## 1NC – T

#### Interpretation: “Appropriation of outer space” by private entities refers to the exercise of exclusive control of space.

TIMOTHY JUSTIN TRAPP, JD Candidate @ UIUC Law, ’13, TAKING UP SPACE BY ANY OTHER MEANS: COMING TO TERMS WITH THE NONAPPROPRIATION ARTICLE OF THE OUTER SPACE TREATY UNIVERSITY OF ILLINOIS LAW REVIEW [Vol. 2013 No. 4]

The issues presented in relation to the nonappropriation article of the Outer Space Treaty should be clear.214 The ITU has, quite blatantly, created something akin to “property interests in outer space.”215 It allows nations to exclude others from their orbital slots, even when the nation is not currently using that slot.216 This is directly in line with at least one definition of outer-space appropriation.217 [\*\*Start Footnote 217\*\*Id. at 236 (“Appropriation of outer space, therefore, is ‘the exercise of exclusive control or exclusive use’ with a sense of permanence, which limits other nations’ access to it.”) (quoting Milton L. Smith, The Role of the ITU in the Development of Space Law, 17 ANNALS AIR & SPACE L. 157, 165 (1992)). \*\*End Footnote 217\*\*]The ITU even allows nations with unused slots to devise them to other entities, creating a market for the property rights set up by this regulation.218 In some aspects, this seems to effect exactly what those signatory nations of the Bogotá Declaration were trying to accomplish, albeit through different means.219

#### Violation: constellations’ use of LEO does not exclusively occupy or preclude other orbits

Johnson 20 [(Christopher, Professor of Law at the Georgetown University Law Center, Adjunct Faculty at the International Space University in Strasbourg, France, the Legal Advisor for the Moon Village Association, Core Expert and Rule Drafter in the Manual on International Law Applicable to Military Activities in Outer Space project, Juris Doctor from New York Law School and an Advanced Masters in Law in Air and Space Law from Leiden University’s International Institute of Air and Space Law) “The Legal Status of MegaLEO Constellations and Concerns About Appropriation of Large Swaths of Earth Orbit,” Handbook of Small Satellites, 2020] JL

The use of LEO by satellite constellations is substantially similar to the use of GSO, and therefore permissible. In each region, individual actors are given permission - either from a national administrator or from an international governing body (the ITU) via a national administer–to use precoordinated subsections of space. In a way that is overwhelmingly similar to the use of orbital slots in GSO, the placement of spacecraft into orbits in LEO or higher orbits does not constitute possession, ownership, or occupation of those orbits. This is because States (and their companies) have been occupying orbital slots in GSO for decades, and these uses of GSO have never been accused of “appropriating” GSO. The users have never claimed to be appropriating GSO, and their exercising of rights to use GSO is respected by other actors in the space domain. This is the same situation for other orbits, including LEO and other non-Geostationary orbits. And while GSO locations are relatively stable (subject to space weather and other perturbations, and require stationkeeping), spacecraft in LEO are actually moving through space and are not stationary, so it is even more difficult to see this use by constellations as occupation, much less appropriation. Moreover, Space Situational Awareness (SSA) and Space Traffic Management (STM) will allow other uses to use these orbits, and nothing about the use of any one user necessarily precludes others. Lastly, there is no intention by operators of constellations to exclusively occupy, must less possess or appropriate, these orbits. Would not the appropriation of outer space be an intentional, volutional act? No such intention can be found in the operators of global constellations.

#### Net benefits:

#### Precision – their interp justifies jettisoning any word in the rez, like private actors and outer space which zeroes neg prep ­– proven by the absence of “appropriation” in the plan text

#### Limits – literally anything that takes place in space becomes topical under their interp – 2 physical entities can never occupy space at the same time – tourism, mining, constellations, rockets, skydiving, lunar bases, exploration, radio waves, photography – limits explosion precludes nuanced clash and privileges the aff by stretching pre-tournament neg prep too thin

#### Drop the debater – indicts the whole aff and deters abuse

#### Competing interps – reasonability invites arbitrary judge intervention and a race to the bottom

#### No RVIs – fairness and education are logical litmus tests and incentivizes baiting abuse to win on prepped out counterinterps

## 1NC – DA

#### JCPOA passes now, but it’s tentative and the window is closing

Norman 3/15 [(Laurence, deputy bureau chief at Dow Jones Newswires and The Wall Street Journal based in London) “Russia Softens Iran Demands, Re-Opening Way for Nuclear Deal,” The Wall Street Journal, 3/15/2022] JL

Russia walked back recently made demands on Washington related to the Iran nuclear deal, clearing the way for Tehran and Washington to revive the 2015 agreement, senior western diplomats said.

On Tuesday, after Russia’s Foreign Minister Sergei Lavrov met in Moscow with his Iranian counterpart, both Mr. Lavrov and Hossein Amir-Abdollahian said Russia wasn’t standing in the way of the accord.

Russia earlier this month had demanded guarantees from Washington that its economic ties with Iran wouldn’t be affected by the Western sanctions imposed on Moscow over Ukraine. The last-minute move was the driving factor that prevented a deal to revive the 2015 nuclear agreement over the past 10 days, western diplomats have said.

The European Union, which coordinates the talks, announced a break in the negotiations on Friday, blaming “external factors” for preventing a deal that is “essentially ready.”

A senior Western diplomat said Tuesday evening that Russia’s chief negotiator at the talks, Mikhail Ulyanov, had informed the EU that Russia would accept narrower guarantees ensuring that Russia could carry out the nuclear work it is mandated to do under the 2015 nuclear deal. That includes a uranium swap with Iran, the redesign of the Fordow nuclear facility and the provision of nuclear fuel to Iranian reactors.

“Russia says happy with guarantees on nuclear projects and not asking for anything else,” said the diplomat, who asked to remain unidentified because of the sensitive nature of the talks. “So we can go ahead with negotiations that are now exclusively US-Iran.”

State Department spokesman Ned Price said Tuesday evening that “we are not going to sanction Russia for undertaking, for participating in nuclear projects that are part of the” nuclear deal.

The negotiations, which have taken place for almost a year now, aim to reach agreement on the steps Washington and Tehran will take to return into compliance with the 2015 agreement, which lifted most international sanctions on Tehran in exchange for tight but temporary restrictions on Iran’s nuclear work.

After the Trump administration took the U.S. out of the accord and reimposed sweeping sanctions on Iran, saying the accord was too weak, Tehran expanded its nuclear work and has now gathered almost enough nuclear high-grade enriched uranium for a nuclear weapon, according to the United Nations nuclear agency.

Iran says its nuclear program is purely peaceful and U.S. officials have said there is no evidence Iran has decided to build a nuclear weapon.

Over the weekend, a senior U.S. official told The Wall Street Journal that only “a handful of issues left” remained between the U.S. and Iran to reach an accord, mainly on the issue of the scope of sanctions relief Iran would receive from Washington. The official said the U.S. side felt the resolution of these issues was “within reach.”

The U.S. official and senior European diplomats said they wouldn’t negotiate broad carve-outs from Western sanctions over Russia’s invasion of Ukraine with Moscow to save the nuclear deal. They warned that if Russia didn’t back off its demands, they would seek to complete an agreement with Iran, bypassing Russia.

Mr. Ulyanov said Tuesday evening on Twitter it was a lie that Russia had stood in the way of the accord with its demands for guarantees. He added that “some demands were accepted.” Iran, which has friendly ties with Moscow, has also continued to blame Washington for not completing the deal.

Negotiations between the U.S. and Iran could resume without negotiators returning to Vienna, where the talks have been held since April 2021, the senior western diplomat said. Iran so far has refused to talk directly with the Americans and instead have negotiated through the European powers at the talks. With so few issues still to be resolved, negotiators could work from capitals to resolve the remaining differences.

Time is pressing. U.S. and European officials say that Iran’s nuclear work has expanded close to a point that the deal’s main benefit to the West—keeping Iran months away from amassing enough nuclear fuel for a nuclear weapon—would be impossible.

European diplomats in particular have warned that with the war in Ukraine becoming ever-deadlier, the diplomatic window for concluding the deal is closing.

#### Space diplomacy directly trades off with nonproliferation agreements – finite manpower, money, and political will within the AVC

Johnson-Freeze 16 [(Joan, Professor and former Chair of National Security Affairs at the US Naval War College, Newport, Rhode Island) “Space Warfare in the 21st Century: Arming the Heavens,” Cass Military Studies, 11/8/2016] JL

 \*The plan is legislated in the AVC (same bureau of the State Department that’s concerned with the JCPOA)

Proactive policymaking takes commitment, manpower, and money. A quick look at the money and manpower devoted to diplomacy in the US State and Defense departments compared to the resources available for the hardwareproducing military–industrial complex efforts described in Chapter 5 is enlightening. The Assistant Secretary of State for Arms Control, Verification, and Compliance (AVC) leads space-related diplomacy in the State Department. The AVC Bureau is responsible for “all matters related to the implementation of certain international arms control, nonproliferation, and disarmament agreements and commitments; this includes staffing and managing treaty implementation commissions.”34 The AVC arms control portfolio includes nuclear, biological, and chemical weapons and all related issues. The AVC section charged with space issues is the Office of Emerging Security Challenges; this office also handles missile defense issues and the promotion of transparency, cooperation, and building confidence regarding cybersecurity. As of financial year 2013, AVC had a budget of $31.2 million and 141 employees35 to be active participants and leaders in all of these issues.

By way of comparison, the Space Security and Defense Program, a joint program of the DoD and the Office of the Director of National Intelligence (ODNI) was programmed for a similar budget amount in financial year 2015: $32.3 million. That program is described as a “center of excellence for options and strategies (materiel, non-materiel, cross-Title, cross-domain) leading to a more resilient and enduring National Security Space (NSS) Enterprise.”36 A majority of SSDP funding is allocated to the development of offensive space control strategies. So basically, the same budget is allocated for all US global space diplomacy efforts as for an in-house Pentagon think tank to devise counterspace strategies.

Within the Pentagon, the Deputy Assistant Secretary of Defense for Space Policy is charged with all issues related to space policy, including diplomacy. The responsibilities of the Space Policy office are to:

• Develop policy and strategy for a domain that is increasingly congested, competitive, and contested

• Implement across DoD — plans, programs, doctrine, operations — and with the IC and other agencies

• Engage with allies and other space-faring countries in establishing norms and augmenting our capabilities.37

The breadth of those responsibilities, which includes reviewing space acquisitions, means that there may be only a handful of individuals actually engaged in multilateral diplomatic efforts, acting, for example, as advisors to diplomatic discussions such as those through the United Nations. Additionally, the expanse of the Pentagon results in a chain of command that makes organizational competition for attention to subject matter challenging at best. The Deputy Assistant Secretary of Defense for Space Policy reports to the Assistant Secretary of Defense for Homeland Defense, who then reports to the Principle Deputy Secretary of Defense for Homeland Defense and Global Security, who then reports to the Under Secretary of Defense for Defense Policy. There are also a multitude of space players in other governmental organizations to coordinate and contend with, particularly within the Air Force and intelligence communities. Personnel are spread thin.

US government-wide space diplomacy needs a mandate, manpower, and a supporting budget. Diplomacy, especially multilateral diplomacy, can be timeconsuming, manpower-intensive, and frustrating; and patience is not a strong American virtue. The recent experience in the UN LTS Working Group is emblematic of everything that causes the United States to shun multilateralism. Under the auspices of this group, countries had worked in good faith over the past five years to develop technical guidelines as reciprocal constraints, as insisted upon by the developing countries when they rejected the ICOC. Yet group success appeared thwarted at the February 2016 meeting of the LTS Working Group by one country, Russia.

#### The plan kills Iranian support for JCPOA – private space capabilities are a key focus for Raisi

Larson and Lewis 21 [(Jim, Senior research associate at the James Martin Center for Nonproliferation Studies at the Middlebury Institute of International Studies at Monterrey)(Jeffery, Professor at the Middlebury Institute of International Studies at Monterey and a staff member at the James Martin Center for Nonproliferation Studies) “IRANIAN PRESIDENT RAISI’S RENEWED EMPHASIS ON SPACE IS LIKELY TO CREATE NEW TENSIONS”, War on the Rocks, 12/20/2021]  
Western press reporting on the first 100 days of Iran’s new hardline president, Ebrahim Raisi, has naturally focused on his impact on Iran’s nuclear and missile programs. But in Iran, officials refer to three, not two, “power-creating” (eghtedar-saz) industries: nuclear, missiles, and space. And it is space, more so than either nuclear or missiles, where Raisi has focused his early public efforts. And it is Iran’s moves in space that will probably present President Joe Biden with the first challenge of the post-nuclear deal era.

In his first 100 days, Raisi has moved to place his imprint by reinvigorating Iran’s space program, the results of which will be visible in the coming months and years. Raisi has now set in motion a process that will result in Iran launching more satellites in the coming year, unveiling new space launch vehicles, and breaking ground on a new space launch facility in southern Iran. These developments will understandably be interpreted by Western media in the context of Iran’s missile programs and the broader security situation. But it is important to understand that Iran is also deeply committed to the economic, military, and security uses of outer space.

The Biden administration will have to choose how to respond to Iran’s growing presence in space. Will the United States try to balance its legitimate concerns about proliferation with Iran’s right to access space? Or will it treat Iran as a pariah, hoping that vocal opposition to Iran’s space launches will somehow produce a different result than the same approach did with North Korea?

Raisi Moves to Revive Iran’s Space Programs

Raisi is very publicly attempting to reinvigorate an Iranian space program that has been struggling in recent years. His new communications minister has criticized the state of the space program left by his predecessor — he called it “sorrowful” and “backwards” and sacked the head of the Iranian Space Agency. Raisi chaired a meeting of the Supreme Space Council — the country’s highest-level space policymaking organization — which had not met for more than a decade. At that meeting, Raisi committed Iran to launching more satellites into low earth orbit and reaching geostationary orbit by 2026.

Iran has two space programs: a state space program and a parallel program run by the Islamic Revolutionary Guard Corps. The state space program is under Iran’s president, who chairs the Supreme Space Council. The council, in turn, oversees the Iranian Space Agency, which contracts with entities under the communications, defense, and science ministries — and increasingly, Iran’s private sector. We use the phrase “state” space program rather than “civilian” because Iran’s military is fully integrated into this program.

#### The JCPOA returns Iran to global oil markets – increased supply and perception solve market volatility

Shokri 3/3 [(Omid, visiting research scholar at the School of Policy and Government at George Mason University and is an analyst at Gulf State Analytics (GSA) who specializes in energy security, author of US Energy Diplomacy in the Caspian Sea Basin: Changing Trends Since 2001) “Can Iranian oil stabilize a volatile market?” Atlantic Council, 3/3/2022] JL

As fuel prices skyrocket following the Russian invasion of Ukraine, another major supplier of oil and natural gas is poised to play an important role.

Before Donald Trump‘s withdrawal from the 2015 nuclear deal and the imposition of sanctions on Iran’s oil exports, Iran produced 3.8 million barrels of oil per day. Afterwards, this dropped as low as 1.9 million barrels and currently it is about 2.4 million barrels. It will take time for the country’s production to return to pre-sanction levels due to this significant drop as well as low levels of investment in recent years. However, Iran’s oil and gas condensate reserves in tankers, as well as onshore oil storage facilities, will help Iran accelerate its exports which currently total more than 1 million barrels per day.  Some sources predict that with the lifting of the sanctions, Iran could ship an additional 500,000 barrels of oil per day to international markets from April to May, and by the end of this year this figure could reach an additional 1.3 million barrels per day.

All of this assumes that current talks in Vienna on reviving the Joint Comprehensive Plan of Action (JCPOA) are successful. Without sanctions relief, any new disruptions in US supplies could boost oil prices beyond $100 a barrel to as high as $150. As reported by GasBuddy**,** the United States is already struggling to cope with its highest level of inflation in four decades. The price of gasoline has risen about $4 a gallon in many parts of the country since the Ukraine crisis began.

Iran has said that it is ready to increase its oil exports significantly if sanctions imposed by the Trump administration are lifted, but it will take time to restore relationships with customers in Europe and Asia. In February, officials from the National Iranian Oil Company (NIOC) traveled to Seoul, the capital of South Korea, to hold talks with several refineries on the prospects for resuming oil deliveries.

The International Energy Agency (IEA) has increased its forecast for demand growth in 2022, stating that global demand for oil will increase by 3.2 million barrels per day this year to a record 100.6 million barrels per day. These forecasts show that there is a market for more oil and that this is an opportunity for producers to increase oil sales and export revenues.

Iran will clearly be a major beneficiary of this increase if it can resolve its problems with the United States over a return to the JCPOA.  Iran is asking the US government to remain committed to the deal in the event of a change of administration in Washington. But this is something that President Joe Biden, or any other US leader, cannot promise. Tehran must decide whether it is worthwhile to reach an agreement that could last only three years.

After the JCPOA went into implementation in 2016, Iran increased its oil production much faster than expected. Most analysts had predicted that Iran would increase its production by 500,000 barrels per day within a year after the lifting of sanctions, but in fact Iran reached this figure in less than four months, and by the end of the year had increased production by nearly one million barrels.

After sanctions were reimposed following the US withdrawal from the JCPOA in 2018, Iran stored oil in tankers. It is estimated that Iran has stored more than 85 million barrels of oil and gas condensate at sea. These supplies can be exported rapidly if sanctions are lifted.

The elimination of important oil exporting countries from the market has major ripple effects. Other producers often raise prices and pursue their own interests. Even if Iran returns to the market, not all problems of oil and gas will be solved, but an Iranian return can have a major psychological impact in helping the oil market move towards equilibrium. There is also the possibility that Iran can play a role in replacing Russian gas exports to Europe.

#### High oil prices and volatility cause nuclear war

King 8 [(Neil King, Global Economics Editor for the WSJ), Peak Oil: A Survey of Security Concerns, Center for a New American Security, September, http://www.cnas.org/files/documents/publications/CNAS\_Working%20Paper\_PeakOil\_King\_Sept2008.pdf] TDI

Many commentators in the United States and abroad have begun to wrestle with the question of whether soaring oil prices and market volatility could spark an outright oil war between major powers—possibly ignited not by China or Russia, but by the United States. In a particularly pointed speech on the topic in May, James Russell of the Naval Postgraduate School in California addressed what he called the increasing militarization of international energy security. “Energy security is now deemed so central to ‘national security’ that threats to the former are liable to be reflexively interpreted as threats to the latter,” he told a gathering at the James A. Baker Institute for Public Policy at Houston’s Rice University.6 The possibility that a large-scale war could break out over access to dwindling energy resources, he wrote, “is one of the most alarming prospects facing the current world system.”7 Mr. Russell figures among a growing pool of analysts who worry in particular about the psychological readiness of the United States to deal rationally with a sustained oil shock. Particularly troubling is the increasing perception within Congress that the financial side of the oil markets no longer functions rationally. It has either been taken over by speculators or is being manipulated, on the supply side, by producers who are holding back on pumping more oil in order to drive up the price. A breakdown in trust for the oil markets, these analysts fear, could spur calls for government action—even military intervention. “The perceptive chasm in the United States between new [oil] market realities and their impact on the global distribution of power will one day close,” Mr. Russell said. “And when it does, look out.”8 The World at Peak: Taking the Dim View For years, skeptics scoffed at predictions that the United States would hit its own domestic oil production peak by sometime in the late 1960s. With its oil fields pumping full out, the U.S. in 1969 was providing an astonishing 25 percent of the world’s oil supply—a role no other country has ever come close to matching. U.S. production then peaked in December 1970, and has fallen steadily ever since, a shift that has dramatically altered America’s own sense of vulnerability and reordered its military priorities. During World War II, when its allies found their own oil supplies cut off by the war, the United States stepped in and made up the difference. Today it is able to meet less than a third of its own needs. A similar peak in worldwide production would have far more sweeping consequences. It would, for one, spell the end of the world’s unparalleled economic boom over the last century. It would also dramatically reorder the wobbly balance of power between nations as energy-challenged industrialized countries turn their sights on the oil-rich nations of the Middle East and Africa. In a peak oil future, the small, flattened, globalized world that has awed recent commentators would become decidedly round an d very vast again. Oceans will reemerge as a hindrance to trade, instead of the conduit they have been for so long. An energy-born jolt to the world economy would leave no corner of the globe untouched. Unable to pay their own fuel bills, the tiny Marshall Islands this summer faced the possibility of going entirely without power. That is a reality that could sweep across many of the smallest and poorest countries in Africa, Asia, and Latin America, reversing many of the tentative gains in those regions and stirring deep social unrest. Large patches of the world rely almost entirely on diesel-powered generators for what skimpy electricity they now have. Those generators are the first to run empty as prices soar. A British parliamentary report released in June on “The Impact of Peak Oil on International Development” concluded that “the deepening energy crisis has the potential to make poverty a permanent state for a growing number of people, undoing the development efforts of a generation.”9 We are seeing some of the consequences already in Pakistan – a country of huge strategic importance, with its own stash of nuclear weapons – that is now in the grips of a severe energy crisis. By crippling the country’s economy, battering the stock market, and spurring mass protests, Pakistan’s power shortages could end up giving the country’s Islamic parties the leverage they have long needed to take power. It’s not hard to imagine similar scenarios playing out in dozens of other developing countries. Deepening economic unrest will put an enormous strain on the United Nations and other international aid agencies. Anyone who has ever visited a major UN relief hub knows that their fleets of Land Rovers, jumbo jets and prop planes have a military size thirst for fuel. Aid agency budgets will come under unprecedented pressure just as the need for international aid skyrockets and donor countries themselves feel pressed for cash. A peaking of oil supplies could also hasten the impact of global climate change by dramatically driving up the use of coal for power generation in much of the world. A weakened world economy would also put in jeopardy the massively expensive projects, such as carbon capture and storage, that many experts look to for a reduction in industrial emissions. So on top of the strains caused by scarce fossil fuels, the world may also have to grapple with the destabilizing effects of more rapid desertification, dwindling fisheries, and strained food supplies. An oil-constricted world will also stir perilous frictions between haves and have-nots. The vast majority of all the world’s known oil reserves is now in the hands of national oil companies, largely in countries with corrupt and autocratic governments. Many of these governments—Iran and Venezuela top the list—are now seen as antagonists of the United States. Tightened oil supplies will substantially boost these countries’ political leverage, but that enhanced power will carry its own peril. Playing the oil card when nations are scrambling for every barrel will be a far more serious matter that at any time in the past. The European continent could also undergo a profound shift as its needs—and sources of energy—diverge all the more from those of the United States. A conservation-oriented Europe (oil demand is on the decline in almost every EU country) will look all the more askance at what it sees as the gluttonous habits of the United States. At the same time, Europe’s governments may have little choice but to shy from any political confrontations with its principal energy supplier, Russia. An energy-restricted future will greatly enhance Russia’s clout within settings like the UN Security Council but also in its dealings with both Europe and China. Abundant oil and gas have fueled Russia’s return to power over the last decade, giving it renewed standing within the UN and increasing sway over European capitals. The peak oil threat is already sending shivers through the big developing countries of China and India, whose propulsive growth (and own internal stability) requires massive doses of energy. For Beijing, running low on fuel spells economic chaos and internal strife, which in turn spawns images of insurrection and a breaking up of the continent sized country. Slumping oil supplies will automatically pit the two largest energy consumers—the United States and China—against one another in competition over supplies in South America, West Africa, the Middle East, and Central Asia. China is already taking this competition very seriously. It doesn’t require much of a leap to imagine a Cold War-style scramble between Washington and Beijing—not for like-minded allies this time but simply for reliable and tested suppliers of oil. One region that offers promise and peril in almost equal measure is the Artic, which many in the oil industry consider the last big basin of untapped hydrocarbon riches. But the Artic remains an ungoverned ocean whose legal status couldn’t be less clear, especially so long as the United States continues to remain outside the international Law of the Sea Treaty. As the ices there recede, the risk increases that a scramble for assets in the Artic could turn nasty.

## 1NC – CP

#### CP: Ukraine should surrender its forces to the Russian Federation.

#### Starlink has transformed Ukraine’s resistance – it’s the only reliable way to ensure connectivity

Lerman and Zakrzewski 3/19 [(Rachel, covers technology for The Washington Post in San Francisco, and Cat, technology policy reporter, tracking Washington's efforts to regulate Silicon Valley companies) “Elon Musk’s Starlink is keeping Ukrainians online when traditional Internet fails,” Washington Post, 3/19/2022] JL

Ukraine has already received thousands of antennas from Musk’s companies and European allies, which has proved “very effective,” Fedorov said in an interview with The Washington Post Friday.

“The quality of the link is excellent,” Fedorov said through a translator, using a Starlink connection from an undisclosed location. “We are using thousands, in the area of thousands, of terminals with new shipments arriving every other day.”

The use of Starlink as a stopgap measure for citizens and the government to stay connected during an invasion is a major test of the relatively new technology, experts say, and could have widespread implications for the future of war. Internet has become an essential tool for communication, staying informed and even powering weapons.

It’s also a test for Musk. The world’s richest man, valued at $232 billion according to the Bloomberg Billionaire‘s Index, makes a habit of turning to Twitter for brash promises and proclamations in the midst of world crises. Already this week, the Tesla CEO has challenged Putin to a fight and followed up by pledging he would use just one hand if Putin was scared. And he told Putin he could bring a bear.

He has fallen short on some past pledges, including making ventilators for coronavirus patients and efforts to help rescue Thai children stuck in a cave.

But this time, Fedorov and some experts say he’s come through. Tesla employees in Europe reportedly assembled systems to help power Starlink in Ukraine, and Fedorov said other European countries have sent Starlink equipment from their own supplies.

Musk responded to a request for comment on his efforts with Starlink and past efforts, telling The Post to give his regards “to your puppet master Besos😘😘.” (Amazon founder Jeff Bezos owns The Post.) Musk did not respond to a follow-up request specifically on his work with Starlink in Ukraine.

SpaceX declined to comment on its work in Ukraine.

Internet disruptions can be caused by power outages or by fiber optic cables being cut as a result of shelling, experts said. The Starlink technology is being used by civilians in areas under attack that have lost Internet service, and by government officials. Starlink terminals have also been provided to help the country’s tech companies stay online when the war has forced them to relocate. The Times of London reports that a Ukrainian unit is using Starlink to connect its drones attacking Russian forces.

Starlink has grown quickly in recent years, surpassing some satellite Internet competitors by launching more than 1,000 satellites into space. People can buy the service online for $99 a month, plus $499 for the equipment, but Starlink cautions it can take six or more months to ship in some cases.

A person familiar with Starlink’s effort in Ukraine, speaking on the condition of anonymity to discuss sensitive matters, said there are more than 5,000 terminals in the country.

Still, experts said that even a big Starlink network probably wouldn’t be enough power to keep an entire country online and operating at full-speed. But the terminals can serve as a reliable backup as Internet services falter. Fedorov said he and his staff are having discussions with other European leaders and companies about additional satellite and cellular technologies that could help keep Ukrainians online in the event of greater Internet outages.

Internet flows deteriorated on the first day of Russia’s invasion of Ukraine on Feb. 24 and have not fully recovered, according to data-monitoring services. But since that initial dip, connectivity has remained fairly stable, with mainly temporary, isolated outages even during heavy Russian shelling.

“Every day there are outages, but generally service comes back,” said Doug Madory, director of Internet analysis for Kentik, which monitors global data flows.

Even before Fedorov tweeted at Musk for help, SpaceX was working on a way to get Starlink to Ukraine. President and COO Gwynne Shotwell said in a talk at California Institute of Technology this month that the company had been working for several weeks to get regulatory approval to allow the satellites to communicate in Ukraine.

“But then they tweeted,” she said, according to SpaceNews. “There’s our permission.”

Fedorov’s agency is working to get Starlink terminals to regions where Internet access has been cut off, he said. The systems have in some instances been used to connect people when cellular networks in the country have been overloaded.

Fedorov said that he’s briefly texted with Musk and that the tech billionaire has also had a call with Ukrainian President Volodymyr Zelensky.

There are some concerns that accompany the use of the terminals. Like all satellite communications during war, Starlink signals could be used to detect the location of the antennas, experts say.

While it’s unclear if Russia can use the signals to target attacks, Musk instructed caution on Twitter.

“Important warning: Starlink is the only non-Russian communications system still working in some parts of Ukraine, so probability of being targeted is high,” he tweeted. He added that users should turn on the terminal only when needed and keep it far away from people.

Experts have warned that the devices could give away Ukrainians’ locations to Russian attackers, but that hasn’t been an issue so far, Fedorov said. The devices have usually been used in “densely populated areas where there would be a lot of civilians anyway.”

He said Russian cyberattacks have not ramped up on the systems — yet.

#### Starlink will secure Ukrainian victory – 2 internal links:

#### Information sharing – connectivity is key to morale, foreign support, and Russian infighting

Aral 3/1 [(Sinal, David Austin Professor of Management, IT, Marketing and Data Science at MIT,Director of the MIT Initiative on the Digital Economy, Ph.D. in Information Systems from MIT) “Ukraine is winning the information war,” Washington Post, 3/1/2022] JL \*brackets for ableist language

Today, the information war in Ukraine is more intense, more tightly contested and arguably more important than ever because motivating volunteer fighters at home and encouraging foreign support abroad are critical to success. And this time, it seems, Russia is losing. Reports abound on social media of more than 4,000 Russian casualties, images of [destroyed] ~~crippled~~ Russian helicopters and armored vehicles and cellphone videos of savage Russian missile attacks on civilian targets. This mix of official Ukrainian war statistics combined with videos (both verified and unverified), posted by Ukrainian citizens and sympathizers from the front lines, is painting a vivid picture of a homegrown resistance successfully slowing the advance of a much larger and ostensibly better organized military machine. Facebook posts showing Ukrainians kneeling in front of tanks to stop their progress and Twitter images of women and children sheltering in subways and basements set the emotional backdrop of senseless aggression against a peaceful nation. Viral videos and audio clips evoke a defiant optimism impossible to ignore: Ukrainian President Volodymyr Zelensky appearing via his cellphone walking the streets of Kyiv, unharmed, in a “proof of life” demonstration emphasizing his willingness to stay and fight for his country, despite a U.S. offer to evacuate him, for example, or the recording of soldiers in an isolated Ukrainian outpost on Snake Island, in the Black Sea, cursing and telling off the Russian Black Sea Fleet. These stories are spreading rapidly on social media and subsequently echoing through official news channels in a media feedback loop that amplifies the information war and broadcasts it on television sets all over the world.

Zelensky, in particular, is deftly outmaneuvering Putin in this information war. He rallied Ukrainian men to defend their homeland, used the encrypted messaging platform Telegram to speak directly to the Russian people to counter Putin’s narrative, urged the West to step up its assistance in defense of law, order and peace, and even pleaded with foreigners to cross the border into Ukraine to defend Western democracy. While misinformation exists on both sides, Zelensky gives the impression that he’s more committed to truth and transparency. In contrast, Russia has been secretive, obfuscating the true extent of its incursion into Ukraine, and out of touch, airing the rambling addresses of its leader. It’s as if Putin has forgotten that social media transitioned from text to real-time video around the time of the Crimean annexation. In today’s information war, Russian news claiming Zelensky had turned tail and fled was swiftly countered by a video selfie of the Ukrainian president in Kyiv, vowing to defend his homeland. The symbolic contrast between Zelensky striding through war-torn streets, confident even under fire, and Putin, seated, hunched over a large wooden desk in the safety of a secure office hundreds of miles away from the fighting, is stark.

This time, Facebook, YouTube, Twitter and Google are also proactively engaged in the information war. During the Crimean annexation, they were reactive and struggled to keep up with misinformation and false abuse reports. Today, in Ukraine, they have banned Russian state-owned media from advertising on their platforms and defiantly fact-checked Putin’s propaganda despite Russia’s protests and a full ban of Twitter and a partial ban of Facebook in Russia. Facebook has spun up a special operations center, staffed with native Russian and Ukrainian speakers, to monitor misinformation posted about the war, added warning labels to war-related images that its software detects are more than a year old, and restricted access to content from the state-affiliated Russian media outlets RT and Sputnik. YouTube is restricting access to Russian state-owned media outlets for users in Ukraine, removing Russian state-owned channels from recommendations, and limiting their content’s reach across the platform. Twitter has temporarily banned all ads in Ukraine and Russia, added labels to tweets with links to Russian state-affiliated media and downranked their content in algorithmic timelines. While numerous fake videos are circulating on TikTok about Ukraine, the Chinese-owned platform has no comprehensive policy on policing information about the conflict. Despite blocking state-owned Russian media in the European Union, this information flows freely in Ukraine and Russia on the platform, now dubbed “WarTok” by some observers, in part because it is organizing such videos into a convenient discover playlist by the same name.

The information war is critical to what happens next in Ukraine for several reasons. It motivates the resistance by inspiring Ukrainian citizens to take up arms in defense of their country and motivating them with social proof that they are united and not fighting alone. It encourages foreign assistance, pressuring Europe and the United States to step up their efforts to end the conflict. It fans the flames of protest in Russia, mobilizing the antiwar movement in Moscow and elsewhere in defiance of Putin’s aggression. And it may even eventually demoralize Russian troops, who must be wondering what on earth they are doing in Ukraine if the motivation for the intervention has been a lie all along. When Russia struck a Ukrainian television tower on Tuesday, it seemed to confirm Moscow’s keen awareness of the need to counter Ukraine’s information war and to highlight the importance of information in modern conflicts.

Information campaigns are difficult to quantify during the fog of war. But while it is hard to pinpoint the extent to which the information war is contributing to the overwhelming international unity against Putin’s aggression, one thing is clear: Social media, mainstream media and the narrative framing of the invasion of Ukraine undoubtedly will play an important role in how this conflict ends. Now, vigilance and fortitude are not only needed on the battlefield, where lives and territory will be won and lost, but also will be essential online, where the hearts and minds of the world will be won or lost.

#### Drone warfare – Starlink is key to surveillance and attacks

Brodkin 3/21 [(Jon, covers a wide array of IT and tech policy topics for Ars Technica, studied journalism and literature at Boston University) “Starlink helps Ukraine’s elite drone unit target and destroy Russian tanks,” Ars Technica, 3/21/2022] JL

SpaceX's Starlink Internet is proving to be useful for Ukraine's military as it fights the Russian invasion. In an article Friday titled, "Elon Musk's Starlink helping Ukraine to win the drone war," The Telegraph described how the satellite connection helps the Ukrainian army's Aerorozvidka (Aerial Reconnaissance) unit do its work of "using surveillance and attack drones to target Russian tanks and positions."

The Telegraph wrote:

Amid Internet and power outages, which are expected to get worse, Ukraine is turning to the newly available Starlink system for some of its communications. Drone teams in the field, sometimes in badly connected rural areas, are able to use Starlink to connect them to targeters and intelligence on their battlefield database. They can direct the drones to drop anti-tank munitions, sometimes flying up silently to Russian forces at night as they sleep in their vehicles.

The Ukrainian unit's "most sophisticated drones are connected using Starlink," The Times of London wrote. "If we use a drone with thermal vision at night, the drone must connect through Starlink to the artillery guy and create target acquisition," an Aerorozvidka officer told the paper.

The Times wrote that Aerorozvidka "has been picking off tanks, command trucks, and vehicles carrying electronic equipment since the invasion began," destroying dozens of "priority targets."

#### Ukrainian victory shores up global democracy – the alternative is mass genocide – that’s a decision rule

Applebaum 3/22 [(Anne, Senior Fellow at the Johns Hopkins School of Advanced International Studies and the Agora Institute, where she co-directs Arena, a program on disinformation and 21st century propaganda) “Ukraine Must Win,” The Atlantic, 3/22/2022] JL

Russian planners expected the entire war, the conquest of Ukraine, to last no more than six weeks. More than half that time has already passed. There must be an endgame, a moment when the conflict stops. The Ukrainians, and the democratic powers that support Ukraine, must work toward a goal. That goal should not be a truce, or a muddle, or a decision to maintain some kind of Ukrainian resistance over the next decade, or a vow to “bleed Russia dry,” or anything else that will prolong the fighting and the instability. That goal should be a Ukrainian victory.

Before you can achieve something, you have to imagine what it will look like. And in this war, victory can be imagined without difficulty. It means that Ukraine remains a sovereign democracy, with the right to choose its own leaders and make its own treaties. There will be no pro-Russian puppet regime in Kyiv, no need for a prolonged Ukrainian resistance, no continued fighting. The Russian army retreats back over the borders. Maybe those borders could change, or maybe Ukraine could pledge neutrality, but that is for the Ukrainians to decide and not for outsiders to dictate. Maybe international peacekeepers are needed. Whatever happens, Ukraine must have strong reasons to believe that Russian troops will not quickly return.

Imagine, too, the consequences of such a victory. In Washington, most people have long believed that Ukraine is part of a regional conflict, and that Ukraine is a piece of territory that the Russians care more about than we do and always will. But this is no longer true. The Ukrainians, and especially their president, Volodymyr Zelensky, have made their cause a global one by arguing that they fight for a set of universal ideas—for democracy, yes, but also for a form of civic nationalism, based on patriotism and a respect for the rule of law; for a peaceful Europe, where disputes are resolved by institutions and not warfare; for resistance to dictatorship. Zelensky has urged Americans to remember Pearl Harbor. He appealed to the German Parliament with the phrase “Never again”—a mantra used to mean that no Hitler would be allowed to arise again—and told members that, in light of the brutal war in his country, those words are now “worthless.” He called on the European Parliament to “prove that you indeed are Europeans” and admit Ukraine to the European Union.

This language is effective because it evokes the principles that bind together the majority of Europeans, Americans, and many other people around the world, reminding them of how much worse the world was in the bloodier past, and how much worse it could be in the future if those principles no longer matter. The words Zelensky uses also reverberate because they are true. A victory for Ukraine really will be a victory for all who believe in democracy and the rule of law. Citizens of existing democracies and members of the democratic opposition in Russia, Cuba, Belarus, and Hong Kong will all be emboldened. “Their struggle is ours,” a Venezuelan acquaintance told me last week. The institutions protecting the states that embody those ideas, most notably the European Union and NATO, will be strengthened too.

Zelensky’s words resonated further because the Russians have also given this conflict enormous significance. The Russian foreign minister has just declared that this war will change global politics: “This is not about Ukraine at all, but the world order. The current crisis is a fateful, epoch-making moment in modern history. It reflects the battle over what the world order will look like.” Much as Stalin once declared that, when the Second World War ended, “everyone imposes his own system as far as his army can reach,” President Vladimir Putin had planned for the Russian army to impose Russia’s autocratic, kleptocratic political system on all of Ukraine. Already, the Russian occupation of some eastern-Ukrainian towns resembles the Soviet occupation of Central Europe at the end of World War II. Public officials and civic leaders—mayors and police but also members of Parliament, journalists, museum curators—have been arrested and not seen since. Civilians have been terrorized at random. In Mariupol, authorities report that citizens are being forcibly deported to Russia, just as Soviet secret police deported Balts, Poles, and others to Russia after the invasions of 1939 and 1945. In the case of a Russian victory, these tactics would be applied all over Ukraine, creating mass terror, mass violence, and instability for years to come. And, yes, if we accept that outcome, autocrats from Minsk to Caracas to Beijing will take note: Genocide is now allowed*.*

#### Democracy caps a litany of converging existential threats.

Diamond 19, Professor of Political Science and Sociology at Stanford University, Senior Fellow at the Hoover Institution, Senior Fellow at the Freeman Spogli Institute for International Studies, PhD in Sociology from Stanford University, (Dr. Larry, Ill Winds: Saving Democracy from Russian Rage, Chinese Ambition, and American Complacency, p. 199-202)

The most obvious response to the ill winds blowing from the world’s autocracies is to help the winds of freedom blowing in the other direction. The democracies of the West cannot save themselves if they do not stand with democrats around the world. This is truer now than ever, for several reasons. We live in a globalized world, one in which models, trends, and ideas cascade across borders. Any wind of change may gather quickly and blow with gale force. People everywhere form ideas about how to govern—or simply about which forms of government and sources of power may be irresistible—based on what they see happening elsewhere. We are now immersed in a fierce global contest of ideas, information, and norms. In the digital age, that contest is moving at lightning speed, shaping how people think about their political systems and the way the world runs. As doubts about and threats to democracy are mounting in the West, this is not a contest that the democracies can afford to lose. Globalization, with its flows of trade and information, raises the stakes for us in another way. Authoritarian and badly governed regimes increasingly pose a direct threat to popular sovereignty and the rule of law in our own democracies. Covert flows of money and influence are subverting and corrupting our democratic processes and institutions. They will not stop just because Americans and others pretend that we have no stake in the future of freedom in the world. If we want to defend the core principles of self-government, transparency, and accountability in our own democracies, we have no choice but to promote them globally. It is not enough to say that dictatorship is bad and that democracy, however flawed, is still better. Popular enthusiasm for a lesser evil cannot be sustained indefinitely. People need the inspiration of a positive vision. Democracy must demonstrate that it is a just and fair political system that advances humane values and the common good. To make our republics more perfect, established democracies must not only adopt reforms to more fully include and empower their own citizens. They must also support people, groups, and institutions struggling to achieve democratic values elsewhere. The best way to counter Russian rage and Chinese ambition is to show that Moscow and Beijing are on the wrong side of history; that people everywhere yearn to be free; and that they can make freedom work to achieve a more just, sustainable, and prosperous society. In our networked age, both idealism and the harder imperatives of global power and security argue for more democracy, not less. For one thing, if we do not worry about the quality of governance in lower-income countries, we will face more and more troubled and failing states. Famine and genocide are the curse of authoritarian states, not democratic ones. Outright state collapse is the ultimate, bitter fruit of tyranny. When countries like Syria, Libya, and Afghanistan descend into civil war; when poor states in Africa cannot generate jobs and improve their citizens’ lives due to rule by corrupt and callous strongmen; when Central American societies are held hostage by brutal gangs and kleptocratic rulers, people flee—and wash up on the shores of the democracies. Europe and the United States cannot withstand the rising pressures of immigration unless they work to support better, more stable and accountable government in troubled countries. The world has simply grown too small, too flat, and too fast to wall off rotten states and pretend they are on some other planet. Hard security interests are at stake. As even the Trump administration’s 2017 National Security Strategy makes clear, the main threats to U.S. national security all stem from authoritarianism, whether in the form of tyrannies from Russia and China to Iran and North Korea or in the guise of antidemocratic terrorist movements such as ISIS.1 By supporting the development of democracy around the world, we can deny these authoritarian adversaries the geopolitical running room they seek. Just as Russia, China, and Iran are trying to undermine democracies to bend other countries to their will, so too can we contain these autocrats’ ambitions by helping other countries build effective, resilient democracies that can withstand the dictators’ malevolence. Of course, democratically elected governments with open societies will not support the American line on every issue. But no free society wants to mortgage its future to another country. The American national interest would best be secured by a pluralistic world of free countries—one in which autocrats can no longer use corruption and coercion to gobble up resources, alliances, and territory. If you look back over our history to see who has posed a threat to the United States and our allies, it has always been authoritarian regimes and empires. As political scientists have long noted, no two democracies have ever gone to war with each other—ever. It is not the democracies of the world that are supporting international terrorism, proliferating weapons of mass destruction, or threatening the territory of their neighbors.

#### It competes – inserted 1AC Bernat

Each satellite weighs around 260 kg, is equipped with an ion propulsion system, autonomous collision avoidance system, and orbits Earth at approximately 540-560 km altitude (Starlink, 2020). At the beginning of November 2020, more than 860 Starlink satellites were orbiting the Earth (Jewett, 2020). Immediate plans include launching 12,000 satellites, but they assume a potential later extension to 42,000 (Henry, 2019a). Of course, SpaceX has employed, at least declaratively, all necessary measures to keep the space clean – the satellites are equipped with the deorbiting system, and in the event of inoperability of the propulsion system (Starlink, 2020). The orbital collisions are, however, inevitable. As it was shown before, the possibility of collisions grows with the number of orbital objects. Bastida Virgili with the team compared (2016, p. 154-155) orbital debris environment development without and with a large hypothetical constellation consisting of merely 1080 satellites, distributed across 20 orbital planes at 1,100 km altitude (Fig. 5).

## 1NC – Case

### 1NC – Space War

#### No Kessler syndrome, but even a worst case is confined to low LEO with no impact

Daniel Von Fange 17, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 5/21/2017, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong.

What is Kessler Syndrome?

Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites.

It is a dark picture.

Is Kessler Syndrome likely to happen?

I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit.

The orbital area around earth can be broken down into four regions.

Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over.

High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue.

Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here.

GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here.

How bad could Kessler Syndrome in High LEO be?

Let’s imagine a worst case scenario.

An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space?

I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000.

So even in the worst case, we don’t lose access to space.

Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits.

In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment.

* Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely.
* Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner.
* Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided.
* The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler.
* Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting)

So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect.

I’m removing Kessler Syndrome from my list of things to worry about.

#### 1AC Farley is about ASAT tests – plan can’t solve

The recent Russian anti-satellite test didn’t tell the world anything new, but it did reaffirm the peril posed by warfare in space. Debris from explosions could make some earth orbits remarkably risky to use for both civilian and military purposes. But the test also highlighted a less visible danger; attacks on nuclear command and control satellites could rapidly produce an extremely dangerous escalatory situation in a war between nuclear powers. James Acton and Thomas Macdonald drew attention to this problem in a recent article at Inside Defense. As Acton and MacDonald point out, nuclear command and control satellites are the connective tissue of nuclear deterrence, assuring countries that they’re not being attacked and that they’ll be able to respond quickly if they are.

#### 1AC Perez says Space Force, states intentionally deploying nukes, and launch platforms causes war – plan can’t solve – inserted in blue

This process has already begun. Under the Trump administration, the Pentagon established the U.S. Space Force as a new branch of the Armed Forces to protect the country and allied interests in space. Already, Delta 4 — one of the U.S. Space Force’s missions — conducts strategic and theater missile warnings, manages weapon systems, and provides information to missile defense forces. The measure shows that for the U.S., outer space is not only a domain of scientific exploration but has the potential to become increasingly securitized.

With the impending expiration of the Strategic Arms Reduction Treaty (START) between the U.S. and Russia on February 5, 2021, a number of security dilemmas could arise. If the world’s two largest nuclear powers do not edge toward extending the treaty, Washington and Moscow risk returning to the era of unrestricted expansion of launch platforms and strategically-deployed nuclear warheads — potentially with the aid of military infrastructure in space.

1. **No space war – insurmountable barriers and everyone has an interest in keeping space peaceful**

**Dobos 19** [(Bohumil Doboš, scholar at the Institute of Political Studies, Faculty of Social Sciences, Charles University in Prague, Czech Republic, and a coordinator of the Geopolitical Studies Research Centre) “Geopolitics of the Outer Space, Chapter 3: Outer Space as a Military-Diplomatic Field,” Pgs. 48-49] TDI

Despite the theorized potential for the achievement of the terrestrial dominance throughout the utilization of the ultimate high ground and the ease of destruction of space-based assets by the potential space weaponry, the utilization of space weapons is with current technology and no effective means to protect them far from fulfilling this potential (Steinberg 2012, p. 255). In current global international political and technological setting, the utility of space weapons is very limited, even if we accept that the ultimate high ground presents the potential to get a decisive tangible military advantage (which is unclear). This stands among the reasons for the lack of their utilization so far. Last but not the least, it must be pointed out that the states also develop passive defense systems designed to protect the satellites on orbit or critical capabilities they provide. These further decrease the utility of space weapons. These systems include larger maneuvering capacities, launching of decoys, preparation of spare satellites that are ready for launch in case of ASAT attack on its twin on orbit, or attempts to decrease the visibility of satellites using paint or materials less visible from radars (Moltz 2014, p. 31). Finally, we must look at the main obstacles of connection of the outer space and warfare. The first set of barriers is comprised of physical obstructions. As has been presented in the previous chapter, the outer space is very challenging domain to operate in. Environmental factors still present the largest threat to any space military capabilities if compared to any man-made threats (Rendleman 2013, p. 79). A following issue that hinders military operations in the outer space is the predictability of orbital movement. If the reconnaissance satellite's orbit is known, the terrestrial actor might attempt to hide some critical capabilities-an option that is countered by new surveillance techniques (spectrometers, etc.) (Norris 2010, p. 196)-but the hide-and-seek game is on. This same principle is, however, in place for any other space asset-any nation with basic tracking capabilities may quickly detect whether the military asset or weapon is located above its territory or on the other side of the planet and thus mitigate the possible strategic impact of space weapons not aiming at mass destruction. Another possibility is to attempt to destroy the weapon in orbit. Given the level of development for the ASAT technology, it seems that they will prevail over any possible weapon system for the time to come. Next issue, directly connected to the first one, is the utilization of weak physical protection of space objects that need to be as light as possible to reach the orbit and to be able to withstand harsh conditions of the domain. This means that their protection against ASAT weapons is very limited, and, whereas some avoidance techniques are being discussed, they are of limited use in case of ASAT attack. We can thus add to the issue of predictability also the issue of easy destructibility of space weapons and other military hardware (Dolman 2005, p. 40; Anantatmula 2013, p. 137; Steinberg 2012, p. 255). Even if the high ground was effectively achieved and other nations could not attack the space assets directly, there is still a need for communication with those assets from Earth. There are also ground facilities that support and control such weapons located on the surface. Electromagnetic communication with satellites might be jammed or hacked and the ground facilities infiltrated or destroyed thus rendering the possible space weapons useless (Klein 2006, p. 105; Rendleman 2013, p. 81). This issue might be overcome by the establishment of a base controlling these assets outside the Earth-on Moon or lunar orbit, at lunar L-points, etc.-but this perspective remains, for now, unrealistic. Furthermore, no contemporary actor will risk full space weaponization in the face of possible competition and the possibility of rendering the outer space useless. No actor is dominant enough to prevent others to challenge any possible attempts to dominate the domain by military means. To quote 2016 Stratfor analysis, "(a) war in space would be devastating to all, and preventing it, rather than finding ways to fight it, will likely remain the goal" (Larnrani 20 16). This stands true unless some space actor finds a utility in disrupting the arena for others.

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#### No one’s going to war over a downed satellite

Bowen 18 [Bleddyn Bowen, Lecturer in International Relations at the University of Leicester. The Art of Space Deterrence. February 20, 2018. https://www.europeanleadershipnetwork.org/commentary/the-art-of-space-deterrence/]

Space is often an afterthought or a miscellaneous ancillary in the grand strategic views of top-level decision-makers. A president may not care that one satellite may be lost or go dark; it may cause panic and Twitter-based hysteria for the space community, of course. But the terrestrial context and consequences, as well as the political stakes and symbolism of any exchange of hostilities in space matters more. The political and media dimension can magnify or minimise the perceived consequences of losing specific satellites out of all proportion to their actual strategic effect.

#### 1AC MacDonald concludes terrestrial war turns and space wars won’t go nuclear – in blue

Significant instability in space is unlikely to lead to war if there is stability in other domains and in the larger geopolitical relationship between participants, while conflict could easily spread to a stable space domain if war in other domains appeared preferable to the alternative. While any use of nuclear weapons would pose a serious threat of escalation to full-scale nuclear war, any use of space or cyber offense would not pose a comparable escalation threat.

#### Use or lose is wrong – It’d be irrational AND never be contemplated by any state.

Kroenig 18 Matthew Kroenig, Associate Professor in the Department of Government and the Edmund A. Walsh School of Foreign Service at Georgetown, The Logic of American Nuclear Strategy: Why Strategic Superiority Matters, Oxford UPress, pp. 137-142

The second, and more common, argument as to why nuclear superiority might be destabilizing is because the state in the position of nuclear inferiority (in this case, America’s adversaries) may feel “use ’em or lose ’em” (UELE) pressures, but this argument also withers under interrogation.26

According to strategic stability theorists, a US nuclear advantage increases the danger of nuclear war because the inferior opponent may fear that its nuclear arsenal is vulnerable to a first strike. Rather, than wait for the adversary (in this case the United States) to move first and wipe out, or seriously blunt, its strategic forces, the argument goes, the inferior state may decide to intentionally launch a nuclear war early in a crisis in order to avoid suffering a disarming first strike. This is the logic most often invoked by strategic stability theorists when they claim that US nuclear advantages are destabilizing. This is also the precise problem identified and inspired by Wohlstetter’s basing studies.

Use ’em or lose ’em enjoys a certain superficial plausibility, but, upon closer inspection, there are two fundamental reasons why the logic simply does not hold up. First, it ignores the fact that the superior state retains a healthy ability to retaliate. So, even if the inferior state is worried about having its nuclear weapons eliminated in a first strike, the decision to launch its nuclear weapons first as a coping mechanism would be a decision to intentionally launch a nuclear war against a state with at least a secure, second-strike capability. This means that even if the inferior state launches its nuclear weapons first, it will be virtually guaranteed to suffer devastating nuclear retaliation. Moreover, given that it is in a situation of extreme inferiority (so extreme that it might even be vulnerable to a preemptive nuclear strike), this would mean intentionally launching a devastating nuclear war that will likely turn out much worse for itself then for its opponent. It would simply be irrational for a state to intentionally launch a nuclear war against a state with an assured retaliatory capability.

Let us consider a concrete example. The United States maintains nuclear superiority over China, as we have seen in previous chapters. Strategic stability theorists want us to believe that if the United States takes additional steps to further enhance its superiority, then China would face even greater temptations to launch a nuclear first strike against the US homeland in the event of a serious crisis. In other words, strategic stability theorists hold that China would be so worried about losing a devastating nuclear war against United States that it would intentionally choose to start a devastating nuclear war against the United States. The argument does not make sense.

### 1NC – Astronomy

#### No terminal impact to astronomy – 1AC Harvard is about tech that already exists

Computers, satellites and the smartphones they service, Global Positioning System (GPS), energy-efficient solar panels, digital camera sensors, airport security scanners, portable X-ray machines, and Magnetic Resonance Imaging (MRI) scanners are just a few of technological advances that are the legacy of astronomy, and that benefit us all on Earth. None of these would have happened if we hadn’t first been dedicated to simple human curiosity about what may be out in the far reaches of our Universe. As it has been throughout our history, the impulse to explore is still one of the greatest wellsprings of human ingenuity.

#### No terminal impact to NEOs and inevitable even with advanced tech and detection

Patrascu 5/15 [(Daniel, journalist for Auto Evolution) “Asteroid Hits Europe as NASA and Others Unable to Stop It in Impact Game,” Auto Evolution, 5/15/2021] JL

Not long ago, a group of scientists, including from NASA, got together In Vienna, Austria, for the 7th IAA Planetary Defense Conference. Among the many things being discussed there, the scientists played something like an impact game, trying to see how fast the world can react and stop an asteroid bound for Earth. And the grim reality is not only we can't do that fast enough, but there’s absolutely nothing we can do to stop such an event.

The idea behind the exercise was simple. On April 26, those taking part pretended to have discovered a potentially dangerous near-Earth object ([NEO](https://www.autoevolution.com/news/asteroid-apophis-to-leave-earth-alone-for-a-century-still-scary-close-in-2029-158596.html)) heading our way, and over the coming days they simulated the passage of time, the measures needed to be taken to stop it if need be, and of course the outcome.  
  
Now that the conference is over, NASA published the results of this tabletop exercise, and they are not at all encouraging. Here’s how the whole simulation all went down.  
  
On simulated time April 26, the team discovered an asteroid 35 million miles (57 million km) from Earth, with a 5 percent chance of impacting the planet on or around October 20, 2021. On simulated time May 2, further calculations showed the chances of an impact were now 100 percent, with the [asteroid](https://www.autoevolution.com/news/piece-of-asteroid-heading-for-earth-in-a-spacecraft-because-they-do-that-now-160970.html) expected to impact somewhere in Europe or northern Africa.  
  
On simulated time June 30, the impact area is narrowed down to Germany, the Czech Republic, Austria, Slovenia, and Croatia. Scientists now know the asteroid is in between 100 feet (35 meters) and 1,600 feet (500 m) in diameter.  
  
On simulated time October 14, the impact regions shrank even further to include only Germany, the Czech Republic, and Austria. Scientists can do nothing to stop it, and the team starts discussing options for evacuation.  
  
During all this time (the [teams](https://www.autoevolution.com/news/nasa-is-playing-asteroid-impact-games-to-see-how-the-world-would-react-160111.html) spent a week in real life turning this scenario upside down), hypothetical options for stopping the asteroid have been discussed. The bottom line is that with our current technology, there’s nothing we can do in just six months to stop a piece of space rock hurtling toward Earth.  
  
First off, deflection was ruled out because too much force was needed to be applied too far in advance. Also, NASA determined that “if confronted with the 2021 PDC hypothetical scenario in real life we would not be able to launch any spacecraft on such short notice with current capabilities*.”*  
  
Disruption by means of nuclear explosion was considered next, but this has its own issues, as since it was impossible to determine the asteroid’s properties, the team was unable to determine to amount of force needed. As a result, the largest nuclear device available was considered for the mission. NASA calculated that even with this device, the “largest size asteroid that can be disrupted by the NED ranges from ~100 m to ~210 m*, for asteroid densities ranging from 5 g/cm3 down to 1 g/cm3.”*  
Eventually, this plan fell through as well, on account of several factors, including the fact that rendezvous missions have been deemed impractical.  
  
The bottom line of all this? As per NASA, current infrastructure for spacecraft and launch make reconnaissance or mitigation missions impossible in *“a short warning scenario if this were a real situation.”*Deflection would not be possible also due to the short warning time. Disruption by means of nuclear devices would probably be possible, but remember, we’ll not have the time or spacecraft to launch the thing at the asteroid.

#### Astronomy creates massive emissions increases that cause climate change

Greenfield-Boyce 3/21 [(Nell, NPR science correspondent) “Astronomy's contribution to climate change rivals the emissions from some countries,” NPR, 3/21/2022] JL

Astronomers spend their careers looking up at the sky, away from Earth, but now some stargazers say their field has to grapple with the fact that observing the cosmos is contributing to their home planet's climate emergency.

A new estimate of the greenhouse gas emissions linked to all ground- and space-based telescopes, in the journal *Nature Astronomy*, says the annual carbon footprint of astronomy's research infrastructure is equivalent to about 20 million metric tons of carbon dioxide.

"Just to give you some perspective — 20 million tonnes of CO2 — this is the annual carbon footprint of countries like Estonia, Croatia, or Bulgaria," says Jürgen Knödlseder, an astronomer at IRAP, an astrophysics laboratory in France.

He and IRAP colleagues including Annie Hughes and Luigi Tibaldo got the idea to do this study while making an estimate of the greenhouse gas emissions from their own institute.

"The only missing piece of our assessment was the footprint of the observational data," says Knödlseder, whose own research, for example, has relied on observations made with the Fermi Gamma-ray Space Telescope.

Bottom of Form

"No study had ever tried to calculate the carbon emissions due to the construction and operation of all the telescopes and space missions that astronomers use to make observations," notes Hughes.

That's just what this research team set out to do. Data were sometimes hard to come by, but they did their best to approximate and tally up greenhouse gas emissions associated with nearly 50 space-based missions and 40 ground-based telescope facilities.

The most prolific emitters were the biggest, most expensive observatories, such as the new James Webb Space Telescope and the Square Kilometer Array, according to the report.

By dividing up the total annual emissions by the number of astronomers worldwide, the researchers figure that each astronomer's share of the profession's emissions is around 36 metric tons per year.

Knödlseder points out that this is about the amount of emissions from driving an average car in France 165,000 kilometers, or over 100,000 miles.

And that's just from using the telescopes — it doesn't include things like scientists' travel to conferences, supercomputing power and office heating. "For our lab, the total is actually about 50 tonnes of equivalent CO2 per year an astronomer," he says.

#### Warming is incremental – any climate reform saves millions

**Wallace-Wells 19**, David. [David Wallace-Wells is an American journalist known for his writings on climate change. He wrote the 2017 essay "The Uninhabitable Earth", which he later expanded into the 2019 book The Uninhabitable Earth.“The Cautious Case for Climate Optimism (From a Climate Alarmist).” Intelligencer, February 4, 2019. http://nymag.com/intelligencer/2019/02/book-excerpt-the-uninhabitable-earth-david-wallace-wells.html.]//anop

It’s not too late. In fact, it never will be. Whatever you may have read over the past year — as extreme weather brought a global heat wave and unprecedented wildfires burned through 1.6 million California acres and newspaper headlines declared, “Climate Change Is Here” — global warming is not binary. It is not a matter of “yes” or “no,” not a question of “fucked” or “not.” Instead, it is a problem that gets worse over time the longer we produce greenhouse gas, and **can be made better** if we choose to stop. Which means that no matter how hot it gets, no matter how fully climate change transforms the planet and the way we live on it, it will always be the case that **the next decade could contain more**warming, and more suffering, or less warming and less suffering. Just how much is up to us, and always will be. A century and a half after the greenhouse effect was first identified, and a few decades since climate denial and misinformation began muddying our sense of what scientists do know, we are left with a set of predictions that **can appear falsifiable** — about global temperatures and sea-level rise and even hurricane frequency and wildfire volume. And there are, it is true, feedback loops in the climate system that we do not yet perfectly understand and dynamic processes that remain mysterious. But to the extent that we live today under clouds of uncertainty about the future of climate change, those clouds are, overwhelmingly, not projections of collective ignorance about the natural world but of blindness about the human one, and they can be dispersed by human action. The question of how bad things will get is not, actually, a test of the science; it is a bet on human activity. How much will we do to forestall disaster and how quickly? These are the disconcerting, contradictory lessons of global warming, which counsels both human humility and human grandiosity, each drawn from the same perception of peril. There’s a name for those who hold the fate of the world in their hands, as we do — gods. But for the moment, at least, many of us seem inclined to run from that responsibility rather than embrace it. Or even admit we see it, though it sits in front of us as plainly as a steering wheel. That climate change is all-enveloping means that it targets us all and that we must all share in the responsibility so we do not all share in the **suffering** — at least not share in so suffocatingly much of it.Since I first began writing about climate a few years ago, I’ve been asked often whether I see any reason for optimism. The thing is, I am optimistic. But optimism is always a matter of perspective, and mine is this: No one wants to believe disaster is coming, but those who look, do. At about two degrees Celsius of warming, just one degree north of where we are today, some of the planet’s ice sheets are expected to begin their collapse, eventually bringing, over centuries, perhaps as much as 50 feet of sea-level rise. In the meantime, major cities in the equatorial band of the planet will become unlivable. There will be, it has been estimated, 32 times as many extreme heat waves in India, and even in the northern latitudes, heat waves will kill thousands each summer. Given only conventional methods of decarbonization (replacing dirty-energy sources like coal and oil with clean ones like wind and solar), this is probably our best-case scenario. It is also what is called — so often nowadays the phrase numbs the lips — “catastrophic warming.” A representative from the Marshall Islands spoke for many of the world’s island nations when he used another word to describe the meaning of two degrees: genocide. You do not need to contemplate worst-case scenarios to be alarmed; this best-case scenario is alarming enough. **Two degrees would be terrible, but it’s better than three**, at which point **Southern Europe would be in permanent drought**, African droughts would last five years on average, and the **areas burned**annually by wildfires in the United States **could quadruple**, or worse, from last year’s million-plus acres. And three degrees **is** much **better than four**, at which point six natural disasters could strike a single community **simultaneously**; the number of climate refugees, already in the millions, could grow tenfold, or 20-fold, or more; and, globally, damages from warming **could reach $600 trillion** — about double all the wealth that exists in the world today. We are on track for more warming still — just above four degrees by 2100, the U.N. estimates. So if optimism is always a matter of perspective, the possibility of four degrees shapes mine. It is unlikely, I think, that we reach four degrees this century. But this is what it would take to stay under two: a comprehensively decarbonized economy, a perfectly renewable energy system, a reimagined system of agriculture, perhaps even a planet without meat-eaters. We also need overhauls of the world’s transportation systems and infrastructure. Every year the average American emits enough carbon to melt 10,000 tons of ice in the Antarctic ice sheets — enough to add 10,000 cubic meters of water to the ocean. Every minute, we each add five gallons. If the task of reversing all that seems incomprehensibly big, it is. The scale of the technological transformation required dwarfs every technological revolution ever engineered in human history, including electricity and telecommunications and even the invention of agriculture 10,000 years ago. By definition, it dwarfs them, because it contains all of them — every single sector needs to be rebuilt from the foundation, since every single one breathes on carbon like it’s a ventilator. In October, the U.N.’s Intergovernmental Panel on Climate Change warned that the world has only a dozen years to halve its carbon emissions to safely avoid two degrees of warming and all those “catastrophic” impacts. Is it possible? The short answer is, technically speaking, maybe — though just maybe. But speaking practically, and politically, is another matter.

### 1NC – Ozone

#### Tourism thumps

Marais 21 Eloise Marais 7-19-2021 "Space tourism: rockets emit 100 times more CO₂ per passenger than flights – imagine a whole industry" <https://theconversation.com/space-tourism-rockets-emit-100-times-more-co-per-passenger-than-flights-imagine-a-whole-industry-164601> (Associate Professor in Physical Geography, UCL)//Elmer

The commercial race to get tourists to space is heating up between Virgin Group founder Sir Richard Branson and former Amazon CEO Jeff Bezos. On Sunday 11 July, Branson ascended 80 km to reach the edge of space in his piloted Virgin Galactic VSS Unity spaceplane. Bezos’ autonomous Blue Origin rocket is due to launch on July 20, coinciding with the anniversary of the Apollo 11 Moon landing. Though Bezos loses to Branson in time, he is set to reach higher altitudes (about 120 km). The launch will demonstrate his offering to very wealthy tourists: the opportunity to truly reach outer space. Both tour packages will provide passengers with a brief ten-minute frolic in zero gravity and glimpses of Earth from space. Not to be outdone, Elon Musk’s SpaceX will provide four to five days of orbital travel with its Crew Dragon capsule later in 2021. What are the environmental consequences of a space tourism industry likely to be? Bezos boasts his Blue Origin rockets are greener than Branson’s VSS Unity. The Blue Engine 3 (BE-3) will launch Bezos, his brother and two guests into space using liquid hydrogen and liquid oxygen propellants. VSS Unity used a hybrid propellant comprised of a solid carbon-based fuel, hydroxyl-terminated polybutadiene (HTPB), and a liquid oxidant, nitrous oxide (laughing gas). The SpaceX Falcon series of reusable rockets will propel the Crew Dragon into orbit using liquid kerosene and liquid oxygen. Burning these propellants provides the energy needed to launch rockets into space while also generating greenhouse gases and air pollutants. Large quantities of water vapour are produced by burning the BE-3 propellant, while combustion of both the VSS Unity and Falcon fuels produces CO₂, soot and some water vapour. The nitrogen-based oxidant used by VSS Unity also generates nitrogen oxides, compounds that contribute to air pollution closer to Earth. Roughly two-thirds of the propellant exhaust is released into the stratosphere (12 km-50 km) and mesosphere (50 km-85 km), where it can persist for at least two to three years. The very high temperatures during launch and re-entry (when the protective heat shields of the returning crafts burn up) also convert stable nitrogen in the air into reactive nitrogen oxides. These gases and particles have many negative effects on the atmosphere. In the stratosphere, nitrogen oxides and chemicals formed from the breakdown of water vapour convert ozone into oxygen, depleting the ozone layer which guards life on Earth against harmful UV radiation. Water vapour also produces stratospheric clouds that provide a surface for this reaction to occur at a faster pace than it otherwise would. Space tourism and climate change Exhaust emissions of CO₂ and soot trap heat in the atmosphere, contributing to global warming.

Cooling of the atmosphere can also occur, as clouds formed from the emitted water vapour reflect incoming sunlight back to space. A depleted ozone layer would also absorb less incoming sunlight, and so heat the stratosphere less. Figuring out the overall effect of rocket launches on the atmosphere will require detailed modelling, in order to account for these complex processes and the persistence of these pollutants in the upper atmosphere. Equally important is a clear understanding of how the space tourism industry will develop. Virgin Galactic anticipates it will offer 400 spaceflights each year to the privileged few who can afford them. Blue Origin and SpaceX have yet to announce their plans. But globally, rocket launches wouldn’t need to increase by much from the current 100 or so performed each year to induce harmful effects that are competitive with other sources, like ozone-depleting chlorofluorocarbons (CFCs), and CO₂ from aircraft. During launch, rockets can emit between four and ten times more nitrogen oxides than Drax, the largest thermal power plant in the UK, over the same period. CO₂ emissions for the four or so tourists on a space flight will be between 50 and 100 times more than the one to three tonnes per passenger on a long-haul flight. In order for international regulators to keep up with this nascent industry and control its pollution properly, scientists need a better understanding of the effect these billionaire astronauts will have on our planet’s atmosphere.

#### 1NC Fange – debris burns up before reentering the atmosphere

#### No Ozone Impact.

Ridley 14 (Matthew White Ridley, BA and PhD in Zoology from Oxford. “THE OZONE HOLE WAS EXAGGERATED AS A PROBLEM,” *Rational Optimist*, 9/25/14, <http://www.rationaloptimist.com/blog/the-ozone-hole-was-exaggerated-as-a-problem.aspx>) dwc 19

Serial hyperbole does the environmental movement no favours My recent Times column argued that the alleged healing of the ozone layer is exaggerated, but so was the impact of the ozone hole over Antarctica: The ozone layer is healing. Or so said the news last week. Thanks to a treaty signed in Montreal in 1989 to get rid of refrigerant chemicals called chlorofluorocarbons (CFCs), the planet’s stratospheric sunscreen has at last begun thickening again. Planetary disaster has been averted by politics. For reasons I will explain, this news deserves to be taken with a large pinch of salt. You do not have to dig far to find evidence that the ozone hole was never nearly as dangerous as some people said, that it is not necessarily healing yet and that it might not have been caused mainly by CFCs anyway. The timing of the announcement was plainly political: it came on the 25th anniversary of the treaty, and just before a big United Nations climate conference in New York, the aim of which is to push for a climate treaty modelled on the ozone one. Here’s what was actually announced last week, in the words of a Nasa scientist, Paul Newman: “From 2000 to 2013, ozone levels climbed 4 per cent in the key mid-northern latitudes.” That’s a pretty small change and it is in the wrong place. The ozone thinning that worried everybody in the 1980s was over Antarctica. Over northern latitudes, ozone concentration has been falling by about 4 per cent each March before recovering. Over Antarctica, since 1980, the ozone concentration has fallen by 40 or 50 per cent each September before the sun rebuilds it. So what’s happening to the Antarctic ozone hole? Thanks to a diligent blogger named Anthony Watts, I came across a press release also from Nasa about nine months ago, which said: “ Two new studies show that signs of recovery are not yet present, and that temperature and winds are still driving any annual changes in ozone hole size.” As recently as 2006, Nasa announced, quoting Paul Newman again, that the Antarctic ozone hole that year was “the largest ever recorded”. The following year a paper in Nature magazine from Markus Rex, a German scientist, presented new evidence that suggested CFCs may be responsible for less than 40 per cent of ozone destruction anyway. Besides, nobody knows for sure how big the ozone hole was each spring before CFCs were invented. All we know is that it varies from year to year. How much damage did the ozone hole ever threaten to do anyway? It is fascinating to go back and read what the usual hyperventilating eco-exaggerators said about ozone thinning in the 1980s. As a result of the extra ultraviolet light coming through the Antarctic ozone hole, southernmost parts of Patagonia and New Zealand see about 12 per cent more UV light than expected. This means that the weak September sunshine, though it feels much the same, has the power to cause sunburn more like that of latitudes a few hundred miles north. Hardly Armageddon. The New York Times reported “an increase in Twilight Zone-type reports of sheep and rabbits with cataracts” in southern Chile. Not to be outdone, Al Gore wrote that “hunters now report finding blind rabbits; fisherman catch blind salmon”. Zoologists briefly blamed the near extinction of many amphibian species on thin ozone. Melanoma in people was also said to be on the rise as a result. This was nonsense. Frogs were dying out because of a fungal disease spread from Africa — nothing to do with ozone. Rabbits and fish blinded by a little extra sunlight proved to be as mythical as unicorns. An eye disease in Chilean sheep was happening outside the ozone-depleted zone and was caused by an infection called pinkeye — nothing to do with UV light. And melanoma incidence in people actually levelled out during the period when the ozone got thinner.

### 1NC – Grid

#### No terminal impact to satellites or grid security – hold the line

#### No blackouts – redundancy solves

Walton 10/28 [(Robert, covers policy, regulation and business in Washington, D.C., with a focus on the natural gas and electric utility) “Sophisticated hackers could crash the US power grid, but money, not sabotage, is their focus,” Utility Dive, 10/28/2021] JL

And the U.S. grid is designed with such redundancy in mind, that even if a hacker were able to take down the largest generating asset on the grid — the 6.8 GW Grand Coulee Dam in Washington — it would not cause a blackout, said security consultant Tom Alrich.

"Plants being down should never be the cause of an outage," Alrich said. "That's the whole idea of a reliability coordinator. They make sure there's always enough backup to cover any contingency."

#### 1AC Denkenberger is about cyberattacks – plan can’t solve

Lastly, both physical [6, 8, 69, 89, 111] and cyber attacks [3, 63, 90, 96, 118, 128, 130] could also compromise electric grids. Physical attacks include traditional acts of terrorism such as bombing or sabotage [130] in addition to EMP attacks. Significant actors could scale up physical attacks, for example by using drones. A scenario could include terrorist groups hindering individual power plants [126], while a large adversary could undertake a similar operation physically to all plants and electrical grids in a region.

Unfortunately, the traditional power grid infrastructure is simply incapable of withstanding intentional physical attacks [91]. Damage to the electric grid resulting in physical attack could be long lasting, as most traditional power plants operate with large transformers that are difficult to move and source. Custom rebuilt transformers require time for replacement ranging from months and even up to years [91]. For example, a relatively mild 2013 sniper attack on California’s Pacific Gas and Electric (PG&E) substation, which injured no one directly, was able to disable 17 transformers supplying power to Silicon Valley. Repairs and improvements cost PG&E roughly $100 million and lasted about a month [10, 102]. A coordinated attack with relatively simple technology (e.g., guns) could cause a regional electricity disruption.

However, a high-tech attack could be even further widespread. The Pentagon reports spending roughly $100 million to repair cyber-related damages to the electric grid in 2009 [57]. There is also evidence that a computer virus caused an electrical outage in the Ukraine [56]. Unlike simplistic physical attacks, cyber attackers are capable of penetrating critical electric infrastructure from remote regions of the world, needing only communication pathways (e.g., the Internet or infected memory sticks) to install malware into the control systems of the electric power grid. For example, Stuxnet was a computer worm that destroyed Iranian centrifuges [73] to disable their nuclear industry. Many efforts are underway to harden the grid from such attacks [51, 63]. The U.S. Department of Homeland Security responded to ~ 200 cyber incidents in 2012 and 41% involved the electrical grid [103]. Nations routinely have made attempts to map current critical infrastructure for future navigation and control of the U.S. electrical system [57].

#### Cyber attacks on critical infrastructure are coming now

Underwood 20 [Kimberly Underwood is a reporter on emerging communication technologies, cyberwarfare, the intelligence community, military command operations and weaponry research. “China is Retooling, and Russia Seeks Harm to Critical Infrastructure.” June 24, 2020. <https://www.afcea.org/content/china-retooling-and-russia-seeks-harm-critical-infrastructure>]

Intelligence leader warns of the mounting threats of cyber espionage, digital attacks and influence operations from adversaries. U.S. adversaries are trying to take control of cyberspace as a medium, resulting in implications to our freedom of maneuver and access in cyberspace, says Brig. Gen. Gregory Gagnon, USAF, director of Intelligence (A2), Headquarters Air Combat Command (ACC), Joint Base Langley-Eustis. Increasing cyberspace activity is coming from China, Russia, Iran and North Korea. “We are seeing it not just in volume, but we are seeing an expansion in the ways that they use cyberspace, whether it is to steal information, whether it is to directly influence our citizens or whether it is to disrupt critical infrastructure,” Gen. Gagnon reports. The general spoke at the AFCEA Tidewater chapter’s recent monthly virtual luncheon. China and Russia continue to pose the greatest espionage and cyber attack threats to the United States, but the intelligence leader anticipates that other adversaries and strategic competitors will also build and integrate cyber espionage, cyber attacks and influence operations into how they conduct business. “Our strategic competitors will increasingly use cyber space capabilities including cyber espionage, cyber attack and continued influence operations to seek political, economic and military advantage over the United States, our allies and our partners,” he said. “This is not an ‘if,’ it is a yes. They are doing it and they will continue.” Gen. Gagnon warned that China in particular is using cyber espionage to collect intelligence, target critical infrastructure and steal intellectual property. It is all part of China’s plan to move from being a regional actor to being seen as a global power. The shift also means a greater role for the adversary’s military. The Chinese military is in the process of transitioning from a defensive, inflexible ground-based force charged with domestic and peripheral security to a joint, highly agile, expeditionary and power projecting arm of Chinese foreign policy, he noted. “What is going on in China is a dynamic revectoring of the objectives and goals of the People's Liberation Army,” Gen. Gagnon said. “This is not a small change. This is a major change in course and direction. They're doing it to be a power projection arm of a Chinese foreign policy that engages both in military diplomacy and operations around the globe, but also in predatory economic activity.” Moreover, China’s military spending in 2018 exceeded $200 billion, an increase of about 300% since 2002, the general stated. And while it is not the $750 billion that the United States government spends every year on military defense, the Chinese funding does not reflect the same level of investment in manpower or healthcare. A good portion of their $200 billion directly funds technology and capabilities. “A big chunk of our budget is not buying kit,” Gen. Gagnon explained. “If you're the CCP [Chinese Communist Party], you don't have the same extensive retirement programs that you have to pay for,” he said. “You don't have this extensive healthcare which you have to provide. So, when you think about $200 billion, think about that buying kit and buying operations. That is significant.” To the industry, Gen. Gagnon warned companies that Beijing will authorize Chinese espionage against key U.S technologies. “Many of your corporations hold this technology,” he stressed. “They are trying to undercut your ability to be profitable by developing those same technologies in China. They are competing against us in the international market. I will tell you that China's persistent cyber espionage threat and their growing tech threat to our core military and critical infrastructure will continue to be persistent. China remains the most active strategic competitor responsible for cyber espionage against corporations and allies.” China, like Russia, is also increasing its information warfare against the United States. “They are becoming more adept at using social media to deliver messages directly to the U.S. population that alter the way we think, the way we behave and the way we decide,” the general observed. The improvement of their cyber attack capabilities and ways to alter information online is intended to shape views inside China, shift the mindset of Chinese people around the world, as well as to try to shape the world’s view, not just of China, but also of the United States. “You are seeing that play out in the pandemic, how people view us around the world,” he offered. “We're also concerned about Chinese intelligence and security services,” the A2 continued. “They use Chinese information technology firms as routine and systemic espionage platforms against the United States and against our allies. Many of you are tracking what is in the news about 5G and Huawei, and that's what we're talking about.” As for Russia, their highly capable operations of cyber espionage, influence and cyber attacks continue to target the United States and its allies. In particular, Russia’s form of integrating cyber espionage attacks and influence operations, or information confrontation, is very effective, Gen. Gagnon emphasized. “If you think about it, they’re generally playing with the weaker hand, so they have been rather brilliant on the international stage in achieving their foreign policy objectives,” he said. In addition, Moscow is staging cyberattack assets to disrupt or damage U.S. military or civilian information systems during the COVID-19 pandemic. “There is activity that they undertake on a day-to-day basis to try to gain a decisive military intelligence,” he stated. “Their security services continue to target our systems, both for U.S. information systems and critical infrastructure, as well as the networks of our NATO and Five-Eye partners. They do it for positional advantage in cyberspace to be able to do the five Ds: deceive, deny, disrupt, degrade and destroy our assets, but also to gain intelligence on how systems are established and set up so that they can maintain attack vectors.” Russia also is targeting U.S. critical infrastructure, the general cautioned. “Russia has the ability to execute cyber attacks in the United States that can generate localized temporary disruptive effects on critical infrastructure, such as disrupting electric distribution networks for at least a few hours.” In fact, he warned, Moscow is mapping out critical infrastructure with the long-term goal of being able to cause “substantial damage.”

### 1NC – Food Insecurity

#### No food wars---no causal evidence, only maybe true for the poorest countries, and government responses solve the impact

Mark W. Rosegrant 13, Director of the Environment and Production Technology Division at the International Food Policy Research Institute, et al., 2013, “The Future of the Global Food Economy: Scenarios for Supply, Demand, and Prices,” in Food Security and Sociopolitical Stability, p. 39-40

Several researchers have studied the connection between food price shocks and conflict, finding at least some relationship between food prices and conflict. According to Dell et al. (2008), higher food prices lead to income declines and an increase in political instability, but only for poor countries. Researchers also found a positive and significant relationship between weather shocks (affecting food availability, prices, and real income) and the probability of suffering government repression or a civil war (Besley and Persson 2009). Arezki and Bruckner (2011) evaluated a constructed food price index and political variables, including data on riots and anti-government demonstrations and measures of civil unrest. Using data from 61 countries over the period 1970 to 2007, they found a direct connection between food price shocks and an increased likelihood of civil conflict, including riots and demonstrations.

Other researchers have broadened the analysis by considering government responses or underlying policies that affect local prices, and consequently influence outcomes and the linkage between food price shocks and conflict. Carter and Bates (2012) evaluated data from 30 developing countries for the time period 1961 to 2001, concluding that when governments mitigate the impact of food price shocks on urban consumers, the apparent relationship between food price shocks and civil war disappears. Moreover, when the urban consumers can expect a favorable response, the protests only serve as a motivation for a policy response rather than as a prelude to something more serious, such as violent demonstrations or even civil war.

Many in the international development community see war and conflict as a development issue, with a war or conflict severely damaging the local economy, which in turn leads to forced migration and dislocation, and ultimately acute food insecurity. Brinkman and Hendrix (2011) ask if it could be the other way around, with food insecurity causing conflict. Their answer, based on a review of the literature, is "a highly qualified yes," especially for intrastate conflict. The primary reason is that insecurity itself heightens the risk of democratic breakdown and civil conflict. The linkage connecting food insecurity to conflict is contingent on levels of economic development (a stronger linkage for poorer countries), existing political institutions, and other factors. The researchers say establishing causation directly is elusive, considering a lack of evidence for explaining individual behavior. The debate over cause and effect is ongoing.

Policies can nevertheless be implemented to reduce price variability. Less costly forms of stabilization, at least in terms of government outlays, include reducing import tariffs (and quotas) to lower prices and restricting exports to increase food availability. However, these types of policy responses, while perhaps helping an individual country's consumers in the short run, can lead to increased international price volatility, with potential for disproportionate adverse impacts on other countries that also may be experiencing food insecurity.

#### Resource conflict is inevitable from population and economic shifts--- scarcity creates cooperation that defuses conflict broadly

Dr. Thomas Bernauer 20, Professor of Political Science and Director of the Institute of Science, Technology and Policy (ISTP) at ETH Zurich, and Dr. Tobias Böhmelt, Professor of Government at the University of Essex, “International Conflict and Cooperation Over Freshwater Resources”, Nature Sustainability, Volume 3, https://www.nature.com/articles/s41893-020-0479-8

Unsustainable use of freshwater resources worldwide creates enormous challenges for human societies populating these natural systems, and these challenges are likely to grow with climate change. Will societies respond with increased cooperation to manage freshwater resources more sustainably or will there be more conflict over this scarce but vital resource? This review of research on conflict and cooperation over transboundary freshwater resources shows that, thus far, the prevailing response is cooperation, albeit non-violent conflict is quite frequent, too. It also documents substantial progress in understanding the drivers of water-related cooperation and conflict. Key knowledge gaps remain, particularly with respect to transboundary water conflict and cooperation in the past 10 to 15 years and in terms of local water-related events. The key prerequisite for filling these gaps is that the research community engages in a joint effort to address persistent shortcomings in existing event datasets on water cooperation and conflict.

Main

Scientific and policy debates over human impacts on global freshwater resources have been intensifying, particularly in the context of growing concerns about the implications of climate change for already stressed freshwater systems1,2,3. Climate change is likely to lead to greater variability and, in some places, an overall decrease of available freshwater, while human water use is likely to increase. The latter is driven primarily by population and economic growth as well as more consumption of goods with a high water footprint4. Projections such as these have led some scholars and policymakers to expect an increasing risk of conflicts, including violent ones, over scarce freshwater resources. Others, objecting to this Neo-Malthusian predicament, are more optimistic in view of humanity’s potential for social and technological innovation. While such expectations about the future are marked by great uncertainty, empirical research can help us understand whether and under what conditions human and climate-induced water scarcity has led to conflict or cooperative problem solving.

Human impacts on freshwater systems are well understood from a geophysical and biological perspective5,6,7,8,9,10. Much less is known about the implications of these impacts for the wellbeing of human societies relying on them. For example, controversy surrounds whether and how higher freshwater-related stress, resulting from overconsumption (water demand) or from climate-related variability and scarcity (water supply), might affect people, and how societies will respond and perform in terms of adaptive capacity and resilience. Potential effects of increased water stress on human security range from higher poverty and social instability to human migration and violent conflict within and between nations11,12,13,14.

Research on freshwater conflict and cooperation to mitigate and adapt to water problems has contributed in important ways to scientific and policy debates over the past two decades. Scholars have developed concepts and approaches to measure conflict and cooperation and to systematically assess their drivers. The most important literature in this field focuses on international freshwater catchments, on global comparisons of such catchments, and conflict and cooperation amongst riparian countries15,16,17,18,19,20. International river basins are defined by either a common water flow destination, or water flowing year-round across boundaries21. There currently are around 310 international river basins that are shared by 150 countries. They cover 47% of the world’s land surface and are home to 52% of the world’s population15. In this Review, we assess what we can learn from research on international freshwater conflict and cooperation, where our understanding remains limited, and how we can overcome existing gaps22.

Most studies on freshwater conflict and cooperation focus on individual international freshwater catchments and on policy options for dealing with the respective local challenges (for example, the Brahmaputra23, Indus24 or La Plata25 river basins). Complementing case-specific studies, we focus this Review on more general, global answers to several key questions: how prevalent are water conflict and cooperation in international freshwater catchments globally? Which catchments are more prone to water conflict or cooperation, and under what circumstances do we observe more conflict or cooperation? What conditions make catchments and their riparian countries more resilient to water-related stress and what role does international cooperation play here? Together with insights on specific freshwater catchments, answers to these questions contribute to a comprehensive assessment of anthropogenic impacts, adaptation and vulnerability with respect to global freshwater resources, and also to more informed policy choices.

Why focus on international water basins?

Freshwater-related conflict and cooperation can, in principle, be studied at any geographic, hydrological or social scale, for example, from small social groups such as a village to the water-catchment level as a hydrological unit. Climate change may be more likely to lead to local or sub-national than to international conflicts and there is an urgent need to concentrate more strongly on those as well. However, most scientific progress so far has been made on international freshwater conflict and cooperation, and we focus on this research for two additional reasons. The first reason is analytical. Generalizable conclusions about conflict and cooperation over freshwater resources should be based on a systematic comparison of a large number of clearly defined and homogeneous units, ideally for a known population. These conditions are met for countries and international freshwater catchments, all of which can be systematically identified and characterized, based on hydrological, political and other data. Such identification is more difficult for other units of analysis, such as social or ethnic groups, villages, cities and subsystems of water catchments. This also explains why the literature on freshwater conflict and cooperation at sub-national scales remains less developed (for exceptions, see refs. 18,26,27).

Second, because international freshwater catchments extend beyond national jurisdictions and their policy-making structures, effective policy responses to water stress require international collective action. In contrast to domestic water problems, which in principle can be addressed through interventions by a single government, problem-solving approaches among countries in international freshwater catchments are more complex and potentially more prone to failure15,19,20,28.

Characterizing freshwater catchments

A large literature focuses on individual cases and provides valuable insights into how water stress may lead to cooperative or conflictive outcomes, for example, via differences in how international negotiations and river management institutions are designed29,30,31,32,33,34,35,36,37. The main limitation of this research is that cooperation and conflict are empirically identified and measured differently, and explanations of particular outcomes are case-specific and based mostly on qualitative interpretation of evidence. This makes it difficult to generate generalizable conclusions about international freshwater cooperation and conflict, such as global development over time, spatial and temporal drivers, and which freshwater systems are at particular risk.

Quantitative research on conflict and cooperation in international river basins has made substantial progress over the past two decades. This applies in particular to generating better empirical data on the characteristics of international freshwater catchments and a widely accepted approach to measuring levels of cooperation and conflict. With regard to the characteristics of international freshwater catchments, based on geographic information systems and geophysical, political and other data, researchers have characterized the global landscape of international freshwater catchments. Generating this information is challenging, particularly because of technical difficulties in delineating, with high spatial resolution, the geophysical boundaries of freshwater catchments and the (sometimes time-varying) political boundaries of countries15,20,38.

One example for why increased spatial resolution is important concerns a popular hypothesis in the international water management literature. It holds that river settings with an upstream–downstream political geography are more prone to conflict. In such settings, the upstream country is likely to have an incentive to exploit its position in ways to impose damages on the downstream state (for example, reduced river flow). However, identifying where any given country in a catchment is located relative to other states is far from trivial, particularly in complex river geographies. Available data and methods now allow us to capture country and catchment boundaries with adequate precision. This also facilitates determining which countries in a catchment are more upstream or downstream, and how two or more states relate to each other in terms of freshwater dependencies15. We can thus use these measures to assess, for instance, whether upstream–downstream asymmetries between countries in freshwater catchments are, all else equal, associated with more water conflict and less cooperation.

To capture hydro-political dependence among riparian states, Beck et al.16, for example, employ a flow accumulation matrix that was created for each international river basin. They calculate the number of cells draining into a given country and determine the dependence of each riparian country on the other countries within a basin16. A flow interdependence matrix then indicates the flow contribution to each of the riparian countries. Based on these new data, they show that, contrary to conventional wisdom, there is no robust evidence for the claim that upstream–downstream catchments suffer from more water conflict than catchments with less pronounced upstream–downstream asymmetries.

Quantifying water conflict and cooperation

Generating accurate data on international freshwater conflict and cooperation is associated with a variety of challenges. In contrast to geophysical phenomena, social or political ones are usually not directly observable, but must be inferred from secondary sources. That said, most scholars now agree on what water-related cooperation and conflict means at the conceptual level, what procedures should be used to assess information from particular sources to generate numerical scores from this information, and how to structure such data for meaningful analysis14,20,39. In line with common practice in conflict research, conflict and cooperation are viewed as a social interaction that involves at least two actors. Hence, freshwater catchments with more than two countries are disaggregated into country pairs (for example, three country pairs, or dyads, in a catchment with three riparians).

Three main approaches capture conflict and/or cooperation over international freshwater catchments. First, conflict can be measured by means of widely available data on armed conflict40 and/or so-called militarized interstate disputes41. These outcomes are then combined with explanatory variables characterizing freshwater systems. Using this approach, various studies have examined whether water scarcity could, all else equal, increase the probability of armed hostilities between countries42. Second, cooperation over international freshwater resources can be operationalized via international water agreements, treaties, or joint river basin management approaches, among other variables along those lines43,44,45,46,47,48. For example, Giordano et al.47 identify 688 agreements signed between 1820 and 2007 that constitute 250 independent treaties and apply to 113 basins. Third, research coding event data for both conflict and cooperation builds on data collection approaches used in the study of international relations and conflict between countries (for example, the WEIS49 coding project or, more recently, the CAMEO50 framework and the Open Event Data Alliance51). Such coding is based on content analysis of global news media reporting, available from digital archives of translated reports, such as BBC Monitoring52 or Factiva53. Research teams have extracted large amounts of text material from these sources, using search algorithms that seek to strike a balance between capturing relevant reports and avoiding too many irrelevant items38. Human coders then identified water-related events and scored these on scales ranging from conflict to cooperation.

Studies based on the first approach, that is, those explaining armed conflict or militarized disputes in terms of water stress, have produced inconclusive findings15,16,41. Even if there is evidence for some water-related influence, other determinants of armed conflict actually play a much more important role than water stress. For example, Beck et al.16 or Bernauer and Böhmelt17 report a stronger impact of factors like income or population, which are indeed among the most robust predictors in ‘traditional’ armed-conflict models54. This finding mirrors the literature on climate change and political violence. Besides, this literature has three limitations. First, it focuses on identifying a possible correlation (all else equal) between water stress and conflict, but cannot tell us whether conflict, if observed, was directly water-related. This raises questions about the causal influence of water stress. Second, armed conflict is an extreme, and rare, form of social interactions. Concentrating on this disregards other types of conflictive interactions that water stress may induce. In fact, the basins-at-risk (BAR) scale discussed below demonstrates that non-violent conflict events are far more prevalent than violent ones. Third, this literature does not tell us much about the flip-side of conflict, that is, the conditions under which water stress may induce cooperative efforts and motivate societies to unleash their adaptive capacities11,13,27,41. The works on transboundary water cooperation42,43,44,45,46,47 address the latter point to some extent, but many of these studies focus on binary classifications of treaty formation. However, the overall degree of cooperation and eventual success cannot be comprehensively captured by a dichotomous item on whether states concluded a treaty on a transboundary water resource or not.

The main limitations of event-data coding, which we consider the most promising approach, pertain to the quality of the text material and the human-coding process. Media reporting in richer countries with free media is more likely to pick up events of interest and report on them with accuracy. This means, for instance, that conflictive events, relative to cooperative ones, might be underreported in authoritarian political systems. While this problem is not trivial, it is usually mitigated because at least the more important events (because of scale and intensity) tend to be covered by several media sources, including those in neighbouring countries or the international press. One alternative is to scrape the Internet or use social-media data, such as data from Twitter. But such information suffers from biases, too, because governments and other actors can manipulate Internet access and post wrong or misleading information. In addition, there are no information platforms that would offer consistent information for events-data coding in one or a few languages—the latter is needed to make the task manageable for a small- to medium-size research team (there are around 6,500 spoken languages in the world).

Another challenge is that in extracting and characterizing events from media text material, humans can make mistakes (for example, overlook certain information) or subjective assessments. Agreed definitions of key concepts and detailed coding instructions, scales and procedures have helped to reduce subjectivity and error. While the obvious next step would be to use automated (computerized) coding approaches, the material from which to code freshwater conflict and cooperation is more heterogeneous than for other applications, such as central bank statements, consumer sentiment or political party programs. Moreover, machine-learning algorithms may also be biased due to the data they are trained on. In sum, while some challenges remain and the data generated on freshwater conflict and cooperation are not perfect, they are probably as good in quality as the most commonly used social-sciences data, such as economic growth, democracy, poverty and so on.

Event-data coding of transboundary water conflict and cooperation is arguably the most widely used approach and has generated numerical information on freshwater-related events between pairs of countries in a given international catchment over time38. The BAR55,56,57 scale is one of the most prominent measures here: it ranges between –7 (maximum conflict) and +7 (maximum cooperation) and captures the degree of conflict and cooperation over international freshwater catchments between 1948 and 2008. Other datasets include the International River Basin Conflict and Cooperation (IRCC) data38 and the Issue Correlates of War − River Claims dataset56. Evidently, one shortcoming of the BAR data is that the most recent year covered is 2008. While we can still learn a lot from analysing data for 50 years, including information on the more recent past remains highly desirable from a policy perspective and in the scholarly interest.

Figure 1 illustrates the distribution of cooperation and conflict events across all freshwater catchments and countries, using median values of conflict and cooperation per year from 1948–2008. Perhaps surprisingly, states’ interaction over freshwater catchments is generally, that is, on global average of all catchments and countries in a given year, characterized by more cooperation than conflict. For the majority of years from 1948–2008, the median values of the BAR scale are well above 0, indicating that cooperation was more prevalent than conflict. From a policy perspective, it is interesting to pinpoint those catchments that experience most conflict or cooperation: hence, disaggregating the BAR scale by catchment.

The graph depicts three median splines across the BAR scale’s observation period for all possible BAR values, only cooperative (positive) ones, and only conflictive (negative) ones. The graph is based on data from www.transboundarywaters.science.oregonstate.edu.

Understanding the spatial and temporal distribution of international freshwater conflict and cooperation, in a descriptive sense, is important in its own right. However, it is also imperative to understand the drivers of variation in conflict and cooperation. Why do some catchments and/or pairs of countries in those catchments experience more conflict? Why is cooperation more prevalent in other cases?

Predictors of water cooperation and conflict

Accurate characterizations of international freshwater catchments and precise data on water conflict and cooperation are a precondition for meaningful analysis of drivers of water conflict and cooperation. Such analysis views conflict and cooperation as the outcomes to be explained and focuses both on conflict and cooperation at varying levels of intensity (for example, from conflictual verbal exchanges to violent conflict over water). Such research is obviously also of interest to practitioners because they are interested in which particular factors induce conflict or cooperation to identify risks and opportunities for cooperative solutions. Studies of factors associated with, or that cause variation in, the outcome variable (for example, the outbreak of armed conflict, the emergence of a water treaty, or values on the BAR scale) are based on a range of statistics, from correlational analysis to estimating the predictive power of specific determinants. In the following, we discuss the most common and robust predictors of transboundary water conflict and cooperation55,58,59.

#### No terminal impact to disease or internal link to nukes in 1AC Cribb – ask yourself which countries go to war