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**Contested Commons:**  
*The Future of American Power  
in a Multipolar World*

Edited by Abraham M. Denmark and Dr. James Mulvenon  
Contributing Authors: Abraham M. Denmark, Dr. James Mulvenon,  
Frank Hoffman, Lt Col Kelly Martin (USAF), Oliver Fritz, Eric Sterner,  
Dr. Greg Rattray, Chris Evans, Jason Healey, Robert D. Kaplan



Center for a  
New American  
Security

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### Cover Image

*Cover Illustration by Liz Fontaine, CNAS.*

## TABLE OF CONTENTS

Acknowledgments		
Chapter 1: Contested Commons: The Future of American Power in a Multipolar World By Abraham M. Denmark and Dr. James Mulvenon	3	
Chapter 2: The Maritime Commons in the neo-Mahanian Era By Frank Ho man	49	
Chapter 3: Sustaining the Air Commons By Lt Col Kelly Martin (USAF) and Oliver Fritz	77	
Chapter 4: Beyond the Stalemate in the Space Commons By Eric Sterner	105	
Chapter 5: American Security in the Cyber Commons By Dr. Greg Rattray, Chris Evans, Jason Healey		137
Chapter 6: Power Plays in the Indian Ocean: The Maritime Commons in the 21st Century By Robert D. Kaplan		177
Appendix A: Contested Commons Working Groups		195

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**CHAPTER I:**  
CONTESTED COMMONS:  
THE FUTURE OF AMERICAN POWER  
IN A MULTIPOLAR WORLD

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By Abraham M. Denmark and Dr. James Mulvenon



*Our overall policy at the present time may be described as one designed to foster a world environment in which the American system can survive and flourish.*

— NSC 68: U.S. Objectives and Programs for National Security, April 14, 1950



the threshold for states and non-state actors to acquire asymmetric anti-access capabilities, such as advanced anti-ship cruise missiles, anti-satellite weapons, and cyber warfare capabilities. The decentralization of military power and expanded access to technologies once reserved for superpowers will necessarily contest America's 60-year-old dominance over the global commons and its ability to maintain their openness.

While disturbing on their own, these trends are developing concurrently with America's growing reliance on the commons. Militarily, the United States increasingly relies on the commons to enable many aspects of its operations, from logistics, to command and control, to extended power projection. Economically, the United States depends on the global commons to provide essential services to its citizens, connect its markets to suppliers and customers overseas, and manage billions of dollars of financial transactions.

As threats mount, it is in the interest of the international community to reaffirm its commitment to preserving the openness of the global commons. American military primacy will not dissuade rising powers from acquiring capabilities designed to contest U.S. power on the sea, in the air, in space and in cyberspace. Thus, while the United States should continue to develop military capabilities to ensure it can counter anti-access threats posed by state and non-state actors in the global commons, it must recognize that it cannot and should not protect the commons alone.

This report advocates a new strategy that is firmly grounded in the American traditions of maintaining openness, building institutions and empowering friends and allies. As part of this strategy, the United States should use all elements of national power, and work with its friends and allies, to ensure that responsible states continue to enjoy the ability to operate within the global commons. This renewed commitment to defending

the global commons will require not only changes in American policy and posture, but also a coordinated set of international agreements, foreign military and civilian capacity building initiatives, and a network of subnational norms and agreements that support openness and stability while confronting disruption and exclusivity.

Specifically, as part of this strategy, the United States should renew its commitment to the global commons by pursuing three mutually supporting objectives:

- **Build global regimes:** America should work with the international community, including allies, friends, and potential adversaries, to develop international agreements and regimes that preserve the openness of the global commons.
- **Engage pivotal actors:** The United States should identify and build capacities of states and non-state actors that have the will and ability to responsibly protect and sustain the openness of the global commons.
- **Re-shape American hard power to defend the contested commons:** The Pentagon should develop capabilities to defend and sustain the global commons, preserve its military freedom of action in commons that are contested, and cultivate capabilities that will enable effective military operations when a commons is unusable or inaccessible.



## Introduction

Dependable access to the commons is the backbone of the international economy and political order, benefiting the global community in ways that few appreciate or realize. Over 90 percent of global trade, worth over 14 trillion dollars in 2008, travels by sea.<sup>5</sup> Every year, 2.2 billion passengers and 35 percent of the world's manufactured exports by value travel through the air.<sup>6</sup> Governments, militaries, and corporations around the world rely on space for communications, imagery, and accurate positioning services, making space a 257 billion dollars industry in 2008 alone.<sup>7</sup> Financial traders in New York City use the Internet to transfer 4 trillion dollars, greater than 25 percent of America's annual GDP, every day.<sup>8</sup> Moreover, any computer in the world with access to the Internet can access and transmit information to any place in the world within seconds, allowing unprecedented connectivity for global social networks, commercial enterprises and militaries.

While the liberalization of global trade laws is a major cause of today's active and robust global market, a fundamental physical openness is also essential. Goods manufactured overseas have to be shipped in large containers on huge cargo ships over vast oceans. The orders for the goods and requisite parts assembled in a factory must be transmitted over networks that constitute the Internet. The container ships carrying goods use satellites to navigate and communicate. These capabilities do not happen by accident — they are the result of decades of effort by governments and private corporations to build a “system of systems” that allows for global commerce. These systems exist within and between the global commons: the high seas, air, space and cyberspace.

The interconnectedness and interdependence brought by the globalized economy contributes significantly to stability and prosperity, allowing people, ideas and capital to freely crisscross the

world with little regard for international borders. Globalization has lifted millions out of poverty and given emerging regional powers new influence over their own destinies. Indeed, the 2008 *U.S. National Defense Strategy* claimed that “global prosperity is contingent on the free flow of ideas, goods, and services.”<sup>9</sup> Clearly, if the United States and the international community want to sustain this level of globalization, the openness of the global commons must be maintained.

Contemporary American strategists recognize the commons, individually and as a group, as central to American national security interests. The United States regularly updates naval, air and space strategies to detail how the U.S. military should think about each commons. Moreover, President Barack Obama has identified cyberspace as a national security priority, bringing it into the fold as a recognized strategic commons. Taken together, the global commons form “the connective tissue of the international system and of our global society.”<sup>10</sup> Secretary of Defense Robert Gates described the American approach toward the global commons as:

Opening doors, protecting and preserving common spaces on the high seas, in space, and more and more in the cyber world. This presence has offered other nations the crucial element of choice and enabled their entry into a globalized international society. . . . We stand for openness, and against exclusivity, and in favor of common use of common spaces in responsible ways that sustain and drive forward our mutual prosperity.<sup>11</sup>

Since the end of World War II, the openness and stability of the global commons have been protected by U.S. military dominance and sustained by U.S. political and economic leadership. The U.S. Navy and Coast Guard have dissuaded naval aggression and fought piracy around the world, ensuring unprecedented freedom of the seas. America also forged an international consensus

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on the openness of space, ensuring that all countries with the means to do so can utilize space for scientific, commercial and military purposes. The United States drove the creation of international agreements on air transportation, enabling the creation of a global air industry. Lastly, research funded by the U.S. government created a decentralized network of connections now called the Internet, which facilitates the free flow of ideas and connects physically dispersed markets, capital and people. In all these domains, the United States supported political and economic leadership with uncontested military dominance.

The prevailing American approach to the global commons was described and eloquently advocated in Barry Posen's influential 2003 article, "Command of the Commons." Posen argues that command of sea, air and space "provides the United States with more useful military potential for a hegemonic foreign policy than any other offshore power ever had."<sup>12</sup> He paints a picture of American military dominance that was sweeping and uncontested:

Command of the commons is the military foundation of U.S. political preeminence. It is the key enabler of the hegemonic foreign policy that the United States has pursued since the end of the

Cold War. The military capabilities required to secure command of the commons are the U.S. strong suit. They leverage science, technology, and economic resources. They rely on highly trained, highly skilled, and increasingly highly paid military personnel. On the whole, the U.S. military advantage at sea, in the air, and in space will be very difficult to challenge — let alone overcome. Command is further secured by the worldwide U.S. base structure and the ability of U.S. diplomacy to leverage other sources of U.S. power to secure additional bases and over-flight rights as needed."<sup>13</sup>

As a result of this unfettered access to the commons, the U.S. military has dominated all dimensions of conflict. Geography made the United States a natural sea power, and successful exploitation of air, space and U.S. technological prowess made the United States a power in the cyber commons as well. The commons, in turn, serve as a key enabler of the U.S. military and its ability to project power globally. The American military demonstrated its conventional military dominance in the 1991 Persian Gulf War, the 1994 air war over Yugoslavia, the 2001 invasion of Afghanistan, and the 2003 invasion of Iraq. The utilization of satellites and advanced communications technologies empowered the U.S. military to operate with overwhelming speed, coordination, efficiency and destructiveness. For example, as former Secretary of the Air Force Michael Wynne explained, "In World War II, it took 1,500 B-17s dropping 9,000 bombs to destroy a given target. Today, one B-2 can strike and destroy 80 different targets on a single mission using weapons guided by space-based USAF global positioning system signals."<sup>14</sup>

Yet, this dominance is becoming increasingly contested, with significant consequences for the world's access to the commons and the power of the American military. While Posen was correct to argue that American primacy is rooted in its

continued access to the commons, some emerging trends suggest that cracks may be appearing in the U.S. military's capacity to maintain command of the commons.

The free flow of capital has facilitated the emergence of a multipolar world, giving rise to new centers of power. While the consequent reduction in poverty has generally been a positive development and a long-sought American objective, some of these new powers have used their newfound wealth to acquire and develop high-end anti-access capabilities that could undermine the openness and stability of the global commons. Globalization and technological advancements have also lowered the threshold for poor states and non-state actors to acquire disruptive military technologies. Some developing nations and non-state actors have acquired and developed advanced military technologies, such as anti-ship cruise missiles and cyber warfare units.

These threats to America's role in the commons coincide with the rise of other challenges that will tax the U.S. military. In fact, some states are developing anti-access military capabilities and exclusionary policies that threaten the very international system that has made them stable and prosperous. Pentagon assessments suggest the United States in the coming decades will confront a greater number of threats, across a broader spectrum of warfare, in a more geographically diverse and challenging number of hotspots, than it has in the past.<sup>15</sup> In addition, the United States will need to maintain existing military commitments to deter and defend attacks on U.S. interests and allies.

At the same time, America's allies are showing less willingness to employ military force. While some states have joined in operations to preserve the maritime commons, many others free ride on American power.

These troubling trends are occurring within the context of an ongoing reduction in the size of America's forward-stationed military forces in Europe, Asia and the Middle East. In 2004, the Department of Defense's Global Posture Review recommended a 35 percent reduction in forward-stationed military personnel, and a 30 percent cut of U.S. military facilities abroad. There are several reasons for these shifts (e.g., changing threats, ongoing operations, technological improvements), not the least of which is a degree of reluctance to permanently station U.S. forces in other nations, particularly in the Middle East and East Asia. While the United States is attempting to revise many of its alliances into broader agreements focused on multilateral and global missions, the declining presence of U.S. military bases abroad will force American military power to become more reliant on an expeditionary, rather than a forward-stationed, posture. In other words, just as the global commons are becoming more contested, the U.S. military will rely increasingly on the global commons for extended power projection.

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*Taken as a whole,  
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Taken as a whole, the future security environment will test American leadership. Protecting open access to the global commons will be in high demand, but the capacity of the U.S. military to protect the commons will be challenged by new commitments and an increasingly diverse set of military threats. The status quo, in which the United States is the sole guarantor of the openness of the global commons and other states free ride, is unsustainable.

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If states and non-state actors are able to disrupt the commons, the existing international political and economic order will be fundamentally undermined. However, the United States has a unique opportunity to shape the world's approach to the commons. If a larger number of existing and emerging powers can be persuaded to promote the openness and stability of the commons, the international political and economic order will be strengthened.

Despite the emergence of an increasingly complex set of military threats, it is important to remember that it is not America's *absolute* level of power and influence that is falling, but its *relative* power compared to other emerging states.<sup>16</sup> While its dominance may be contested in the coming decades, America's ability to lead remains. The key for the United States will be to recognize both its capabilities and its limitations, and to act now to shape the future security environment in ways that will protect key U.S. interests, as well as interests shared with the international community.

#### PROTECTING THE CONTESTED GLOBAL COMMONS

Going forward, the United States should develop political and military strategies that take these new realities into account and preserve the openness and stability of the global commons in an age of multipolarity. This report advocates a broad and multi-pronged strategy to preserve the openness of the four global commons: maritime, air,

space and cyberspace. This strategy should employ all elements of national power, including diplomacy, strategic public engagement, and economic incentives and disincentives. Military power will continue to play an essential role because militaries worldwide can sustain the commons by promoting access, or they can destroy them by enforcing exclusivity or rendering a commons unusable. The U.S. military, for its part, should be prepared to sustain and defend the global commons.

This strategy should be firmly founded in the best traditions of American institution-building and with the recognition that the United States can no longer protect the commons alone. Specifically, the United States should develop and enable an international order which, in turn, nurtures a loose set of international agreements and regimes among responsible and like-minded states that effectively preserves the openness and stability of the global commons. Although America's "unipolar moment" may be fading and its military dominance becoming increasingly contested, the need for American leadership is as strong as ever.

To support this strategy, the United States should re-commit to three traditional pillars of American foreign policy: preserving American leadership, projecting American power as necessary, and promoting alliances and partnerships.

**Preserving American Leadership:** American leadership in the coming decades will depend on Washington's ability to adapt to an era in which American military primacy throughout the global commons will be contested. Rising and revanchist powers are investing heavily in naval, air, space and cyber power; non-state actors are also gaining access to advanced anti-access military capabilities. The United States must be prepared to lead in a world in which its dominance is also contested politically in a world where other powers demand influence on and within the world's common spaces.

**Projecting American Power:** American power faces a critical paradox: the United States requires the ability to project military power anywhere, but the use of forward bases in the key regions in the world come at considerable strategic cost.<sup>17</sup> Thus, throughout the world — from the Middle East to Africa to East and South Asia — the United States needs to retain the ability to persistently project power without provoking resentment. It is therefore vital that America develop flexible basing and access options that do not require large and politically costly forward bases, but can support sea-based power projection. As Robert Kaplan notes, “Carrier strike groups, floating in international waters only a few miles offshore, require no visas or exit strategies.”<sup>18</sup> Further, as cyber power emerges as a form of warfare, options to project power from cyberspace with a minimal overseas footprint could develop.

**Promoting Alliances and Partnerships:** Working with and through allies and partners will be key to America’s ability to develop an effective international community that can share the responsibility of maintaining the global commons with the United States. These partnerships reinforce America’s position as a global leader.<sup>19</sup> The 2007 maritime strategy recognizes this fact, and identifies the imperative for the Navy, Marine Corps and Coast Guard to “foster and sustain cooperative relationships with more international partners.”<sup>20</sup> Such an approach can and should be pursued in all commons.

#### ABOUT THIS REPORT

To inform this report, the Center for a New American Security (CNAS) commissioned four papers designed to explore specific aspects of the contested commons. Each paper was reviewed by a separate commons working group, which was composed of leading experts from academia, the government, the military and the private sector (see the Appendix: Contested Commons Working Groups). In addition, CNAS Senior Fellow Robert

D. Kaplan contributed a case study on the future maritime security environment in the Indian Ocean to illustrate how one area of the global commons could become contested. These papers directly informed this chapter, which presents a comprehensive assessment of the global commons, the threats to American interests in those commons, and strategies to address them.

### Overview of the Global Commons

There are four major global commons: maritime, air, space and cyberspace. Each commons is fundamentally different from the others. However, this report examines them together as a global commons because they share four broad characteristics:

1. They are not owned or controlled by any single entity.
2. Their utility as a whole is greater than if broken down into smaller parts.
3. States and non-state actors with the requisite technological capabilities are able to access and use them for economic, political, scientific and cultural purposes.
4. States and non-state actors with the requisite technological capabilities are able to use them as a medium for military movement and as a theater for military conflict.

Academics have long studied “the commons,” though primarily as shared properties or resources that pose challenges for societal resource management. While that examination can be traced back to commentary by the likes of Thucydides and Aristotle,<sup>21</sup> contemporary academic investigation of the commons was catalyzed by a seminal 1968 article, “The Tragedy of the Commons,” by the ecologist Garrett Hardin.<sup>22</sup> Hardin described a hypothetical common pasture in which local herdsmen graze their cattle. Although each herdsman relies on the pasture to sustain his cattle,

Hardin argues that each herdsman is individually motivated by self-interest to increase the size of his herd. This action, repeated by every herdsman with the means, quickly leads to overgrazing and the destruction of the pasture. Thus, to quote Hardin's bleak conclusion, "Freedom in a commons brings ruin to all."<sup>23</sup>

To overcome the tragedy of the commons, theorists point to several potential means of governance:

- Hardin proposed the establishment of control by a central authority and/or commercialization of common property, either of which could overrule the self-interest of individuals.
- American economist Mancur Olson proposed that smaller groups are more capable of cooperation than larger groups, as it is easier to share values and responsibilities with a smaller set of actors.<sup>24</sup>
- International relations theorist Robert Keohane argued that a "hegemonic" power can establish international regimes that facilitate international cooperation, but these regimes can remain effective after periods of hegemony have ended.<sup>25</sup>
- Elinor Ostrom, who received the 2009 Nobel Prize for Economics for her work on the commons, argues that self-governing institutions, properly constructed, can play a lead role in maintaining resources.<sup>26</sup> For Ostrom, a key to lasting governance of the commons is the ability to deny benefits of the commons to states that violate its rules and norms.

These perspectives suggest that the United States, as the "hegemonic power," has an opportunity to develop international institutions that last beyond its "hegemonic period." By engaging a set of like-minded states and non-state actors with the ability or potential to substantially contribute to the health and success of the global commons (referred to in this study as "pivotal actors"), the United States could build and lead an international

effort to protect the global commons. Moreover, by firmly opposing efforts by those who would undermine the openness and stability of the global commons, the United States and its partners will give challengers new incentives to contribute to the health and openness of the global commons.

#### THE STRATEGIC GLOBAL COMMONS

Parallel to this academic focus on the commons, strategists have pointed to the commons as the primary channels through which commerce, militaries, people and ideas travel. The concept was probably first coined in 1890 by the famed naval strategist Alfred Thayer Mahan, in his influential work *The Influence of Sea Power Upon History, 1660–1783*:

The first and most obvious light in which the sea presents itself from the political and social point of view is that of **a great highway; or better, perhaps, of a wide common**, over which men may pass in all directions, but on which some well-worn paths show that controlling reasons have led them to choose certain lines of travel rather than others. These lines of travel are called trade routes; and the reasons which have determined them are to be sought in the history of the world [emphasis added].<sup>27</sup>

As technologies advanced, new commons have become accessible. The birth of the airplane made it possible for people and goods to travel across continents and over oceans in a matter of hours, with the effect of bringing the most far-flung parts of the world closer together in terms of time, if not space. The advent of high-thrust rocketry during and after World War II allowed for the use of space for several applications, including international communications at the speed of light and ever-present satellite observation. Most recently, the digital revolution spurred the development of the Internet, enabling the transfer of vast amounts of information across the Earth in a matter of seconds.

Table 1

MILITARY COMPARISONS OF THE GLOBAL COMMONS <sup>28</sup>				
	MARITIME	AIR	SPACE	CYBER
<b>Strategic Advantages</b>	Enables global power projection	Allows direct strikes against enemy forces and centers of gravity	Creates a new high ground; enables global imaging and communications	Enables fast transfer of information; newly coordinated military operations; force multiplier, especially for non-state actors
<b>Speed and Scope of Operations</b>	Slow transit over long distances; enables global strikes	Fast, global transit. Scope dependent on sortie rates close to targets	Allows for continuous global operations; detailed C3ISR; precision strike	Extremely fast global operations; automation of command and control
<b>Examples of Key Features</b>	Sea lanes, straits, canals, sea ports	Airports, air ceilings, English language commercial standard, basing and over-ight access	Orbit slots, Lagrangian points, space ports	<b>Physical:</b> submarine cables and their landing stations, Internet exchange points, corporate data centers, infrastructure nodes; <b>Logical:</b> TCP/IP standard, highly-connected web nodes

The global commons all have distinct military applications and implications, in addition to their importance to the global economy (Table 1).

The maritime, air, and space commons are based (to varying degrees) on a conceptual foundation that facilitates international cooperation by defense and commercial establishments, as well as a set of global regimes that regulate behavior within, and open access to, the commons. The maritime and air commons are the most mature, with robust intellectual and institutional frameworks. The space commons is less mature, with governance that is limited and dated. The cyber commons is largely anarchic, with an amalgamation of

multilateral, national, and non-state agreements that have all had limited success in governance and regulation.

The characteristics of each of the commons should not obscure their fundamental similarities. Indeed, their fundamental interdependence is what binds them. In many ways, the global commons only functions effectively because each aspect is utilized simultaneously. To provide just one example, American aircraft carriers — the most potent symbol of American military power — sail on the high seas, use satellites for communications and positioning, use the air for combat and patrol, and

*The characteristics of each of the commons should not obscure their fundamental similarities.*

leverage cyberspace to transfer data quickly inside the ship and to ground stations around the world. Just one ship, therefore, uses all of the commons in one voyage.

The following sections summarize key characteristics of each of the global commons, with particular attention to the strategic importance of each.

#### THE MARITIME COMMONS<sup>i</sup>

The maritime commons includes 139 million square miles of ocean, ports and the littoral corridors that connect widely dispersed markets and manufacturers around the globe. Goods produced in Asian or American factories, or oil extracted from Middle Eastern oil fields, require the openness of this commons in order to deliver their goods to customers around the world. With 90 percent of global commerce traveling by sea, and many countries (for example, China and Japan) relying on maritime shipping for critical energy supplies, the openness of the maritime commons is essential to a healthy international economic system and is vital to the national security interests of the United States and its allies. As articulated in the United States' 2005 *National Strategy for Maritime Security*, "The right of vessels to travel freely in international waters, engage in innocent and transit passage, and have access to ports is an essential element of national security. The free, continuing, unthreatened intercourse of nations is an essential global freedom and helps ensure the smooth operation of the world's economy."<sup>29</sup>

The maritime commons has been central to trade and military power since antiquity. Mahan emphasized the close link between maritime power and economic development, and the application of sea power to sustain geopolitical influence. He recognized that whoever controlled the commons had great leverage and could exploit it to preserve the peace and exert influence. Another leading naval theorist, Julian S. Corbett, focused on the importance of sea lines of communication, and described a strategy now known as *sea control*.<sup>30</sup> The openness of the maritime commons today depends to some degree on the security of key ports of entry and vulnerable straits. About 75 percent of the world's maritime commerce passes through a handful of international straits and canals, which function as choke points.<sup>31</sup>

The importance of the openness of the maritime commons has been enshrined in a series of international agreements, most notably, the UN Convention on the Law of the Sea (UNCLOS). This agreement defines acceptable claims of sovereignty in the oceans, identifies the rights and responsibilities of coastal states, and preserves the rights of states to operate peacefully within international waters. Other agreements detail accepted rules of behavior and standardize forms of communication at sea. To date, UNCLOS has been a tremendous success of international institution building — 158 countries, and the European Union, have joined the Convention. Although the United States signed UNCLOS in 1994, the agreement has not yet been ratified by the Senate. Nevertheless, the United States operates according to its main provisions and regards it as customary international law.

#### THE AIR COMMONS<sup>ii</sup>

Open access to the air is a foundation of the global economy. The air commons see more than 2.2 billion passengers annually.<sup>32</sup> In 2006, air transport facilitated the movement of 35 percent by value

<sup>i</sup> The views expressed in this section are derived from Frank Hoffman, "The Maritime Commons in the neo-Mahanian Era," *Contested Commons: The Future of American Power in a Multipolar World* (January 2010) 49–75.

<sup>ii</sup> The views expressed in this section are derived from Lt Col Kelly Martin and Oliver Fritz, "Sustaining the Air Commons," *Contested Commons: The Future of American Power in a Multipolar World* (January 2010) 77–103.



(3.5 trillion dollars) of the world's manufactured exports, as well as over 40 percent of the world's international tourists, which accounts for 3.4 percent of global GDP. The air transport industry directly employs 5.5 million people and indirectly brings about 32 million jobs worldwide.<sup>33</sup>

Since World War I, air power has been a fundamental aspect of military power. Air power allows a military to overcome geographic obstacles on the battlefield, at speeds that minimize the distance between the air bases and the battlefield, given sufficient air-refueling capabilities. The scope and speed of air power allows countries to influence a conflict at the strategic and tactical levels from positions around the world. Contemporary American theorists on air power emphasize the importance of it in influencing an enemy's leadership and in striking the enemy's military.<sup>34</sup> While a decades-old debate about the ability of air power to influence events on the ground continues to rage, the U.S. military views air superiority as critical enough to warrant the expenditure of billions of dollars.

The air commons today represents a "mature" commons. Use of the air for commercial purposes is managed effectively by a series of international organizations and bilateral agreements, all of which are largely unseen by the casual traveler. States exercise unquestioned authority over their airspace up to 60,000 feet in their geographic borders, plus 12 miles out from their coastlines. Despite a successful set of international standards and bilateral access agreements, a single international agreement on access and over-flight continues to elude the international community. International air travel agreements today remain almost entirely bilateral, leading to inconsistencies and inefficiencies in the system. That being said, access is generally open, and limitations on access usually result more from internal challenges than external threats.

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*In many ways, the global commons only functions effectively because each aspect is utilized simultaneously.*

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The U.S. military has embraced a strategy of preserving the military advantages necessary to maintain air superiority during conflict. Secretary of Defense Gates claimed that by 2020, "The United States is projected to have nearly 2,500 manned combat aircraft of all kinds. Of those, nearly 1,100 will be the most advanced fifth-generation F-35s and F-22s. China, by contrast, is projected to have no fifth-generation aircraft by 2020. And by 2025, the gap only widens."<sup>35</sup>

#### THE SPACE COMMONS<sup>iii</sup>

Satellite-based positioning information, overhead imagery and communications facilitate global coordination of commercial, scientific and military activities with a degree of speed and precision that would be impossible without the use of outer space. In general, space can be understood as a utility that lies at the heart of other international activities. For example, signals from the Global Positioning Satellite (GPS) system not only help users navigate the surface of the planet, but they also can help to precisely time financial transactions around the world. Militarily, space provides the "strategic high ground" from which global communications and remote sensing can be quickly transmitted to militaries around the world. A military that can effectively use space has a tremendous advantage in terms of speed of communications, breadth of surveillance and intelligence, and accuracy of positioning and timing.

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<sup>iii</sup> The views expressed in this section are derived from Eric Sterner, "Beyond the Stalemate in the Space Commons," *Contested Commons: The Future of American Power in a Multipolar World* (January 2010) 105 – 135.

Space's *militarization*—its use as a medium to support military operations—has existed for more than four decades. Since the height of the Cold War, satellites have monitored nuclear tests and other military activities and facilitated global communications, mapping, and other activities with both military and scientific purposes. Yet space has yet to be *weaponized*, in that it is not yet a theater for warfare or for the placement of arms, and it remains a global commons open to any actor with the means to access it.<sup>36</sup>

To a large degree, this openness can be credited to a robust set of international agreements that effectively codify space as a global commons. When space first became accessible to humanity in the 1950s, the United States proposed an agreement establishing orbits as common spaces beyond traditional conceptions of sovereignty. The Soviet Union initially disagreed, arguing that its sovereign claim over its territorial air space extended to orbit and beyond. Once Moscow saw the benefit of sending satellites into orbit to spy on the West, its conceptions of its sovereign interests changed, and the USSR agreed to establish space as, in effect, a global commons. Although several arms-control agreements helped to solidify space as a commons, the most comprehensive existing international agreement on the use of space is the 1967 Outer Space Treaty. It defines space as an area beyond claims of state sovereignty, but it has a limited focus on military matters—beyond banning weapons of mass destruction in orbit or on any celestial body, and prohibiting the use of celestial bodies for military bases or the testing of weapons.

U.S. policy has consistently embraced space as a global commons “by all nations for peaceful purposes and for the benefit of all humanity.”<sup>37</sup> Yet the United States has also defended space as a legitimate medium for defense and intelligence activities. The 2006 National Space Policy

reinforced an American commitment to the “exploration and use of outer space by all nations for peaceful purposes, and for the benefit of all humanity,” rejected claims of national sovereignty, and reaffirmed the “rights of passage through and operations in space without interference.” On the issue of military objectives, it was quite clear, asserting:

The United States considers space capabilities—including the ground and space segments and supporting links—vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities, and freedom of action in space; dissuade or deter others from either impeding those rights or developing the capabilities intended to do so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to U.S. national interests.<sup>38</sup>

#### THE CYBER COMMONS<sup>iv</sup>

Cyber space is now an integral part of modern life. People interact, cooperate, and compete through a series of networked linkages that span the world. This unique system has evolved into a global commons. Through a combination of simple web-based communications and more complex infrastructure networks, the cyber commons enables private and public institutions to provide essential services such as energy, food, and water. Banks and asset traders use the Internet to shift billions of dollars within seconds. Modern militaries—especially the U.S. military—employ the cyber commons as a key enabler of military operations, using both commercial and private networks for everything from command and control to logistics support.

As the newest and least-understood global commons, a more robust discussion on the nature of the cyber commons is necessary. Its speed

<sup>iv</sup> The views expressed in this section are derived from Dr. Greg Rattray, Chris Evans and Jason Healey, “American Security in the Cyber Commons,” *Contested Commons: The Future of American Power in a Multipolar World* (January 2010) 137-176.

and scope creates advantages and challenges. Communications across cyberspace can happen near instantaneously, and vast amounts of data can rapidly transit vast distances, often unimpeded by physical barriers and political boundaries. However, dependence on the use of cyberspace creates vulnerabilities and weaknesses that could be exploited by adversaries.

To date, the United States and the international community have had little success in governing the cyber commons. In many respects, governance in cyberspace resembles the American Wild West of the 1870s and 1880s, with limited governmental authority and engagement. Users — whether organizations or individuals — must typically provide for their own security. Much of cyberspace operates outside the strict controls of any hierarchical organizations. No one individual or entity is in charge. Internet traffic is routed through peer arrangements between Internet Service Providers (ISPs), without central authority or control. The resolution of domain names fundamental to web browsing and e-mail is strictly based on an agreed set of protocols, loosely coordinated by a nongovernmental organization referred to as the Internet Corporation for Assigned Names and Numbers (ICANN).

Further challenging any effort to govern or control the cyber commons is the complexity of its ownership — the physical infrastructure of the cyber commons is largely owned and controlled by the private sector. States do not, and cannot, command the cyber commons to the same degree as the sea or air, or even to the extent that they controlled communications technologies in the past. Today, there are myriad providers of devices, connectivity and services in loosely woven networks with open standards. Many governments, especially in the western world, have a limited ability to control cyber activities that originate within their borders. To date, the American approach to

cyberspace has been supportive of a cyber commons that is open and market-based.

This condition of anarchy is not absolute. Economic imperatives and the desire to widen and standardize communication networks have led to the creation of relatively public and transparent nongovernmental operations of the Internet Engineering Task Force (IETF), ICANN, and other organizations for standardization, governance and regulation of cyberspace. States and other organizations can also establish boundaries by making choices in how to employ hardware, software and standards. To date, America has supported a cyber commons that is open and market-based.

The United States has also come to realize the strategic value of the cyber commons. Late in the Bush administration, in 2008, a Comprehensive National Cyber Security Initiative was formulated and launched, codified in NSPD-54/HSPD-23. Early in the Obama administration, a White House-led review of cyberspace policy identified cyberspace as a “national asset” and committed the United States to a concerted effort to secure its infrastructure from attack. A few months later, the U.S. military established Cyber Command, charged with protecting networks and conducting offensive cyber warfare. Beyond the Department of Defense, national cyber security efforts have included the National Security Agency, the Department of Justice and the Department of Homeland Security.

### **Challenges to the Global Commons**

In the coming decades, the United States will face a more diverse set of threats, from a broader array of actors, than ever before. As new powers rise and globalization lowers the threshold for less-advanced nations and non-state actors to acquire cheap yet advanced military technologies, the openness of the global commons, and America’s traditional military dominance therein, will become increasingly contested.



















































































































































































































































































































































































































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