# 1NC vs Orange Lutheran AZ

## CASE

### 1NC - Cap

#### Capitalism is sweet --- the *proliferation of markets* and economic growth supplanted by liberalism has created a *massive reduction* in global violence, war, AND oppression by every metric

Cohen & Zenko 19 (Michael A. Cohen, former lecturer at Columbia University’s School of International and Public Affairs, regular contributor for The Boston Globe on national politics and foreign affairs, has written for dozens of news outlets, including as a columnist for the Guardian and Foreign Policy, US Political Correspondent for the London Observer, former speechwriter at the US State Department; and Micah Zenko, Whitehead Senior Fellow on the US and Americas Programme at Chatham House, former Senior Fellow at the Council on Foreign Relations, former research associate on the Project on Managing The Atom, Harvard University's Belfer Center for Science and International Affairs, PhD Politics, Brandeis University; Clear and Present Safety: The World Has Never Been Better And Why That Matters To Americans, Yale University Press, Kindle Edition, 2019, locations 57-712)

Introduction Neither a man nor a crowd nor a nation can be trusted to act humanely or to think sanely under the influence of a great fear. —Bertrand Russell On a crisp January day in 2016, in the small hamlet of Pittsfield, New Hampshire, several hundred voters were gathered for what is a quadrennial rite of passage in the Granite State: listening to a politician make his or her pitch to be the next president of the United States. The speaker this day was Chris Christie, who was then the Republican governor of New Jersey and one of more than a dozen presidential candidates campaigning across the state. Christie discussed everything from illicit drugs and immigration to the federal budget and the U.S. war against the self-proclaimed Islamic State. “He was pretty good,” one woman unenthusiastically shrugged after he finished. But as she struggled to say anything of substance, it seemed clear that Christie had not made much of an impression. When asked, though, if any specific policy issue took on particular importance, her face lit up: “ISIS. I’m really worried about ISIS.” The thought of her kids and grandkids growing up in a world where groups like the Islamic State would be threatening their future seemed to cause her genuine and palpable concern.1 The woman’s anxieties were sincere, but her fear could not have been more misplaced. The Islamic State had yet to launch even one direct terrorist attack within the United States, and if the group had drawn up a list of potential targets, the chances that Pittsfield, New Hampshire—an hour’s drive north of Manchester—would be high on that list were decidedly slim. At a time of ever-widening income inequality, stagnant wage growth, gun violence, and a raging opioid epidemic that in the previous year had claimed 422 lives in New Hampshire alone, this woman considered a shadowy terrorist group that had not killed a single American on U.S. soil one of the biggest challenges facing the country.2 She was far from alone. Public opinion polling consistently shows that Americans have long exaggerated the danger that terrorism represents to the United States. Since 9/11 the average number of Americans killed yearly in a terrorist attack is twenty-seven—and 90 percent of them were in Afghanistan or Iraq. Yet, in 2018, 81 percent of Americans ranked “cyberterrorism” as the most critical threat facing the United States, followed by international terrorism at 75 percent.3 Eighty-three percent of voters expect that a major terrorist incident with large numbers of casualties is likely to occur in the near future. Remarkably, in November 2017, more than half (52 percent) of Americans thought the United States was less safe then than it was before 9/11—as if the trillions spent on homeland security and fighting terrorists in Iraq and Afghanistan had done nothing to make America less vulnerable to international terrorism. Seventeen years after September 11, the outsized fears of another 9/11-style terrorist attack provided compelling—and depressing—evidence that terrorist groups had succeeded, beyond their wildest imaginations, in transforming American society.4 It is not just armed jihadists that scare Americans. A 2012 poll showed that six out of seven Americans agree that “the United States faces greater threats to its security today than it did during the Cold War”—a time when the United States found itself in the crosshairs of approximately ten thousand nuclear weapons, each with a destructive power up to fifty times that of the nuclear bomb that was dropped on Hiroshima.5 How Americans, such as this woman from a small town in the “Live Free or Die” state, became convinced that the United States faces such acute and harmful foreign threats is, at its core, the story of this book. The American public is being fed, by politicians and pundits alike, a steady diet of threat inflation that has made them deeply fearful of the world outside their borders. They have become convinced that overseas menaces are perpetually becoming more likely, lethal, and complex. The world is forever on fire; America is always getting weaker; and its citizens are facing a constant drumbeat of tremendous and unceasing risks. The pervasiveness of threat inflation is such conventional wisdom that alternative—or even less threatening—descriptions of the world are largely nonexistent in foreign policy debates. As a result, most Americans are simply unaware of the extraordinary and unprecedented political, economic, and social progress that has taken place in virtually every corner of the globe over the past three decades. On that January day in New Hampshire, while alluding to the national debate on the balance between security and privacy, Christie declared ominously, “You can’t protect civil liberties from a coffin.” Pittsfield voters who had watched the most recently aired Republican presidential debate would have heard former Florida governor Jeb Bush tell them that the Islamic State had formed “a caliphate the size of Indiana with . . . 30,000 to 40,000 battle-tested soldiers that are organized to destroy our way of life.”6 They would have heard candidate and former pediatric neurosurgeon Ben Carson claim that dirty bombs and cyberattacks are, “in fact, an existential threat to us.”7 Those following the Republican primaries would have heard Donald Trump, the eventual Republican nominee and president of the United States, tell them that the only way to keep America safe was to ban all Muslims from entering the country, torture suspected terrorists, and “take out” (murder) their families.8 As regular consumers of news, Republican voters might have heard South Carolina senator Lindsey Graham tell Americans, “The world is literally about to blow up,” in January 2014 (spoiler: it did not).9 They might have caught Sen. John McCain, who, having been born in 1936, had lived through conflicts that killed an estimated sixty million people and had fought in one of those wars, say in 2015, “We are probably in the most serious period of turmoil in our lifetime.”10 Perhaps in the spring of 2017, they caught secretary for homeland security John Kelly claiming, “Make no mistake—we are a nation under attack” and “We are under attack every single day. The threats are relentless.”11 Or, in the summer of 2018, they might have heard his boss, President Trump, warn that “people coming in from the Middle East” would come across the border by using “children to get through the lines.”12 This incessant, default threat-mongering is neither a partisan issue nor a habit reserved for elected officials. Those Americans tuning in to CNN in October 2014 might have the chyron asking the hypothetical question “Ebola: ‘The ISIS of Biological Agents?’ ”13 Maybe they saw local reporting on defense secretary Chuck Hagel saying, “Cyber threats . . . are just as real and deadly and lethal as anything we’ve ever dealt with,” or New York senator Kirsten Gillibrand calling Iran an “existential threat” to America, or perhaps Arkansas senator Tom Cotton warning that the Islamic State, in coordination with Mexican drug cartels, could infiltrate the border and “attack us right here.”14 Even if viewers missed all that, they would have found it far more difficult to avoid the nonstop news coverage of the latest terrorist attack in Paris, Barcelona, or London. Even more important than what Americans hear from the nation’s leaders is what they do not hear. They do not hear that terrorism harms fewer Americans each year than falling televisions and furniture, bathtub drownings, and lightning strikes do. Annually, more Americans lose their lives from these three rare killers—roughly thirty-three, eighty-five, and forty fatalities, respectively—than at the hands of wild-eyed Islamic jihadists.15 These numbers pale next to the number of Americans killed each year prematurely by preventable, noncommunicable diseases (more than 2.5 million), suicide (44,100), and gun homicides (14,400). In short, Americans do not hear that America is unusually safe and secure from foreign threats. Part of this is a function of geography, but it is also true that the United States faces no serious great-power rival and no near-term political or economic competitor. So it should not be surprising that 86 percent of Americans view Russia’s military power as either an important or a critical threat to America, even though Russia is hemmed in by NATO, has a moribund economy, and has no enduring military partnerships in South Asia, the Middle East (outside of Syria), or the Western Hemisphere. Nor should it be surprising that 87 percent of Americans are concerned about China’s military power even though China faces its own pressing social, economic, and environmental challenges—and its primary near-term interest is maintaining Communist Party rule, not directly challenging the United States. Nor should it be surprising that 75 percent of Americans called the development of nuclear weapons by Iran a “critical threat”—even though Iran has surrendered its nuclear fuel and has allowed invasive inspections of its nuclear facilities through at least 2030.16 Finally, we should not be surprised that half the American people believe that U.S. armed forces are not the number-one military in the world, even though the United States spends more on national defense than the next nine nations combined, is allied or has mutual defense treaties with five of those countries, enjoys long-term security partnerships in every region of the world (outside Antarctica), and is, quite simply, the world’s most dominant nation and more secure than any other great power in history.17 In addition, the Republican primary voters in Pittsfield—or those who voted for a president who regularly told them “the world is a mess”—almost certainly did not hear that the world today is cumulatively more peaceful, freer, healthier, better educated, and wealthier than at any point in human history.18 Like most Americans, they would not have heard that in the year 2015 the proportion of people living in extreme poverty (on less than two dollars a day) dropped to below 10 percent of the global population, the lowest level ever and down from close to 50 percent in 1981.19 They are likely unaware that AIDS deaths have declined for more than fifteen years in a row, global life expectancy has increased by seven years since 1990 alone, and child mortality rates (for children under five years old) has been halved over that same period. Unbeknownst to them and the overwhelming majority of Americans, improvements in polio vaccines and delivery methods have practically eradicated the disease (just eleven active global cases by July 2018), saving more than 650,000 lives since 1988.20 What is most remarkable about all these positive developments is that they are uncontestable—the data are simply that strong. This fundamental disconnect between what Americans have been encouraged to believe about the world and the reality of global affairs is the most critical foreign policy issue facing the United States today. The American people are being sold a dangerous bill of goods that is distorting our foreign policy choices and leading politicians and policy makers to focus more on the threats that Americans perceive, rather than the ones that actually exist. This strategic misdiagnosis has led to consistently mistaken foreign (and domestic) policy choices that are diverting resources and attention away from the actual dangers that Americans face in their homes, neighborhoods, and workplaces. Every dollar spent bombing and then rebuilding Middle Eastern countries, modernizing a duplicative nuclear weapons arsenal, or building the next generation of combat aircraft that are intended to fight yesterday’s enemies means less money for America’s greatest domestic challenges. This includes America’s underperforming schools; a health care system that performs far worse than those of other affluent countries; crumbling roads, bridges, and water systems in places like Flint, Michigan; inadequate preparation for the inevitable and irreversible effects of climate change; and a tattered social safety net that is a far cry from those enjoyed by other developed countries. Pointing out that foreign threats pose a relatively insignificant risk to Americans compared to vastly greater domestic dangers and systemic harms is not to suggest that the United States should pull up the drawbridge and abandon its global role. If anything, at a time of relative peace and stability in the world, smart American leadership and active involvement in global affairs are more important than ever. In the seventy-plus years since the end of World War II, the United States, along with its allies and partners, has helped construct an international system that limits large-scale interstate conflict; encourages democratization, adherence to the rule of law, and respect for human rights; and advances human development. The challenge for the next generation of U.S. policy makers is to solidify the gains that have been made and to ensure that this extraordinary progress is not reversed. For that to happen, Americans must change the ways they think and talk about foreign policy and national security—and the first step is to acknowledge that foreign-threat inflation and the corresponding policy choices that it encourages are a problem. Americans need to think about the world in a whole new way, one that is more accurate and more uplifting than the dystopian view promoted by politicians and pundits. In the following six chapters, we will spell out how this paradigm shift might occur. First, there must be greater recognition that potential rivals and complex issues—frequently portrayed as dangers to Americans—are, in reality, relatively minor threats to Americans. Great-power wars have disappeared, interstate wars have become vanishingly rare, and the world is a safer and freer place than it has ever been in human history. Second, there needs to be better appreciation of the extraordinary global progress that has been made over the past several decades—and why it benefits the American people. The world today is healthier than would have been scarcely imaginable decades ago and is far richer and better educated than ever before. It is also more united and interconnected through travel, communications, economic links, and diplomatic relations. These trends make this current era of relative peace, safety, and prosperity not a momentary blip but, more likely than not, the future reality of global affairs. Third, it is imperative that Americans rethink what “national security” means and focus on the systemic dangers that diminish economic opportunities and the American people’s basic quality of life. From noncommunicable diseases to gun violence to crippling political dysfunction, the things that actually injure and kill us receive rare moments of national attention, while foreign terrorists and other outside threats perpetually occupy our minds. Political attention, policy changes, and expanded government resources can significantly—and cost-effectively—reduce these risks, but that will happen only if Americans recognize the need to address them. Fourth, the loose collection of politicians, government officials, pundits, private security firms, think tankers, academics, cable news hosts, and news editors that we call the Threat-Industrial Complex demands far greater scrutiny. These are the individuals—and institutions—who shape public perceptions about international relations and promulgate a false narrative of danger and insecurity. Fifth, our modern era of threat inflation must be placed in a larger political and historical context: namely, as an enduring feature of American politics and foreign policy debates since World War II. From “missile gaps” and the “domino theory” to the “evil empire” and “evildoers,” foreign threats have been consistently manipulated both in times of actual danger and in times of genuine peace and security. Sixth, to dramatize our argument, we offer a case study and cautionary tale of how threat inflation occurs and its larger political consequences: namely, the response to the tragedy of September 11. Public statements and policy decisions made by President George W. Bush and his administration set the tone, agenda, and political incentives of our contemporary fear-mongering but also wasted opportunities in a disproportionate response to a relatively minor and manageable threat. Finally, we lay out recommendations for reversing this unbalanced perspective and approach to foreign policy that will answer the question of what a U.S. domestic and global policy—properly informed by a more accurate understanding of the world—should look like. This book is not meant to be a comprehensive treatment of threat inflation or the final word about the nature and degree of foreign threats facing the United States and its citizens. As has been true for the past 240 years, the degree to which foreign dangers threaten America and its citizens has changed dramatically over time and will continue to evolve in ways that nobody can predict today. Nonetheless, it is quantitatively true that the current global environment is one of relatively few foreign threats, particularly in comparison to other great powers and to America’s historical experience. The fixation of American foreign policy and national security should not be what former president John Quincy Adams spoke of nearly two hundred years ago: namely, the impulse to look “abroad in search of monsters to destroy.” Rather, it must be to remain focused on ensuring that today’s hopeful present is America’s brighter future. A Safer and Freer World I think, what we need to do is to remind people that the earth is a very dangerous place these days. —White House press secretary Sean Spicer, February 7, 2017 February 16, 2012, was, from all appearances, an unremarkable day. The political world was focused on the upcoming Republican presidential primary in Michigan, in which the frontrunner, Mitt Romney, was facing a spirited challenge from former Pennsylvania senator Rick Santorum. Journalists were mourning the loss of the New York Times reporter Anthony Shadid, who had died on a reporting trip to Syria. New Yorkers obsessed over the Knicks’ budding superstar point guard, Jeremy Lin; the Simpsons marked its five hundredth episode; and Chinese President Xi Jinping was in Iowa hoping, as the Washington Post put it, “to emphasize the idea of an enduring U.S.-Chinese friendship.”1 Yet, on Capitol Hill, the most senior officer in the world’s most powerful military, chairman of the Joint Chiefs of Staff Gen. Martin Dempsey, saw something else altogether: danger. Testifying before the House Appropriations Defense Subcommittee on budget sequestration—the congressional mandate passed in 2011 that required all federal agencies, including the Pentagon, to automatically cut their budgets by 5 to 10 percent in the following decade—Dempsey warned, “in my personal military judgment, formed over thirty-eight years, we are living in the most dangerous time in my lifetime, right now.”2 This is a surprising statement. After all, Martin Dempsey was born in March 1952, during the tail end of the Korean War—which killed more than two million people, including 36,574 Americans. When he attended elementary school, the Cuban Missile Crisis brought the world closer to nuclear holocaust than at any other point during the Cold War. By the time he enlisted in the army in 1974, the Vietnam War had been going on for several years and before it ended would take the lives of more than three million people, including 58,220 Americans. As Dempsey rose through the military ranks, he witnessed the strategic nuclear arms buildup of the 1980s, when the United States and the Soviet Union had tens of thousands of nuclear-armed missiles pointed at each other. Later, on September 11, 2001, the most lethal terrorist attack in American history took the lives of nearly three thousand people. While all of these events directly affected Americans, there were plenty of other dangerous moments in Dempsey’s lifetime, such as the Biafra separatist civil war in Nigeria that killed two hundred thousand, the Angolan civil war in which one million people died, the Khmer Rouge’s genocide in Cambodia that took the lives of approximately a quarter of that nation’s eight million people, the Iran-Iraq War during the 1980s that killed more than one million people, and the internationalized civil war in Congo that has led to three million war-related deaths since the mid-1990s.3 Yet, if Dempsey is to be taken literally, none of those moments compared to the dangers facing the world on the morning of February 16, 2012. What made Dempsey’s statement particularly odd was an observation he made one year later testifying before Congress: “I will personally attest to the fact that [the world is] more dangerous than it’s ever been”—in other words, since the earth was fully formed 4.6 billion years ago.4 Though Dempsey’s comments were clearly hyperbolic—and easily disprovable—they garnered little attention. In a political environment dominated by habitual threat inflation, they barely stand out. Indeed, two years after Dempsey’s testimony, the director of national intelligence, James Clapper, told Congress, “looking back over my more than half a century in intelligence, I have not experienced a time when we have been beset by more crises and threats around the globe.” Remarkably, he had made virtually the same statement—word for word—a year earlier when testifying before Congress.5 In January 2015, army chief of staff Gen. Raymond Odierno told the Senate Armed Services Committee, “today the global environment is the most uncertain I have seen in my thirty-six years of service.”6 This assertion was especially well received by the committee’s chairman, Sen. John McCain, who only days before had proclaimed, “we are probably in the most serious period of turmoil in our lifetime.”7 In November 2017, Air Force Lt. Gen. Steve Kwast went further back in time proclaiming, “There’s no question that this generation . . . is living in the most dangerous time since the Civil War for the Republic.”8 There are specific bureaucratic and political reasons for such apocalyptic descriptions of the global environment (the more vivid the threat, the more likely Congress will be to maintain military and intelligence-community funding). Such views, however, are mimicked across the national security community. Indeed, in the elite world of foreign policy punditry (and national politics), the notion of grave, growing, and irreversible dangers facing the United States is the default (and unchanging) position. So we should not be surprised that most Americans think the world is getting more and more dangerous.9 In the immediate aftermath of the bombing of a subway train and airport terminal in Brussels in March 2016, MSNBC news anchor Brian Williams asked Senator McCain if the world was on the verge of World War III. McCain unsurprisingly said yes.10 Sen. Lindsay Graham, then in the running for the Republican nomination for president, echoed these fears, claiming, “there is a sickness in the world that has to be dealt with, and the civilized world must come together to confront it.”11 Quite simply, this is the lingua franca of the Threat-Industrial Complex. There is one problem: this image of the world is completely wrong. In virtually no element of our national discourse are Americans provided with a more inaccurate depiction of the world than when it comes to matters of war, peace, and freedom. Americans live in a world that is safer and freer than ever before in human history—and it is not even close. To state this is not to be insensitive to those who are suffering real harms or being denied their personal freedoms. It doesn’t mean one is naïve to the potential of current global challenges—some of which are neither illusory nor false—to become serious threats in the future. But facts are facts, and the transformation in the human experience over the past two to three decades is the most consequential global trend in security affairs in any of our lifetimes—and it is largely unknown to the wider public. A Safer World The data supporting the proposition that the world is safer than ever are so overwhelming that they can barely be disputed. For example, interstate war, or war between states, was the defining characteristic of international relations for centuries. Today, such wars have largely disappeared. Since 2012, there have been just two interstate wars: one between Sudan and South Sudan in 2012 and one between India and Pakistan in 2014 and 2015 that led to fewer than one hundred fatalities in total over both years.12 In the seven years before 2010, there was one major interstate conflict—started by the United States in Iraq in March 2003.13 How about great-power conflict? These protracted and bloody wars—such as the Thirty Years’ War, World War I, and World War II—have been historically the most devastating and consequential conflicts. They’ve repeatedly led to massive death tolls of soldiers and civilians, forced transfers of millions of people, and the redrawing of national boundaries to the benefit of the victors. As the historian Timothy Snyder has documented in Bloodlands: Europe between Hitler and Stalin, 10.5 million civilians (Germans, Poles, Belarusians, Ukrainians, and Jews from various countries) were killed by Germany and the Soviet Union between 1939 and 1945.14 Put another way by the eminent British historian Max Hastings, approximately twenty-seven thousand people lost their lives every single day of that conflict.15 That means that during World War II, between a given Monday and Thursday, there would have been as many deaths as there were battle-related deaths in all of 2016.16 Despite the December 2015 claim by Chris Christie that the United States was “already in World War III,” the world has not seen such a total global conflict in more than seven decades.17 All of this might sound like apostasy when you consider the daily fare on cable news segments, in social media feeds, and in the nation’s newspapers and magazines. Foreign reporting in these outlets has been dominated in recent years by North Korea’s nuclear weapons development, stories of terrorist attacks in Iraq and western Europe, a bloody civil war in Syria that has killed an estimated five hundred thousand people, the barbaric cruelty of the Islamic State, Russia’s meddling in its near abroad, and China’s campaign of building military facilities on disputed territories in the South China Sea.18 For those whose lives are directly affected, these crises are serious matters. But alarmist coverage of these global hot spots has deluded Americans into believing that the world is a chronically violent place. It’s not. In fact, modern war is not only a rare occurrence, but when it does happen, it tends to be less violent and of shorter duration. On average, conflicts kill about 80 percent fewer people now than in the 1950s, when wars in Korea, Southeast Asia, and sub-Saharan Africa took millions of lives.19 The vastly greater harm today is the displacement of civilians caught up in the fighting between combatants. By June 2018, sixty-eight million people around the world had been forced from their homes.20 To the credit of the United Nations, international organizations, and nongovernmental groups, the breadth and depth of understanding about the underlying dynamics and drivers of conflict have expanded dramatically, and there now exist far more tools for preventing and mitigating such armed violence. Not surprisingly, conflict gets more attention than does the successful use of international and regional conflict-prevention methods to prevent wars from occurring in the first place. The wars that never occurred between Israel and Iran, Peru and Ecuador, Russia and its Baltic neighbors, and Turkey and Russia after the shooting down of a Russian fighter in 2016 receive precious little attention. Despite routine alarms of mounting tensions between China and its neighbors over territorial disputes in the East and South China Seas, conflict there has been avoided. This is true of the overwhelming number of maritime and land disputes, which a majority of countries have with their neighbors. Additionally, of the 430 bilateral maritime boundaries in the world, most are not defined by formal agreements between affected states. Unfortunately, peace, even between bitter adversaries, is not an “event” worth recognizing, much less celebrating; the dominant media narrative is that of an ever-threatening world.21 The current era of relative peace and stability has also contributed to a notable decline in the prevalence of state-directed mass killings of civilians.22 During the Cold War, approximately one in seven countries experienced a state-sponsored mass killing. This number increased to nearly 25 percent immediately after the Berlin Wall came down and declined to between 5 and 10 percent by the 2010s.23 In fact, far fewer people have been killed in war in the past quarter century than in any other quarter century over the past six hundred years. In 1800, one out of every two thousand people on earth—civilians and combatants—died from a combat-related death; in 1900, it was one in every twenty thousand; by 2016, it was one in every one hundred thousand.24 The overall decline in global conflict has had extraordinary ripple effects. William Tecumseh Sherman famously declared in 1879 that “war is hell,” but his words barely capture the full costs of warfare and armed violence. As one would expect, warfare significantly limits life expectancy. The Syrian civil war, for example, reduced life spans there from 79.5 years before 2011 to 55.7 in 2015, an extraordinary twenty-year decline in just a four-year period.25 Children living in conflict-affected poor countries are twice as likely to die before their fifth birthday as are children in other poor countries, and warfare diminishes educational opportunities at all levels as well as overall quality of life. For example, children who grow up in conflict-affected countries are less likely to be literate and far less likely to be enrolled in primary school.26 Beyond the immediate human costs, wars do untold physical and environmental damage. In 2016, a time of relative peace and stability, all of the world’s armed conflicts combined cost the global economy an estimated $14.3 trillion. That is nearly 12.5 percent of global GDP.27 The relationship between conflict and economic distress is self-perpetuating—just as war drains government coffers, economic slowdowns also increase the likelihood of the outbreak and recurrence of conflict. Finally, conflict-prone countries are far less democratic, and, in fact, the presence of an autocratic government increases the risk of a civil war starting within that government’s territory.28 As noted previously, this matters because civil wars—including those like Syria’s that became “internationalized” with external support—are virtually the only type of armed conflicts that still occur in the world today. Ironically, Americans tend to see the world as far more dangerous than it is precisely because the world is safer. Conflicts that were once far more routine have become more unusual and thus receive greater (and more vivid) media attention. This bolsters the impression that we live in a world of constant conflict when compared to recent history. Yet it is often forgotten exactly how bloody the final years of the Cold War were, particularly in comparison to today. The Cold War is mistakenly remembered as an era of relative quiet in which Washington and Moscow co-managed global affairs. For example, in February 2016, Clapper said the reason there were more threats than at any point in his seventy-three-year lifetime was the disappearance of the superpower rivalry between the United States and Soviet Union. “Virtually all other threats were sort of subsumed in that basic bipolar contest that went on for decades and was characterized by stability,” said Clapper.29 Yet, in the decade preceding the end of the Cold War in 1991, there were more than two million battle-related deaths around the world. In the ten years immediately after, there were 651,000, and in the past ten years, there were even fewer: 402,000.30 While the Cold War saw a bipolar (albeit unimaginably costly) peace between two nuclear-armed superpowers, it does not mean the rest of the world enjoyed peace and safety. There were significant internationalized wars, genocides and mass killings, and lengthy and bloody civil wars dotting the globe, from Indonesia and Afghanistan to Vietnam, Nigeria, and throughout Central America. There is also the inconvenient fact that the United States and Soviet Union possessed nearly seventy thousand nuclear weapons, many perched on intercontinental missiles pointed directly at each other. The two adversaries also had tactical nuclear weapons deployed in twelve countries—many poorly secured or with the authority to use them resting with local military commanders.31 In the event of a full-scale superpower conflict, human life as we know it would have likely ceased to exist. Since Americans misremember what happened during the Cold War—and forget how real the threat of nuclear conflict was—they are far more prone to accept claims that the world is less stable and safe today. One more reason Americans perceive the world to be so dangerous is that the overwhelming foreign policy focus of government leaders, Congress, and the media is on the Middle East and North Africa (MENA). Chronic political instability, proxy wars, and occasional interstate wars have long come to dominate the region. Indeed in 2017 alone, eight of nineteen MENA countries experienced intrastate conflicts (noninternational conflicts that resulted in twenty-five or more battlefield deaths).32 That is the exception, not the rule, in comparison to every other part of the world. Though the MENA region gets oversized media attention, it constitutes less than 5 percent of the world’s population and is not representative of the overwhelming majority of the planet’s seven and a half billion residents. Painting a picture of the world solely using the chaotic and violent imagery from the Middle East severely distorts one’s image of global affairs. More Freedom The world is not merely safer than ever before; it has also become demonstrably freer over the past quarter century. Just as the Cold War is misremembered for being an era of relative peace and stability, it is often forgotten that the world then was defined far more by authoritarianism and totalitarianism than by democracy. In most corners of the globe, political freedom represented an aspirational, seemingly unachievable, goal. Today, even in the face of troubling reversals and assaults on democracy, a greater percentage of people are freer than before. They enjoy personal, political, and economic self-determination that would have been unimaginable to most people living outside the United States and western Europe just thirty years ago. In November 1989, as the Berlin Wall was being dismantled, there were just 69 electoral democracies in the world, or 41 percent of 167 countries in total. Today, according to the Freedom House Index, that number is 116 (out of 196 countries), or 59 percent.33 In the 1980s, Latin America was mired in economic stagnation, social injustice, persistent conflict (both civil wars and cross-border conflicts), and above all, an almost complete lack of democratic governance. In Chile in 1973, a democratic election was overturned by a military coup, leading to dictatorship, widespread human rights abuses, and a full-fledged economic crisis. In Argentina, a military junta invaded the Falkland Islands in 1982, sparking a pointless war with the United Kingdom. Throughout the late ’70s and ’80s, Central America became a hotbed of human rights abuses, civilian massacres, and economic deprivation, fueled by superpower competition between Washington and Moscow. Today, while economic and political progress across the region has been uneven and backsliding is evident, all of Latin America—with the exception of Venezuela and Cuba—is today designated as “free” or “partly free” by Freedom House. Thirty years ago in Europe, half the continent was under the thumb of totalitarian leaders, basic freedoms were restricted, and barbed-wire-topped walls prevented citizens from traveling outside their borders. With the exception of Belarus and Russia, every country in western and eastern Europe is today considered a free or partly free democracy. In the Far East, South Korea, Mongolia, and Taiwan—countries once (wrongly) considered by Western academics as culturally inappropriate for political liberalization—have become full-fledged democracies. Even in sub-Saharan Africa, which has experienced a decline or stagnation in democratization since 2005, the majority of people live in free or partly free countries.34 Once again, it is the Middle East that remains outside the global shift toward greater political freedom, with only Tunisia and Israel being considered free countries and a handful ranked as partly free.35 These gains have also led to greater political stability as there has been a marked decline in the number of coup attempts across the globe over the past three decades.36 The Polity IV project, a widely respected data source of global governance trends, assigns “polity scores” to states to quantify their governing authority on a scale of –10 to +10. It does this by coding democratic and autocratic traits, such as political participation, competitiveness of political leadership positions, and constraints on the chief of state. A polity score of +10 would be a full democracy, such as Sweden, while a –10 would be a severe autocracy, such as North Korea.37 In 1989, the average score for all governments was –0.5, the equivalent of an Afghanistan governance score by the latest rankings. By 2016, it had moved all the way to +4.3.38 Meanwhile, today a country with a score of –0.5 would be somewhere between Afghanistan and the Central African Republic. Moreover, when changes in polity scores from 1949 to 2014 are tracked against changes in “human rights scores” over the same period, a hopeful trend is apparent: as countries become more democratic, their respect for human rights also increases.39 Democratic progress, however, remains fragile, and according to Freedom House—which tracks relative democratic rankings—global freedom has declined for the past twelve years. In aspiring great and midlevel powers such as China, Russia, and Turkey, there has been a disturbing uptick in autocratic behaviors. In all three countries, there’s been the silencing and even murder of independent journalists, the overregulation and harassment of civil society organizations, consolidation of political rule by authoritarian leaders, and more centralized control of security forces. Notable and troubling declines are also evident in the Philippines, Poland, Hungary, and Nicaragua. Moreover, confidence in elected officials in strongly democratic countries—including the United States and in western Europe—has notably fallen in recent years as populist, nativist, and xenophobic political movements have made inroads.40 The extraordinary democratic progress made in the years after the fall of the Berlin Wall is now moving in the opposite direction. Struggles for more entrenched democratization and personal freedoms are constantly contested, messy, and even bloody affairs—and many young democracies go through extended periods of political turmoil. Those who hold power generally seek to exercise it with the fewest possible restraints, and those restraints are growing. Indeed, if there is one area where the path of human progress could potentially be slowed or even reversed, it is on the expansion of political freedom. The growing disinterest among U.S. policy makers toward the issue—and the cultivation of authoritarian leaders by President Donald Trump—will undoubtedly make this situation worse. Yet the path of progress over the past thirty years cannot be denied. Quite simply, the world is far more democratic and free today than it was during the height of the Cold War. Why Does This Matter for America? While fewer armed conflicts and increased political freedom is good news for the vast majority of the world’s seven and a half billion people, it is also great news for America. If there is one relatively ironclad rule of international affairs, it is that democracies tend to have happier, healthier, and better-educated citizens. They almost never go to war with other democracies, much less even threaten each other; and they are also far less likely to find themselves in conflict with nondemocratic governments.41 A world that is relatively freer and thus less conflict-prone is one that is indisputably better for the United States. It means the U.S. homeland is less likely to be threatened or attacked by great powers with conventional or nuclear weapons. It means treaty allies are not at war, and as a result, the U.S. military is not required to come to their defense. Indeed, in 2015, only five armed conflicts (all internal) took place in countries that are U.S. treaty allies: Philippines (two of them), Colombia, Thailand, and Turkey.42 It means that fewer countries host or sponsor transnational terrorist groups dedicated to attacking the United States, its citizens, or its overseas diplomatic facilities. It means there are fewer disruptions to global flows of trade, tourism, and energy supplies that benefit the U.S. economy and American jobs. It means fewer people grow up in societies where hopelessness, resentment, and alienation make them susceptible to the appeals of violent extremists. Finally, it means governments are more likely to cooperate on transnational challenges such as fighting climate change, preventing the spread of infectious diseases, lowering the barriers to global trade and furthering human development.43 Since terrorism dominates contemporary foreign policy debates, Americans might immediately ask, “What about 9/11?” Understandably, the September 11, 2001, attacks are deeply imprinted into our national consciousness and will remain an inflection point for the division of historical eras, similar to the “Cold War” and “post-Cold War” eras. Yet it is important to understand just how tragically lucky al-Qaeda was on 9/11 and why the attacks were such an anomaly. U.S. homeland security policies, intelligence cooperation, and commercial aviation security were hugely deficient, and this combined negligence made America needlessly vulnerable. As we will detail later, the United States is vastly safer today from such a mass-casualty terror attack. There are still terrorist groups seeking to kill Americans on American soil, yet they have been overwhelmingly unsuccessful in their efforts to do so. Since 9/11, 103 Americans have been killed within the United States by jihadist terrorists or affiliated terrorist actors, which is almost the same number of Americans killed in hate-crime attacks since 2002.44 Since 9/11, 402 U.S. citizens have died in terrorist incidents while living abroad, but nearly 75 percent of them died working as diplomats, contractors, aid workers, or journalists in Iraq, Syria, Pakistan, and Afghanistan—the very places where the United States started wars and continues to conduct air strikes to destroy terrorist safe havens.45 It is tragic but unsurprising that individuals bravely serving in places where conflict is occurring face severely heightened risks to their personal safety, but that does not mean Americans should feel at increased risk of being killed by terrorists.46 Indeed, at the same time that Americans have become safer from terrorism, such attacks have increased globally. In 2002, there were fewer than 200 terror incidents worldwide, which killed a total of 725 people; in 2017, there were 8,584 incidents, which took the lives of 18,753 people, one-quarter of whom were the perpetrators.47 Yet seventy percent of all these fatalities occurred in just five countries: Afghanistan, Iraq, Nigeria, Somalia, and Syria. The perpetrators are relatively weak, nonstate actors using violence to achieve their political objectives, while the victims are overwhelmingly civilians (who themselves are overwhelmingly Muslims) caught between government security forces that cannot protect them and terrorist armies willing to kill them. Even in these five countries, however, there have been notable improvements, especially within Pakistan, which has experienced a decline in civilian deaths from terrorism every year between 2012 and 2017, with 3,007 deaths in 2012 and 540 in 2017.48 Contrary to General Dempsey’s apocalyptic warnings, the world that existed on February 16, 2012, was far less dangerous than at any point since he had been alive—and it remains so today. In the years after the end of the Cold War, many foreign policy analysts predicted a very different world—a “coming chaos” of continuous ethnic conflicts and genocidal civil wars.49 The political scientist Samuel Huntington warned of a potential “clash of civilizations,” while John Mearsheimer wrote ominously in the pages of the Atlantic that we would soon miss the Cold War.50 The journalist Robert Kaplan predicted that the post-Cold War years would be defined by “anarchy” and regional wars sparked by ancient, tribal hatreds. U.S. senator Daniel Patrick Moynihan warned that renewed ethnic tensions could turn the planet into a “pandaemonium.”51 Contrary to this drumbeat of doomsaying, globalization failed to produce the xenophobia and unchecked ethnic and racial hatreds that were confidently predicted.52 If anything, the end of the Cold War led to a period of expanded global commerce, communications, and travel, as well as vastly higher living standards for the majority of people on earth. Global and regional cooperation, not competition, is the defining characteristic of international politics today. That includes national governments, corporations, industry associations, nongovernmental organizations, and individual citizens. As we demonstrate in the following chapter, the world is not just safer and freer; it is a far better place to live now than at pretty much any point in the history of the human race. Healthier, Wealthier, Better Educated, and More Interconnected When you look at all the measures of well-being in the world, if you had a choice of when to be born and you didn't know ahead of time who you were going to be—what nationality, whether you were male or female. v/hat religion—but you had said. ‘When in human history would be the best time to be born?'” the time would be now. —President Barack Obama, September 7,201 a In 2013, a Swedish research firm wanted to know what the residents of the world's most powerful and influential nation knew about the world outside its borders.: What it found out is not pretty. That its survey showed the American people lacked detailed knowledge about global affairs was unsurprising. More interesting, however, is the way Americans are wrong. Eighty-three percent believed that less than half of the world's children had been vaccinated for measles. In fact. 85 percent of kids have received this life-saving vaccines. Americans underestimated the number of adults with basic literacy skills (a majority guessed 00 percent; it is actually 30 percent). Most telling, however, was the response to a question about the proportion of people in the world living in extreme poverty. Two-thirds said the global poverty rate had "almost doubled.\*’ 29 percent said it has •‘remained more or less the same,\* and a mere 5 percent picked what was then the correct answer—that it has been cut in half. This survey is an incomplete snapshot, but it is backed up by other data. When Americans were polled in the fall of 2017 about their perceptions of the world, just 10 percent agreed that “the world is getting better;" while nearly four times as marry (63 percent) thought it was getting worse.! A 2010 poll found that 92 percent of Americans believed that extreme poverty has either increased or stayed the same over the past two decades.! In short. Americans think the world is a pretty lousy place. That means they are missing the most important international story of any of our lifetimes—namely, that it has never been a better time to be a human being than right now. Today, the seven and a half billion people who reside on our planet live longer lives; are better educated; have greater access to health care, sanitation, and food; and are far less likely to live in extreme poverty. These improvements, most of which have occurred over the previous two to three decades, have reduced the potential for military conflict, created social and economic opportunities for women and girls that previously never existed, and improved the happiness and quality of life for billions of people. Indeed, these are the fastest and most extraordinary advances in human progress in the history of the species. Recognizing and celebrating this unprecedented improvement in the human experience does not mean that global development work has reached its conclusion. Neither does it diminish the obstacles facing those who continue to lack access to health services or live in countries where poverty eradication has stalled, which increasingly includes the United States. There are still hundreds of millions of people around the world who remain in dire need. However, to overlook positive social trendlines ignores the unquestioned successes of global development endeavors and further cements the pessimistic view that little can be done to improve the lives of others. If recent history teaches us anything, it is that the opposite is true—the power to enhance people's lives for the better is overwhelmingly within our grasp. These vast improvements in the health and well-being of people outside the United States—and the increased global interconnectivity among governments, markets, and people—matters a great deal for ordinary Americans. The United States has global interests that range from protecting treaty allies and preventing nuclear proliferation to expanding export markets. Those interests are far better secured when children across the world are in school learning, women are able to work and have greater control of their bodies and their lives, and people's time on earth is longer, happier, and more fulfilling. All of these factors are strongly correlated with greater political stability and lesser chances for conflict. Fewer states at war means reduced regional tensions that may otherwise compel a government to obtain weapons of mass destruction and more stable and prosperous economies to purchase American goods and services. When the world is a better place for more people, it is also a better place for the United States. How the World Became Far Better for Far More People Why has the world become such a wealthier, healthier, freer, and less violent place? It is no coincidence that it began to occur at the same time that the Cold War was winding down. As communism was cast into the ashbin of history, once-closed-off countries adopted policies that made them more economically dynamic and interdependent. At the same time, new information technologies became increasingly ubiquitous—even in some of the world’s poorest countries. Take the experience of China. Beginning in the early 1990s. Chinese leaders opened their country to foreign investment and global trade. Economic growth became a national priority, and while the reigning Communist Party stubbornly clung to one-party rule, it began to loosen the political, economic, and social restrictions that had impeded the country's development. Similar efforts at moving to a more-market-based economy began in India, the world's second-most-populous country. Between 1990 and 2010, GDP per capita increased by $7,300 in China and $1,350 in lndia.1 The success of the world's two most populous nations in raising living standards has been a critical driver of global social and economic change. But the advances in the human condition over the past several decades have hardly been restricted to these two nations. In practically every country on earth, there have been significant and notable improvements in reducing poverty, extending life expectancies, and improving health outcomes. TO chart that growth, a good place to start is the Millennium Development Coals (MDGs). The MDGs are an initiative that will be familiar to few Americans outside the world of global development. Indeed, even for most foreign policy professionals, the MDGs are not well understood or appreciated. But this landmark commitment—agreed to unanimously by all 193 countries in September 2000—has been translated into eight sweeping goals that have transformed the developing world and changed the lives of hundreds of millions of people for the better. Moreover, the MDGs offer a compelling lesson of how the international community can continue to work together for the common global good—which will be essential as world leaders face the growing and potentially calamitous threat of climate change. When the MDGs were initially proposed, development trend lines were already moving in a more positive direction, but their global adoption brought more sustained political focus and consolidated numerous governmental and nongovernmental resources. By definition, the creation of strategic goals only occurs when leaders and states agree that they want to accelerate progress. The MDGs represented concrete and actionable goals that every country in the world supported. Moreover, they created metrics that allow us to assess the trajectory of human development—and the results speak for themselves. The first and most essential MDG was aimed at eradicating extreme poverty and hunger—and for good reason. Reducing poverty, besides making life better, opens up innumerable economic opportunities: more food, more leisure, longer lives, and perhaps, above all else, lowers economic anxiety and stress. It means children in developing countries are more likely to live past their fifth birthday. It means they go to school, rather than toil infields or factories. And it means they will have access to healthcare that will ensure they will not be felled by preventable diseases and illnesses. Mothers who have confidence that their children will not just survive into adolescence and adulthood but have an opportunity for success will get pregnant less often. With fewer kids to care for, women are more likely to enter the workforce, which increases overall household wealth. Higher income means that even the smallest luxuries of life—which people in the devel- oped world take for granted, such as taking a vacation, buying a toy, or getting an ice cream cone as a treat for our children—suddenly become available. Quite simply, a life not lived in poverty means far greater happiness.L Since 1990. the reduction in global poverty rates has been astounding-Over the past twenty-eight years, the number of people in the developing world living on less than $1.25 a day (a traditional definition for extreme poverty) has been reduced by one billion! Back then, approximately half the developing world was mired in such crippling poverty; today, it is fewer than one in ten, and it continues to drop year after year, with further reductions challenging but likely.! China accounts for much of this decline, having seen its extreme poverty rate drop by 60 percent in just eighteen years. This means that by 2017 more than eight hundred million Chinese citizens had been lifted out of economic deprivation.. But China's evolution has been replicated in countries across the globe. Iran's poverty rate has gone from 17.6 percent in 1986 to under 1 percent in 2014!£ El Salvador's fell from 36 percent in 1989 to 1.9 percent in 20 IS. and Ethiopia went from 92 percent in 1981 to under 30 percent today.il The underlying cause for these rapid improvements has been the end of conflict: bloody civil wars in El Salvador and Ethiopia and. for Iran, the end to a brutal eight-year struggle with Iraq. It is yet another reminder that fewer wars and greater peace and stability bring enormous residual benefits. In other places, however, the story is simpler: countries liberalized their economies and removed trade barriers that prevented them from selling their products overseas. They attracted new investment and new businesses with the advantage of lower labor costs. They sent workers overseas to send back remittances to family members, and at home, they strengthened the social safety net to help give those who were mired in poverty a helping hand. And perhaps above all, as more countries became democratic, it put pressure on political leaders to keep the good economic times going—or face the potential prospect of losing their own jobs. We can see positive results from Brazil, where the poverty rate dropped from 20 percent in 1990 to just 4.3 percent in 201 5!! In Namibia, it went from 69 percent in 1993 to 27 percent in 201S!land in Bangladesh, it dropped from 44 percent in 1990 to 24.3 percent in 2016.11 While these countries still face serious social and economic challenges, their success in reducing poverty is staggering. As for hunger, the trend lines are similarly positive. In 1990, about one in five people in the developing world suffered from undernourishment. Since then, that number has been cut in half—i At one time, famine was one of the world's worst killers. In the 1960s alone, it took the lives of more than eighteen million people. Biafra. Bangladesh, North Korea, and Ethiopia had all been witness to famines that killed more than a million in each country. China is estimated to have lost thirty million people during the 19SOs and '60s in a famine caused, in part, by horribly misguided government policies. By contrast, from 2010 through 2016. the number of people killed in famine was around a quarter of a million—a tragedy, of course, but also an indication of how far the world has come in preventing such deaths!! The MDGs also established benchmarks for universal primary education and promoted greater gender equality by ensuring that young girls had the same opportunity to go to school as young boys. The benefits of such a strategy are self-evident: abetter-educated populace means that more people can read and write. When more people are literate, that translates into a workforce that is more highly skilled and innovative, less unequal, and more productive. But the benefits of education are particularly important when it comes to young women. Girls who are enrolled in school at a young age are more likely to get married later in life. They have fewer children and thus lower levels of poverty. They are at reduced danger of the most common and acute diseases that have long ravaged the developing world. And girls who are given the chance to attend school along with their male peers are more likely to grow up to be women who arc socially and per- sonally empowered to take control of their own destiny. Ask any development expert about the best way to lift up adeveloping economy, and virtually all of them will give you the same answer: make sure girls are going to school.il Increasingly that is exactly what is happening. Primary-education enrollment rates in the developing world have jumped from 33 percent in 2000 to 91 percent today.!! That might seem like a relatively small rise, but, in fact, it means that more than forty million more children spend their day in a classroom today than did fifteen years ago. In 1990. in sub-Saharan Africa, only 4 5 percent of the population received a basic education; today, 80 percent do.il The jump in South Asia and Southeast Asia has gone from 75 percent to 95 percent; and in the Middle East and North Africa, from 63 percent to 95 percent 11 Today, the global literacy rate stands at 91 percent among young people and 86 percent for adults; in 1990. just 61 percent of the world could read or write!l For young girls, the story is even more positive. In South Asia, in 1990, the girls' literacy rate was 49 percent, and an average of 74 girls compared to lOO boys were in primary school; today, the rate is 85 percent, and the enrollment ratio stands at 103 girls for every lOO boys!\* Across all developing countries, girls are less likely than boys to repeat grades or drop out of school. This has helped to promote steady advances in female labor-force participation (for both formal and informal work)!! Tt>day. a previously unimaginable percentage of young boys and girls around the world are being educated. This both improves lives and. once again, makes the world a safer place, since countries with higher education levels are less likely to find themselves mired in armed conflict.il Two MDGs were aimed at decreasing child mortality and improving maternal health. This has led to notable increases in vaccination rates that have reduced the number of children felled by preventable diseases by more than seven million This decline has helped cut the under-five child mortality rate in half since 1990. That means that every year, 2 72,000 children who two or three decades ago would have died are alive today !! Here, enhanced access to education has had an enormous impact, since increases in education levels for women strongly correlate with reduced levels of childhood mortality!! In the same period, maternal mortality rates have dropped globally by 45 percent, with the sharpest decline occurring from 2000 to 200S.il This means that in 2017, more than 136.000 mothers who would have died a couple of decades ago are alive and able to help raise their children. Finally, the increased availability of family planning op- tions cut the number of unintended pregnancies around the world by 44 percent between 1990 and 2014.21 An MDG focused on combating HIV/AIDS, malaria, and other infectious diseases has been similarly transformative. Since 2000. new HIV infections have dropped 45 percent around the world, and more than thirteen million AIDS-related deaths have been averted!: Additionally, tuberculosis prevention and treatment saved an estimated fifty-three million lives, increased measles immunizations prevented more than twenty million deaths between 2000 and 2016, and polio has largely been eradicated. There were just eleven active cases of the disease as of July 2018.11 An oral polio vaccine—delivered with just two drops—and the necessary funding to make it widely available had. as of 2014, saved the lives of more than 650,000 people over the previous twenty-five years!! In March 2018. South Sudan announced that it had eradicated guinea worm, a parasitic illness that causes agonizing and incapacitating pain. In 1986, the disease afflicted three and a half million people in the developing world. In 2017, the number had fallen to thirty, and by May 2018, there were just three reported casesll According to the Carter Center, which has been at the forefront of the guinea-worm eradication effort, close to eighty million cases of the illness have been averted over the past thirty Improved access to safe drinking water and basic sanitation has been another target of the MDGs. The expanded international commitment to these issues has helped more than a fifth of the current global population (1.3 billion people) gain access to sanitation since 200011 In addition to saving the lives of 340,000 children who used to die from diarrhea because they were exposed to dirty water, improved sanitation also keeps children in school instead of sick at home. Even better, children with access to clean drinking water are in better shape physically, cognitively, and even socially!! Nutritional advances have come so quickly and been so significant that public health officials now express concern over what is known as the 'double burden of malnutrition,'’ in which developing countries are simultaneously experiencing health perils generally associated with being overweight as well as those from undernourishment. Amazingly, obesity now poses greater harm globally than lack of adequate nutrition does, a phenomenon that would have been unimaginable even a quarter century ago.!! What is perhaps most remarkable about all this sweeping progress is that it was achieved at the same time that the planet's population grew by one and a half billion people, and global life expectancy increased by more than five full years since the MDGs were announced in 2000!! Yet for all of the success of the MDGs (and also the full panoply of public health and human development changes), they are rarely mentioned in current foreign policy debates. Long-term positive trends go largely unreported, with the focus instead, almost exclusively, on-hard" security issues, such as coercive “redlines," nuclear weapons, terrorism, and drone strikes. Highlighting polio eradication, for example, does not drive internet clicks, justify’ a larger Pentagon budget, or motivate voters to support a more interventionist foreign policy. In the United States, good news about the world has little political salience, and it is sim- ply not deemed newsworthy. The development scholar Laura Freschi pithily captured why this phenomenon matters. She observed in 2010 that more Americans believed that their president was a Muslim than had heard of the improvements in quality of life on our planet!! Global Interconnectivity While the global development community deserves enormous credit for many of the advances chronicled above, they drafted off of historic geopolitical changes. When the Cold War ended, the most resonant image was the fall of the Berlin Wall on November 9. 1939. The pictures of Germans chipping away at the barrier that hid separated them for thirty-eight years—and the pictures of supposed enemies joyfully embracing—were poignant reminders of the universal desire for freedom. From that moment forward, hundreds of millions of people around the world—from Jakarta to Johannesburg and Managua to Minsk—began choosing their own leaders, holding them accountable, and voicing their opinions without the government interference they endured while living under dictatorship. Yet, in the nearly thirty years since that epoch-making event, it is the economic bonds built between peoples and countries that have played the leading role in changing the human experience for the better. Communism, by its very nature, was an overwhelmingly closed economic system that purposely avoided commercial and business ties with capitalist nations. Even countries outside the Soviet and Chinese orbits often pursued economic policies that protected failing native industries; suppressed talented entrepreneurs, investment, economic innovation, and development: and. more generally, shut the door to the outside world. But with the breakup of the Soviet Union and the gradual shift in China toward an export-driven economic strategy, all of that began to change. China transitioned along with its regional neighbors—Japan and South Korea and then Taiwan. Singapore, and Hong Kong. Even in noncommunist countries like India and Brazil, the end of the Cold War ushered out protectionist policies in favor of those seeking foreign investment, encouraging entrepreneurship, and creating new and vibrant trade links. Tariffs went down, and subsidies were slowly eased out, as countries worked to fashion themselves into more attractive investment destinations for global businesses. The results are overwhelming. Foreign direct investment in the developing world has gone from $20 billion a year in 1990 to Jo 53 billion in 2017, while private capital flaws went from $91 billion to $1.2 trillion during the same time.li Emerging economies are today deeply reliant on international trade not only as a means of development and job creation but also for attracting new capital investments and technical expertise. The result is stronger and more diversified economies, higher productivity, significant improvements in the welfare of women, and of course, reduced poverty.:\*® Recent trends, such as a decline inG-20 imports and new trade restrictions, suggest that this economic openness has slowed—the consequences of which have been hundreds of billions of dollars in lost global GDP.il In addition, while the process of globalization has contributed to higher living standards, it can contribute to greater income inequality and has given impetus to nativist and anti-immigrant movements in Europe and the United States. These are issues of serious concern, and if they go unaddressed in Western democracies, it could undermine the economic progress made over the past quarter century. Nonetheless, it is undoubtedly true that far more people have benefited from globalization than have been harmed.42 From the perspective of global security, the benefits are even more clear-cut because when a country trades with other states, it significantly diminishes the likelihood of conflict. Doubling a country's international commerce can reduce its risk of interstate violence by up to 30 percent, while countries with no regional trade tics are more than twice as likely as their highly integrated neighbors to experience a civil war.43 Similarly, when a country experiences an increase in foreign direct investment, it significantly improves the welfare of women and reduces the likelihood that the country will participate in an armed conflict.44 Being an active participant in today's globalized economy does not eliminate the possibility of a country going to war, as is evinced by America's ongoing military operations in Afghanistan. Iraq, and Syria. However, it is a fact that countries with increased economic interconnectivity are less likely to find themselves mired in conflict. The Smartphone Story The foregoing numbers, while impressive, do not fully do justice to the impact of economic integration over the past few decades. Visualizing the spectrum of changes that global interdependence has wrought is as simple as reaching into your pocket and pulling out your phone. That device that you use to talk to and text with your friends and family, get news, watch soccer or basketball clips, find out what the president of the United States just tweeted, or play Words wick Friends offers one of the best possible explanations for how the world has become more connected, wealthier, and safer—and why it is likely to stay that way. Since there are many smartphones, let's pick the one that is perhaps most ubiquitous: Apple’s iPhone. Since its introduction in 2007, the iPhone has improved productivity, sped up communications, and allowed for more people to live and work remotely from their employers, customers, or clients. The iPhone is sold in more than 130 countries—a symbolic example of how the removal of trade barriers has spurred the rapid adoption of transformative technologies in both rich and poor countries. Some 725 million smartphones were sold in 2012, increasing to more than l.S billion by 2010, of which more than 000 million went to emerging-market customers from China. India, Brazil, and IndonesiaJi. Additionally, while mobile internet usage in Western countries is increasing fourfold annually, it is rising twenty-seven-fold in developing countries. There are 5.2 billion smartphone subscriptions globally, with 3.5 billion projected by 2023—and most of them will be in the developing world.iLIn many countries, there arc actually more cell phones than people. In places like Afghanistan, one of the poorest countries in the world, the landscape is defined by omnipresent cell towers that now provide mobile services to more than 80 percent of the population.47 The iPhone contains components that have been developed and manufactured in multiple countries, which exemplifies how patent protections, increased foreign investment, and globalized supply chains have spread economic development across the globe. Take, for example, the iPhone X, which was released in fall 2017. Its accelerometer comes from the German firm Bosch, the display screen from the South Korea-based giant Samsung, the electronic compass from the Japanese firm Alps Electronic Company, and various radio-frequency components from Sky works Solutions, a compary located in a suburb of Boston. Massachu- setts \_li The iPhone X was assembled at a Taiwanese-owned Foxconn plant in southern China, which is emblematic of the inflow of low-wage manufacturing jobs that have taken the world's most populous nation from impoverishment to becoming among the most dynamic and steadily growing economies in the world. The iPhone and the internet access it provides have further empowered hundreds of millions of people in developing nations. From Tunisia to Egypt's Tahrir Square and in multiple elections in fledgling democracies, ordinary citizens have used their cell phones to safeguard votes against electoral fraud and organize activists and pro-democracy demonstrators. Mobile technology and social media apps have made it possible for citizens to compile damning information about their governments, report abuses to news outlets outside their communities, and more easily publicize those abuses on a variety of social media plat- forms. This has even, ironically, become a problem for Apple itself- In 2012. after workers at the company's Foxconn factories in China documented and publicized poor working conditions there. Apple agreed to independent audits of the facilities by the Fair Labor Association. Here in America, cell-phone cameras have served as an invaluable tool for documenting and holding local police officers accountable for police shootings and gave critical impetus to the Black Lives Matter movement. Governments have also occasionally used mobile technology to expand democratic participation. In 2014, Libya's election commission worked with the firm Reboot to digitize the country's voter registration system, making it possible for voters (including diaspora Libyan citizens) to register for upcoming parliamentary elections on their phones. Considering that mobile penetration in Libya stood at nearly 150 percent, it was amove that made more sense than asking Libyans to register in person. More than l.l million citizens living in Libya and thirteen other countries were successfully signed up. and the system is still being used today to manage voter rolls. Libya remains fractured along ethnic and geographic lines, but the digital voting infrastructure remains in place if political leaders choose to reuse it in future elections. Communication technologies are, of course, a double-edged sword, and governments have leveraged internet and mobile-phone penetration to spy on, influence, track, and harass their citizens. Journalists, activists, opposition-party leaders, and others have found their phones unknowingly implanted with spyware—often with the assistance of Western cyber security firms—that allows security services to monitor political opponents. Governments have also, at times, blacked or limited access to social media networks on the whims of political leaders. Yet technologically savvy and creative citizens are constantly developing workarounds to such spying—with encrypted communications, like Tt leg ram and WhatsApp, as well as virtual private networks and other digital solutions that are not widely publicized. Government authorities have tried to control the flow of information and communications for centuries, and one should be under no il- lusion that this will not continue for the foreseeable future, ftt never before have so many people been more empowered to learn, connect, and collaborate in real time for relatively little cost. Moreover, one does not need a cutting-edge smartphone to take advantage of the mobile revolution. Basic mobile phones are increasingly essential in those places where citizens do not have access to brick-and-mortar banks or any credit history. Mobile banking is benefiting hundreds of millions of new individuals each year by allowing them to document and save money, safely transfer funds, and pay down loans±l In Kenya, 90 percent of households use mobile phones and mobile money, mostly through a text-message-based payment system called M-PESA.li Researchers found that mobile banking makes it easier for breadwinners to provide for their families or for friends and family to send emergency funds immediately to each other when feeing a health crisis. Between 2003 and 2014, more than 194,000 households were lifted out of poverty and 185,000 women were induced to enter the business world as a direct result of the soci- etal shift provided by M-PESA.1L Similarly, smartphones are empowering a wide range of entrepreneurs in all sectors, from small business owners to farmers. For example, a free mobile app called MandiTrades allows farmers in India to receive real-time market information to help manage their crops, upload information about their produce right from the field, and finally connect with markets for salesJ2 In India, where one of the biggest challenges to cell-phone proliferation is getting the devices in the hands of women, wider access to smartphones will make it easier for women to find and apply for jobs outside the home and. as a result, increase their partic- ipation in the workforce. Finally, that iPhone on which you pi a)1 Candy Crush Saga and Fortnitc is also saving lives. In Mozambique, for example, a free app alerts patients with HIV or tuberculosis when to take their medicine and reminds them of upcoming appointments.!! Other programs send text messages and voice mails to new and expectant mothers, with basic advice on nutrition, health, and immunization schedules. In Bangladesh, the Mobile Alliance for Maternal Action has reached more than five hundred thousand pregnant women and new moms” In Pakistan, targeted calls from provincial educational officials and local school council members increased the school enrollment rates for young girls by 12 percent-11 More broadly, in classrooms around the developing world, tablets and cell phones are increasingly replacing books and notepads, as students can now download reading assignments directly, helping to improve literacy and promote reading. There are hundreds, if not thousands, more stories that speak to the direct positive impact that mobile technology has had on global public health, the promotion of democracy, the improvement of educational outcomes, and the expansion of economic growth. But there is one behind-the-scenes component that makes all of this possible. What, for example, protects the patents used to develop the iPhone? The answer: international treaties (starting with the Paris Convention for the Protection of Industrial Property of 18 84) that uphold patent rights and bolster international organizations (namely, the Patent Cooperation Treaty), which ensures that Apple's intellectual property rights are protected. What makes it possible for you to get on a plane, fly to China, anduseaphone as if you were in your home country? Answer: several international agreements (starting with the International Convention for the Protection of Submarine Telegraph Cables, also of 1884) and industry groups (particularly the International Cable Protection Committee), which govern and share best practices for laying and maintaining undersea cables. This might seem minor, but keep in mind that these three hundred transoceanic cables stretching six hundred thousand miles are responsible for 95 percent of the world's internet, phone, and data traffic. This overlapping web of reciprocal agreements and international understandings is unknown to all but a few Americans. But the ability to connect people, ideas, and markets from every corner of the earth is the direct result of an international system that is specifically constructed to further global coopera- tion. That iPhone in your hand tells the story of an interdependent and interconnected world that would have been unimaginable just a generation ago. Why should Americans care that the world has become a far better place for far more people than ever before? Because a world that is more prosperous, healthier, better educated, and closely connected is a less chaotic and violent place—and more likely to stay that way22 Countries that are more democratic are also more politically stable and more open to trade and foreign investment that is likely to benefit American workers and consumers 1\_1 Yet, despite all of these remarkable gains, there is significant work to be done. Eight hundred million people still live in extreme poverty, 100 million children under age five do not get enough to eat, and 01 million are not attending school. Only half of the 30.7 million who are living with HIV in developing regions receive antiviral treatments, and 884 million people still lack adequate drinking water.!! These numbers are sobering, and they demand greater resources and a more concerted effort on the part of the international community.!! But the fact that sizable problems remain cannot take away from the sustained progress that has been made. Domestic politics, in part, explain why Americans remain unaware of these tremendous changes. Stating that the world is actually a pretty safe and much-better place to live is somehow a taboo, a sign of naivete, or deeply insensitive in light of the real harms experienced by Americans. Yet politicians should recognize and celebrate the positive accomplishments that have improved the lives of so man)' people, and U5 citizens should come to expect this from their elected leaders. All too rarely have U.S. '\*national interests" included advancing the health, well-being, and economic opportunities of humanity. But the top foreign pol- icy priority for whoever sits in the Oval Office or controls Congress should be precisely that—not just because it is the right thing do but also because it makes America safer.

#### Private actors solve space war and specifically ASAT restraint.

Cobb 21 [Wendy N. Whitman Cobb, Associate Professor of Strategy and Security Studies at the School of Advanced Air and Space Studies, “Privatizing Peace: How Commerce Can Reduce Conflict in Space,” 2021, Routledge, pp. 68-69, EA]

Finally, given the involvement of an ever-larger number of private actors in space, states also need to consider the lost opportunity costs if private actors choose to forego research, development, and deployment of new technologies because the danger in space is too high. As space becomes more commercialized, these private actors can exert pressure on states to behave peacefully in order to promote further economic development. Gartzke and Quan Li argue that this can happen through the movement of capital from conflict-prone states or areas to non-conflictual states.50 This is not necessarily applicable to space because there is no area in space which is formally protected, but commercial space actors may choose not to engage in new economic investment which can in turn affect a state’s economic performance. To date, the size of the space sector is comparatively small, so, arguably, the potential economic loss would not be that great. Where the harm comes from is state reliance on private actors for military and national security space services. As states contract out space services to a greater extent, private actors exert an even greater influence over the state by having a capability they do not.

Why might private companies want a more conflict-free space? If there is weaponized conflict in space, they could potentially benefit through new launches to send up replacement satellites; this is similar to an argument that war can actually be beneficial to an economy because companies are needed to create materiel and weapons.51 But, in a debris filled environment, sending replacements is more difficult and dangerous. Some private companies want to engage in human spaceflight; a conflictual or more dangerous orbital environment would likely prevent those activities or increase their costs to such an extent that it becomes economically infeasible. James Clay Moltz argues specifically that “the growing presence of space tourists in low-Earth orbit would greatly increase the incentives for restraint in any future [ASAT] test programs.”52 Those foregone development costs and commercial activities can have a similar cost to states simply by discouraging private actors from participating in the market.

#### X/app 1AC Blatt --- goes nuclear

#### Commercial space is the lynchpin of tech innovation – progress at the margins and spinoff tech change global information networks

Joshua Hampson 17, Security Studies Fellow at the Niskanen Center, 1-25-2017, “The Future of Space Commercialization”, Niskanen Center, https://republicans-science.house.gov/sites/republicans.science.house.gov/files/documents/TheFutureofSpaceCommercializationFinal.pdf

Innovation is generally hard to predict; some new technologies seem to come out of nowhere and others only take off when paired with a new application. It is difficult to predict the future, but it is reasonable to expect that a growing space economy would open opportunities for technological and organizational innovation. In terms of technology, the difficult environment of outer space helps incentivize progress along the margins. Because each object launched into orbit costs a significant amount of money—at the moment between $27,000 and $43,000 per pound, though that will likely drop in the future —each 19 reduction in payload size saves money or means more can be launched. At the same time, the ability to fit more capability into a smaller satellite opens outer space to actors that previously were priced out of the market. This is one of the reasons why small, affordable satellites are increasingly pursued by companies or organizations that cannot afford to launch larger traditional satellites. These small 20 satellites also provide non-traditional launchers, such as engineering students or prototypers, the opportunity to learn about satellite production and test new technologies before working on a full-sized satellite. That expansion of developers, experimenters, and testers cannot but help increase innovation opportunities. Technological developments from outer space have been applied to terrestrial life since the earliest days of space exploration. The National Aeronautics and Space Administration (NASA) maintains a website that lists technologies that have spun off from such research projects. Lightweight 21 nanotubes, useful in protecting astronauts during space exploration, are now being tested for applications in emergency response gear and electrical insulation. The need for certainty about the resiliency of materials used in space led to the development of an analytics tool useful across a range of industries. Temper foam, the material used in memory-foam pillows, was developed for NASA for seat covers. As more companies pursue their own space goals, more innovations will likely come from the commercial sector. Outer space is not just a catalyst for technological development. Satellite constellations and their unique line-of-sight vantage point can provide new perspectives to old industries. Deploying satellites into low-Earth orbit, as Facebook wants to do, can connect large, previously-unreached swathes of 22 humanity to the Internet. Remote sensing technology could change how whole industries operate, such as crop monitoring, herd management, crisis response, and land evaluation, among others. 23 While satellites cannot provide all essential information for some of these industries, they can fill in some useful gaps and work as part of a wider system of tools. Space infrastructure, in helping to change how people connect and perceive Earth, could help spark innovations on the ground as well. These innovations, changes to global networks, and new opportunities could lead to wider economic growth.

#### Extinction – cumulative extinction events solved via tech innovation outweighs.

Dylan **Matthews ‘18**. Co-founder of Vox, citing Nick Beckstead @ Rutgers University. 10-26-2018. "How to help people millions of years from now." Vox. https://www.vox.com/future-perfect/2018/10/26/18023366/far-future-effective-altruism-existential-risk-doing-good

If you care about improving human lives, you should overwhelmingly care about those quadrillions of lives rather than the comparatively small number of people alive today. The 7.6 billion people now living, after all, amount to less than 0.003 percent of the population that will live in the future. It’s reasonable to suggest that those quadrillions of future people have, accordingly, hundreds of thousands of times more moral weight than those of us living here today do. That’s the basic argument behind Nick Beckstead’s 2013 Rutgers philosophy dissertation, “On the overwhelming importance of shaping the far future.” It’s a glorious mindfuck of a thesis, not least because Beckstead shows very convincingly that this is a conclusion any plausible moral view would reach. It’s not just something that weird utilitarians have to deal with. And Beckstead, to his considerable credit, walks the walk on this. He works at the Open Philanthropy Project on grants relating to the far future and runs a charitable fund for donors who want to prioritize the far future. And arguments from him and others have turned “long-termism” into a very vibrant, important strand of the effective altruism community. But what does prioritizing the far future even mean? The most literal thing it could mean is preventing human extinction, to ensure that the species persists as long as possible. For the long-term-focused effective altruists I know, that typically means identifying concrete threats to humanity’s continued existence — like unfriendly artificial intelligence, or a pandemic, or global warming/out of control geoengineering — and engaging in activities to prevent that specific eventuality. But in a set of slides he made in 2013, Beckstead makes a compelling case that while that’s certainly part of what caring about the far future entails, approaches that address specific threats to humanity (which he calls “targeted” approaches to the far future) have to complement “broad” approaches, where instead of trying to predict what’s going to kill us all, you just generally try to keep civilization running as best it can, so that it is, as a whole, well-equipped to deal with potential extinction events in the future, not just in 2030 or 2040 but in 3500 or 95000 or even 37 million. In other words, caring about the far future doesn’t mean just paying attention to low-probability risks of total annihilation; it also means acting on pressing needs now. For example: We’re going to be better prepared to prevent extinction from AI or a supervirus or global warming if society as a whole makes a lot of scientific progress. And a significant bottleneck there is that the vast majority of humanity doesn’t get high-enough-quality education to engage in scientific research, if they want to, which reduces the odds that we have enough trained scientists to come up with the breakthroughs we need as a civilization to survive and thrive. So maybe one of the best things we can do for the far future is to improve school systems — here and now — to harness the group economist Raj Chetty calls “lost Einsteins” (potential innovators who are thwarted by poverty and inequality in rich countries) and, more importantly, the hundreds of millions of kids in developing countries dealing with even worse education systems than those in depressed communities in the rich world. What if living ethically for the far future means living ethically now? Beckstead mentions some other broad, or very broad, ideas (these are all his descriptions): Help make computers faster so that people everywhere can work more efficiently Change intellectual property law so that technological innovation can happen more quickly Advocate for open borders so that people from poorly governed countries can move to better-governed countries and be more productive Meta-research: improve incentives and norms in academic work to better advance human knowledge Improve education Advocate for political party X to make future people have values more like political party X ”If you look at these areas (economic growth and technological progress, access to information, individual capability, social coordination, motives) a lot of everyday good works contribute,” Beckstead writes. “An implication of this is that a lot of everyday good works are good from a broad perspective, even though hardly anyone thinks explicitly in terms of far future standards.” Look at those examples again: It’s just a list of what normal altruistically motivated people, not effective altruism folks, generally do. Charities in the US love talking about the lost opportunities for innovation that poverty creates. Lots of smart people who want to make a difference become scientists, or try to work as teachers or on improving education policy, and lord knows there are plenty of people who become political party operatives out of a conviction that the moral consequences of the party’s platform are good. All of which is to say: Maybe effective altruists aren’t that special, or at least maybe we don’t have access to that many specific and weird conclusions about how best to help the world. If the far future is what matters, and generally trying to make the world work better is among the best ways to help the far future, then effective altruism just becomes plain ol’ do-goodery.\*

#### Capitalism’s key to *global medical innovation* --- only the profit motive solves

**Norberg 3** – Fellow at Timbro and CATO[Johan Norberg, In Defense of Global Capitalism, pg. 186]

One common objection to the market economy is that it causes people and enterprises to produce for profit, not for needs. This means, for example, pharmaceutical companies devoting huge resources to research and medicines to do with obesity, baldness, and depression, things that westerners can afford to worry about and pay for, whereas only a fraction is devoted to attempting to cure tropical diseases afflicting the poorest of the world's inhabitants, such as malaria and tuberculosis. This criticism is understandable. The unfairness exists, but capitalism is not to blame for it. Without capitalism and the lure of profit, we shouldn't imagine that everyone would have obtained cures for their illnesses. In fact, far fewer would do so than is now the case. If wealthy people in the West demand help for their problems, their resources can be used to research and eventually solve those problems, which are not necessarily trivial to the people afflicted with them. Capitalism gives companies economic incentives to help us by developing medicines and vaccines. That westerners spend money this way does not make things worse for anyone. This is not money that would otherwise have gone to researching tropical diseases—the pharmaceutical companies simply would not have had these resources otherwise. And, as free trade and the market economy promote greater prosperity in poorer countries, their needs and desires will play a larger role in dictating the purposes of research and production.

#### Commercial space manufacturing is booming --- solves disease and tissue innovation

Giulianotti et. al 21 [Marc A. Giulianotti1\*, Arun Sharma2,3, Rachel A. Clemens4 , Orquidea Garcia5 , D. Lancing Taylor6, Nicole L. Wagner7 , Kelly A. Shepard8 , Anjali Gupta4, Siobhan Malany9 , Alan J. Grodzinsky10, Mary Kearns‐Jonker11, Devin B. Mair12, Deok‐Ho Kim12,13, Michael S. Roberts1, Jeanne F. Loring14, Jianying Hu15, Lara E. Warren1 , Sven Eenmaa1, Joe Bozada16, Eric Paljug16, Mark Roth17, Donald P. Taylor18, Gary Rodrigue1, Patrick Cantini19, Amelia W. Smith1, William R. Wagner19,20\* 1 Center for the Advancement of Science in Space, Melbourne, FL, USA 2 Board of Governors Regenerative Medicine Institute, Cedars‐Sinai Medical Center, Los Angeles, CA, USA 3 Smidt Heart Institute, Cedars‐Sinai Medical Center, Los Angeles, CA, USA 4 Axiom Space, Inc., Houston, TX, USA 5 Johnson & Johnson 3D Printing Innovation & Customer Solutions, Johnson & Johnson Services, Inc., Irvine, CA , USA. 6 University of Pittsburgh Drug Discovery Institute and Department of Computational and Systems Biology, University of Pittsburgh, Pittsburgh, PA, USA 7 LambdaVision Inc., Farmington, CT, USA 8 California Institute for Regenerative Medicine, Oakland, California, USA 9 Department of Pharmacodynamics, College of Pharmacy, University of Florida, Gainesville, FL USA 10 Departments of Biological Engineering, Mechanical Engineering and Electrical Engineering and Computer Science, Massachusetts Institute of Technology, Cambridge, MA, USA 11 Department of Pathology and Human Anatomy, Loma Linda University School of Medicine, Loma Linda, CA, USA 12 Department of Biomedical Engineering, Johns Hopkins University School of Medicine, Baltimore, MD, USA 13 Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, MD, USA 14 Scripps Research Institute, San Diego, CA, USA 15 Center for Computational Health IBM Research, Yorktown Heights, NY, USA 16 Joseph M. Katz Graduate School of Business, University of Pittsburgh, Pittsburgh, PA, USA 17 Pittsburgh, PA, USA 18 The Ohio State University, Columbus, OH, USA 19 McGowan Institute for Regenerative Medicine, Pittsburgh, PA, USA 20 Departments of Surgery, Bioengineering, Chemical Engineering, University of Pittsburgh, Pittsburgh, PA, USA. “Opportunities for Biomanufacturing in Low Earth Orbit: Current Status and Future Directions.” August 2, 2021. https://www.preprints.org/manuscript/202108.0044/v1/download]

The use of LEO by governments and commercial enterprises is a complex ecosystem for providing opportunities and financing. In the last two decades, governments around the world, led by the U.S. and China, have heavily supported private space companies (2019 Report). These investments have focused on launch technologies, as high launch costs are perceived to be the greatest limiting factor to expanded space exploration and utilization (Werzt et al., 1996) and have led to recent reductions in the cost of transporting cargo to LEO by a factor of more than 20. Between 1970 and 2020, the average cost to launch a kilogram of payload into LEO on the space shuttle remained constant at about $54,500. Now, the cost per kilogram is $2,720 on a SpaceX Falcon 9 rocket (Figure 1) (Jones, H. W. et al., 2020). Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 2 August 2021 doi:10.20944/preprints202108.0044.v1 4 Figure 1: The cost of launching payloads to LEO has dropped considerably over the last 50 years. Note: Data is not to scale. Additionally, several private companies are now pursuing commercial space stations. Axiom Space, headquartered in Houston, is currently developing what promises to be the first‐ever privately operated space station, with the initial module scheduled to launch to the ISS in 2024. Axiom plans to dock multiple modules to the ISS that will eventually detach to become a standalone station. As the cost of transport to LEO has decreased—and is expected to decrease further—and plans for new platforms in LEO continue to advance (Dinkin S., 2019), opportunities in areas such as satellite deployment, biomedical research, in‐space manufacturing, and space tourism increase. Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 2 August 2021 doi:10.20944/preprints202108.0044.v1 5 As the past half century has witnessed the opening of space for exploration and commercial opportunities, in this same period, we have experienced exponential growth in our understanding of biology and physiology. This knowledge has been translated and commercialized for the benefit of human health and continues to accelerate as new technologies create additional tools to explore and cure. One aspect of this biomedical revolution is in the field of regenerative medicine, built upon advances in stem cell biology, biomaterials, and bioengineering. Remarkable advancements have been made in the design of MPS, also called tissue chips or organs‐on‐chips, and organoids that can mimic complex organ systems outside of the body for drug development or potential implantation to restore function. Stem cell isolation, characterization, and manipulation is advancing, with target applications broadly spread across tissues impacted by disease, trauma, and congenital conditions. Biomaterials and bioengineering advances have created new medical devices, targeted drug delivery platforms, biosensors and new imaging modalities, and the bioprinting of tissue constructs. To take advantage of these significant advances—more frequent and more affordable access to LEO and exponential progress in biomedical technology—the question is: How do these intersect, and what new opportunities arise as both advance? How can the unique LEO environment be leveraged to further advance biomanufacturing? Compelling answers to these questions will introduce economic drivers for investment in space‐based R&D that extend beyond the initial focus on pure discovery and into the expansion of commercial development in LEO. Over the past decade, the ISS National Lab has supported important space‐based research in the areas of tissue engineering and regenerative medicine that lays the groundwork for more complex studies and future investment. This critical research addressed fundamental questions such as: How does the LEO environment affect the organ function mimicked by tissue chips, and how do these changes relate to human disease? How does microgravity affect stem cell proliferation and differentiation? And how might 3D bioprinting benefit from the absence of gravity? Continued access to LEO through the ISS National Lab provides a unique opportunity for R&D that enables the jump from this initial work to the development of a sustainable market for biomanufacturing in space. The ISS is a powerful platform with a limited lifetime and thus limited time left for utilization; therefore, now is the time to leverage this invaluable orbiting laboratory to conduct R&D that demonstrates the value of biomanufacturing in space. This work will set the stage for increased private investment and the transition to larger and more numerous platforms in LEO that can support further discovery and development in the coming decades.

#### Solves global food security

Mark **Post 14**, MD, PhD in Pharmacology from Utrecht University, Professor of Vascular Physiology and Chair of Physiology at Maastricht University, and Cor van der Weele, Prof and bioethicist in the Dept of Applied Philosophy at Wageningen University, PhD in philosophy of Biology, “Principles of Tissue Engineering for Food,” Ch 78 in Principles of Tissue Engineering (Fourth Edition), 2014, Pages 1647–1662, Science Direct

Most techniques in tissue engineering were developed for medical applications. The potential benefits of tissue engineering and regenerative medicine for the repair of non-regenerative organs in the human body have not really been questioned. It is generally accepted that these technologies offer therapeutic opportunities where very limited alternatives are at hand to improve quality of life. Therefore, a tremendous amount of government funded research and business R&D has been and continues to be devoted to tissue engineering. Still, 25 years after its introduction, regenerative medicine by tissue engineering is not yet part of mainstream medical therapy [1]. This suggests that the technical challenges to generate tissues that are fully functional and can immediately replace damaged tissue are substantial.¶ **As a spin off from this research activity**, techniques in tissue engineering and regenerative medicine may be used to **produce organs to produce food**. This idea is not new and had in fact been proposed by Winston Churchill in his 1932 book ‘Thoughts and adventures' [2] and by Alexis Carrel [3]. Although the biological principles of tissue engineering of food are **very similar to the medical application** there are also differences in goals, scale of production, cost-benefit ratio, ethical-psychological considerations and regulatory requirements.¶ In this chapter the distinctions between the challenges of tissue engineering for food production are highlighted and discussed. The focus will be mainly on tissue engineering of meat as a particularly attractive and suitable example.¶ Why Tissue Engineering of Food?¶ Growing food through domestication of grasses, followed by other crops and livestock has a 13,000 years head start. The success of economical food production likely determined the growth and sophistication of our civilization [4]. Why would we try to replace the relatively low-tech, cheap and easy natural production of food by a high-tech complicated engineering technology that is likely to be more expensive? There are two main reasons why current ways of food production need to be reconsidered.¶ First, with growth of the world population to **9.5 billion** and an even faster growth in global economy, traditional ways of producing food, and in particular meat, **may no longer suffice to feed the world** [5]. Food security is already an issue for some populations, but absence of this security may spread **across all civilizations** due to **generalized scarcity of food**. Meat production through livestock for example **already seems maximized** by the occupation of 70% of current arable land surface, yet the demand for meat **will double** over the next four decades [6]. Without change, this will lead to **scarcity** and high prices. Likely, the high prices will be an incentive for intensification of meat production, which will increase the pressure of using crops for **feed for livestock instead of feeding people**. The arable land surface could be increased but this would occur at the expense of forests with predictable unfavorable climate consequences. Lifestyle changes that include the reduction of meat consumption per capita would also solve the problem, but historically this **seems unlikely to happen**. A technological alternative such as **tissue engineering of meat** might offer a solution. In fact, the production of meat is a good target for tissue engineering. Pigs and cows are the major sources of the meat we consume, and these animals are very inefficient in transforming vegetable proteins into edible animal proteins, with an average bioconversion rate of 15% [7]. If this efficiency can be **improved through tissue engineering**, this will predictably lead to **less land, water and energy use for the production of meat** [8], which introduces the second major reason why alternatives and more efficient meat production should be considered.

#### Extinction

**FDI 12** – Future Directions International ’12 (“International Conflict Triggers and Potential Conflict Points Resulting from Food and Water Insecurity Global Food and Water Crises Research Programme”, May 25, <http://www.futuredirections.org.au/files/Workshop_Report_-_Intl_Conflict_Triggers_-_May_25.pdf>,)

There is a growing appreciation that the conflicts in the next century will **most likely** be fought over a lack of **resources**. Yet, in a sense, this is not new. Researchers point to the French and Russian revolutions as conflicts induced by a lack of food. More recently, Germany’s World War Two efforts are said to have been inspired, at least in part, by its perceived need to gain access to more food. Yet the general sense among those that attended FDI’s recent workshops, was that the scale of the problem in the future could be significantly greater as a result of population pressures, changing weather, urbanisation, migration, loss of arable land and other farm inputs, and increased affluence in the developing world.¶ In his book, Small Farmers Secure Food, Lindsay Falvey, a participant in FDI’s March 2012 workshop on the issue of food and conflict, clearly expresses the problem and why countries across the globe are starting to take note. .¶ He writes (p.36), “…if people are hungry, especially in cities, the state is not stable – riots, violence, breakdown of law and order and migration result.” “Hunger feeds anarchy.” This view is also shared by Julian Cribb, who in his book, The Coming Famine, writes that if “large regions of the world run short of food, land or water in the decades that lie ahead, then wholesale, **bloody wars are liable to follow**.” He continues: “An increasingly credible scenario for **World War 3** is not so much a confrontation of super powers and their allies, as a festering, self-perpetuating chain of resource conflicts.” He also says: “The wars of the 21st Century are **less likely** to be global conflicts with sharply defined sides and huge armies, than a scrappy mass of failed states, rebellions, civil strife, insurgencies, terrorism and genocides, sparked by bloody competition over dwindling resources.” As another workshop participant put it, people do not go to war to kill; **they go to war over resources**, either to protect or to gain the resources for themselves. Another observed that hunger results in passivity not conflict. Conflict is over resources, not because people are going hungry. A study by the International Peace Research Institute indicates that where food security is an issue, it is more likely to result in some form of conflict. Darfur, Rwanda, Eritrea and the Balkans experienced such wars. Governments, especially in developed countries, are increasingly aware of this phenomenon.¶ The UK Ministry of Defence, the CIA, the US **C**enter for **S**trategic and **I**nternational **S**tudies and the Oslo Peace Research Institute, all identify famine as **a potential trigger for** conflicts and possibly even **nuclear war**.

#### Private development and expansion makes the system sustainable

Collins 10

Patrick Collins, professor of economics at Azabu University in Japan, and a Collaborating Researcher with the Institute for Space & Astronautical Science, as well as adviser to a number of companies, Adriano V. Autino is President of the Space Renaissance International; Manager, CEO/CTO, Systems Engineering Consultant / Trainer at Andromeda Systems Engineering LLC; and Supplier of methodological tools and consultancy at Intermarine S.p.A, Acta Astronautica, Volume 66, Issues 11–12, June–July 2010, “What the growth of a space tourism industry could contribute to employment, economic growth, environmental protection, education, culture and world peace”, Pages 1553–1562

4. Environmental protection

Economic development in space based on low launch costs could contribute greatly, even definitively, to solving world environmental problems. As a first step, substantially reducing the cost of space travel will reduce the cost of environment-monitoring satellites, thereby improving climate research and environmental policy-making.

4.1. Space-based solar power supply

A second possibility, which has been researched for several decades but has not yet received funding to enable testing in orbit, is the delivery of continuous solar-generated power from space to Earth. Researchers believe that such space-based solar power (SSP) could supply clean, low-cost energy on a large scale, which is a prerequisite for economic development of poorer countries, while avoiding damaging pollution. However, realisation of SSP requires much lower launch costs, which apparently only the development of a passenger space travel industry could achieve. Hence the development of orbital tourism could provide the key to realising SSP economically [14].

4.2. Carbon-neutral space travel

Clean energy produced by SSP could eliminate the environmental impact of space travel, and even make it “carbon neutral” if this is considered desirable [25]. Moreover, SSP has a much shorter energy pay-back time than terrestrial solar energy, due to the almost continuous supply of power which it can generate, rather than only in day-time during clear weather. Some critics claim that space travel will become a significant environmental burden [26]. However, while superficially correct in the short term, this is the opposite of the truth over the longer term. It would be a dangerous error to prevent the growth of space tourism in order to avoid its initial, minor environmental impact, since this would prevent a range of major benefits in the future, including the supply of low-cost, carbon-neutral SSP, and other space-based industry.

4.3. Space-based industry

If orbital travel grows to a scale of millions of passengers/year—as it could by the 2030s, with vigorous investment—it will stimulate the spontaneous growth of numerous businesses in space. These will grow progressively from simple activities such as maintenance of orbiting hotels, to in-space manufacturing using asteroidal minerals. For example, the development of SSP would enable a range of industrial processes using the advantages of space, including high vacuum, weightlessness, low-cost electricity and sources of both minerals and volatile chemicals in shallow gravitational wells.

If SSP grows to supply a significant share of the terrestrial energy market, more and more industry would operate outside the Earth's ecological system. While most industries cause growing damage to the Earth's environment as they grow in scale, industrial activities which are outside the Earth's ecosystem need not cause any such damage. Hence the growth of space-based industry to large scale offers the longer-term possibility of decoupling economic growth from the limits of the terrestrial environment. Indeed, it has been convincingly argued that only the use of space resources, including especially SSP, offers the possibility of protecting the Earth's environment while enabling sufficient economic growth to preserve civilised society [22] and [27].

4.4. Severe weather amelioration and climate stabilisation

The use of solar power satellites for reducing the severity of hurricanes and typhoons, and/or ameliorating severe snow conditions has been discussed for some years. In the extreme case this application of SSP might even include a role in the stabilisation of climate. Earth's climate system is extremely complex, and is the subject of a great deal of ongoing scientific research, including collection of an ever-wider range of data, and ever-more detailed analysis of climate change in the past.

A positive-feedback cycle causing sudden onset of the cooling phase of the long-term cycle of “ice ages” has been hypothesized, whereby a winter with unusually low temperatures and/or unusually widespread and/or long-lasting snow cover would increase the probability of the following winter being even more severe [28] and [29]. The beginning of such a trend would be similar to the sharply more severe winters seen over the two last years in North America (as well as the unusually cool 2009 summer).

Consequently, although such a possibility may seem remote, and although there are thorny legal problems concerning deliberate weather modification, it is nevertheless noteworthy that satellite power stations may be the only practical means of selectively melting snow over areas of thousands of square kilometres, possibly sufficient to prevent such a vicious circle, even in the event of terrestrial energy shortages.

4.5. Ethical consumption

Passenger space travel and its numerous spinoff activities have the important potential to escape the limitations of the “consumerism” which governments in the rich countries have encouraged in recent decades in order to stimulate economic growth, defined as GDP. Researchers now understand that this is resulting in “excess consumption” which causes unnecessary environmental damage [30], while reducing rather than increasing popular satisfaction [31]. That is, “first world” citizens are increasingly trapped in a culturally impoverished “consumer” lifestyle which reduces social capital, social cohesion and happiness, while damaging the environment. By contrast, expenditure on the unique experience of space travel promises to play a more positive role in the economy and society, enriching customers culturally without requiring mass production of consumer goods and corresponding pollution. As such it could be a harbinger of a future “open world” economy [27].

#### Warming irreversible – only markets solves through CCS and a bridge to renewables – link turns every impact.

Graciela 16 – Professor of Economics and of Statistics at Columbia University and Visiting Professor at Stanford University, and was the architect of the Kyoto Protocol carbon market (being interviewed by Marcus Rolle, freelance journalist specializing in environmental issues and global affairs, “Reversing Climate Change: Interview with Graciela Chichilnisky,” http://www.globalpolicyjournal.com/blog/01/09/2016/reversing-climate-change-interview-graciela-chichilnisky)//

GC: Green capitalism is a new economic system that values the natural resources on which human survival depends. It fosters a harmonious relationship with our planet, its resources and the many species it harbors. It is a new type of market economics that addresses both equity and efficiency. Using carbon negative technology™ it helps reduce carbon in the atmosphere while fostering economic development in rich and developing nations, for example in the U S., EU, China and India. How does this work? In a nutshell Green Capitalism requires the creation of global limits or property rights nation by nation for the use of the atmosphere, the bodies of water and the planet’s biodiversity, and the creation of new markets to trade these rights from which new economic values and a new concept of economic progress emerges updating GDP as is now generally agreed is needed. Green Capitalism is needed now to help avert climate change and achieve the goals of the 2015 UN Paris Agreement, which are very ambitious and universally supported but have no way to be realized within the Agreement itself. The Carbon Market and its CDM play critical roles in the foundation of Green Capitalism, creating values to redefine GDP. These are needed to remain within the world’s “CO2 budget” and avoid catastrophic climate change. As I see it, the building blocks for Green Capitalism are then as follows; (1) Global limits nation by nation in the use of the planet’s atmosphere, its water bodies and biodiversity - these are global public goods. (2) New global markets to trade these limits, based on equity and efficiency. These markets are relatives of the Carbon Market and the SO2 market. The new market create new measures of economic values and update the concept of GDP. (3) Efficient use of Carbon Negative Technologies to avert catastrophic climate change by providing a smooth transition to clean energy and ensuring economic prosperity in rich and poor nations. These building blocks have immediate practical implications in reversing climate change and can assist the ambitious aims of Paris COP21 become a reality. MR: What is the greatest advantage of the new generation technologies that can capture CO2 from the air? GC: These technologies build carbon negative power plants, such as Global Thermostat, that clean the atmosphere of CO2 while producing electricity. Global Thermostat is a firm that is commercializing a technology that takes CO2 out of air and uses mostly low cost residual heat rather than electricity to drive the capture process, making the entire process of capturing CO2 from the atmosphere very inexpensive. There is enough residua heat in a coal power plant that it can be used to capture twice as much CO2 as the plant emits, thus transforming the power plant into a “carbon sink.” For example, a 400 MW coal plant that emits 1 million tons of CO2 per year can become a carbon sink absorbing a net amount of 1 million tons of CO2 instead. Carbon capture from air can be done anywhere and at any time, and so inexpensively that the CO2 can be sold for industrial or commercial uses such as plastics, food and beverages, greenhouses, bio-fertilizers, building materials and even enhanced oil recovery, all examples of large global markets and profitable opportunities. Carbon capture is powered mostly by low (85°C) residual heat that is inexpensive, and any source will do. In particular, renewable (solar) technology can power the process of carbon capture. This can help advance solar technology and make it more cost-efficient. This means more energy, more jobs, and it also means economic growth in developing nations, all of this while cleaning the CO2 in the atmosphere. Carbon negative technologies can literally transform the world economy. MR: One final question. You distinguish between long-run and short-run strategies in the effort to reverse climate change. Would carbon negative technologies be part of a short-run strategy? GC: Long-run strategies are quite different from strategies for the short-run. Often long-run strategies do not work in the short run and different policies and economic incentives are needed. In the long run the best climate change policy is to replace fossil fuel sources of energy that by themselves cause 45% of the global emissions, and to plant trees to restore if possible the natural sources and sinks of CO2. But the fossil fuel power plant infrastructure is about 87% of the power plant infrastructure and about $45-55 trillion globally. This infrastructure cannot be replaced quickly, certainly not in the short time period in which we need to take action to avert catastrophic climate change. The issue is that CO2 once emitted remains hundreds of years in the atmosphere and we have emitted so much that unless we actually remove the CO2 that is already there, we cannot remain long within the carbon budget, which is the concentration of CO2 beyond which we fear catastrophic climate change. In the short run, therefore, we face significant time pressure. The IPCC indicates in its 2014 5th Assessment Report that we must actually remove the carbon that is already in the atmosphere and do so in massive quantities, this century (p. 191 of 5th Assessment Report). This is what I called a carbon negative approach, which works for the short run. Renewable energy is the long run solution. Renewable energy is too slow for a short run resolution since replacing a $45-55 trillion power plant infrastructure with renewable plants could take decades. We need action sooner than that. For the short run we need carbon negative technologies that capture more carbon than what is emitted. Trees do that and they must be conserved to help preserve biodiversity. Biochar does that. But trees and other natural sinks are too slow for what we need today. Therefore, negative carbon is needed now as part of a blueprint for transformation. It must be part of the blueprint for Sustainable Development and its short term manifestation that I call Green Capitalism, while in the long run renewable sources of energy suffice, including Wind, Biofuels, Nuclear, Geothermal, and Hydroelectric energy. These are in limited supply and cannot replace fossil fuels. Global energy today is roughly divided as follows: 87% is fossil, namely natural gas, coal, oil; 10% is nuclear, geothermal, and hydroelectric, and less than 1% is solar power — photovoltaic and solar thermal. Nuclear fuel is scarce and nuclear technology is generally considered dangerous as tragically experienced by the Fukushima Daichi nuclear disaster in Japan, and it seems unrealistic to seek a solution in the nuclear direction. Only solar energy can be a long term solution: Less than 1% of the solar energy we receive on earth can be transformed into 10 times the fossil fuel energy used in the world today. Yet we need a short-term strategy that accelerates long run renewable energy, or we will defeat long-term goals. In the short term as the IPCC validates, we need carbon negative technology, carbon removals. The short run is the next 20 or 30 years. There is no time in this period of time to transform the entire fossil infrastructure — it costs $45-55 trillion (IEA) to replace and it is slow to build. We need to directly reduce carbon in the atmosphere now. We cannot use traditional methods to remove CO2 from smokestacks (called often Carbon Capture and Sequestration, CSS) because they are not carbon negative as is required. CSS works but does not suffice because it only captures what power plants currently emit. Any level of emissions adds to the stable and high concentration we have today and CO2 remains in the atmosphere for years. We need to remove the CO2 that is already in the atmosphere, namely air capture of CO2 also called carbon removals. The solution is to combine air capture of CO2 with storage of CO2 into stable materials such as biochar, cement, polymers, and carbon fibers that replace a number of other construction materials such as metals. The most recent BMW automobile model uses only carbon fibers rather than metals. It is also possible to combine CO2 to produce renewable gasoline, namely gasoline produced from air and water. CO2 can be separated from air and hydrogen separated from water, and their combination is a well-known industrial process to produce gasoline. Is this therefore too expensive? There are new technologies using algae that make synthetic fuel commercially feasible at competitive rates. Other policies would involve combining air capture with solar thermal electricity using the residual solar thermal heat to drive the carbon capture process. This can make a solar plant more productive and efficient so it can out-compete coal as a source of energy. In summary, the blueprint offered here is a private/public approach, based on new industrial technology and financial markets, self-funded and using profitable greenmarkets, with securities that utilize carbon credits as the “underlying” asset, based on the KP CDM, as well as new markets for biodiversity and water providing abundant clean energy to stave off impending and actual energy crisis in developing nations, fostering mutually beneficial cooperation for industrial and developing nations. The blueprint proposed provides the two sides of the coin, equity and efficiency, and can assign a critical role for women as stewards for human survival and sustainable development. My vision is a carbon negative economy that represents green capitalism in resolving the Global Climate negotiations and the North–South Divide. Carbon negative power plants and capture of CO2 from air and ensure a clean atmosphere together innovation and more jobs and exports: the more you produce and create jobs the cleaner becomes the atmosphere. In practice, Green Capitalism means economic growth that is harmonious with the Earth resources.

#### Ozone hole is increasing – flips U/Q.

Horton 21 Helena Horton 9-15-2021 "‘Larger than usual’: this year’s ozone layer hole bigger than Antarctica" <https://www.theguardian.com/environment/2021/sep/16/larger-than-usual-ozone-layer-hole-bigger-than-antarctica> (Environmental Journalist for the Guardian)//Elmer

The hole in the ozone layer that develops annually is “rather larger than usual” and is currently bigger than Antartica, say the scientists responsible for monitoring it. Researchers from the Copernicus Atmosphere Monitoring Service say that this year’s hole is growing quickly and is larger than 75% of ozone holes at this stage in the season since 1979. Ozone exists about seven to 25 miles (11-40km) above the Earth’s surface, in the stratosphere, and acts like a sunscreen for the planet, shielding it from ultraviolet radiation. Every year, a hole forms during the late winter of thesouthern hemisphere as the sun causes ozone-depleting reactions, which involve chemically active forms of chlorine and bromine derived from human-made compounds. In a statement Copernicus said that this year’s hole “has evolved into a rather larger than usual one”. Vincent-Henri Peuch, the service’s director, told the Guardian: “We cannot really say at this stage how the ozone hole will evolve. However, the hole of this year is remarkably similar to the one of 2020, which was among the deepest and the longest-lasting – it closed around Christmas – in our records since 1979.

#### Dichloromethane thumps

Perkins 17 Sid Perkins 6-27-2017 "New threat to ozone layer found" <https://www.science.org/content/article/new-threat-ozone-layer-found> (Sid is a freelance science journalist based in Crossville, Tennessee. He specializes in earth sciences and paleontology but often tackles topics such as astronomy, planetary sciences, materials sciences, and engineering. Sid has a bachelor’s degree in natural science from Christian Brothers College in Memphis, Tennessee; bachelor’s and master’s degrees in aeronautical engineering from the Air Force Institute of Technology in Ohio; and a master’s degree in journalism from the University of Missouri in Columbia)//Elmer

The ozone layer—a high-altitude expanse of oxygen molecules that protects us from the sun's ultraviolet rays—has been on the mend for the past decade or so. But a newly discovered threat could delay its recovery. Industrial emissions of a chemical commonly used in solvents, paint removers, and the production of pharmaceuticals have doubled in the past few years, researchers have found, which could slow the healing of the ozone layer over Antarctica anywhere between 5 and 30 years—or even longer if levels continue to rise. The findings are "frightening" and "a big deal," says Robyn Schofield, an environmental scientist at the University of Melbourne in Australia who was not involved with the work. The chemical in question is called dichloromethane (CH2Cl2). Natural sources of this substance are small, says Ryan Hossaini, an atmospheric chemist at Lancaster University in the United Kingdom. Thus, he notes, the increase in emissions seen in recent years likely stems from human sources. Between 2000 and 2012, low-altitude concentrations of CH2Cl2 vapor rose, on average, about 8% per year, he adds. Globally, concentrations of CH2Cl2 approximately doubled between 2004 and 2014. Current CH2Cl2 emissions are about 1 million metric tons per year, Hossaini and his team estimate. Like chlorofluorocarbons (CFCs) and several other ozone-destroying chemicals you may have heard of, CH2Cl2 breaks apart when struck by sunlight. The chlorine atoms that are released then dismantle any ozone molecules they interact with. In 1987, an international agreement known as the Montreal Protocol led to a ban on the production and use of CFCs and many related compounds in industrial nations, but it ignored CH2Cl2 because researchers thought it didn't stay intact in the atmosphere long enough to rise into the stratosphere. Recent evidence now suggests, however, that the molecules can reach the lower edge of the stratosphere, which includes the ozone layer, despite its height 8 kilometers above the poles. To gauge the current and future threat to high-altitude ozone from CH2Cl2, Hossaini and his colleagues used computer simulations. In 2016, their analyses suggest, about 3% of the summer ozone loss in the Antarctic could be traced to CH2Cl2. That seems small, but in 2010 the substance was responsible for only 1.5% of the region's summer ozone loss, Hossaini says. If CH2Cl2 emissions continue to rise at the rate seen in the last decade, recovery of the ozone hole would be delayed about 30 years, the researchers estimate in Nature Communications. But if emissions of CH2Cl2 are held to current levels, healing of the ozone hole would be delayed only 5 years or so, the team finds. Simulations that don't include the effect of CH2Cl2 suggest that high-altitude ozone in the Antarctic will return to pre-1980 levels, the concentration measured before CFCs and other ozone-destroying chemicals were recognized as a problem, in 2065. The team's analyses "are quite important," says Björn-Martin Sinnhuber, an atmospheric scientist at Karlsruhe Institute of Technology in Germany. "It's clear that concentrations [of CH2Cl2] have increased quite a lot," he notes. But one critical question, he contends, is what will happen to emissions over the long term: "They've been quite variable in recent years, and it's difficult to say how they might evolve." Although the rapid rise in CH2Cl2 emissions may one day level off, it's also possible that emissions of this multipurpose chemical may accelerate even further. Hossaini and his team also assessed what would happen to high-altitude ozone if CH2Cl2 emissions rose at twice the rate seen in the past decade. The answer? Not good. Antarctic ozone wouldn't recover to pre-1980 levels until well after the year 2100, the analyses suggest. All this means that scientists now reviewing the Montreal Protocol should consider expanding the agreement to also regulate substances like CH2Cl2 that have atmospheric lifetimes of less than 6 months, Schofield says. Possibly as important, however, the team's results might also help other researchers identify which sources of CH2Cl2 are contributing most to the recent rise in emissions. That sort of information, Hossaini admits, is sadly lacking as of now.

#### Public space tourism will fill in mass launch

Seedhouse 18 [Erik, editor at the Encyclopedia Britannica, “Space Tourism” https://www.britannica.com/explore/space/space-tourism/]

Space tourism, recreational space travel, either on established government-owned vehicles such as the Russian Soyuz and the International Space Station (ISS) or on a growing number of vehicles fielded by private companies. Since the flight of the world’s first space tourist, American businessman Dennis Tito, on April 28, 2001, space tourism has gained new prominence as more suborbital and orbital tourism opportunities have become available. Orbital space tourism The advent of space tourism occurred at the end of the 1990s with a deal between the Russian company MirCorp and the American company Space Adventures Ltd. MirCorp was a private venture in charge of the space station Mir. To generate income for maintenance of the aging space station, MirCorp decided to sell a trip to Mir, and Tito became its first paying passenger. However, before Tito could make his trip, the decision was made to deorbit Mir, and—after the intervention of Space Adventures Ltd.—the mission was diverted to the ISS. Tito, who paid $20 million for his flight on the Russian spacecraft Soyuz TM-32, spent seven days on board the ISS and is considered the world’s first space tourist. However, given the arduous training required for his mission, Tito objected to the use of the word tourist, and since his flight the term spaceflight participant has been more often used to distinguish commercial space travelers from career astronauts.

### 1NC - AT: Celestial Proliferation

#### Alt mechanisms solve – Russia’s technical contributions and improvement of the space station solve— Haven reads green.

CSIS 18 [(Center for Strategic and International Studies), “Why Human Space Exploration Matters,” August 21, 2018 https://www.csis.org/blogs/post-soviet-post/space-cooperation] TDI

U.S.-Russian space cooperation continues to be a stated mutual goal. In April 2018, President Putin said of space, “Thank God, this field of activity is not being influenced by problems in politics. Therefore, I hope that everything will develop, since it is in the interests of everyone…This is a sphere that unites people. I hope it will continue to be this way.” During his statement at a recent event at CSIS, NASA Administrator Jim Bridenstine said, “[space] is our best opportunity to dialogue when everything else falls apart. We’ve got American astronauts and Russian cosmonauts dependent on each other on the International Space Station, which enables us to ultimately maintain that dialogue.” The U.S. and Russia both benefit from the ISS partnership. Russia provides transportation to the ISS for U.S. astronauts, from which Russia receives an average of $81 million per seat on the Soyuz (and recognition of its status as a space power). The U.S. also benefits from Russia’s technical contributions to the ISS while Russia benefits The U.S. and Russia signed a joint statement in 2017 in support of the idea of collaborating on deep space exploration, including the construction of the Lunar Orbital Platform-Gateway, a research-focused space station orbiting the moon. Through agreements on civilian space exploration, such as the Lunar Orbital Platform-Gateway or future Mars projects, that have clear benefits to both sides, some degree of cooperation will remain in both countries’ interest. The high price tag for pursuing space exploration alone and opportunities for sharing and receiving technical expertise encourages international partnerships like the ISS. However, at least three factors, apart from the overall deterioration of U.S.-Russia relations, threaten this cooperation. First, growth of the private sector space industry may alter the economic arrangement between the U.S. and Russia, and ultimately lower the benefits of cooperation to both countries. The development of advanced technologies by private companies will give NASA new options to choose from and reduce the need to depend on (and negotiate with) Russia. If NASA and its Russian counterpart, Roskosmos, have no need to talk with one another, they probably won’t in the face of tense political relations. The U.S. intends to use Boeing and SpaceX capsules for human spaceflight beginning in 2020, and a Congressional plan in 2016 set a phase out date of Russian RD-180 rocket engines by 2022.

#### Turn --- creating space dependence through corporations, jobs, and resources deters war

--dependence means deterrence because no one wants to destroy space

--rapid economic expansion has made space domain of commerce that has created dependence in squo

--Satellites are necessary to GPS, weather monitoring and only 16% have strictly military use

Triezenberg, 17

Bonnie Triezenberg, Senior engineer at RAND. Previously, she was the senior technical fellow at the Boeing Company, specializing in agile systems and software development. “Deterring Space War: An Exploratory Analysis Incorporating Prospect Theory into a Game Theoretic Model of Space Warfare,” RAND Corporation. 2017. <https://www.rand.org/pubs/rgs_dissertations/RGSD400.html>

The above discussion suggests that a likely means to achieve deterrence of acts of war in outer space is to increase civilian dependence on space to support day-to-day life—if everyone on earth is equally dependent on space, no one has an incentive to destroy space. Largely by accident, this dependence appears to have, in fact, occurred. The space age was born in an age of affluence and rapid economic expansion; space quickly became a domain of international commerce as well as a domain of national military use. Space assets and the systems they enable have transformed social, infrastructure and information uses perhaps more visibly than they have transformed military uses. In fact, in the current satellite database published by the Union of Concerned Scientists, of the 1461 satellites in orbit 40% support purely commercial ventures, while only 16% have a strictly military use.46 The first commercial broadcast by a satellite in geo-synchronous orbit was of international news between Europe and the United States.47 The first telephony uniting the far flung islands of Indonesia was enabled by satellite48. Those of us who are old enough remember the 1960s “magic” of intercontinental phone calls and international “breaking news” delivered by satellite. Today, most social and infrastructure uses of space are taken for granted – even in remote locales of Africa, people expect to be able to monitor the weather, communicate seamlessly with colleagues and to find their way to new and unfamiliar locations us[e]ing the GPS in their phones. All of us use space every day.49 These unrestricted economic and social uses of space may be the best deterrent, making everyone on all sides of combat equally dependent on space and heightening the taboo against weaponizing space or threatening space assets with weapons.

#### Attacks don’t escalate

--no retaliation – nukes are categorically different than space bc existential

--space is like cyber – attacks are unfortunate but not worthy of a nuke response

--nuke threats not credible bc nobody thinks space is at that lvl

Lewis, 13 – Senior fellow and Program Director at the Center for Strategic and

International Studies

James A. Lewis, “Reconsidering Deterrence for Space and Cyberspace,” in Anti-satellite Weapons, Deterrence and Sino-American Space Relations, September 2013. <https://apps.dtic.mil/dtic/tr/fulltext/u2/a587431.pdf>

Unlike other military technologies, nuclear weapons pose an existential threat. If used, damage and casualties would be massive. In contrast, neither cyberattacks nor ASAT attacks pose the same level of destructiveness; they certainly are not existential threats. If there was some way credibly to threaten the use of nuclear weapons after a cyberattack, deterrence might be possible. However, a nuclear threat in response to these attacks would not be proportional and the threat to use nuclear weapons is likely to be discounted by opponents. There are powerful norms that constrain the use of these weapons, and therefore, a threat to use nuclear weapons in response to cyberattacks would be dramatic but not credible. Calls for a nuclear response to cyberattacks would be dismissed as frivolous. Threats to use military force to retaliate against an act that would not be considered as justifying the use of force in self-defense under international law or practice will likely be dismissed by opponents as bluster.

**Space cooperation doesn’t lead to broader relations.**

**Sterner 15** (Eric Sterner is a fellow at the George C. Marshall Institute. He held senior staff positions for the U.S. House Science and Armed Services committees and served in DoD and as NASA’s associate deputy administrator for policy and planning, “Talk and Cooperation in Space” 8/6/2015 <https://spacenews.com/op-ed-china-talk-and-cooperation-in-space/>)

How might cooperation with China benefit the United States? Some hold that cooperation in space helps promote cooperation on Earth. Writing in SpaceNews in 2013, Michael Krepon argued “The more they cooperate in space, the less likely it is that their competition on Earth will result in military confrontation. The reverse is also true.” That sentiment is widespread and flows from the nobility of exploration. **If only it were so.** Unfortunately, a country’s space behavior appears to have little affect on its terrestrial actions. Russia’s multidecadal human spaceflight partnership with the United States did not prevent it from invading and destabilizing Ukraine when it moved toward a closer relationship with the European Union, many of whose members are Russian partners in the International Space Station. Space cooperation **has not, and will not**, prevent the continued worsening of the security environment in Europe, which flows from Russian behavior on Earth, not in space. **Space cooperation with China is similarly unlikely to moderate its behavior**. Tensions in Asia derive from China’s insistence on pressing unlawful territorial claims in the Pacific, most recently by transforming disputed coral reefs into would-be military bases. Ironically, civilian space technology has proved critical in documenting these aggressive moves. To further demonstrate the civil space cooperation does not promote cooperation on Earth, we need look no further than recent history. The NASA administrator’s visit to China in the fall of 2014 nearly coincided with China’s hacking of NOAA, with whom Beijing has a “partnership” in studying climate change. Military confrontation flows from the interaction of hard power in pursuit of competing national interests. Space cooperation falls into the realm of soft power. It has value in strengthening relationships among like-minded states with similar interests. China’s aggressiveness toward its neighbors, its human rights record and its cyberattacks on the United States strongly demonstrate that it and the United States are **not of like minds**. This is not the result of insufficient space cooperation, but of divergent national interests. The United States is a status quo power; China is not.

#### But Russia cheats – gives an asymmetric advantage – constitutional and political constraints prevent US reciprocation

Lambakis 17 [Dr. Steven Lambakis is a national security and international affairs analyst specializing in space power and policy studies. Dr. Lambakis serves as the Editor-in-Chief of Comparative Strategy, a leading international journal of global affairs and strategic studies whose readership includes key policymakers, academics, and other leaders. Dr. Lambakis was educated in the fields of international politics, with special emphasis on arms control and intelligence issues, American government, and U.S. foreign policy at Northern Illinois University in DeKalb, Illinois (B.A., 1982) and the Catholic University of America in Washington D.C. (M.A., 1984, and Ph.D., 1990). Foreign Space Capabilities: Implications for U.S. National Security. September 2017. www.nipp.org/wp-content/uploads/2017/09/Foreign-Space-Capabilities-pub-2017.pdf]

While Russia is making strong technical strides toward having weapons capable of damaging or destroying U.S. satellites, it is using its foreign policy to try to hobble potential U.S. space weapons. For example, Russia (along with China) has advocated for a treaty preventing the placement of weapons in outer space and the threat or use of force against space-based assets. Russia is fully aware that there are no known technologies or capabilities to verify compliance with such a treaty. The purpose in pursuing such arms control agreements is to hobble U.S. weapons and technology development, because of the domestic political opposition such rhetoric might generate and because the United States will comply with any arms control agreement that it signs. The Russians do not have the same constitutional and political constraints in place as the United States to restrain its development of ASATs. Moreover, the Russians are accustomed to violating arms control agreements that it they have signed. Writes defense analyst Mark Schneider: “There is no reason to expect Russia to break a habit of ignoring its arms control and treaty obligations. By doing this, it has gained military advantages for decades.”119

#### Russia uses non-compliance to expand military power at the expense of the US.

Payne & Foster 17 – \*Keith, PhD in IR @ USC, Professor of Defense and Strategic Studies @ Mo State, \*\*John, PhD, Director of Defense Research and Engineering, Department of Defense; Director of the Lawrence Livermore National Laboratory (“Russian strategy Expansion, crisis and conflict,” Comparative Strategy, 36.1)

Russian arms control behavior, including the desire to limit U.S. military capabilities through legally binding agreements while violating those agreements when convenient, is an element of Russia’s overall strategy for accomplishing Moscow’s expansionist goals outlined in Chapter One. Russia sees arms control, including noncompliance with its treaty obligations, as a tool to be employed as necessary to obtain military advantage, convey strength, compel respect as a superpower, deter Western challenges, enhance its freedom of action and leverage over others, and bolster the regime’s respect and domestic legitimacy by demonstrating toughness and a willingness to confront the West. Moscow views arms control not as a cooperative activity to create a more benign world. It is another arena in which to reinforce President Putin’s statement that, “It’s best not to mess with us.”1 Too often there is a tendency in the West to dismiss individual Russian arms control violations as mere “technical” violations that are not “militarily significant.” This approach ignores the broader role that arms control and a policy of arms control noncompliance play in helping Russia to achieve its strategic objectives and the military capabilities possible as a result of noncompliance. Soviet/Russian arms control violations generally are not accidents, one-time incidents, misunderstandings or legitimate disputes concerning the technical meaning of treaty obligations. More often, they are directly related to Russian military objectives, which in turn are related to achieving foreign policy goals such as: 1) recovering Russia’s great power status through enhanced nuclear capability; 2) extending its sphere of influence over (i.e., dominating) former Soviet space by enhancing Russia’s political and military power in Europe; 3) constraining U.S. military capabilities; and, 4) undermining NATO’s will and capability to resist. If an arms control commitment—either legal or political—comes to interfere with an important Russian objective, it is simply ignored. Significantly, Russia has violated arms control agreements even when it was clear the violations would be detected.

#### Russian expansionism leads to nuclear use.

Payne & Foster 17 – \*Keith, PhD in IR @ USC, Professor of Defense and Strategic Studies @ Mo State, \*\*John, PhD, Director of Defense Research and Engineering, Department of Defense; Director of the Lawrence Livermore National Laboratory (“Russian strategy Expansion, crisis and conflict,” *Comparative Strategy*, 36.1)//BB

Russian nuclear and conventional force programs and Russia grand strategy Russia clearly attributes political and military value to its nuclear arsenal, and the threat of limited nuclear first use more specifically, as a means to support its efforts to reassert its dominance over the post-Soviet space. Moscow’s strategy is intended to intimidate neighbors and deter outside interference in Russian activities through the threat of nuclear first use. Russia’s apparently low nuclear threshold raises the stakes in any conflict, and compels adversaries to confront the possibility that should they become involved, so too would Russian nuclear weapons. This has been prominently displayed throughout hostilities in Ukraine, as Russian nuclear exercises, official statements, and bomber patrols are intended to intimidate Western states. First and foremost, Russia’s strategy couples multidimensional operations with overt nuclear threats for the purpose of precluding retaliation by the aggrieved party and/or its allies—thus giving Russia a free hand to pursue its expansionist goals. Moscow seeks this seemingly ultimate trump card within its “near abroad.” This use of nuclear weapons is not a replay of Cold War notions of mutual nuclear deterrence. It is a strategy of nuclear coercion to support expansionist goals. As noted in Chapter Three, Deputy Commander of NATO Forces in Europe General Sir Adrian Bradshaw, concluded in this regard that Russia’s “threat of escalation might be used to prevent reestablishment of territorial integrity.”125 Acclaimed Russian analyst Pavel Felgenhauer agreed, suggesting Moscow is becoming comfortable with using the threat of nuclear war to “scare the West into concessions.”126 This continued approach could lead to an “emboldened Russia brandishing nuclear weapons each time it wants something.”127 Despite describing its policy as purely defensive, it is clear that Russia considers nuclear coercion as a great power instrument to be leveraged during periods of hostilities to protect a potential fait accompli. If, as seems to be the case, Moscow views this as a viable strategy, Russia may continue to act more aggressively toward post-Soviet states, potentially including the eastern portion of NATO, backed up by nuclear threats. At the very least, if the Kremlin feels threatened, it will display its nuclear sabre to escalate the conflict to a nuclear level others would simply be unwilling to match. During a meeting at the Valdai Club in October 2014, Putin himself gave a history lesson on the power of nuclear intimidation, stating: True, the Soviet Union was referred to as “the Upper Volta with missiles.” Maybe so, and there were loads of missiles. Besides, we had such brilliant politicians like Nikita Khrushchev, who hammered the desk with his shoe at the UN. And the whole world, primarily the United States, and NATO thought: this Nikita is best left alone, he might just go and fire a missile, they have lots of them, we should better show some respect for them.128 The danger in this Russian view is obvious: nuclear brinksmanship could trigger a chain of events that leads to a nuclear confrontation or conflict.129 Should a confident and “bold” Putin severely miscalculate a NATO response, he could believe nuclear escalation of a conflict to be a viable option. In addition, if a conflict erupts, Russia’s flexible and discriminate nuclear systems may afford Moscow the ability to frustrate NATO war-planning. By employing specific, specialized systems against high-value target sets, such as aircraft carriers, critical command and control nodes, and long-range air bases, Russia could effectively carry out an offset strategy using both non-nuclear and nuclear means to negate NATO’s conventional superiority by destroying the alliance’s most prized assets. This could cause enormous losses for NATO military personal and infrastructure, and constrain NATO’s ability to conduct offensive operations to dislodge an occupying Russian force. As is intended, Moscow’s threat to use nuclear weapons could result in coercive pressure to prevent certain conventional NATO actions during the course of a conflict as well—essentially a form of intra-war nuclear coercion.130 This could consist of nuclear threats to prevent NATO from targeting supply hubs, air bases, or sophisticated air and missile defenses located just inside Russia’s borders, which could be critical targets during an operation to remove Russian forces. By threatening nuclear escalation, Moscow could force NATO to choose between limiting its response or nuclear war. Thus, NATO must prepare for not just a miscalculated Russian nuclear strike, but a calculated one as well. Finally, should deterrence fail and a crisis escalate, Russian leaders could believe that limited nuclear use would localize and terminate a conflict on advantageous terms, as is suggested by its nuclear escalation strategy. Moscow appears to believe that it can control escalation by restraining the types of nuclear weapons used, their targets, and under what circumstances each weapon is used, while threatening the possibility of further nuclear escalation, up to global nuclear war. Essentially, by credibly threatening to break the long revered nuclear taboo, Russia appears to anticipate being able to coerce NATO into submission or acquiescence to Russian domination of the post-Soviet space. In short, Russian nuclear strategy envisions the threat of and possible employment of nuclear weapons to achieve military and political objectives. As Sergei Ivanov once told the state Duma, “As regard to use of nuclear weapons in case of aggression, of course [we will use them in this case]. What else were they built for?131 The Times of London reported in April 2015 that retired Russian generals, who had been briefed by Ivanov and approved by Putin, met with a group of retired U.S. generals and warned that if NATO builds up its forces in the Baltics, Russia would respond by increasing its “nuclear posture” and that, “Russia will use its nuclear weapons against NATO.”132 However, the core of Russia’s nuclear strategy does not appear to anticipate a general nuclear war with NATO. The Kremlin appears to believe that NATO’s greatest strength is also its most exploitable weakness: dependence on unanimity among its 28 members.133 Following the great Chinese strategist Sun Tzu’s teaching on the value of disrupting an enemy’s alliances, Russian limited nuclear use threats appear intended to divide NATO by threatening greater destruction and loss should the bloc fail to yield during a conflict. The Russian leadership appears to assume that French, British, American, and German leaders will be divided in their willingness to risk nuclear retaliation over distant regions such as Warsaw, Narva, or Daugavpils. As U.S. Amb. Robert Joseph has noted, “Russia’s doctrine assumes an asymmetry of interests and a lack of willingness on the part of the enemy to risk nuclear war (emphasis added).”134 A fundamental component of Russia’s nuclear strategy is to challenge NATO’s resolve. Indeed, the Russian leadership has seemingly come to see limited nuclear threats as a viable policy option specifically fashioned to challenge NATO, based on the presumption that most NATO members ultimately will be unwilling to defend their Eastern-most allies in the face of Russian nuclear escalation threats.135 Conclusion The Russian leadership undoubtedly views nuclear weapons as an essential coercive instrument to accomplish both political and military objectives related to securing Moscow’s goals. By developing a spectrum of nuclear threats and capabilities, and a strategy to employ nuclear weapons, Russia clearly backstops its expansionist campaigns. Whether it be covering hybrid operations, intimidating European states, or potentially employing nuclear strikes to defeat a conventionally superior adversary, nuclear weapons and the threat of their use are likely to remain, if not grow, in importance for Russia. In short, Russia’s nuclear strategy is in line with the Putin regime’s worldview and grand strategy discussed in Chapter One, the goal of which is to establish a new Eurasian security order based on Russian hegemony at the expense of NATO, and more importantly, the United States. More disturbingly, the Kremlin appears to believe that actual nuclear employment is a realistic option in support of expansion. Should Putin determine a major confrontation probable, he could conclude that launching a limited nuclear strike would be an advantageous option. Given Putin’s apparent propensity for risk-taking and his absolute desire to reestablish a greater Russia, he could find himself in a situation where he greatly miscalculates either his own forces’ abilities or NATO’s willingness to capitulate. If Russia’s nuclear exercises are an indication, the threat of Russian nuclear first use is real in a European contingency that is itself the result of Russian expansionism and aggression.

### 1NC - AT: Detritus

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

Fange 17 [Daniel Von Fange, Web Application Engineer, Founder and Owner of LeanCoder, Full Stack, Polyglot Web Developer, “Kessler Syndrome is Over Hyped”, 05/21/17, *Braino*, http://braino.org/essays/kessler\_syndrome\_is\_over\_hyped/]

Kessler Syndrome is overhyped. A chorus of online commenters great any news of upcoming low earth orbit satellites with worry that humanity will to lose access to space. I now think they are wrong. What is Kessler Syndrome? Here’s the popular view on Kessler Syndrome. Every once in a while, a piece of junk in space hits a satellite. This single impact destroys the satellite, and breaks off several thousand additional pieces. These new pieces now fly around space looking for other satellites to hit, and so exponentially multiply themselves over time, like a nuclear reaction, until a sphere of man-made debris surrounds the earth, and humanity no longer has access to space nor the benefits of satellites. It is a dark picture. Is Kessler Syndrome likely to happen? I had to stop everything and spend an afternoon doing back-of-the-napkin math to know how big the threat is. To estimate, we need to know where the stuff in space is, how much mass is there, and how long it would take to deorbit. The orbital area around earth can be broken down into four regions. Low LEO - Up to about 400km. Things that orbit here burn up in the earth’s atmosphere quickly - between a few months to two years. The space station operates at the high end of this range. It loses about a kilometer of altitude a month and if not pushed higher every few months, would soon burn up. For all practical purposes, Low LEO doesn’t matter for Kessler Syndrome. If Low LEO was ever full of space junk, we’d just wait a year and a half, and the problem would be over. High LEO - 400km to 2000km. This where most heavy satellites and most space junk orbits. The air is thin enough here that satellites only go down slowly, and they have a much farther distance to fall. It can take 50 years for stuff here to get down. This is where Kessler Syndrome could be an issue. Mid Orbit - GPS satellites and other navigation satellites travel here in lonely, long lives. The volume of space is so huge, and the number of satellites so few, that we don’t need to worry about Kessler here. GEO - If you put a satellite far enough out from earth, the speed that the satellite travels around the earth will match the speed of the surface of the earth rotating under it. From the ground, the satellite will appear to hang motionless. Usually the geostationary orbit is used by big weather satellites and big TV broadcasting satellites. (This apparent motionlessness is why satellite TV dishes can be mounted pointing in a fixed direction. You can find approximate south just by looking around at the dishes in your northern hemisphere neighborhood.) For Kessler purposes, GEO orbit is roughly a ring 384,400 km around. However, all the satellites here are moving the same direction at the same speed - debris doesn’t get free velocity from the speed of the satellites. Also, it’s quite expensive to get a satellite here, and so there aren’t many, only about one satellite per 1000km of the ring. Kessler is not a problem here. How bad could Kessler Syndrome in High LEO be? Let’s imagine a worst case scenario. An evil alien intelligence chops up everything in High LEO, turning it into 1cm cubes of death orbiting at 1000km, spread as evenly across the surface of this sphere as orbital mechanics would allow. Is humanity cut off from space? I’m guessing the world has launched about 10,000 tons of satellites total. For guessing purposes, I’ll assume 2,500 tons of satellites and junk currently in High LEO. If satellites are made of aluminum, with a density of 2.70 g/cm3, then that’s 839,985,870 1cm cubes. A sphere for an orbit of 1,000km has a surface area of 682,752,000 square KM. So there would be one cube of junk per .81 square KM. If a rocket traveled through that, its odds of hitting that cube are tiny - less than 1 in 10,000. So even in the worst case, we don’t lose access to space. Now though you can travel through the debris, you couldn’t keep a satellite alive for long in this orbit of death. Kessler Syndrome at its worst just prevents us from putting satellites in certain orbits. In real life, there’s a lot of factors that make Kessler syndrome even less of a problem than our worst case though experiment. Debris would be spread over a volume of space, not a single orbital surface, making collisions orders of magnitudes less likely. Most impact debris will have a slower orbital velocity than either of its original pieces - this makes it deorbit much sooner. Any collision will create large and small objects. Small objects are much more affected by atmospheric drag and deorbit faster, even in a few months from high LEO. Larger objects can be tracked by earth based radar and avoided. The planned big new constellations are not in High LEO, but in Low LEO for faster communications with the earth. They aren’t an issue for Kessler. Most importantly, all new satellite launches since the 1990’s are required to include a plan to get rid of the satellite at the end of its useful life (usually by deorbiting) So the realistic worst case is that insurance premiums on satellites go up a bit. Given the current trend toward much smaller, cheaper micro satellites, this wouldn’t even have a huge effect. I’m removing Kessler Syndrome from my list of things to worry about.

#### Asteroid mining’s key to Space Colonization – anything else risks extinction from an existential crisis

Williams ’17 [Matt Williams, Writer for Universe Today. Citing A. J. Berliner, UC Berkeley; C. P. McKay. Space Sciences Division, NASA Ames Research Center; Valeriy Yakovlev, an astrophysicist and hydrogeologist from Laboratory of Water Quality in Kharkov, Ukraine. 3/10/17, “The future of space colonization – terraforming or space habitats?” [https://phys.org/news/2017-03-future-space-colonization-terraforming-habitats.html Accessed 1/2/20](https://phys.org/news/2017-03-future-space-colonization-terraforming-habitats.html%20Accessed%201/2/20) \*edited for gendered language]

In light of this, Yakolev presents what he considers to be the most likely prospects for humanity's exit to space between now and 2030. This will include the creation of the first space biospheres with artificial gravity, which will lead to key developments in terms of materials technology, life support-systems, and the robotic systems and infrastructure needed to install and service habitats in Low Earth Orbit (LEO). These habitats could be serviced thanks to the creation of robotic spacecraft that could harvest resources from nearby bodies – such as the Moon and Near-Earth Objects (NEOs). This concept would not only remove the need for planetary protections – i.e. worries about contaminating Mars' biosphere (assuming the presence of bacterial life), it would also allow human beings to become accustomed to space more gradually. As Yakovlev told Universe Today via email, the advantages to space habitats can be broken down into four points: "1. This is a universal way of mastering the infinite spaces of the Cosmos, both in the Solar System and outside it. We do not need surfaces for installing houses, but resources that robots will deliver from planets and satellites. 2. The possibility of creating a habitat as close as possible to the earth's cradle allows one to escape from the inevitable physical degradation under a different gravity. It is easier to create a protective magnetic field. "3. The transfer between worlds and sources of resources will not be a dangerous expedition, but a normal life. Is it good for sailors without their families? 4. The probability of death or degradation of [hu]mankind as a result of the global catastrophe is significantly reduced, as the colonization of the planets includes reconnaissance, delivery of goods, shuttle transport of people – and this is much longer than the construction of the biosphere in the Moon's orbit. Dr. Stephen William Hawking is right, a person does not have much time." And with space habitats in place, some very crucial research could begin, including medical and biologic research which would involve the first children born in space. It would also facilitate the development of reliable space shuttles and resource extraction technologies, which will come in handy for the settlement of other bodies – like the Moon, Mars, and even exoplanets. Ultimately, Yakolev thinks that space biospheres could also be accomplished within a reasonable timeframe – i.e. between 2030 and 2050 – which is simply not possible with terraforming. Citing the growing presence and power of the commercial space sector, Yakolev also believed a lot of the infrastructure that is necessary is already in place (or under development). "After we overcome the inertia of thinking +20 years, the experimental biosphere (like the settlement in Antarctica with watches), in 50 years the first generation of children born in the Cosmos will grow and the Earth will decrease, because it will enter the legends as a whole… As a result, terraforming will be canceled. And the subsequent conference will open the way for real exploration of the Cosmos. I'm proud to be on the same planet as Elon Reeve Musk. His missiles will be useful to lift designs for the first biosphere from the lunar factories. This is a close and direct way to conquer the Cosmos." With NASA scientists and entrepreneurs like Elon Musk and Bas Landorp looking to colonize Mars in the near future, and other commercial aerospace companies developing LEO, the size and shape of humanity's future in space is difficult to predict. Perhaps we will jointly decide on a path that takes us to the Moon, Mars, and beyond. Perhaps we will see our best efforts directed into near-Earth space. Or perhaps we will see ourselves going off in multiple directions at once. Whereas some groups will advocate creating space habitats in LEO (and later, elsewhere in the Solar System) that rely on artificial gravity and robotic spaceships mining asteroids for materials, others will focus on establishing outposts on planetary bodies, with the goal of turning them into "new Earths". Between them, we can expect that humans will begin developing a degree of "space expertise" in this century, which will certainly come in handy when we start pushing the boundaries of exploration and colonization even further.

#### Commercial mining solves extinction from scarcity, climate, terror, war, and disease.

Pelton 17—(Director Emeritus of the Space and Advanced Communications Research Institute at George Washington University, PHD in IR from Georgetown).. Pelton, Joseph N. 2017. The New Gold Rush: The Riches of Space Beckon! Springer. Accessed 8/30/19.

Are We Humans Doomed to Extinction? What will we do when Earth’s resources are used up by humanity? The world is now hugely over populated, with billions and billions crammed into our overcrowded cities. By 2050, we may be 9 billion strong, and by 2100 well over 11 billion people on Planet Earth. Some at the United Nations say we might even be an amazing 12 billion crawling around this small globe. And over 80 % of us will be living in congested cities. These cities will be ever more vulnerable to terrorist attack, natural disaster, and other plights that come with overcrowding and a dearth of jobs that will be fueled by rapid automation and the rise of artifi cial intelligence across the global economy. We are already rapidly running out of water and minerals. Climate change is threatening our very existence. Political leaders and even the Pope have cautioned us against inaction. Perhaps the naysayers are right. All humanity is at tremendous risk. Is there no hope for the future? This book is about hope. We think that there is literally heavenly hope for humanity. But we are not talking here about divine intervention. We are envisioning a new space economy that recognizes that there is more water in the skies that all our oceans. Th ere is a new wealth of natural resources and clean energy in the reaches of outer space—more than most of us could ever dream possible. There are those that say why waste money on outer space when we have severe problems here at home? Going into space is not a waste of money. It is our future. It is our hope for new jobs and resources. The great challenge of our times is to reverse public thinking to see space not as a resource drain but as the doorway to opportunity. The new space frontier can literally open up a “gold rush in the skies.” In brief, we think there is new hope for humanity. We see a new a pathway to the future via new ventures in space. For too long, space programs have been seen as a money pit. In the process, we have overlooked the great abundance available to us in the skies above. It is important to recognize there is already the beginning of a new gold rush in space—a pathway to astral abundance. “New Space” is a term increasingly used to describe radical new commercial space initiatives—many of which have come from Silicon Valley and often with backing from the group of entrepreneurs known popularly as the “space billionaires.” New space is revolutionizing the space industry with lower cost space transportation and space systems that represent significant cost savings and new technological breakthroughs. “New Commercial Space” and the “New Space Economy” represent more than a new way of looking at outer space. These new pathways to the stars could prove vital to human survival. If one does not believe in spending money to probe the mysteries of the universe then perhaps we can try what might be called “calibrated greed” on for size. One only needs to go to a cubesat workshop, or to Silicon Valley or one of many conferences like the “Disrupt Space” event in Bremen, Germany, held in April 2016 to recognize that entrepreneurial New Space initiatives are changing everything [ 1 ]. In fact, the very nature and dimensions of what outer space activities are today have changed forever. It is no longer your grandfather’s concept of outer space that was once dominated by the big national space agencies. The entrepreneurs are taking over. The hopeful statements in this book and the hard economic and technical data that backs them up are more than a minority opinion. It is a topic of growing interest at the World Economic Forum, where business and political heavyweights meet in Davos, Switzerland, to discuss how to stimulate new patterns of global economic growth. It is even the growing view of a group that call themselves “space ethicists.” Here is how Christopher J. Newman, at the University of Sunderland in the United Kingdom has put it: Space ethicists have offered the view that space exploration is not only desirable; it is a duty that we, as a species, must undertake in order to secure the survival of humanity over the longer term. Expanding both the resource base and, eventually, the habitats available for humanity means that any expenditure on space exploration, far from being viewed as frivolous, can legitimately be rationalized as an ethical investment choice. (Newman) On the other hand there are space ethicists and space exobiologists who argue that humans have created ecological ruin on the planet—and now space debris is starting to pollute space. Th ese countervailing thoughts by the “no growth” camp of space ethicists say we have no right to colonize other planets or to mine the Moon and asteroids—or at least no right to do so until we can prove we can sustain life here on Earth for the longer term. However, for most who are planning for the new space economy the opinion of space philosophers doesn’t really fl oat their boat. Legislators, bankers, and aspiring space entrepreneurs are far more interested in the views of the super-rich capitalists called the space billionaires. A number of these billionaires and space executives have already put some very serious money into enterprises intent on creating a new pathway to the stars. No less than five billionaires with established space ventures—Elon Musk, Paul Allen, Jeff Bezos, Sir Richard Branson, and Robert Bigelow—have invested millions if not billions of dollars into commercializing space. They are developing new technologies and establishing space enterprises that can bring the wealth of outer space down to Earth. This is not a pipe dream, but will increasingly be the economic reality of the 2020s. These wealthy space entrepreneurs see major new economic opportunities. To them space represents the last great frontier for enterprising pioneers. Th us they see an ever-expanding space frontier that offers opportunities in low-cost space transportation, satellite solar power satellites to produce clean energy 24h a day, space mining, space manufacturing and production, and eventually space habitats and colonies as a trajectory to a better human future. Some even more visionary thinkers envision the possibility of terraforming Mars, or creating new structures in space to protect our planet from cosmic hazards and even raising Earth’s orbit to escape the rising heat levels of the Sun in millennia to come. Some, of course, will say this is sci-fi hogwash. It can’t be done. We say that this is what people would have said in 1900 about airplanes, rocket ships, cell phones and nuclear devices. The skeptics laughed at Columbus and his plan to sail across the oceans to discover new worlds. When Thomas Jefferson bought the Louisiana Purchase from France or Seward bought Alaska, there were plenty of naysayers that said such investment in the unknown was an extravagant waste of money. A healthy skepticism is useful and can play a role in economic and business success. Before one dismisses the idea of an impending major new space economy and a new gold rush, it might useful to see what has already transpired in space development in just the past five decades. The world’s first geosynchronous communications satellite had a throughput capability of about 500 kb / s. In contrast, today’s state of the art Viasat 2 —a half century later— has an impressive throughput of some 140 Gb/s. Th is means that the relative throughput is nearly 300,000 greater, while its lifetime is some ten times longer (Figs. 1.1 and 1.2 ). Each new generation of communications satellite has had more power, better antenna systems, improved pointing and stabilization, and an extended lifetime. And the capabilities represented by remote sensing satellites , meteorological satellites , and navigation and timing satellites have also expanded their capabilities and performance in an impressive manner. When satellite applications first started, the market was measured in millions of dollars. Today commercial satellite services exceed a quarter of a billion dollars. Vital services such as the Internet, aircraft traffi c control and management, international banking, search and rescue and much, much more depend on application satellites. Th ose that would doubt the importance of satellites to the global economy might wish to view on You Tube the video “If Th ere Were a Day Without Satellites?” [ 2 ]. Let’s check in on what some of those very rich and smart guys think about the new space economy and its potential. (We are sorry to say that so far there are no female space billionaires, but surely this, too, will come someday soon.) Of course this twenty-fi rst century breakthrough that we call the New Space economy will not come just from new space commerce. It will also come from the amazing new technologies here on Earth. Vital new terrestrial technologies will accompany this cosmic journey into tomorrow. Information technology, robotics, artificial intelligence and commercial space travel systems have now set us on a course to allow us humans to harvest the amazing riches in the skies—new natural resources, new energy, and even totally new ways of looking at the purpose of human existence. If we pursue this course steadfastly, it can be the beginning of a New Space renaissance. But if we don’t seek to realize our ultimate destiny in space, Homo sapiens can end up in the dustbin of history—just like literally millions of already failed species. In each and every one of the five mass extinction events that have occurred over the last 1.5 billion years on Earth, some 50–80 % of all species have gone the way of the T. Rex, the woolly mammoth, and the Dodo bird along with extinct ferns, grasses and cacti. On the other hand, the best days of the human race could be just beginning. If we are smart about how we go about discovering and using these riches in the skies and applying the best of our new technologies, it could be the start of a new beginning for humanity. Konstantin Tsiokovsky, the Russian astronautics pioneer, who fi rst conceived of practical designs for spaceships, famously said: “A planet is the cradle of mankind, but one cannot live in a cradle forever.” Well before Tsiokovsky another genius, Leonardo da Vinci, said, quite poetically: “Once you have tasted flight, you will forever walk the earth with your eyes turned skyward, for there you have been, and there you will always long to return.” The founder of the X-Prize and of Planetary Resources, Inc., Dr. Peter Diamandis, has much more brashly said much the same thing in quite diff erent words when he said: “The meek shall inherit the Earth. The rest of us will go to Mars.” The New Space Billionaires Peter Diamandis is not alone in his thinking. From the list of “visionaries” quoted earlier, Elon Musk, the founder of SpaceX; Sir Richard Branson, the founder of Virgin Galactic; and Paul Allen, the co-founder of Microsoft and the man who financed SpaceShipOne, the world’s first successful spaceplane have all said the future will include a vibrant new space economy. Th ey, and others, have said that we can, we should and we soon shall go into space and realize the bounty that it can offer to us. Th e New Space enterprise is today indeed being led by those so-called space billionaires , who have an exciting vision of the future. They and others in the commercial space economy believe that the exploitation of outer space may open up a new golden age of astral abundance. They see outer space as a new frontier that can be a great source of new materials, energy and various forms of new wealth that might even save us from excesses of the past. Th is gold rush in the skies represents a new beginning. We are not talking about expensive new space ventures funded by NASA or other space agencies in Europe, Japan, China or India. No, these eff orts which we and others call New Space are today being forged by imaginative and resourceful commercial entrepreneurs. Th ese twenty-fi rst century visionaries have the fortitude and zeal to look to the abundance above. New breakthroughs in technology and New Space enterprises may be able to create an “astral life raft” for humanity. Just as Columbus and the Vikings had the imaginative drive that led them to discover the riches of a new world, we now have a cadre of space billionaires that are now leading us into this New Space era of tomorrow. These bold leaders, such as Paul Allen and Sir Richard Branson, plus other space entrepreneurs including Jeff Bezos of Amazon and Blue Origin, and Robert Bigelow, Chairman of Budget Suites and Bigelow Aerospace, not only dream of their future in the space industry but also have billions of dollars in assets. These are the bright stars of an entirely new industry that are leading us into the age of New Space commerce. These space billionaires, each in their own way, are proponents of a new age of astral abundance. Each of them is launching new commercial space industries. They are literally transforming our vision of tomorrow. These new types of entrepreneurial aerospace companies—the New Space enterprises—give new hope and new promise of transforming our world as we know it today. The New Space Frontier What happens in space in the next few decades, plus corresponding new information technologies and advanced robotics, will change our world forever. These changes will redefi ne wealth, change our views of work and employment and upend almost everything we think we know about economics, wealth, jobs, and politics. Th ese changes are about truly disruptive technologies of the most fundamental kinds. If you thought the Internet, smart phones, and spandex were disruptive technologies, just hang on. You have not seen anything yet. In short, if you want to understand a transition more fundamental than the changes brought to the twentieth century world by computers, communications and the Internet, then read this book. There are truly riches in the skies. Near-Earth asteroids largely composed of platinum and rare earth metals have an incredible value. Helium-3 isotopes accessible in outer space could provide clean and abundant energy. There is far more water in outer space than is in our oceans. In the pages that follow we will explain the potential for a cosmic shift in our global economy, our ecology, and our commercial and legal systems. These can take place by the end of this century. And if these changes do not take place we will be in trouble. Our conventional petro-chemical energy systems will fail us economically and eventually blanket us with a hydrocarbon haze of smog that will threaten our health and our very survival. Our rare precious metals that we need for modern electronic appliances will skyrocket in price, and the struggle between “haves” and “have nots” will grow increasingly ugly. A lack of affordable and readily available water, natural resources, food, health care and medical supplies, plus systematic threats to urban security and systemic warfare are the alternatives to astral abundance. The choices between astral abundance and a downward spiral in global standards of living are stark. Within the next few decades these problems will be increasingly real. By then the world may almost be begging for new, out of- the-box thinking. International peace and security will be an indispensable prerequisite for exploitation of astral abundance, as will good government for all. No one nation can be rich and secure when everyone else is poor and insecure. In short, global space security and strategic space defense, mediated by global space agreements, are part of this new pathway to the future.

#### Resource scarcity coming now and causes extinction—asteroid mining is the only way to solve

Crombrugghe 18 – Guerric, Business Development Manager Brussels, Brussels Capital Region, “Asteroid mining as a necessary answer to mineral scarcity”, LinkedIn, 1/11/2018, <https://www.linkedin.com/pulse/asteroid-mining-necessary-answer-mineral-scarcity-de-crombrugghe>

We need minerals, and we always will. Yet, our reserves are finite and a 100% end-of-life recycling rate is impossible to achieve. Eventually, new entrants will therefore be required to sustain our system. While the business case for asteroid mining can obviously not be closed with current technologies, it will someday become a necessity. We may as well start preparing ourselves. Scarcity of resources, the challenge of the 21st century According to the World Bank, in 2016 humanity's growth rate was of 1.18% in terms of population, and 2.50% in terms of GDP. Both of these, in turn, drive our staggering resource consumption: there are more of us, and each of us needs more. On the other, the Earth is a closed system, and resources are only available in a finite amount. We all know by now that there is only this much oil & gas, but the same can actually be said for water, arable land, minerals, etc. These two simple observations have sparkled the debate around the scarcity of resources. Even with the best intentions, mathematics teaches us that it is impossible to indefinitely extract resources from a given finite supply [1]. The problem arising in the short-term is the exhaustion of the existing supply. That limit is actually coming in fast. In a paper published in 2007, Stephen Kessler demonstrates that the global mineral reserves are only sufficient for the next 50 years. The figure on the right shows the ratio of known global reserve to global annual consumption, given a rough indication of adequacy in years. It dates from an earlier paper, published in 1994. Since then, the development of environmental-friendly technologies (e.g. batteries, electric engines, etc.) has drastically increased the consumption rate of high-tech metals such as cobalt, platinum, rare earths, or titanium. On the other hand, exploration programs have allowed to discover new deposits, notably of gold and diamond. We will certainly be able to continue to increase - or at least sustain - our reserves, but only temporarily. Recycling and other temporary fixes An obvious solution is recycling, i.e. rejuvenating our stocks. A popular concept to illustrate this idea is that of urban mining: retrieving the ores present in smartphones and other electronic devices. It may prove to be not only more environmental-friendly, be also safer and more cost-effective. Nevertheless, every solution based on recycling is, again, nothing more than a temporary fix, buying us a finite amount of time. The United Nations Environment Programme studied in a report the current recycling rate of 60 metals. More than half of them have an end-of-life recycling rate below 1%, and less than one-third are above 50%. Nickel, for example, is relatively easy to retrieve, with and end-of-life recycling rate of up to 63% under the best conditions. At that rate, less than 1% of the initial stock is available after only 10 cycle. Even with a staggering 99% efficiency, the same 1% limit is achieved in less than 460 cycles. Not bad, of course, but still not enough. Should our hunger for resources continue, and even with the most optimised recycling techniques, a second problem will arise in the longer term: the amount of resources needed at a given time will simply exceed the total available stock. Unless we manage to find growth vectors that do not require raw materials, that tipping point is an impassable limit. Its proximity obviously depends on our consumption rate. Asteroid mining? No matter which way we look at it, we will thus be short on resources, either through sheer exhaustion (i.e. transformation in an unrecoverable form) or because the demand will exceed the total reserves. We can - and should - talk about recycling, dematerialisation, and other more ethically questionable solutions such as bio-engineering. Nonetheless, no matter how good they are, these are only temporary fixes. If we don't radically change our lifestyle, we will sooner or later have to address the elephant in the room: the Earth is a closed system, we need new entrants. How can space help? Short answer: all these minerals can be found in space. Some are difficult to obtain, others are even more difficult, none are straightforward. The most accessible destination is near-Earth asteroids, a reservoir of over 17,000 known - and counting - giant rocks that regularly cross the orbit of our planet. They are commonly classified in three main families. The most interesting one, for our case, is that of the S-type asteroids. These are metallic bodies, containing first and foremost nickel, iron and cobalt, but also gold, ores from the platinum group. But the list doesn't stop there, many other minerals can be found in smaller amounts: iridium, silver, osmium, palladium, rhenium, rhodium, ruthenium, manganese, molybdenum, aluminium, titanium, etc. How do we get there? Let's take an example: Ryugu, formerly known as 1999 JU3. It's a C-type asteroid measured to be approximately one kilometre in size [2]. In addition to nickel, iron and cobalt, it also contains a fair share of water, nitrogen, hydrogen, and ammonia. Its total value is estimated to be approximately 80 billion USD. Fantastic! But how do we get there and, most importantly, how much does it cost? Well, we may have the start of an answer to these questions. Reaching Ryugu is a technological challenge, but it is feasible. In December 2014, the Japanese space agency has launched a spacecraft, Hayabusa2, heading to the asteroid. Its mission includes the collection of a small sample which will be sent back to the Earth, with a landing planned for December 2020. The target for the sample size is at least 100 µg. The total cost of the mission was projected to be around 200 million USD. That's 2 trillion USD per gram. Let's be optimistic and assume that the sample retrieved is pure gold. At today's rate, it is worth 42.5 USD per gram. That's a difference of over 10 orders of magnitude. Some may argue that Hayabusa2 has many other objectives that retrieving a sample. The mission does indeed include multiple landers, thorough scientific investigations, etc. There is actually another asteroid sample return mission underway, which we could you as a second point of comparison: OSIRIS-Rex, from NASA. It's heading for Bennu, also a C-type asteroid, which it will reach in August 2018. Total cost of the mission: 980 million USD. Target sample size: at least 60 g. We achieve thus roughly speaking 16 million USD per gram. Better, but still 6 orders of magnitude off compared to pure gold. It's pretty much as good as it gets with existing state-of-the-art technologies. Not much of a business case. Should we forget about it? Referring back to our earlier conclusion on resource scarcity, we had two options. Either we drastically reduce our resource consumption, to such a degree that reserves can last for longer than humanity itself, or we extend our closed system, the Earth, to nearby asteroids. In the current state of affairs, I am honestly not sure which course of action is the easiest. As they get increasingly rare, the cost of minerals will go up. On the other hand, as explained in a previous article, we can expect the cost of space activities to go steadily down. Step by step, these 6 orders of magnitude will slowly get munched away from both ends, until eventually asteroid mining becomes a viable operation. In other words: it will only become financially interesting once minerals become a thousand times more expensive and space activities a thousand times cheaper. As a point of reference, the introduction of reusable rockets by SpaceX, widely considered as one of the few truly disruptive changes in the aerospace sector in the last few decades, has "only" brought a cost reduction of 30%. While it's clearly amazing, we still need at least 220 innovations of the same calibre [3] before we can make it work (again: assuming the price of minerals simultaneously goes up by a factor of a thousand). It's therefore quite likely that space mining will not take place within our lifetime [4]. How can we accelerate the process? Firstly, we can only celebrate and support the numerous private initiatives which contribute to make that reality happen, either indirectly (e.g. launchers, space systems, etc.) or directly (e.g. in-space manufacturing, lunar exploration, etc.). Shout out to all the folks who manage to keep the flame of space exploration burning while generating profit for their investors. Secondly, space agencies and other institutional actors should continue to act as promoters of pioneering mission such as Hayabusa2, OSIRIS-REx, or DART. We can only regret that the Asteroid Redirect Mission from NASA and the Asteroid Impact Mission from ESA were not funded. From my perspective, these should actually be amongst the top priorities of our space exploration agenda. Not only are they instrumental to our understanding of the solar system, but they are also essential if we want to avoid the same fate as the dinosaurs. It's a question of survival. As a bonus, they also pave the way towards cost-efficient asteroid mining. In the meantime, we might want to consume existing resources a bit more efficiently.

#### Resource Shortages Exacerbate Conflict

Wingo 13 - Dennis Wingo, Former CTO of the Orbital Recovery Corporation, Founder & CEO of Skycorp Inc, and Greentrail Energy Inc., Co-Founder & CTO of Orbital Recovery Inc. Leader of NASA's the Lunar Orbiter Image Recovery Project (LOIRP), First in history to rescue and operate a spacecraft (ISEE-3) in interplanetary space, and University of Alabama in Huntsville Consortium for Materials Development in Space Researcher At University of Alabama in Huntsville Consortium for Materials Development in Space “Commentary | The Inevitability of Extraterrestrial Mining”, *Space News*, 7/29/2013, https://spacenews.com/36511the-inevitability-of-extraterrestrial-mining/

I am honored to provide the counterpoint to my esteemed colleague Ambassador Roger Harrison’s negative contention concerning the mining of extraterrestrial materials off of planet Earth. Let’s begin with his ending: “The conclusion is inescapable, though liable to be escaped, i.e., that raw materials will never be mined in space and sold profitably within the atmosphere or anywhere else. … Asteroids will continue unvexed in their obits, and the Moon too.” I bring a different quote, from the book “Empire Express,” the story of the intercontinental railroad, from U.S. Army Lt. Zebulon Pike, for whom Pike’s Peak is named: “In various places there were tracts of many leagues, where the wind had thrown up sand in all the fanciful forms of the ocean’s rolling wave, and on which not a spear of vegetable matter existed.” Pike’s visions of sand dunes, pathless wastes and sterile soils were reported, widely read and faithfully believed by geographers. The myth became innocently embellished by subsequent visitors, especially those in the party of Maj. Stephen H. Long, who traversed the whole area in 1820. It was reported to be “an unfit residence for any but a nomad population … forever to remain the unmolested haunt of the native hunter, the bison, and the jackal.” The delicious irony is that Mr. Harrison today lives in the shadow of Pike’s Peak, and the U.S. Air Force Academy where he teaches is in the middle of the confidently prophesied unmolested haunt. When Long’s report was written, the Erie Canal across New York was five years from completion and it was another 31 years before the first railroad was completed across the state. Mr. Harrison’s technical objections are for the most part valid today for his scenario, just as objections to a railroad across the North American continent were valid in the 1820s. However, technology is being developed today that will enable extraterrestrial mining, manufacturing and development just as technology was developed that would enable the creation of the national railroad. Mr. Harrison says it is an illusion that we are running out of resources. He is correct. That is not our claim. The claim is that extraction costs of economically viable terrestrial resources are rising dramatically and may soon exceed the cost of extraction from much more plentiful extraterrestrial sources. Today rapidly advancing costs and diminishing returns are rapidly redefining mining due to diminishing ore grades. This fact is developed in a 2012 distinguished lecture by Dan Wood before the Society of Environmental Geologists, “Crucial Challenges to Discovery and Mining — Tomorrow’s Deeper Ore Bodies.” This is a vitally important issue to solve as resource conflict has been the impetus for most wars in human history. We live in a global civilization of over 7 billion people, which will expand to over 9 billion before plateauing in mid-century. While American politicians are not paying attention to what this means, the rest of the world is noticing. Gross domestic product (GDP) growth and increasing global resource demand are addressed in “Iron Ore Outlook 2050,” a report commissioned for the Indian government. The GDP of the major powers (the United States, Europe, China, India and Japan) is forecast to rise from $48 trillion in 2010 to $149 trillion by 2050. The report’s substance is that with this massive increase in global GDP, an intensifying scramble for metal resources is inevitable. If the trend of resource consumption demand increase continues unabated, there are three likely potential outcomes. The first is collapse, forecast by the “Limits to Growth” school of thought. The second and more likely scenario is fierce national economic competition leading to wars over diminishing resources. The third, and most desirable, is to increase the global resource base by the economic and industrial development of the inner solar system. Mr. Harrison uses cost as the primary reason that extraterrestrial mining will never happen by focusing on a straw man argument related to mining asteroids in orbits far from Earth. Just as the U.S. railroad infrastructure began on shorter routes with lower capital requirements and shorter payback periods, asteroid mining can begin with our nearest neighbor, the Moon, where telepresence robotics, high-bandwidth communications and a short three-day trip for humans negate his premise. We know from the Apollo samples that plentiful metallic asteroidal materials exist in the lunar highlands. We also know from several missions that extensive water, titanium, thorium, uranium, aluminum and native iron all exist on the Moon, in easily separable oxide form. Improvements in remote sensing data from current missions and computer modeling continue to increase the amount of potential asteroidal material on the Moon, increasing confidence in the Moon first premise. The extensive resources of the Moon become the catalyst for an inner solar system-wide economy providing fuel, vehicles and the all-important experience in developing an industrial infrastructure off planet. The asteroids then become the force multiplier of inner solar system development with billions of tons of water, metals and free space energy from solar power. Mars figures in here as well as the second home of humanity, creating further demand for asteroidal resources, and providing something else that is becoming increasingly scarce on the Earth: hope for the future. The technical barriers that Mr. Harrison points to are being overcome just as those of the 19th century were. New technology developments in 3-D printing, additive manufacturing and advanced robotics are breaking down the final barriers to exploiting off-planet resources and indeed the industrial development of the inner solar system. It is not a question if, it is a question of when, and by whom. Just as the Pacific Railway Act of 1862 was a primary catalyst for a century of American economic growth, it should be the role of government to develop policies and concrete legislation to support this development for the continued health of the American economy and the future of all mankind.

#### Those Conflicts go Nuclear

Klare 13 – Michael T., professor emeritus of peace and world-security studies at Hampshire College and senior visiting fellow at the Arms Control Association in Washington, DC, " How Resource Scarcity and Climate Change Could Produce a Global Explosion", *The Nation*, 4/22/2013, <https://www.thenation.com/article/how-resource-scarcity-and-climate-change-could-produce-global-explosion/> JHW

Resource Shortages and Resource Wars Start with one simple given: the prospect of future scarcities of vital natural resources, including energy, water, land, food and critical minerals. This in itself would guarantee social unrest, geopolitical friction and war. It is important to note that absolute scarcity doesn’t have to be on the horizon in any given resource category for this scenario to kick in. A lack of adequate supplies to meet the needs of a growing, ever more urbanized and industrialized global population is enough. Given the wave of extinctions that scientists are recording, some resources—particular species of fish, animals and trees, for example—will become less abundant in the decades to come, and may even disappear altogether. But key materials for modern civilization like oil, uranium and copper will simply prove harder and more costly to acquire, leading to supply bottlenecks and periodic shortages. Oil—the single most important commodity in the international economy—provides an apt example. Although global oil supplies may actually grow in the coming decades, many experts doubt that they can be expanded sufficiently to meet the needs of a rising global middle class that is, for instance, expected to buy millions of new cars in the near future. In its 2011 World Energy Outlook, the International Energy Agency claimed that an anticipated global oil demand of 104 million barrels per day in 2035 will be satisfied. This, the report suggested, would be thanks in large part to additional supplies of “unconventional oil” (Canadian tar sands, shale oil and so on), as well as 55 million barrels of new oil from fields “yet to be found” and “yet to be developed.” However, many analysts scoff at this optimistic assessment, arguing that rising production costs (for energy that will be ever more difficult and costly to extract), environmental opposition, warfare, corruption and other impediments will make it extremely difficult to achieve increases of this magnitude. In other words, even if production manages for a time to top the 2010 level of 87 million barrels per day, the goal of 104 million barrels will never be reached and the world’s major consumers will face virtual, if not absolute, scarcity. Water provides another potent example. On an annual basis, the supply of drinking water provided by natural precipitation remains more or less constant: about 40,000 cubic kilometers. But much of this precipitation lands on Greenland, Antarctica, Siberia and inner Amazonia where there are very few people, so the supply available to major concentrations of humanity is often surprisingly limited. In many regions with high population levels, water supplies are already relatively sparse. This is especially true of North Africa, Central Asia and the Middle East, where the demand for water continues to grow as a result of rising populations, urbanization and the emergence of new water-intensive industries. The result, even when the supply remains constant, is an environment of increasing scarcity. Wherever you look, the picture is roughly the same: supplies of critical resources may be rising or falling, but rarely do they appear to be outpacing demand, producing a sense of widespread and systemic scarcity. However generated, a perception of scarcity—or imminent scarcity—regularly leads to anxiety, resentment, hostility and contentiousness. This pattern is very well understood, and has been evident throughout human history. In his book Constant Battles, for example, Steven LeBlanc, director of collections for Harvard’s Peabody Museum of Archaeology and Ethnology, notes that many ancient civilizations experienced higher levels of warfare when faced with resource shortages brought about by population growth, crop failures or persistent drought. Jared Diamond, author of the bestseller Collapse, has detected a similar pattern in Mayan civilization and the Anasazi culture of New Mexico’s Chaco Canyon. More recently, concern over adequate food for the home population was a significant factor in Japan’s invasion of Manchuria in 1931 and Germany’s invasions of Poland in 1939 and the Soviet Union in 1941, according to Lizzie Collingham, author of The Taste of War. Although the global supply of most basic commodities has grown enormously since the end of World War II, analysts see the persistence of resource-related conflict in areas where materials remain scarce or there is anxiety about the future reliability of supplies. Many experts believe, for example, that the fighting in Darfur and other war-ravaged areas of North Africa has been driven, at least in part, by competition among desert tribes for access to scarce water supplies, exacerbated in some cases by rising population levels. “In Darfur,” says a 2009 report from the UN Environment Programme on the role of natural resources in the conflict, “recurrent drought, increasing demographic pressures, and political marginalization are among the forces that have pushed the region into a spiral of lawlessness and violence that has led to 300,000 deaths and the displacement of more than two million people since 2003.” Anxiety over future supplies is often also a factor in conflicts that break out over access to oil or control of contested undersea reserves of oil and natural gas. In 1979, for instance, when the Islamic revolution in Iran overthrew the Shah and the Soviets invaded Afghanistan, Washington began to fear that someday it might be denied access to Persian Gulf oil. At that point, President Jimmy Carter promptly announced what came to be called the Carter Doctrine. In his 1980 State of the Union Address, Carter affirmed that any move to impede the flow of oil from the Gulf would be viewed as a threat to America’s “vital interests” and would be repelled by “any means necessary, including military force.” In 1990, this principle was invoked by President George H.W. Bush to justify intervention in the first Persian Gulf War, just as his son would use it, in part, to justify the 2003 invasion of Iraq. Today, it remains the basis for US plans to employ force to stop the Iranians from closing the Strait of Hormuz, the strategic waterway connecting the Persian Gulf to the Indian Ocean through which about 35 percent of the world’s seaborne oil commerce passes. Recently, a set of resource conflicts have been rising toward the boiling point between China and its neighbors in Southeast Asia when it comes to control of offshore oil and gas reserves in the South China Sea. Although the resulting naval clashes have yet to result in a loss of life, a strong possibility of military escalation exists. A similar situation has also arisen in the East China Sea, where China and Japan are jousting for control over similarly valuable undersea reserves. Meanwhile, in the South Atlantic Ocean, Argentina and Britain are once again squabbling over the Falkland Islands (called Las Malvinas by the Argentinians) because oil has been discovered in surrounding waters. By all accounts, resource-driven potential conflicts like these will only multiply in the years ahead as demand rises, supplies dwindle and more of what remains will be found in disputed areas. In a 2012 study titled Resources Futures, the respected British think-tank Chatham House expressed particular concern about possible resource wars over water, especially in areas like the Nile and Jordan River basins where several groups or countries must share the same river for the majority of their water supplies and few possess the wherewithal to develop alternatives. “Against this backdrop of tight supplies and competition, issues related to water rights, prices, and pollution are becoming contentious,” the report noted. “In areas with limited capacity to govern shared resources, balance competing demands, and mobilize new investments, tensions over water may erupt into more open confrontations.” Heading for a Resource-Shock World Tensions like these would be destined to grow by themselves because in so many areas supplies of key resources will not be able to keep up with demand. As it happens, though, they are not “by themselves.” On this planet, a second major force has entered the equation in a significant way. With the growing reality of climate change, everything becomes a lot more terrifying. Normally, when we consider the impact of climate change, we think primarily about the environment—the melting Arctic ice cap or Greenland ice shield, rising global sea levels, intensifying storms, expanding desert and endangered or disappearing species like the polar bear. But a growing number of experts are coming to realize that the most potent effects of climate change will be experienced by humans directly through the impairment or wholesale destruction of habitats upon which we rely for food production, industrial activities or simply to live. Essentially, climate change will wreak its havoc on us by constraining our access to the basics of life: vital resources that include food, water, land and energy. This will be devastating to human life, even as it significantly increases the danger of resource conflicts of all sorts erupting. We already know enough about the future effects of climate change to predict the following with reasonable confidence: \* Rising sea levels will in the next half-century erase many coastal areas, destroying large cities, critical infrastructure (including roads, railroads, ports, airports, pipelines, refineries and power plants) and prime agricultural land. \* Diminished rainfall and prolonged droughts will turn once-verdant croplands into dust bowls, reducing food output and turning millions into “climate refugees.” \* More severe storms and intense heat waves will kill crops, trigger forest fires, cause floods and destroy critical infrastructure. No one can predict how much food, land, water and energy will be lost as a result of this onslaught (and other climate-change effects that are harder to predict or even possibly imagine), but the cumulative effect will undoubtedly be staggering. In Resources Futures, Chatham House offers a particularly dire warning when it comes to the threat of diminished precipitation to rain-fed agriculture. “By 2020,” the report says, “yields from rain-fed agriculture could be reduced by up to 50%” in some areas. The highest rates of loss are expected to be in Africa, where reliance on rain-fed farming is greatest, but agriculture in China, India, Pakistan and Central Asia is also likely to be severely affected. Heat waves, droughts and other effects of climate change will also reduce the flow of many vital rivers, diminishing water supplies for irrigation, hydro-electricity power facilities and nuclear reactors (which need massive amounts of water for cooling purposes). The melting of glaciers, especially in the Andes in Latin America and the Himalayas in South Asia, will also rob communities and cities of crucial water supplies. An expected increase in the frequency of hurricanes and typhoons will pose a growing threat to offshore oil rigs, coastal refineries, transmission lines and other components of the global energy system. The melting of the Arctic ice cap will open that region to oil and gas exploration, but an increase in iceberg activity will make all efforts to exploit that region’s energy supplies perilous and exceedingly costly. Longer growing seasons in the north, especially Siberia and Canada’s northern provinces, might compensate to some degree for the desiccation of croplands in more southerly latitudes. However, moving the global agricultural system (and the world’s farmers) northward from abandoned farmlands in the United States, Mexico, Brazil, India, China, Argentina and Australia would be a daunting prospect. It is safe to assume that climate change, especially when combined with growing supply shortages, will result in a significant reduction in the planet’s vital resources, augmenting the kinds of pressures that have historically led to conflict, even under better circumstances. In this way, according to the Chatham House report, climate change is best understood as a “threat multiplier…a key factor exacerbating existing resource vulnerability” in states already prone to such disorders. Like other experts on the subject, Chatham House’s analysts claim, for example, that climate change will reduce crop output in many areas, sending global food prices soaring and triggering unrest among those already pushed to the limit under existing conditions. “Increased frequency and severity of extreme weather events, such as droughts, heat waves and floods, will also result in much larger and frequent local harvest shocks around the world….These shocks will affect global food prices whenever key centers of agricultural production area are hit—further amplifying global food price volatility.” This, in turn, will increase the likelihood of civil unrest. When, for instance, a brutal heat wave decimated Russia’s wheat crop during the summer of 2010, the global price of wheat (and so of that staple of life, bread) began an inexorable upward climb, reaching particularly high levels in North Africa and the Middle East. With local governments unwilling or unable to help desperate populations, anger over impossible-to-afford food merged with resentment toward autocratic regimes to trigger the massive popular outburst we know as the Arab Spring. Many such explosions are likely in the future, Chatham House suggests, if current trends continue as climate change and resource scarcity meld into a single reality in our world. A single provocative question from that group should haunt us all: “Are we on the cusp of a new world order dominated by struggles over access to affordable resources?” For the US intelligence community, which appears to have been influenced by the report, the response was blunt. In March, for the first time, Director of National Intelligence James R. Clapper listed “competition and scarcity involving natural resources” as a national security threat on a par with global terrorism, cyberwar and nuclear proliferation. “Many countries important to the United States are vulnerable to natural resource shocks that degrade economic development, frustrate attempts to democratize, raise the risk of regime-threatening instability, and aggravate regional tensions,” he wrote in his prepared statement for the Senate Select Committee on Intelligence. “Extreme weather events (floods, droughts, heat waves) will increasingly disrupt food and energy markets, exacerbating state weakness, forcing human migrations, and triggering riots, civil disobedience, and vandalism.” There was a new phrase embedded in his comments: “resource shocks.” It catches something of the world we’re barreling toward, and the language is striking for an intelligence community that, like the government it serves, has largely played down or ignored the dangers of climate change. For the first time, senior government analysts may be coming to appreciate what energy experts, resource analysts and scientists have long been warning about: the unbridled consumption of the world’s natural resources, combined with the advent of extreme climate change, could produce a global explosion of human chaos and conflict. We are now heading directly into a resource-shock world.

#### 1AC Scoles is about government missions --- public sector thumps --- Haven reads blue.

Scoles 15 ~~[(Sarah Scoles, freelance science writer, contributor at Wired and Popular Science, author of the books Making Contact and They Are Already Here) "Dust from asteroid mining spells danger for satellites," New Scientist, May 27, 2015, <https://www.newscientist.com/article/mg22630235-100-dust-from-asteroid-mining-spells-danger-for-satellites/>~~] TDI

* Study this is citing – Javier Roa, Space Dynamic Group, Applied Physics Department, Technical University of Madrid. Casey J Handmer, Theoretical Astrophysics, California Institute of Technology. Both PhD Candidates. "Quantifying hazards: asteroid disruption in lunar distant retrograde orbits," arXiv, Cornell University, May 14, 2015, <https://arxiv.org/pdf/1505.03800.pdf>

NASA chose the second option for its [Asteroid Redirect Mission](http://www.nasa.gov/content/what-is-nasa-s-asteroid-redirect-mission/), which aims to [pluck a boulder from an asteroid’s surface](https://www.newscientist.com/article/dn27243-rock-grab-from-asteroid-will-aid-human-mission-to-mars) and relocate it to a stable orbit around the moon. But an asteroid’s gravity is so weak that it’s not hard for surface particles to escape into space. Now a new model warns that debris shed by such transplanted rocks could intrude where many defence and communication satellites live – in geosynchronous orbit.

According to [Casey Handmer](http://www.caseyhandmer.com/) of the California Institute of Technology in Pasadena and Javier Roa of the Technical University of Madrid in Spain, 5 per cent of the escaped debris will end up in regions traversed by satellites. Over 10 years, it would cross geosynchronous orbit 63 times on average. A satellite in the wrong spot at the wrong time will suffer a damaging high-speed collision with that dust.

The study also looks at the "catastrophic disruption" of an asteroid 5 metres across or bigger. Its total break-up into a pile of rubble would increase the risk to satellites by more than 30 per cent ([arxiv.org/abs/1505.03800](http://arxiv.org/abs/1505.03800)).

#### They don’t solve Rauenzhan 20 --- a. powertagged --- just says companies want profit, b. no ind. impacts, c. just because of a dearth of ilaw --- the 1AC doesn’t solve

#### No impact to dust --- millions of particles already in the atmosphere and thumped --- mechanical failures in the squo. Haven reads green.

Intagliata 17, [(Christopher Intagliata, MA Journalism from NYU, Editor for NPRs All Things Considered, Reporter/Host for Scientific American’s 60 Second Science) “The Sneaky Danger of Space Dust,” Scientific American, May 11, 2017, https://www.scientificamerican.com/podcast/episode/the-sneaky-danger-of-space-dust/] Recut Sachin

When tiny particles of space debris slam into satellites, the collision could cause the emission of hardware-frying radiation, Christopher Intagliata reports.

Aside from all the satellites, and the space station orbiting the Earth, there's a lot of trash circling the planet, too. Twenty-one thousand baseball-sized chunks of debris, according to NASA. But that number's dwarfed by the number of small particles. There's hundreds of millions of those.

"And those smaller particles tend to be going fast. Think of picking up a grain of sand at the beach, and that would be on the large side. But they're going 60 kilometers per second."

Sigrid Close, an applied physicist and astronautical engineer at Stanford University. Close says that whereas mechanical damage—like punctures—is the worry with the bigger chunks, the dust-sized stuff might leave more insidious, invisible marks on satellites—by causing electrical damage.

"We also think this phenomenon can be attributed to some of the failures and anomalies we see on orbit, that right now are basically tagged as 'unknown cause.'"

Close and her colleague Alex Fletcher modeled this phenomenon mathematically, based on plasma physics behavior. And here's what they think happens. First, the dust slams into the spacecraft. Incredibly fast. It vaporizes and ionizes a bit of the ship—and itself. Which generates a cloud of ions and electrons, traveling at different speeds. And then: "It's like a spring action, the electrons are pulled back to the ions, ions are being pushed ahead a little bit. And then the electrons overshoot the ions, so they oscillate, and then they go back out again.”

That movement of electrons creates a pulse of electromagnetic radiation, which Close says could be the culprit for some of that electrical damage to satellites. The study is in the journal Physics of Plasmas. [Alex C. Fletcher and Sigrid Close, Particle-in-cell simulations of an RF emission mechanism associated with hypervelocity impact plasmas]

#### X/app war turns from celestial prolif advnatage

#### No retal or escalation from satellite attacks

Dr. Eric J. Zarybnisky 18, MA in National Security Studies from the Naval War College, PhD in Operations Research from the MIT Sloan School of Management, Lt Col, USAF, “Celestial Deterrence: Deterring Aggression in the Global Commons of Space”, 3/28/2018, https://apps.dtic.mil/dtic/tr/fulltext/u2/1062004.pdf

PREVENTING AGGRESSION IN SPACE

While deterrence and the Cold War are strongly linked in the public’s mind through the nuclear standoff between the United States and the Soviet Union, the fundamentals of deterrence date back millennia and deterrence remains relevant. Thucydides alludes to the concept of deterrence in his telling of the Peloponnesian War when he describes rivals seeking advantages, such as recruiting allies, to dissuade an adversary from starting or expanding a conflict.6F6 Aggression in space was successfully avoided during the Cold War because both sides viewed an attack on military satellites as highly escalatory, and such an action would likely result in general nuclear war.7F7 In today’s more nuanced world, attacking satellites, including military satellites, does not necessarily result in nuclear war. For instance, foreign countries have used high-powered lasers against American intelligence-gathering satellites8F8 and the United States has been reluctant to respond, let alone retaliate with nuclear weapons. This shift in policy is a result of the broader use of gray zone operations, to which countries struggle to respond while limiting escalation. Beginning with the fundamentals of deterrence illuminates how it applies to prevention of aggression in space.

#### Losing a satellite won’t cause war

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

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