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**Hypersonics are coming now – a new “space race” will push the US, Russia, and China to overcome tech hurdles and develop technologies that are impervious to nuclear deterrence and ABMs**

**Stone 1/8**

Stone, Richard. [Senior science editor at the Howard Hughes Medical Institute’s Tangled Bank Studios in Chevy Chase, Maryland. Rich was a Fulbright Scholar in Russia from 1995–96 and in Kazakhstan from 2004–05. He spent 4 years as European news editor in Science’s office in Cambridge, U.K., during which he also served as visiting writer in science at the University of Cambridge, and 5 years as Asia news editor in Beijing. Rich has won several awards for articles that have appeared in Science, Discover, Smithsonian, and National Geographic.] “‘National pride is at stake.’ Russia, China, United States race to build hypersonic weapons.” Association for the Advancement of American Science. <https://www.sciencemag.org/news/2020/01/national-pride-stake-russia-china-united-states-race-build-hypersonic-weapons>.

High in the sky over northwestern China, a wedge-shaped unmanned vehicle separated from a rocket. Coasting along at up to Mach 6, or six times the speed of sound, the Xingkong-2 “waverider” hypersonic cruise missile (HCM) bobbed and weaved through the stratosphere, surfing on its own shock waves. At least that’s how the weapon’s developer, the China Academy of Aerospace Aerodynamics, described the August 2018 test. (China did not release any video footage.) The HCM’s speed and maneuverability, crowed the Communist Party’s Global Times, would enable the new weapon to “break through any current generation anti-missile defense system. For decades, the U.S. military—and its adversaries—have coveted missiles that travel at hypersonic speed, generally defined as Mach 5 or greater. Intercontinental ballistic missiles (ICBMs) meet that definition when they re-enter the atmosphere from space. But because they arc along a predictable ballistic path, like a bullet, they lack the element of surprise. In contrast, hypersonic weapons such as China’s waverider maneuver aerodynamically, enabling them to dodge defenses and keep an adversary guessing about the target. Since the dawn of the Cold War, the Pentagon has periodically thrown its weight behind the development of maneuverable hypersonic weapons, only to shy away when technological hurdles such as propulsion, control, and heat resistance proved daunting. “You see a flurry of activity, a lot of investment, and then we conclude it’s a bridge too far,” says aerospace engineer Mark Lewis, director of defense research and engineering for modernization at the U.S. Department of Defense (DOD). “The community was underfunded and largely forgotten for many years,” adds Daniel DeLaurentis, director of Purdue University’s Institute for Global Security and Defense Innovation. Now, DOD is leading a new charge, pouring more than $1 billion annually into hypersonic research. Competition from ambitious programs in China and Russia is a key motivator. Although hype and secrecy muddy the picture, all three nations appear to have made substantial progress in overcoming key obstacles, such as protecting hypersonic craft from savage frictional heating. Russia recently unveiled a weapon called the Kinzhal, said to reach Mach 10 under its own power, and another that is boosted by a rocket to an astonishing Mach 27. China showed off a rocket-boosted hypersonic glide vehicle (HGV) of its own, the Dongfeng-17, in a recent military parade. The United States, meanwhile, is testing several hypersonic weapons. “It’s a race to the Moon sort of thing,” says Iain Boyd, an aerospace engineer at the University of Colorado, Boulder. “National pride is at stake.” This new arms race promises to upend strategic calculations. Russian officials have cast nuclear-armed hypersonic craft as a hedge against future U.S. prowess at shooting down ICBMs, which could undermine nuclear deterrence. China’s military, in contrast, sees hypersonic weapons (as well as cyberwarfare and electromagnetic pulse strikes) as an “assassin’s mace”: a folklore term for a weapon that gives an advantage against a better-armed foe, says Larry Wortzel, a senior fellow at the American Foreign Policy Council who serves on the U.S.-China Economic and Security Review Commission. If tensions were to spike over Taiwan or the South China Sea, for instance, China might be tempted to launch preemptive strikes with conventional hypersonic weapons that could cripple U.S. forces in the Pacific Ocean, Wortzel says. China’s hypersonic weapons, he warns, “seem deliberately targeted at upending the tenuous strategic stability that has been in place since the end of the Cold War.”

**Private space development key to missile defense – US needs to check itself before it wrecks itself**

**Button 18**

(Keith Button, Author & Reporter specializing in military tech / engineering; “Hypersonic weapons race” (06-2018); <https://aerospaceamerica.aiaa.org/features/hypersonic-weapons-race/>)//ckd

The U.S. continues to pursue air-breathing hypersonics while increasing its focus on boost-glide vehicles. Charles Miller, president of NexGen Space consulting and a former NASA senior adviser for commercial space, argues that the U.S. government should follow the lead of the private space industry, which has invested heavily in rocket propulsion and passed over the air-breathing hypersonic concepts. “The free market is saying rockets are the way to do it; scramjets are not,” Miller says, using a shorthand term for supersonic combustion ramjets, an air-breathing concept. “One of them has a large commercial market that will drive private investment and make it sustainable; the other does not.” With air-breathing hypersonics, he says, “Companies are not going to put private skin in the game. They see no long-term commercial market opportunity. That means it’s all going to be cost-plus contracts that the government has to pay for.” It would make sense for the U.S. to look to the technology advances of the private space launch companies and their potential military capabilities, says Jess Sponable, former DARPA program manager for the hypersonic XS-1. The rocket-powered XS-1 Experimental Spaceplane would take off and accelerate under rocket power to nearly orbital altitudes to launch satellites, then glide back to Earth. Flight tests are planned by 2020. “I think **we should leverage the billionaire entrepreneurs at the companies investing in reusable hypersonic launch systems that are rocket-powered, and we should figure out how to take advantage of all that capability that people are literally spending billions of dollars on**.” That does not have to mean giving up on air-breathing, he cautions. The advantage of boost-glide is that the rocket engine technology — how to build them and how they perform — is well known. The critical design limits for boost-glide aren’t propulsion; they’re aerodynamics and maneuverability, says Lewis of the Institute for Defense Analyses. Another advantage to boost glide is that its flight is typically through space during the acceleration phase, so the extreme thermal conditions and shock waves caused by trying to push through the air of the atmosphere are avoided during that phase, Sponable says. ATTRACTION OF AIR-BREATHING While both modes of flight present extreme engineering challenges, air-breathing hypersonic flight is the most difficult and least developed option. An air-breathing hypersonic engine — the supersonic combustion ramjet, or scramjet — has no moving parts. The inlet compresses the supersonic air rushing in to mix oxygen with fuel for combustion, and a nozzle at the back of the engine accelerates the heated air out of the combustion chamber to generate thrust. Igniting and maintaining combustion when air is traveling through the engine at 1.6 kilometers per second is challenging. “It’s like trying to light a match in a hurricane, to keep that combustor lit,” says Sponable, the former XS-1 manager. Extreme temperatures created by hypersonic airflow — more than 1,500 degrees Celsius (2,732 degrees Fahrenheit) on parts of the vehicle — and the shifting shock waves that buffet the aircraft at the extreme velocities add to the challenge. So far, the longest air-breathing hypersonic flight on record is the 210 second X-51 Waverider flight. The potential advantage of air-breathing engines would be that at hypersonic speeds, they could have three times the specific impulse — a measure of propulsion efficiency — of the rocket engines that would drive boost-glide vehicles. That could give the weapons an advantage in range. RESEARCH COMMUNITY In the U.S., most fundamental hypersonics research is handled by universities, while applied research progresses mostly through DARPA, and to a lesser extent through the Air Force Research Lab and NASA. While DARPA receives funding from the Air Force, Navy and Army for hypersonics research, it doesn’t have its own laboratories — it farms out the research activities to its **private-industry** contractors. On the university side, Boyd says about 300 faculty members, graduate students and post-doctorate researchers devote themselves to hypersonics research in the U.S., with about $20 million per year spent on it. The total number of hypersonics researchers is about half of that in China, judging by the publicly available research, he says. **China also appears to employ a more integrated research effort**, putting more of its university researchers together to work in one place. In the U.S., the largest individual university hypersonics programs may have 25 people, typically not coordinating together but working individually or in teams of two, Boyd says. China’s spending on hypersonics is also seen in its numerous new research facilities, contrasting with the U.S., which has “a lot of great facilities,” but many are in old buildings that are “creaking at the seams,” Boyd says. IMPORTANCE OF BASIC RESEARCH **To catch up with China, the U.S. will have to do more**, starting with its spending on fundamental hypersonics research, Boyd says. “There has to be more investment, because at the end of the day, China is investing more people and newer facilities than we have. We don’t have any really secret sauce, I don’t think, to any great extent that’s going to allow us to catch up without increasing our effort here.” If the U.S. decides that hypersonics is going to be an important element of its national security strategy, then it’s going to have to develop a workforce. Boosting fundamental research spending would help accomplish that: educating and training engineers in the details of a challenging field, as well as germinating the next generation of ideas for new technologies, Boyd says.

**That’s key to stopping China and Russia**

**Honrada 12-21**

(Gabriel Honrada, MA in IR @ Peoples' Friendship University of Russia; “US signs deal to seek and destroy China’s hypersonics” (12-21-2021); <https://asiatimes.com/2021/12/us-signs-deal-to-seek-and-destroy-chinas-hypersonics/>)//ckd

The US Missile Defence Agency (MDA) [signed a feasibility study contract](https://eurasiantimes.com/hypersonic-missiles-us-draws-big-plan-to-engage-intercept-shoot-down-china/?amp) this month with **Stratolaunch** to develop the Talon-A hypersonic test vehicle to simulate Russian and Chinese hypersonic weapons. Daniel Millman, chief technology officer of Stratolaunch, [stated](https://www.prnewswire.com/news-releases/stratolaunch-announces-research-contract-with-missile-defense-agency-301440611.html) that the company aims to provide the MDA with “a threat-representative and threat-replicating target that allows them to understand how to engage and intercept hypersonic threats.” He did not reveal further details about the company’s contract with the MDA. Hypersonic weapons are designed to defeat current missile defense systems by flying at five times the speed of sound and performing evasive maneuvers during their terminal phase. Stratolaunch is now in the process of developing its [Talon-A hypersonic testbed](https://www.stratolaunch.com/vehicles/talon-a), which aims to make hypersonic testing more routine. It is a highly-instrumented Mach-6 vehicle designed to collect flight data during testing. At present, the company is building two such vehicles, namely [TA-0](https://dlt1hdy7nkt32.cloudfront.net/default/Stratolaunch_TalonA0_1200x675.jpg?mtime=20211004102441&focal=none) and [TA-1](https://dlt1hdy7nkt32.cloudfront.net/default/Stratolaunch_TalonA1_1200x6752.jpg?mtime=20211004102445&focal=none). They are designed to be launched from the company’s [Roc carrier aircraft](https://www.stratolaunch.com/vehicles/carrier), are capable of long-duration hypersonic flight and can perform autonomous landing and take-off from conventional runways. Stratolaunch [aims to start](https://finance.yahoo.com/finance/news/stratolaunch-announces-research-contract-missile-194500865.html) power-on testing of its Talon-A test vehicles by year-end, conduct hypersonic test flights in 2022, and start hypersonic testing services for government and commercial customers in 2023. Stratolaunch was [founded in 2011](https://www.universetoday.com/91737/revolutionary-air-launched-commercial-rocket-to-orbit-announced-by-microsoft-billionaire-paul-allen/) by Microsoft co-founder Paul Allen and aerospace designer Burt Rutan. The company is a **privately-funded** venture to develop an air-launched space transportation system that can cut high costs and reduce risks of launching both cargo and human crews to low Earth orbit. The MDA and Stratolaunch contract is the latest move in US efforts to develop hypersonic weapons and countermeasures. On [October](https://www.reuters.com/world/us/us-successfully-tests-hypersonic-booster-motor-utah-2021-10-29/) 28, the US successfully tested a hypersonic booster motor, following a series of failed hypersonic weapons tests. Those include a test on [October](https://www.reuters.com/business/aerospace-defense/rocket-failure-delays-us-hypersonic-weapon-test-sources-2021-10-21/) 21, when a booster rocket carrying a hypersonic weapon failed. The US tested its AGM-183A Air-launched Rapid Response Weapon (ARRW) on [July](https://www.defensenews.com/air/2021/08/04/after-latest-flight-test-failure-us-air-force-hoping-to-keep-first-hypersonic-missile-on-track-for-production/) 28 but the missile failed to launch. The first test of the AGM-183A ARRW on [April](https://www.defensenews.com/air/2021/04/06/the-first-flight-test-of-the-air-forces-air-launched-hypersonic-booster-didnt-go-as-planned/) 5 failed as the missile did not launch. In [2011](https://www.cbsnews.com/news/us-army-tests-hypersonic-weapon-over-pacific/), the US did successfully test its Advanced Hypersonic Weapon (AHW) as part of its Prompt Global Strike program. The recent setbacks prompted [an admission](https://www.politico.com/news/2021/11/20/hypersonic-technology-us-behind-china-russia-523130) from US Space Force General David Thompson, Vice Chief of Space Operations, that the US has fallen behind China and Russia in developing hypersonic weapons. The US Army is not slated to field its first hypersonic weapon until 2024, while the US Navy aims to arm a destroyer with hypersonic weapons in 2025 and equip its Virginia-class submarines with them in 2028. In contrast, China has been testing hypersonic weapons [since 2014](https://web.archive.org/web/20151129233721/https:/www.janes.com/article/56282/us-officials-confirm-sixth-chinese-hypersonic-manoeuvring-strike-vehicle-test), and has fielded the [DF-17 hypersonic missile](https://missilethreat.csis.org/missile/df-17/) since 2019, which can carry nuclear or conventional anti-ship warheads Further, China tested a hypersonic weapon on [July](https://www.scmp.com/news/world/united-states-canada/article/3157006/chinese-hypersonic-test-included-path-breaking) 27 this year, which circled the globe and launched hypersonic warheads against test targets in mainland China and the South China Sea. Russia is also in the hypersonic game. In 2018, Russian President Vladimir Putin unveiled Russia’s 3M22 Tsirkon hypersonic weapon alongside five other “[superweapons](https://www.chathamhouse.org/2021/09/advanced-military-technology-russia/03-putins-super-weapons).” Following that, on [October](https://www.cbsnews.com/news/russia-hypersonic-missile-tsirkon-submarine-test-launch/) 4, Russia conducted a successful test firing of the 3M22 Tsirkon from a submarine and another test on [November](https://www.themoscowtimes.com/2021/11/18/russia-test-fires-tsirkon-hypersonic-missile-in-arctic-a75604) 18 from a surface warship. In light of these developments, the rapid deployment of hypersonic weapons by the US, China and Russia has sparked fears of a hypersonic arms race between the three major military powers.

**Current hotspots will go nuclear. Current response systems will be insufficient to prevent nuclear devastation**

**Simon 20**

Simon, Steve. [**Steven Simon** is a former [United States National Security Council](https://en.wikipedia.org/wiki/United_States_National_Security_Council) senior director for the Middle East and North Africa.[[1]](https://en.wikipedia.org/wiki/Steven_Simon#cite_note-1) He also previously served as the Executive Director [IISS](https://en.wikipedia.org/wiki/IISS)-US and Corresponding Director IISS-Middle East [[2]](https://en.wikipedia.org/wiki/Steven_Simon#cite_note-2) and as a Senior Fellow at the [Middle East Institute](https://en.wikipedia.org/wiki/Middle_East_Institute) based in Washington, D.C.[[3]](https://en.wikipedia.org/wiki/Steven_Simon#cite_note-3) He was Hasib J. Sabbagh Senior Fellow for Middle Eastern Studies, at the [Council on Foreign Relations](https://en.wikipedia.org/wiki/Council_on_Foreign_Relations). He was a Spring 2008 [Berlin Prize](https://en.wikipedia.org/wiki/Berlin_Prize) Fellow. Steven Simon is now a visiting professor at [Colby College](https://en.wikipedia.org/wiki/Colby_College) in Maine.] “Hypersonic Missiles Are a Game Changer.” *The New York Times.* January 1, 2020. https://www.nytimes.com/2020/01/02/opinion/hypersonic-missiles.html

Hypersonic weapons, at long last, appear poised to fulfill the promise of air power. In an era when the use of ground troops has proved costly, unpopular and generally ineffective, and where threats might be real but not necessarily “strategic,” they are a godsend: missiles whose accuracy minimizes the risk of collateral damage, that pose no risk to aircrews, are unstoppable and phenomenally accurate, can yield an impact equal to five to ten tons of high explosive with no warhead at all yet be capable of delivering a nuclear bomb, and can reach nearly every coordinate on the surface of the earth within 30 minutes. Death from the air, guaranteed on-time delivery. The United States has been developing its own hypersonic program, under the project name Prompt Global Strike. But the Russians got there first because they’ve made hypersonics a priority: They offset Russia’s inability to sustain an expansive high-tech military infrastructure, and they represent a direct response to Donald Trump’s withdrawal from the Intermediate-Range Nuclear Forces Treaty. Mr. Trump withdrew presumably so America could develop stronger defenses against a nuclear attack; with the Avangard in its arsenal, Russia doesn’t have to worry too much about penetrating whatever defenses the American military had in mind. It gets worse. China, India, France and others are all developing similar weapons. The age of hypersonics, when even medium-size powers can deliver unstoppable damage on an American (or Russian, or Chinese) city, is a whole new game. For starters, hypersonics change the way we think about crisis management. Suppose the United States detected an adversary’s launch of a missile — or mistakenly thought it had detected a launch, as American authorities had actually done in January 2018. At a moment like this, the stakes are high, and the time frame for decision making is extremely compressed. Throw in exhaustion, intense emotions and uncertainty about the other side’s intentions, and you have a seriously volatile situation. If the contending parties are armed with hypersonic missiles, the time frame for deciding what to do is even shorter, and the uncertainty about what your enemy is targeting and the nature of an incoming warhead — is it nuclear or conventional? — is virtually total. In such a situation, the overwhelming incentive is to shoot first. Think of two gunslingers in a dark room. Moreover, hypersonics are a weaponized moral hazard for states with a taste for intervention, because they erase barriers to picking fights. Is an adversary building something that might be a weapons factory? Is there an individual in an unfriendly country who cannot be apprehended? What if the former commander of Iran’s Revolutionary Guards, Qassim Suleimani, visits Baghdad for a meeting and you know the address? The temptations to use hypersonic missiles will be many. Hypersonics also push us toward a slippery slope. They blur the line between conventional and strategic weapons, and their easy, justifiable use — say, to kill a single terrorist leader in a crowded city — could make it easier to accept their widespread use, with much more destructive consequences. Hypersonics might look like just a zoomier version of existing weapons, but in fact they are game-changing. When the United States used nuclear weapons against Japan, they were thought to be a dramatic advance on bombs already in use, even those used to generate firestorms that had already devoured the cities of Germany and Japan. It was not until later that they were understood to be categorically different and ultimately too destructive to use. If past is prologue, deployment of the systems is going to take place well before their ramifications are fully understood. By 1950, as the Chinese Army was overrunning American and South Korean forces, the Truman administration had already grasped the dilemmas intrinsic to nuclear weapons; the Soviet detonation of a hydrogen bomb a few years later drove the lesson home. But between the exuberance of acquiring a new military capability and the sobering realization of its dangers, there is plenty of opportunity to use them.

**CP**

**Text: The United Nations Committee on the Peaceful Uses of Outer Space’s Legal Subcommittee ought to designate space a global commons.**

**Normal means for treaties involves solely the signatory countries – actor of the plantext is states**

**Berkeley Law Library 16**

Berkeley Law (It’s the handbook from the Berkeley law library, just a basic definition), 2016-2-23 (date from source code), "Treaties and International Agreements," Berkeley Law Library, https://www.law.berkeley.edu/library/guide.php?id=65, // HW AW

Treaties can be referred to by a number of different names: international conventions, international agreements, covenants, final acts, charters, protocols, pacts, accords, and constitutions for international organizations. Usually these different names have no legal significance in international law. **Treaties may be bilateral (two parties) or multilateral (between several parties) and a treaty is usually only binding on the parties to the agreement.** An agreement "enters into force" when the terms for entry into force as specified in the agreement are met. Bilateral treaties usually enter into force when both parties agree to be bound as of a certain date.

**The CP competes – they had complete control over how and who implements the aff, especially in this topic since the actor was not specified in the resolution. The actor is a key, debatable element and a change poses an opportunity cost, which is sufficient for competition.**

**COPUOS has jurisdiction and has passed treaties on similar topics in the past**

**UNOOSA**

UNOOSA (united nations outer space committee), 2021 (no date but written about the 2021 conference), "COPUOS 2021 Session," UNOOSA, <https://www.unoosa.org/oosa/en/ourwork/copuos/index.html> // HW AW

The Committee on the Peaceful Uses of Outer Space (COPUOS) was set up by the General Assembly in 1959 to govern the exploration and use of space for the benefit of all humanity: for peace, security and development. The Committee was tasked with reviewing international cooperation in peaceful uses of outer space, studying space-related activities that could be undertaken by the United Nations, encouraging space research programmes, and **studying legal problems arising from the exploration of outer space**. The Committee was **instrumental in the creation of the five treaties and five principles of outer space**. International cooperation in space exploration and the use of space technology applications to meet global development goals are discussed in the Committee every year. Owing to rapid advances in space technology, the space agenda is constantly evolving. The Committee therefore provides a unique platform at the global level to monitor and discuss these developments. The Committee has two subsidiary bodies: the [Scientific and Technical Subcommittee](https://www.unoosa.org/oosa/en/ourwork/copuos/stsc/2020/index.html), and the [Legal Subcommittee](https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/2019/index.html), both established in 1961. The Committee reports to the [Fourth Committee of the General Assembly](http://www.un.org/en/ga/fourth/), which adopts an annual resolution on international cooperation in the peaceful uses of outer space.

COPUOS is losing legitimacy due to an inability to reach consensus and thereby pass policies – the plan restores faith, discourages weak agreements, solves space debris, sustainability, and security issues

**Masson-Zwaan 19**

Tanja Masson-Zwaan (deputy director of institute of air and space at Leiden University), 2019, "SYNOPSIS ON THE NEW SPACE RACE: NEW STATES IN SPACE " Cambridge, https://www.cambridge.org/core/services/aop-cambridge-core/content/view/E68383DE71B60A711EE1E4578CA303A8/S2398772319000138a.pdf/new\_states\_in\_space.pdf, // HW AW

The “old” space race started in 1957 and involved mainly the United States and the Soviet Union. These states led the development of the initial international agreements adopted in the framework of the UN Committee on the Peaceful Uses of Outer Space (COPUOS).1 Within less than two decades, between 1967 and 1984, five international treaties were adopted and entered into force.2 At the time, COPUOS had less than twenty-five member states and agreement was reached relatively easily. Gradually, the group of space actors grew, but space activity remained state-centered and involved a relatively small number of states, while private-entity involvement was mostly limited to the telecommunication sector in the United States. Today, the landscape is entirely different. Not only are more and more states interested and involved in exploring and using outer space, but private entities also have entered the scene, and the trend of privatization and commercialization of space activities is expected to gain more speed in years to come. As the number of states active—or wishing to become active—in outer space has grown, so has the membership of COPUOS, which today counts nearly ninety states.3 It has thus **become more difficult to reach consensus, which has been the working method of COPUOS from the start**. As a consequence of the growing number and diversity of stakeholders, in recent decades the **agreements among states about the use and exploration of outer space have taken the form of principles and other UN resolutions, rather than legally binding treaties**. At the same time, a growing number of new topics require states’ attention. With constant advances in technology, new capacities and activities emerge at high speed, such as ever-smaller satellites, large constellations of hundreds or even thousands of satellites, the prospect of suborbital flights, reusable launch vehicles, on-orbit servicing, and the use of resources from asteroids or the Moon. These developments were not foreseen in the early days of space exploration. Although the UN space treaties and resolutions provide the basic legal framework, some form of further elaboration is now needed to provide clear and predictable standards to govern these new activities. Issues such as the continuing congestion of outer space, the problems related to the mitigation and remediation of space debris, the long-term sustainability of space activities, space traffic management, space situational awareness, and the security of critical space infrastructure will also increasingly require the attention of the international community of states. In this changed landscape with new states, private entities, new activities, and new concerns, it is useful to look at how emerging space nations view the rules that were laid down in the past, the issues that will require regulation in the future, and whether there are any special concerns that influence their positions.4 The main principles of international space law are embodied in the Outer Space Treaty of 1967 (OST). The treaty has been widely adopted and states have consistently acted in accordance with its principles.5 In addition, states have not publicly contested those principles, proposed amendments, or withdrawn from the treaty. Thus, at least parts of the treaty could be considered to have reached the status of customary international law, meaning that they are binding on all states, including nonparties. The following sections highlight principles that are not likely to be contentious for new space states and then identify current principles and future issues that may raise more concerns.

**Revitalizing COPUOS solves great power space conflict – it is the single organization that has enough member states, legitimacy, and empirical success to ensure peace – it stopped the first space race, it can do it again**

**McMillan 7-14-**21

Anne Mcmillan (journalist trained in law, chai tea enthusiast), 7-14-2021, "The final frontier – 21st century space race," International Bar Association, <https://www.ibanet.org/the-final-frontier> , // HW AW

As far as international oversight is concerned, the UN Committee on the Peaceful Uses of Outer Space (COPUOS) is the main forum governing the exploration and use of space. But it has failed to achieve an agreement on the interpretation of the broad concepts outlined in the OST, and legal developments since 1979 have been in the form of soft law guidelines and principles. Perhaps multinational initiatives led by individual states, such as the recent US-sponsored Artemis Accords, signal an alternative route. These envisage a series of bilateral agreements between the US and individual countries in the context of planned future exploration of the Moon, Mars, comets and asteroids. Nacimiento thinks such initiatives could help to develop space law. ‘There is some indication that international space law may develop in a different form, meaning not necessarily within the United Nations Committee on the Peaceful Uses of Outer Space and via multilateral international treaties. The Artemis Accords signed in October 2020 are one very recent example of how space law could develop in the future.’ However, not all states support the US-led initiative and so far the Artemis accords have only been signed by eight countries. Predictably China and Russia are prominent critics, objecting in particular to a suggestion in Artemis to create ‘safety zones’ around national lunar exploration sites, arguing that this amounts to a creeping claim of sovereignty. Nacimiento concedes that the provision for such zones under Artemis ‘could be in conflict with existing international law prohibiting any form of national appropriation of celestial bodies. It remains to be seen how these Accords work in practice and if they develop into generally recognized principles of cooperation.’ Although much of Artemis reflects existing international law, its future is likely to depend on as much as law itself. The mere fact that the process is led by the US seems to have stoked the fires of competing states, with the head of Russia’s space agency dubbing it ‘too US-centric’. Consequently, China and Russia signed an agreement this year to set up a rival system for exploration of the Moon, planning to establish a joint ‘International Lunar Research Station’. This, like the US-led effort, seeks to attract international partners. Monthly number of objects in Earth orbit by object type As China-Russia cooperation increases, Russia-US cooperation is waning. For many years the International Space Station has been a beacon for international cooperation in space, notably as a forum for detente between Russia and the US. However, it will eventually be de-orbited, possibly as soon as 2024, and with its demise will go a touchstone of cooperation between historical rivals. Clearly, events in space exploration have moved on since the 1967 OST which reduced tensions between Russia and the US. But now, with China as a significant new player, we seem to be witnessing a reignition of the space race. ‘The UN, notably its COPUOS, is still the best forum for all discussions on where the OST and the rest of the framework might need further elaboration, interpretation and implementation, comprising basically all the spacefaring nations,’ says von der Dunk. Based on experience, are international bodies helping to reduce friction in space?

**Case**

**nuq – article 2 is about national appropriation ("by claim of sovereignty or occupation") – no ev that private entities would cause the same issues bc countries wont go to war to protect private assets**

**either that or enforcement wont work anyways cuz**

**Turn – limitations on commons access such as private entity restrictions lead to backlash**

**Stang 13**

Gerald Stang (associate fellow at the EUISS) , 2013, "Global Commons: between cooperation and competition" European Institute for security studies, https://www.iss.europa.eu/sites/default/files/EUISSFiles/Brief\_17.pdf, // HW AW

Rapid economic development and increasing international trade are leading to a more crowded international stage and raising new challenges in the ‘global commons’ – those domains that are not under the control or jurisdiction of any state but are **open for use by countries, companies and individuals from around the world**. Their management involves increasingly complex processes to accommodate and integrate the interests and responsibilities of states, international organisations and a host of non-state actors. Shared rules regarding the usage of - and access to - the global commons encourage their peaceful and cooperative use. Over the last seven decades, the US has led in the creation of a liberal international order which has attempted to define these rules in such a way as to make it easier and more beneficial to join the order and follow the rules than it does to operate outside of (or undermine) it. With the rise of nonWestern, less liberal powers - particularly **China - questions must be asked regarding the durability of the existing processes for managing the global commons,** along with the potential for developing effective new processes that can address new threats and challenges. The EU is uniquely positioned to play an important role in giving value to existing multilateral frameworks and in developing new ones for international cooperation in these domains. But with a multitude of competing interests among stakeholders, much work remains to be done. What exactly are the global commons? Security analysts generally identify **four domains as global commons: high seas, airspace, outer space** and, now, cyberspace. From a security perspective, the primary concern is safeguarding ‘access’ to these domains for commercial and military reasons. It is important to highlight that this language differs from the discourse on commons developed by environmental analysts: their arguments focus on damage to the ‘condition’ of the commons from overuse by actors who do not have to pay direct costs. They worry about the depletion of shared resources such as ocean fish stocks, or the damage to shared domains such as Antarctica or the atmosphere. A third strand of analysis looks not at the need for ‘access’ to or preservation of the ‘condition’ of the commons, but at the capacity of the commons to provide ‘global public goods’. As there is no accepted definition of a global public good (a functioning trading system, peace, clean water, electricity, the internet, and many other things are often included), it may be wiser to focus on the four global commons relevant to security analysts mentioned above. While there are major differences between the ‘access’ views of security analysts and the ‘condition’ views of environmentalists, both are concerned about how the Global commons: Between cooperation and competition by Gerald Stang Photo by NASA / Rex Features (1568628a) European Union Institute for Security Studies April 2013 2 rules for use of the commons are set and enforced. In today’s interconnected world, **any limitations on access to the commons would be highly disruptive**. Militaries rely on access to the commons to pursue security goals in domains outside their sovereign control. Economic actors rely on the commons to trade and conduct business. **Changes to the condition of the commons can therefore disrupt commerce and security, not to mention the status of the global environment.** Each of the four commons discussed below possesses unique attributes and poses unique challenges for international cooperation and governance. Sea As the primary avenue for international commerce since ancient times, norms for access to and passage on the seas have developed and evolved over many years. Only in recent decades, however, have there been agreed regulatory frameworks and institutions to manage them. The UN Convention on the Law of the Sea (UNCLOS), first initiated in 1956 though not legally in force until 1994, is the primary international treaty regarding the sea, laying out rules for territorial boundaries (22km from shore), resource management and the rights of states within their exclusive economic zones (370km from shore). The International Tribunal for the Law of the Sea (ITLOS), created by UNCLOS, has the power to resolve disputes by States Parties. Except for the US, most countries and all global powers - including the EU-27 - have signed and ratified UNCLOS. The UN International Migratory Organization (IMO), created in 1948, regulates international shipping and rulings on safety, environmental and technical cooperation issues (the EU has observer status). As the world’s only global sea power, the United States has historically seen itself as the protector of free movement on the seas. With 11 carrier groups (Russia has one, rarely used) and hundreds of naval bases and allied ports throughout the globe, the US has a naval footprint that dwarfs all its allies and competitors. While countries such as Iran and China may be uncomfortable with US capacity to deny others access to the sea, US support for the creation and respect of transparent international regulations for use of the sea (which they adhere to themselves despite not having ratified UNCLOS), has allowed for the stable management of access to the seas. Except for the disruptive (but still rare) threat of piracy, access to the seas is generally a smooth and well-regulated process. The massive and relatively effective, if ad hoc, global response to the localised piracy problem off the coast of Somalia (for which the EU launched Atalanta, its own anti-piracy mission under the CSDP) highlighted the world’s impressive capacity to handle disruptions of this type. Territorial disputes exist in places like the South China Sea, but relate to historical boundary disagreements rather than conflict over rules of sea access. Normally, no state has an interest in disrupting sea trade. Even in times of crisis, while individual states may wish to deny their opponents access to certain regions, they are unlikely to harm their own interests by disrupting traffic on the world’s oceans. Environmental ‘condition’ issues in the sea commons are disconnected from ‘access’ issues. No single international treaty or body addresses pollution, overfishing or the various challenges in the melting Arctic. A confusing patchwork of sea basin cooperation groupings, regional fisheries management organisations and pollution monitoring agreements is in place. The integrated marine policy of the EU recognizes the need to improve governance of the seas while avoiding treaty congestion. While no unifying treaty or body to manage maritime issues is likely to appear, years of patient discussion in a variety of venues (of the type that the EU excels at) may lead to greater coherence and cooperation in managing environmental threats. Air International air travel requires the use of national airspace for continuous transit and involves detailed agreements that define transit rights. The UN International Civil Aviation Organisation, established in 1947, is the leading institution for regulating air travel. All EU countries are members, while the EU has observer status. As with piracy at sea, any potential disruption of access to the air commons is likely to come from non-state actors. While terrorist events can disrupt air traffic, however, intergovernmental cooperation between national police and security agencies is well established. Any systemic threat to the air commons appears so unlikely that some security analysts do not even include air as a one of the commons. Also like the sea commons, issues of management of environmental ‘condition’ are disconnected from ‘access’ issues. The accumulation of greenhouse gases is a form of pollution of the atmosphere, but the alarm stems from their effects on the biosphere rather than from the risk that the atmosphere may become unbreathable or inaccessible. The EU is a global leader on climate change, with the world’s most comprehensive emissions trading scheme and intense efforts to regulate and limit emissions. The Union has set the tone at the international level but has been unable to win agreement for an internal carbon tax or stronger emissions targets from external partners. European Union Institute for Security Studies April 2013 3 Space More than a thousand orbiting satellites facilitate communications in both the military and the civilian spheres, regulated by a mix of UN guidelines, bilater- al Cold War agreements and industry standards. The UN International Telecommunications Union (ITU) allocates radio spectrum and satellite orbits and develops international technical standards. Established in 1869, the ITU has almost universal membership among existing states, including all EU countries - though not the EU itself. The 1967 Outer Space Treaty, signed by all spacefaring nations, provides the minimal framework for activities in space, banning weapons of mass destruction and preventing states from claims to celestial bodies. The Treaty does not establish infrastructure for coordination, and consultation among party states is ad hoc. Following China’s destruction of one of its own satellites in 2007, there has been increasing concern about protection of satellites from attack. During the later stages of the Cold War, the US and the USSR tacitly agreed to a moratorium on testing anti-satellite weapons (ASAT) - but there are no binding rules in place. The satellite’s destruction also created a debris cloud which could have damaged other satellites or spacecraft. Unlike the sea and air domains, the problem of debris management in space indicates an overlap between ‘access’ and ‘condition’ issues. While access to space has previously been limited to a small number of states, **the increasing role of new actors (including from the private sector) suggests that the creation of comprehensive and binding regulations for the space commons may become more difficult.** The EU has pushed to become a key actor in space matters, working with the European Space Agency (ESA) - an intergovernmental body - on Galileo, Europe’s civilian satellite navigation system. In an effort to get ahead of the curve and manage uncertainty, the European Council approved a voluntary Code of Conduct for Outer Space Activities in late 2008 (revised in 2010) to address both space operations and space debris. It has only limited operational requirements but develops important cooperation, consultation, and notification mechanisms. To make it more palatable to the US and other states, it is not binding and has no enforcement mechanism. As with many efforts in multilateral regulation of the global commons, the US has been hesitant to agree to the Code for fear of diminishing its own freedom of manoeuvre. It may be an important step, however, in setting the groundwork for future space cooperation if the EU can follow up on the Code’s development with diplomatic action by bringing other space-faring countries on board. Cyberspace Cyberspace differs from the other commons because it is not a physical domain and because of the preponderant role of the private sector in both the infrastructure and the management of the domain. All of the physical nodes of the internet also exist within states and are subject to national law, rather than existing physically outside of national control as for the other commons. The American and security-related roots of the internet are reflected in how technical internet standards are managed. The Internet Corporation for Assigned Names and Numbers (ICANN), a private non-profit entity under contract with the US government, has ensured the coordination of internet addresses and registries since 1998. While ICANN operations have been stable - and their inclusive governance style has won imitators for handling technical issues - many countries prefer a formal international body to manage technical internet issues. The ITU has been suggested as a neutral management body, but this idea has been resisted by most Western states. Interestingly, non-Western states are pushing for international management of the internet within a framework that provides individual countries with rights and roles, rather than leaving it to the nonprofit sector to decide how the internet works. All EU-27 countries are members of the ITU and, following a European Parliament deliberation, voted as a bloc against the measures granting more power to the ITU, concerned over states wishing to regulate, control, and limit internet use. The UN Internet Governance Forum (IGF) has become the leading multi-stakeholder platform for states and other actors to debate internet governance. Regardless of the ICANN/ITU issue, states can filter and censor within their territories, and for the time being, efforts to protect against cyber attacks remain within the national sphere. Cyberspace allows for the spread of information, creating pressures for transparency in both democratic and non-democratic states. Discussions on the management of cyberspace, therefore, have become connected with those on the power of states to control information. Finally, although there is no environmental constitu- ency for cyberspace, there are constituencies of users and providers - private and public - who play a similar role in pushing for the protection of certain conditions in cyberspace. Unlike for sea and air domains, therefore, there is overlap between ‘access’ and ‘condition’ discussants. With worries about Cold War-style espionage and cyber conflict between states, cyber security problems European Union Institute for Security Studies April 2013 4 QN-AK-13-017-2A-N | ISSN 2315-1110 are expected to grow worse and are unlikely to be addressed through multilateral fora. Problems with hackers of various types make problems of attribution, response and coordination of policing very difficult. Cyber conflict involving states will ebb and flow along with the quality of the relationship between those states and competing states will continue to test each other’s cyber defences.

**Space debris creates existential deterrence and a taboo**

Bowen 18 [(Bleddyn, lecturer in International Relations at the University of Leicester) “The Art of Space Deterrence,” European Leadership Network, February 20, 2018, https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/] TDI

Fourth, the ubiquity of space infrastructure and the fragility of the space environment may create a degree of existential deterrence. As space is so useful to modern economies and military forces, a large-scale disruption of space infrastructure may be so intuitively escalatory to decision-makers that there may be a natural caution against a wholesale assault on a state’s entire space capabilities because the consequences of doing so approach the mentalities of total war, or nuclear responses if a society begins tearing itself apart because of the collapse of optimised energy grids and just-in-time supply chains. In addition, the problem of space debris and the political-legal hurdles to conducting debris clean-up operations mean that even a handful of explosive events in space can render a region of Earth orbit unusable for everyone. This could caution a country like China from excessive kinetic intercept missions because its own military and economy is increasingly reliant on outer space, but perhaps not a country like North Korea which does not rely on space. The usefulness, sensitivity, and fragility of space may have some existential deterrent effect. China’s catastrophic anti-satellite weapons test in 2007 is a valuable lesson for all on the potentially devastating effect of kinetic warfare in orbit.

**Satellite loss shuts down global fracking**

Les **Johnson 13**, Deputy Manager for NASA's Advanced Concepts Office at the Marshall Space Flight Center, Co-Investigator for the JAXA T-Rex Space Tether Experiment and PI of NASA's ProSEDS Experiment, Master's Degree in Physics from Vanderbilt University, Popular Science Writer, and NASA Technologist, Frequent Contributor to the Journal of the British Interplanetary Sodety and Member of the American Institute of Aeronautics and Astronautics, National Space Society, the World Future Society, and MENSA, Sky Alert!: When Satellites Fail, p. 99-105

**Energy**, environment, farming, mining, land use. All of these areas and more **are now inextricably linked to satellite data and would be devastated should that flow of data stop**.

Environmental Monitoring

Oh how complacent we've become. We take for granted that we will have instant images from space showing a volcanic eruption somewhere in the South Pacific within hours of learning that it happened. When the BP oll spill happened in the Gulf of Mexico in 2010, satellite images were used in conjunction with aircraft and ships to monitor the extent and evolving nature of the spill (Figures 10.1 and 10.2).

The data were also used to direct the ships that were attempting to clean up the spill, to warn fishermen of areas in which it would be dangerous to fish, and to generally monitor the extent of the disaster. This is the type of data we get from space in a field known as remote sensing.

Remote sensing is, well, exactly what its name implies. With it, you gather data, or sense, usually in the form of electromagnetic radiation (light), remotely - that is, you are not physically touching what you are looking at. Satellite remote sensing began shortly after we began launching satellites and many industries are now totally dependent upon having the capability.

We use satellites, like the venerable Landsat series, to study the Earth m unprecedented detail. Since 1972, Landsat satellites have taken millions of high resolution images of the Earth's surface, allowing comprehensive studies of how the land has changed due to human intervention (deforestation, agriculture, settlement, etc.) and natural processes (desertification, floods, etc.).

The best way to understand how useful Landsat and similar data can be to governments at all levels is best illustrated by looking at 14then and now" photographs. For example, Africa's Lake Chad has been shrinking for 40 years, as the desert has encroached on this once plentiful inland freshwater lake. Forty years ago, there were about 15,000 square miles of water within the lake. Now, it is less than 500 square miles (Figure 10.3) [1].

And what is the practical side of this particular bit of information?

Governments use this type of satellite imagery to avoid human tragedy. Hundreds of thousands of people, if not millions, depend upon the waters of Lake Chad for agriculture, industry, and personal hygiene. With the lake going dry, how has this impacted on their livelihoods, their families, and their very lives?

The European Space Agency (ESA) is freely providing satellite data to developing countries as they search for new sources of drinking water. For example, ESA assessed data obtained from space over Nigeria to find over 90 new freshwater sources within that country. After ground teams visited the new sites, all were confirmed to contain fresh water. This was no accident. These were satellites with sensors developed for just such purposes in mind [2].

Desertification is but one example of changing climates affecting people's everyday lives. What about more direct observations of our impact on the planet? Figures 10.4 and 10.5 show the scarring of the Earth's surface as a result of surface mining in West Virginia. This is not a polemic against mining; rather, it is an observation that we can use satellite imagery to monitor such mining and be mindful of its impact on the environment.

Other than taking pictures of surface features, like lakes and open pit mines, how are satellites monitoring the Earth's changing climate? In just about every way, by: monitoring global land, sea, and atmospheric temperatures; measuring yearly average rainfall amounts just about everywhere on the globe; measuring glaciation rates; measuring sea surface heights; and more. Remote sensing is more than taking pictures of the Earth in the visible part of the spectrum. We can learn a great deal from looking at part of the spectrum that our eyes cannot see - but our instruments can.

Shown in Figure 10.6 is a composite image of the Earth's surface showing the average land-surface temperature at night. The data came from two NASA satellites, Terra and Aqua, as they orbit the Earth in a polar orbit. (This means that they circle the Earth from top to bottom, passing over both the North and South Poles with each complete orbit.) Terra's orbit is such that it passes from the north to the south across the equator in the morning; Aqua passes south to north over the equator in the afternoon. Taken together, they observe the Earth's surface in its entirety every two days. Data sets such as this exist for just about any day of the year and can show either night-time lows or daytime highs.

By looking in different parts of the spectrum, like the infrared light discussed above, we can make observations as described in Table 10.1.

Pollution Monitoring

As emerging countries industrialize, they also become polluters. Many of these countries are not exactly forthright about releasing air-pollution details to the media, so much of our awareness of the rising pollution there is anecdotal - typically m the form of stories told by people who have visited these countries and seen the extreme pollution at first hand. This, by the way, is not exactly scientific.

Using satellites, and not relying on either the governments in question or second-hand stories, we can accurately assess the pollution levels there and elsewhere. Using satellite images to measure the amount of light absorbed or blocked by fine particulates in the atmosphere, otherwise known as air pollution, you can determine not only what the airborne pollutant might be, but also its size. And, by looking at the overall light blockage, an accurate estimate of the amount of pollution in the air can also be made. Recent studies show that many of these countries are covered in a pollution cloud that countries in the developed world would deem extremely harmful. And how do we know this with scientific certainty? From satellite measurements.

**Energy Production**

The recent boom in the production of shale oil in the **U**nited **S**tates and elsewhere is due in large part to the **identification** and **geolocation** of promising geologic formations for test drilling and fracking. "Fracking" is a somewhat new term that comes from the phrase "hydraulic fracturing". In fracking, massive amounts of previously unusable reservoirs of oil and natural gas are released for capture, sale, and transport from deposits deep within the Earth - many located at least a mile below the surface. In the **U**nited **S**tates alone, there may be as much as 750 trillion cubic feet of natural gas within shale deposits releasable by fracking [3]. How do energy companies know where to look for these deposits? In large part, by analyzing **satellite imagery**.

According to Science Daily (26 February 2009), a new map of the Earth's gravitational field based on satellite measurements makes it **much less resource intensive** to find new oil deposits. The map will be particularly useful as the ice melts in the oil-rich Arctic regions. The easy-to-find oilfields have already been found. To fuel the growing world economy, those harder-to-find deposits must be located and tapped - which is why satellite imagery is **so important**. Take away this and other satellite-dependent techniques of oil and gas exploration and the **world economy will feel the impact** through higher oil and natural gas prices.

**Fracking makes extinction inevitable---try-or die to shut it off**

Rev. Mac **Legerton 18**, Co-Founder and Executive Director of the Center for Community Action, Member of the Board of Directors of the NC Climate Solutions Coalition, Member of the Board of Directors of the Windcall Institute, “Will The U.S. Blaze A Trail To Mass Extinction?”, APPPL News, 1/15/2018, https://www.apppl.org/news/will-the-u-s-blaze-a-trail-to-mass-extinction/

As an elder, I now realize that there is even a **greater threat** to humanity and **life on Earth** than **nuclear war**—though, unlike a nuclear exchange, this threat is a slow-motion catastrophe. Can you guess what it is? Here’s a clue: it is something with which most people don’t have a personal relationship. Tragically, some persons remain in total denial of its validity, much less its present danger. And that’s the problem – that’s why this threat needs to be more seriously addressed on the local, state, national, and international level.

What is it? It’s the slow-motion but **rapidly growing** catastrophe of climate change. There’s now good news amidst this seemingly overwhelming challenge. But the answer may surprise you. Today we know what is the #1 preventable cause of climate change. It’s not coal, it’s not nuclear, and it’s not oil and gasoline. It’s actually the use of the very fuel that is touted as being cleaner, greener, and cheaper than all the rest. This fuel is called “Natural Gas”.

Let’s start with its name – “Natural Gas”. What is “natural gas”? There’s actually nothing “natural” about it when it is forcibly extracted from the ground through hydraulic fracturing, commonly known as “fracking”. When something is forcibly ruptured from deep within the earth with the use of toxic chemicals, the last name you would use for it is “natural”.

Fracking disrupts the geologic fault lines causing **earthquakes**, uses millions of gallons of **fresh water** that becomes permanently poisoned by unknown, **cancer-producing chemicals** added to it, creates **air pollution** during the drilling process, increases the risk of injury and explosions, raises major health risks to both people and place in close proximity to it, and changes the nature of both neighborhoods and landscapes. Fracking also leaves a **massive carbon footprint** of drilling wells as deep as 8,000 feet and then drilling horizontally over 10,000 feet; On top of all this, it **leaks** major amounts of gas into the **environment**.

So, what is this gas? It is 90-95% methane gas which is a hydrocarbon compound made up of one carbon atom and four hydrogen atoms (CH4). It releases carbon into the atmosphere and produces carbon dioxide (C02) just like coal does when it is burned. Methane is not its trace element–it is its undisputed compound of this fossil fuel product. If a compound is 90-95% of a product, it makes sense to call it by that name. Doesn’t it? Well, actually not if you want people to believe and think that it is something that it is not. It is un-natural methane gas produced under massive and highly toxic pressure and hazardous conditions.

Now that we know what this gas is, what does it do to the atmosphere and climate that is so dangerous? This hydrocarbon has properties that block the radiation of heat from Earth’s surface 100 times more effectively than CO2 (released from burning coal) during its first 10 years of release and 86 times more effectively in its first 20 years. Because of the climate emergency underway, the first 10 or 20 years matter most.

When utility companies and the larger fossil fuel companies state that they are committed to lowering carbon emissions, this just isn’t true. They are **radically escalating** the **most dangerous and worst of all** fossil fuels in relation to its impact on the climate. Now the industry wants to expand production of methane gas all over the world by calling it “the most environmentally friendly fossil fuel”and a “bridge fuel” that we can safely use until we transition to 100% renewable energy sources.

Why would a major business industry want to call its product by another name? Perhaps for the same reason that the tobacco industry did not like the term “coffin nails” or “cancer sticks” for cigarettes. Honestly, there’s a striking similarity between what are called cigarettes and natural gas. When both were produced and named, their harm was not fully known. Once the industries promoting them learned of their significant harm, they did everything they could to hide this knowledge from the public. They even hired scientists to deny their dangers. The tobacco industry was eventually sued, the truth was acknowledged, and billions of dollars were paid out in the tobacco settlement.

This same scenario that occurred with the tobacco industry needs to occur with methane gas and the fossil fuel industry. The major difference in these two scenarios is that that this fossil fuel product doesn’t just threaten the lives of individuals who voluntarily breathe it in – it threatens the lives of not only every human being, but also **all life on the planet**. The outcome of this scenario needs to be a moratorium and eventual **end** to all use of methane gas as an energy source. For the sake of all of us, our communities, and **world**, the sooner the better. This abomination is different. There is no time to waste.

**Satellites are crucial for large, industrial megafarms**

Les **Johnson 13**, Deputy Manager for NASA's Advanced Concepts Office at the Marshall Space Flight Center, Co-Investigator for the JAXA T-Rex Space Tether Experiment and PI of NASA's ProSEDS Experiment, Master's Degree in Physics from Vanderbilt University, Popular Science Writer, and NASA Technologist, Frequent Contributor to the Journal of the British Interplanetary Sodety and Member of the American Institute of Aeronautics and Astronautics, National Space Society, the World Future Society, and MENSA, Sky Alert!: When Satellites Fail, p. 106

Agriculture

To feed the Earth's growing population affordably, farming has gone from a **mostly decentralized, family-owned business** to **corporate farming** on a **scale** never before imagined. These **industrial megafarms** are a primary reason that many people in the world can enjoy plentiful and varied foods at a reasonable cost. On this scale, deciding what crop to plant in a given field is not just business - it's science. And the science **relies**, in large part, on **data from space**.

Companies such as the Satellite Imaging Corporation (SIC) provide data from space on overall crop health, soil analysis, and irrigation impacts and efficiencies. From space, you can easily map soil variations, finding areas rich in organic matter and others less so - this allows optimized planting to take advantage of crops that thrive in any given soil environment. **Very large** farms also use satellite images to assess the overall health of their crops by land area, spotting those that are being impacted by non-optimal soil moisture content, etc., allowing the farmer to take corrective action while there is still time to save the crop.

**Industrial ag’s unsustainable and causes extinction**

Alice **Friedemann 17**, Systems Architect and Engineer For Over 25 Years, Science, Energy, and Agriculture Writer, Investigative Journalist and Energy Expert, Founder of Energy Skeptic, Author of When Trucks Stop Running: Energy and the Future of Transportation, “Chemical Industrial Agriculture is Unsustainable. Here’s Why”, Resilience, 5-27, http://www.resilience.org/stories/2017-03-27/chemical-industrial-farming-unsustainable-heres/

We hear a lot about how we’re running out of antibiotics. But we are also doomed to run out of pesticides, because insects **inevitably** develop resistance, whether toxic chemicals are sprayed directly or genetically engineered into the plants.

Worse yet, weeds, insects, and fungus develop resistance in **just 5 years** on average, which has caused the chemicals to grow increasingly lethal over the past 60 years. And it takes on average eight to ten years to identify, test, and develop a new pesticide, though that isn’t long enough to discover the long-term toxicity to humans and other organisms.

And this devil’s bargain hasn’t even provided most of the gains in crop yields, which is due to natural-gas and phosphate fertilizers plus soil-crushing tractors and harvesters that can do the work of millions of men and horses quickly on farms that grow only one crop on thousands of acres.

Yet before pesticides, farmers lost a third of their crops to pests, after pesticides, farmers still lose a third of their crops.

Even without pesticides, **industrial agriculture is doomed to fail** from extremely high rates of soil erosion and soil compaction at rates that far exceed losses in the past, since soil couldn’t wash or blow away as easily on small farms that grew many crops.

But pest killing chemicals are surely **accelerating the day of reckoning** sooner rather than later. Enormous amounts of toxic chemicals are dumped on land every year — over **1 billion pounds** are used in the United State (US) every year and 5.6 billion pounds globally (Alavanja 2009).

This **destroys the very ecosystems** that used to help plants fight off pests, and is a **major factor** biodiversity loss and **extinction**.

Evidence also points to pesticides playing a **key role in the loss of bees** and their pollination services. Although paleo-diet fanatics won’t mind eating mostly meat when fruit, vegetable, and nut crops are gone, they will not be so happy about having to eat more carbohydrates. Wheat and other grains will still be around, since they are wind-pollinated.

Agricultural chemicals **render land lifeless** and toxic to beneficial creatures, also **killing the food chain above** — fish, amphibians, birds, and **humans** (from cancer, chronic disease, and suicide).

Surely a day is coming when pesticides stop working, resulting in **massive famines**. But who is there to speak for the grandchildren? And those that do speak for them are mowed down by the logic of libertarian capitalism, which only cares about profits today. Given that a political party is now in power in the U.S. that wants to get rid of the protections the Environmental Protection Agency (EPA) and other agencies provide, may make matters worse if agricultural chemicals are allowed to be more toxic, long-lasting, and released earlier, before being fully tested for health effects.

Meanwhile chemical and genetic engineering companies are making a fortune, because the farmers have to pay full price, since the pests develop resistance long before a product is old enough to be made generically. Except for glyphosate, but weeds have developed resistance. Predictably.

In fact, the inevitability of resistance has been known for nearly seven decades. In 1951, as the world began using synthetic chemicals, Dr. Reginald Painter at Kansas State University published “Insect Resistance in Crop Plants”. He made a case that it would be better to understand how a crop plant fought off insects, since it was inevitable that insects would develop genetic or behavioral resistance. At best, chemicals might be used as an emergency control measure.

Farmers will say that we simply must carry on like this, there’s no other choice. But that’s simply not true.

Consider the corn rootworm, that costs farmers about $2 billion a year in lost crops despite spending hundreds of millions on chemicals and the hundreds of millions of dollars chemical companies spend developing new chemicals.

To lower the chances of corn pests developing resistance, corn crops were rotated with soybeans. Predictably, a few mutated to eat soybeans plus changed their behavior. They used to only lay eggs on nearby corn plants, now they disperse to lay eggs on soybean crops as well. Worse yet, corn is more profitable than soy and many farmers began growing continuous corn. Already the corn rootworm is developing resistance to the latest and greatest chemicals.

But the corn rootworm is not causing devastation in Europe, because farms are smaller and most farmers rotate not just soy, but wheat, alfalfa, sorghum and oats with corn (Nordhaus 2017).

Before planting, farmers try to get rid of pests that survived the winter and apply fumigants to kill fungi and nematodes, and pre-emergent chemicals to reduce weed seeds from emerging. Even farmers practicing no-till farming douse the land with herbicides by using GMO herbicide-resistant crops. Then over the course of crop growth, farmers may apply several rounds of additional pesticides to control different pests. For example, cotton growers apply chemicals from 12 to 30 times before harvest.

Currently, the potential harm is only assessed for 2 to 3 years before a permit is issued, even though the damage might occur up to 20 years later.

Although these chemicals appear to be just like antibiotics, that isn’t entirely true. We develop some immunity to a disease after antibiotics help us recover, but a plant is still vulnerable to the pests and weeds with the genetics or behavior to survive and chemical assault.

Although there are thousands of chemical toxins, what matters is how they kill, their method of action (MOA). For herbicides there are only 29 MOAs, for insecticides, just 28. So if a pest develops resistance to one chemical within an MOA, it will be resistant to all of the thousands of chemicals within that MOA.

The demand for chemicals has also grown due the high level of bioinvasive species. It takes a while to find native pests and make sure they won’t do more harm than good. In the 1950s there were just three main corn pests. By 1978 there were 40, and they vary regionally. For example, California has 30 arthropods and over 14 fungal diseases to cope with.

When I was learning how to grow food organically back in the 90s, I remember how outraged organic farmers were that Monsanto was going to genetically engineer plants to have the Bt bacteria in them. This is because the only insecticide organic farmers can use is Bt bacteria, because it is found in the soil. It’s natural. Organic farmers have been careful to spray only in emergencies so that insects didn’t develop resistance to their only remedy. Since 1996, GMO plants have been engineered to have Bt in them, and predictably, insects have developed resistance. For example, in 2015, 81% of all corn was planted with genetically engineered Bt. But corn earworms have developed resistance, especially in North Carolina and Georgia, setting the stage for damage across the nation. Five other insects have developed resistance to Bt as well.

GMO plants were also going to reduce pesticide use. They did for a while, but not for long. Chemical use has increased 7% to 202,000 tons a year in the past 10 years.

Resistance can come in other ways than mutations. Behavior can change. Cockroach bait is laced with glucose, so cockroaches that developed glucose-aversion now no longer take the bait.

It is worth repeating that chemicals and other practices are ruining the long-term viability of agriculture. Here is how author Dyer explains it:

“Ultimately the practice of modern farming is **not sustainable**” because “the damage to the soil and natural ecosystems is so great that farming becomes dependent not on the land but on the artificial inputs into the process, such as fertilizers and pesticides. In many ways, our battle against the diverse array of pest species is a battle against the health of the system itself. As we kill pest species, we also kill related species that may be beneficial. We kill predators that could assist our efforts. We reduce the ecosystem’s ability to recover due to reduced diversity, and we interfere with the organisms that affect the biogeochemical processes that maintain the soils in which the plants grow.

Soil is a complex, multifaceted living thing that is far more than the sum of the sand, silt, clay, fungi, microbes, nematodes, and other invertebrates. All biotic components interact as an ecosystem within the soil and at the surface, and in relation to the larger components such as herbivores that move across the land. Organisms grow and dig through the soil, aerate it, reorganize it, and add and subtract organic material. Mature soil is structured and layered and, very importantly, it remains in place. Plowing of the soil turns everything upside down. What was hidden from light is exposed. What was kept at a constant temperature is now varying with the day and night and seasons. What cannot tolerate drying conditions at the surface is likely killed. And very sensitive and delicate structures within the soil are disrupted and destroyed.

Conventional tillage disrupts the **entire soil ecosystem**. Tractors and farm equipment are large and heavy; they compact the soil, which removes air space and water-holding capacity. Wind and water erosion remove the smallest soil particles, which typically hold most of the micronutrients needed by plants. Synthetic fertilizers are added to supplement the loss of oil nutrients but often are relatively toxic to many soil organisms. And chemicals such as pre-emergents, fumigants, herbicides, insecticides, acaricides, fungicides, and defoliants eventually kill all but the most tolerant or resistant soil organisms. It does not take long to reduce a native, living, dynamic soil to a relatively **lifeless collection** of inorganic particles with little of the natural structure and function of undisturbed soil”.

When I told my husband all the reasons we use agricultural chemicals and the harm done, my husband got angry and said “Farmers aren’t stupid, that can’t be right!”

I think there are a number of reasons why farmers don’t go back to sustainable organic farming.

First, there is far too much money to be made in the chemical herbicide, pesticide, and insecticide industry to stop this juggernaut. After reading Lessig’s book “Republic, Lost”, one of the best, if not the best book on campaign finance reform, I despair of campaign financing ever happening. So chemical lobbyists will continue to donate enough money to politicians to maintain the status quo. Plus the chemical industry has infiltrated regulatory agencies via the revolving door for decades and is now in a position to assassinate the EPA, with newly appointed Scott Pruitt, who would like to get rid of the EPA.

Second, about half of farmers are hired guns. They don’t own the land and care about passing it on in good health to their children. They rent the land, and their goal, and the owner’s goal is for them to make as much profit as possible.

Third, renters and farmers both would lose money, maybe go out of business in the years it would take to convert an industrial monoculture farm to multiple crops rotated, or an organic farm.

Fourth, it takes time to learn to farm organically properly. So even if the farmer survives financially, mistakes will be made. Hopefully made up for by the higher price of organic food, but as wealth grows increasingly more unevenly distributed, and the risk of another economic crash grows (not to mention lack of reforms, being in more debt now than 2008, etc).

Fifth, industrial farming is what is taught at most universities. There are only a handful of universities that offer programs in organic agriculture.

Sixth, subsidies favor large farmers, who are also the only farmers who have the money to profit from economies of scale, and buy their own giant tractors to farm a thousand acres of monoculture crops. Industrial farming has driven 5 million farmers off the land who couldn’t compete with the profits made by larger farms in the area.

But farmers will have to go organic **whether they like it or not**

It’s hard to say whether this will happen because we’ve **run out** of pesticides, whether from **resistance** or a **financial crash** reducing new chemical research, or whether peak oil, peak coal, and peak natural gas will cause the decline of chemical farming. Agriculture uses about 15 to 20% of fossil fuel energy, from natural gas fertilizer, oil-based chemicals, farm vehicle and equipment fuel, the agricultural cold chain, distribution, packaging, refrigeration, and cooking to name a few of the uses.

At some point of fossil decline, **there won’t be enough fuel or pesticides** to continue business as usual.

Farmers will be **forced** to go organic at some point. Wouldn’t it be easier to start the transition **now**?

**Loss of satellites shuts down drones**

Daniel **Ventre 11**, Engineer for CNRS and Researcher for CESDIP, Cyberwar and Information Warfare, p. 198-199

The introduction of cyberspace operations is part of a specific context; a major evolution in the operation environment and the nature of the conflicts, which make irregular wars the rule, and make regular actors the exception to the rule. But the battle against unconventional, non-state governed, irregular actors raises specific problems: there are multiple actors, unpredictable at that, who do not abide by the same rules. New orders in conflicts are imposing the implementation of an ever more important need for information, and information collection and processing. Networks now have an **incredible importance**. The document refers to the growing threats against American heritage: the USA is a target and the increasing amount of attacks against their networks is indeed the proof of this. There are many obstacles which need to be removed before they can achieve real superiority and freedom to act, especially as vulnerable points may originate within the very operations of the armed forces. An example of this is the vulnerability of using products (software and hardware), commercial products (off-the-shelf), and sometimes even foreign products123. This brings to mind the fact that the US Air Force uses commercial, even foreign, applications for its cyberspace operations.

Information space extends to space124, particularly via communication and observation satellites125. Satellites are the keystone to the cyberspace and communication systems, but also the security system: monitoring (Echelon network is the symbol), observation, communication. These are at the heart of the C4ISR systems, without which a concept such as network-centric warfare could not exist. **There would be no drones without satellites**. It is even a question of extending the Internet to extra-atmospheric space. Projects in this vein (Interplanetary Networks) were being formed in the 1990s, but ran into several technical difficulties (delays in important transmissions due to high distances and costs) [GEL 06]. NASA dedicates a few pages on its website to this project126. The development of communication systems based on the infrastructures in extra-atmospheric space will also raise questions for legal, geopolitical and geostrategic domains: questions of seizing this space, questions of regulation of human activity in this space, of sovereignty, new territoriality and independence.

**Drone prolif is inevitable and causes global nuclear war**

Dr. Michael C. **Horowitz 19**, Professor of Political Science at University of Pennsylvania, NDT Champion from Emory University, PhD in Government from Harvard University, Adjunct Senior Fellow at the Center for a New American Security, “When Speed Kills: Autonomous Weapon Systems, Deterrence, and Stability”, 5/2/2019, https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=3348356

Thus, the reason to deploy autonomous systems would have to be their reliability and effectiveness rather than signaling. And giving up human control to algorithms in a crisis that could end with **global nuclear war** would require an extremely high level of perceived reliability and effectiveness. Few things are more important to militaries in crisis situations than informational awareness and control over decisions, and there might be fear that autonomous systems are prone to **accidents**.

This counterfactual illustrates that the development and deployment of lethal autonomous weapon systems by national militaries, if it occurs, is unlikely to have simple, easy, and linear consequences. Instead, human factors, including the psychological desire for control and organizational politics, will strongly shape how militaries think about developing and using LAWS. This will not just influence the potential for arms races in peacetime, but deterrence and wartime stability due to the organizational processes militaries implement for the deployment and use of autonomous systems on the battlefield.

This paper draws on research in strategic studies and examples from military history to assess how LAWS could influence the development and deployment of military systems, including **arms races**, **crisis stability**, and wartime stability, especially the risk of **escalation**. It also discusses the potential for arms control. It focuses on these questions through the lens of key characteristics of LAWS, especially the potential for increased operational speed and, simultaneously, less human control over battlefield choices. One of the primary attractions of autonomous systems, even compared to remotely piloted systems, is the potential to operate at machine speed. Another potential benefit is the possibility of machine-like accuracy in following programming, but that comes with a potential downside: the loss of control and the accompanying risk of **accidents**, adversarial **spoofing**, and **miscalculation**. Even if LAWS malfunction at the same rate as humans in a given scenario, the ability of operators to control the impact of those malfunctions may be lower, which could make LAWS less predictable on the battlefield. The paper then examines how these issues interact with the large uncertainty parameter associated with AI-based military capabilities at present, both in terms of the range of the possible and the opacity of their programming.

The results highlight several critical issues surrounding the development and deployment of LAWS.1 First, the desire to fight at machine speed with autonomous systems, while making a military more effective in a conflict, could increase **crisis instability**. As countries fear losing conflicts faster, it will generate **escalation pressure**, including an increased incentive for **first strikes**. Second, in addition to the actual risk of accidents and miscalculation from LAWS, the fear of accidents and losing control of autonomous systems could limit the willingness of militaries to deploy them, particularly since many militaries are conservative when it comes to emerging technologies and have high standards for system reliability. Third, the dual-use, or even general purpose, character of the basic science underlying many autonomous systems will make the technology hard to control, giving many countries and actors access to basic algorithms, though whether this is described as diffusion, proliferation, or an arms race will depend on political dynamics as much as anything.

Finally, multiple uncertainty parameters concerning lethal autonomous weapon systems could exacerbate **security dilemmas**.

Uncertainty over the range of the possible concerning the programming of lethal autonomous weapon systems will increase fear of those systems in the near term, making restraint less likely for competitive reasons. Moreover, the inherent differences between remotely piloted systems and LAWS at the platform level come from software, not hardware. There is arguably an inherent opacity to lethal autonomous weapon systems. If an arms race over lethal autonomous weapon systems occurs, it will likely be because of worse-case assumptions about capability development by potential adversaries.

What is Autonomy or Artificial Intelligence?

Artificial intelligence is the use of computing power, in the form of algorithms, to conduct tasks that previously required human intelligence.2 Artificial intelligence in this context is best thought of as an umbrella technology or enabler, like the combustion engine or electricity. Military applications of artificial intelligence are potentially broad – from image recognition for surveillance to more efficient logistics to battle management.3 These include both non-kinetic applications, including in the cyber realm, as well as kinetic applications.4 One potential application of artificial intelligence is through armed autonomous systems that could be deployed on the battlefield, or what are most popularly called lethal autonomous weapon systems or lethal autonomous weapon systems. This differs from remotely-piloted systems where a human, though at a distance, still operates a given vehicle or system.

What is a lethal autonomous weapon system? While simple to describe on first glance, and easy to understand in the extreme – an armed humanoid robot with extremely broad programming making decisions about engaging in warfare – drawing the line between a lethal autonomous weapon system and other weapon systems is complex. In Directive 3000.09, published in 2012, the US Department of Defense defines an autonomous weapon as “A weapon system that, once activated, can select and engage targets without further intervention by a human operator.”5 What it means to select and engage a target is not entirely clear, however. For example, homing munitions, which have existed since World War II, select and engage targets, according to a common sense understanding of the terms.6

Exactly what functions are autonomous also matters. A system could have automatic piloting, for example, that flies or drives a platform to a target, but still have complete human control over the use of the weapon. That would be a system with a high level of automation, though not a lethal autonomous weapon system according to most perspectives. Heather Roff measures the level of autonomy in a weapon system based on three subcomponents: self-mobility, self-direction, and self-determination. This helps distinguish systems where there might be autonomy concerning the best way a missile should get to a target, but the target itself is designated by a person fromsystems where an algorithm might be making higher-level engagement decisions.7 There are already some applications of limited machine autonomy in military systems, with the most prominent example being the automatic mode present on many Close-In Weapon Systems (CIWS), such as the Phalanx, used to defend ships and incoming missiles from attack.8

This article will not resolve the definitional debate surrounding lethal autonomous weapon systems, which is still ongoing in meetings of the Group of Governmental Experts focused on lethal autonomous weapon systems in the United Nations Convention on Certain Conventional Weapons. Provisionally, this article adopts the Scharre and Horowitz definition that a lethal autonomous weapon system is “[A] weapon system that, once activated, is intended to select and engage targets where a human has not decided those specific targets are to be engaged.”9 However, moving beyond the close cases (e.g. particular types of missile guidance systems) and considering those weapon systems that clearly use machine intelligence to search for, select, and/or engage targets can help clarify what is at stake in this debate in the first place.10 After all, if most militaries most of the time would not have any need for lethal autonomous weapon systems, or those systems have significant disadvantages relative to remotely-piloted military robotics or soldiers on the battlefield, the stakes are lower. In contrast, if the integration of machine intelligence with military systems could give countries or violent non-state actors a significant advantage in how they employ force, it becomes even more crucial to engage the topic.

It is important to note that this article does not address concerns about existential risk related to artificial general intelligence – the fear that a superintelligence could decide to destroy the human race, either because it decides humans are malign or because humans program it to achieve a goal it can only accomplish by destroying humans.11 The existential risk issue associated with artificial intelligence is not necessarily closely coupled to military applications of artificial intelligence. If a super-intelligent machine learning system has the ability to take over human society in the interest of a goal – any goal – whether autonomous systems at much smaller orders of magnitude already exist in military systems will likely be unimportant. The super-intelligent system would simply create what it needed.

Why Invest in Autonomous Systems?

Militaries are already increasing their investments in remotely-piloted robotic systems. From UAVs such as the MQ-9 Reaper (**U**nited **S**tates) to uninhabited surface vehicles (USVs) such as the Guardium (**Israel**) to uninhabited ground vehicles (UGV) such as Platform-M (**Russia**), militaries **around the world** are investing in remotely piloted platforms, some of which can carry weapons. In these systems, human control over the use of force is not fundamentally different from the use of force with inhabited systems. In some cases, such as the MQ-9 Reaper, the sensor system a drone pilot uses to launch a weapon might even be the same sensor system a pilot in the cockpit of an inhabited fighter uses. Using remotely piloted systems gives militaries the ability to reduce the risk to their own soldiers while still projecting power in similar ways to how they used force previously.12 The first places militaries are likely to use kinetic lethal autonomous weapon systems include relatively “clear” environments such as air-to-air combat or naval combat, especially in geographic arenas where civilians are extremely unlikely to be present.13

**Loss of satellites will shut down terrestrial mining**

Les **Johnson 13**, Deputy Manager for NASA's Advanced Concepts Office at the Marshall Space Flight Center, Co-Investigator for the JAXA T-Rex Space Tether Experiment and PI of NASA's ProSEDS Experiment, Master's Degree in Physics from Vanderbilt University, Popular Science Writer, and NASA Technologist, Frequent Contributor to the Journal of the British Interplanetary Society and Member of the American Institute of Aeronautics and Astronautics, National Space Society, the World Future Society, and MENSA, Sky Alert!: When Satellites Fail, p. 105

Resource Location

Looking for rare minerals to be mined for our many gadgets, household appliances, and industrial machines? Soil type is often a strong indicator of whether or not underground deposits of metals and minerals are located. By **using satellite data** to identify promising surface structural features and different soil types, mining companies can **better identify promising mining locations**, **wasting less time and effort** in finding the best places to obtain much-needed industrial resources. **Without** satellite images, the finding and assessment of promising new mines would **grind to a halt** as the industries **retooled** back into the days of **much slower and labor-intensive field surveys** (but **without GPS!**).

**Amazon mining will cause extinction**

Charito **Ushiñahua 11**, Anthropologist Working for the Preservation of Indigenous Amazonian Cultures, “Yanomami Indians: The Fierce People?”, http://www.amazon-indians.org/yanomami.html

A mineralogical survey of the northern Amazon by the Brazilian government in 1975 revealed the presence of gold ore in the Roraima region of Brazil. By the early 1980's, miners in search of gold began invading the Yanomami territory in Brazil and by 1987 it had become a full-fledged gold rush. Over 30,000 prospectors entered Yanomami lands and established over a hundred clandestine mining operations. The resulting massacres and diseases brought by these invaders is estimated to have caused the death of over 2,000 Yanomami. One of the problems with gold mining is the **environmental destruction** it causes. In order to separate gold from rocks and soil, mercury is used. Mercury in the rivers and streams **bio-accumulates** and permeates the entire **ecosystem**. The mercury accumulates in predators and hunters (such as the Yanomami) higher up the food chain and creates a neurotoxin that causes birth defects and abnormal child development. The Yanomami have had increased child mortality rates while their birth rates have declined putting their very existence into risk. Moreover, malaria increased in the area due to the stagnant pools left by the miners that increase the mosquito populations that are vectors of the disease. Some have estimated that malaria is responsible for the deaths of about 13% of the Yanomami population every year. However, the negative influence of the miners extends beyond physical health. Their introduction of alcohol and other western goods has had an immense negative effect on Yanomami society itself.

In response to the crisis created by the gold miners, in 1992 the Yanomami territory was protected by the Brazilian government by creating a federal indigenous reserve. However, the gold miners were not happy about the creation of the reserve and in July, 1993, a group of miners tried to exterminate an entire village in what has become to be known as the "Haximu Massacre." At lease 16 Yanomami were killed in what many have called genocide. Some of the miners were tried and convicted and after numerous appeals on the 7th of August, 2006 the Brazilian Supreme Federal Court reaffirmed that the crime known as the Haximu Massacre and upheld the ruling sentencing the miners to 19 years in prison for genocide. However, to this day there is political pressure by the mining industry to reduce the Yanomami territory and allow commercial mining operations on their lands.

In the year 2000, a journalist named Patrick Tierney published a book called, "Darkness in El Dorado," and accused anthropologist Napoleon Chagnon and his colleague geneticist James Neel of numerous misdeeds, among them intentionally creating an epidemic of measles among the Yanomami people in order to study the effects of natural selection on primitive societies. Tierney states that the resulting epidemic caused the death of hundreds of Yanomami. Incredibly, Tierney charged that the experiments were funded by the US Atomic Energy Commission, who sought to model the societal consequences of mass mortality caused by nuclear war. In addition to the measles epidemic, Tierney charged that Chagnon mischaracterized the Yanomami as "The Fierce People" when in fact it was Chagnon who was causing the violence by introducing enormous amounts of western goods such as machetes into the Yanomami society, thus stimulating warfare over the introduced goods. Tierney also accused Chagnon of fraud by staging films, such as "The Axe Fight" that he helped produce. The journalist charged that the anthropologist prescripted the films and that they were not spontaneous as portrayed.

Tierney's book caused an uproar in the anthropological community and the American Anthropological Association (AAA) got involved in the debate. In fact, the AAA convened a special commission to investigate the allegations against Chagnon and Neel. The report by the AAA issued in May, 2002 exonerated the anthropologist and geneticist from causing a measles epidemic among the Yanomami. Nonetheless, the AAA criticized some aspects of Chagnon's research, including his portrayal of the Yanomami as "The Fierce People," and his bribing of Venezuelan officials. However, the AAA debate was not over and three years later in June, 2005 they rescinded the acceptance of the 2002 report.

As someone who is working to support indigenous people, I would like to point out that over the many years since publishing his first book on the Yanomami (whose revenues made him a millionaire), Chagnon has failed to bring significant aid to the Yanomami people. In fact, he sought to damage the indigenous movement by publicly criticizing Davi Kopenawa, a Yanomami activist who helped establish the Yanomami reserve in Brazil. One might ask if it was proper behavior for an anthropologist to hurt the efforts of an indigenous Amazonian activist attempting to defend his people. Interestingly, the Yanomami leader Davi Kopenawa has predicted the destruction of the entire human race if the Amazon Rainforest is destroyed. Kopenawa states, "The forest-land will only die if it is destroyed by whites. Then, the creeks will disappear, the land will crumble, the trees will dry and the stones of the mountains will shatter under the heat. The xapiripë spirits who live in the mountain ranges and play in the forest will eventually flee. Their fathers, the shamans, will not be able to summon them to protect us. The forest-land will become dry and empty. The shamans will no longer be able to deter the smoke-epidemics and the malefic beings who make us ill. And so everyone will die." Many ecologists seem to agree with Kopenawa, believing that the Amazon Rainforest are the **"lungs of the Earth"** and that if the Amazon is destroyed, it will cause a **global ecological disaster** resulting in the eventual **destruction of the human race**.

**Antarctic mining causes conflict---goes nuclear**

David W. **Floren 1**, J.D. from the University of Oregon, “Antarctic Mining Regimes: An Appreciation of the Attainable”, Journal of Environmental Law and Litigation, Fall, Volume 16, Number 2, 467-513

Concern for the quality of the environment provides a great reason for a mining moratorium, but additional justifications exist. Critics of CRAMRA worry about Antarctica becoming a "scene [or] object of international discord." n221 Largely ignored in the ATS debate is the real danger an introduction of **mining** and fossil fuel facilities and infrastructure would pose to the integrity of the peacekeeping goals of the ATS. n222 Such facilities and their transportation mechanisms (pipelines, tankers, etc.) will be **important targets** for destruction or seizure during any armed conflict involving any nation reliant on Antarctic mineral and fossil fuel resources. Article I bans, "inter alia, any measures of a military nature, such as the establishment of military bases and fortifications, the carrying out of military maneuvers, as well as the testing of any type of weapons." n223 Although mining qua mining is clearly not military in nature, the simple existence of mining facilities necessarily entails certain consequences. The history of armed conflict shows the increasingly vital role played by mineral and energy resource facilities in sustaining wartime economies. n224 Such facilities have always been selected as priority targets in military planning and strategy sessions, and the absence of major civilian targets in Antarctica further emphasizes the focus on mining facilityes. Target status is inseparable from the existence of productive mining and fossil fuel facilities, n225 and target priority grows with [\*504] distance from large human population centers. n226 Compounding this problem is the possibility that **nuclear weapons might be used**. The remoteness and inaccessibility of targets in the AT Area, n227 combined with the tiny number of anticipated human casualties boosts the likelihood that tactical nuclear weaponry would be engaged to achieve top military priorities, despite AT obligations n228 and other international accords discouraging their use. n229

**Satellites drive poppy eradication**

Xiangyu **Liu 18**, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences and University of Chinese Academy of Sciences, et al., “Opium Poppy Detection Using Deep Learning”, Remote Sensing, Volume 10, Number 12, https://www.mdpi.com/2072-4292/10/12/1886/htm

5. Conclusions

Using satellite remote sensing has become a **mainstream approach** for **monitoring** poppy cultivation. However, **identifying** the location of poppy parcels and **mapping** their spatial distribution are of **great practical significance** for local governments making and implementing **eradication plans**. In order to obtain the specific location coordinates of poppy parcels, we used deep learning-based object detection to detect the location of target poppy parcels in remote sensing images and obtain a spatial distribution map of the poppy growing area. We also compared and analyzed the model performance in different situations using verification areas in Phongsali. It was found that for the region in Phongsali, our method can not only detect poppy parcel locations with a higher precision and recall (95% and 85%, respectively), it also performs well on other types of satellite images and at other spatial resolutions. Compared to existing monitoring methods, our work has three unique points: (1) it can obtain the specific location coordinates of poppy parcels by automatic feature extraction from training data; (2) it provides a quantitative analysis of prediction performance for different parameters; and (3) it performs well on **satellite** images of different types and varying spatial resolution. In future work, our detection method will be utilized to monitor poppy parcels in different areas, and more experiments will be conducted to verify the applicability of our model to other types of satellite images.

**That crushes Afghan stability**

Dr. Vanda Felbab-**Brown 17**, Senior Fellow in the Center for 21st Century Security and Intelligence in the Foreign Policy Program at Brookings, PhD in Political Science from MIT, “Afghanistan’s Opium Production is Through The Roof—Why Washington Shouldn’t Overreact”, Brookings Report, 11/21/2017, https://www.brookings.edu/blog/order-from-chaos/2017/11/21/afghanistans-opium-production-is-through-the-roof-why-washington-shouldnt-overreact/

The diversity of the Taliban’s income portfolio is has important implications for counternarcotics and counterinsurgency strategies, especially since eliminating the Taliban’s financial base through counternarcotics efforts is often seen as a key element of the counterinsurgency strategy. There is simply no easy way to bankrupt the Taliban by wiping out the opium poppy economy. And as discussed below, any such move would be **disastrous** for the counterinsurgency efforts.

There is simply no easy way to bankrupt the Taliban by wiping out the opium poppy economy.

The Taliban is not the only group profiting from the opiate business in Afghanistan. So are various criminal gangs, which often are connected to the government, the Afghan police, tribal elites, and many ex-warlords-cum-government-officials. Many of these powerbrokers are also key anti-Taliban counterinsurgency actors, including in the north of the country where opium too has expanded.

NO MAGIC BULLET

Most counternarcotics measures adopted since 2001 have been ineffective or counterproductive economically, politically, and with respect to counterinsurgency and **stabilization efforts**.

Eradication and bans on opium poppy cultivation, often borne by the poorest and most socially marginalized, have **generated extensive political capital for the Taliban** and **undermined counterinsurgency**. They **sparked provincial revolts**, **alienated the rural population** from the Afghan government, and **drove the rural population into Taliban hands**. The Taliban presented itself as a protector of the people’s poppies and cast the Afghan government and its international sponsors as apostates and infidels trying to kill the Afghan people with hunger.

The Obama administration’s decision to defund centrally-led eradication was a courageous break with U.S. counternarcotics dogma, and such a policy is still correct today. Aerial spraying would be the only way to do any large-scale eradication since manual eradication teams have been attacked. That would be **disastrous** from the counterinsurgency perspective, since it would **cement** the Taliban’s political capital rather than bankrupting it. Eradication never bankrupted insurgents anywhere, not even in Colombia. Nor is it sustainable without an end to conflict.

**Global nuclear war**

Caroline **Wadhams 14**, Senior Fellow at the Center for American Progress, Senior Advisor in the Office of the Quadrennial Diplomacy and Development Review (QDDR) in the Department of State, “Afghans Find Their Way”, Center American Progress, 3/14/2014, <https://www.americanprogress.org/issues/security/report/2014/03/10/85598/afghans-find-their-way/>

Both unifying and centrifugal forces exist simultaneously in Afghanistan, and which forces will prove stronger as international troops draw down remains unknown. Based on consultations with Afghan civil society members; Afghan and international governmental officials; members of the Afghan National Security Forces, or ANSF; and NATO-ISAF officials in Afghanistan and the United States, it is clear that unifying forces in Afghanistan have strengthened since 2001 and **may be able to prevent a return to an expanded civil war**. These unifying forces are Afghans who have become stakeholders in the current political system. They include young people, the media, many Afghan women and representatives of organized Afghan women’s groups, traditional leaders and new civil society groups, Afghan government officials, and members of the Afghan National Security Forces. They wish to build upon and improve the current system, rather than overthrow it and begin anew.

Afghanistan’s stability remains in the national security interest of the United States. Expanded conflict in Afghanistan has the potential to not only reverse numerous developmental gains for Afghans but also to **spill over into nuclear-armed Pakistan and throughout the region**. Insecurity in Afghanistan could drive refugees across Afghanistan’s borders and **enable violent militant groups** to flourish, including Al Qaeda-affiliated groups, placing strains on Afghanistan’s neighbors. As in the past, regional countries—**including India, Pakistan, Russia, and Iran**—may decide to back their respective **proxies**, thereby leading to Afghanistan’s **further fragmentation and tensions among countries**.