought-climate-change-ken-caldeira-editorials-debates/23465975/>.

The path of climate intervention is well worn. It reveals tracks old as well as fresh, footprints we are ill advised to ignore, despite the complicit silence of corporate media, academia, and of course, governments and their military establishments.

And so the road to Paris is paved with intentions both good (Jekyllian) and above all unknown (Hydean), and obscured by a long history of denial, prevarication, and collective inattention.

### **The dawn of the Age of Geoengineering: The Sorcerer's apprentices at play**

During WW II “a revolution took place, one that was initiated and sustained not so much by the military as by science,” according to historian Kathleen Williams. Immediately after the war, “Military stimulation of science and technology became institutionalized” and the “Cold War ensured the military funding of science would continue...changing both academic science and the military.”<sup>12</sup> Sixty years ago the writer Robert Jungk noted: “In the universities, once homes of free speech throughout the world, the spirit of secrecy took possession.”<sup>13</sup> The Department of Defense (DoD) alone has accounted for “nearly 70 percent of all government funds directed towards research and development” of basic scientific knowledge.<sup>14</sup> The 350-year tradition of independent, individual investigation of nature and matter gave way to the era of ‘Big Science’, meaning scientific research with big, government-funded budgets. Big Science unequivocally included weather and climate modification, as well as other forms of geoengineering, all of which have been invariably cloaked in secrecy. And “secrecy always lowers the standard of environmental accountability”<sup>15</sup> — not to mention democratic accountability.

Two protégés of Irving Langmuir, a Nobel laureate chemist, Vincent Schaefer and Bernard Vonnegut, launched the era of modern weather modification — what Langmuir himself termed “Control of Weather” from the outset of their work

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<sup>12</sup> Kathleen B Williams, “The Military’s Role in Stimulating Science and Technology: The Turning Point,” *Foreign Policy Research Institute*, May 2010. Accessed July 30, 2015, <http://www.fpri.org/articles/2010/05/militarys-role-stimulating-science-and-technology-turning-point>, accessed July 30, 2015. See also: Fleming, Op. Cit., 167-169.

<sup>13</sup> Robert Jungk, *Brighter than a Thousand Suns: A Personal History of the Atomic Scientists*, translated by James Clough (San Diego, CA: Harcourt, 1958), 255.

<sup>14</sup> K B Williams, Op. Cit. See also Melman, *Permanent War Economy*, 20-21, 30 and Gusterson, *Nuclear Rites*, 43.

<sup>15</sup> Richard Williams, “Atmospheric Threat,” Comment, *Physics and Society*, 27, No. 2 (1988), 16. <http://www.aps.org/units/fps/newsletter/upload/april88.pdf>.

together at a General Electric research lab — in late 1946 and early 1947 when they demonstrated that storm clouds could be made to yield snow or rain with small quantities of either dry ice (frozen CO<sub>2</sub>) or silver iodide applied to clouds.<sup>16</sup> Within short months the US military had hired all three scientists and launched its first weather-modification research effort, code-named Project Cirrus. Between 1947 and 1952 the classified program conducted approximately 250 cloud and weather experiments, including a misbegotten attempt to steer a hurricane off Georgia in mid-October 1947.<sup>17</sup> Given the testimony of many high officials over many decades, exemplified by one Air Force general's famous remark — “If you control the weather, you can control the world”<sup>18</sup> — it is unsurprising weather and climate modification research for military purposes has continued up to the present moment.

Meantime humanity's first modern geoengineering experiment had already begun. Starting in the summer of 1945 with the Trinity Test, nuclear experiments continued vigorously well beyond the 1963 Partial Test Ban Treaty. The tests released huge amounts of radionuclides, such as strontium-90 and cesium-137, into the planet's atmosphere and into the flesh (and bones) of living beings everywhere on Earth. Atmospheric tests did not end until 1980, and their total fallout has been estimated equivalent to 40,000 Hiroshima-size bomb detonations, releasing hundreds of megatons of environmentally destructive force into the biosphere. In aggregate, over 1,900 nuclear tests (over half by the US) have inflicted untold and publically unquantified damage to Earth's biosphere. Estimates of the resultant incidence of cancer and cancer mortality run into the millions and hundreds of millions.<sup>19</sup>

Rocket technology and nuclear technology developed in tandem in the US and USSR after WW II, fertilized by the exodus of German scientists to both countries. The US and the Soviet Union were the only nations to conduct high-altitude, upper atmosphere nuclear tests, starting in April 1958 and concluding late in 1962. Physicist James Van Allen discovered Earth's radiation belts in Earth's magnetic field on the basis of data gathered by the US's first satellites — Explorer 1 and

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<sup>16</sup> Fleming, *Fixing the Sky*, 143-149.

<sup>17</sup> *Ibid.*, 150-152.

<sup>18</sup> Earl Lane, “Author and Historian Questions Whether ‘Fixing the Sky’ Can Address Climate Change,” *American Association for the Advancement of Science*, October 22, 2010. Accessed July 30, 2015, <http://www.aaas.org/news/author-and-historian-questions-whether-“fixing-sky”-can-address-climate-change>.

<sup>19</sup> Eduardo Goncalves, “The Secret Nuclear War,” *The Ecologist*, 31, 3, April 2001. Accessed July 29, 2015, <http://exacteditions.com/read/resurgence/vol-31-no-3-april-2001-5369/4/1/>.



Explorer 3 in January and March 1958. But before Van Allen could finish his scientific work, the US military made the decision to conduct what it called “the biggest scientific experiment ever undertaken.”<sup>20</sup>

Code-named Project Argus, the navy and air force detonated three fission bombs 100 to 325 miles over a remote sector of the South Atlantic Ocean and two hydrogen bombs 100 miles over the Pacific, near Johnston Island. Project Argus’ “research” explosions were kept classified for the next quarter century. The explosions took place in Earth’s ionosphere, defined in 1950 by the Institute of Radio Engineers as “the part of the earth’s upper atmosphere where ions and electrons are present in quantities sufficient to affect the propagation of radio waves.”<sup>21</sup> The Argus detonations wiped out radio communication over a large swath of the southern Atlantic Ocean for several days.<sup>22</sup>

Earth’s atmosphere consists of several layers, each significantly related to the other, from the lowest layer, the troposphere, where the air we breathe and the weather we experience occurs, to the stratosphere, which also holds the ozone layer, to the mesosphere, the thermosphere, and finally the exosphere, which shades into outer space. The ionosphere stretches from the mesosphere through the thermosphere and into the lower reaches of the exosphere, from 31 to 621 miles above Earth. It was this region that drew the military’s fiery curiosity: how could it be influenced, what were its secrets, and powers?

Its appetite for knowledge whetted by Argus, the military exploded a much larger bomb in July 1962 as part of Project Starfish, a 1.4 megaton device — the largest ever detonated above Earth’s atmosphere. Starfish “disrupted the Van Allen belts and created an artificial magnetic belt and ‘an aurora tropicalis’ visible as far away as New Zealand, Jamaica, and Brazil,” according to James Fleming, who added, “[t]hree Soviet high-altitude explosions that year had similar effects.”<sup>23</sup> Rosalie Bertell, an expert on the weaponization of geophysical systems such as the

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<sup>20</sup> Rosalie Bertell, *Planet Earth, the Latest Weapon of War: A Critical Study into the Military and the Environment* (London: The Women’s Press, 2000), 64. See also Fleming, *Fixing the Sky*, 209-210.

<sup>21</sup> *Encyclopædia Britannica Online*, s. v. “ionosphere and magnetosphere.” Accessed July 06, 2015, <http://www.britannica.com/science/ionosphere-and-magnetosphere>.

<sup>22</sup> Rosalie Bertell, “Background on the HAARP Project,” *Global Policy Forum*, November 5, 1996. Accessed June 15, 2015, <https://www.globalpolicy.org/component/content/article/212/45492.html>.

<sup>23</sup> Fleming, *Fixing the Sky*, 210. See also: Bertell, *Planet Earth*, 68-72.

ionosphere, wrote: “According to American scientists, it could take many hundreds of years for the Van Allen Belts to restabilize at their normal levels.”<sup>24</sup>

These experiments were inspired by Nicholas Christofilos, a physicist who worked under Edward Teller at the Lawrence Livermore National Laboratory in order to find out if the military could create *an artificial Van Allen belt* to better conduct radio and other electromagnetic communication by injecting charged particles from nuclear explosions into space.<sup>25</sup> Argus and Starfish vindicated Christofilos’ theories. Later in 1962 Teller could boast, “We know how we can modify the ionosphere. We have already done it.”<sup>26</sup> Future experimentation with Earth’s protective ionosphere and magnetosphere layers was expanded from the 1960s to the 1980s using electromagnetic wave technology, and was ramped up in the 1990s with the US Navy and Air Force’s construction of the High Frequency Active Auroral Research Program’s (HAARP) ionospheric-heater “research” station in Gakona, Alaska.<sup>27</sup>

At the same time Argus was being wound down Project West Ford, an experiment carried out by MIT on behalf of the military in 1961 and 1963, attempted “to create a telecommunications shield in the ionosphere” by placing 350 billion “copper needles” in orbit to facilitate global radio communication.<sup>28</sup> This shield was placed 3,000 kilometers in the ionosphere to form “a belt 10 km (6 miles) thick and 40 km (25 miles) wide” in order to “counteract the interference to radio communication caused by solar wind.”<sup>29</sup> West Ford caused a howl of protest from astronomers around the world, and was allowed to atrophy, leaving the needles suspended until they fell to Earth over ensuing years (some are estimated to still be in the ionosphere). As James Fleming wryly noted, “This is indeed geoengineering.”<sup>30</sup>

Captain Howard T. Orville, the first chairman of the US Advisory Committee on Weather Control established in 1953, was convinced that after Sputnik 1 and 2 the

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<sup>24</sup> Bertell, *Planet Earth*, 71.

<sup>24</sup> “Operation Argus: 1958–South Atlantic,” *Nuclear Weapon Archive*. Accessed July 28, 2015, <http://nuclearweaponarchive/Usa/Tests/Argus.html>.

<sup>26</sup> Jacob Darwin Hamblin, *Arming Mother Nature: The Birth of Catastrophic Environmentalism* (Oxford: Oxford University Press, 2013), 12.

<sup>27</sup> Dr. Nick Begich and Jeane Manning, *Angels Don’t Play This HAARP: Advances in Tesla Technology* (Anchorage: Earthpulse Press, 1995, 2002).

<sup>28</sup> Bertell, *Planet Earth*, 67.

<sup>29</sup> *Ibid.*

<sup>30</sup> Fleming, *Fixing the Sky*, 212.

Soviets had a weapon whose potential “could even be more disastrous than nuclear warfare”<sup>31</sup> and became an advocate for researching the use of weather control as a weapon. Orville is quoted asserting “that the Dept. of Defense was studying ‘ways to manipulate the charges of earth and sky and so affect the weather’ by means of ‘an electronic beam to ionize or de-ionize the atmosphere over a given area.’”<sup>32</sup> The active concern of military planners then as now was who will “control the earth’s thermometers”<sup>33</sup> — “[w]ho is going to decide?”<sup>34</sup> All these questions and statements were made over half a century ago, a very long time in the scope of modern science.

After Argus, Starfish, and West Ford, research on the ionosphere proceeded apace with construction of a worldwide network of radio frequency transmitters, and later ionospheric heaters, in the US, Canada, Norway, Greenland, Australia, Puerto Rico, and Peru, in partnership with what the National Academy of Sciences calls the “ionospheric modification (IM) community”<sup>35</sup> of major research universities and institutes working in cooperation with the Pentagon. Research also continued in the Soviet Union. “Atmospheric modification experiments,” Dr. Bertell informs us, “can be categorized as either chemical [aerosols] or wave [electromagnetic] related.”<sup>36</sup> The ionosphere is an “active electrical shield protecting the planet from the constant bombardment of high-energy particles from space” and probing it with radio waves has led to the understanding that a “strong electrical coupling exists between the ionosphere and the lower atmosphere.”<sup>37</sup> IM community research has led to many discoveries useful to the military for global over-the-horizon communications, earth-penetrating tomography (also useful to fossil-fuel and other mining

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<sup>31</sup> Ibid.,176. See also “Case Study 2: Weather Modification: The Evolution of an R&D Program into a Military Operation,” *United States Military*, undated, 4, archived at <http://www.fas.org/man/eprint/leitenberg/weather.pdf>. Accessed May 13, 2015.

<sup>32</sup> Lowell Ponte, *The Cooling* (Englewood Cliffs, NJ: Prentice-Hall Inc., 1976), 169.

<sup>33</sup> Matt Novak, “Weather Control as a Cold War Weapon,” *Smithsonian*, December 5, 2011. Accessed May 28, 2015, <http://www.smithsonianmag.com/history/weather-control-as-a-cold-war-weapon-1777409/?no-ist>.

<sup>34</sup> Charles J Hanley, “Tweaking the Climate to Save it: Who Decides?” *Associated Press*, April 3, 2011, accessed July 5, 2015, <http://www.businessweek.com/ap/financialnews/D9MC6CLO1.htm>.

<sup>35</sup> National Research Council, *Opportunities for High-Power, High-Frequency Transmitters to Advance Ionospheric/Thermospheric Research: Report of a Workshop* (Washington, DC: The National Academies Press, 2014).

<sup>36</sup> Bertell, *Planet Earth*, 114.

<sup>37</sup> Begich and Manning, *Angels*, 71.

companies), surveillance, and weather or climate modification, among other purposes.<sup>38</sup>

By 1996 the US Air Force (USAF) could speak of “owning the weather in 2025” and proclaim the goal of “complete dominance of global communications and counterspace [sic] control.”<sup>39</sup> A year after the USAF published its 5-volume *Air Force 2025* report trumpeting godlike power over the atmosphere and space, Secretary of Defense William Cohen projected US military capabilities onto the nation’s then putative but non-existent enemies: “Others are engaging...in an eco-type terrorism whereby they can alter the climate, set off earthquakes, [and] volcanoes remotely through the use of electromagnetic waves....It’s real, and that’s the reason why we have to intensify our efforts” to develop these kinds of weapons.<sup>40</sup> As if to reinforce this claim, two years later a retired French military officer, Marc Filterman, wrote in the *Intelligence Newsletter* that the US and Soviet Union had “mastered the know-how needed to unleash sudden climate changes (hurricanes, drought) in the 1980s.”<sup>41</sup> Filterman also noted it was possible to use “weather war” weapons “to trigger atmospheric disturbances by using Extremely Low Frequency (ELF) radar.”<sup>42</sup>

Ever since the early days of Project Cirrus weather modification has been both weaponized and commercialized. Since the early 1970s over sixty countries<sup>43</sup> and most US western states have used weather modification technology to manipulate

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<sup>38</sup> Bertell, Op. Cit. See also T J Coles, “Weather weapons: the dark world of environmental warfare,” *Lobster Magazine*, Issue 62, Winter 2011. Accessed on August 02, 2015, <http://www.lobster-magazine.co.uk/free/lobster62/lob62-weather-wars.pdf>.

<sup>39</sup> Col. Tamzy J House et al, “Weather as a Force Multiplier: Owning the Weather in 2025,” research paper presented to *Air Force 2025* by the Department of Defense, June 17, 1996, and published as Chapter 15 in Vol. 3 of the USAF *Air Force 2025* (5 volumes). Accessed August 05, <http://fas.org/spp/military/docops/usaf/2025/>.

<sup>40</sup> William Cohen, “Terrorism, Weapons of Mass Destruction, and U.S. Strategy,” address by Secretary Cohen at Sam Nunn Policy Forum, University of Georgia, Athens, Georgia, April 28, 1997. Accessed July 15, 2015, <http://fas.org/news/usa/1997/04/bmd970429d.htm>.

<sup>41</sup> Michel Chossudovsky, “Washington’s New World Order Weapons Have the Ability to Trigger Climate Change,” *Centre for Research on Globalization*, January 4, 2002. Accessed July 20, 2015, <http://globalresearch.ca/articles/CH0201A.html>.

<sup>42</sup> Ibid.

<sup>43</sup> E B Weiss, “International Responses to Weather Modification,” *International Organization*, 29 (3), Summer 1975, 805–836, as cited in “Case Study 2,” 29.

their weather, programs that almost certainly have had and continue to have an as yet unspecified effect on the planet's overall climate. One region's or one country's drought becomes another's flood, and one's rain, a neighbor's drought. The artificial weather seamlessly becomes the artificial climate. Thousands of regional weather modifications made over the past 65 years, such as the UK's Project Cumulus (1949–1955)<sup>44</sup> and the US's Project Skywater (1961–1988),<sup>45</sup> have collectively impacted the world's meteorological and hydrological cycles *in ways that remain largely unclarified* and ignored by the UN Framework Convention on Climate Change (UNFCCC), the 1997 Kyoto Protocol, and IPCC climate modelers.

### **ENMOD, geoengineering, and secrecy**

When the US was bogged down in Indochina, it launched its highly secret weather modification program Operation Popeye to “make mud, not war” over the Ho Chi Minh Trail. This program was executed from 1967 to 1972 without the knowledge of either the governments of South Vietnam, Laos, or Thailand (from where the spray planes took off and landed, at Udon Air Base) or of the US ambassadors to those countries.<sup>46</sup> Not only pivotal ambassadors but top Congressional committee chairs as well as “many usually well-informed members of the Nixon administration had been kept in the dark,” according to *New York Times* reporter Seymour Hersh.<sup>47</sup> When syndicated columnist Jack Anderson reported on Operation Popeye in March 1971, Congress demanded disclosure in a series of hearings that lasted for two years as the military refused to divulge information. Quoting a well-informed official, Hersh explained, “This kind of thing [secret weather-modification warfare] was a bomb...and Henry [Kissinger] restricted information about it to those who had to know.”<sup>48</sup> Although Secretary of Defense Robert McNamara reportedly ordered a halt to the operation, according to Hersh's sources “it went underground—into the

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<sup>44</sup> John Vidal and Helen Weinstein, “RAF rainmakers ‘caused 1952 flood’,” *The Guardian*, August 30, 2001. Accessed August 25, 2015, <http://www.theguardian.com/uk/2001/aug/30/sillyseason.physicsciences>.

<sup>45</sup> Jedediah S Rogers, “Project Skywater,” *Bureau of Reclamation*, 2009. Reformatted and edited by Adrew H Gahan, July 2013. Accessed May 29, 2015, [http://www.usbr.gov/history/ProjectHistories/Project\\_Skywater\\_D1\[1\].pdf](http://www.usbr.gov/history/ProjectHistories/Project_Skywater_D1[1].pdf).

<sup>46</sup> Fleming, *Fixing the Sky*, 180.

<sup>47</sup> Seymour Hersh, “Rainmaking Is Used As Weapon by U.S.,” *The New York Times*, July 3, 1972.

<sup>48</sup> Seymour Hersh, “Weather As a Weapon Of War,” *The New York Times*, July 9, 1972.

dark”<sup>49</sup> and continued there until Hersh exposed it in his July 1972 *New York Times* reports.

Covert means covert. Few, very few of the many people needed and cleared to implement a classified military operation know the entirety of ‘the big picture’ even as it unfolds, except on a strict, hierarchical need-to-know basis. The military and intelligence communities work according to principles of “compartmentalization” (operations, including research, are broken into segments, none of whose participants understand the details of the whole enterprise) and “need-to-know,” that together function as “containment,” so that the overall project or program’s intent is masked or opaque to all but a very few decision makers.<sup>50</sup> Ambassadors and powerful senators are among those high up in the hierarchy who may be foreclosed. As former insider Daniel Ellsberg admitted: “Once I was inside the government, my awareness of how easily and pervasively Congress, the public, and journalists were fooled and misled contributed to a lack of respect” for them.<sup>51</sup>

The anthropologist Hugh Gusterson observed: “Secrecy is a means by which power constructs itself as power, and the knowledge of secrets is a perquisite of power.”<sup>52</sup> Pervasive secrecy and democracy cannot coexist. The experiment that began with the inauguration of George Washington as the first US president in 1789 will be undone when secrecy reaches a threshold beyond which the mores of empire eclipse those of a democratic republic. In a report submitted to the Congress after the Vietnam War, the highly influential UCLA-based geoscientist Gordon J. F. MacDonald argued that the key lesson of that war was not the failure of Operation Popeye to alter its outcome but “that one can conduct covert operations using a new technology in a democracy *without the knowledge of the people*” [emphasis added].<sup>53</sup> This lesson has been bred into the bones of the military establishments of the Western democracies ever since Vietnam.

In reaction to the massive use of weather modification, defoliants, and herbicides such as Agent Orange, and other toxic aerosols in Vietnam — directly killing one to 3.5 million Vietnamese, maiming tens of thousands still being born with birth defects, and disrupting the ecology of 40 percent of their land, “reducing dense

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<sup>49</sup> Ibid.

<sup>50</sup> Daniel Ellsberg, *Secrets: A Memoir of Vietnam and the Pentagon Papers* (New York: Viking Penguin, 2002). See also Begich and Manning, *Angels*, 84 and Gusterson, *Nuclear Rites*, 75-92.

<sup>51</sup> Ellsberg, *Secrets*, 44.

<sup>52</sup> Gusterson, *Nuclear Rites*, 87.

<sup>53</sup> Fleming, *Fixing the Sky*, 182.

jungles and mangrove forests to barren wastelands”<sup>54</sup>— the world community created the 1978 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (ENMOD). Rattled by the uproar caused by Daniel Ellsberg’s release of the Pentagon Papers to the *New York Times* and the subsequent US Senate hearings, the US ratified ENMOD in 1979.

However, rather than halting weather and other environmental modification programs, the treaty had the effect of causing them to be more rigorously disguised as “research” or sequestered inside the unscrutinized budgets of “‘black’ or secret operations,”<sup>55</sup> and thus outside either the purview of ENMOD or US citizens and their institutions of representation. After ENMOD the military-science-industrial research complex went further underground.<sup>56</sup> Two decades later, 9-11 drove it yet deeper underground with the advent of a new, corrosive ethos of perpetual war<sup>57</sup> that again made the words ‘national security’ an unchallengeable barrier to independent inquiry, a supreme state prerogative.

Gordon MacDonald had warned that ENMOD or environmental warfare “could damage an adversary without revealing its [the aggressor’s] intent” and that “applying such techniques [of war] under cover of nature’s irregularities presents a disquieting prospect.”<sup>58</sup> MacDonald added that a secretly waged weather war “need never be declared or even known by the affected populations. It could go on for years with only the country’s [aggressor’s] security forces involved being aware of it,” as the complex randomness of the weather makes accusations plausibly deniable.<sup>59</sup>

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<sup>54</sup> Bertell, *Planet Earth*, 158. See also: Dana Visalli, “The Greatest Danger in the World Today,” *Information Clearing House*, May 1, 2015. Accessed May 28, 2015, <http://www.informationclearinghouse.info/article41733.htm>.

<sup>55</sup> Pauline Cantwell, “The Wild Cards in Climate Change: Weather Warfare, Geoengineering and ENMOD,” talk presented at the United Nations DPI/NGO Conference, September 5, 2007. Accessed May 20, 2015, [http://www.un.org/dpi/ngosection/conference/60/4\\_Wild\\_Cards.htm](http://www.un.org/dpi/ngosection/conference/60/4_Wild_Cards.htm).

<sup>56</sup> Bertell, *Planet Earth*, 45-46, 114. See also Fleming, *Fixing the Sky*, 184-186.

<sup>57</sup> James Risen, *Pay Any Price: Greed, Power, and Endless War* (Boston: Houghton Mifflin Harcourt, 2014).

<sup>58</sup> Gordon J F MacDonald, “How to Wreck the Environment,” in *Unless Peace Comes: A Scientific Forecast of New Weapons*, ed. Nigel Calder (New York: The Viking Press, 1968), 188.

<sup>59</sup> *Ibid.*, 203.

## Is global warming good or bad? That depends....

In the 1950s and early 1960s climate change geoengineering proposals in both the US and Soviet Union were oriented toward causing global warming for the benefit of human activity, with the melting of the Arctic then the glittering jewel on the geoengineer's horizon, and a prospect devoutly hoped for by Soviet geoengineers and planners.<sup>60</sup> (One fifth of Russia's territory lies north of the Arctic Circle and includes an Arctic-frontier coastline thousands of miles long.) This original or early orientation of geoscientists has been quietly maintained for decades despite the ever-growing consensus about global warming, and has been funded by the big energy companies who have been wedged inside the great climate change debate since its inception.<sup>61</sup> In a March 25, 2012 letter to *The Economist* Matt Andersson, an aerospace executive and intelligence industry consultant, bluntly stated: "The public and press are largely uninformed (and misled) as to the actual Geo-engineering operations being conducted by military and certain cooperating commercial interests to effectively 'melt' the arctic for naval navigation and resource extraction."<sup>62</sup>

Four years before Andersson wrote his blunt letter, Shell (the US subsidiary of Royal Dutch Shell), spent over \$2 billion for leases in the Chukchi Sea off Alaska's North Slope. Undeterred by the fate of its abortive attempt to drill there in the summer of 2012, Shell's massive refurbished Transocean Polar Pioneer drilling rig was being towed northward in June 2015, "pushing into the Arctic as it faces intense economic pressure to replace its diminishing oil resources."<sup>63</sup> The company's CFO noted the Arctic's fossil fuels potential was "by far the largest unexplored and undeveloped

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<sup>60</sup> Fleming, Op. Cit., 198-200, 208, 256. See also: Spencer Weart, "Climate Modification Schemes," *The American Institute of Physics*, June 2011. Accessed July 07, 2015, <https://www.aip.org/history/climate/RainMake.htm>.

<sup>61</sup> Francesca Grifo et al, "A Climate of Corporate Control: How Corporations Have Influenced the U.S. Dialogue on Climate Science and Policy," *Union of Concerned Scientists*, May 2012. Accessed on August 03, 2015, <http://www.ucsusa.org/our-work/center-science-and-democracy/fighting-misinformation/a-climate-of-corporate-control.html#.Vb.DD3jRzgU>. See also Naomi Oreskes and Eric M Conway, *Merchants of Doubt* (New York: Bloomsbury, 2010).

<sup>62</sup> Matt Andersson, "Cosy Amid the Thaw," *The Economist*, March 25, 2012. Accessed July 07, 2015, <https://www.economist.com/users/matt%20andersson/comments>.

<sup>63</sup> Jennifer A Dlouhy, "Shell undertaking critical Arctic mission," *Houston Chronicle*, June 12, 2015. Accessed June 18, 2015, <http://www.houstonchronicle.com/business/energy/article/Shell-undertaking-critical-Arctic-mission-6324687.php>.



[fossil] liquids resource on Earth.”<sup>64</sup> In 2008 the US Geological Survey’s Circum-Arctic Resource Appraisal claimed that 20 percent of the world’s oil and natural gas reserves were located above the Arctic Circle.<sup>65</sup> That same year Dimitry Medvedev, then Russia’s president, addressed his nation’s Security Council: “Our biggest task now is to turn the Arctic into Russia’s [resource] base for the twenty-first century.”<sup>66</sup> Is the otherwise perplexing discord between NATO and Russia about access to natural resources — viewed through a zero-sum-game lens? A US Space Command document, *Vision for 2020*, asserts: “Space power...will be increasingly leveraged to close the ever-widening gap between diminishing resources and increasing military commitments.”<sup>67</sup> By “commitments” one assumes the US Space Command refers to the US/NATO ring of bases that stretch from Norway and Estonia in the West to South Korea and Japan in the East to guarantee access to those militarily strategic resources, above all energy resources, essential to the military’s survival.<sup>68</sup>

The world’s fossil fuel industry recognizes that world demand for oil and gas is outstripping production, and that fossil fuels are likely to continue to supply 80 percent of humanity’s energy needs as late as 2040, despite the recent exponential growth of renewables.<sup>69</sup> Such recognition is especially acute inside the world’s largest consumer of fossil fuels, the Pentagon, and by extension the militaries of the world’s great and emergent powers. Without oil to fuel their ships, tanks, planes,

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<sup>64</sup> Terry Macalister and Damian Carrington, “Shell Determined to Start Arctic oil drilling this summer,” *The Guardian*, January 29, 2015. Accessed June 10, 2015, <http://www.theguardian.com/business/2015/jan/29/shell-determined-arctic-oil-drilling-summer>.

<sup>65</sup> Michael T Klare, *The Race for What’s Left: The Global Scramble for the World’s Last Resources* (New York: Picador Press, 2012), 75.

<sup>66</sup> Dimitry Medvedev, “Speech at Meeting of the Russian Security Council on Protecting Russia’s National Interests in the Arctic,” September 17, 2008. Accessed August 29, 2015, [http://archive.kremlin.ru/eng/text/speeches/2008/09/17/1945\\_type82912type82913\\_206564.shtml](http://archive.kremlin.ru/eng/text/speeches/2008/09/17/1945_type82912type82913_206564.shtml).

<sup>67</sup> United States Space Command, *Vision for 2020*, undated. Accessed September 04, 2015, <http://fas.org/spp/military/docops/usspac/visbook.pdf>.

<sup>68</sup> Jules Dufour, “Review Article: The Worldwide Network of US Military Bases,” *Global Research*, July 01, 2007. Accessed August 19, 2015, <http://www.globalresearch.ca/the-worldwide-network-of-us-military-bases/5564>.

<sup>69</sup> U.S. Energy Information Administration, “EIA projects world energy consumption will increase 56% by 2040,” *US Department of Energy*, July 25, 2013. Accessed June 22, 2015, <http://www.eia.gov/todayinenergy/detail.cfm?id=12251>.

missiles, and satellite-launchers, the world's militaries will radically shrink into paltry images of their former selves.

"It's no coincidence that our [NATO's] strategic interest in the Arctic warms with the climate," a US Admiral said during a NATO workshop on security in the Arctic.<sup>70</sup> At the same time Shell's Polar Pioneer inched its way northward, the US Navy, which has been planning for ice-free Arctic operations since 2001, was launching the largest war game exercises in Alaskan Arctic waters in over 30 years of conducting them, a new five-year program of war readiness called Northern Edge. By its own admission, the naval exercises "may result in damage could take years to decades from which to recover" but as journalist Dahr Jamail reports, "they are preparing for what's coming in the Arctic as the race for what's left" of the world's oil and gas.<sup>71</sup>

Despite the 21<sup>st</sup> century Arctic black-gold rush, in the wake of ENMOD a scientific consensus had already begun to form around the need to counteract the buildup of anthropogenic CO<sub>2</sub>. By the early 1980s new geoengineering proposals were being made in science journals to bring about, for example, "desired changes in Earth albedo [reflectivity] through judicious introduction of small particles [that] can probably be accomplished at acceptable cost through the use of modified combustors on high-flying aircraft."<sup>72</sup> Such geoengineering proposals generated a host of new technology patents, in particular for aerosol spray techniques as well as specifications for aerosol particles suitable for geoengineering sprays. These were the unclassified patents open to public scrutiny.<sup>73</sup> We do not know what classified geoengineering patents the military holds, only that it presumably holds many pertinent to what it conceives to be national security interests.

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<sup>70</sup> Klare, *The Race for What's Left*, 98.

<sup>71</sup> Dahr Jamail, interview by Amy Goodman and Aaron Maté, "Bombing the Arctic: US Navy War Games in Gulf of Alaska Threaten One of the World's Most Pristine Areas," *Democracy Now!*, June 16, 2015. Accessed June 29, 2015, [http://www.democracynow.org/2015/6/16/bombing\\_the\\_arctic\\_us\\_navy\\_war](http://www.democracynow.org/2015/6/16/bombing_the_arctic_us_navy_war).

<sup>72</sup> S. S. Penner, A. M. Schneider and E. M. Kennedy, "Active Measures for Reducing the Global Climatic Impact of Escalating CO<sub>2</sub> Concentrations," *Acta Astronautica* 11, 6 (1984). Accessed May 8, 2015, <http://adsabs.harvard.edu/abs/1984AcAau..11..345P>.

<sup>73</sup> Some of the public domain geoengineering patents can be found in Lorie Kramer, "A Partial History of Aerosol and Weather Related Technologies," July 30, 2003, <http://www.seektress.com/patlist.htm> and in "Extensive list of Patents," and *GeoEngineering Watch*, <http://www.geoengineeringwatch.org/links-to-geoengineering-patents/>. Both accessed July 07, 2015.

Climate change has been a national security concern for at least a quarter century,<sup>74</sup> roughly speaking ever since the problem of global warming due to anthropogenic greenhouse gases was dramatically publicized in the hot summer of 1988 when NASA's James Hansen testified before Congress to warn humanity faced an uncertain future if steps to reduce CO<sub>2</sub> were not taken soon. According to the physicist and science historian Spencer Weart, in that same year "the International Panel on Global Climate Change (IPCC) was designed by the Reagan administration, primarily as a replacement for the self-appointed committees of scientists" that "the administration thought were unduly alarmist. The IPCC was designed so that it can make a statement only by the unanimous consent of all the scientific representatives of all the world's governments....a recipe for conservatism, if not paralysis."<sup>75</sup> In hindsight it would appear the omniscient hands of the fossil fuels industry and its martial cohort were at work at the very outset of the great climate debate.

Three years after Hansen's salvo the National Academy of Science (NAS) published its signal study *Policy Implications of Greenhouse Warming*, which stated that "Despite the great uncertainties, greenhouse warming is a potential threat sufficient to justify action now" and that research should be undertaken to learn more about "the potential of geoengineering options to offset global warming and their possible side-effects."<sup>76</sup> Some observers believe this particular NAS study and the massive 944-page similarly titled technical study co-sponsored and published by NAS a year later in 1992 effectively launched a new wave of climate engineering experiments.<sup>77</sup> These coincided almost exactly with US Under Secretary of Defense for Policy Paul D Wolfowitz's first articulation of the post-Soviet US military policy of what later came

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<sup>74</sup> Spencer Weart, "A National Security Issue? How People Tried to Frame Global Warming," in *Global Climate Change: National Security Implications*, ed. Carolyn Pumphrey (Carlisle, PA: Strategic Studies Institute, US Army War College, 2008), 36. Accessed June 19, 2015, <http://www.strategicstudiesinstitute.army.mil/pdffiles/PUB862.pdf>.

<sup>75</sup> Ibid., 38.

<sup>76</sup> National Academy of Sciences, National Academy of Engineering, Institute of Medicine, *Policy Implications of Greenhouse Warming* (Washington, DC: National Academy Press, 1991), 72.

<sup>77</sup> Gabriel Stetter, "Der Zerstörung des Himmels," 127, Jan/Feb 2004. Accessed July 07, 2015, <http://www.raum-und-zeit.com/r-z-online/artikel-archiv/2004/ausgabe-127>. Translated by Graham Rickett as "White Skies: The Global Warming Problem and Chemtrails." Accessed July 07, 2015, <http://www.holmestead.ca/chemtrails/r+z.html>.

to be known as “full spectrum dominance,” leaked in March 1992 to *The New York Times*.<sup>78</sup>

Further hint of a new military research agenda was betokened in 1990 and 1991 when the US Air Force (USAF) Academy offered its underclassmen chemistry courses using spiral-bound textbooks or manuals with the name “*Chemtrails*” printed on their front covers.<sup>79</sup> Coincidentally at this time two chemists filed one of the most famous of the many unclassified geoengineering patents, “Stratospheric Welsbach Seeding for the Reduction of Global Warming.” The 1991 patent, now owned by Raytheon, one of the world’s premiere weapons and weather information companies, is of particular interest because it calls for “dispersing tiny particles of a material within the [greenhouse] gases’ layer, the particle material characterized by wavelength-dependent emissivity or reflectivity.”<sup>80</sup> In other words the mix of particles sprayed would behave exactly opposite to the greenhouse gases, both reflecting incoming sunlight back into space during the day and permitting Earth’s radiated heat to escape back into space at night. The patent specifies Welsbach materials, as well as “Welsbach-like materials” such as “the oxides of metals which have high emissivity” (aluminum oxide and thorium are notably cited) and which “may be seeded by dispersal from seeding aircraft...at an altitude on the order of 10 kilometers.”<sup>81</sup>

As if on cue, in June 1991 Earth conducted a geoengineering experiment of her own, Earth is wont to do every decade or so, one that would later be described as a prime example of “stratospheric aerosol geoengineering” or what the geoengineers now

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<sup>78</sup> Patrick E. Tyler, “US Strategy Plan calls for Insuring No Rivals Develop: A One-Superpower World,” *The New York Times*, March 8, 1992. Accessed July 07, 2015, <http://www.nytimes.com/1992/03/08/world/us-strategy-plan-calls-for-insuring-no-rivals-develop.html>. For a later iteration see The Project for the New American Century, *Rebuilding America’s Defenses: Strategy, Forces and Resources For a New Century* (Washington, DC: The Project for the New American Century, 2000). Accessed September 29, 2015, <http://www.informationclearinghouse.info/pdf/RebuildingAmericasDefenses.pdf>.

<sup>79</sup> Department of Chemistry, USAF Academy, *Chemtrails: Chemistry 131 Manual*, Fall 1990 and Department of Chemistry, USAF Academy, *Chemtrails: Chemistry 141 and 142*, Fourth Edition (Reading, MA: Addison Wesley, 1998), ISBN-13: 978-0201306842 and ISBN-10: 0201306840. The Chemistry 131 manual in my possession, Fall 1990 edition, has no listed ISBN.

<sup>80</sup> David B Chang and I-Fu Shih “Stratospheric Welsbach seeding for reduction of global warming,” US Patent No. 5,003,186, March 26, 1991. Accessed May 6, 2015, <http://www.google.com/patents/US5003186>.

<sup>81</sup> Ibid.

refer to as “the Pinatubo Option.”<sup>82</sup> According to the US Geological Survey, the Philippine island of Luzon’s Mt. Pinatubo ejected 20 million tons of sulfur dioxide into the stratosphere, more than 1 cubic mile of material that rose in an ash cloud 22 miles into the air and caused global temperatures to drop from 1991 to 1993 by about 1° F (0.5° C).<sup>83</sup> Geoengineers ever since have looked to the 1991 Pinatubo explosion as their inspirational lodestar, incontrovertible proof that stratospheric aerosols can cool the planet abruptly.

But only for one or two years, or as long as the ejected aerosols stay aloft.

### **Strategic aerosol geoengineering (SAG) aka solar radiation management (SRM) aka chemtrails**

As noted, the term “chemtrails” originated with DoD in 1990. It was picked up later in the decade and adopted by concerned citizens who had begun to post thousands of photographs and videos on the Internet,<sup>84</sup> recording new “persistent” aerosol trails in the skies not seen up to this time (or rarely seen outside theaters of war). Many of these citizens were alarmed by the health effects the new aerosols were having, suspecting they were linked to sudden spates of mysterious illnesses, as reported by independent journalists from 1999 onward, in North America,<sup>85</sup> Europe,<sup>86</sup> Australia and New Zealand.<sup>87</sup> These reports, published in independent

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<sup>82</sup> Eli Kintisch, *Hack the Planet: Science’s Best Hope—or Worst Nightmare—for Averting Climate Catastrophe* (Hoboken, NJ: John Wiley & Sons, 2010).

<sup>83</sup> Chris Newhall et al, “The Cataclysmic 1991 Eruption of Mount Pinatubo, Philippines,” *U.S. Geological Survey*, 1997. Accessed August 03, 2015, <http://pubs.usgs.gov/fs/1997/fs113-97/>.

<sup>84</sup> For one extensive piece of video footage see *Don’t Talk About the Weather*, Ill Eagle Films, 2008. Accessed on August 05, 2015, <http://topdocumentaryfilms.com/don’t-talk-about-the-weather/>. There are many thousands of such videos now on the Internet.

<sup>85</sup> Examples of many such reports are: William Thomas, “Stolen Skies: The Chemtrail Mystery,” *Earth Island Journal*, Summer 2002. Accessed August 14, 2015, [http://www.earthisland.org/journal/index.php/eij/article/stolen\\_skies\\_the\\_chemtrail\\_mystery/](http://www.earthisland.org/journal/index.php/eij/article/stolen_skies_the_chemtrail_mystery/) and Amy Worthington, “Chemtrails And Terror In the Age Of Nuclear War,” *Idaho Observer*, May 2004. Accessed on August 03, 2015, <http://proliberty.com/observer/20040501.htm>.

<sup>86</sup> Maria Liliopoulou, “Judging that They Contain Substances Dangerous to the Environment, Scientists Anxious About the Consequences of ‘Chemtrails’ from Jet Planes,” *Ethnos*, February 12, 2004. Accessed on August 03, 2015, <http://www.chemtrails.ch/dokumentationen/Ethnos-Articles.htm>. And Gabriel Stetter, Op. Cit.

local newspapers such as *Columbus Alive* and nonprofit magazines such as the *Earth Island Journal*, contained eyewitness rumors of a new order in the heavens above.

The reports were based on not only ordinary citizens' sightings but on the testimonies of insiders, such as an airline mechanic<sup>88</sup> and later an airline manager who confirmed the existence of the CIA's Project Cloverleaf to "allow commercial airlines to assist [the military] in releasing these chemicals into the atmosphere."<sup>89</sup> The reports also referenced taped testimonies of a senior US Federal Aviation Authority (FAA) official and a Canadian international airport environmental manager,<sup>90</sup> as well as an unrecorded interview with a USAF scientist at the Wright-Patterson Air Base in Ohio who explained the different reasons for barium and aluminum aerosol spraying.<sup>91</sup> The USAF scientist stated that aluminum oxide was used "to create an artificial sunscreen to reflect solar radiation back into space to alleviate global warming" and that "barium may be sprayed in a similar manner for the purpose of 'high-tech 3-D radar imaging' ...[and] used as a 'wire' to shoot an electromagnetic beam through to take 3-D images of the ground far over the horizon."<sup>92</sup> The FAA official confirmed that air traffic controllers [ATCs] at the major airports of New York, Chicago, Los Angeles, Atlanta, Washington, DC, and elsewhere throughout the country told him they "were being ordered to route airliners

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<sup>87</sup> Eve Sinton, "Byron Bay Chemtrails," *The Echo*, July 07, 2000. Accessed July 08, 2015, <http://www.worldgathering.net/world/byronbay1.html>.

<sup>88</sup> "A Mechanic's Statement," posted by Clifford E. Carnicom on *Carnicom Institute Website*, May 19, 2000. Accessed July 08, 2015, <https://carnicominstitute.website/articles/PDF/mech1.pdf>.

<sup>86</sup> "An Airline Manager's Statement," posted by Clifford E. Carnicom on the *Carnicom Institute Website*, May 22, 2000. Accessed July 08, 2015, <https://carnicominstitute.website/articles/mgr1.htm>.

<sup>90</sup> S.T. Brent and William Thomas, "Chemtrails – FAA Official Confirms Ongoing East Coast 'Military Operation,'" *Lifeboat News Service*, April 03, 2001. Accessed May 03, 2015, <http://www.chemtrailcentral.com/msg3778.html>.

<sup>91</sup> Bob Fitrakis and Fritz Chess, "Stormy Weather – The Government's Top Secret Efforts to Control Mother Nature," *Columbus Alive*, December 22, 2001. Accessed August 04, 2015, <http://www.rense.com/general18/mn.htm>.

<sup>92</sup> Ibid.

beneath formations of Air Force tanker planes spraying something that regularly clouds their [the ATC's] screens."<sup>93</sup>

During this early period of what the USAF calls "aerial obscuration" Representative Dennis Kucinich of Ohio introduced the Space Preservation Act of 2001 (HR 2977), which sought a permanent ban on the weaponizing of outer space with "Plasma, electromagnetics, sonic or ultrasonic weapons [and] laser weapons systems." It also explicitly outlawed "chemtrails."<sup>94</sup> Asked why he would introduce a bill outlawing chemtrails when the government itself denied their existence and explained them as a "hoax," Kucinich answered: "The truth is there's an entire program in the Department of Defense...that's developing these weapons."<sup>95</sup> (He was later quoted saying, "Chemtrails are real.") Though it still remains in the *Congressional Record*, HR 2977 was supplanted by HR 3616, eviscerating the original bill, with chemtrails and other space-based weapons no longer mentioned and therefore not prohibited under federal law.<sup>96</sup>

The pioneering journalists who covered the early chemtrails story from 1999 to 2005 also reported that individual citizens collected post-spray rainwater samples and had them tested by independent laboratories in several countries throughout the Western world. These tests showed elevated levels of aluminum and barium most frequently, but also many other toxic elements such as strontium, thorium, copper, titanium, arsenic, lithium, boron, iron, sodium, calcium, lead, selenium, magnesium, chromium, and cadmium, among others as well as strange gels, polymers, and a variety of microorganisms. Post-spray rainwater tests have been conducted throughout the world, most commonly in North America, Europe, Australia, and New Zealand.<sup>97</sup>

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<sup>93</sup> William Thomas, "Air Traffic Controllers Concerned Over Chemtrails," *Lifeboat News Service*, March 04, 2002. Accessed April 27, 2015, <http://www.rense.com/general20/cc.htm>.

<sup>94</sup> Space Preservation Act of 2001, HR2977, 107<sup>th</sup> Cong., 1st Sess., (2001), accessed July 10, 2015, <http://fas.org/sgp/congress/2001/hr2977.pdf>.

<sup>95</sup> Bob Fitrakis, "Chemtrails Outlaw," *Columbus Alive*, January 24, 2002. Accessed August 04, 2015, <http://www.globalresearch.ca/articles/FIT203A.html>.

<sup>96</sup> Bob Fitrakis, "Into Thin Air," *Columbus Alive*, March 28, 2002. Accessed August 04, 2015, <http://web.archive.org/web/20030309184138/http://www.columbusalive.com/2002/20020328/032802/03280205.htm>.

<sup>97</sup> "Rainwater Test Results," *Global Skywatch*. Accessed on August 04, 2015, <http://globalskywatch.com/chemtrails/ubbthreads.php?ubb=postlist&Board=&page=1#.VcDUrXjRzgV>.

Aerosolized aluminum, leached by rainwater into a chemically mobile state, is toxic to biota and may be linked to boreal forest disease and mortality — including mortality due to forest fires — in North America, Scandinavia, and Russia.<sup>98</sup> Aluminum, in particular, is a known human health toxin — a neurotoxin associated with such exponentially occurring neurological diseases as Alzheimer’s and autism — and unless toxic aerosol spraying is assumed, its notably high presence as a chemically mobile element in rainwater remains puzzling (as well as untested by university-based scientists or government agencies).<sup>99</sup>

According to a reporter for the *Las Vegas Tribune* who covered the many anecdotal reports of clogged emergency rooms around the country in 2005, “Severe headaches, nosebleeds, shortness of breath, joint pain and a dry hacking cough ‘that never leaves’ are being reported by countless Americans jamming Emergency Rooms from coast to coast...doctors and nurses across the U.S. report hospital wards filled to overflowing with bronchitis, pneumonia, and acute asthma admissions at up to twice-normal winter rates.”<sup>100</sup> Long-lasting flu-like symptoms without fevers were common. Long before this report, Senator Joseph Lieberman of Connecticut wrote the Environmental Protection (EPA) Administrator on March 5, 1999 regarding his constituents’ “concerns about the possible release of toxic chemical substances from jet contrails,” noting “recent outbreaks of flu-like symptoms and other sicknesses...that may possibly be linked to jet fuel exhaust fumes.”<sup>101</sup> The

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<sup>98</sup> Donald W Sparling and T Peter Lowe, “Environmental hazards of aluminum to plants, invertebrates, fish, and wildlife,” *Reviews of Environmental Contamination and Toxicology*, 145 (1996) 1-127. Accessed August 04, 2015, [http://www.researchgate.net/publication/15704011\\_Environmental\\_Hazards\\_of\\_Aluminum\\_to\\_Plants\\_Invertebrates\\_Fish\\_and\\_Wildlife](http://www.researchgate.net/publication/15704011_Environmental_Hazards_of_Aluminum_to_Plants_Invertebrates_Fish_and_Wildlife).

<sup>99</sup> J Marvin Herndon, “Aluminum poisoning of humanity and Earth’s biota by clandestine geoengineering activity: implications for India,” *Current Science* 108, no. 12 (2015). Accessed July 15, 2015, [www.currentscience.ac.in/Volumes/108/12/2173.pdf](http://www.currentscience.ac.in/Volumes/108/12/2173.pdf). See also Dr. Ilva Sandra Perlingieri, “Chemtrails: The Consequences of Toxic Metals and Chemical Aerosols on Human Health,” *Global Research*, May 7, 2010. Accessed July 13, 2015, <http://www.globalresearch.ca/chemtrails-the-consequences-of-toxic-metals-and-chemical-aerosols-on-human-health/19047>.

<sup>100</sup> Marcus K Dalton, “Chemtrails Are Over Las Vegas,” *Las Vegas Tribune*, Part 1: August 19, 2005, Part 2: August 26, 2005. Accessed June 10, 2015, <http://www.lasvegastribune.com/20050826/headlines3.html>.

<sup>101</sup> Jon Nowinski, “Congressional Response to Contrails,” Letter from Joseph I. Lieberman to Carol M. Browner, Administrator of the EPA, March 5, 1999. Accessed July 08, 2015, <http://netowne.com/environmental/contrails/smokin/index.htm>.



senator also noted similar reports of toxic spraying in 41 other states. A response from the EPA was not forthcoming.

Complaints like these induced DoD and all other government agencies, universities, and corporate media to ridicule the term chemtrails as a “hoax” perpetrated by “conspiracy theorists.”<sup>102</sup> Various community and citizen groups’ appeals for official explanation were met by silence or ridicule; or if the protest was not stood down but persisted, it was termed a matter of “no significance”; with yet more persistence, it yielded a reply like, “due to military exercises whose purpose is unknown”; and finally, it was rejected as a subject that could not be discussed, “due to national security.”<sup>103</sup>

### **Whose conspiracy?**

Most people, when confronted with the idea of clandestine geoengineering, find the idea psychologically incomprehensible. If shown reliable photographic evidence or real-life visual evidence, they will proclaim the idea impossible if only on the basis of its secrecy: such a massive operation, fulfilled by thousands of human beings along a strict chain of command, could not possibly be kept secret! This is a psychological response, blind to history. Some 130,000 US, Canadian, and British scientists, administrators, military, and political figures were involved in the Manhattan Project. It was kept secret for years. Leonard Cole documented the US Army’s covert tests using biological and chemical agents on unwitting urban civilian populations in the 1950s and 1960s. These tests were kept secret for years and even decades. Conducted on the ground or from ships, in subways and otherwise in public view, the tests elicited scant interest among the populations being tested with clouds of bacteria and chemicals — an indifference, or lack of suspicion, that certainly made the Army’s job easier.<sup>104</sup>

Daniel Ellsberg, who had a top-secret clearance for many years, insists that “the fact is that the overwhelming majority of secrets do not leak to the American public....The reality unknown to the public and to most members of Congress and the press is that secrets that would be of the greatest import...*can be kept from them*

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<sup>102</sup> US Air Force, “The ‘Chemtrail’ Hoax,” *Air Force Link*, April 21, 2001. Accessed August 04, 2015, [http://www.af.mil/environment/contrails\\_contrails\\_chemtrail.shtml](http://www.af.mil/environment/contrails_contrails_chemtrail.shtml).

<sup>103</sup> Stetter, Op.Cit.

<sup>104</sup> Leonard A Cole, *Clouds of Secrecy: The Army’s Germ Warfare Tests over Populated Areas* (Lanham, MD: Rowan & Littlefield, 1988). For germ warfare tests conducted in the United Kingdom, see Anthony Barnett, “Millions were in germ war tests,” *The Guardian*, April 21, 2002. Accessed August 06, 2015, <http://www.theguardian.com/politics/2002/apr/21/uk.medicalscience>.

*reliably for decades* by the executive branch, even though they are known to thousands of insiders” [emphasis added].<sup>105</sup>

Power that does not exercise control over language rides a precarious horse, especially in the age of mass communication. The CIA appropriated the venerable word conspiracy and created the terms ‘conspiracy theory’ and ‘conspiracy theorist’ in a 1967 dispatch secured by the *New York Times* in 1976 under the Freedom of Information Act.<sup>106</sup> Written in response to mounting criticism of the Warren Commission and marked “PSYCH,” the dispatch worried that published criticisms “tend...to cast doubt on the whole leadership of American society” as well as “the whole reputation of the American government.”<sup>107</sup> The CIA document recommends to editors and politicians alike, that when confronted with criticism of the Warren Commission’s lone-gunner theory, they counterclaim, “Conspiracy on the large scale often suggested [i.e., involving the government] would be impossible to conceal.”<sup>108</sup> Using this myth over the ensuing decades the state has managed to hoodwink most of the people, most of the time.

Political scientist Lance deHaven-Smith masterfully deconstructs the meaning of this dispatch for the US, whose “Founders worried most about the potential for power to become concentrated in the executive because of real or pretended threats to national security.”<sup>109</sup> In the context of national security the “Founders do not appear to have anticipated the mobilization of political officials and insiders as a unified force” that is “becoming a sort of super-faction, a transcendent function with interests that are higher, more general, and...more important” than the interests of the rest of the citizenry.<sup>110</sup> This ruling faction naturally has a special interest in the rigorous application of the conspiracy theorist label, “a powerful smear that,” in deHaven-Smith’s words, “preempts public discourse, reinforces rather than resolves disagreements, and undermines popular vigilance against abuses of power.”<sup>111</sup>

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<sup>105</sup> Daniel Ellsberg, *Secrets*, 43.

<sup>106</sup> Lance deHaven-Smith, *Conspiracy Theory in America* (Austin, TX: University of Texas Press, 2013), 107.

<sup>107</sup> CIA Document 1035-960, “Concerning Criticism of the Warren Report,” January 1967. Accessed on August 02, 2015, <http://www.jfklancer.com/CIA.html>. See also “Appendix: CIA Dispatch #1035-960” in deHaven-Smith, Op. Cit., 197-202.

<sup>108</sup> *Ibid.*

<sup>109</sup> deHaven-Smith, Op. Cit., 58-59.

<sup>110</sup> *Ibid.*, 69-70.

<sup>111</sup> *Ibid.*, 131.

In the decades since the Vietnam War the state's and corporate media's appropriation of the term "conspiracy theorist" has cast a pall over the search for truth about the exercise of power, and especially the state's covert exercise of its military, intelligence, and technological prowess. This has profoundly colored the search for answers about the military's ongoing geoengineering activities because secret operations are classified, hence unprovable by standard criteria, and thus remain invisible to the public. Accusations that cannot be verified because of classified information can be safely dismissed with *plausible denial*. The doctrine of plausible deniability was specifically adopted by the US government at the outset of the Cold War in 1948: "covert operations' are understood to be all activities...so planned and executed that any US Government responsibility for them is not evident to unauthorized persons and that if uncovered the US Government can plausibly disclaim any responsibility for them."<sup>112</sup>

This information cul-de-sac created by the post-WWII US national-security state was further compounded by DoD's overt policy of telling outright lies. Science journalist Bill Sweetman, citing a Pentagon manual, tells us "the Department of Defense explicitly authorizes the dissemination of misleading information in order to protect classified programs."<sup>113</sup> According to Steven Aftergood of the Federation of American Scientists, "Once we know that the DoD practices this kind of deception, it becomes harder to discern what's for real and what is not."<sup>114</sup>

In the climate of fear and extreme dissimulation that followed in the wake of 9-11, reporters and activists who claimed there were no Iraqi weapons of mass destruction, no yellowcake, were discredited and effectively silenced by the government's and the complicit press's claims they were "conspiracy theorists." By projecting their own complicity onto their critics and enemies (conflating the two in the process), US and UK power elites disguised their own intentions and actions. The destruction of nations that followed the "coalition of the willing," gruesome immolations of whole societies and peoples, was the first casualty of *the official conspiracy*, the one that denied the truth of the unofficial conspiracy that no *casus belli* existed. There are of course two sides to this linguistic coin of the realm: the side of power that uses its potent "conspiracy theorist" pejorative to ensure such

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<sup>112</sup> National Security Council 10/2, "Document 292. National Security Council Directive on Office of Special Projects," Washington, DC, June 18, 1948. Accessed August 06, 2015, <https://history.state.gov/historicaldocuments/frus1945-50intel/d292>. See also Fleming, *Fixing the Sky*, 166.

<sup>113</sup> Bill Sweetman, *Aurora: The Pentagon's Secret Hypersonic Spyplane* (Minneapolis: Motorbooks, 1993), 92.

<sup>114</sup> *Ibid.*, 92.

“theorists” are shunned, and the obverse side comprised of the mass of citizens whose credulous silence confirms the term’s premises whenever it’s applied to noncompliant activists and reporters.

In this way environmental organizations, for example, have been persuaded to avoid rhetorical contamination that would compromise their funding and to remain safely silent about geoengineering, thus steering clear of one of the world’s major environmental problems. After a decade of close study Dane Wigington, one of the most prominent anti-geoengineering activists, believes weather modification and other geoengineering operations past and present are “likely the single greatest factor in climate disruption and making the overall climate worse,”<sup>115</sup> a possibility unexamined not only by climate scientists, but also by the world’s best-funded environmental groups — despite the fact that climate change is an issue of supreme importance to both communities.

The words of Malcolm Muggeridge, written over half a century ago during the onset of the Vietnam War, sum up where we stand today: “In the eyes of posterity it will inevitably seem that...the vast clandestine apparatus we built up to prove our enemies’ resources and intentions only served in the end to confuse our own purposes; that practice of deceiving others for the good of the state led infallibly to our deceiving ourselves, and that the vast army of Intelligence personnel built up to execute these purposes were soon caught up in the web of their own sick fantasies, with disastrous consequences to them and us.”<sup>116</sup>

As the world approaches Paris toward yearend, the atmosphere of mistrust between officialdom and unruly “ignorant” citizens presents a thoroughly unwholesome situation. Unless the parties confront the truth of their shared secret past, what can Paris beget but more mayhem, likely in the form of officially sanctioned, overt geoengineering that will then further disguise the covert geoengineering that many now believe plagues the world? With so much unknown, undisclosed, and unacknowledged about current geoengineering activities entangled in the complexity of the planetary geophysical system — the climate — how can a democratic process of law and regulation be established? How can trust between elites, activists, and ordinary citizens be forged?

According to a 2011 sample survey of US, Canadian, and British people 16-17 percent of respondents gave some credence to the chemtrail conspiracy theory.<sup>117</sup>

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<sup>115</sup> Dane Wigington, email message to author, April 30, 2015.

<sup>116</sup> Malcolm Muggeridge, “Book Review of a Very Limited Edition,” (*The Care of Devils* by Sylvia Press), *Esquire*, May 1966.

<sup>117</sup> AM Mercer, DW Keith, and JD Sharp, “Public understanding of solar radiation management,” *Environmental Research Letters*, 6, 2011. Accessed July 08, 2015, <http://iopscience.iop.org/1748-9326/6/4/044006>.

That suggests on the order of 70,000,000 people *in these three countries alone* are wondering about what is really going on in the skies above them. No high official has stepped up to reassure these people in a credible, meaningful way. Social scientist Rose Cairns, in a recent paper for the UK's Climate Geoengineering Governance research project, comments on the striking absence of social scientific research into an arguably significant social phenomenon. She deconstructs the impasse between the two sides, "the unstable boundary between the conspiratorial and the normal"<sup>118</sup> and reminds us "*we are living in a 'climate of fear about our future climate,'*" [emphasis added].<sup>119</sup> Such beliefs as the chemtrail conspiracy "reflect not so much a lack of science as a lack of trust"<sup>120</sup> in "the increasingly secretive nature of government actions 'behind closed doors.'"<sup>121</sup> She adds that the issue of trust "is likely to be perennially problematic, were a programme of solar geoengineering to go ahead."<sup>122</sup>

### **Cracks in the wall**

Public unrest with official stonewalling about geoengineering is growing. Various European Green parties, including Sweden's, Spain's, and Cyprus', have broken the environmental movement's silence. The Cyprus Green Party required its government to test air, rainwater, and soil for heavy metals and other signs of geoengineering that neighboring Greek scientists have observed in their soils (elevated levels of barium and aluminum).<sup>123</sup> When the government failed to do the tests to the Green Party's satisfaction, the party vowed to conduct a public education campaign and join forces with other EU Green parties to seek answers from

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<sup>118</sup> Rose Cairns, "Climates of suspicion: 'chemtrail' conspiracy narratives and the international politics of geoengineering," *Climate Geoengineering Governance Working Papers Series, 009, 27*, April 29, 2014. Accessed July 14, 2015, <http://www.geoengineering-governance-research.org/perch/resources/workingpaper9cairnsclimatesofsuspicion-1.pdf>.

<sup>119</sup> Ibid., 18.

<sup>120</sup> Ibid., 22.

<sup>121</sup> Ibid., 9.

<sup>122</sup> Ibid., 23.

<sup>123</sup> Elias Hazou, "Cyprus Green Party Calls for Chemtrails To Be Investigated," *Cyprus Mail*, April 19, 2011. Accessed July 16, 2015, <http://evolutionnews.co.nz/news/greens-call-for-chemtrails-to-be-investigated/>.

officials.<sup>124</sup> In 2013 a conference was held at the European Parliament under the rubric “Beyond Theories of Weather Modification — Civil Society against Geo-engineering,” convened under the aegis of the European Green and Liberal parties. The conference, according to Christof Lehmann of nsnbc, spoke of an “acute lack of democratic instruments within the EU system” among other “stumbling blocks for progress...[on] geo-engineering and weather modification.”<sup>125</sup> The EU conference conveners resolved to conduct ambitious public education campaigns.

In 2013 a Canadian MP submitted a petition to the House of Commons stating, “high altitude spraying has been observed occurring throughout Canada for many years and continues to this day” and “has been carried out without the knowledge or consent of the People of Canada.”<sup>126</sup> Some 3,500 Canadian citizens signed the petition. In February 2015 two Rhode Island legislators introduced “The Geoengineering Act of 2015” to the Rhode Island General Assembly. The act listed many possible effects of “climate remediation...that is in the experimental stages,” and warned that allowing “aluminum oxide particles...or other compounds used in geoengineering schemes, to eventually fall from the stratosphere into the troposphere and ‘rain out’ onto the land and ocean” is an undue hazard that “should be strictly regulated by the state.”<sup>127</sup> On the West Coast activists, attorneys, environmental corporate executives, and other professionals are in the discovery stage of a class action lawsuit against the state of California for not disclosing public health threats brought to the attention of the relevant state regulatory agencies without result. The organizers of this possibly precedent-setting initiative believe “a class action lawsuit is the quickest and most cost effective way to get geoengineering stopped.”<sup>128</sup>

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<sup>124</sup> Bejay Browne, “Chemtrails Controversy Won’t Go Away,” *Cyprus Mail*, February 14, 2014. Accessed June 28, 2015, <http://cyprus-mail.com/2014/02/14/chemtrail-controversy-wont-go-away/>.

<sup>125</sup> Christof Lehmann, “EU Conference on weather modification,” *nsnbc international*, April 13, 2013. Accessed July 16, 2015, <http://nsnbc.me/2013/04/13/eu-conference-on-weather-modification-and-geo-engineering-reiterates-1999-demands-for-transparency-and-democratic-control/>.

<sup>126</sup> Global Research News, “Chemtrails: Spraying in Our Sky. Petitions to Canadian Parliament. Government’s Response,” *Global Research*, January 14, 2014. Accessed July 16, 2015, <http://www.globalresearch.ca/chemtrails-spraying-in-our-sky-petition-to-canadian-parliament-governments-response/5364947>.

<sup>127</sup> State of Rhode Island, General Assembly, H. Doc. 5480, “The Geoengineering Act of 2015,” February 12, 2015. Accessed July 28, 2015, <http://webserver.rilin.state.ri.us/BillText/BillText15/HouseText15/H5480.pdf>.

<sup>128</sup> Geoengineering Action Network, “Class Action Lawsuit,” undated. Accessed July 27, 2015, [http://geoengineeringactionnetwork.org/?page\\_id=17](http://geoengineeringactionnetwork.org/?page_id=17).

Public consciousness has been raised in part because independent reports about aerosol spraying operations overhead ramped up when several award-winning documentaries began to be released at film festivals, in DVDs, and on the Internet from late 2010 onward. There are now more than a half-dozen or so such documentaries, including Michael Murphy's two films *What In the World Are They Spraying?* (2010) and *Why In the World Are They Spraying?* (2012), as well as George Barnes' *Look Up!* (2015). Film that captures unmarked military tanker jets laying out long plumes of thick "persistent contrails" at atmospheric levels below those meteorologists claim necessary for such contrails to form is singularly persuasive.

They also help train citizens to become careful observers of the atmosphere, which plays such a vital role in their own health, and the health of those they love. By looking up and carefully taking note of what we see each day, we can learn to be natural historians of the realm that lives and moves above and around us, inside our lungs, our most intimate life-giving source. We can reclaim our conscious participation in the life of Earth, a participation in danger of fatal atrophy.

In his 2010 breakthrough documentary on aerosol geoengineering, *What in the World Are They Spraying?* filmmaker Michael Murphy records geoengineer David Keith presenting the case for using aluminum as an aerosol, claiming it will be significantly more efficient than sulfur as a climate-forcing stratospheric aerosol spray. When a member of the audience, anti-geoengineering activist Dane Wigington, stands up to ask what health risks spraying 10 million tons of aluminum into the atmosphere annually will have, Keith replies: "We haven't done anything serious on aluminum [health effects]," adding, "so there could be something terrible that we will find tomorrow that we haven't looked at."<sup>129</sup> But the health effects of chemically mobile aluminum are known to be toxic, as geoengineer Keith is surely aware. What goes up, must come down, even if it's nanosized aluminum almost as light as air. And enter the air we breathe, the water we drink, and even the food we eat.

This schizoid moment is deepened in the film as Murphy moves back and forth between geoengineers uniformly insisting climate engineering is a *possible future* event and activists' equally uniform insistence SAG is an ongoing worldwide covert military-civilian operation. The strange impasse raises the question of where the geoengineers, broadly conceived as a science profession, stand in the military's "need-to-know" chain of command and information sharing. It raises, too, the Jekyll-and-Hyde conundrum mentioned at the outset of this essay.

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<sup>129</sup> Michael J. Murphy, "What In The World Are They Spraying?" *Countercurrents.org*, March 3, 2010. Accessed June 05, 2015, <http://www.countercurrents.org/murphy030310.htm>.

Some scientists have broken ranks. In May 2010 a Belgian environmental citizens movement called The Belfort Group convened an international symposium at Ghent University, whose highlight was the release of a 300-page scientific report, *Case Orange: Contrail Science, Its Impact on Climate and Weather Manipulation Programs Conducted by the United States and Its Allies*. A University of Delft aerospace engineer named Coen Vermeeren introduced the report, which contains 25 technical appendices. *Case Orange* asserts, "Manipulation of climate through modification of Cirrus clouds is neither a hoax nor a conspiracy theory."<sup>130</sup> Although the many scientists and aerospace industry specialists who wrote the report remained anonymous to protect their positions in academia and industry, they broke the long-standing official silence about aerosol geoengineering, at least in Europe.

A year later, a consortium of British universities planned to launch an experimental trial for their geoengineering research project, Stratospheric Particle Injection for Climate Engineering (SPICE). In 2010 the British Parliament had already announced small-scale geoengineering testing was underway.<sup>131</sup> The SPICE test was reported in the September 14, 2011 issue of the *Financial Times (FT)* under the banner "Trial aims to hose down the warming climate."<sup>132</sup> The experiment never happened. As one reads aerospace company CEO Matt Andersson's letter written in response to the *FT* SPICE story, the British research trial seems pathetic to the point of bathos. Andersson reminded *FT* readers that "the US has been in *full swing at it for nearly a decade*. Dozens of aerospace, defence and technical companies like ours [Indigo Aerospace] have been advising into the initiative for many years." The letter continues, noting that a "series of tests to create a polymerized and ionized mixture of certain metals, including aluminum, barium, thorium and selenium...was perfected and tested....A joint public-private operation, initially called 'Cloverleaf', was operationalized....Throughout the continental US, dozens of tanker and other aircraft are daily applying thousands of gallons of aerosol nano-particulates that serve several objectives, including the purported ability to reflect UV radiation.

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<sup>130</sup> "Case Orange: Contrail Science, Its Impact on Climate and Weather Manipulation Programs Conducted by the United States and its Allies," assembled for the *Belfort Group, Citizens in Action*, May 10, 2010. Accessed July 16, 2015, [https://coto2.files.wordpress.com/2010/07/case\\_orange-5-10-2010-belfort-chemtrails.pdf](https://coto2.files.wordpress.com/2010/07/case_orange-5-10-2010-belfort-chemtrails.pdf).

<sup>131</sup> Science and Technology Committee, "MPs Call For Early Action on Geoengineering Regulation," March 18, 2010. Accessed September 29, 2015, <http://www.parliament.uk/business/committees/committees-archive/science-technology/s-t-pn26-100318/>.

<sup>132</sup> Clive Cookson, "Trial aims to hose down warming climate," *Financial Times*, September 14, 2011. Accessed July 17, 2015, <http://www.ft.com/intl/cms/s/2/b6e288ec-de17-11e0-a115-00144feabdc0.html>.



Similar operations are being conducted in Canada and parts of Europe” [emphasis added].<sup>133</sup>

The academic geoengineers are, it seems, not in the military’s geoengineering information loop, and apparently clueless about their profession’s ongoing activities.

Establishment ranks were further broken in Europe when an Italian general, NATO commander, and author of books on advanced military weaponry and strategy made several remarks in a panel convened on April 2, 2013 in Florence, Italy. As a former top NATO commander for air operations during the Kosovo War, General Fabio Mini explained to his audience how cloud cover can be created and dispersed and how chemical substances, polymers, and other materials are used as a “war tool.” Specifically he mentioned that sodium, barium, and aluminum were used to deflect electromagnetic waves in the Balkan wars.<sup>134</sup> (General Mini’s remarks harken back to 1943 when aluminum chaff was successfully used by the RAF to jam German radar during the Allies’ devastating air raid on Hamburg.)

When the subject of chemtrails was raised, General Mini responded at length. “Chemtrails in the sky? You’re convinced and so am I....I don’t know what it’s for. I don’t even know if it’s any use at all. I wonder what these people are doing.” Asserting forthrightly that the sprayed aerosol trails were “not condensation,” the General insisted, “sooner or later, someone will speak up,” and urged his audience not to conclude that the conspiracy of silence was unbreakable.<sup>135</sup>

Evidence high in IPCC climate science ranks that covert geoengineering is known by some civilian climate scientists to be an ongoing program became available earlier this year with the release of a video made during a public hearing in Melbourne, Australia, sponsored by the Australian Oceanographic and Meteorological Society for the 2013 IPCC Climate Change Report (AR5). A member of the audience, anti-geoengineering activist Paul Mac, stood up and told the panelists, “we are seeing very high levels of aluminum, barium, strontium, etc.” in soil, water, hair, and blood analyses. He then asked the panel: “Are you aware that geoengineering is already

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<sup>133</sup> Matt Andersson, “Geo-engineering trial follows in US slipstream,” *Financial Times*, September 16, 2011. Accessed on August 16, 2015, <http://www.ft.com/intl/cms/s/0/5c12b3c2-df8b-11e0-845a-00144feabdc0.html?siteediion=intl#axzz3ivcpNUwl>.

<sup>134</sup> “General Fabio Mini: Chemtrails in the Sky? You’re Convinced and so am I,” *Ingegneria*, translated by Alexander Synge, April 2, 2013. Accessed July 16, 2015, <http://www.nogeoingegneria.com/news-eng/general-fabio-mini-chemtrails-in-the-sky-youre-convinced-and-so-am-i/>

<sup>135</sup> *Ibid.*

happening in the world and that it's not being advertised by governments globally?" The panel member who fielded the question was Neville Nicholls, an important IPCC scientist and former president of the sponsoring organization. He answered: "It's got major government issues, major problems of international law. *But it is happening. I agree*" [emphasis added].<sup>136</sup>

Bearing in mind Nicholls' mention of major government and international law issues, it is interesting that since 1996 the IPCC's Assessment Reports (AR) have explicitly discussed geoengineering options. The most recent report (AR5) concludes by specifying climate mitigation strategies, including SRM. According to Arthur Peterson, one of the lead participants in the IPCC process, when the draft of AR5 "first came up for discussion in the plenary approval session in Stockholm in September 2013 *no country raised its flag*" to object to the timing and substance of the geoengineering paragraph that concluded the report [emphasis added].<sup>137</sup> This fact did not escape the furious notice of *The Guardian*. Quoting the IPCC's AR5 statement, "Modeling indicates that SRM methods...have the potential to substantially offset a global temperature rise," reporter Jack Stilgoe reminded his readers, "[i]n the political world, a final paragraph is a coda, a big finish, the place for a triumphant, standing-ovation-inducing summary."<sup>138</sup>

### Searching for motives in the climate murk

When the USSR began to dissolve in 1989, formally ceasing to exist as a contestant in the quest for world dominance two years later, the Cold War ended. However, the massive military-scientific-political-and-economic infrastructure of the US, and the US's enduring, habitual psychological need for an enemy, a threatening nemesis, an incarnated "evil" power, remained largely intact. What would the US, the leader of the West, do? Would it help midwife the long, arduous process of transformation to a multipolar democratic world, with global regulatory institutions authorized to act in the interests of all, a one-world community? Would it commence the painful but

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<sup>136</sup> Paul Mac questions Professor Neville Nichols, "Melbourne Against Chemtrails at IPCC Climate Change Report 2013, 3/10/2013" *YouTube video*, 4:09, posted by BoostinR31, October 4, 2013. Accessed July 15, 2015, <https://www.youtube.com/watch?v=I1kaj36k4-g>.

<sup>137</sup> Arthur Peterson, "The Emergence of the Geoengineering Debate Within the IPCC (Case Study)," *geoengineeringourclimate*, September 9, 2014. Accessed April 17, 2015. <http://geoengineeringourclimate.com/2014/09/09/the-emergence-of-the-geoengineering-debate-within-the-ipcc-case-study/>.

<sup>138</sup> Jack Stilgoe, "Why has geoengineering been legitimized by the IPCC?" *The Guardian*, September 27, 2013. Accessed May 16, 2015, <http://www.theguardian.com/science/political-science/2013/sep/27/science-policy1>.

essential *demilitarization of its economy*, liberating resources to make a momentous, concerted shift to a non-fossil-fuel energy economy, and radically reduce its carbon footprint?

As we know, the US took a different road: it decided to become the world's only hegemon, the supreme state power on Earth. Was this a failure of nerve, a lack of confidence in — even dread of — the prospect of a new approach to international relationships? Canadian political scientist and historian Jacques Pauwels argues that during and immediately after WW II, US elites designed an economic and political system to keep at bay the “ghost of disharmony between supply and demand” that had caused the Great Depression, the ghost that “threatened to return to haunt America again” at the end of the war. The world war showed US elites that “[m]ilitary state expenditures were the source of high profits,” near-full employment, and economic and social stability. Pauwels alleges that “new enemies and new war threats were urgently needed.”<sup>139</sup> The Soviet Union served as a complex structural requirement for the post-war US state, one it was unable to forfeit forty-five years later, despite its former adversary's collapse. The militarized economy had become permanent, a state necessity.

The consequences of this momentous decision are numerous and much commented on, but one possible consequence is rarely, if ever, discussed: a decision shortly after the Cold War to directly act to confront the “new” climate threat by starting clandestine geoengineering tests, first over the US and Canada, and then over European NATO countries, as well as Australia and New Zealand. The US doctrine of unilateralism and preemptive war did not publically surface until 2003 when it attacked and shattered the nation of Iraq. But the policy's architects were in positions of high power in the early 1990s, and by 1992 they had already begun to articulate the new US geopolitical doctrine of full spectrum dominance, as we have seen.<sup>140</sup>

In considering the possibility of secretly initiating climate-altering experiments it's important to realize that the US was a supreme, unchallengeable technological and military world power in the mid-1990s. Neither Russia nor China stood, as they now to some extent stand, to challenge it. Further, “when it comes to large-scale geoengineering in the atmosphere, ‘there is no directly and explicitly applicable

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<sup>139</sup> Jacques R Pauwels, “Why America Needs War,” *Global Research*, 30 April 2003. Accessed August 23, 2015, <http://www.globalresearch.ca/why-america-needs-war/5328631>.

<sup>140</sup> In addition to Patrick Tyler, Op. Cit. and The Project for a New American Century, Op. Cit., see Jim Garamone, “Joint Vision 2020 Emphasizes Full-spectrum Dominance,” *American Forces Press Service*, U.S. Department of Defense, June 02, 2000. Accessed August 13, 2015, <http://www.defense.gov/news/newsarticle.aspx?id=45289>.

international law’,” according to John Steinbruner of Johns Hopkins University.<sup>141</sup> *Science* magazine reporter Eli Kintisch writes that the “Pinatubo Option [deployment of SAG or SRM] would allow an alliance of nations...to cool the planet without leaving their own airspace....And the relatively low cost of the Pinatubo Option makes it ‘not all that hard to do’ [quoting geoengineer Granger Morgan] — especially...for a nuclear-armed state, which could act with relative impunity.”<sup>142</sup> Kintisch also quotes Rutgers University philosopher Martin Bunzl, who has collaborated with geoengineers, and who argues that at least some geoengineers understand geoengineering the atmosphere cannot proceed except “on a grand scale. ‘You basically have to go at full strength’,”<sup>143</sup> in order to obtain meaningful scientific data.

We have seen that the National Academy of Science’s *Policy Implications of Greenhouse Warming* report urged research action without delay, warning in 1991 that “greenhouse warming is a potential threat *sufficient to justify action now*” [emphasis added].<sup>144</sup> There is compelling circumstantial evidence secret climate engineering aerosol spraying, if only for research purposes, commenced four or five years later, when the sudden unexplained appearance of aerosol trails in skies overhead gave rise to public alarm and to a concerted, official disinformation campaign around the “chemtrail hoax.”

If the military had been conducting the visually, profusely documented aerosol spraying, might there be a telltale signature other than polluted rainwater samples? Might the 2007 discovery announced by NASA of “an extensive and previously unseen ‘twilight zone’ of particles...that are neither cloud droplets nor typical dry aerosols such as dust and air pollution” point in the direction of a decade’s worth of mysterious aerosol spraying?<sup>145</sup> Lead author of the research paper<sup>146</sup> that described the finding, Ilan Korten, said the new “twilight zone” of particulates “suggests that

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<sup>141</sup> Kintisch, *Hack the Planet*, 220.

<sup>142</sup> Ibid.

<sup>143</sup> Ibid., 225.

<sup>144</sup> National Academy of Sciences et al, Op. Cit., 72.

<sup>145</sup> NASA, “Widespread ‘Twilight Zone’ Detected Around Clouds,” May 03, 2007. Accessed June 30, 2015, <http://www.nasa.gov/centers/goddard/news/topstory/2007/twilightzone-particles.html>.

<sup>146</sup> Ilan Korten et al, “On the twilight zone between clouds and aerosols,” *Geophysical Research Letters*, Vol 34, 8, April 2007. Accessed June 30, 2015, <http://onlinelibrary.wiley.com/doi/10.1029/2007/GL029253/full>.

30 to 60 percent of the atmosphere previously labeled as ‘cloud-free’ is actually affected by cloud-aerosol processes that reflect solar energy back into space.”<sup>147</sup> Clouds are already the Achilles heel of climate models: their diversity (types), locations in the atmosphere, optical densities, saturation levels, coverage extents, changeability, and many other variables make them extraordinarily difficult to model.<sup>148</sup> *Artificial clouds* can only further complicate the climate modelers’ immense task (were they inclined to factor them).

Although many believe CO<sub>2</sub> is the dominant driver of climate change, according to NASA the most significant greenhouse gas is water vapor.<sup>149</sup> Clouds consist of water vapor and aerosols that are large enough to be visible and they are “the key regulator of the planet’s average temperature.”<sup>150</sup> Increased CO<sub>2</sub> means increased evaporation, which means increased cloud cover creating an amplifying, positive feedback loop. NASA reports: “Even *small changes* in the abundance and location of clouds could change the climate more than the anticipated changes caused by [other] greenhouse gases, human-produced aerosols, or other factors associated with global change” [emphasis added].<sup>151</sup> NASA adds: “The main uncertainties in global-change predictions come from inadequate representation of clouds in climate models” and “[m]any scientists consider the uncertainty about the feedback of clouds on the climate to be the major obstacle to credible predictions of climate change.”<sup>152</sup>

Digesting these facts, one wonders about the wisdom and real-world consequences of anthropogenic climate intervention, whether clandestinely or openly geoengineered.

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<sup>147</sup> NASA, Op.Cit.

<sup>148</sup> To glimpse the difficulty involved see Ting Chen, William B Rossow, and Yuangchong Zhang, “Radiative Effects of Cloud-Type Variations,” *Journal of Climate*, 13, 264-286, January 2000. Accessed May 17, 2015, <http://journals.ametsoc.org/doi/full/10.1175/1520-0442%282000%/29013%3C0264%3AREOCTV%3E2.o.CO%3B2>

<sup>149</sup> EPA, “Causes of Climate Change,” undated. Accessed June 20, 2015, <http://www.epa.gov/climatechange/science/causes.html>.

<sup>150</sup> NASA, “The Importance of Understanding Clouds, undated. Accessed August 04, 2015, [http://www.nasa.gov/pdf/135641main\\_clouds\\_trifold21.pdf](http://www.nasa.gov/pdf/135641main_clouds_trifold21.pdf)

<sup>151</sup> Ibid.

<sup>152</sup> Ibid.

John Abraham, a climate scientist writing for *The Guardian*, reports on a 2015 climate science study<sup>153</sup> that indicates, “future changes to clouds will cause slightly more warming,” contradicting the scientific truism that clouds have a net cooling effect on Earth’s surface.<sup>154</sup> Intervening to affect climate depends on where the clouds being intervened with are located. A 2009 scientific paper showed that stratospheric cirrus clouds can be theoretically modified to cool Earth, and the higher up they are in the stratosphere, the more effective they are in cooling Earth when saturated by aerosol sprays.<sup>155</sup> The scientific papers that have proposed SRM — the dispersal of sunlight-reflecting aerosols placed in the stratosphere — do not take account of the aerosol spraying in the troposphere by tanker jets observed in many countries over the better part of two decades.

Environmental scientist and anti-geoengineering activist Clifford Carnicom wrote: “Hypothetical research models...such as the Teller proposal, are more appropriate to the outer reaches of the planet....and do not explain the [current] deposition of massive amounts of hygroscopic [rain-inhibiting] aerosols into the lower atmosphere.”<sup>156</sup> In an earlier report Carnicom argued that “[r]ather than reducing the temperature of the earth and lower atmosphere, the aerosol operations commonly have the opposite effect of increasing temperature” as well as “aggravating drought conditions.”<sup>157</sup>

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<sup>153</sup> Kevin E Trenberth et al, “Climate variability and relationships between top-of-atmosphere radiation and temperatures on Earth,” *Journal of Geophysical Research: Atmospheres*, May 05, 2015. Accessed August 13, 2015, <http://onlinelibrary.wiley.com/doi/10.1002/2014JD022887/full>.

<sup>154</sup> John Abraham, “Changes in water vapor and clouds are amplifying global warming,” *The Guardian*, April 23, 2015. Accessed May 23, 2015, <http://www.theguardian.com/environment/climate-consensus-97-per-cent/2015/apr/23/changes-in-water-vapor-and-clouds-are-amplifying-global-warming>.

<sup>155</sup> David I Mitchell and William Finnegan, “Modification of cirrus clouds to reduce global warming,” *Environmental Research Letters*, 4, October 30, 2009. Accessed June 10, 2015, <http://iopscience.iop.org/article/10.1088/1748-9326/4/4/045102/meta;jsessionid=4EC99B5152E03C82FA75EC2939DEA288.c1>.

<sup>156</sup> Clifford E Carnicom, “Global Warming & Aerosols,” *Carnicom Institute*, January 23, 2004. Accessed May 01, 2015, <http://www.carnicominstitute.org/articles/sh1.htm>.

<sup>157</sup> Clifford E Carnicom, “The Theft of Sunlight,” *Carnicom Institute*, October 25, 2003. Accessed May 01, 2015, <http://www.carnicominstitute.org/articles/light1.htm>.

In 2009 two climate scientists showed that as a result of major volcanic eruptions — such as would be mimicked by geoengineering’s Pinatubo Option — “greenhouse gas emissions tend to slightly increase rainfall in the short term but...[the] reduction in rainfall in the months following a major volcanic eruption is far more dramatic,”<sup>158</sup> lending support to Carnicom’s disturbing claim about the rain-inhibiting effects of tropospheric aerosol spraying. Carnicom’s claim is further buttressed by a 2008 study published in *Science*<sup>159</sup> and by a later study of forest fire particulate pollution in the Amazon that also suggests super-saturation of the atmosphere with aerosols inhibits rainfall.<sup>160</sup> Thus despite the presumed heating-evaporation effect of increasing CO<sub>2</sub> that acts to increase atmospheric water vapor which should then act to increase global rainfall, there is evidence that whatever their source atmospheric aerosols are effectively *inhibiting* rainfall, at least regionally.

Contrails generated by more than 100,000 daily commercial jet airplane flights have had a considerable effect on global climate, as was reported by NASA scientists in 2004: “[C]irrus clouds, formed by jet aircraft engine exhaust, are capable of increasing average surface temperatures enough to account for a warming trend in the United States that occurred between 1975 and 1994.”<sup>161</sup> The release of the planet’s most important greenhouse gas, water vapor, by massive commercial jet airplane traffic in the lower stratosphere not only creates heat-trapping cirrus clouds<sup>162</sup> but also promotes the destruction of the ozone layer.<sup>163</sup>

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<sup>158</sup> Judith Burns, “Climate fixes ‘pose drought risk,’” *BBC News*, August 07, 2009. Accessed May 22, 2015, <http://news.bbc.co.uk/2/hi/8188409.stm>.

<sup>159</sup> News Staff, “Does Air Pollution Increase or Decrease Rainfall?” *Science 20*, September 07, 2008. Accessed August 15, 2015, [http://www.science20.com/news\\_releases/does\\_air\\_pollution\\_increase\\_or\\_decrease\\_air\\_pollution](http://www.science20.com/news_releases/does_air_pollution_increase_or_decrease_air_pollution).

<sup>160</sup> News Staff, “Air Pollution Could Reduce Rainfall, Hasten Climate Change,” *Science 20*, April 22, 2010. Accessed May 01, 2015, [http://www.science20.com/news\\_articles/air\\_pollution\\_could\\_reduce\\_rainfall\\_hasten\\_climate\\_change](http://www.science20.com/news_articles/air_pollution_could_reduce_rainfall_hasten_climate_change).

<sup>161</sup> Gretchen Cook-Anderson, “Clouds Caused by Aircraft Exhaust May Warm the U.S. Climate,” *NASA*, April 27, 2004. Accessed June 12, 2015, <http://www.nasa.gov/centers/langley/news/releases/2004/04-140.html>.

<sup>162</sup> William R Cotton, “Weather and Climate Engineering,” in Jost Heintzenberg and Robert J Charlson (eds), *Clouds in a Perturbed Climate System* (Cambridge: MIT Press, 2009). Accessed June 06, 2015, [https://www.google.com/?gws\\_rd=ssl#safe=off&g=william+r+cotton+weather+and+climate+engineering](https://www.google.com/?gws_rd=ssl#safe=off&g=william+r+cotton+weather+and+climate+engineering).

Climate chaos — already nearly impenetrably murky were it left on its own “natural” terms — is made more murky by unintended civilian inputs and by unknown but presumably intended military inputs, observed by many millions of people. If the military is spraying aerosols of unknown purpose and effect, what could be the source of the staggering amounts of aerosols needed?

A recently published article by Marvin Herndon, a chemist and geoscientist, poses an answer and backs it up with impressive initial research results. These results implicate one of the world’s largest industrial waste streams: “[C]oal fly ash is one major global waste product stream with the appropriate grain-size distribution for aerosolized tropospheric spraying that is readily available at extremely low cost and with existent processing and transport infrastructure.”<sup>164</sup> Herndon was led to his research on geoengineering when he observed, starting in 2014, a substantial increase of unmarked tanker-jet persistent contrails in the warm, dry, and formerly deep blue skies of San Diego, where he lives. He was surprised to discover that the phenomenon “has gone unidentified and unremarked in the scientific literature”<sup>165</sup> and began to study post-spraying rainwater tests conducted worldwide. The chemical “fingerprint” that began to reveal itself led him to coal fly ash and further testing of his own rainwater samples.

Noting that “ultra-fine particulates of aerosolized coal fly ash do not remain at tanker-jet operational altitudes” but “mix with and pollute the air people breathe,” Herndon went on to discover an eight-element chemical fingerprint in rainwater and coal-leachate tests that pointed to coal fly ash as the source of the aerosols found in post-spray rainwater.<sup>166</sup> One of these eight toxic elements, not surprisingly given its prevalence in worldwide tests, was chemically mobile aluminum. Since chemically mobile aluminum does not normally occur in nature, biota (including human beings) have not developed defense mechanisms to cope with its intrusion. Herndon notes that “[a]luminum is implicated in such neurological diseases as autism spectrum disorder (ASD), Alzheimer’s disease, Parkinson’s disease, and

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<sup>163</sup> Drew Shindell, “Reaction of Ozone and Climate to Increasing Stratospheric Water Vapor,” *NASA GISS*, May 2001. Accessed August 13, 2015, [http://www.giss.nasa.gov/research/briefs/shindell\\_05/](http://www.giss.nasa.gov/research/briefs/shindell_05/).

<sup>164</sup> J Marvin Herndon, “Evidence of Coal-Fly-Ash Toxic Chemical Geoengineering in the Troposphere: Consequences for Public Health,” *International Journal of Environmental Research and Public Health*, 12 (8), August 11, 2015. This article was retracted by the journal under suspicious circumstances in early September. It is now available at [http://www.nuclearplanet.com/ijerph-error\\_corrected.pdf](http://www.nuclearplanet.com/ijerph-error_corrected.pdf).

<sup>165</sup> Ibid.

<sup>166</sup> Ibid.



attention deficit hyperactivity disorder (ADHD)...all of which have markedly increased in recent years.”<sup>167</sup>

Coal combustion fly ash must now be captured and stored in the US and most Western countries. The massive 2008 Kingston, Tennessee, coal ash spill was the largest industrial spill in US history and drove up the costs of waste storage for coal-burning electric utilities, motivating them to seek new commercial uses for coal fly ash, of which there were already several (including agricultural uses). Unfortunately the EPA does not consider coal ash a hazardous substance even though combustion concentrates toxins and renders fly ash hazardous.<sup>168</sup> Based on Herndon’s initial research, is it possible the coal-and-electric utility sector of the military-industrial complex is conspiring with the Pentagon to create a “win-win” solution to satisfy mutual corporate goals?

The motives that drive de facto geoengineering activities cannot be known with certainty until the activities themselves are declassified — or until an insider blows a whistle (an act that today bears heavy penalties). In the meantime it’s reasonable to presume the goals of military past are prelude to those of military future. The doctrine of full spectrum dominance in a globalized world economic order where people, ideas, and technology move rapidly around the planet mandates a globalized military command, control, and communications infrastructure. Various radar or electromagnetic communications capacities have been researched by the military for many decades, and aerosolized metal oxides are known to facilitate radio conductivity.<sup>169</sup> In any event there is, as we’ve seen, considerable and consistent documentation of the military’s drive to control both the weather and the climate.<sup>170</sup>

A range of different motivations for ongoing geoengineering thus presents itself: effective global military and civilian communications systems impervious to atmospheric conditions and interference; regional and even continental weather control for both military and civilian purposes (e.g., meteorological, agricultural);

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<sup>167</sup> Ibid.

<sup>168</sup> Ben Whitford, “Coal ash: America’s multi-billion ton toxic legacy,” *The Ecologist*, September 29, 2015. Accessed October 1, 2015, [http://www.theecologist.org/News/news\\_analysis/2985615/coal\\_ash\\_americas\\_multibillion\\_ton\\_toxic\\_legacy.html](http://www.theecologist.org/News/news_analysis/2985615/coal_ash_americas_multibillion_ton_toxic_legacy.html).

<sup>169</sup> Clifford E Carnicom, “Atmospheric Conductivity,” July 09, 2001; “Atmospheric Conductivity II,” May 07, 2003; and “Conductivity: The Air, The Water, and The Land,” April 15, 2005, *Carnicom Institute*. Accessed May 01, 2015, <http://www.carnicominstitute.org/articles>.

<sup>170</sup> Col. Tamzy J House et al, Op. Cit. See also Fleming, *Fixing the Sky*, and Bertell, *Planet Earth*.

global warming for purposes of extraction of scarce strategic resources — preeminently, but by no means exclusively, fossil fuels — essential to secure the continuity of a fossil-fuel-dependent civilization and militarized world order; global warming to achieve significantly shortened mercantile and military transportation routes through both the Northern (Russian) and Northwest (Canadian) passages; and lastly, global cooling, or slowing down the rate of global warming. Other purposes mentioned in both the geoengineering and anti-geoengineering literature include ozone repair (protection against ultraviolet radiation), population control, and psychological manipulation (e.g., the Soviet Woodpecker<sup>171</sup>). This list is not exhaustive.

About climate-change strategies to counteract global warming, however, the peripatetic writer on geopolitical events, Matt Andersson, warns: “Various themes in public debate, including global warming, have unfortunately been subsumed into much larger military and commercial objectives that have nothing to do with broad public environmental concerns,” adding that these objectives “include the gradual warming of polar regions to facilitate naval navigation and resource extraction.”<sup>172</sup>

In the end we are stranded on a plateau of speculation. The reigning assumption among both anti-geoengineering activists and academic geoengineers is that cooling the planet is the goal, the difference between these groups being that the activists believe implementation is proceeding apace while the academics believe it’s a rapidly approaching option. (Activists also entertain a wide range of beliefs about the reasons behind ongoing geoengineering.) According to Ken Caldeira, “[The earth] would probably start cooling within a year after a solar geoengineering system were deployed.”<sup>173</sup> Obviously this ‘probability’ isn’t in evidence. There may other reasons to doubt that SRM, if it is already happening, is having a cooling influence on the planet, or will have an indisputably dramatic net cooling effect, as the geoengineers who have worked at LLNL have consistently proclaimed for nearly two decades with great confidence. In any event if SRM is being carelessly deployed in the troposphere, its cooling effects are likely worse than nil.

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<sup>171</sup> Dave Finley, “Radio hams do battle with ‘Russian Woodpecker,’” *The Miami Herald*, July 07, 1982. Accessed August 25, 2015, <http://www.qsi.net/n1irz/woodpeck.html>. See also Bertell, *Planet Earth*, 130-131. Begich and Manning, *Angels*, 134-139, 152-156.

<sup>172</sup> Matt Andersson, “At war over geoengineering,” *The Guardian*, February 9, 2012. Accessed on July 03, 2015, <http://www.theguardian.com/environment/2012/feb09/at-war-over-geoengineering>.

<sup>173</sup> Gal Koplewitz, “Engineering The Climate,” *Harvard Political Review*, August 28, 2015. Accessed September 25, 2015, <http://harvardpolitics.com/world/geoengineering-climate/>.

As to why the troposphere — not the stratosphere — would be laced with geoengineered aerosols, it is impossible at this juncture to know. It's both cheaper and easier for tanker jets to operate below the stratosphere, *and* it lessens the known risks aerosols pose to the ozone layer.<sup>174</sup> The rainwater tests themselves show toxic metals being leached out of the troposphere's rainwater (the troposphere holds 99 percent of Earth's atmospheric water vapor). Nonetheless, were the intent to cool the planet, SRM —*stratospheric* radiation management (or SAG, *stratospheric* aerosol geoengineering) — is the technology called for by academic geoengineers. By their lights, spraying should be taking place exclusively in the stratosphere.

But perhaps not by the military's lights.

Meantime, 2015 is thus far the hottest year on record, just as 2014 was before it.

The US Navy expects the Arctic to be ice-free next year — for the first time in millennia.

### **Dr. Jekyll and Mr. Hyde**

We have seen there is considerable circumstantial evidence of ongoing SAG operations whose purposes remain unknown. These operations are controlled by DoD and its NATO counterparts, if we give credibility to DoD's own documents. They are likely not connected to the work of academic climate engineers, according to David Keith, who is "reasonably confident that there is no significant [military] involvement."<sup>175</sup> Nor are the ongoing clandestine operations likely linked directly to the geoengineers at LLNL, climate engineering's seedbed, about which Clive Hamilton, an author concerned about the ethics of geoengineering, observed: "It is striking to realize how many scientists working on geoengineering have either worked at or collaborated with the Lawrence Livermore National Laboratory."<sup>176</sup> Circumscribed as *future* climate intervention, geoengineering is now largely a civilian discourse, a discourse whose roots in military praxis, ethos, and worldview are hidden to Dr. Jekyll. But both Jekyll and Hyde are inextricably linked by forces perhaps neither fully recognizes.

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<sup>174</sup> Kintisch, *Hack the Planet*, 63, 69-70.

<sup>175</sup> David Keith, *A Case for Climate Engineering* (Cambridge: MIT Press/Boston Review, 2013), 104.

<sup>176</sup> Clive Hamilton, *Earth Masters: The Dawn of the Age of Climate Engineering* (New Haven: Yale University Press, 2013), 120.

The first well-known scientific climate engineering paper to be published in the post-Cold War era was written by three inveterate Cold War LLNL weaponeers: Edward Teller, Lowell Wood, and Roderick Hyde. These emissaries from the world of Mr. Hyde, reoriented themselves to a new global threat, and wrote “Global Warming and Ice Ages,” a paper that reveals they did not believe in the urgency of global warming even as they addressed it as a serious hypothetical problem. For them, “Greenhouse warming of the Earth due to human activities is a *possibility*,” while “Ice Age-severity cooling...is a practical *certainty*.” The difference is not truly important, because the problem for them is a purely technical one: placed at a suitable distance “small-angle ( $\leq$ - 1°) scattering will suffice for an appropriate deflection of the Earth-directed sunlight (either toward the Earth, if warming is desired, or away from it, if cooling is sought).”<sup>177</sup> In other words, from the perspective of these weaponeers turned climate engineers, the problem posed by the climate is not only merely technical but also eminently solvable or doable, like designing a slatted window shade with a wand to twist and adjust.

In a follow-on paper in 2002 — one of Dr. Teller’s last — the LLNL trio presented the case for researching four different SRM options to manage the climate, concluding, “if you’re inclined to subscribe to the Rio Framework Convention’s directive that mitigation of global warming should be effected in the ‘lowest possible cost’ manner...then you will *necessarily* prefer active technical management of radiative forcing of the Earth to administrative management of greenhouse gas inputs.”<sup>178</sup> When it comes to the massively complex Earth climate system, doubt does not rattle the “physics-based” convictions of these weaponeers turned climate saviors. In the meantime, “[m]itigation [CO<sub>2</sub> reduction] is not happening and it not going to happen,” according to Lowell Wood.<sup>179</sup> His mentor, Edward Teller, had earlier suggested, “all-out war on fossil fuels and those who use them” does not make sense; rather, “[l]et us play to our uniquely American strengths in innovation and technology” and use solar radiation management technology, “offsetting global warming by the least costly means possible,”<sup>180</sup> as opposed to “international measures focused on prohibitions.”<sup>181</sup>

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<sup>177</sup> E. Teller, L. Wood, R. Hyde, “Global Warming and Ice Ages: I. Prospects for Physics-Based Modulation of Global Change,” paper presented to the 22<sup>nd</sup> International Seminar on Planetary Emergencies, Erice (Sicily), Italy, August 15, 1997. Accessed April 23, 2015, <https://e-reports-ext.llnl.gov/pdf/231636.pdf>.

<sup>178</sup> Edward Teller, Roderick Hyde and Lowell Wood, “Active Climate Stabilization: Practical Physics-Based Approaches to Prevention of Climate Change,” submitted to the *National Academy of Engineering Symposium*, Washington, D.C., April 23-24, 2002. Accessed August 31, 2015, <http://www.osti.gov/accomplishments/documents/fullText/ACC0233.pdf>.

<sup>179</sup> Fleming, “The Climate Engineers,” 1.

<sup>180</sup> Teller, “Sunscreen.”

The transition from weaponeering to climate engineering was a natural development. With the disintegration of the USSR, the warming climate rose up as a new global adversary to be surveilled, analyzed, and tracked. Over decades, under the influence of his fellow Hungarian-American colleague John von Neumann, Teller had made sure LLNL had “state-of-the-art computational facilities”<sup>182</sup> and assembled “one of the best atmospheric modeling outfits in the world,” consisting of a “cadre of fundamental [research] scientists whose job was...to understand how unleashing...unimaginable forces...might affect [the] health of ecological systems.”<sup>183</sup> This capability, “dubbed the Livermore Atmospheric Model” was developed “into a climate model.”<sup>184</sup>

Historian Jacob Hamblin writes, “a group of scientists called the MEDEA Committee began in the 1990s to salvage classified data from the Cold War era that might help track changes in climate, assess deforestation, and shed light on other environmental developments. Doing so made perfect sense: the military had all the best information, collected over five decades...[via] satellites, planes, ships, and other sources....Scientists could continue to keep the earth under surveillance.”<sup>185</sup> Thus “nuclear weapons research spilled over into atmospheric science.”<sup>186</sup> No one possessed more powerful computing capacity than the US weaponeers, and computer-driven models lie at the heart of climate science. Ineluctably military intelligence infrastructure fused with its civilian brother’s in academia.

The new post-war ambience of LLNL did not morph into mere humanitarian concerns about the climate all at once. Recalling his early days at the laboratory during a radio interview Ken Caldeira said, “at Lawrence Livermore...we all sat around the room thinking of ways to manipulate geophysical systems to use it [sic]

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<sup>181</sup> Teller, Wood, and Hyde, “Global Warming and Ice Ages,” 3.

<sup>182</sup> Istvan Hargittai, *Judging Edward Teller: A Closer Look at One the Most Influential Scientists of the Twentieth Century* (Amherst, NY: Prometheus Books, 2010), 256.

<sup>183</sup> Kintish, *Hack the Planet*, 94-95.

<sup>184</sup> *Ibid.*, 96.

<sup>185</sup> Jacob Darwin Hamblin, *Arming Mother Nature: The Birth of Catastrophic Environmentalism* (Oxford: Oxford University Press, 2013), 245-46.

<sup>186</sup> Hamilton, *Earth Masters*, 127.

as a weapon....Could you change climate, what could you do to manipulate the earth's physical system," including using nuclear bombs.<sup>187</sup>

Caldeira and David Keith exemplify the new breed of climate engineers, Caldeira having arrived at LLNL shortly after the Cold War ended, while in 1989 Keith "stumbled into geoengineering....drawn in by the lack of high-quality analysis...a lack that seemed odd given the potential importance of geoengineering to the climate's future."<sup>188</sup> These two are the informal leaders of what Eli Kintisch calls "the Geoclique" funded by Bill Gates.<sup>189</sup> In his lucid introduction to climate engineering Keith tells us that the "first climate model experiment to test the effectiveness of geoengineering grew out of an argument" between Caldeira and Lowell Wood, known to LLNL insiders as "Dr. Evil" (Dr. Faustus would be more apt). Caldeira returned to his lab and his computers to prove Wood's confidence in SRM's ability to control global warming was wrong. "Instead, Caldeira found [that]... geoengineering did a surprisingly accurate job in compensating for the climate change caused by increased carbon dioxide."<sup>190</sup>

Climate engineering remained in the shadows of both public and mainstream scientific discourse at the outset of the 21<sup>st</sup> century, however, even as abrupt climate change was being quietly weighed as a growing possibility that politicians as well as the military had to formally recognize.<sup>191</sup> The UN Framework Convention on Climate Change (UNFCCC)'s Conference of the Parties (COP)'s meetings hadn't resulted in reductions in greenhouse gas emissions. Worse, since 1994 when the UNFCCC went into force the growth of emissions has accelerated, while global carbon emissions have grown at about 3 percent per year since 2000.<sup>192</sup> "These are desperate times," climate scientist and Nobel laureate Paul Crutzen declared, and over the objections of his colleagues at the Max Planck Institute, he submitted a paper whose publication in *Climate Change* in 2006<sup>193</sup> finally "brought the idea of

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<sup>187</sup> Geoff Brady, producer, "Climate Engineers: War, Profit, Survival," *WBAI, Pacifica Radio*, New York City, August 2006. Accessed August 25, 2015, <http://newyorkskywatch.com/climate-engineers-war-profit-survival/>.

<sup>188</sup> Keith, *A Case*, xiv.

<sup>189</sup> Kintisch, *Hack the Planet*, 8.

<sup>190</sup> Keith, *A Case*, 50. See also Govindasamy and Caldeira, *Op. Cit.*

<sup>191</sup> James R. Fleming, "The Climate Engineers," *Wilson Quarterly*, Spring 2007. Accessed on June 30, 2015, <http://archive.wilsonquarterly.com/essays/climate-engineers>.

<sup>192</sup> Keith, *A Case*, 35.

<sup>193</sup> Crutzen, *Op. Cit.*

geoengineering into the scientific mainstream.”<sup>194</sup> The public intervention by the man “who knows more about the Earth’s atmosphere than anyone else alive,”<sup>195</sup> “broke the taboo on geoengineering”<sup>196</sup> among climate scientists. The scientific civilian climate-change discourse, formerly focused almost exclusively on reducing emissions, or mitigation, now began to expand to include geoengineering strategies.

This movement toward climate intervention research was and is being driven by the growing anxiety of climate scientists over climate “tipping points” that make the future of civilization increasingly uncertain. That, and the observed *rate of climate change* influenced the unsettling perception in many climate scientists’ minds that “we are committing our children to climate changes that will be extraordinarily rapid” and potentially overwhelming to civilization.<sup>197</sup> Given this “existential crisis,” will the nations of the world agree this year in Paris that “climate intervention isn’t going to be an option” but “a requirement”?<sup>198</sup>

When civilian scientists and engineers talk of “future options” they make no reference to Mr. Hyde’s world of past and present covert experiments. To its alter ego the Dr. Jekyll community turns a blind eye. More than 200,000 scientists, engineers, and technicians work for the US military,<sup>199</sup> not including the thousands employed by its many subcontractors, scientifically and technically trained people that comprise a core part of the over 5 million US citizens with security clearances.<sup>200</sup> The military possesses an immense classified research and design

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<sup>194</sup> Kintisch, *Hack the Planet*, 57.

<sup>195</sup> Goodell, Op. Cit.

<sup>196</sup> Hamilton, *Earth Masters*, 15.

<sup>197</sup> Keith, *A Case*, 27.

<sup>198</sup> Michael Specter, “The Climate Fixers,” *The New Yorker*, May 14, 2012. Accessed August 25, 2015, <http://www.newyorker.com/magazine/2012/05/14/the-climate-fixers>.

<sup>199</sup> Roz Pidcock, “Science in the Military,” *Science Careers*, December 02, 2011. Accessed July 30, 2015, [http://www.sciencemag.org/career\\_magazine/previous\\_issues/articles/2011\\_12\\_02/career.a1100135](http://www.sciencemag.org/career_magazine/previous_issues/articles/2011_12_02/career.a1100135).

<sup>200</sup> Brian Fung, “5.1 million Americans have security clearances. That’s more than the entire population of Norway,” *The Washington Post*, March 24, 2014. Accessed September 4, 2015, <https://www.washingtonpost.com/news/the-switch/wp/2014/03/24/5-1-million-americans-have-security-clearances-thats-more-than-the-entire-population-of-norway/>.

capacity and infrastructure, including the world's most powerful computers and satellite surveillance systems, research laboratories, universities, science and engineering campuses on more than 90 bases run the US Navy, Air Force, Army, and the Pentagon. The Army alone employs 96,000 scientists, engineers, and technicians, of whom more than 16,000 are "world-class scientists and engineers." Subsidized by trillions of dollars of public funds over decades, the military's secret R & D programs vastly exceed the funding of the nonmilitary sector, persist through election cycles, and are overseen by a de facto permanent government whose unelected bureaucratic elites run what Mike Lofgren, a former Congressional aide and Washington insider, calls the Deep State.<sup>201</sup> Clandestine geoengineering is a Deep State operation. It is in this "enormous secret world next to but separate from the everyday world inhabited by the rest of us"<sup>202</sup> that Mr. Hyde flourishes.

Mr. Hyde has been interested in the weather and the climate for a long time, as we have seen. To quote from a now musty USAF document, "weather modification can provide battlespace dominance to a degree never before imagined." The authors of this document speak of "the alteration of global climate on a far-reaching and/or long-lasting scale," and remind their readers of weather modification's proven abilities to "enhance rainfall on the mesoscale" [100 meters<sup>2</sup>] or render "the desired territory 'dry,'" as well as amplify or dampen massive storms. Under the heading "Communications Dominance via Ionospheric Modification" the authors remind us that a "number of methods have been explored to modify the ionosphere, including the injection of chemical vapors [aerosols] and heating or charging via electromagnetic radiation or particle beams," methods that "have been successfully demonstrated experimentally."<sup>203</sup>

Under the heading "Artificial Weather" the authors point to slightly more futuristic scenarios where clouds "of microscopic computer particles, all communicating with each other and with a larger control system" can be used to degrade enemy sensors or block enemy surveillance. These nanoparticulate "clouds" could also "provide an atmospheric electrical potential difference...to achieve precisely aimed and timed lightening strikes" and if sufficient power levels for such strikes is not attained, then

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<sup>201</sup> Mike Lofgren, "Essay: Anatomy of the Deep State," *Bill Moyers & Company*, February 14, 2014. Accessed August 18, 2015, <http://billmoyers.com/2014/02/21/anatomy-of-the-deep-state/>. See also Peter Dale Scott, "The Hidden Government Group," *Voltaire Network*, May 15, 2015. Accessed May 29, 2015, <http://www.voltairenet.org/article187504.html>.

<sup>202</sup> Gusterson, *Nuclear Rites*, 68.

<sup>203</sup> Col. Tamzy J House et al, *Op. Cit.*, viii, 6, 14, 16, 21.



at least “the potential for psychological operations in many situations could be fantastic.”<sup>204</sup>

### **The Sorcerer’s spell: Prometheans and Soterians**

Who conjures this relentless cornucopia of Earth-altering schemes that flow out of the fertile minds inside Dr. Jekyll and Mr. Hyde’s communities? Do we, like Pogo, admit: It is we, ourselves? Are we the Sorcerer?

Insofar as we harbor an idea that shapes what we do, we are subject to its sorcery, to both its occult (unseen) as well as to its seen influence. The gateway to human motivation is through the realm of cosmology, beliefs about our origins and purpose, beliefs that shape our values, goals, phantom desiderata; beliefs that construct humanity’s deep-rooted worldviews. Ideas are the Sorcerer. It is they who exercise power over how we conceive ourselves and motivates us to do what we do. When weaponeers, geoengineers, and climate scientists talk about climate intervention, what do they reveal about their own cosmology, about their sense of human purpose and destiny, about what guides and orients them? About what, if anything, constrains them?

Clive Hamilton divides geoengineers into two camps: Prometheans and Soterians, by which rubric he refers us to “Soteria, the [Greek] goddess of safety, preservation and deliverance from harm.”<sup>205</sup> The Prometheans represent the Sorcerer’s instructions to “interrogate nature with power”<sup>206</sup> with scant heed to Soterian values. Their attitude is captured by Edward Teller’s blunt, confident assertion: “We will change the Earth’s surface to suit us.”<sup>207</sup> The Prometheans, named after the Titan who stole fire from the Olympian gods and gave it surreptitiously to human beings, are by and large “unaware of the long and checkered history of weather and climate control,” and see “themselves as heroic pioneers” who, however, “risk repeating the mistakes of the past.”<sup>208</sup> Historian James Fleming warns that as a group they “appear to possess a too-literal-belief in progress that produces an anything-is-possible mentality.”<sup>209</sup>

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<sup>204</sup> Ibid., 27. On page 32 the authors give credit to the US Army for the concept of “owning the weather” citing Mary Ann Seagraves and Richard Szymber, “Weather a Force Multiplier,” *Military Review*, November/December 1995, 69.

<sup>205</sup> Hamilton, *Earth Masters*, 18.

<sup>206</sup> Roszak, *Wasteland*, quoting Benjamin Franklin, 198.

<sup>207</sup> Goodell, Op. Cit. See also Hargittai, *Judging Edward Teller*, 270.

<sup>208</sup> Fleming, “The Climate Engineers,” 3.

<sup>209</sup> Ibid., 10.

Perhaps no living geoengineer articulates the Promethean worldview more clearly than Lowell Wood. “Unlike many of his peers, Wood retains an unshakable faith in technology as a tool to reshape the world to our liking. ‘Isn’t agriculture a form of geoengineering?...Where do you draw the line?...We’ve engineered every other environment we live in — why not the planet?’”<sup>210</sup> The historian Jacob Hamblin explores the birth of what he calls “catastrophic environmentalism,” a habit of mind ingrained in scientists who, like Wood himself, worked for the military during the Cold War, and who “extended their ‘total war’ thinking to the natural environment” and in the process, “fostered a profound belief in the manipulability of the natural world.”<sup>211</sup> This belief has long been anchored deep within the entire project we call science, and transcends Mr. Hyde’s covert community of scientists inside the military.

In what Goodell terms Wood’s “oddly sunny view” of the world, nothing could ever be so great an obstacle that we human beings, “in all our ingenuity, will not find a way to fix it.”<sup>212</sup> Nor do “anxieties...bother Lowell Wood, who has said there is no point in arguing with him about geoengineering because deployment is ‘written in the stars.’”<sup>213</sup> Indeed, controlling the climate is but “the first stop” in an interplanetary quest that includes terraforming Mars, all part of “‘the manifest destiny of the human race!’” Wood continues: “‘In this country we are builders of new worlds...We took a raw wilderness and turned it into the shining city on the hill of our world.’”<sup>214</sup> The climate engineer manqué here points to America’s role as a light to the rest of humanity, its destined leader. “Technological supremacy, militarization of strategic policy and a unilateralist intolerance of collaborative agreements under the United Nations,” endemic to institutions like LLNL, are now, according to Clive Hamilton, “tendencies...emerging in thinking about climate engineering” inside US conservative think tanks and policy institutes.<sup>215</sup> These tendencies point to the problem of the national identity of the world’s sole self-proclaimed superpower, and to its overriding sense of entitlement, destiny and ambition, its Judeo-Christian sense of being “chosen” to lead the world.

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<sup>210</sup> Goodell, Op. Cit.

<sup>211</sup> Hamblin, *Arming Mother Nature*, 251.

<sup>212</sup> Goodell, Op. Cit.

<sup>213</sup> Hamilton, *Earth Masters*, 132.

<sup>214</sup> Goodell, Op. Cit.

<sup>215</sup> Hamilton, *Earth Masters*, 127

What of the Soterians, those in Dr. Jekyll's climate science community who worry about safety and the avoidance of "harm"? As a group they are less forthright about their worldview than the Prometheans, but they nonetheless articulate their concerns. More than one Soterian has observed that engineering "is something you do to a system you understand very well" and therefore "you can try out new techniques thoroughly at a small scale before staking people's lives on them."<sup>216</sup> David Keith explains that "although engineering may lead to new science," and the two branches of knowledge are "intertwined," there is however "an essential difference: engineering is about design and science is about understanding."<sup>217</sup> The Soterians' most fundamental objection to geoengineering focuses on its role in relation to science itself. Is there a sufficiently solid, reliable scientific understanding of the climate to provide the basis for intervening in it, for engineering it to serve deliberately designed ends?

The Soterians answer no. Their view is summed up succinctly by Clive Hamilton: "Our understanding of the dense network of links between ocean biology, atmospheric chemistry, cloud physics and Earth's albedo [reflectivity] is in its infancy."<sup>218</sup> A slightly more confident summary of the current science speaks of "an intermediate understanding of how Earth controls its climate" based on twenty-five years of intensive worldwide climate modeling.<sup>219</sup> Hamilton reminds us that "[t]he climatic effects of burning fossil fuels will last longer than Stonehenge," adding that "the future of the Earth over the coming millennia is already inscribed in the atmosphere."<sup>220</sup> David Keith, a Promethean, agrees that CO<sub>2</sub> "casts a long shadow into the future," but claims the trick is to introduce SRM slowly: "If geoengineering was slowly ramped up until 2070 and then ramped back down over the following half century to stop in 2120, the net effect would be to spread the same amount of warming out over...the full century, reducing the rate of warming by half."<sup>221</sup>

Despite this Promethean claim of controllability, Soterians such as the physicist Anders Levermann argue that globally deployed SRM "could cool the planet on

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<sup>216</sup> Raymond T. Pierrehumbert, "Climate Hacking Is Dangerous and Barking Mad," *Slate*, February 10, 2015. Accessed on April 21, 2015, [http://www.slate.com/articles/health\\_and\\_science/science/2015/02/nrc\\_geoengineering\\_report\\_climate\\_hacking\\_is\\_dangerous\\_and\\_barking\\_mad.html](http://www.slate.com/articles/health_and_science/science/2015/02/nrc_geoengineering_report_climate_hacking_is_dangerous_and_barking_mad.html).

<sup>217</sup> Keith, *A Case*, 78.

<sup>218</sup> Hamilton, *Earth Masters*, 31.

<sup>219</sup> Kintisch, *Hack the Planet*, 68.

<sup>220</sup> Hamilton, *Earth Masters*, 191.

<sup>221</sup> Keith, *A Case*, 16.

average, but it cannot reverse the effect of the greenhouse gases” which “change our climate differently in different places,” and cannot alter the basic ongoing warming of the poles even as it may cool the tropics. Levermann concludes we must focus mainly on mitigation, “the only real solution,”<sup>222</sup> a core Soterian position, along with planned adaptation.

But can humanity resist the Promethean temptation to intervene with geoengineering, the Sorcerer’s imperative “urge to mastery” buried so deep with human hearts, which in the end will likely “overwhelm the best efforts of the reluctant geoengineers,” the Soterians?<sup>223</sup> About this question Lowell Wood has no doubt: “Once they [‘political elites’] realize geoengineering is the cheapest solution...‘they’ll swiftly & reliably beat a path to the Geoengineering Door.’”<sup>224</sup> Indeed, as we’ve seen, many informed people believe “political elites” have already passed through the “Geoengineering Door” and committed humanity to the deliberate modification and presumed eventual control of Earth’s climate. Despite their many well-founded doubts about geoengineering “as surely the ultimate expression of humankind’s technological arrogance,” who among the Soterians will not find themselves complicitly asking: “[I]f the alternative is to stand back and watch humanity plunge the Earth into an era of irreversible and hostile climate change, *what is one to do*” [emphasis added]?<sup>225</sup> The temptation to intervene inheres in the project of science itself, and most decidedly in its post-WW-II incarnation.

The temptation to intervene (engineering) is preceded by the temptation to know (science). In 1949 the father of the A-bomb that ushered in the Geoengineering Age, Robert Oppenheimer, confessed, “when you see something that is technically sweet you go ahead and do it and you argue about what to do about it only after you have your technical success.” Robert Jungk, chronicler of the scientists who made the A-bomb, adds that “the twentieth century Faust allows himself, in his obsession with [scientific-technical] success...to be persuaded into signing the pact with the Devil that confronts him: What is ‘technically sweet’ he finds nothing less than irresistible.”<sup>226</sup> Oppenheimer himself concluded: “We did the devil’s work.”<sup>227</sup>

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<sup>222</sup> Anders Levermann, “Why Climate Engineering Won’t Work,” *Huffington Post*, May 08, 2015. Accessed May 21, 2015, [http://www.huffingtonpost.com/anders-levermann/why-climate-engineering-wont-work\\_b\\_7239816.html](http://www.huffingtonpost.com/anders-levermann/why-climate-engineering-wont-work_b_7239816.html).

<sup>223</sup> Hamilton, *Earth Masters*, 72-73.

<sup>224</sup> Goodell, Op. Cit.

<sup>225</sup> Hamilton, *Earth Masters*, 18.

<sup>226</sup> Jungk, *Brighter*, 296.

<sup>227</sup> *Ibid.*, 333.

Sir Francis Bacon called on humanity to “unite forces against the nature of things, to storm and occupy her [nature’s] castles and strongholds and extend the bounds of human empire [scientific knowledge].” Four hundred years ago Bacon’s “ambition...could be safely entertained. There was relatively little damage the human race could then do to its environment. The arrogance was innocuous as it was exhilarating. But within the past few generations the scale of applied science has become global....[s]o the vastness of contemporary technical enterprise has magnified the innermost meaning of the scientific worldview and revealed its full ecological ignorance....We deal now in a technology that alters the climate of entire continents and threatens to murder the flora and fauna of whole oceans.”<sup>228</sup>

Those prophetic words were written over 40 years ago.

The Russian physicist and Nobel laureate Peter Kapitsa wrote of the change that came over science on the eve of WW II: “[T]he happy days of free scientific work...disappeared forever” and science “lost her freedom. She has become a productive force. She has become rich, but she has become enslaved” to governments, war, and commerce, and she is “veiled in secrecy.”<sup>229</sup> After the war diverse writers could claim that science had become, in the words of historian James Fleming, “a prominent and permanent part of all modern militaries,” and that the links between them “in perspectives, personnel, values, budgets, [and] scale...have grown inexorably over the years” with a consequent “militarization of the natural world.”<sup>230</sup>

Science’s “loss” of a “deeply rooted set of ethical beliefs”<sup>231</sup> was compensated by a vast increase in scientists’ social status and political power: “[T]here broods over them a mythological identity” that serves to ensure them a “supremacy within our culture,” and “envisages them as the new Prometheus pitted against the hostile forces of nature,”<sup>232</sup> uniquely serving humanity. Roszak asks if science is “to be pardoned on the grounds it has that it has systematically taught our society to regard knowledge as a thing apart from wisdom.” Such “alienated knowing is, sooner or later, ecologically disastrous knowing.”<sup>233</sup>

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<sup>228</sup> Roszak, *Wasteland*, 235.

<sup>229</sup> Jerome R Ravitz, *Scientific Knowledge and Its Social Problems* (New Brunswick, NJ: Transaction Publishers, 1995), 32.

<sup>230</sup> Fleming, *Fixing the Sky*, 168.

<sup>231</sup> Jungk, *Brighter*, 328.

<sup>232</sup> Roszak, *Wasteland*, 212.

<sup>233</sup> *Ibid.*, 234.

Perhaps John von Neumann, who “exerted a greater influence on the modern world than any other mathematician of the 20<sup>th</sup> century,”<sup>234</sup> and who was deeply involved in all aspects of the birth of the Geoengineering Age, best summed up its scientific attitude or credo: “*All stable processes we shall predict. All unstable processes we shall control.*”<sup>235</sup> Inspired by such confidence, what weaponeers formerly did, climate engineers now strive to do: develop “technologies to control titanic powers.”<sup>236</sup> By the 21<sup>st</sup> century James Fleming could write that the “interaction of science and the military seems to be well on its way to fulfilling a Faustian bargain....Physics, chemistry, and biology have weaponized the atom, molecule, virus, and bacterium, while the geosciences have militarized the global environment in the air, under the sea, and in outer space.”<sup>237</sup>

The migration of science into the labyrinths of war and commerce subjected scientists to political and corporate power, and left society bereft of any “knowledge that can delimit power.”<sup>238</sup> That is, we are now bereft of wisdom and surfeited with scientific and technical facts. We are epistemologically lost in a maze of our own making.

What are we to make of the statement that “the Earth,” the planet on which humanity lives, “has become a human artefact,”<sup>239</sup> an inert thing to be plundered and used as we humans see fit? The co-founder and principal formulator of Gaia theory, the atmospheric chemist James Lovelock, decries this fate of artefactuality — non-aliveness — to which the Promethean geoscientists have consigned our blue planet. Lovelock asks, “But what if instead the Earth is a vast living organism?” And then he warns, “If the Earth is like this, then we face the hard task of reintegrating creation. Of learning again to be part of the Earth and not separate from it. If we

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<sup>234</sup> William Poundstone, “John von Neumann: American mathematician,” *Encyclopedia Britannica*. Accessed September 12, 2015, <http://www.britannica.com/biography/John-von-Neumann>.

<sup>235</sup> Fleming, “The Climate Engineers,” 8.

<sup>236</sup> Hamilton, *Earth Masters*, 125.

<sup>237</sup> Fleming, *Fixing the Sky*, 186.

<sup>238</sup> Roszak, *Wasteland*, 197.

<sup>239</sup> Hamilton, *Earth Masters*, 110.

choose to go this way, the change of heart and mind needed will be great and it will include also the reintegration of religion and science.”<sup>240</sup> Of wisdom and science.

Can humanity summon from deep within itself a new Sorcerer, one who does not beguile and deceive it into believing it is a species uniquely chosen and set apart, divorced from the rest of life on Earth, isolated from the fate of other beings?

### **Nemesis summons a new Sorcerer — a tentative conclusion**

The goddess Nemesis, daughter of Night, a fatal divinity who manifests to restore balance or equilibrium to human affairs, has appeared before us. She confronts us, reckless and swollen with the pride bestowed by our technological prowess, prowess fatally enhanced by the miracle of fossil fuels, by liquid oil, “black gold.” She appears in the guise of Climate Change, whose real names, the great American writer Wendell Berry says are “Waste and Greed,”<sup>241</sup> an inexorable Force thrusting us into a white-water-rapid sluice in which we will bend our utmost energies to stay afloat in the craft we call civilization. According to Dennis Meadows, co-author of the prophetic *The Limits to Growth* (1972), “[t]he dominant drivers of the [climate] system are not [any longer] people sitting around trying to reach a consensus about [it].” The real drivers, the ones in the driver’s seat, are “a set of feedback loops — like the methane cycle and the melting of Arctic ice sheets — which are *beyond human control*” [emphasis added].<sup>242</sup>

Recognizing our parlous state Paul Kingsnorth and Dougald Hine write: “All around us, shifts are under way which suggest that our whole way of living is already passing into history. It is time to look for new paths and new stories, ones that can lead us through the end of the world as we know it and out the other side.” These authors remind us that the Modernist credo of “human centrality, of a species destined to be lord of all it surveys” is no more — or less — than a story. The danger

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<sup>240</sup> James Lovelock, “I speak for the Earth,” *Resurgence & Ecologist*, September/October 2015 (an extract of an article published in the July/August 1988 issue of *Resurgence*). Accessed September 14, 2015, <http://www.resurgence.org/magazine/article4482-i-speak-for-the-earthe.html>.

<sup>241</sup> Wendell Berry, “Faustian Economics: Hell hath no limits,” *Harper’s Magazine*, May 2008. Accessed May 01, 2015, <http://www.harpers.org/archive/2008/05/faustian-economics/>.

<sup>242</sup> Allen White, “Growing, growing, Gone: Reaching the Limits. An Interview with Dennis Meadows,” *Great Transition Initiative*, June 2015. The white-water rapid is Meadows’ metaphor. Accessed June 24, 2015, <http://www.greattransition.org/publication/growing-growing-gone>.

is, “we have forgotten that it is a story.”<sup>243</sup> As such, it may be revised, retold a different way, or radically transformed. In his 2015 climate encyclical Pope Francis offers a parallel recognition: “There is a growing awareness that scientific and technical progress cannot be equated with the progress of humanity and history, a growing sense that the way to a better future lies elsewhere.”<sup>244</sup>

The obstacles to moving to a new story are immense, but in the end, not more than obstacles. To confront climate change — whether by adaptation, mitigation, or both — humanity *must confront and overcome these obstacles*. Or succumb to the Promethean urge to intervene and damn the consequence.

The two most formidable obstacles include growth and our commitment to war, to organized violence as a means of solving problems. War and the ideology of economic growth, “which has become fetishized” and “invested with magical powers”<sup>245</sup> are intimately linked, as many scholars have observed, most recently Herman Daly, originator of the idea of a steady state economy. “Contrary to popular belief, growth in a finite and full world is not the path to peace, but to further conflict. It is an illusion to think that we can buy peace with growth. The growth economy and warfare are now natural allies.” Daly adds: “Modern devotion to the Secular God of Growth, who promises heaven on earth, has itself become a fanatical religion.”<sup>246</sup> The recognition that neo-liberal economics or market “fundamentalism” has gained the status of a “fanatical religion” — religion being a set of beliefs and rituals that bind people to the sacred — has caused humanity’s true religious or spiritual leaders to speak out in protest against the unseemly Modernist twist that elevates and conflates economic growth with the sacred.

The first of these leaders spoke out almost half a century ago. Martin Luther King’s shock-force anti-war speech in New York City’s Riverside Church in 1967 directly challenged the habitual resort to war then rampant in Vietnam, naming “my own

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<sup>243</sup> Paul Kingsnorth and Dougald Hine, *Uncivilization: The Dark Mountain Manifesto* (The Dark Mountain Project, UK, 2009/2014), 17, 18. Accessed on September 25, 2015, <http://dark-mountain.net/about/manifesto/>.

<sup>244</sup> Pope Francis, *Laudato Si': On Care for Our Common Home. Encyclical Letter* (Huntington, IN: Our Sunday Visitor Publishing Division, 2015), 76-77. Accessed August 17, 2015, [http://www.w2.vatican.va/content/francesco/en/encyclicals/documents/pap-francesco\\_20150524\\_enciclica-laudato-si.html](http://www.w2.vatican.va/content/francesco/en/encyclicals/documents/pap-francesco_20150524_enciclica-laudato-si.html).

<sup>245</sup> Hamilton, *Earth Masters*, 206.

<sup>246</sup> Herman Daly, “War and Peace and the Steady-State Economy,” *Center for the Advancement of the Steady State Economy*, April 29, 2015. Accessed April 30, 2015, <http://steadystate.org/war-and-peace-and-the-steady-state-economy/>.



government” as “the greatest purveyor of violence in the world today.” To escape the “madness” of war, the national “folly,” King incisively urged his audience to “begin the shift from a thing-oriented society to a person-oriented society. When machines and computers, profit motives and property rights, are considered more important than people, the giant triplets of racism, extreme materialism, and militarism are incapable of being conquered.”<sup>247</sup>

Almost a half century later Pope Francis urges us “to hear both the cry of the earth and the cry of the poor” for the sake of “our own dignity.” He reminds us that “[l]eaving a habitable planet to future generations is, first and foremost, up to us” and doing so speaks to “the ultimate meaning of our sojourn on earth.”<sup>248</sup> A decade earlier the authors of the 30-year update of *The Limits to Growth* provided a strong secular echo to the pope’s words: “Humanity must learn to love the idea of leaving to future generations a living planet,”<sup>249</sup> in order to escape the collapse promised by a business-as-usual scenario. Martin Luther King spoke of the need for a revolution of values, away from militarism and über-nationalism: “A genuine revolution of values means...that our loyalties must become ecumenical rather than sectional. Every nation must now develop an overriding loyalty to mankind as a whole in order to preserve the best in their individual societies.”<sup>250</sup>

These prophetic words King uttered long before Nemesis appeared to confront humanity face-to-face in the present century as Climate Change.

In his climate encyclical, the Pope speaks of a “change in humanity” and notes that “all of us are linked by unseen bonds and together form a kind of universal family, a sublime communion which fills us with a sacred, affectionate and humble respect.”<sup>251</sup> This communion is something the Pope clearly feels himself and he believes each of us has the spiritual capacity to also experience it. He asks each of us “to become painfully aware, to dare to turn what is happening to the world into our own personal suffering and thus discover what each of us can do about it.”<sup>252</sup>

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<sup>247</sup> Martin Luther King, Jr. “Beyond Vietnam — A Time to Break Silence,” Riverside Church speech delivered April 04, 1967. Accessed September 11, 2015, <http://www.americanrhetoric.com/speeches/mlkatimetobreaksilence.htm>.

<sup>248</sup> Pope Francis, *Laudato Si*, 63,107.

<sup>249</sup> Donella Meadows, Jørgen Randers, and Dennis Meadows, *Limits to Growth: The 30-Year Update* (White River Junction, VT: Chelsea Green, 2004), 283.

<sup>250</sup> Martin Luther King, Op. Cit.

<sup>251</sup> Pope Francis, *Laudato Si*, 11, 62.

<sup>252</sup> *Ibid.*, 18.

Shortly after the dawn of the Geoengineering Age the father of the A-bomb, Robert Oppenheimer, stood trial for loyalty. As Robert Jungk recounts toward the close of his epic tale about the making of the atomic bomb, the atomic scientists and engineers who stood as witnesses to Oppenheimer's loyalty to the US, also stood before an invisible, higher "bar of justice." Before that invisible bar "the critical question which they ought to have answered was not 'Have you been loyal to the state?' but 'Have you been true to mankind?'"<sup>253</sup> Seventy years later, might we too ask our climate scientists and geoengineers, 'Will you be true to all creation, and do no lasting harm to life on Earth?'

"The root of the climate threat," according to David Keith, "is that humanity is moving carbon from deep geological reservoirs to the biosphere approximately a hundred times faster than the corresponding natural processes" such as volcanoes do.<sup>254</sup> Keith warns, "roughly half of all the carbon dioxide emitted in human history was emitted in the last quarter century" [emphasis added].<sup>255</sup> Growth is the ideological fuel we are using to run ourselves into a climate wall we cannot leap. And fossil fuels provide the material basis for this "economic" growth ideology, fuels whose waste products are relentlessly ratcheting up the titanic energies driving global climate change.

The transition to alternative sources of energy is at long last under way<sup>256</sup> but "[p]rogress in green investment continues to be outpaced by investment in fossil fuel intensive, inefficient infrastructure."<sup>257</sup> Nor can we maintain our present growth-based civilization on alternative fuels without burning fossil fuels. "Building the fossil-fueled energy producing-and-consuming infrastructure of the modern world has been by far the greatest construction project in human history. It took over a century," energy analyst and author Richard Heinberg reminds us, "and it's still a work in progress." Heinberg calls for a "complete rethinking of the economy"

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<sup>253</sup> Jungk, *Brighter*, 329.

<sup>254</sup> Keith, *A Case*, 26.

<sup>255</sup> *Ibid.*, 25.

<sup>256</sup> Paul Gilding, "Don't Be Fossil Fooled — It's time to say goodbye," *Resilience*, July 14, 2015. Accessed July 15, 2015, <http://www.resilience.org/stories/2015-07-14/don-t-be-fossil-fooled-it-s-time-to-say-goodbye>.

<sup>257</sup> Green Growth Action Alliance, "The Green Investment Report," *World Economic Forum*, 2013. Accessed September 18, 2015, [http://www3.weforum.org/docs/WEF\\_GreenInvestment\\_Report\\_2013.pdf](http://www3.weforum.org/docs/WEF_GreenInvestment_Report_2013.pdf).

including “both its means and ends,” within “a shrinking budget of energy and materials.” He concludes, “society will be forced to change in profound ways.”<sup>258</sup>

We need a new story. A story that frees us “to confront the dilemma of growth” and releases us from the “iron cage of consumerism.”<sup>259</sup> We need, according to economist Tim Jackson, “a new vision of prosperity as the ability to flourish” and “to participate meaningfully in the life of society.”<sup>260</sup> At a deep level we are engaged in a struggle to achieve a spiritual condition known as humility, a maturity of being, a process Wendell Berry describes as “coming under pressure to understand ourselves as limited creatures in a limited world.”<sup>261</sup> Such a human-scale world can be a “fund of beauty, solace, and pleasure” that “cannot be exhausted in a lifetime or in generations.”<sup>262</sup>

Until we reclaim that world of human-scale political economy Berry warns us that the “global ‘free market’ is free to the corporations precisely because it dissolves the boundaries of the old national colonialisms, and replaces them with a new colonialism without restraints or boundaries,” a globalized marketplace in which the hounds of capital are unrestrainedly “free” to feast on rabbits shorn of the safety of their holes.<sup>263</sup> “Without prosperous local economies, the people have no power and the land no voice,”<sup>264</sup> and all is surrendered to Greed and Waste. This surrender has caused the Indian scientist and activist Vandana Shiva to label the global free-market economy “anti-life.”<sup>265</sup>

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<sup>258</sup> Richard Heinberg, “Renewable Energy Will Not Support Economic Growth,” Resilience, June 05, 2015. Accessed June 05, 2015, <http://www.resilience.org/stories/2015-06-05/renewable-energy-will-not-support-economic-growth>.

<sup>259</sup> Tim Jackson, *Prosperity without Growth: Economic for a Finite Planet* (London: Earthscan, 2009), 188.

<sup>260</sup> Ibid., 189, 143.

<sup>261</sup> Wendell Berry, Op. Cit.

<sup>262</sup> Ibid.

<sup>263</sup> Wendell Berry, “The Idea of a Local Economy,” *Harper’s Magazine*, April 2002. The rabbit-and-hound metaphor is Berry’s. Accessed on March 14, 2015, <http://harpers.org/archive/2002/04/the-idea-of-a-local-economy/>.

<sup>264</sup> Wendell Berry, “The Idea of a Local Economy.”

<sup>265</sup> Vandana Shiva, “How economic growth has become anti-life,” *The Guardian*, November 01, 2013. Accessed September 25, 2015, <http://www.theguardian.com>.

To confront the global warming crisis of globalized free-market Western civilization, four responses, according to IPCC climate scientist Neville Nicholls, are possible: “You can mitigate...you can adapt...you can geoengineer...or you can suffer.” Nicholls adds: “My feeling is we’ll do all four.”<sup>266</sup> Suffering is endemic to human existence and cannot be escaped. Nor can humanity escape the climate consequences of the heat being trapped by the greenhouse gases civilization, itself trapped by its Sorcerer’s exhortations, is committed to release for the foreseeable future. Iraq-war veteran and writer Roy Scranton advises that “we need to live with and through the end of our current civilization.” To survive “the death throes” of “carbon-fueled capitalism” we need to possess a “tolerance...grounded in a faith in human community existing beyond any parochial identity, local time, or single place.”<sup>267</sup> As for geoengineering, or climate intervention, we “need to stop thinking in terms of ‘interventions’ to save the environment in favor of policies developed and debated by *all interested parties*” and that entails “being *fully informed* about such” interventions as well as fully informed about their “risks and possibilities” [emphasis added].<sup>268</sup>

In order to delegitimize the hold of the ideology of growth and war, humanity must create a new vision, one that does not shirk the truth of our present circumstances, one that turns “a breakdown to advantage” — “a new story that articulates a positive vision grounded in what in what is best in...society’s values and history.”<sup>269</sup> Sixty years ago John von Neumann foresaw that “[i]ntervention in atmospheric and climatic matters...will merge each nation’s affairs with those of every other, more thoroughly than the threat of nuclear or any other war could have done.”<sup>270</sup> In order to resist the Promethean urge to intervene in Earth’s vast climate system, a system science does not yet understand and cannot engineer without creating more climate imponderables and mayhem, we will need not only a new story but also *a powerful*

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[www.theguardian.com/commentisfree/2013/nov/01/how-economic-growth-has-become-anti-life](http://www.theguardian.com/commentisfree/2013/nov/01/how-economic-growth-has-become-anti-life).

<sup>266</sup> Paul Mac questions Professor Neville Nicholls, Op. Cit. Nicholls said he was paraphrasing remarks made by Obama Science advisor John Holdren.

<sup>267</sup> Roy Scranton, *Learning to Die in the Anthropocene: Reflections on the End of a Civilization* (San Francisco: City Lights Books, 2015), 21, 24.

<sup>268</sup> Pope Francis, *Laudato Si*, 121.

<sup>269</sup> James Gustave Speth, *The Bridge at the End of the World: Capitalism, the Environment, and Crossing from Crisis to Sustainability* (New Haven, CT: Yale University Press), 212.

<sup>270</sup> John von Neumann, “Can We Survive Technology?” *Fortune*, June 1955. Accessed on May 28, 2015, <http://fortune.com/2013/01/13/can-we-survive-technology/>.

*social change movement*: a global “blockadia,” global cadres of “climate warriors”<sup>271</sup> committed to halting the ravages of Waste and Greed in favor of climate justice, the demilitarization of human social relations, and the gradual relocalization of human economies.

May my grandchildren live to prosper in this new world.

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<sup>271</sup> Naomi Klein, *This Changes Everything: Capitalism vs. The Climate* (New York: Simon & Schuster, 2014).

