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By Spencer Stucky

SPACE PRIVATIZATION, COLONIZATION, AND
MILITARIZATION: A NEW FRONTIER FOR
INTERNATIONAL LAW

Juan A. Ortiz Salazar

Abstract

Early into the 21st century, technological developments made unparalleled advances in the field of space. The realm of outer space has seen a change from exploration to technology-driven, ambitious goals more aligned with national interests and security. In this paper I ask the following research question: How can international organizations and law address the rapid advances in space exploration? To answer the research question, I conducted three case studies: 1) space privatization, 2) space colonization, and 3) space militarization. According to my research, existing international law cannot inhibit conflict in the 21st century characterized by intense competition to obtain space power. To inhibit space conflict, new international norms and laws need to be adopted that address the rapid pace of technological development , as well as the market-oriented and laissez-faire way in which technological development is carried out in order to prevent a single hegemonic state from securing space dominance.

Introduction

The field of astropolitics – the extension of geopolitics into outer space – is understudied and underrepresented in international studies. Nevertheless, scholarly and political interest has ramped up in the last three presidential tenures as technological developments and ambitious space programs allow new space ventures in the 21st century. Moreover, policies on technology tend to not keep up with advances. Existing treaties on outer space are obsolete. The Outer Space Treaty is subject to the UN – international laws on space have to be created in the UN, space activities must comply with general international law and the UN Charter, and all parties are required to consult with others before engaging in “potentially harmful interference” with the peaceful use of space.¹

Although the Outer Space Treaty states outer space and other celestial bodies are not subject to national appropriation, sovereignty, and occupation, it does not limit military and industrial activities in space and, it alone does not prohibit the achievement of space power.² Similarly, the Moon Treaty does not inhibit development of space power – it may ban national appropriation, but it allows privatization and private property rights. Moreover, weapons treaties such as the 1972 Antiballistic Missile (ABM) treaty are being repealed in the US; the ABM treaty barred placing missiles in space and deploying space weapons like space-based lasers (SBLs).³ The issues brought up by space privatization, colonization and militarization, and the absence of precedent on those monumental issues in the international arena begs me to ask the question: How can international organizations and law address the rapid advances in space exploration?

¹ James L. Hyatt, III, Ronald R. Ricchi, et. al., “Space Power 2010,” *ACSC* (May 1995): 1-118.

² *Ibid.*

³ Bruce M. DeBlois, Richard L. Garwin, R. Scott Kemp, Jeremy C. Marwell, “Space Weapons: Crossing the U.S. Rubicon,” *International Security*, Vol. 29, no. 2 (Fall 2004): 50-84.

Contextualization

SpaceX

Private firms and industry leaders have shared their interests to make humans a spacefaring species. SpaceX, a NASA-contracted (or public-private partnership), has set the ambitious goal to colonize Mars.⁴ Its goal becomes more plausible as it establishes itself as the most reliable space cargo and private satellite commercial delivery provider. SpaceX is not the only private US company engaged in the new space era. The success of US-based aerospace companies translates to US independence in what may be a new wave of space exploration; since 2011 the US has been dependent on Russia for delivery of cargo and ferrying astronauts to the International Space Station.⁵

It is to the advantage of the US that it has horizontal and vertical integration in the growing aerospace industry. Elon Musk’s firm, SpaceX, has the explicit goal of “[sending] humans to Mars for permanent settlement and [making] humanity a multiplanetary species” demonstrates the ambitious optimism and enthusiasm for space exploration by Americans.⁶ He has stated multiple times his Interplanetary Transport System could be used to travel to Europa – one of Saturn’s moons. It will not be a vehicle between Mars and Earth, it is being designed for manned exploration between Earth and worlds in the greater solar system.⁷ The sentiment towards space exploration is not new.

Outer Space Ventures in the 21st Century

Aspiration to explore our solar system, settle uninhabited planets, and mine asteroids are neither fantasy nor new. In 2004 the first commercial space venture – space tourism – was

⁴ Robbin Seemangal, “SpaceX’s Road to Mars to Begin With First Mission From Iconic Apollo II Launch Pad,” *The Observer*, February 10, 2017.

⁵ *Ibid.*

⁶ Kenneth Chang, “Elon Musk’s Plan: Get Humans to Mars, and Beyond,” *The New York Times*, September 27, 2016.

⁷ *Ibid.*

conducted successfully. Mike Melvill privately funded the SpaceShipOne spacecraft designed by Scaled Composites.⁸ Public and private companies involved in this military-industrial complex include Blue Origin, Lockheed Martin and Boeing (the United Launch Alliance), and Aerojet Rocketdyn – industry leaders in space systems as well as tactical defense. In 2010 and again in 2016, President Obama reiterated US interests on space exploration, “We have set a clear goal vital to the next chapter of America’s story in space: sending humans to Mars by the 2030s and returning them safely to Earth, with the ultimate ambition to one day remain there for an extended time”.⁹

The former president left his footprint on the Space Program by announcing the US’s goal to mine profitable asteroids by 2040. The plans are real: NASA has contracts with six companies solely for the purpose of developing sustainable habitats for astronauts, the Space Launch System (for Mars) is scheduled for 2018, the Jet Propulsion Laboratory has made proposals for manned missions to Mars with existing budgets, and the US government invested \$18 billion between 2010 and 2015 on new space technologies like space fueling stations, spacecraft engines for deep space, manned missions, and robotic factories for churning soil on the moon and Mars.¹⁰

Scott Pace, a former NASA official, and director at the Space Policy Institute at George Washington University, stated that colonizing Mars is plausible but only probable as a public-private partnership.¹¹ The barriers are not technical, politics and budget approvals within congress remain the biggest challenge. These projects are long-term, multiple administrations and presidents

⁸ Moloney Figliola, Patricia, Carl E. Behrens, and Daniel Morgan, “U.S. Space Programs: Civilian, Military, and Commercial,” *CRS Issue Brief for Congress* (2006): 1-17.

⁹ Kenneth Chang and Daniel Victor, “Can the U.S. Really Get Astronauts to Mars by 2030?” *The New York Times*, October 11, 2016.

¹⁰ Kenneth Chang, “Billions for NASA, With a Push to Find New Ways Into Space,” *The New York Times*, February 1, 2010.

¹¹ *op. cit.*, fn. 8

must support the space program. Fortunately, President Trump has mentioned his curiosity “to unlock the mysteries of space,” and Robert M. Lightfoot, acting NASA administrator, wrote, “From my interactions with the transition team, NASA is clearly a priority for the president and his administration.”¹² It should come to little surprise then that on February 17th, 2017, congress passed a new NASA bill that allocates \$19.5 billion USD for spending in fiscal year 2017 alone. The bill also made settling Mars, robotic missions to Europa, and “[moving] an asteroid into lunar orbit and have astronauts visit it on the upcoming Orion spacecraft as soon as 2020, called the Asteroid Redirect Mission (ARM)” explicit goals of NASA.¹³ The new wave of space exploration is experiencing fervent enthusiasm.

On the surface, space exploration may appear to be dominated by private and public companies, like SpaceX and Aerojet Rocketdyne, NASA, and officials such as the US president, but the truth is space endeavors, plans, and technologies are manipulated by federal agencies that receive little limelight by news sources. The Department of Defense (DOD) alone manages “launch vehicle development, communications satellites (or GPS), early warning satellites weather satellites, reconnaissance satellites, and developing capabilities to protect U.S. satellite systems and to deny the use of space to adversaries (called ‘space control’ or ‘counterspace systems’).”¹⁴ Whatever domestic and foreign services satellites and the Space Program may provide, the DOD appears to be intricate. Space privatization, colonization, and militarization have advanced from discourse on races and cooperation between private companies and government agencies to planned missions

¹² Kenneth Chang, “NASA Looks to Speed Timetable for Putting Astronauts in Deep Space,” *The New York Times*, February 15, 2017.

¹³ Jonathan O’Callaghan, “Congress Passes \$19.5bn NASA Bill, Includes Humans To Mars and Europa Mission,” *I Fucking Love Science*, March 3, 2017.

¹⁴ *op. cit.*, fn. 9

and other objectives, such as the weaponization of space.

Public Opinion

Americans do not see the possible conflict between states in outer space. In a 2010 lecture at Colgate University, Professor Andrew Deudney captured the dominant outlook in the frontier expansion narrative – a Star Trek-like outlook on space and the human species.¹⁵ Deudney quickly dispelled it: “this vision has been overwhelmingly dominant in the discursive characterization of space, particularly in the United States” but the “frontier expansion narrative is almost completely exactly wrong”.¹⁶ If we extrapolate, “It is more or less the exact opposite”.¹⁷ Americans’ frontier expansion narrative or bias is captured in a 2011 survey by the Pew Research Center and the Smithsonian. It found Americans support NASA, the space program and exploration, and are optimistic about the future of space exploration.¹⁸ Moreover, Americans are “firmly committed to the space program”.¹⁹ According to a 2009 survey by Gallup, most of the public believes the US should continue to be the world leader in space exploration, and 70% of college graduates and 54% of non-graduates find the benefits of the space program justify its costs. Similarly, the majority of Americans agree that within the next 40 years astronauts will land on Mars (63%) and space tourism will be affordable to ordinary people (53%).²⁰ I contend that the American technological optimism is based on the lack of factual knowledge, or blissful ignorance, by civil society.

¹⁵ “Daniel Deudney: The Sky is the Limit,” Youtube video. Posted by “Colgate University,” Nov 15, 2010.

¹⁶ *Ibid.*

¹⁷ *Ibid.*

¹⁸ Brian Kennedy, “5 facts about Americans’ views on space exploration,” *Pew Research Center* (July 14, 2015).

¹⁹ Jeffrey M. Jones, “Majority of Americans Say Space Program Costs Justified,” *Gallup* (July 17, 2009).

²⁰ *Ibid.*

Theoretical Paradigm

Privatization, colonization, and militarization are characteristic of imperialism, which is best explained by the realist theory. The underlying assumptions of realism are: states are primary actors, the main objective is to ensure security by maximizing military power, and that the international order can be viewed as a zero-sum game. Most important is the assumption that the international system is anarchic. The assumptions of realism listed are also characteristic of outer space and allow for the extension of realism to space. Since the future of space exploration mirrors imperialism and realism emphasizes the continual search for ways to increase power, realism best explains and frames the answer to my research question.²¹

Case Studies

Space Privatization

The US space industry is composed of four sectors: (1) defense, (2) intelligence, (3) commercial, and (4) civil space sectors.²² Space privatization is associated with the commercial space sector. In President Obama’s tenure private and public companies established themselves as necessary in space exploration. For the most part, the US national launch infrastructure has been privatized or leased to companies like SpaceX and Blue Origin.²³ Asteroid mining may come next; it may be the most lucrative space endeavor in the near future and it does not violate international law nor the Moon Treaty. Asteroids can be composed of “nickel-iron metal, silicate minerals, semiconductor and platinum group metals, water,” and/or “bituminous

²¹ Ian Hurd, *International Organizations’ Politixs, Law, Practice* (Cambridge: University Printing Press, 2014) 19 Shelley L. Hurt, “Theoretical Paradigms of International Law,” *POLS 426*, Winter 2017.

²² Linda L. Haller, Melvin S. Sakazaki, “Commercial Space and United States National Security,” *Federation of American Scientists* (2001): 1 -56.

²³ U.S. Congress, House of Representatives. Committee on Armed Forces. 2001. *Commission to Assess United States National Security Space Management and Organization*, (107th Congress, 1st Session).

hydrocarbons,” and at least 10% of near-Earth asteroids are more accessible than the moon.²⁴ Energy collection is another mode of acquiring tremendous profit from space. Helium-3 reserves on the moon alone would generate ten times as much energy as coal, oil, and gas combined.²⁵ Ezra J. Reinstein claims that the privatization of space for profit is at a standstill due mainly to the uncertainty of the legal regime: if exploitation of outer space resources is the goal, then a space property legal system with incentives and predictability is necessary.

The moon is the best example on space privatization. It is within close-proximity and has valuable resources. It has promising sites for mining, energy-capturing projects, and spaceship refueling. Unfortunately, the resources are finite and usable land exits are limited.²⁶ Space privatization also includes space itself. The Geo-Stationary Orbit (GSO) – a very well defined orbit above the Earth’s equatorial surface – is the most valuable space resource today. The GSO is related to all types of communication, weather monitoring, and military intelligence and surveillance. It is also the most satellite dense space around Earth. Due to its narrow band it is riddled with electromagnetic interference and “space-junk”.²⁷ The most common private Space ventures remain competitions. Ansari X, Bigelow Aerospace, and NASA offer cash prizes in the millions for space ventures such as docking with an inflatable space station and collecting moon rocks.²⁸ The objectives of those ventures are not to further research for the sake of science but for commercial

²⁴ Christopher Mari, *2011-2012 Topic Overview: Space Exploration and Development* (New York: H.W. Wilson Co., 2011).

²⁵ Ezra J. Reinstein, “Owning Outer Space,” *Northwestern Journal of International Law & Business*, Vol. 20, no.1 (Fall 1999): 59-98.

²⁶ Ezra J. Reinstein, “Owning Outer Space,” pp. 63.

²⁷ Ezra J. Reinstein, “Owning Outer Space,” pp. 64.

²⁸ Jonathan Thomas, “Privatization of Space Ventures: Proposing a Proven Regulatory Theory for Future Extraterrestrial Appropriation,” *Brigham Young University International Law & Management Review*, Vol 1, no. 1 (August 2005): 191-236. 28 Ezra J. Reinstein, “Owning Outer Space,” pp. 74-76.

research, tourism, and industrial production to generate profit.

There are three arguments for the privatization of space systems: (1) ownership will reduce wasteful use, (2) alienability would create incentives to productively develop space, and (3) colonization.²⁸ The first argument is founded on the bargain theory of economics – whoever can use the site for humanity’s greatest benefit will reap the greatest profit and is willing to spend the most to own it. Therefore, ownership may reduce wastefulness to increase profit margins by maximizing efficiency. An increase in overall efficiency of private ventures would in turn lead to space development to sustain such enterprises: routes, mines, colonies, and infrastructure. Privatization would create incentives to productively develop space because early developers would hold ownership rights allowing the company to internalize positive external effects. Colonization is special in that it is an argument for privatization as much as it may be an effect of it. Colonization cannot be maintained without property and private ownership, and enterprises such as mining may operate best with human supervision on site.²⁹

The leading proposal for celestial appropriation suggest abandoning the Outer Space Treaty and the Moon Treaty entirely, replacing them with a free-market approach summarized by discovery, claim, and possession.³⁰ Discovery would be an almost identical reflection of imperialism. Claim is necessary because the whole world needs to know a site is property to a state or company. Possession instructs the owner must “secure ‘its position and continually perform symbolic acts to indicate authority over the [site]’”.³¹ Because space appropriation is no longer within the domain of just states, market and economy trends are critical. Despite the advantages of the bargain theory of

²⁹ *Ibid.*

³⁰ Jonathan Thomas, “Privatization of Space Ventures,” pp. 218-219.

³¹ Jonathan Thomas, “Privatization of Space Ventures,” pp. 233.

economics and the efficiency of the private sector, privatization of the space environment may ignite a gargantuan amount of issues not worth the wealth on any asteroid or the moon. In the international arena developed nations hold more military power, but less-developed nations hold a considerable amount of voting power in international organizations. On space acquisition less-developed states find a first-come, first serve regime immoral, while privatization and appropriation of space left unchecked resembles imperialist behavior. Another issue is that space is no longer reserved for the superpower(s) or governments. Private firms in the US are taking lead roles in new space exploration where there is no precedent. International bodies may not agree with a US-centric, US-first approach that is developing.

Space Colonization

Potential sites for space settlements include the moon, Mars, and moons of other planets.³² The second type of colonies are free-floating colonies. These types of colonies can be entirely man made, such as an inflatable space station, or a mining station on an asteroid. Space colonization is due to human curiosity, and the facts that Earth, like all celestial bodies, have a finite lifetime and limited resources. Colonizing other worlds may provide sanctuaries in the cases of asteroids hitting Earth, nuclear war, and other global cataclysms. Colonizing celestial bodies is not a new idea. In 1959 Project Horizon provided a study for a moon-based fort. The plan was to land to soldier-astronauts in 1965 and deliver 245 tons of cargo by the next year. The Lunex Project by the US Air Force planned an underground Air Force base on the moon by 1968 with a budget of \$7.5 billion. Recent proposals for space colonization include Japan's 2006 plan to have a lunar base by 2030, Russia's 2007 plan to have a moon base in 2027 – 2032, a 2007 proposal for a Lunar Noah's Ark by

³² *op. cit.*, fn. 20

the International Lunar Exploration Working Group, and Newt Gingrich's unrealistic 2012 plan to build a moon base by 2020.³³

Water is necessary for human life and most human needs. When water was discovered on the moon in September 2009 moon bases became more feasible.³⁴ The feasibility increased exponentially when ice deposits were discovered two months later in November 2009.³⁵ A lunar base has many rational advantages: (1) site for launching rockets and refueling them with locally-manufactured fuel, (2) space launches from the moon would be easier (but maybe not more affordable), (3) energy required to send objects to the moon is lower than to any other celestial body, (4) the close proximity of the moon makes the transit time short, and (5) if the moon is colonized and humans are demonstrated to survive in low gravity atmospheres, then humans may be able to survive on Mars.³⁶ The disadvantages cover: (1) long lunar nights may impede dependence on solar power, (2) the moon is depleted of volatile elements such as the ones we need to survive, (3) there are temperature extremes, (4) increased chance of being hit by meteors, (5) moon dust is extremely abrasive, (6) the moon is not fit to grow crops, and (7) Earth politics.³⁷ Regardless of the disadvantages the US has predicted the lunar laboratory will have 10,000 residents by the year 2030 dedicated to research and exploiting the moon's resources.³⁸ Its cost will be dramatically decreased due to new technologies in solar energy. Private firms are working with government agencies on the infrastructure necessary to cultivate the moon, including niches such as genetic engineering, new

³³ NASA, 2006, *Colonization of the Moon*.

³⁴ Kenneth Chang, "In Surprise, Moon Shows Signs of Water," *The New York Times*, September 23, 2009.

³⁵ Saswator R. Das, "A Permanent outpost on the Moon," *The New York Times*, November 24, 2009

³⁶ *op. cit.*, fn. 33

³⁷ *Ibid.*

³⁸ James L. Hyatt, III, Ronald R Ricchi, et. at., "Space Power 2010," *ACSC* (May 1995): 53.

chemical processes, and refueling stations. All colonies will require locations prime for transport operations, strategic natural objects and features, and an abundance of natural resources. Naturally, colonies will also experience economic development. Most colonies are expected to have economies based on spaced-based materials processing, exporting material to Earth, refueling stations, and energy collection.³⁹ In other words, colonies may or may not be state property but they will likely operate under market driven conditions. Space colonies, like the lunar bases, are also most likely to be military installations.

Space Militarization

On October 4, 1957, Sputnik instilled the fear of Soviet attacks from space. The fear was so great the American people and its policymakers responded quickly by “creating government policies in support of science and of education, with the aim of maintaining the U.S. scientific, technological, and military superiority over the rest of the world”.⁴⁰ In 1958 the Space Act, the National Defense Education Act, and the creation of the Advanced Research Project Agency (ARPA or DARPA) organized the space program into civilian and military branches.⁴¹ Immediately, US military space policy emphasized the observational potential of satellites, especially for arms limitation treaty verification. This can be easily seen in the burst of US space achievements in 1960, including Tiros I, a joint military-civilian weather satellite, Transit 1B, the first navigation satellite, and Discoverer 14, the first successful film reconnaissance satellite.⁴² In the past decades the US has mobilized in order to achieve space power, rather than using satellites and space systems solely for integrated tactical warning and attack

³⁹ *Ibid.*

⁴⁰ Homer A. Neal, Tobin L. Smith, and Jennifer B. McCormick, *Beyond Sputnik: U.S. Science Policy in the Twenty-First Century* (Ann Arbor: The University of Michigan Press, 2008)

⁴¹ *Ibid.*

⁴² James L. Hyatt, III, Ronald R Ricchi, et. at., “Space Power 2010,” pp. 17.

assessment, weather and environmental monitoring, satcom, surveillance and reconnaissance, and navigation and positioning.

Military space power – “the ability of an actor’s military space forces to successfully contribute to achieving the actor’s goals and objectives in the presence of other actors on the world stage through control and exploitation of the space environment” – has five elements or requirements: (1) forces deployed, (2) ability to deploy forces, (3) ability to employ forces, (4) ability to sustain forces, and (5) ability to “deny an adversary control and exploitation of space”.⁴³ In the case of the US, the objectives are explicitly to defend US space assets, control space by denying other actors the use of space in conventional war, and project force through the deployment of space-based weapons.⁴⁴ Those goals are reiterated in both the 2001 Report of the Commission to Assess United States National Security Space Management and Organization as well as in a 2002 RAND report. In “Totem and Taboo” Karl Mueller organizes policy views on space weaponization into six categories: (1) idealists, (2) internationalists, (3) nationalists, (4) space racers, (5) space controllers, and (6) space hegemonists. Idealists oppose militarization of space under all conditions, internationalists oppose it due to concerns it may destabilize international security, and nationalists oppose it because space weaponization may weaken US power. Space racers, controllers, and hegemonists promote space militarization. Space racers argue space weaponization is inevitable; therefore, the US should be the first. Controllers find weaponization outweighs the costs, and hegemonists believe space will become “the ultimate, and decisive, battle ground of the future – the ‘ultimate

⁴³ James L. Hyatt, III, Ronald R Ricchi, et. at., “Space Power 2010,” pp. 9-10.

⁴⁴ Bruce M. Deblois, Richard L. Garwin, R. Scott Kemp, Jeremy C. Marwell, “Space Weapons,” pp. 52.

high ground”.⁴⁵ In the US, the schools of thought which promote space militarization appear to have a greater influence.

US space military capabilities include weapon and non-weapon assets. Non-weapon assets include camouflage and smoke screens for denial and deception, interfering with satellite signals and inserting false commands for electronic warfare, radiation hardening and shielding, command and data encryption. Space weapons also have a large variation: inhibiting satellite sensors, pellet-cloud attacks on other satellites, weaponized microsattellites, hit-to-kill antisatellite weapons, and high altitude nuclear weapons.⁴⁶ Non-weapons can be and may already be employed into satellites such as the US Global Positioning Satellites (GPS).

Unlike non-weapons, space-based weapons require development and deployment. For example, in 2003 the US Air Force demonstrated the capabilities of microsattellites with XSS-10 which approached targets near enough to have destroyed if it had been weaponized.⁴⁷ Research and developments have been fruitful in both kinetic-energy weapons and directed-energy weapons for the space environment. According to the 2002 RAND report, specific space weapons being developed include SBLs, long-rod penetrators, common aero vehicles (CAV), and pace-based hit-to-kill interceptors (or boost-phase interceptors).⁴⁸ The realization of space militarization is no longer science fiction, fantasy, and/or scientific theory. SBLs such as MIRACL and Alpha – chemical lasers – began test-firing in the early 1990s. Today accurate predictions for long-range strikes can be made;

⁴⁵ Bruce M. DeBlois, Richard L. Garwin, R. Scott Kemp, Jeremy C. Marwell, “Space Weapons,” pp. 54-55.

⁴⁶ Bruce M. DeBlois, Richard L. Garwin, R. Scott Kemp, Jeremy C. Marwell, “Space Weapons,” pp. 56.

⁴⁷ Bruce M. DeBlois, Richard L. Garwin, R. Scott Kemp, Jeremy C. Marwell, “Space Weapons,” pp. 59.

⁴⁸ James L. Hyatt, III, Ronald R Ricchi, et. at., “Space Power 2010,” *ACSC (May, 1995)*: 62.

the major constraints are political but they can be deployed now.⁴⁹

The dilemma of space militarization is that the well-being and security of the US and its allies “depends on the promotion and protection of the peaceful use of outer space.”⁵⁰ To preserve what may be a liberal world and pursue space power, the US must establish an international environment that allows it to pursue its objectives and compliment its allies’ endeavors. Since the technological requirements are already feasible, and advances in space lift, satellite miniaturization, information systems, space weapons and non-weapons, robotics and virtual reality facilitate space militarization, properly focused policy is needed to complement the rapid advances in space exploration. Interestingly, Space Power 2010 suggests policies such as technology proliferation, policies that facilitate space commercialization, and treaty modifications that will allow “the eventual exploitation of Lunar, Martian, and Near-Earth crossing asteroid resources enroute to space power expansion throughout the solar system and beyond” are the best policies to address.⁵¹

Discussion & Research Implications

Conflict in the 21st Century

If outer space can indeed be analyzed and predicted by realism, then the 21st century will be characterized by intense competition to obtain space power and/or inhibit other states from achieve it. Conflict in space will be exacerbated by public and private ventures that international law could not conceive when created, such as space privatization and colonization. Prominent scholars in the fields of international relations and astropolitics recognize the possibilities of conflict. Laura Grego, Senior Scientist at the Global Security

⁴⁹ James L. Hyatt, III, Ronald R Ricchi, et. at., “Space Power 2010,” *ACSC (May, 1995)*: 65.

⁵⁰ Bruce M. DeBlois, Richard L. Garwin, R. Scott Kemp, Jeremy C. Marwell, “Space Weapons,” pp. 84.

⁵¹ James L. Hyatt, III, Ronald R Ricchi, et. at., “Space Power 2010,” *ACSC (May, 1995)*: 89.

Program at the Union of Concerned Scientists, writes:⁵²

In recent decades, satellites have become increasingly important in the economic, civil, and military spheres. At the same time, space has become more crowded with satellites and the debris from their use, and many more states have become spacefaring. However, the legal and normative regime has not kept pace with these changes. Recent trends and events – including demonstrations of antisatellites (ASAT) capability, a collision between satellites, and a dramatic increase in dangerous space debris – make clear that the space environment needs more protection, that satellites face growing risks, and that space activities may be a potential source of mistrust and tension between countries. While voluntary confidence-building and transparency measures can help solve some of these issues, more substantive engagement is required to keep space safe and secure into the future.

Moreover, the US space program may be directing the world to confrontations in space. The 2018 Defense authorization bill requires the Department of Defense (DoD) to establish a new Space Corps and a new Space Command by January 2019.⁵³ Furthermore, General John E. Hyten, Commander, Air Force Space Command, stated space is vital and essential to joint warfare.⁵⁴ Therefore, he contended implementing a new Space Mission Force that “move[s] beyond the status quo and adopt[s] new tactics, techniques and procedures (TTPs)” is necessary

⁵² Laura Grego, “Security in Space: What Is at Stake and How Do We Move forward?” *Asian Perspective* Vol. 35 (2011): 503-520.

⁵³ Jared Serbu, “House panel votes to split Air Force, create a new US Space Corps,” *Federal News Radio*, June 29, 2017.

⁵⁴ John E. Hyten, “Space Mission Force: Developing Space Warfighters for Tomorrow,” (report, June 29, 2016).

so that the US may execute “swift and deliberate action” when deterrence fails.⁵⁵ The amount of factual knowledge available on parties involved, as well as technology being developed increase uncertainty and fear among international actors.

Technology

The technologies needed for human deep space travel and for humans to live on extraterrestrial bodies are designed to overcome human’s greatest technical drawback: humans evolved to live only on Earth. Deep space refers to distances at and/or past the moon.⁵⁶ Many obstacles such as radiation poisoning and osteoporosis may find a technological solution in the forms of human enhancement. The issues that arise from developing and employing such technologies may affect institutions and public policy on Earth. The main concern with human enhancement is that its use may not be just, it provides a new dynamic for equity and ethical dilemmas: “How will technology be developed, by whom and for whom? Will nanotechnology reach those in desperate need?”⁵⁷

Due to the overly market-oriented and laissez-faire way in which technological development is carried out in the US, “there is a great amount of hubris in regard to how scientific and technological achievements are used in society”.⁵⁸ At the same time, the technologies needed for are dual use – “can be used for both civilian and military purposes” – which allows both the US military and other domestic and foreign institutions to weaponized and militarize benign technologies, Bill Joy’s

⁵⁵ *Ibid.*

⁵⁶ David W. Dunham, et. al., “New Approaches for Human Deep-Space Exploration,” *J of Astronaut Sci* Vol. 60 (2013): 149-166.

⁵⁷ Layne Hartsell, “Review of Nanotechnology and Global Equity,” *Nanoethics* Vol. 6 (September 2012): 151-152.

⁵⁸ Andrew Jamison, “Can Nanotechnology Be Just? On Nanotechnology and the Emerging Movement for Global Justice,” *Nanoethics* Vol. 3 (August 2009): 129-136.

fear.⁵⁹ Developing technologies such as human enhancement may expedite the goals of the new space era but the development and commercial adoption of the technologies needed raise numerous ethical and social issues, including, but not limited to: (1) defining the distinction between therapy and enhancement, (2) concerns about “playing god”, (3) concerns about the return to eugenics, (4) concerns about the commodification of human life, and (5) issues around social justice and disparities in access to new technologies.⁶⁰ With the amount of public and private investment for human deep space travel, many disruptive and promising technologies will be developed. Combined with commercialization, scarcity, and absence and lack of public policy, those technologies may enable the future’s many critics of the new space era fear. At the very least, standards for social justice, equity, and equality will be challenged.

Conclusion

If the US or any state can achieve space power, then that state may acquire global dominance. Combined with space privatization and colonization, it is plausible a living generation may experience the birth of an interplanetary empire, or at the very least a monopoly on the space environment. The jump to a space empire was almost quantized, but it is plausible. Neither domestic nor international law can keep up with the rapid advances in space exploration. Since the US exercises its hegemonic power in the international arena, international organizations and law may not even be able to react to a US space force. If they do in fact react to US space privatization, colonization, and militarization, I predict the US

will respond with a realist approach since any actions against the US will inhibit its ability to maximize its military power.

⁵⁹ Homer Alfred Neal et al., *After Sputnik*, chapter 11, “Science for National Defense,” pp. 181-197.

⁶⁰ Sheila Jasanoff, “Perfecting the Human: Posthuman Imaginaries and Technologies of Reason,” in *Perfecting Human Futures: Transhuman Visions and Technological Imaginations* (Temple, USA: Springer VS, 2016): 73-96.