### 1NC---OFF

#### States except for the United States ought to expand the Public Trust Doctrine to reduce private actor appropriation of Outer Space.

#### Litigation is controlled now

Emily S. Taylor Poppe 21, Assistant Professor of Law at the University of California, Irvine School of Law, “Institutional Design for Access to Justice”, UC Irvine Law Review, 11 U.C. Irvine L. Rev. 781, February 2021, Lexis

This law-centric orientation is strikingly different from that of most Americans, despite popular claims about their litigiousness. Most individuals never even identify the civil legal problems they experience as "legal." Only a tiny minority will ever seek legal advice in response to a problem, and most are more likely to do nothing than to file a lawsuit. Decades of empirical scholarship have confirmed that despite the prevalence of civil legal problems in everyday life, there is remarkably little recourse to formal law. [FOOTNOTE BEGINS] DAVID M. ENGEL, THE MYTH OF THE LITIGIOUS SOCIETY: WHY WE DON'T SUE 3 (2016) (noting that "specious claims of a litigation explosion have been made so often that they have rooted themselves in the national psyche"). [FOOTNOTE ENDS]

#### Plaintiffs are more likely to perceive its in their interest to go to trial

**Brewer and Lidecap, 9** (Gary Lidecap, Bren School of Environmental Justice @ UC Santa Barbara, and Jebediah Brewer, FRMC, Inc. in Bellingham, WA, 2009, Australian Journal of Agricultural and Resource economics, " Property rights and the public trust doctrine in envonmental protection and natural resource conservation", https://moscow.sci-hub.se/940/4377e6d8fd3dce49793a3a7fab2c7281/brewer2009.pdf#navpanes=0&view=FitH)

In this section we develop a more formal model of the incentives to settle or go to trial in public trust litigation.19 The model shows that use of the public trust doctrine heightens the incentives of the respective parties to push for trial rather than settling, all else equal. As discussed in the preceding section, the publicness of certain resources as proclaimed under the public trust doctrine provides for broad legal standing for multiple constituencies. That is, any member or agency of the public potentially can enter as plaintiff in challenging current natural and environmental resource use. Let the number of potential plaintiffs be indexed by i where i = 1, . . . , n and let Tpi be the subjective expected benefit to plaintiff i of bringing suit against a defendant. This benefit will be a function of two factors: First, it will be increasing as the probability of winning the lawsuit rises, where p denotes the plaintiff’s probability of success. Second, it will be increasing as the expected size of the damages rises, where D represents the expected size of the damages. Therefore, Tpi = pi Di . Among potential plaintiffs, the one with the maximum subjective expected benefit of bringing suit will challenge the defendant, where the relevant plaintiff’s subjective expected benefit is Tp = maxi Tpi, where i = 1, . . . , n. There are three determinants of Tp: First, Tp increases in the number of potential litigants, n. Second, Tp increases in effort invested by the plaintiff, where ep is the effort expended by the plaintiff. Hiring more qualified lawyers, soliciting expert witnesses, or engaging in more concentrated research, makes it more likely that the judge will side with the plaintiff and increase the expected size of the damages awarded. Third, Tp declines with the effort expended by the defendant, where ed denotes the effort expended by the defendant. Accordingly, it follows that: Tp(ep, ed, n) = maxipi (epi, ed)Di (epi, ed), (1) where i = 1, . . . , n. Similarly, the subjective expected loss of going to trial for the defendant is Td. 19 Td (ep, ed) = p(ep, ed)D(ep, ed).20 (2) The plaintiff can use two types of effort: wp, standard labourers who work for market wages and z, non-standard labourers who work for below market wages. The latter are those who derive utility from participating in the case.21 In many environmental disputes, the defendant, with less emotional or popular appeal, in general can use only wp. 22 As a result, ep(wp, z) and ed(wd) and the plaintiff’s and defendant’s labour costs are ctp(wp, z) and ctd(wd). The value to the plaintiff of trial, Vtp, is the benefit less the costs incurred or Vtp = Tp(ep(wp, z), ed(wd), n) − ctp(wp, z). (3) The defendant’s total expected loss, Ltd, of going to trial will be the sum of the subjective expected loss and the costs of trial or23 Ltd = Td (ep(wp, z), ed (wd)) + ctd (wd). (4) The net value of trial, Vt, is the difference between the plaintiff’s expected value and the defendant’s total expected loss or Vt = Vtp − Ltd = Tp − ctp − Td − ctd (5) = Tp−Td− (ctp+ctd). 3.2 Settlement Let Sp and Sd denote the plaintiff’s subjective expected benefit and the defendant’s subjective expected loss from settlement.24 Let csp and csd be the costs incurred by the plaintiff and defendant, respectively, of reaching a private solution. In the special case of the public trust doctrine, there are multiple potential litigants, so that any settlement reached by the defendant with one plaintiff may be thwarted by the entry of another plaintiff. Therefore, we can write csd (n), where csd is increasing in n. The net expected value of settlement to the plaintiff, Vsp, will be the subjective expected benefit of settlement minus settlement costs, or Vsp = Sp − csp. (6) The net expected loss of settlement to the defendant, Lsd, will be the subjective expected loss of settlement plus settlement costs, or Lsd = Sd + csd(n). (7) The net value of settlement, Vs, the difference between the net expected value of settlement to the plaintiff and the net expected loss of settlement to the defendant is Vs = Vsp − Lsd = Sp − csp − Sd − csd (8) = Sp − Sd − (csp + csd).25 3.3 Trial and settlement together Because trial is more costly than settlement, in natural and environmental resource disputes we are concerned when trial will be observed. This will occur whenever the net value of trial, Vt, is greater than the net value of settlement, Vs, or comparing Equations (5) and (8), when Tp − Td − (ctp + ctd) > Sp − Sd − (csp + csd) Tp − Td − (Sp − Sd) > ctp + ctd − (csp + csd).26 (9) 3.4 Implications Several implications emerge from this discussion regarding the settlement of disputes under the public trust doctrine. First, because the doctrine requires no compensation to the defendant, the plaintiff will benefit more from going to trial. A higher Tp raises Vtp and Vt . In contrast, private negotiated settlements are not affected. Equation (9) shows that increasing Tp while holding Sp constant, raises the relative value of trial to the plaintiff, the net value of trial, and ultimately the likelihood of trial. Second, trial is more likely to occur than settlement because the public trust doctrine allows open standing for numerous plaintiffs. Equation (5) shows that Vt = Tp − Td − (ctp + ctd) Vt = Tp(ep(wp, z), ed(wd), n) − Td(ep(wp, z), ed(wd)) − (ctp(wp, z) + ctd (wd)). As the number of potential litigants, n, increases, so does the relevant plaintiff’s subjected expected benefit of trial, Tp, and hence the value of trial, Vt. 27 Furthermore, from Equations (7) and (8), Vs = Sp − Sd − (csp + csd(n)). Increasing n raises the costs of settlement for the defendant, implying that the value of settlement, Vs, is decreasing in the number of potential litigants. Third, trial is more likely when the plaintiff can invest in low-cost labour, as is often the case in resource and environmental disputes. Returning to Equations (5) and (9), recall that Equation (9) shows that when Vt increases relative to Vs, trial is more likely, and recall from Equation (5) that Vt = Tp − Td − (ctp + ctd) Vt = Tp(ep(wp, z), ed(wd), n) − Td (ep(wp, z), ed (wd)) − (ctp(wp, z) + ctd (wd)). Differentiating Vt with respect to both z and wp will show their relative impacts on Vt. The (10) The (11) The key comparison is to see how Equation (10) relates to Equation (11). If the marginal product of labour is the same for non-standard and standard labour, the first two terms on the right hand side of Equation (10) will be equal to the first two terms on the right hand side of Equation (11), respectively. Second, (∂ctp/∂z) < (∂ctp/∂wp) because non-standard labourers work for below market wages. The above two points together imply that (∂Vt/∂z) > (∂Vt/∂wp) or that the value of trial rises when non-standard workers are used for labour rather than standard labour. Fourth, when more below market labour is available and when there are more potential litigants, trial outcomes will be skewed more heavily in favour of the plaintiff, increasing the likelihood of trial. Recall Equation (1), which states that Tp(ep, ed, n) = maxi pi (epi, ed)Di (epi, ed). Expanding this equation yields, Tp(ep(wp, z), ed (wd), n) = maxi pi (epi(wpi, zi ), ed (wd))Di (epi(wpi, zi ), ed (wd)). (12) Equation (1) shows that the subjective expected benefit to the relevant plaintiff of trial is the product of the probability the judge will side with the plaintiff and the expected size of the damages awarded. Taking the derivative of the left hand side of Equation (12) with respect to z yields, (13) The first partial derivative on the right hand side of Equation (13) is strictly positive, as increased effort induces a greater expected benefit, and the second derivative is strictly positive when the marginal product of labour is positive. This indicates that the subjective expected benefit of trial to the plaintiff is strictly increasing in the number of low-wage workers. Furthermore, by examining the right hand side of Equation (12) the plaintiff is able to increase both the probability of winning and the expected size of the award with more low-cost effort, which is not available to the defendant. Furthermore, as indicated in Equation (12) when the number of potential litigants, n, increases, both the probability of winning the case and the expected damages rise for the plaintiff. As outlined by the model, the public trust doctrine raises the costs of private settlement relative to trial in natural and environmental resource disputes making trial more likely.

#### Court Clog turns the case---PTD means cases take forever to resolve, leaving resources locked in the squo

**Brewer and Lidecap, 9** (Gary Lidecap, Bren School of Environmental Justice @ UC Santa Barbara, and Jebediah Brewer, FRMC, Inc. in Bellingham, WA, 2009, Australian Journal of Agricultural and Resource economics, " Property rights and the public trust doctrine in envonmental protection and natural resource conservation", https://moscow.sci-hub.se/940/4377e6d8fd3dce49793a3a7fab2c7281/brewer2009.pdf#navpanes=0&view=FitH)

The goal of any reallocation mechanism should be to redistribute resources to their highest valued uses as efficiently as possible. In general, trial is lengthier than settlement and tends to be more costly. As the legal system works through its process, the controversial trust resource remains in its current use, potentially remaining suboptimally allocated. We cannot directly test the model’s implications because of a lack of data on settlement vs. trial, but we can illustrate how the costs of dispute resolution are affected by examining the conflict over water for Mono Lake. Property rights to water and the public trust ruling in Audubon 4.1 History Between 1930 and 1940, the Los Angeles Department of Water and Power (LADWP) acquired riparian water rights to the four tributaries that feed Mono Lake, an alkaline and hypersaline lake situated in the eastern side of the Sierra–Nevada mountains, roughly 300 miles north-east of the city.28 The agency applied to the State Water Resources Control Board (SWRCB) in 1940 for permits to appropriate the water, and in 1941 finished constructing an aqueduct and began diverting the water for urban use. In 1963, to further augment urban supplies, construction began on a second aqueduct, which was completed in 1970.29 While between 1940 and 1970 an average of 57 067 acre-feet was exported to Los Angeles, with new aqueduct capacity exports increased to 100 000 acre-feet or more through 1975.30 At the time, water for urban consumption was viewed as the highest and best use of the water.31 Indeed, the Mono Basin alone accounted for about 15 per cent of the city’s water.32 Over time, however, these water exports had substantial adverse effects on Mono Lake and its surrounding environment. The tributaries dried up below the diversion points and the level of Mono Lake began to decline about 1.6 feet a year.33 Between 1941 and 1981 the lake’s level fell about 46 feet, with one-third of that decline occurring after 1970. The surface area of Mono Lake receded from 90 to 60 square miles, and its salinity increased from 50 to 90 g/L.34 4.2 Public trust ruling As Mono Lake levels declined, the National Audubon Society, Friends of the Earth, the Sierra Club, and a new coalition of environmental activists, the Mono Lake Committee that had formed in 1978, brought suit under the public trust doctrine in May of 1979 to curtail Los Angeles’ export of water. Referring to Marks v. Whitney 6 Cal. 3d 251 (1971) which held that the public trust doctrine applied not only to navigable waterways but to streams used for recreation, wildlife habitat and ecological study, the plaintiffs charged that Mono Lake was being harmed and that the diversion was not a reasonable and beneficial use as required by the state’s appropriative water rights system. This public trust argument posed a clear challenge to Los Angeles’ water rights.35 On 17 February 1983 in National Audubon Society v. Superior Court 33 Cal 3d 419 the California Supreme Court held that exercise of appropriative water rights is subject to limitation by the state in order to protect public trust values, including those of wildlife habitat: ‘Thus, the public trust is more than an affirmation of state power to use public property for public purposes. It is an affirmation of the duty of the state to protect the people’s common heritage of streams, lakes, marshlands and tidelands . . .’ (33 Cal 3d 441). According to the court, public trust regulatory responsibilities applied ex post to existing water rights, and these rights were use rights only that could be reconsidered in light of changing perceptions of the trust. The court charged the SWRCB with monitoring water use and re-allocating it in a manner consistent with the public trust: ‘Thus, the function of the Water Board has steadily evolved from the narrow role of deciding priorities between competing appropriators to the charge of comprehensive planning and allocation of waters.’ (33 Cal 3d 444). Because the ruling not only signalled the mostly uncompensated loss of valuable water rights, but also the value of Los Angeles’ past fixed investments in the aqueducts, dams, reservoirs and hydroelectric facilities, the LADWP filed a petition for certiorari with the U.S. Supreme Court on the basis that the California court misinterpreted the public trust doctrine and that the decision deprived Los Angeles of vested property rights without due process of law (a takings).36 The Department of Interior’s Regional Solicitor for California supported the appeal, but it was denied,37 7 November 1983.38 The public trust ruling in 1983, however, did not resolve the conflict over Mono water. Various parties claimed standing in the debate, including environmental and sports groups, as well as state and federal agencies. It took over a decade of a complex series of subsequent court rulings, appeals and case consolidations before the SWRCB published a final Environmental Impact Report in September 1994, which called for a target lake level of 6392.6 feet.39 To achieve this level, there could be no water diversions by the LADWP from the Mono Basin until the lake reached 6377 feet. After that various benchmarks were set allowing for small diversions. Once the lake level reached the objective, Los Angeles would be allowed to export only about one-third the amount it had diverted in the early 1970s.40 In the end, it took nearly 20 years from the initial effort to reduce diversions from the Mono Basin until the SWRCB handed down its final decision. All the while, Mono Lake’s environment continued to worsen, streams remained dry, and riparian and aquatic habitats remained unrestored.

#### Court efficiency is key patent protections and innovation

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While most economic scholarship analyzing the importance of the courts has focused on disputes over real property, the relationship between the court system and investment is no less strong for intellectual property. And to a large extent, the relationship between the courts and the patent system depends on the quality of “judicial human capital.”

In the United States, as in many countries, the courts are a crucial part of the patent system to the extent that the patent system is can be termed a two-stage process. In the first stage, the U.S. Patent and Trademark Office grants property rights to inventors. In the second stage, inventors can protect those rights through patent infringement suits in the courts and alleged infringers have the right to challenge improvidently granted patents and have them declared invalid. As a consequence, some authors have referred to patent rights as being “probabilistic,” depending not only on whether the innovation embodied in the patent has commercial value, but also on the refinement of that patent property right after litigation.15

Just as with real property, the management of the court system has an impact on both patenting behavior and on investment in research and development. While the majority of all patents are not litigated, those that are disputed in the courts are among the most valuable.16 The rules governing the court system may even “feed back” into patenting behavior; some authors have found evidence that the increasingly “patent friendly” rules17 adopted by the courts are a major factor in the surge in patenting since the 1980s.18 Moreover, the ability to define the “probabilistic” property rights is an important element in determining whether patents fulfill their purpose of promoting innovation.19 Finally, the costs associated with the patent systems can be reduced by an efficient court system; firms may hesitate to invest in new products and technologies which may infringe on existing patents, so any additional delay or cost in clarifying existent rights may slow the process of innovation. The more quickly and cheaply these rights are defined, the more beneficial the patent system will be in promoting and not inhibiting innovation and investment.

#### Efficient court review underpins patent-led innovation---that stops nuclear war and a range of existential threats.

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Robert F. Kennedy’s speech, which includes his reference to the oft-quoted “interesting times” curse, applies throughout history in many contexts and, indeed, with both negative and positive connotation. While he focused on the struggles for freedom and social justice, the requisite ascendancy of the individual over the state, and the institution and integration of those ideals for the greater good, he also promoted the goals of greater global unity, cooperation and communication, which were, and could be, achieved by advances in technology. And, as noted in the excerpt, he championed “the creative energy of men.”

Intellectual Property in “Interesting Times”

It is beyond question that starting with the last decade of the twentieth century and throughout the first two decades of the twenty-first century, when it comes to matters relating to intellectual property, we have been living in “interesting times.” Some may interpret these interesting times as defined by the curse and others may view it by the ordinary meaning of “interesting.” In either case, those of us that toil in the fields of patents, copyrights, trademarks, trade secrets, and privacy rights have experienced an unprecedented sea change in the way those rights are procured, protected and enforced. Likewise, and perhaps more importantly, even those of us that do not practice in these areas of law, as well as the general public, have been, and continue to be, impacted by the consequences of these changes (both positive and negative).

The Changes In Intellectual Property Law

Examples of some of the changes in intellectual property law are: the sweeping 2011 legislative changes to the patent laws under the America Invents Act (AIA), which impact is only beginning to be fully appreciated; the various proposals for patent law reform, on the heels of the AIA, beginning with the 113th and 114th Congress; the copyright laws Digital Millennium Copyright Act (DMCA) and numerous 114th Congressional proposed copyright law changes; the recently enacted federal trade secret law (Defend Trade Secrets Act of 2016 (DTSA))2; the impact of the internet, domain names and globalization on Trademark law; the intellectual property law harmonization requirements included in various global/regional trade agreements; and the proliferation of devices (both invasive and non-invasive) that defy any rational basis for believing we can still adhere to the republic’s libertarian understanding of the right to privacy.

Without engaging in “chicken and egg” analysis, it is sufficient to observe that technological advancement, societal needs, globalization, existential threats, economic realities, and political imperatives (or what James Madison referred to in the Federalist Papers No. 10 as factious governance), have combined to create the “interesting times” for the United States [IP] intellectual property laws.

What was said by Bobby Kennedy in 1966 remains true today. We live in dangerous and uncertain times. Many of the existential threats remain the same (nuclear war and proliferation, [genocides] ~~genocidal maniacs~~ and natural disease) and some are new ([hu]manmade disease, greater awareness of environmental changes and possibly human interrelationship factors, and the unintended consequences of genetic manipulation and robotic technologies). The danger and uncertainty that pervades changes in intellectual property laws, though not an existential threat of the same manner and kind, correlates with the threat and remains “more open to the creative energy of man than any other time in history.”

Apropos the creative energy of man, there is a non-coincidental congruence and convergence of activity across and among the three branches of government, occurring almost simultaneously with the congruence and convergence of the rapid developments of technological innovation across various scientific disciplines and the information age, reflected in the transformation of the [IP] intellectual property laws in the United States.

Patents

The passage of the AIA was a culmination of efforts spanning several years of Congressional efforts; and the product of a push by the companies at the forefront of the twenty-first century new technology business titans. The legislation brought about monumental changes in the patent law in the way that patents are procured (first inventor to file instead of first to invent) and how they are enforced (quasi-judicial challenges to patent validity through inter-party reviews at the Patent Trial and Appeals Board (PTAB)).

The 113th and 114th Congress grappled with newly proposed patent law reforms that, if enacted, may present additional tectonic shifts in the patent law. Major provisions of the proposals include: fee-shifting measures (requiring loser pays legal fees - counter to the American rule); strict detailed pleadings requirements, promulgated without the traditional Rules Enabling Act procedure, that exceed those of the Twombly/Iqbal standard applied to all other civil matters in federal courts, and the different standards applicable to patent claim interpretation in PTAB proceedings and district court litigation concerning patent validity.

The Executive and administrative branch has also been active in the patent law arena. President Obama was a strong supporter of the AIA3 and in his 2014 State Of The Union Address, essentially stated that, with respect to the proposed patent law reforms aimed at patent troll issues, we must innovate rather than litigate.4 Additionally, the USPTO has embarked upon an energetic overhaul of its operations in terms of patent quality and PTO performance in granting patents, and the PTAB has expanded to almost 250 Administrative Law Judges in concert with the AIA post-grant proceedings’ strict timetable requirements.

The Supreme Court, not to be outdone by the Articles I and II branches of the U.S. government, has raised the profile of patent cases to historical heights. From 1996 to the 2014-15 term there has been a steady increase in the number of patent cases decided by the SCOTUS5. The 2014-15 term occupied almost ten percent of the Court’s docket. Prior to the last two decades, the Supreme Court would rarely include more than one or two patent cases in a docket that was much larger than those we have become accustomed to from the Roberts’ Court6.

While the SCOTUS activity in patent cases is viewed by some as a counter-balance to the perceived Federal Circuit’s pro-patent and bright line decisions, it can just as assuredly be viewed as decisions rendered by a Court of final resort which does not function in a vacuum devoid of the social, economic and political winds of the times. In recognition of the effect new technologies have on the patent law, the politicization of intellectual property law matters, especially patent law (through factious governing principles of the political branches of the government), and the maturation of the Federal Circuit patent law jurisprudence, the SCOTUS has rendered opinions in cases that impact, and perhaps are/were intended to mitigate the concerns regarding, some of the vexing issues confronting the patent community today (e.g., non-practicing entities or in the politicized parlance “patent trolls,” the intersection of patent and antitrust laws in Hatch-Waxman so called “pay-for-delay” settlements between Branded and Generic pharma companies, and the fundamental tenets that comprise the very heart of what is patent eligible subject matter).

Copyrights

The advent and ubiquity of the internet, social media and digital technologies (MP3s, Napster, Facebook, YouTube, and Twitter) represents the impetus for changes in the Copyright laws. The DMCA addressed the issues presented by these advances or changes in the differing media and forms of artistic impressions. The proliferation of digital photos, graphic designs and publishing alternatives, as well as adherence to globalization harmonization have given rise to changes in the statutory law and jurisprudence in this area of intellectual property law. Additionally, there is an overlap of patent rights and copyrights for software driven by the ebb and flow of the strength of each respective intellectual property protection.

Notably, the Patent and Copyright Clause7, in addition to Author’s writings, has been viewed as discretely applying to two different types of creativity or innovation. When drafted the “sciences” referred not only to fields of modern scienctific inquiry but rather to all knowledge. And the “useful arts” does not refer to artistic endeavors, but rather to the work of artisans or people skilled in a manufacturing craft. Rather than result in ambiguity or confusion, perhaps the Framers were either quite prescient or, just coincidentally, these aspects of the Patent and Copyright Clause have converged.

For example, none other than the famous Crooner, Bing Crosby, benefited from both protections. Well-known as a prolific and popular recording artist he also benefited from his investments in the, then innovative, recording technologies. Similarly, the Beatles, Beach Boys, as well as many other rock and roll artists, experimental efforts in music performance, recording and production, helped to transform the music industry in both copyrightable artistic expression and patentable inventions. Similarly, film, literary and digital arts reap benefits at the crossroads of both copyright and patent protections.

Trademarks

Trademark laws have been impacted by numerous changes in the business landscape. They include the internet, Domain names, international rights in a global economy, different venues and avenues for branding, marketing and merchandising, global knock-offs from nations that have a less than stellar respect for intellectual property rights, and international trade agreements. More recently, politicization (or perhaps political correctness) has creeped into the trademark law arena pitting branding rights and protections against first amendment rights.

Trade Secrets

As with Copyright and Trademark law, trade secrets law includes some of the same issues related to trade agreements. TRIPS required members to have trade secret protection in place. Initially, the United States compliance with this requirement has relied upon the trade secret law of the individual states. That compliance may be supplanted by the recently enacted DTSA. Similarly, the Trans Pacific Partnership (TPP) trade agreement contains intellectual property rights provisions that will trigger required changes to United States statutory Intellectual Property Laws.

The proposed trade secret legislation also gives rise to several concerns. For instance, there is an absence of a specific definition for trade secret, as well as potential issues of federalism, conflict with state law precedent (despite no preemption), remedies, and the impact on employer/employee relations.

There is also a real concern that the strengthening of trade secret protection in conjunction with the perceived weakening of patent protection (e.g., high rate of invalidating patents in post-grant proceedings before the PTAB and strict limitations on what is patent eligible subject matter) may very-well have the unintended consequence of contravening the purpose behind the Patent and Copyright Clause: “to promote the progress of the sciences and the useful arts.” Moreover, the incentive to innovate may very well be usurped by the advantage of withholding patent law disclosure of highly beneficial scientific advancements that directly affect the human condition, alter life expectancies and the evolution of the human species (rather than by mere “natural selection”), and what is the very essence of a human being (for better or worse). Thus, crippling innovation and the progress of the sciences and useful arts.

Privacy Rights

It is increasingly more difficult to function “off the grid.” The invasive and non-invasive attributes of the internet, the reliance upon the multitude of devices, social media, and information age technologies, and access to big data, all contribute to the decrease in and dilution of the right to privacy. Wittingly or otherwise, the strong libertarian roots of the republic have been replaced by dependence upon these modes of an information-age life. Commentary on the benefits and deficits of this reality are beyond the subject and purpose of this writing. Suffice to acknowledge that the right to privacy has been significantly reduced. The laws that protect these rights are in a constant struggle to maintain those rights while yielding to the demands of the lifestyle and security concerns. Laws that relate to cybersecurity in the global and domestic space create interplay with privacy rights. Legislation, trade agreements and jurisprudence all impact this area of intellectual property. Cross-border theft of trade secrets, competitor espionage, and loss of control over personal data are all implicated in the intellectual property law arena.

America’s Need For Strong Intellectual Property Protection

The need for strong protection of intellectual property rights is greater now than it was at the dawn of our republic. Our Forefathers and the Framers of the U.S. Constitution recognized the need to secure those rights in Article 1, Section 8, Clause 8. James Madison provides insight for its significance in the Federalist Papers No. 43 (the only reference to the clause). It is contained in the first Article section dedicated to the enumerated powers of Congress. The clause recognizes the need for: uniformity of the protection of IP rights, securing those rights for the individual rather than the state; and, incentivizing innovation and creative aspirations.

Underlying this particular enumerated power of Congress is the same struggle that the Framers grappled with throughout the document for the new republic: how to promote a unified republic while protecting individual liberty. The fear of tyranny and protection of the “natural law” individual liberty is a driving theme for the Constitution and throughout the Federalist Papers. For example, in Federalist No. 10, James Madison articulated the important recognition of the “faction” impact on a democracy and a republic. In Federalist No. 51, Madison emphasized the importance of the separation of powers among the three branches of the republic. And in Federalist No. 78, Alexander Hamilton, provided his most significant essay, which described the judiciary as the weakest branch of government and sought the protection of its independence providing the underpinnings for judicial review as recognized thereafter in Marbury v. Madison.

All of these related themes are relevant to the Patent and Copyright Clause and at the center of the intellectual property protections then and now. The Federalist Papers No. 10 recognition that a faction may influence the law has been playing itself out in the halls of congress in the period of time leading up to the AIA and in connection with the current patent law reform debate. The large tech companies of the past, new tech, new patent-based financial business model entities, and pharma factions have been the drivers, proponents and opponents of certain of these efforts. To be sure, some change is inevitable, and both beneficial and necessary in an environment of rapidly changing technology where the law needs to evolve or conform to new realities. However, changes not premised upon the founding principles of the Constitution and the Patent and Copyright Clause (i.e., uniformity, secured rights for the individual, incentivizing innovation and protecting individual liberty) run afoul of the intended purpose of the constitutional guarantee.

Although the Sovereign does not benefit directly from the fruits of the innovator, enacting laws that empower the King, and enables the King to remain so, has the same effect as deprivation and diminishment of the individual’s rights and effectively confiscates them from him/her. Specifically, with respect to intellectual property rights, effecting change to the laws that do not adhere to these underlying principles, in favor of the faction that lobbies the most and the best in the quid pro quo of political gain to the governing body threatens to undermine the individual’s intellectual property rights and hinder the greatest economic driver and source of prosperity in the country.

It is also important to recognize that the social, political and economic impact of strong protections for intellectual property cannot be overstated. In the social context, the incentive for disclosure and innovation is critical. Solutions for sustainability and climate change (whether natural, man-made or mutually/marginally intertwined) rely upon this premise. Likewise, as we are on the precipice of the ultimate convergence in technologies from the hi-tech digital world and life sciences space, capturing the ability to cure many diseases and fatal illnesses and providing the true promise of extended longevity in good health and well-being, that is meaningful, productive, and purposeful; this incentive must be preserved.

In similar fashion, advancements in technologies related to the global economy and communications will enhance the possibilities for solutions to political and cultural conflicts that arise around the globe. Likewise, the United States economy has always benefited when it is at the forefront of innovation and achieves prosperity from its leadership role in technological advancements.

Conclusion

As was the case in 1966, how we move forward today, to solve the many problems facing our country and the broader global community in these “interesting times,” both within and without the laws affecting intellectual property rights, depends upon the “creative energy of man” which must prevail. An achievable goal, dependent on the strong, stable and sound protection of intellectual property rights.

#### It says disease---extinction

Thomas Such 21, Writer for the Glasgow Guardian, “How to Wipe Out Humanity”, The Glasgow Guardian, 2/9/2021, https://glasgowguardian.co.uk/2021/02/09/how-to-wipe-out-humanity/

Not only is a virus the key to an unpredictable disease which may one day wipe out humanity, but the origins of said virus are key. My “research” concluded that the most efficient way of killing humanity is to have the disease spread in a semi-developed country such as China; it is far easier for viruses and other diseases to spread in less developed countries - but in order to successfully achieve global transmission, a host country must have the substantial international infrastructure to spread a pandemic worldwide. Using this strategy in my “research”, I was able to play a game of Plague Inc. wherein the spread and threat of Covid-19 seemed minimal by using China as a perfect starting point to wipe out humanity. The key, as it turns out, is the spreading of the virus - something that Covid-19 has proved can be done very easily in our modern globalised society. The journey from China to Italy spreading the plague across Europe took almost 40 years back in the middle ages: in 2020, it took a mere 40 days for widespread outbreaks to begin in Italy spreading across much of Europe.

My research into the historical spread of pandemics and my attempts to create my destroyer of humanity illustrates a significant disparity between what happens in the real world and the measures one may find in a simulator. Political realities and measures many may consider “draconian” or simply unrealistic heavily impact how a pandemic may spread and the eventual impact it will have on humanity. Using Plague Inc., I was able to effectively kill off humanity in around a year using a fast transmission of virus, which also became gradually more lethal. This is essential to ensure the near-universal transmission of the virus, and to penetrate measures such as increased border security and isolated regions once the knowledge of the pandemic spreads. Whilst it is unlikely that humanity will be wiped out any time soon, it became clear to me that instead of nuclear war, alien invasion or the looming threat of global warming; the real threat to humanity and the eventual destruction of our species may come from something as simple as bacteria. While we like to revel in our scientific advancements of the modern era and the ascension of humans as Earth’s alpha species, it becomes clear that, when we adapt, our environment and the threats it poses adapt with us. Plague Inc. showed a clear pathway to killing off humanity - though, luckily, the Covid-19 threat in the program was combated due to immense political pressure, restrictions and record-making vaccine paces. The real threat, however, remains clear: if humanity becomes increasingly lax with preventive and managerial measures, it is obvious what the future may hold for us.

1. Ground

a. Aff should be prepared to defend the entire plan text, PIC’s prove the plan is a bad idea in at least one instance.

b. Most cp’s are pics – the ability to test the agent is destroyed if we can’t run pics

c. Key to checking extra topical plan planks

2. Education

a. Forces better plan writing – the aff will write their plan more strategically

b. Depth over Breadth – focuses the debate on specifics of the policy which is better for topical education.

3. Lit checks abuse – there is only a few things we can functionally pic out which answers their infinite regression argument.

4. Err neg on theory – aff gets first and last speech and infinite prep.

5. Not a voter, reject the argument not the team.

### 1NC---OFF

#### Interp: affs must only defend that the appropriation of outer space by private entities is unjust.

#### Violation – the aff is wildly extra T or it solves none of their offense – here’s what a Public Trust Doctrine in outer space entails—1AC evidence.

Babcock 19 (, H., 2019. THE PUBLIC TRUST DOCTRINE, OUTER SPACE, AND THE GLOBAL COMMONS: TIME TO CALL HOME ET. [online] Lawreview.syr.edu. Available at: <https://lawreview.syr.edu/wp-content/uploads/2019/09/H-Babcock-Article-Final-Document-v2.pdf#page=67> [Accessed 15 December 2021] Professor Babcock served as general counsel to the National Audubon Society from 1987-91 and as deputy general counsel and Director of Audubon’s Public Lands and Water Program from 1981-87. Previously, she was a partner with Blum, Nash & Railsback, where she focused on energy and environmental issues, and an associate at LeBoeuf, Lamb, Leiby & MacRae where she represented utilities in the nuclear licensing process. From 1977-79, she served as a Deputy Assistant Secretary of Energy and Minerals in the U.S. Department of the Interior. Professor Babcock has taught environmental and natural resources law as a visiting professor at Pace University Law School and as an adjunct at the University of Pennsylvania, Yale, Catholic University, and Antioch law schools. Professor Babcock was a member of the Standing Committee on Environmental Law of the American Bar Association, and served on the Clinton-Gore Transition Team.)-rahulpenu

F. The Public Trust Doctrine (PTD) as a Gap Filling, Place-Holding Management Approach506 The PTD offers both an approach for managing an open access commons and a gap-filling tool until a regulatory regime is adopted.507 The doctrine is based on the idea that the “sovereign holds certain common properties in trust in perpetuity for the free and unimpeded use of the general public.”508 The public’s right to access and use trust resources is never lost, and neither the government nor private individuals can alienate or otherwise adversely affect those resources unless for a comparable public purpose.509 The resources the doctrine protects “have long been part of a ‘taxonomy of property’ [that recognizes] the division of natural wealth into private and public property.”510 “The doctrine places on governments ‘an affirmative, ongoing duty to safeguard the long-term preservation of those resources for the benefit of the general public,’”511 thus limiting the sovereign’s power on behalf of both present and future individuals.512 It directs the government to manage trust resources for public benefit, not private gain.513 It applies to private as well as public resources and is used to preserve the public’s access to CPRs.514 Government agencies have the non-rescindable power to revoke uses of trust resources that are inconsistent with the doctrine.515 This effectively places a permanent easement over trust resources that burdens their ownership with an overriding public interest in the preservation of those resources.516 However, trust resources can be alienated in favor of private ownership, if the alienation will still serve the public’s interest in those resources and not interfere with trust uses of the remaining land.517 The PTD, therefore, protects the “people’s common heritage,”518 just as Article 11 of the Moon Treaty protects outer space as part of the common heritage of mankind.519 The doctrine also appears to be infinitely malleable. Original uses of the doctrine were restricted to only that “aspect of the public domain below the low-water mark on the margin of the sea and the great lakes, the waters over those lands, and the waters within rivers and streams of any consequence,”520 and covered only traditional uses of those lands, like fishing and navigation.521 Over time, the scope and application of the doctrine broadened to protect more public resources and different uses.522 Thus, the **doctrine** expanded to protect new trust resources, such as dry sand beaches, inland lakes, groundwater, dry riverbeds, and wildlife,523 and passive uses of those resources, like scientific study.524 The original link to navigable water and tidelands disappeared.525 Supporters of the doctrine successfully advocated that it be applied to “wildlife, parks, cemeteries, and even works of fine art,”526 while arguing more recently its application to the atmosphere.527 A doctrine that imposes a perpetual duty on the sovereign to preserve trust resources, prevents their alienation for private benefit, assures public access to them, and can be invoked by anyone seems particularly useful as a management tool in outer space.528 The fact that **public** **access** to trust resources is so **central** to the doctrine **makes** it **reflective**, not contradictory, **of** international space **law’s** **bar** **against** **appropriation** of outer space and of the principle of space being the “province of all mankind.”529 It **avoids** the problems of alienation and **exclusion** associated with any of the management approaches associated with some form of private property and requires neither the creation of a new administrative authority nor the presence of a close-knit group of like-minded people.530 Members of the public, both rich and poor, can invoke and enforce the doctrine as easily as the sovereign.531 It is cost effective to the extent that no separate apparatus is required to implement it, and the doctrine has shown itself to be highly adaptable and innovative as different needs arise.532 It could also fill the gap in international law with respect to managing celestial property. Therefore, of all the management approaches studied here, the PTD seems the most suited to keep order in space until a regulatory regime is imposed. However, the doctrine provides no incentives for development of trust resources; rather, it might be used to limit or curtail that development, making it an imperfect, perhaps even counter-productive solution by itself to the extent that such development might be beneficial.533 Modifying the doctrine to allow limited use of private property management approaches, like tradable development claims, might buffer that effect—a form of overlapping hybridity between one type of property, a commons, and a management regime from another, private property, enabled by application of the PTD. CONCLUSION “Only a legal system that accommodates both the human need for resources and the necessary preservation of mankind’s common heritage can fulfill these criteria.”534 The future is now with regard to the development of outer space and its resources—it is no longer a question of whether humans will engage in these activities, but how soon they will. Technically advanced countries and private commercial enterprises are probing outer space and preparing for landing on an asteroid or the moon to extract their resources.535 Speculators are selling deeds to the moon’s surface and preparing to exploit the tourism potential that space offers.536 But, the legal framework for managing these initiatives is almost nonexistent.537 International treaties came into being before all this activity began in earnest and national laws that might apply are stunted by jurisdictional quandaries like the absence of national boundaries in outer space.538 Thus, there is an urgency to figure out how to control what happens in outer space before its resources are irreparably damaged or permanently monopolized by powerful countries and individuals. In the absence of regulation, much of the current debate centers on what property regime should be applied in outer space.539 The assumption is that by only allowing private property rights in space, countries and commercial enterprises will undertake the risks and costs of space development.540 However, unless international space law changes, it may prevent this from happening. If it changes, strong management controls will be necessary to prevent destruction or over-consumption of celestial resources, as well as monopolization and competitive behavior by participants, which could lead to hostilities and inequities. This Article examines various private property regimes, including those of less than full fee ownership, to see if any would avoid the conflict with the international prohibition on appropriation of outer space and its resources. It concludes that none will because each retains the right to exclude and each is insensitive to the treaties’ equity concerns. In contrast, considering outer space to be common is consistent with international space law in both respects. Hypothesizing that private property in outer space may yet prevail, this Article investigates different private property management approaches, such as the right of first possession, lotteries, and tradable development rights, to see if any would be cost effective, easy to implement and equitable, and would also prevent over-consumption, monopolization or the slide into rivalrous behavior. The Article concludes that each comes up short in some respect. Social norms as a management tool for property held in common, although compliant with international law, are also not up to the task. Instead, although ancient, the PTD, with its malleability, easy and cost-effective implementation and enforcement, non-consumption principle, and consistency with the goals that animate international space treaties, seems best suited to the task of protecting the public’s interests in the global commons that is outer space as it has done for centuries in Earth-bound commons. But, as its principal terrestrial use has been to protect trust resources from development, the doctrine needs some modification to encourage development of celestial resources. Hence, this Article suggests that modifying the PTD to allow the application of private property management tools, like tradable development rights, will not only allow development, but also will assure that when it happens, it will not be just profitable for a few, but will also be sustainable and equitable.

#### Vote neg for limits – extra-topicality allows them to tack on infinite planks to artificially improve aff solvency and spike out of DAs, like fiating enforcement or random possible modifications to extraterrestrial property rights. The counter-interp sets a precedent that the scope of aff fiat doesn’t have to be bounded by the resolution, which outweighs on magnitude. No drop the arg – we shouldn’t have to always read T just to get back to what we should’ve been debating to begin with – it incentivizes adding random extra-t planks because there’s no punishment.

#### Competing interpretations—it tells the negative what they do and do not have to prepare for. Reasonability is arbitrary and unpredictable, inviting a race to the bottom and we’ll win it links to our offense.

#### No RVIs—it’s your burden to be fair and T—same reason you don’t win for answering inherency or putting defense on a disad.

## Case

**Time frame – Kessler effect 200 years away**

**Stubbe 17** [(Peter, PhD in law @ Johann Wolfgang Goethe University Frankfurt) “State Accountability for Space Debris: A Legal Study of Responsibility for Polluting the Space Environment and Liability for Damage Caused by Space Debris,” Koninklijke Brill Publishing, ISBN 978-90-04-31407-8, p. 27-31] TDI

The prediction of possible scenarios of the future evolution of the debris p o p ulation involves many uncertainties. Long-term forecasting means the prediction of the evolution of the future debris environment in time periods of decades or even centuries. Predictions are based on models84 that work with certain assumptions, and altering these parameters significantly influences the outcomes of the predictions. Assumptions on the future space traffic and on the initial object environment are particularly critical to the results of modeling efforts.85 A well-known pattern for the evolution of the debris population is the so-called Kessler effect’, which assumes that there is a certain collision probability among space objects because many satellites operate in similar orbital regions. These collisions create fragments, and thus additional objects in the respective orbits, which in turn enhances the risk of further collisions. Consequently, the num ber of objects and collisions increases exponentially and eventually results in the formation of a self-sustaining debris belt aroundthe Earth. While it has long been assumed that such a process of collisional cascading is likely to occur only in a very long-term perspective (meaning a time 1 n of several hundred years),87 a consensus has evolved in recent years that an uncontrolled growth of the debris population in certain altitudes could become reality much sooner.88 In fact, a recent cooperative study undertaken by various space agencies in the scope of i a d c shows that the current l e o debris population is unstable, even if current mitigation measures are applied. The study concludes:

Even with a 90% implementation of the commonly-adopted mitigation measures [...] the l e o debris population is expected to increase by an average of 30% in the next 200 years. The population growth is primarily driven by catastrophic collisions between 700 and 1000 km altitudes and such collisions are likely to occur every 5 to 9 years.89

**Probability – 0.1% chance of a collision.**

**Salter 16** [(Alexander William, Economics Professor at Texas Tech) “SPACE DEBRIS: A LAW AND ECONOMICS ANALYSIS OF THE ORBITAL COMMONS” 19 STAN. TECH. L. REV. 221 \*numbers replaced with English words] TDI

The probability of a collision is currently low. Bradley and Wein estimate that the maximum probability in LEO of a collision over the lifetime of a spacecraft remains below one in one thousand, conditional on continued compliance with NASA’s deorbiting guidelines.3 However, the possibility of a future “snowballing” effect, whereby debris collides with other objects, further congesting orbit space, remains a significant concern.4 Levin and Carroll estimate the average immediate destruction of wealth created by a collision to be approximately $30 million, with an additional $200 million in damages to all currently existing space assets from the debris created by the initial collision.5 The expected value of destroyed wealth because of collisions, currently small because of the low probability of a collision, can quickly become significant if future collisions result in runaway debris growth.

**No risk of accidents – tech solves AND space isn’t crowded.**

**Fernholz ’19** [Tim, "SpaceX’s new satellites will dodge collisions autonomously (and they’d better)," May 24, https://qz.com/1627570/how-autonomous-are-spacexs-starlink-satellites]

“Within a year and a half, maybe two years, if things go well, SpaceX will probably have more satellites in orbit than all other satellites combined,” Elon Musk said last week. This is an exaggeration. There are almost 2,000 operational satellites in space right now. But Thursday night’s launch of 60 satellites for a new internet network called Starlink is the first step towards that goal. Today, Musk’s space company said it expects to launch six more times in 2019, with the goal of operating 720 satellites by the end of the 2020, and eventually more than 4,000. The Federal Communications Commission—the lead regulator for American satellites—approved these satellite, among 13,000 new satellites okayed in the last year. That huge number has many in the space community nervous about the potential for collisions with other satellites or with space debris. Neither the United States nor the world has a reliable system for managing traffic in space, and policymakers are struggling to keep up with the private sector’s growing ability to hurl computers into the cosmos at faster and faster rates. Musk said the satellites his company launches will avoid potential collisions on their own. And Mark Juncosa, the SpaceX executive in charge of developing the Starlink satellites, downplayed concerns when answering press inquiries on the matter last week. “It might be worth mentioning for people that are not in the space industry … space is really big,” he said. It was experts focused on pinning down what’s going on in orbit who questioned whether the autonomous systems would have sufficient data to safely maneuver. Musk’s electric cars at Tesla often face similar questions. However advanced their AI, what’s more important is how well the car can see. The ultimate source for space situational awareness is the US Air Force’s Combined Space Operations Center, or CSpOC, which tracks orbital objects 10 centimeters in diameter or larger with a worldwide radar network. Most satellite companies, especially those with large fleets, automate the communications and “station keeping” maneuvers. But when they receive a warning from CSpOC that there is a risk of collision with another spacecraft or with space debris, their team consults with the Air Force to make a decision about how to move. Planet, which operates more than 150 spacecraft, automates its communications with CSpOC and has software that calculates the probability of potential conjunctions when they receive a warning. But, when the probability of conjunction reaches about 1 in 10,000, their flight operations team steps in to plan a maneuver to keep their satellites out of trouble. SpaceX says there will be no human in the loop when it comes to its satellites. When notified of a potential conjunction with another object in space, their software will decide whether and how to maneuver, and communicate that information back to CSpOC. It’s not clear what their threshold will be for taking action, or how much warning they will give to the US Air Force. CSpOC did not respond to questions about this communications system. Satellite experts are happy to see efforts at automation, because conjunction reports are only going to increase as more satellites fly. But they worry about an automated system responding to imperfect data, and emphasize the need for the widest possible transparency. Though orbital mechanics are extremely predictable, space sensing is imperfect and the margin of error around where exactly a satellite can be is quite large. Many spacecraft operators join the Space Data Association, a trade association for exchanging space traffic data, and others partner with new space surveillance companies like LeoLabs to obtain more data about what’s happening in orbit. “Because we look at many hundreds of satellites every single day, we find that there are issues with the data,” Dr. T.S. Kelso, a former Air Force officer who works for the Space Data Association, told Quartz. His operation generates about 2,000 conjunction reports every four days. “We can go from something that looks very serious one day to all of the sudden there is nothing in the data. … if you are maneuvering because it is a 1 in 10,000 chance, if you had done nothing, you still had a pretty good chance nothing was going to happen.” SpaceX isn’t responsible for the lack of a real space traffic management system, but as a first mover among companies preparing ambitious satellite networks that far outstrip anything that came before, it is likely to set the tone for how operators and regulators interact. The company chose to fly the satellites at a low enough altitude that if they fail, they will safely burn up in the atmosphere within a year, rather than remaining space junk. “The space junk thing, we don’t want to trivialize it or not take it seriously,” Musk said. “[But] it’s not crowded up there. It’s extremely sparse. If your goal was to hit something, it wouldn’t be easy.”

#### No risk of Russia war---neither side will escalate

Andrei Tsygankov 16 (Andrei Tsygankov is a Professor at the Departments of Political Science and International Relations at San Francisco State University, PhD from USC, 2/19/16, “5 reasons why the threat of a global war involving Russia is overstated,” http://www.russia-direct.org/opinion/5-reasons-why-threat-great-power-war-involving-russia-overstated)

First, whatever the rhetoric, major powers are not inclined towards risky behavior when their core interests are at stake. This concerns not only the nuclear superpowers, but also countries such as Turkey. The prospect of confronting Russia's overwhelmingly superior military should give pause even to someone as hot-tempered as Turkish President Tayyip Erdogan. Even if Erdogan wanted to pit Russia against NATO, it wouldn’t work.

So far, NATO has been careful to not be drawn into highly provocative actions, whether it is by responding to Russia seizing the Pristina International Airport in June 1999, getting involved on Georgia’s side during the military conflict in August 2008 or by providing lethal military assistance and support for Ukraine. Unless Russia is the clear and proven aggressor, NATO is unlikely to support Turkey and begin World War III.

Second, Russia remains a defensive power aware of its responsibility for maintaining international stability. Moscow wants to work with major powers, not against them. Its insistence on Western recognition of Russia’s interests must not be construed as a drive to destroy the foundations of the international order, such as sovereignty, multilateralism, and arms control.

Third, the United States has important interests to prevent regional conflicts from escalating or becoming trans-regional. Although its relative military capabilities are not where they were ten years ago, the U.S. military and diplomatic resources are sufficient to restrain key regional players in any part of the world. Given the power rivalry across several regions, proxy wars are possible and indeed are happening, but they are unlikely to escalate.

Fourth, unlike the Cold War era, the contemporary world has no rigid alliance structure. The so-called Russia-China-Iran axis is hardly more than a figment of the imagination by American neoconservatives and some Russia conspiracy-minded thinkers. The world remains a space in which international coalitions overlap and are mostly formed on an ad hoc basis.

Fifth, with the exception of the Islamic State of Iraq and the Greater Syria (ISIS), there is no fundamental conflict of values and ideologies. Despite the efforts to present as incompatible the so-called “traditional” and “Western” values by Russia or “democracy” to “autocracy” by the United States and Europe, the world majority does not think that this cultural divide is worth fighting for.

Despite the dangers of the world we live in, it contains a number of important, even underappreciated, checks on great powers’ militarism. The threat talk coming from politicians is often deceiving. Such talk may be a way to pressure the opponent into various political and military concessions rather than to signal real intentions. When such pressures do not bring expected results, the rhetoric of war and isolation subsides.

Then a dialogue begins. Perhaps, the increasing frequency of exchanges between Obama and Putin since December 2015 - including their recent phone conversation following the Munich conference - suggest a growing recognition that the record of pressuring Russia has been mixed at best.

#### Offensive capabilities are weak, there are lots of defenses---their space war ev is hype

Dr. Joan Johnson-Freese 16, Ph.D. in Political Science and International Relations from Kent State University, Chair of the Department of National Security Studies at the Naval War College, and Theresa Hitchens, Senior Research Scholar at the Center for International and Security Studies and Former Director of the United Nations Institute for Disarmament Research (UNIDIR), “Stop The Fearmongering Over War In Space: The Sky’s Not Falling, Part 1”, Breaking Defense, 12/27/2016, https://breakingdefense.com/2016/12/stop-the-fearmongering-over-war-in-space-the-skys-not-falling-part-1/

Star Wars it ain’t, but the Pentagon is increasingly anxious over threats to its satellites, as we’ve reported frequently in recent years. But in this op-ed, scholars Joan Johnson-Freese and Theresa Hitchens argue that war in space is dangerously overhyped. — the editors

In the last two years, we’ve seen rising hysteria over a future war in space. Fanning the flames are not only dire assessments from the US military, but also breathless coverage from a cooperative and credulous press. This reporting doesn’t only muddy public debate over whether we really need expensive systems. It could also become a self-fulfilling prophecy. The irony is that nothing makes the currently slim possibility of war in space more likely than fearmongering over the threat of war in space.

Two television programs in the past two years show how egregious this fearmongering can get. In April 2015, the CBS show 60 Minutes ran a segment called “The Battle Above.” In an interview with General John Hyten, the then-chief of U.S. Air Force Space Command, it came across loud and clear that the United States was being forced to prepare for a battle in space — specifically against China — that it really didn’t want.

Gen. John Hyten: It’s a competition that I wish wasn’t occurring, but it is. And if we’re threatened in space, we have the right of self-defense, and we’ll make sure we can execute that right.

David Martin: And use force if necessary.

Gen. John Hyten: That’s why we have a military. You know, I’m not NASA.

It was explained by Hyten and other guests that China is building a considerable amount of hardware and accumulating significant know-how regarding space, all threatening to space assets Americans depend on every day. If viewers weren’t frightened after watching the segment, it wasn’t for lack of trying on the part of CBS.

Using terms like “offensive counterspace” as a 1984 NewSpeak euphemism for “weapons,” it was made clear that the United States had no choice but to spend billions of dollars on offensive counterspace technology to not just thwart the Chinese threat, but control and dominate space. While it didn’t actually distort facts — just omit facts about current U.S. space capabilities — the segment was basically a cost-free commercial for the military-industrial complex.

In retrospect though, “The Battle Above” was pretty good compared to CNN’s recent special, War in Space: The Next Battlefield. The latter might as well have been called Sharknado in Space – because the only far-out weapons technology our potential adversaries don’t have, according to the broadcast, seems to be “sharks with frickin’ laser beams attached to their heads!”

First, CNN needs to hire some fact checkers. Saying “unlike its adversaries, the U.S. has not yet weaponized space” is deeply misleading, like saying “unlike his political opponents, President-Elect Donald Trump has not sprouted wings and flown away”: A few (admittedly alarming) weapons tests aside, no country in the world has yet weaponized space. Contrary to CNN, stock market transactions are not timed nor synchronized through GPS, but a closed system. Cruise missiles can find their targets even without GPS, because they have both GPS and precision inertial measurement units onboard, and IMUs don’t rely on satellite data. Oh, and the British rock group Pink Floyd holds the only claim to the Dark Side of the Moon: There is a “far side” of the Moon — the side always turned away from the Earth — but not a “dark side” — which would be a side always turned away from the Sun.

More nefariously, the segment sensationalized nuggets of truth within a barrage of half-truths, backed by a heavy bass, dramatic soundtrack (and gravelly-voiced reporter Jim Sciutto) and accompanied by sexy and scary visuals.

Make no mistake there are dangers in space, and the United States has the most to lose if space assets are lost. The question is how best to protect them. Here are a few facts CNN omitted.

The Reality

The U.S. has all of the technologies described on the CNN segment and deemed potentially offensive: maneuverable satellites, nano-satellites, lasers, jamming capabilities, robotic arms, ballistic missiles that can be used as anti-satellite weapons, etc. In fact, the United States is more technologically advanced than other countries in both military and commercial space.

That technological superiority scares other countries; just as the U.S. military space community is scared of other countries obtaining those technologies in the future. The U.S. military space budget is more than 10 times greater than that of all the countries in the world combined. That also causes other countries concern.

More unsettling still, the United States has long been leery of treaty-based efforts to constrain a potential arms race in outer space, as supported by nearly every other country in the world for decades. Indeed, under the administration of George W. Bush, the U.S. talking points centered on the mantra “there is no arms race in outer space,” so there is no need for diplomat instruments to constrain one. Now, a decade later, the U.S. military – backed by the Intelligence Community which operates the nation’s spy satellites – seems to be shouting to the rooftops that the United States is in danger of losing the space arms race already begun by its potential adversaries. The underlying assumption — a convenient one for advocates of more military spending — is that now there is nothing that diplomacy can do.

However, it must be remembered that most space-related technologies – with the exception of ballistic missiles and dedicated jammers – have both military and civil/commercial uses; both benign — indeed, helpful — and nefarious uses. For example, giving satellites the ability to maneuver on orbit can allow useful inspections of ailing satellites and possibly even repairs.

Further, the United States is not unable to protect its satellites, as repeated during the CNN broadcast by various interviewees and the host. Many U.S. government-owned satellites, including precious spy satellites, have capabilities to maneuver. Many are hardened against electro-magnetic pulse, sport “shutters” to protect optical “eyes” from solar flares and lasers, and use radio frequency hopping to resist jamming.

Offensive weapons, deployed on the ground to attack satellites, or in space, are not a silver bullet. To the contrary, U.S. deployment of such weapons may actually be detrimental to U.S. and international security in space (as we argued in a recent Atlantic Council publication, Towards a New National Security Space Strategy). Further, there are benefits to efforts started by the Obama Administration to find diplomatic tools to restrain and constrain dangerous military activities in space.

These diplomatic efforts, however, would be undercut by a full-out U.S. pursuit of “space dominance.” This includes dialogue with China, the lack of which Gen. William Shelton, retired commander of Air Force Space Command, lamented in the CNN report.

Given CNN’s “cast,” the spin was not surprising. Starting with Ghost Fleet author Peter Singer set the sensationalist tone, which never altered. The apocalyptic opening, inspired by Ghost Fleet, posited a scenario where all U.S. satellites are taken off-line in nearly one fell swoop. Unless we are talking about an alien invasion, that scenario is nigh on impossible. No potential adversary has such capabilities, nor will they ever likely do so. There is just too much redundancy in the system.

#### Deterrence and interdependence check war

Kyle L. Evanoff 19, Research Associate for International Institutions and Global Governance at the Council on Foreign Relations, “Big Bangs, Red Herrings, and the Dilemmas of Space Security”, Council on Foreign Relations, 6/27/2019, https://www.cfr.org/blog/big-bangs-red-herrings-and-dilemmas-space-security

Analysts pointed to Mission Shakti as a vivid example of growing contestation in the outer space domain. Traditional U.S. dominance in space has eroded as a litany of foreign actors (collaborator and competitor alike) have increased their spacefaring prowess, including through the development and use of ASAT weapons and dual-use uncrewed orbiters capable of space rendezvous and proximity operations [PDF]. Pundits fear that such space technologies could alter the calculus of deterrence to inauspicious effect or, worse, become instruments in an adversary’s enactment of a “space Pearl Harbor.” These fears are valid in some senses, overblown and misleading in others. Developments in space pose significant challenges for strategic stability. Obsessive concern with the remote contingency of kinetic warfare in orbit, however, detracts from efforts to address more pressing space security issues and makes catastrophic outcomes more, not less, probable.

Missiles and Lasers and Viruses, Oh My

Recent years have witnessed burgeoning democratization in the outer space domain as plummeting costs—both for manufacturing satellites and placing them in orbit—and proliferating technologies have enabled new spacefaring actors to deploy assets in Earth orbit. The number of active satellites has ballooned to more than two thousand, and their integration into military operations and civil life has deepened in tandem. Recognition of the indispensability of these orbital assets to numerous areas of strategic competition, and defense planners’ emphasis on offensive capabilities as a deterrence measure, has led states to invest large sums in the development of ASAT weapons of various stripes.

In their April Space Threat Assessment 2019 [PDF] report, Todd Harrison, Kaitlyn Johnson, and Thomas G. Roberts of the Center for Strategic and International Studies outline four categories of counterspace operations: kinetic physical attacks, non-kinetic physical attacks, electronic attacks, and cyberattacks. This litany of potential threats, which vary in their severity, reversibility, ease of attribution, and other aspects, makes U.S. policymakers uneasy. After over half a century of spacefaring pre-eminence, the United States has come to depend on the remote-sensing, telecommunications, and positioning, navigation, and timing capabilities that satellites provide. The resounding defeat of the Iraqi military by American and coalition forces during the Gulf War of the early 1990s underscored the substantial battlefield advantages that orbital capabilities confer, and numerous subsequent conflicts have affirmed the U.S. military’s tactical and strategic reliance on space assets. Proliferating counterspace systems heighten the potential for adversaries to disrupt American command, control, and communications networks, as well as surveillance and reconnaissance operations. In attacking these critical space systems, U.S. adversaries could compromise large segments of the national defense enterprise.

Indeed, an insecure orbital environment poses significant challenges for broader strategic stability. Actors in possession of counterspace capabilities can threaten or attack vital elements of ballistic missile launch detection architectures and other systems integral to national and international security, which opens new avenues for intentional, inadvertent, or accidental dispute or conflict escalation. In this sense, novel satellite vulnerabilities add layers of technical and psychological complexity to already labyrinthine deterrence calculations. The effect compounds in light of the deep integration of satellites into information and communications networks: cyber intrusions into space systems are a tantalizing option for state and nonstate actors, and such operations carry their own elaborate deterrence considerations, not least the difficulty of attribution. The net result is a convoluted deterrence landscape, rife with uncertainty and in constant motion thanks to the rapid clip and often competitive character of technological innovation.

Swords of Many Edges

For staunch deterrence advocates, this uncertainty justifies expanding counterspace arsenals. In their view, preventing a space Pearl Harbor in which a U.S. adversary launches a crippling surprise attack against American orbital assets requires evincing the certainty of a devastating counterattack. One way of accomplishing this is through the unambiguous demonstration of effective counterspace capabilities. The clearer the demonstration, the better. In this sense, ASAT missile tests, which are easy to attribute and spectacular in nature, hold great allure as a means of signaling orbital strike capabilities.

Such tests, however, come with significant drawbacks. The most obvious of these is that they generate large amounts of dangerous space debris, which pose serious hazards to spacecraft. Each new fragment requires monitoring and, in cases of potential collisions, risk assessment and avoidance maneuvers. Debris-generating military operations, in this sense, are a self-defeating proposition. ASAT missile tests also come with nebulous reputational costs, as the corpus of international space law, including the 1967 Outer Space Treaty, emphasizes that uses of space should be peaceful in nature. Likewise, UN Debris Mitigation Guidelines [PDF] affirm the importance of minimizing space junk, a dictum inconsistent with kinetic weapons testing. Western media heaped scorn on India for its violation of the important, if incipient, norm against debris generation, even after the country took pains to destroy a low-altitude satellite in order to minimize the lifespan of the bulk of the fragments.

Another important consideration for would-be ASAT testers lies in the potential for space militarization to ignite or exacerbate international arms races. Although military activities have been a persistent feature of the Space Age, those activities have often furthered peaceful as much as warlike pursuits, as has been the case with many remote-sensing operations and the opening of the U.S. Global Positioning System to civilian use. Militarization is a process rather than a state of affairs, and one that takes various forms at that. Deterrence implications notwithstanding, the development and deployment of counterspace capabilities can drive potential adversaries to develop and deploy similar capabilities, contributing to the erosion of norms of peaceful use.

Some military planners and policymakers’ assertions to the contrary, space is at present less a domain of warfighting than a domain of deep interdependence. The value of combat support functions performed from space, as important as they are to battlefield success, pales in comparison to that of other satellite-facilitated services, which are vital to myriad aspects of contemporary global society. Common space security interests include minimizing debris-generation, coordinating on satellite placement and radio-frequency spectrum use, monitoring terrestrial and space weather and the global environment, ensuring the integrity of global navigation satellite systems, tracking licit and illicit ground, air, and maritime movements, scanning for hazardous comets and asteroids, and conducting scientific observations and experiments. Many of these require states to work together to maximize benefits and minimize risks. Perceptions that one or more countries are attempting in systematic fashion to exert dominance and preclude other actors’ access to the domain and its benefits, then, carry significant dangers. They bend state behavior toward aggression and actual warfighting.

Security in the Heavens and on Earth

National governments, including that of the United States, should be careful not to make active contributions to such perceptions. Although low-level grey zone aggression has become commonplace for space-linked systems due to the relative ease and reversibility of many cyber and electronic attacks, space remains free of kinetic combat at present, as a recent Secure World Foundation report [PDF] emphasizes. Rather than responding to limited attacks by expanding counterspace arsenals, which carries the risk of contributing to arms race dynamics, U.S. and allied policymakers should accept some amount of limited aggression as more or less inevitable. They should place more emphasis on diplomacy—not weaponry—as a tool in mitigating these sorts of attacks. The United States should work with other spacefaring powers to reach consensus on non-binding rules of the road for space, using the International Code of Conduct for Outer Space Activities [PDF] that the European Union proposed in 2008 as a rough starting point. While new international law could be a greater boon still, formal UN discussions on the Prevention of an Arms Race in Outer Space have yielded little progress since the mid-1980s. A joint Chinese-Russian proposal for a Treaty on the Prevention of the Placement of Weapons in Outer Space, for instance, has significant shortcomings and has drawn open condemnation from the United States. Such paralysis, in tandem with the Trump administration’s and U.S. Senate Republicans’ disdain of multilateral treaties, makes a formal agreement a farfetched proposition for now.

More important, U.S. policymakers should avoid making decisions on the basis of a possible, though highly improbable, space Pearl Harbor. They should recognize that latent counterspace capabilities—as exemplified in 2008’s Operation Burnt Frost, which saw the United States repurpose a ballistic missile interceptor to destroy a satellite—are more than sufficient to deter adversaries from launching a major surprise attack in almost all scenarios, especially in light of the aforementioned deep interdependence in the space domain. Adding to the deterrence effect are uncertain offensive cyber capabilities. The United States continues to launch incursions into geopolitical competitors’ critical systems, such as the Russian power grid, and has demonstrated a willingness to employ cyberattacks in the wake of offline incidents, as it did after Iran shot down a U.S. drone last week. Unlike in the nuclear arena, where anything short of the prospect of nuclear retaliation holds limited dissuasive power, space deterrence can stem from military capabilities in various domains. For this reason, an attack on a U.S. satellite could elicit any number of responses. The potential for cross-domain retaliation, combined with the high strategic value of space assets, means that any adversary risks extreme escalation in launching a major assault on American space architectures. Again, well-conceived diplomatic efforts are useful in averting such scenarios altogether.

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

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Resource Location

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

#### Amazon mining will cause extinction

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

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

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

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

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

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

#### Satellite loss shuts down global fracking

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Energy, environment, farming, mining, land use. All of these areas and more are now inextricably linked to satellite data and would be devastated should that flow of data stop. Environmental Monitoring Oh how complacent we've become. We take for granted that we will have instant images from space showing a volcanic eruption somewhere in the South Pacific within hours of learning that it happened. When the BP oll spill happened in the Gulf of Mexico in 2010, satellite images were used in conjunction with aircraft and ships to monitor the extent and evolving nature of the spill (Figures 10.1 and 10.2). The data were also used to direct the ships that were attempting to clean up the spill, to warn fishermen of areas in which it would be dangerous to fish, and to generally monitor the extent of the disaster. This is the type of data we get from space in a field known as remote sensing. Remote sensing is, well, exactly what its name implies. With it, you gather data, or sense, usually in the form of electromagnetic radiation (light), remotely - that is, you are not physically touching what you are looking at. Satellite remote sensing began shortly after we began launching satellites and many industries are now totally dependent upon having the capability. We use satellites, like the venerable Landsat series, to study the Earth m unprecedented detail. Since 1972, Landsat satellites have taken millions of high resolution images of the Earth's surface, allowing comprehensive studies of how the land has changed due to human intervention (deforestation, agriculture, settlement, etc.) and natural processes (desertification, floods, etc.). The best way to understand how useful Landsat and similar data can be to governments at all levels is best illustrated by looking at 14then and now" photographs. For example, Africa's Lake Chad has been shrinking for 40 years, as the desert has encroached on this once plentiful inland freshwater lake. Forty years ago, there were about 15,000 square miles of water within the lake. Now, it is less than 500 square miles (Figure 10.3) [1]. And what is the practical side of this particular bit of information? Governments use this type of satellite imagery to avoid human tragedy. Hundreds of thousands of people, if not millions, depend upon the waters of Lake Chad for agriculture, industry, and personal hygiene. With the lake going dry, how has this impacted on their livelihoods, their families, and their very lives? The European Space Agency (ESA) is freely providing satellite data to developing countries as they search for new sources of drinking water. For example, ESA assessed data obtained from space over Nigeria to find over 90 new freshwater sources within that country. After ground teams visited the new sites, all were confirmed to contain fresh water. This was no accident. These were satellites with sensors developed for just such purposes in mind [2]. Desertification is but one example of changing climates affecting people's everyday lives. What about more direct observations of our impact on the planet? Figures 10.4 and 10.5 show the scarring of the Earth's surface as a result of surface mining in West Virginia. This is not a polemic against mining; rather, it is an observation that we can use satellite imagery to monitor such mining and be mindful of its impact on the environment. Other than taking pictures of surface features, like lakes and open pit mines, how are satellites monitoring the Earth's changing climate? In just about every way, by: monitoring global land, sea, and atmospheric temperatures; measuring yearly average rainfall amounts just about everywhere on the globe; measuring glaciation rates; measuring sea surface heights; and more. Remote sensing is more than taking pictures of the Earth in the visible part of the spectrum. We can learn a great deal from looking at part of the spectrum that our eyes cannot see - but our instruments can. Shown in Figure 10.6 is a composite image of the Earth's surface showing the average land-surface temperature at night. The data came from two NASA satellites, Terra and Aqua, as they orbit the Earth in a polar orbit. (This means that they circle the Earth from top to bottom, passing over both the North and South Poles with each complete orbit.) Terra's orbit is such that it passes from the north to the south across the equator in the morning; Aqua passes south to north over the equator in the afternoon. Taken together, they observe the Earth's surface in its entirety every two days. Data sets such as this exist for just about any day of the year and can show either night-time lows or daytime highs. By looking in different parts of the spectrum, like the infrared light discussed above, we can make observations as described in Table 10.1. Pollution Monitoring As emerging countries industrialize, they also become polluters. Many of these countries are not exactly forthright about releasing air-pollution details to the media, so much of our awareness of the rising pollution there is anecdotal - typically m the form of stories told by people who have visited these countries and seen the extreme pollution at first hand. This, by the way, is not exactly scientific. Using satellites, and not relying on either the governments in question or second-hand stories, we can accurately assess the pollution levels there and elsewhere. Using satellite images to measure the amount of light absorbed or blocked by fine particulates in the atmosphere, otherwise known as air pollution, you can determine not only what the airborne pollutant might be, but also its size. And, by looking at the overall light blockage, an accurate estimate of the amount of pollution in the air can also be made. Recent studies show that many of these countries are covered in a pollution cloud that countries in the developed world would deem extremely harmful. And how do we know this with scientific certainty? From satellite measurements. Energy Production The recent boom in the production of shale oil in the United States and elsewhere is due in large part to the identification and geolocation of promising geologic formations for test drilling and fracking. "Fracking" is a somewhat new term that comes from the phrase "hydraulic fracturing". In fracking, massive amounts of previously unusable reservoirs of oil and natural gas are released for capture, sale, and transport from deposits deep within the Earth - many located at least a mile below the surface. In the United States alone, there may be as much as 750 trillion cubic feet of natural gas within shale deposits releasable by fracking [3]. How do energy companies know where to look for these deposits? In large part, by analyzing satellite imagery. According to Science Daily (26 February 2009), a new map of the Earth's gravitational field based on satellite measurements makes it much less resource intensive to find new oil deposits. The map will be particularly useful as the ice melts in the oil-rich Arctic regions. The easy-to-find oilfields have already been found. To fuel the growing world economy, those harder-to-find deposits must be located and tapped - which is why satellite imagery is so important. Take away this and other satellite-dependent techniques of oil and gas exploration and the world economy will feel the impact through higher oil and natural gas prices.

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

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

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

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

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

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

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

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

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

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

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