### Off 1

#### States ought to increase the role and resiliency of geospatial technology.

#### Counterplan solves case

Dr. Justin Sheffield et al. 18, Professor of Hydrology and Remote Sensing within Geography and Environmental Science at the University of Southampton, GECEO Research Group Leader, Research Scholar, in Department of Civil and Environmental Engineering at Princeton University (2000-2016), “Satellite Remote Sensing for Water Resources Management: Potential for Supporting Sustainable Development in Data-Poor Regions”, AGU, December, Volume 54, Issue 12, Pages 9724-9758, https://doi.org/10.1029/2017WR022437

5.3 Outlook

Satellite remote sensing is now able to provide near-real-time retrievals of nearly all components of the terrestrial water cycle, albeit with many challenges including those related to accuracy, consistency, continuity, and utility. Although much work is needed to enable and improve approaches for retrieving groundwater, water quality, surface water levels, and river flows, most of these retrievals are also global in coverage, and at the spatial, temporal, and spectral resolutions to resolve hydrological processes and their interaction with human activities. They are therefore well poised to provide information for WRM for operational and tactical decision-making. In particular, satellites can provide information in regions where in situ data are scarce, unreliable, or unavailable as a real-time information source. These opportunities should be leveraged to also support disaster risk management and reduction. Remote sensing products are progressively being integrated in national monitoring and early warning systems at the national and regional level, as the examples show in section 3 for the LAC region.

To fully realize the potential, however, requires an understanding of the multiple, independent, complementary, and competing data products, and their utility for a range of diverse management applications, including flood/drought risk assessment and the monitoring of water availability. Specifically, capacity needs to be built to work with satellite data and translate it into information that can inform the decision-making process. This, in turn, requires continuing and building on existing training programs and initiatives (e.g., UNESC/O International Hydrology Programme capacity development initiatives; NASA SERVIR, ARSET, and DEVELOP programs; ESA Tiger Initiative) to translate the often complex satellite data into formats and data delivery platforms that are easy to use for a range of users. Furthermore, a large gap remains between the availability of these products, and their uptake for decision-making. Therefore, an opportunity remains to engage more actively with the national stakeholders to strengthen capacities to use these remote sensing products, especially in data scarce regions, in order to build solutions and capabilities for monitoring and early warning applications of natural hazards in support of effective disaster risk reduction policies at the national level. To this effect, and to keep up with this fast-evolving field, the role of knowledge networks linking government agencies, universities and research centers, and international development organizations is essential.

### Off 2

#### Satellites key to drones and PGS

Jeremy Rabkin 17, Professor of Law at George Mason University; and John Yoo, Professor of Law at the University of California-Berkeley, 2017, Striking Power: How Cyber, Robots, and Space Weapons Change the Rules of War, p. 193-194

Since the end of the Cold War, space-based military systems have come to exert a more direct terrestrial impact. The global positioning system (GPS) allows U.S. aircraft, naval vessels, and ground units to locate their whereabouts and to direct their fire with precision. The stunning speed of the initial invasion of Iraq in 2003, like the earlier triumph of the Persian Gulf War in 1991, demonstrates the lethal success of military’ operations that integrate satellite communications and information gathering. The drone campaign against terrorist leaders in the Middle East and Pakistan depends on satellites to locate targets, conduct real-time surveillance, and then control the fire systems of the drones.

The future holds even more advances in store. Building on precision-guided munitions, the U.S. Defense Department is developing a “prompt global strike” system that will use GPS satellites to guide hypersonic missiles, armed with conventional warheads, to targets anywhere in the world within an hour.1 More exotic versions envision bombardments from orbital platforms using rods, which would generate their explosive force purely from the kinetic energy created by their high terminal velocity upon reentering the atmosphere. American planners speculate that such systems could replace the need for tactical nuclear weapons because of their combination of precision, speed, and destructive potential.

#### PGS causes destabilization and conflict.

Raf Casps 18, lecturer at the University of Birmingham and a Visiting Researcher at the United Nations Institute of Disarmament Research in Geneva before joining King’s College London and the UK’s Joint Services Command and Staff College. PhD in International Relations from Cambridge University, Medium, 6-21-2018, "Conventional Prompt Global Strike: Enhancing Deterrence?", https://medium.com/raf-caps/conventional-prompt-global-strike-enhancing-deterrence-dac5a0fe6af7

Undermining stability and deterrence

While past US Administrations have viewed CPGS as enhancing deterrence, these weapons have provoked intense debate, in particular how they will impact crisis stability. One of the most significant concerns is that Russia will view such weapons as a direct threat to its Strategic Nuclear Forces. Indeed, this outlook appears in Russian doctrine, and in policy statements in various international fora. For instance, at the 2015 Nuclear Non-proliferation Treaty Review Conference, the head of the Russian delegation stated that US policy hinders further nuclear reductions through its ‘intransigent course’, undermining strategic stability by pursuing, among other things, a missile defence system and the “prompt global strike” concept.[6] This is a consistent mantra. However, some argue that Russia overstates the danger to its forces. Russia is the only state beyond the US with a warning system that is capable of detecting a missile launch. Its over-the-horizon and space-based capabilities should be easily capable of discerning the difference between an ICBM and a CPGS weapon. And while a greater proportion of its deterrent is land-based than that of the US (and clearly that of Britain or France), Russia maintains a significant second-strike capability with its SLBM force. Russia’s willingness to introduce nuclear weapons at a lower threshold than other powers is also clearly established. Therefore, a disarming strike by the US against the Russian ICBM force, or perhaps even its command and control structure, would seem highly risky, and therefore unlikely. Nonetheless, Russia’s sensitivity over their nuclear deterrent cannot be underestimated. The nuclear deterrent is seen as integral to Russia’s claim to be a great power. In addition to this, Russian policy makers are keenly aware of the inferiority of their conventional forces to the US, which acts to magnify both the symbolic and strategic value of nuclear weapons to the Kremlin. Any perceived threat, real or otherwise, will serve to create significant concerns in Moscow.

The perceived threat from these weapons is further amplified when CPGS is allied to missile defence systems. There are numerous statements by Russian and Chinese officials as to the combined effect of these conventional systems, and their capability of a disarming first strike. Such fears have driven Russia to increase its reliance on tactical nuclear weapons, and to upgrade the robustness of its nuclear systems, while also hastening aerospace defence capabilities. The reliance on tactical nuclear weapons in particular brings negative consequence in terms of security and control. They are widely held to highly destabilizing, and change the metrics of deterrence.

Further concerns are created by the ambiguities that are inherent in CPGS designs. These relate to the type of warhead, the country targeted, and the type of target. The points relating to the ambiguity of whether a weapon carried a nuclear or conventional warhead has been discussed above. The withdrawal of funding for the CTM has probably eradicated this as an uncertainty, at least as far as the US programme is concerned. Basing options and inspections would serve to eliminate the vestiges of any further doubt. However, the latter two concerns are more persistent. The ability of CPGS platforms to manoeuvre means that their destination cannot be determined until late in the flight envelope — perhaps not until the final moments. Thus a strike on a third party could be interpreted by Russia (and perhaps China in the future if it builds a missile warning system) as a strike on itself, and trigger a response. The likelihood of such a scenario is slim, but cannot be discounted entirely. Similarly, a state detecting an incoming strike (again, only Russia currently) may incorrectly assume that the strike is targeting its nuclear capabilities, rather than conventional forces. The fear would be that it would result in a serious escalation of tension, or even a nuclear retaliation. However, it is worth noting that the current costs of CPGS technologies would mean that such strikes would involve very limited number of weapons. Such numbers may not be considered sufficient for Russia to retaliate, though they might present a greater concern for China and its smaller nuclear force. Thus it is unlikely that a CPGS strike would be overwhelming. Once more, however, it may be perceptions that matter most. The cost and complexity of US CPGS systems make it hard to persuade Moscow or Beijing that they are designed for much less capable states, and there appears an assumption that ‘orthodox’ nuclear deterrence may be ineffective against conventional counterforce threats.

Thus there is concern that CPGS could have significant impact on the global nuclear order, and perhaps also nuclear proliferation. Even though the US ties these to nuclear reductions, the increased emphasis on conventional weaponry may do very little to allay security concerns in other states. In a scenario of decreased nuclear weapons numbers, conventional weapons will only increase in salience. The consequences could reduce the prospects for future nuclear reductions, and possibly increase tendencies towards proliferation.

Beyond the potential effects on escalation dynamics, questions remain as to how well these weapons would perform their mission. As CPGS rely on precision for their effect, an important consideration is exactly how precise such a weapon would be, given range and manoeuvring, particularly in environments where navigational signals are degraded or denied. Related to this, the timeliness of information is critical. How the requisite ISTAR assets can be brought to bear in non-permissive environments to provide this information, and indeed if they can, whether they wouldn’t be a more effective delivery platform themselves, are further issues that need resolving. Stealth platforms, or future armed reconnaissance Remotely Piloted Air Systems (RPAS) could be more effective in this role.[7]

### Off 3

#### **Interp: aff’s must only effect the empty regions outside the atmosphere**

New World Encyclopedia ND, "Outer space," No Publication, https://www.newworldencyclopedia.org/entry/outer\_space

Outer space (often called space) consists of the relatively empty regions of the universe outside the atmospheres of celestial bodies. Outer space is used to distinguish it from airspace and terrestrial locations. There is no clear boundary between Earth's atmosphere and space, as the density of the atmosphere gradually decreases as the altitude increases.

#### Violation: they don’t;

#### Asteroids are celestial bodies

Team Leverage Edu, 5-21-2021, "Celestial Bodies: Planets, Comets, Asteroids and More," Leverage Edu, https://leverageedu.com/blog/celestial-bodies/

Asteroids are celestial bodies in space that are thin, irregularly formed rocks made of metal or minerals that revolve around the sun. These are mostly located between Mars and Jupiter in a region known as the asteroid belt.

#### Limits: Allowing celestial bodies creates an unpredictable research burden – the neg not only has to familiarize themselves with the privatization of outer space but also every planet ever – this kills limits on an already large topic

#### Ground: they kill neg ground allowing aff’s that effect planets kills neg ground through allowing aff’s to no link out of satellite and other specific DA’s

#### Predictability: literature base concludes neg – most people define outer space as in between athmospheres– including earth guts predictability for topic lit

Voter for fairness and education

## Case

### Inherency

Loopholes banning mining is not the ratification of the moon treaty --- the moon treaty bans permance wich means that there is so

#### OST prohibits space mining – squo solves – they do not meaningly change it

Bhattacharya 18 [Kriti Bhattacharya, National University of Juridical Sciences, West Bengal, India.] “The Viability of Space Mining in the Current Legal Regime” Astropolitics The International Journal of Space Politics & Policy Volume 16, 2018 - Issue 3 (https://doi.org/10.1080/14777622.2018.1536858)

Several private players have expressed their desire to mine resources in space. This posits ethical and legal concerns. Several scholars argue that space mining activities flout the national non-appropriation principle enshrined in Article II of the Outer Space Treaty. However, it is the opinion of the author that space mining does not per se violate the provisions of Article II, though space mining brings forward other concerns of breach of cooperation and environmental damage. The current legal regime is not adequately equipped to address these problems. The national legislations of several countries which allow for space mining do not address these issues. Even though an international regime emulating deep seabed mining addresses some of these concerns, the current political structure is not in favor of such a development. Hence, the legal viability of any potential space mining industry is on tenuous terms.

#### They’re inevitably mining now – proves no brink

Robert Garcia 18. Pacific Council on International Policy. “Regulating International Space Mining, an Enormous Industry.” https://www.pacificcouncil.org/newsroom/regulating-international-space-mining-enormous-industry

Many companies representing various international interests such as Deep Space Industries, British-based Asteroid Mining Corporation (AMC), and U.S.-based Planetary Resources are gearing up to pursue space mining efforts in the possible search for platinum, nickel, gold, and ferrous metals, among other materials. Russia and the European Space Agency are pursuing a joint project to mine ice on the moon. Even the traditionally-earthbound United States Geological Survey (USGS) is getting in on the act.

### Miscalc

#### No miscalc from satellite disruptions

Mazur 12 (Jonathan Mazur, Manager Engineering at Northrop Grumman, writing in Space & Defense, from the Eisenhower Center for Space and Defense Studies. Past U.S. Actions: Redlines in Space. Space & Defense, Volume 6, Number 1, Fall 2012. https://inss.ndu.edu/Portals/97/Space\_and\_Defense\_6\_1.pdf?ver=2018-09-06-135424-147)

U.S. Reactions To Foreign Disruption Of U.S. Capabilities

In the 1970s, it was suspected that a U.S. maritime communications satellite was turned off by the Soviets when it was outside of the range of U.S. tracking stations.25 There does not appear to be any documented U.S. reaction, and I suspect there was none. In the mid-1990s, satellite hackers in Brazil began hijacking U.S. military communication satellite signals to broadcast their own information, though it took until 2009 for Brazil to crack down on the illegal activity with the support of the DoD.26 In 1998, a U.S.-German satellite known as ROSAT was rendered useless after it turned suddenly toward the sun. NASA investigators later determined the accident was possibly linked to a cyber-intrusion by Russia.

The fallout? Though there was an ongoing criminal investigation as of 2008; NASA security officials have seemed determined to publicly minimize the seriousness of the threat.27 In 2003, a signal originating from Cuba—later determined to be coming from Iranian embassy property— was jamming a U.S. communications satellite that was transmitting Voice of America programming over Iran, which was publicly referred to as an “act of war” by a U.S. official. 28 Press reporting indicates the U.S. administration was [frozen]“paralyzed” about how to cope with the jamming that continued for at least a month, even after U.S. diplomatic protests to Cuba.29 In 2005, U.S. diplomats protested to the Libyan government after two international satellites were illegally jammed disrupting American diplomatic, military, and FBI communications.30 In 2006, press reporting indicates that China hit a U.S. spy satellite with a ground-based laser. This action was acknowledged by the then director of the NRO, though the DoD remained tight lipped about the incident.31

“We’re at a point where the technology’s out there, and the capability for people to do things to our satellites is there. I’m focused on it beyond any single event.” – Air Force Space Command Commander, General Chilton, 2006 32

In 2009, a U.S. commercial Iridium communications satellite—extensively used by the DoD—was accidently destroyed by a collision with a dead Russian satellite.33 The U.S. company, Iridium, was able to minimize any loss of service by implementing a network solution within a few days.34 As of early 2011, no legal action had been taken by the company either because it is not clear who was at fault or because it might be politically problematic for the United States, which is trying to enter into bi-lateral transparency and confidence-building measures (TCBM) with Russia regarding space activities.35 Since August of 2010, North Korea has been intermittently using GPS jamming equipment, which reportedly has been interfering with U.S. and South Korean military operations and civilian use south of the North Korean border.36 Reportedly, only South Korea and the United Nations International Telecommunications Union—at the request of South Korea—have issued letters to Pyongyang demanding the cessation of disruptive communications signals in South Korea.37

It appears that the only time the U.S. military has responded with force to a disruption in U.S. space capabilities was in 2003, a few days after the start of the Iraq war.38 According to U.S. officials, Iraq was using multiple GPS jammers—which supposedly did not affect military GPS functionality. However, the U.S. military bombed the jammers anyway after a diplomatic complaint to Russia.39 The use of military force against the GPS jamming threat was possibly because the United States was already intervening in Iraq, and the bombing probably would not have occurred if the United States was not at war.

#### Kessler is inevitable

**Wild 15** (Jim Wild, Professor of Space Physics at Lancaster University, “With So Much Vested In Satellites, Solar Storms Could Bring Life To A Standstill,” July 30, 2015, https://theconversation.com/with-so-much-vested-in-satellites-solar-storms-could-bring-life-to-a-standstill-45204)

These can disrupt satellite operations by depositing electrical charge within the on-board electronics, triggering phantom commands or overloading and damaging sensitive components. The effects of space weather on the Earth’s upper atmosphere disrupts radio signals transmitted by navigation satellites, potentially introducing positioning errors or, in more severe cases, rendering them unusable.

These are not theoretical hazards: in recent decades, solar storms have caused outages for a number of satellites services – and a handful of satellites have been lost altogether. These were costly events – satellite operator losses have run into hundreds of millions of dollars. The wider social and economic impact was relatively limited, but even so it’s unclear how our growing amount of space infrastructure would fare against the more extreme space weather that we might face.

When Space Weather Becomes A Hurricane

The largest solar storm on record was the Carrington event in September 1859, named after the British astronomer who observed it. Of course there were no Victorian satellites to suffer the consequences, but the telegraph systems of the time were crippled as electrical currents induced in the copper wires interfered with signals, electrocuted operators and set telegraph paper alight. The geomagnetic storm it triggered was so intense that the northern lights, usually a polar phenomenon, were observed as far south as the Bahamas.

Statistical analysis of this and other severe solar storms suggests that we can expect an event of this magnitude once every few hundred years – it’s a question of “when” rather than “if”. A 2007 study estimated a Carrington event today would cause US$30 billion in losses for satellite operators and threaten vital infrastructure in space and here on the ground. It’s a risk taken sufficiently seriously that it appears on the UK National Risk Register and has led the government to draw up its preparedness programme.

#### Space miscalc unlikely

Chen Lan 16, an independent analyst and founder of the 'Go Taikonauts!', “Chinese Space Quarterly Report”, January 2016, http://www.go-taikonauts.com/images/newsletters\_PDF/GoTaikonauts18.pdf

During the IAC 2015, China re-iterated the wish for international participation and cooperation in its space station project including extending the station by modules provided by international partners. Twitter messages posted by a European journalist from the Congress, that is still to be confirmed, however, showed a different view from ESA. ESA’s new Director General JohannDietrich Wörner said he had told China that the world does not need two space stations and will likely persuade China to drop its space station in favour of joining the ISS. On the other side, during the traditional “Heads of Space Agencies Panel” in IAC 2015, NASA Administrator Charles Bolden expressed his belief that the current exclusion of China from the ISS will not last forever. Though Sino-U.S. cooperation on human spaceflight is still uncertain, a positive move between the two countries has been made, that is the establishment of a space hotline. Western media reported in November that the hotline has been setup between Washington and Beijing to allow easy sharing of technical information about their space operations, hopefully **avoiding any misunderstandings or accidents.** Russia’s space agency Roscosmos on 17 December signed a cooperation agreement with the China National Space Administration (CNSA). The document was signed at the 20th regular meeting of Russian and Chinese Heads of Government, during Russian Prime Minister Dmitry Medvedev’s three-day visit to Beijing. The two

sides agreed to promote the use of “GLONASS” and “Beidou” and their augmentations in their own countries and around the world, expanding the market of navigation services provided by these systems. The two space agencies signed another agreement on the same day on cooperation in the field of space electronics. It was reported earlier that the two countries were discussing a barter deal that Russia will import Chinese space electronic components and will export rocket engines, presumably the RD-180, to China. However, an official statement about the agreement did not mention the engine. Also on the same day, Russian state-owned nanotechnology company RUSNANO and the China Aerospace Science and Industry Corporation (CASIC) signed a strategic partnership agreement. CNSA also signed an agreement with the Netherlands on 26 October, and a memorandum of understanding with the UAE (United Arab Emirates) on 15 December, on exploration and peaceful use of outer space. A year after India signed its first space cooperation agreement with China, scientists from ISRO and the Chinese space agency have decided on six major areas of interest, including the hosting of payloads on each other’s satellites and inter-planetary missions. The other areas of interest are Earth observation, disaster management, space science and navigation, as the Times of India reported on 5 October. The Brazilian Ministry of Science, Technology and Innovation announced on 30 December that the sixth CBERS (China-Brazil Earth Resources Satellite) satellite, CBERS-4A, is scheduled to be launched into space in December 2018. The Planetary Science Institute signed a cooperation agreement with the Qian Xuesen Laboratory of Space Technology (Qian Xuesen Lab), CAST, on 15 December to advance their mutual interests in facilitating the open-ended expansion of the exploration of the solar system and to use the knowledge thus gained in supporting the expansion of human activity beyond the Earth. Both institutions also wish to advance their common interest in communicating to the public the knowledge and benefits gained through robotic and human exploration of the solar system.

#### Kessler Syndrome false – less debris and existing guidelines solve

Lewis 15 (Hugh, Senior Lecturer in Aerospace Engineering at the University of Southampton, “Space debris, Kessler Syndrome, and the unreasonable expectation of certainty.” Room, <https://room.eu.com/article/Space_debris_Kessler_Syndrome_and_the_unreasonable_expectation_of_certainty>, Accessed 8/10/19, JMoore)

There is now widespread awareness of the space debris problem amongst policymakers, scientists, engineers and the public. Thanks to pivotal work by J.C. Liou and Nicholas Johnson in 2006 we now understand that the continued growth of the debris population is likely in the future even if all launch activity is halted. The reason for this sustained growth, and for the concern of many satellite operators who are forced to act to protect their assets, are collisions that are expected to occur between objects – satellites and rocket stages – already in orbit. In spite of several commentators warning that these collisions are just the start of a collision cascade that will render access to low Earth orbit all but impossible – a process commonly referred to as the ‘Kessler Syndrome’ after the debris scientist Donald Kessler – the reality is not likely to be on the scale of these predictions or the events depicted in the film Gravity. Indeed, results presented by the Inter-Agency Space Debris Coordination Committee (IADC) at the Sixth European Conference on Space Debris show an expected increase in the debris population of only 30% after 200 years with continued launch activity. Collisions are still predicted to occur, but this is far from the catastrophic scenario feared by some. Constraining the population increase to a modest level can be achieved, the IADC suggested, through widespread and good compliance with existing space debris mitigation guidelines, especially those relating to passivation (whereby all sources of stored energy on a satellite are depleted at the end of its mission) and post-mission disposal, such as de-orbiting the satellite or re-orbiting it to a graveyard orbit. Nevertheless, the anticipated growth of the debris population in spite of these robust efforts merits the investigation of additional measures to address the debris threat, according to the IADC.

#### No space war and terrestrial conflict turns it

Luke Penn-Hall 15, Analyst at The Cipher Brief, M.A. from the Johns Hopkins School for Advanced International Studies, B.A. in International Relations and Religious Studies from Claremont McKenna College, “5 Reasons “Space War” Isn’t As Scary As It Sounds”, The Cipher Brief, 8/18/2015, https://www.thecipherbrief.com/article/5-reasons-%E2%80%9Cspace-war%E2%80%9D-isn%E2%80%99t-scary-it-sounds

The U.S. depends heavily on military and commercial satellites. If a less satellite-dependent opponent launched an anti-satellite (ASAT) attack, it would have far greater impact on the U.S. than the attacker. However, it’s not as simple as that – for the following reasons:

1. An ASAT attack would likely be part of a larger, terrestrial attack. An attack on space assets would be no different than an attack on territory or other assets on earth. This means that no space war would stay limited to space. An ASAT campaign would be part of a larger conventional military conflict that would play out on earth.

2. Every country with ASAT capabilities also needs satellites. While the United States is the most dependent on military satellites, most other countries need satellites to participate in the global economy. All countries that have the technical ability to play in this space – the U.S., Russia, China and India - also have a vested interest in preventing the militarization of space and protecting their own satellites. If any of those countries were to attack U.S. satellites, it would likely hurt them far more than it would hurt the United States.

3. Destruction of satellites could create a damaging chain reaction. Scientists warn that the violent destruction of satellites could result in an effect called an ablation cascade. High-velocity debris from a destroyed satellite could crash into other satellites and create more high-velocity debris. If an ablation cascade were to occur, it could render certain orbital levels completely unusable for centuries.

4. Any country that threatened access to space would threaten the global economy. Even if a full-blown ablation cascade didn’t occur, an ASAT campaign would cause debris, making operating in space more hazardous. The global economy relies on satellites and any disruption of operations would be met with worldwide disapproval and severe economic ramifications.

5. International Prohibits the Use of ASAT Weapons. Several international treaties expressly prohibit signatory nations from attacking other countries’ space assets. It is generally accepted that space should be treated as a global common area, rather than a military domain.

While it remains necessary for military planners to create contingency plans for a, space war it is a highly unlikely scenario. All involved parties are incentivized against attacking. However, if a space war did occur, it would be part of a larger conflict on Earth. Those concerned about the potential for war in space should be more concerned about the potential for war, period.

#### No miscalc or escalation

James Pavur 19, DPhil Researcher at the Cybersecurity Centre for Doctoral Training at Oxford University, and Ivan Martinovic, Professor of Computer Science in the Department of Computer Science at Oxford University, “The Cyber-ASAT: On the Impact of Cyber Weapons in Outer Space”, 2019 11th International Conference on Cyber Conflict: Silent Battle, https://ccdcoe.org/uploads/2019/06/Art\_12\_The-Cyber-ASAT.pdf

A. Limited Accessibility

Space is difficult. Over 60 years have passed since the first Sputnik launch and only nine countries (ten including the EU) have orbital launch capabilities. Moreover, a launch programme alone does not guarantee the resources and precision required to operate a meaningful ASAT capability. Given this, one possible reason why space wars have not broken out is simply because only the US has ever had the ability to fight one [21, p. 402], [22, pp. 419–420].

Although launch technology may become cheaper and easier, it is unclear to what extent these advances will be distributed among presently non-spacefaring nations. Limited access to orbit necessarily reduces the scenarios which could plausibly escalate to ASAT usage. Only major conflicts between the handful of states with ‘space club’ membership could be considered possible flashpoints. Even then, the fragility of an attacker’s own space assets creates de-escalatory pressures due to the deterrent effect of retaliation. Since the earliest days of the space race, dominant powers have recognized this dynamic and demonstrated an inclination towards de-escalatory space strategies [23].

B. Attributable Norms

There also exists a long-standing normative framework favouring the peaceful use of space. The effectiveness of this regime, centred around the Outer Space Treaty (OST), is highly contentious and many have pointed out its serious legal and political shortcomings [24]–[26]. Nevertheless, this status quo framework has somehow supported over six decades of relative peace in orbit.

Over these six decades, norms have become deeply ingrained into the way states describe and perceive space weaponization. This de facto codification was dramatically demonstrated in 2005 when the US found itself on the short end of a 160-1 UN vote after opposing a non-binding resolution on space weaponization. Although states have occasionally pushed the boundaries of these norms, this has typically occurred through incremental legal re-interpretation rather than outright opposition [27]. Even the most notable incidents, such as the 2007-2008 US and Chinese ASAT demonstrations, were couched in rhetoric from both the norm violators and defenders, depicting space as a peaceful global commons [27, p. 56]. Altogether, this suggests that states perceive real costs to breaking this normative tradition and may even moderate their behaviours accordingly.

One further factor supporting this norms regime is the high degree of attributability surrounding ASAT weapons. For kinetic ASAT technology, plausible deniability and stealth are essentially impossible. The literally explosive act of launching a rocket cannot evade detection and, if used offensively, retaliation. This imposes high diplomatic costs on ASAT usage and testing, particularly during peacetime.

C. Environmental Interdependence

A third stabilizing force relates to the orbital debris consequences of ASATs. China’s 2007 ASAT demonstration was the largest debris-generating event in history, as the targeted satellite dissipated into thousands of dangerous debris particles [28, p. 4]. Since debris particles are indiscriminate and unpredictable, they often threaten the attacker’s own space assets [22, p. 420]. This is compounded by Kessler syndrome, a phenomenon whereby orbital debris ‘breeds’ as large pieces of debris collide and disintegrate. As space debris remains in orbit for hundreds of years, the cascade effect of an ASAT attack can constrain the attacker’s long-term use of space [29, pp. 295– 296]. Any state with kinetic ASAT capabilities will likely also operate satellites of its own, and they are necessarily exposed to this collateral damage threat. Space debris thus acts as a strong strategic deterrent to ASAT usage.

### Africa

#### Economic decline doesn’t cause war.

Dr. Stephen M. Walt 20, Robert and Renée Belfer Professor of International Relations at Harvard University, PhD in International Relations (with Distinction) from Stanford University, MA in Political Science from the University of California, Berkeley, “Will a Global Depression Trigger Another World War?”, Foreign Policy, 5/13/2020, https://foreignpolicy.com/2020/05/13/coronavirus-pandemic-depression-economy-world-war/

For these reasons, the pandemic itself may be conducive to peace. But what about the relationship between broader economic conditions and the likelihood of war? Might a few leaders still convince themselves that provoking a crisis and going to war could still advance either long-term national interests or their own political fortunes? Are the other paths by which a deep and sustained economic downturn might make serious global conflict more likely? One familiar argument is the so-called diversionary (or “scapegoat”) theory of war. It suggests that leaders who are worried about their popularity at home will try to divert attention from their failures by provoking a crisis with a foreign power and maybe even using force against it. Drawing on this logic, some Americans now worry that President Donald Trump will decide to attack a country like Iran or Venezuela in the run-up to the presidential election and especially if he thinks he’s likely to lose. This outcome strikes me as unlikely, even if one ignores the logical and empirical flaws in the theory itself. War is always a gamble, and should things go badly—even a little bit—it would hammer the last nail in the coffin of Trump’s declining fortunes. Moreover, none of the countries Trump might consider going after pose an imminent threat to U.S. security, and even his staunchest supporters may wonder why he is wasting time and money going after Iran or Venezuela at a moment when thousands of Americans are dying preventable deaths at home. Even a successful military action won’t put Americans back to work, create the sort of testing-and-tracing regime that competent governments around the world have been able to implement already, or hasten the development of a vaccine. The same logic is likely to guide the decisions of other world leaders too. Another familiar folk theory is “military Keynesianism.” War generates a lot of economic demand, and it can sometimes lift depressed economies out of the doldrums and back toward prosperity and full employment. The obvious case in point here is World War II, which did help the U.S economy finally escape the quicksand of the Great Depression. Those who are convinced that great powers go to war primarily to keep Big Business (or the arms industry) happy are naturally drawn to this sort of argument, and they might worry that governments looking at bleak economic forecasts will try to restart their economies through some sort of military adventure. I doubt it. It takes a really big war to generate a significant stimulus, and it is hard to imagine any country launching a large-scale war—with all its attendant risks—at a moment when debt levels are already soaring. More importantly, there are lots of easier and more direct ways to stimulate the economy—infrastructure spending, unemployment insurance, even “helicopter payments”—and launching a war has to be one of the least efficient methods available. The threat of war usually spooks investors too, which any politician with their eye on the stock market would be loath to do. Economic downturns can encourage war in some special circumstances, especially when a war would enable a country facing severe hardships to capture something of immediate and significant value. Saddam Hussein’s decision to seize Kuwait in 1990 fits this model perfectly: The Iraqi economy was in terrible shape after its long war with Iran; unemployment was threatening Saddam’s domestic position; Kuwait’s vast oil riches were a considerable prize; and seizing the lightly armed emirate was exceedingly easy to do. Iraq also owed Kuwait a lot of money, and a hostile takeover by Baghdad would wipe those debts off the books overnight. In this case, Iraq’s parlous economic condition clearly made war more likely. Yet I cannot think of any country in similar circumstances today. Now is hardly the time for Russia to try to grab more of Ukraine—if it even wanted to—or for China to make a play for Taiwan, because the costs of doing so would clearly outweigh the economic benefits. Even conquering an oil-rich country—the sort of greedy acquisitiveness that Trump occasionally hints at—doesn’t look attractive when there’s a vast glut on the market. I might be worried if some weak and defenseless country somehow came to possess the entire global stock of a successful coronavirus vaccine, but that scenario is not even remotely possible. If one takes a longer-term perspective, however, a sustained economic depression could make war more likely by strengthening fascist or xenophobic political movements, fueling protectionism and hypernationalism, and making it more difficult for countries to reach mutually acceptable bargains with each other. The history of the 1930s shows where such trends can lead, although the economic effects of the Depression are hardly the only reason world politics took such a deadly turn in the 1930s. Nationalism, xenophobia, and authoritarian rule were making a comeback well before COVID-19 struck, but the economic misery now occurring in every corner of the world could intensify these trends and leave us in a more war-prone condition when fear of the virus has diminished. On balance, however, I do not think that even the extraordinary economic conditions we are witnessing today are going to have much impact on the likelihood of war. Why? First of all, if depressions were a powerful cause of war, there would be a lot more of the latter. To take one example, the United States has suffered 40 or more recessions since the country was founded, yet it has fought perhaps 20 interstate wars, most of them unrelated to the state of the economy. To paraphrase the economist Paul Samuelson’s famous quip about the stock market, if recessions were a powerful cause of war, they would have predicted “nine out of the last five (or fewer).” Second, states do not start wars unless they believe they will win a quick and relatively cheap victory. As John Mearsheimer showed in his classic book Conventional Deterrence, national leaders avoid war when they are convinced it will be long, bloody, costly, and uncertain. To choose war, political leaders have to convince themselves they can either win a quick, cheap, and decisive victory or achieve some limited objective at low cost. Europe went to war in 1914 with each side believing it would win a rapid and easy victory, and Nazi Germany developed the strategy of blitzkrieg in order to subdue its foes as quickly and cheaply as possible. Iraq attacked Iran in 1980 because Saddam believed the Islamic Republic was in disarray and would be easy to defeat, and George W. Bush invaded Iraq in 2003 convinced the war would be short, successful, and pay for itself. The fact that each of these leaders miscalculated badly does not alter the main point: No matter what a country’s economic condition might be, its leaders will not go to war unless they think they can do so quickly, cheaply, and with a reasonable probability of success. Third, and most important, the primary motivation for most wars is the desire for security, not economic gain. For this reason, the odds of war increase when states believe the long-term balance of power may be shifting against them, when they are convinced that adversaries are unalterably hostile and cannot be accommodated, and when they are confident they can reverse the unfavorable trends and establish a secure position if they act now. The historian A.J.P. Taylor once observed that “every war between Great Powers [between 1848 and 1918] … started as a preventive war, not as a war of conquest,” and that remains true of most wars fought since then. The bottom line: Economic conditions (i.e., a depression) may affect the broader political environment in which decisions for war or peace are made, but they are only one factor among many and rarely the most significant. Even if the COVID-19 pandemic has large, lasting, and negative effects on the world economy—as seems quite likely—it is not likely to affect the probability of war very much, especially in the short term.

#### Covid thumps the adv – card in 2017 proves war should have alr gappened

#### No China wars.

Thompson 17 – Timothy Heath, a senior international defense research analyst at the RAND Corporation. William R. Thompson, Political Science Professor at Indiana University. [U.S.-China Tensions Are Unlikely to Lead to War, https://www.rand.org/blog/2017/05/us-china-tensions-are-unlikely-to-lead-to-war.html]

Graham Allison's April 12 article, “How America and China Could Stumble to War,” explores how misperceptions and bureaucratic dysfunction could accelerate a militarized crisis involving the United States and China into an unwanted war. However, the article fails to persuade because it neglects the key political and geostrategic conditions that make war plausible in the first place. Without those conditions in place, the risk that a crisis could accidentally escalate into war becomes far lower. The U.S.-China relationship today may be trending towards greater tension, but the relative stability and overall low level of hostility make the prospect of an accidental escalation to war extremely unlikely.

In a series of scenarios centered around the South China Sea, Taiwan and the East China Sea, Allison explored how well-established flashpoints involving China and the United States and its allies could spiral into unwanted war. Allison’s article argues that given the context of strategic rivalry between a rising power and a status-quo power, organizational and bureaucratic misjudgments increase the likelihood of unintended escalation. According to Allison, “the underlying stress created by China’s disruptive rise creates conditions in which accidental, otherwise inconsequential events could trigger a large-scale conflict.” This argument appears persuasive on its surface, in no small part because it evokes insights from some of Allison’s groundbreaking work on the organizational pathologies that made the Cuban Missile Crisis so dangerous.

However, Allison ultimately fails to persuade because he fails to specify the political and strategic conditions that make war plausible in the first place. Allison’s analysis implies that the United States and China are in a situation analogous to that of the Soviet Union and the United States in the early 1960s. In the Cold War example, the two countries faced each other on a near-war footing and engaged in a bitter geostrategic and ideological struggle for supremacy. The two countries experienced a series of militarized crises and fought each other repeatedly through proxy wars. It was this broader context that made issues of misjudgment so dangerous in a crisis.

By contrast, the U.S.-China relationship today operates at a much lower level of hostility and threat. China and the United States may be experiencing an increase in tensions, but the two countries remain far from the bitter, acrimonious rivalry that defined the U.S.-Soviet relationship in the early 1960s. Neither Washington nor Beijing regards the other as its principal enemy. Today’s rivals may view each other warily as competitors and threats on some issues, but they also view each other as important trade partners and partners on some shared concerns, such as North Korea, as the recent summit between President Donald Trump and Chinese president Xi Jinping illustrated. The behavior of their respective militaries underscores the relatively restrained rivalry. The military competition between China and the United States may be growing, but it operates at a far lower level of intensity than the relentless arms racing that typified the U.S.-Soviet standoff. And unlike their Cold War counterparts, U.S. and Chinese militaries are not postured to fight each other in major wars. Moreover, polls show that the people of the two countries regard each other with mixed views—a considerable contrast from the hostile sentiment expressed by the U.S. and Soviet publics for each other. Lacking both preparations for major war and a constituency for conflict, leaders and bureaucracies in both countries have less incentive to misjudge crisis situations in favor of unwarranted escalation.

To the contrary, political leaders and bureaucracies currently face a strong incentive to find ways of defusing crises in a manner that avoids unwanted escalation. This inclination manifested itself in the EP-3 airplane collision off Hainan Island in 2001, and in subsequent incidents involving U.S. and Chinese ships and aircraft, such as the harassment of the USNS Impeccable in 2009. This does not mean that there is no risk, however. Indeed, the potential for a dangerous militarized crisis may be growing. Moreover, key political and geostrategic developments could shift the incentives for leaders in favor of more escalatory options in a crisis and thereby make Allison’s scenarios more plausible. Past precedents offer some insight into the types of developments that would most likely propel the U.S.-China relationship into a hostile, competitive one featuring an elevated risk of conflict.

The most important driver, as Allison recognizes, would be a growing parity between China and the United States as economic, technological and geostrategic leaders of the international system. The United States and China feature an increasing parity in the size of their economies, but the United States retains a considerable lead in virtually every other dimension of national power. The current U.S.-China rivalry is a regional one centered on the Asia-Pacific region, but it retains the considerable potential of escalating into a global, systemic competition down the road. A second important driver would be the mobilization of public opinion behind the view that the other country is a primary source of threat, thereby providing a stronger constituency for escalatory policies. A related development would be the formal designation by leaders in both capitals of the other country as a primary hostile threat and likely foe. These developments would most likely be fueled by a growing array of intractable disputes, and further accelerated by a serious militarized crisis. The cumulative effect would be the exacerbation of an antagonistic competitive rivalry, repeated and volatile militarized crisis, and heightened risk that any flashpoint could escalate rapidly to war—a relationship that would resemble the U.S.-Soviet relationship in the early 1960s.

Yet even if the relationship evolved towards a more hostile form of rivalry, unique features of the contemporary world suggest lessons drawn from the past may have limited applicability. Economic interdependence in the twenty-first century is much different and far more complex than in it was in the past. So is the lethality of weaponry available to the major powers. In the sixteenth century, armies fought with pikes, swords and primitive guns. In the twenty-first century, it is possible to eliminate all life on the planet in a full-bore nuclear exchange. These features likely affect the willingness of leaders to escalate in a crisis in a manner far differently than in past rivalries.

More broadly, Allison’s analysis about the “Thucydides Trap” may be criticized for exaggerating the risks of war. In his claims to identify a high propensity for war between “rising” and “ruling” countries, he fails to clarify those terms, and does not distinguish the more dangerous from the less volatile types of rivalries. Contests for supremacy over land regions, for example, have historically proven the most conflict-prone, while competition for supremacy over maritime regions has, by contrast, tended to be less lethal. Rivalries also wax and wane over time, with varying levels of risks of war. A more careful review of rivalries and their variety, duration and patterns of interaction suggests that although most wars involve rivalries, many rivals avoid going to war.

#### 4---No impact to econ decline – it solves war

Christopher Clary 15 (Christopher Clary is a former International Affairs Fellow in India at the Council on Foreign Relations, Postdoctoral Fellow at the Watson Institute at Brown University, Adjunct Staff Member at RAND Corporation, Security Studies Program at MIT, country director for South Asian affairs in the Office of the Secretary of Defense, former Research Fellow at the Harvard Kennedy School's Belfer Center for Science and International Affairs, and former research associate in the Department of National Security Affairs at the Naval Postgraduate School, 4/22/15, accessed 5/10/21, “Economic Stress and International Cooperation: Evidence from International Rivalries”, https://papers.ssrn.com/sol3/papers.cfm?abstract\_id=2597712)AGabay

Abstract: Do **economic downturns** generate pressure for diversionary conflict? Or might **downturns encourage austerity** and **economizing** behavior in **foreign policy**? This paper provides new evidence that **economic stress** is associated with conciliatory policies between **strategic rivals**. For states that view each other as military threats, the biggest step possible toward **bilateral cooperation** is to **terminate** the **rivalry** by taking **political steps** to manage the **competition**. Drawing on data from **109 distinct rival dyads** since 1950, **67 of which terminated**, the evidence suggests rivalries were approximately twice as likely to terminate during economic downturns than they were during **periods of economic normalcy**. This is true controlling for all of the **main alternative explanations** for **peaceful** **relations** between foes (democratic status, nuclear weapons possession, capability imbalance, common enemies, and international systemic changes), as well as many other possible **confounding variables**. This research questions existing theories claiming that **economic downturns** are associated with diversionary war, and instead argues that in certain circumstances peace may result from economic troubles. Defining and Measuring Rivalry and Rivalry Termination I define a rivalry as the perception by national elites of two states that the other state possesses conflicting interests and presents a military threat of sufficient severity that future military conflict is likely. Rivalry termination is the transition from a state of rivalry to one where conflicts of interest are not viewed as being so severe as to provoke interstate conflict and/or where a mutual recognition of the imbalance in military capabilities makes conflict-causing bargaining failures unlikely. In other words, rivalries terminate when the elites assess that the risks of military conflict between rivals has been reduced dramatically. This definition draws on a growing quantitative literature most closely associated with the research programs of William Thompson, J. Joseph Hewitt, and James P. Klein, Gary Goertz, and Paul F. Diehl.1 My definition conforms to that of William Thompson. In work with Karen Rasler, they define rivalries as situations in which “[b]oth actors view each other as a significant politicalmilitary threat and, therefore, an enemy.”2 In other work, Thompson writing with Michael Colaresi, explains further: The presumption is that decisionmakers explicitly identify who they think are their foreign enemies. They orient their military preparations and foreign policies toward meeting their threats. They assure their constituents that they will not let their adversaries take advantage. Usually, these activities are done in public. Hence, we should be able to follow the explicit cues in decisionmaker utterances and writings, as well as in the descriptive political histories written about the foreign policies of specific countries.3 Drawing from available records and histories, Thompson and David Dreyer have generated a universe of strategic rivalries from 1494 to 2010 that serves as the basis for this project’s empirical analysis.4 This project measures rivalry termination as occurring on the last year that Thompson and Dreyer record the existence of a rivalry.5 Why Might Economic Crisis Cause Rivalry Termination? Economic crises lead to conciliatory behavior through **five primary channels**. (1) Economic crises lead to **austerity pressures**, which in turn **incent leaders to** search for ways to **cut defense expenditures**. (2) Economic crises also encourage strategic reassessment, so that leaders **can argue to their peers** and their **publics** that defense spending can be **arrested** without **endangering the state**. This can lead to threat deflation, where **elites attempt to downplay** the **seriousness** of the **threat** posed by a former rival. (3) If a state faces multiple threats, economic crises **provoke elites** to consider **threat prioritization**, a process that is **postponed** during periods of **economic normalcy**. (4) Economic crises increase the **political** and **economic** benefit from international economic cooperation. Leaders seek foreign aid, enhanced trade, and increased investment from abroad during periods of economic trouble. This search is made easier if tensions are reduced with historic rivals. (5) Finally, during crises, elites are more prone to **select leaders** who are perceived as **capable of resolving** economic **difficulties**, permitting the **emergence of leaders** who hold heterodox **foreign policy views.** Collectively, these mechanisms make it much more likely that a leader will prefer conciliatory policies compared to during periods of economic normalcy. This section reviews this causal logic in greater detail, while also providing historical examples that these mechanisms recur in practice.

#### 5---Stats prove

Daniel W. DREZNER, professor of international politics at the Fletcher School of Law and Diplomacy at Tufts University, 14 [“The System Worked: Global Economic Governance during the Great Recession,” *World Politics*, Vol. 66, No. 1 (January 2014), p. 123-164]

The final significant outcome addresses a dog that hasn't barked: the effect of the Great Recession on cross-border conflict and violence. During the initial stages of the crisis, multiple analysts asserted that the financial crisis would lead states to increase their use of force as a tool for staying in power.42 They voiced genuine concern that the global economic downturn would lead to an increase in conflict—whether through greater internal repression, diversionary wars, arms races, or a ratcheting up of great power conflict. Violence in the Middle East, border disputes in the South China Sea, and even the disruptions of the Occupy movement fueled impressions of a surge in global public disorder.

The aggregate data suggest otherwise, however. The Institute for Economics and Peace has concluded that "the average level of peacefulness in 2012 is approximately the same as it was in 2007."43 Interstate violence in particular has declined since the start of the financial crisis, as have military expenditures in most sampled countries. Other studies confirm that the Great Recession has not triggered any increase in violent conflict, as Lotta Themner and Peter Wallensteen conclude: "[T]he pattern is one of relative stability when we consider the trend for the past five years."44 The secular decline in violence that started with the end of the Cold War has not been reversed. Rogers Brubaker observes that "the crisis has not to date generated the surge in protectionist nationalism or ethnic exclusion that might have been expected."43

#### 6---Newest data!!!

\*the stuff in 1 point font is a list of past recessions and the reasoning behind them – you can read them if you want but its not super interesting

Charles Potters 21 (Charles Potters has spent over three decades as a financial educator, involved in the creation and delivery of capital markets and financial services training programs tailored to the needs of both individuals and major financial institutions. Participants have included over 10,000 attendees, coming from the world's leading investment and commercial banks, insurance companies, trading firms, exchanges, and market information providers, 1/26/21, accessed 3/20/21, “A Review of Past Recessions”, https://www.investopedia.com/articles/economics/08/past-recessions.asp)AGabay

Did you know that there have been several recessions in the U.S. since the Great Depression? It may come as a surprise, especially when you see these events covered in the media as one-time horrors. A recession historically has been defined as two consecutive quarters of decline in GDP, the combined value of all the goods and services produced in the U.S.﻿﻿ It differs from the gross national product (GNP) in that it does not include the value of goods and services produced by U.S. companies abroad or goods and services received in the U.S. as imports.﻿﻿﻿﻿ A more modern definition of a recession that's used by the National Bureau of Economic Research (NBER) Dating Committee, the group entrusted to call the start and end dates of a recession, is "a significant decline in economic activity spread **across the economy**, lasting more than a few months."﻿﻿ In 2007, an economist at the Federal Reserve Board (FRB), Jeremy J. Nalewaik, suggested that a combination of GDP and gross domestic income (GDI) may be more accurate in defining a recession.﻿﻿ The following are some of the largest recessions in the history of the United States.

Historical Recessions

Let's take a look at some of these recessions according to some key characteristics.

Duration: How long did the official recession last?

GDP decline: By how much did national income fall?

Peak unemployment rate: What proportion of the workforce was jobless?

Reasons and causes: What unique historical circumstances contributed to the development of this recession?

The NBER officially declared an end to the economic expansion in February of 2020 as the U.S. fell into a recession amid the coronavirus pandemic.

The Roosevelt Recession: (May 1937–June 1938)

Duration: 13 months

GDP decline: 10%

Peak unemployment rate: 20%6﻿

Reasons and causes: The stock market crashed in late 1937.7﻿ Businesses blamed the "New Deal," a series of government-financed infrastructure work projects through the Works Projects Administration (WPA) and Civilian Conservation Corps (CCC).8﻿9﻿ These projects provided work for more than 250,000 men.10﻿ The government blamed a "capital strike" (lack of investment) on the part of businesses, while "New Dealers" blamed cuts in WPA funding.7﻿11﻿ The first four years of Social Security insurance deductions pulled $2 billion out of circulation at this time.12﻿

The Union Recession: (February 1945–October 1945)

Duration: Eight months13﻿

GDP decline: 10.9%14﻿

Peak unemployment rate: 5.2%15﻿

Reasons and causes: The tail-end of World War II, the beginning of demobilization of military forces, and the slow transition to civilian production marked this period. War production had virtually ceased and veterans were just beginning to re-enter the workforce.16﻿ It was also known as the "Union Recession," as unions were beginning to reassert themselves. Minimum wages were on the rise and credit was tight.17﻿

The Post-War Recession: (November 1948–October 1949)

Duration: 11 months13﻿

GDP decline: 1.7%18﻿

Peak unemployment rate: 5.7%19﻿

Reasons and Causes: As returning veterans reentered the workforce in large numbers to compete for jobs with existing civilian workers who had entered the workforce during the war, unemployment began to rise. The government's response was minimal as it was much more worried about inflation than unemployment at the time.20﻿

The Post-Korean War Recession: (July 1953–May 1954)

Duration: 10 months13﻿

GDP decline: 2.7%18﻿

Peak unemployment rate: 5.9%21﻿

Reasons and causes: After an inflationary period that followed the Korean War, more dollars were directed at national security.22﻿ The Federal Reserve tightened monetary policy to curb inflation in 1952. The dramatic change in interest rates caused increased pessimism about the economy and decreased aggregate demand.23﻿

The Eisenhower Recession: (August 1957–April 1958)

Duration: Eight months13﻿

GDP decline: 3.7%18﻿

Peak unemployment rate: 7.4%24﻿

Reasons and causes: The government tightened monetary policy compared to years prior to the recession to curb inflation, but prices continued to rise in the U.S. through 1959.25﻿ The sharp worldwide recession and the strong U.S. dollar contributed to a foreign trade deficit.26﻿

The "Rolling Adjustment" Recession: (April 1960–February 1961)

Duration: 10 months13﻿

GDP decline: 1.6%18﻿

Peak unemployment rate: 6.9%27﻿

Reasons and causes: This recession was also known as the "rolling adjustment" for many major U.S. industries, including the automotive industry. Americans began shifting to buying compact and often foreign-made cars and industry drew down inventories. Gross national product (GNP) and product demand declined.28﻿

The Nixon Recession: (December 1969–November 1970)

Duration: 11 months13﻿

GDP decline: 0.6%18﻿

Peak unemployment rate: 5.9%29﻿

Reasons and causes: Increasing inflation caused the government to employ a very restrictive monetary policy. The structure of government expenditures added to the contraction in economic activity.30﻿

The Oil Crisis Recession: (November 1973–March 1975)

Duration: 16 months13﻿

GDP decline: 3%18﻿

Peak unemployment rate: 8.6%31﻿

Reasons and causes: This long, deep recession was brought on by the quadrupling of oil prices and high government spending on the Vietnam War. This led to stagflation and high unemployment.32﻿ Unemployment finally reached 9% in May of 1975, after the declared end of the recession.31﻿

The Energy Crisis Recession: (January 1980–July 1980)

Duration: Six months13﻿

GDP decline: 2.2%18﻿

Peak unemployment rate: 7.8%33﻿

Reasons and causes: Inflation had reached 11.1% and the Federal Reserve raised interest rates and slowed money supply growth, which slowed the economy and caused unemployment to rise. Energy prices and supply were put at risk causing a confidence crisis as well as inflation.34﻿

The Iran/Energy Crisis Recession: (July 1981–November 1982)

Duration: 16 months13﻿

GDP decline: 2.9%18﻿

Peak unemployment rate: 10.8%35﻿

Reasons and causes: This long and deep recession was caused by the regime change in Iran. The world's fourth-largest producer of oil at the time, the country overthrew its U.S.-backed government.36﻿37﻿ The "New" Iran exported oil at inconsistent intervals and at lower volumes, forcing prices higher.38﻿ The U.S. government enforced a tighter monetary policy to control rampant inflation, which had been carried over from the previous two oil and energy crises.39﻿34﻿ The prime rate reached 20.5% in 1981.40﻿

The Gulf War Recession: (July 1990–March 1991)

Duration: Eight months13﻿

GDP decline: 1.5%18﻿

Peak unemployment rate: 6.8%41﻿

Reasons and causes: Iraq invaded Kuwait. This resulted in a spike in the price of oil in 1990, which caused manufacturing trade sales to decline.42﻿ This was combined with the impact of manufacturing moving offshore as the provisions of the North American Free Trade Agreement (NAFTA) kicked in. In addition, the leveraged buyout of United Airlines triggered a stock market crash.43﻿

The 9/11 Recession: (March 2001–November 2001)

Duration: Eight months13﻿

GDP decline: 0.3%

Peak unemployment rate: 5.5%44﻿

Reasons and causes: The collapse of the dotcom bubble, the 9/11 attacks, and a series of accounting scandals at major U.S. corporations contributed to this relatively mild contraction of the U.S. economy. In the next few months, GDP recovered to its former level.

The Great Recession: (December 2007–June 2009)

Duration: Eighteen months13﻿

GDP decline: 4.3%45

﻿

Peak unemployment rate: 10.0%45﻿

Reasons and causes: The collapse of the housing bubble of the 2000s and resulting record foreclosures and a financial crisis that threw markets worldwide into a tailspin.45﻿46﻿ Oil prices spiked to record highs by mid-2008 and then crashed, devastating the U.S. oil industry.47﻿

Covid-19 Recession (February 2020–Ongoing)

Duration: Ongoing

GDP decline: The Atlanta Fed's GDPNow survey sees the median consensus estimate for the second-quarter GDP at -53.8%.

Peak unemployment rate: 13.0% in May 2020

Reasons and causes: The actions that were taken by the United States and other nations around the world—restricting travel, shuttering nonessential businesses, and implementing universal social distancing policies—to curb the spread of the 2019 novel coronavirus, which was officially declared a pandemic in March 2020 by the World Health Organization, have had severe economic consequences. On June 8, 2020, the National Bureau of Economic Research officially declared a recession in the U.S. economy. Although there has been much speculation, it is so far unknown what the shape of this recession will be, and the duration of the Covid-19 recession will only be obvious in hindsight.

The Bottom Line So what do all these very different recessions have in common? In many cases, the most important single factor is a period of expansionary monetary policy in the years prior to the recession, sometimes to help fund government war spending or in an attempt to re-inflate the economy after the previous round of recession. Once the resulting debt bubbles pop or the end of a war leads to cutbacks in monetary expansion, several years' worth of overextended, debt-based investments and malinvestments tend to be wiped out in a process of debt deflation in a relatively short period. This spikes unemployment and drags down GDP. Beyond the underlying monetary trends, real economic shocks often help to trigger the **turning point** into **recession**. For one, oil price swings appear to be consistent and frequent historical precursors to U.S. recessions.﻿﻿﻿ A spike in oil prices has preceded or coincided with 10 out of 12 post-WWII recessions.﻿﻿﻿ This highlights that while global integration of **economies allowing** for more **effective cooperative efforts between governments** has increased over time, the integration itself ties the world economies more **closely together**, making them more susceptible to problems outside their borders.

=

### Innovation

#### Innovation high now but aff trades off

Raghavan 21[Seetha Raghavan, Seetha Raghavan is a professor in UCF’s Department of Mechanical and Aerospace Engineering. 8-4-2021, "The Impact of Innovation in the New Era of Space Exploration," University of Central Florida News | UCF Today, https://www.ucf.edu/news/the-impact-of-innovation-in-the-new-era-of-space-exploration/]/ISEE

Every once in a while, a confluence of discoveries, events and initiatives results in a breakthrough so significant that it propels the entire world to a higher level, redefining what is possible in so many different fields. This breakthrough is taking centerstage now, as the new era of space exploration — catalyzed by increasing launch access — dawns upon us. The surge of innovation that comes with this will create new opportunities and inspire the next generation of doers. When this happens, boundaries between scientific and social impact are blurred. Innovation leading to scientific discovery can benefit society in the same way that social innovation can diversify and support scientific innovators, who can contribute to global progress. To ride this wave of progress, we must all participate and innovate in the new era of space exploration. The intersection of space exploration, innovation and impact isn’t a new phenomenon. In the past, technology developments and spin-offs from space research have consistently found their way into communities worldwide sometimes with lifesaving benefits. The International Space Station supports experiments that have led to discoveries and inventions in communication, water purification, and remote guidance for health procedures and robotic surgeries. Satellite-enabled Earth observation capabilities that monitor natural disasters, climate and crops often support early warnings for threats and mitigation strategies. Space exploration has always been relevant to everyone no matter the discipline or interest. Commercialization of space has been key in many ways to the current boost in “firsts” over the last few years. It has spurred innovation in launch vehicles and related technologies that led to firsts in vertical-takeoff-vertical landing rocket technology, reusability of rocket boosters and privately developed crewed missions to orbit. Concurrently, NASA has continued to captivate our imagination with the first flight of a helicopter in another world, a mission to return an asteroid sample to Earth and sending a probe to make the closest ever approach to the sun. While we celebrate the scientific progress, there is a vastly important question that we all need to focus on: How can we drive the surge in innovation offered by increased access to space, to benefit humankind? Access to low-Earth orbit, and eventually human exploration of space, is a portal to achieve many impactful outcomes. The numbers and completion rate of microgravity experiments conducted by scientists will be greatly increased as a range of offerings in suborbital flights provide more opportunities to advance critical research in health, agriculture, energy, and more. Lunar, planetary, and even asteroid exploration may lead to discoveries of new materials — busting the limitations now imposed on capabilities for energy, transportation, and infrastructure or creating new sensors and devices that enhance safety on Earth. Space tourism —one can hope — has the power to potentially create an awareness of our oneness that may lead to social change.

#### Commercial space innovation stops extinction

Charles Beames 18, Chairman of the SmallSat Alliance, Executive Chairman of York Space Systems, former Principal Director of Space and Intelligence in the Office of the Undersecretary of Defense for Acquisition, Technology, and Logistics (OUSD(AT&L)), Col. (ret.) in the USAF where he served 23 years in space & intelligence leadership positions around the world, 8/8/18, “Op-ed | SmallSat Alliance is on a path toward a new space horizon,” <https://spacenews.com/op-ed-smallsat-alliance-is-on-a-path-toward-a-new-space-horizon/>

We find ourselves still at the dawn of a new space century, mindful of the victories and setbacks of our past, eager to pass the torch to the next generation of space visionaries, scientists, engineers, and enthusiasts. We look to the future not just to see how much bigger, faster, or higher we can reach, but also how the United States, and specifically the U.S. space community, can again inspire the nations of the world to align with us, as it did in the 20th century. The SmallSat Alliance is an alliance of companies developing, producing, and operating in all segments of the ‘next generation’ space economy; championing renewed U.S. leadership in the burgeoning commercial space economy, and advocating for the transformation of government-led space capabilities. We are experienced space professionals who have chosen to join with others leveraging our decades of hard-won experience, to develop smarter ways to explore space in the 21st century. A wonderful outgrowth of the legacy space program is the commercial, entrepreneurial, and job-creating commercial space business that it bequeathed. These next-generation enterprises range from multi-million-dollar startups providing rideshare opportunities or components for small satellites to multi-billion-dollar space data-analytic platforms reinventing urban car service and agricultural production. The early returns of this economic revolution are already on our doorstep: space data capabilities are exponentially growing elements of the 21st century world economy. Beginning with the dreams and funding by successful tech entrepreneurs, enormous venture investments are already delivering wondrous benefits to the world. Commercial Space – Profit and Non-Profit There are really two major categories in the commercial sector, the profit driven and the non-profit. The classic for-profit companies include not only those designing, building, launching, and operating satellites but also the tech sector that is turning that raw space data into gold through machine-learning analytics. Since for-profit companies are no longer dependent upon the revenues generated by the Cold War space race culture of a bygone era, this new generation of space companies is able to more efficiently capitalize on Moore’s Law, the nonstop exponential growth in chip density, and the associated networking technology co-evolving with it. This new generation is building profitable businesses helping to clean up our oceans of garbage and debris with satellite surveillance, reconnoitering to assist in enforcing laws that protect our oceans from illegal, unregulated, unlicensed fishing, something that is rapidly depleting the world’s most valuable and essential lifeforms. It’s leading in the innovative use of low-cost satellite constellations to produce ubiquitous remote-sensing data, enabling small business owners to be more profitable and less wasteful. For example, precise timing signals from space are already optimizing transportation of people, goods, and services, with even further gains anticipated with the introduction of artificial intelligence to assist drivers, perhaps even someday replacing them entirely. The non-profit sector is the other side of commercial space, concerned more for the general welfare of society, but every bit as integral to this new space enterprise. Much like every century before it in human history, ours is not without its unique challenges, some of which have been a consequence of the last, and all of which the space data domain can be leveraged to help solve. Examples are endless, but one challenge that this new space community is uniquely well-adapted for is to further inform worldwide resource allocation for the 21st century and beyond. These two primary resources are sustainable water and the materials needed for adequate housing for an ever-increasing human population. As cities and urbanization continue to expand, governmental planning challenges such as transportation design optimization for goods and services are only the beginning. Additionally, through using inexpensive remote sensing technologies, some members are designing space data analytics to mitigate human suffering from plagues, contain outbreaks, and combating illegal poaching. Some are connecting with other non-profits to curtail human trafficking for the sex trade or forced labor for migrant debt repayment. Still others are helping non-governmental organizations in their work to expose the use of children as soldiers. Addressing these challenges has little to do with resuscitating dreams conceived by long deceased science-fiction writers and much more to do with turning “swords back into plowshares” to solve real threats to humanity. Other non-profit initiatives include pursuing an even more foundational understanding of who we are and how to be the best custodians of our environment. Much as exploring and monitoring the world’s oceans has advanced civilization through a better understanding of human life and the planet, so too does exploring and monitoring from space. Low Earth orbit (LEO) provides a unique vantage point to look back on the planet and understand what is happening, anticipate what might happen and prepare for the future. In addition to better understanding Earth, responsible and rapid exploitation of the low Earth orbit domain will enhance the understanding of the solar system and the rest of the universe. Small satellites already offer low-cost platforms to study and explore what lies beyond the Earth. Other members are pioneering the use of zero-carbon, hydrogen-based reusable propulsion systems to ensure we don’t worsen our atmosphere using kerosene-fueled rockets for the coming tsunami of satellite launches. Finally, a mission ensuring the general welfare and planet survival for the next thousand years is finally confronting the existential threat that asteroids and comets pose to humanity. These extra-terrestrial, deep-space threats are passing dangerously close to our planet, and today we have no solar map of them and no defense.