SHARING SPACE WITH THE MIDDLE KINGDOM:
ANALYZING BARRIERS TO U.S.-CHINA SPACE COOPERATION

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List of Terms and Abbreviations

AECA	(U.S.) Arms Export Control Act
ASAT	Anti-Satellite Technology
BUSTIND	(Chinese) State Bureau of Science, Technology and Industry for National Defense
CAAC	Civil Aviation Association of China
CAC	China Aerospace Corporation
CALT	China Academy of Launch Vehicle Technology
CAST	China Academy of Space Technology
CCP	Chinese Communist Party
CLTC	China Satellite Launch and Tracking Control
CNSA	China National Space Administration
COMSAT	Communication Satellite Corporation
COSTIND	(Chinese) Commission of Science, Technology and Industry for National Defense
CPMIEC	China Precision Import-Export Company
CSS	Chinese surface-to-surface missile
DF	*Dong Feng* (东风) "East Wind" program of Chinese land-based missile development
DFH	*Dong Fang Hong* (东方红) "The East is Red" series of Chinese geostationary satellites
EAA	Export-Administration Act (U.S.)
ESA	European Space Agency
FSW	Fanhui Shi Weixing (return test) satellite
FY	Feng Yun satellite
GPD	The arm of the Communist Party within the PLA
gai ge kai fang	Deng Xiaoping's 1978 policy of "Reforming and Opening Up" (改革开放)
ICBM	Intercontinental ballistic missile
IRBM	Intermediate range ballistic missile
ISS	International Space Station
ITAR	(U.S.) International Traffic in Arms Regulations
JSLC	Jiuquan (酒泉) Space Launch Center

LM	*Chang Zheng* (长征) “Long March” series of civilian launch vehicles
MASI	(Chinese) Ministry of Space Industry
MTCR	Missile Transfer Control Regime
NASA	(U.S.) National Aeronautics and Space Administration
NDSTIC	(Chinese) National Defense Science, Technology and Industry Commission
NRSC	(Chinese) National Remote Sensing Center
ODTC	(U.S.) Office of Defense Trade Controls
OSTP	White House Office of Science and Technology Policy
PLA	People’s Liberation Army (China)
PRC	People’s Republic of China
SZ	*Shenzhou* (神舟) “Divine Vessel” spacecraft that supports the Chinese human spaceflight program
TG	*Tiangong* (天宫) “Heavenly Palace” series of space laboratories constituting the Chinese space station program
UN	United Nations
UNOOSA	United Nations Office of Outer Space Affairs
USSR	United Soviet Socialist Republic (Soviet Union)
WTO	World Trade Organization
XSCC	Xi’an (西安) Space Command and Control Center
XSLC	Xichang (西昌) Space Launch Center
Zhong Guo	China (中国), or “Middle Kingdom”

Chapter One: *Introduction and Overview*

The Chinese people believe they have every reason to be proud of being Chinese. Chinese culture is the longest-lasting continuous culture in the world, stretching back more than five thousand years. The Chinese name for the nation of China itself, *Zhong Guo* (中国), literally means "middle" kingdom, located right at the center of the world and of world affairs. Bounded on all four sides by the Pacific Ocean, Himalaya mountains and Gobi desert, China was able to develop since ancient times as an isolated, self-sufficient nation with no apparent need for interaction with the outside world. A tribute system with surrounding Asian nations established China as the region's hegemonic power, making the notion of bilateral, international cooperation between sovereign nations an entirely foreign idea. At that time, the Chinese developed a national pride, sense of self-sufficiency, and long-term approach to policy and decision-making that still influences Chinese foreign relations and domestic policy today. It was not even until the mid-nineteenth century that the Opium War of 1839-42 illustrated to China that the world is indeed a larger place with other great powers, powers with equal or superior technological capabilities.

The Communist Revolution introduced a new wave of red-tinged nationalism to China. At the behest of Chairman Mao Zedong, revolutionary China sprung into the twentieth century with industrialization and revolution on all fronts. Beginning in the mid-twentieth century, outer space became the new realm of international competition and dominance. As the Middle Kingdom with the world's largest population and extensive capital and land resources at its disposal, China decided to become a player in the new outer space "game." When the Soviet Union successfully launched *Sputnik* 1, the world's first artificial satellite, into orbit, China became aware that it too must enter outer space.

However, given the background of China as an isolationist hegemon in East Asia, what are the chances that the Chinese would be willing to cooperate with the United States in outer space pursuits? Furthermore, why would the United States be at all interested in cooperation with China? This thesis strives to answer these and many more questions surrounding the U.S.-China space relationship in its present and future forms, as well as characterize the many barriers to cooperation that are currently hindering the relationship.

Today, it is difficult to argue with the emergence of China as a superpower posing a substantive threat to waning U.S. dominance on the world stage. Even so, the proverbial rise of China is not limited to the populous nation's economic growth, manufacturing excellence, or surplus of brainpower. Positioned in a solid third place behind the United States and former Soviet Union in annual launches and space activities, China has risen to a competitive, if not dominant position in outer space pursuits. China has launched more than one hundred orbital missiles since the 1970s,[1] and Chinese government White Papers released in 2003, 2006[2] and 2011[3] lay out even more ambitious plans for the future. In just the past decade, the Chinese have begun construction on the *Tiangong*, or Heavenly Palace, space station, and have released plans for lunar exploration and human spaceflight outside of Earth's orbit. The space exploration accomplishments of the Chinese since their program's inception are certainly impressive, especially considering the setbacks to the program during the Cultural Revolution period of the early 1970s.

Nonetheless, not all the talk of China's space satellite and missile advances is positive. The Chinese space program has been simultaneously praised by some members of the international community while also condemned by other members of the United States

[1] Jeffrey Logan: *China's Space Program: Options for U.S.-China Cooperation*, 2007
[2] CNSA.cn: China's Space Activities in 2006; China's Space Activities (2003 White Paper)
[3] Marc Boucher: "China Releases White Paper - China's Space Activities in 2011." *Space Quarterly Magazine*.

government. Chief among these concerns on the part of the U.S. are national security interests, the potential for the militarization of space, the absence of legislation regulating space activity in China, and the generally secretive and at times hostile climate of negotiating with Beijing on issues considered "state secrets" or "sensitive" technologies. In addition, a variety of cultural, technological, and political barriers to cooperation stand in the way of a more active relationship in the short term. The sometimes-lukewarm relationship between the United States and China is frequently contingent upon legalities and politics.

In this thesis, I explore the background, hindrances to and implications of U.S-China space relations. In particular, I address the extent of cooperation possible between the two programs in the future, and also how domestic politics and international space legislation impact that relationship. According to my findings, it appears that some form of space cooperation could be possible between the U.S. and China in the mid- to long-term, perhaps in the form of commercial satellite launch interaction if the technologies involved do not pose a significant threat to the national security of either side. If measures are taken to prevent the transfer of sensitive military-use technologies, then cooperation with China could be beneficial to the U.S. regardless of whether China is regarded as friend or foe. In addition, I argue that increasing space policy dialogue between Washington and Beijing could provide strategic advantages to the United States. To allow any form of cooperation to happen, U.S. policymakers must tread carefully in the nebulous legal environment of relations with China, keeping in mind that thousands of years of cultural differences, as well as a lack of explicitly written space laws in China, could result in potentially devastating misunderstanding. Differing expectations and values lead to the possibility for a difficult but navigable cooperative relationship.

The overarching questions of my research are as follows: to what extent is space cooperation between the U.S. and China possible? What political, cultural, technological and legislative barriers characterize the space relationship between the United States and China? Finally, given the international cooperative histories of the U.S. and Chinese space programs, what does the future space landscape look like in regards to China and the United States?

Background for Cooperation: An Introduction to Stated Laws and Security Concerns

In order to delve into the issue of space cooperation, it is necessary to first examine the existing surface-level legal framework surrounding cooperation in the doctrines of the U.S. and Chinese space programs. At face value, the "international cooperation" components of the laws of both the U.S. and Chinese space programs seem to promote mutual cooperation and the sharing of space technologies. According to Title II, Section 205 of the United States National Aeronautics and Space Act of 1958 titled "International Cooperation," NASA is permitted to "engage in a program of international cooperation… and in the peaceful application of the results thereof, pursuant to agreements made by the President with the advice and consent of the Senate."[4] On the other hand, the Chinese "2003 White Paper on China's Space Activities" states: "China persistently supports activities involving the peaceful use of outer space, and maintains that international space cooperation shall be promoted and strengthened on the basis of equality and mutual benefit, mutual complementarity (sic) and common development."[5] According to the 2003 White Paper, the

[4] United Nations Office for Outer Space Affairs: *The National Aeronautics and Space Act*
[5] CNSA: China's Space Activities (2003 White Paper)

Chinese claim to adhere to the United Nations' "Declaration on International Cooperation on Exploring and Utilizing Outer Space for the Benefits and Interests of All Countries, Especially in Consideration of Developing Countries' Demands," which was approved by the 51st General Assembly of the United Nations in 1996.[6] In addition, as of the 1980 GA resolution 35/16, China is party to the United Nations Committee on the Peaceful Uses of Outer Space.[7]

China's advocating international cooperation could be a form of putting on a "friendly" face for the rest of the world, intended to assure potential competitors, such as the U.S., of China's peaceful space ambitions. However, years of politically charged debate in the U.S. and conflicted trade relations between the two nations have often called into question the accuracy and legitimacy of these claims, especially in the eyes of some U.S. policymakers. In addition, it is important to bear in mind that U.S. policymakers have criticized China's dubious human rights record, lack of free speech and democracy, and geopolitical conflicts with Taiwan, the South China Sea, and Tibet as reasons to avoid space cooperation or trade.

In the U.S. arena, some worry that the military organization and track record of the Chinese space program lessen the possibility for future cooperation on the outer space front between the U.S. and China, or even preclude cooperation altogether. Concerning perceived military threats, China's vague and imprecise policies and unwillingness to fully divulge the details of its launch activities have resulted in surprises for the international space community. Such surprises serve as sobering reminders of the necessity for either increased space cooperation or increased communication with China on its outer space interests.

[6] CNSA: China's Space Activities (2003 White Paper)
[7] United Nations Office for Outer Space Affairs: "Committee on the Peaceful Uses of Outer Space" <http://www.oosa.unvienna.org/oosa/en/COPUOS/members.html>

Specifically, China's launch of an ASAT (anti-satellite) missile in 2007 was not only an illustration of Chinese technological prowess, but to some it also symbolized the potential for other, perhaps more threatening space activity in years to come. The 2007 ASAT launch, which resulted in the destruction of an outdated meteorological satellite, was not registered with the United Nations Register of Objects Launched into Outer Space,[8] and thus this surprise launch and its unintended aftermath shocked the international community. The rashly planned testing created an enormous amount of space debris, calling into question the stability, planning, and motives of the Chinese ASAT program. According to a National Aeronautics and Space Administration (NASA) assessment, China's 2007 ASAT testing and the communication satellite's resulting destruction produced an overwhelming amount of space debris, overall increasing the amount of space debris circling the Earth by ten percent-more than half of the total debris produced by all countries that year.[9] For this reason, some speculation and questioning of China's motives is justified, and many have wondered how such surprises might be prevented in the future.

In addition to the 2007 ASAT testing, trade and export policies concerning dual-use technologies have also influenced the development of the U.S.-China space relationship. Some, such as 10th District of Virginia Republican Congressman Frank R. Wolf, posit that the United States and China should exchange no technology or space-related materials because of their potential military applications. Congressman Wolf believes that the recent cuts to NASA's budget "clear the way for Chinese dominance in space" and remove America's competitive edge.[10] Additionally, in a letter to NASA Administrator Charles F.

[8] United Nations: "United Nations Register of Objects Launched into Outer Space: Notifications from China (Launch Year 1976-present)," 2012
[9] Bruce W. MacDonald: *China, Space Weapons and U.S. Security*, 2008
[10] Frank R. Wolf: "Statement on the FY11 NASA Budget Proposal," February 2010

Bolden, Jr., Congressman Wolf stated, "I remain ardently opposed to any cooperation with the Chinese and will work to stop the implementation of any U.S.-Chinese human spaceflight programs or information-sharing agreements."[11] While the nature of dual-use technology exports will be explored in greater detail in Chapter Four, finding the right balance between cooperation, competition, and promoting national security must remain a key priority in negotiations moving forward.

In 1998, Joan Johnson-Freese published a book, *The Chinese Space Program: A Mystery Within a Maze* that analyzed the Chinese space program's progress and potential in great detail. However, in the fifteen years since that book's publication, much has changed for the now vastly improved Chinese space program. In its new, technologically superior form, the Chinese space program has accomplished much in the fields of international cooperation, space station development and human spaceflight. In this thesis, I examine whether Freese's conclusions from the late 1990s still hold today, and will adapt those findings the comparatively much more complex U.S.-China relationship of the 21st century.

Building a Thesis: Research and Methodology

My thesis utilizes a qualitative method of research to evaluate the U.S.-China space relationship and predict the future possibilities for space cooperation. Drawing from existing Chinese and U.S. official statements, congressional research, laws and legal analysis, political analysis, and events from the mainstream news within the past decade, I will attempt to evaluate the U.S. and Chinese space programs with a multifaceted approach.

[11] Congressman Frank Wolf: "Letter to NASA Administrator Charles Bolden," October 2010

The U.S.-China relationship is already a complex one based largely on misunderstandings, cultural differences, and sometimes-hostile trade policy. Because of this, I analyze the existing policies of both countries concerning space exploration and their views on the sharing of dual-use technologies, and also look at how those policies have influenced past, present, and future space efforts. Also, I examine public documents and statements made by influential players in the CCP and in the U.S. system, paying close attention to the wording and depiction of the U.S.-China space relationship as implied in these comments. In addition, in order to further strengthen my characterization of the U.S.-China space relationship, I examine the cultural, technological, legal and political barriers to U.S.-China space cooperation.

The thesis is divided into five chapters. In order to fully explore the extent of U.S.-China space cooperation in the past and present, as well as the implications of this space relationship, Chapter Two provides a concise historical overview of the U.S. and Chinese space programs, focusing mainly on substantial differences in structure, organization, and international cooperative efforts. Included in this section are a comparative timeline of the accomplishments of the two space programs, as well as commentary on the historical framework and political environment surrounding the development of each. The present and future goals for both programs are examined in the context of their potential for cooperation.

Chapter Three characterizes the legal, political, and cultural environment of space cooperation, beginning with an overview of space laws, policies, and agreements regulating the peaceful and cooperative use of outer space. Chapter Three also addresses the influence of U.S. politics on space cooperation, and answers the question of whether China even wants to cooperate with the U.S. in outer space. Included in this analysis will be examples of past

and ongoing cooperation attempts between the United States and China. Finally, another crucial component of Chapter Three will be an analysis of the cultural and social framework for cooperation between the United States and China on outer space exploration.

Chapter Four details important barriers to U.S.-China space cooperation from a national security perspective. To deepen understanding of the uncertainties of cooperation with China on space exploration, this section further examines U.S. space legislation and China's lack thereof. Also incorporated into this section are technological barriers to U.S.-China space cooperation, specifically the 2007 ASAT testing and the problems arising from trading in potentially dual-use space technologies.

Finally, Chapter Five presents the future outlook for the U.S.-China space relationship. A brief comparison to the U.S.-USSR space relationship is followed by a detailed examination of various potential avenues to cooperation and the possible benefits and challenges of each option. According to my research, limited cooperation, specifically in the forms of commercial satellite launch interaction and increased space policy dialogue, between the United States and China is not only possible, but perhaps politically necessary for a variety of strategic reasons.

The Political Climate of Today's Space Policy

When examining the context and possibilities for cooperation between the U.S. and China, it is necessary to first note the policies and politics surrounding the issue. This sort of discourse, however, can quickly become embroiled in groundless accusations and changed subjects. Nevertheless, it is worthwhile to preface my research findings with a brief overview of the perspective on cooperation from both sides of the Pacific

Existing literature on the U.S.-China space relationship and contemporary space policy politics has led me to conclude that the relationship in its current state can be loosely defined as a sort of "competitive, uneven rivalry " with some potential for growth into a more cooperative relationship in the short- and long-term future. In addition, I believe that improving channels of communication between the U.S. and China on space exploration will benefit both parties and should be seen as a policy goal, regardless of national security or human rights concerns to the contrary. More on U.S. and Chinese political background and the controversy surrounding space activities will be discussed in Chapters Three and Four.

Projections for the U.S.-China Space Relationship

Cooperation with China on space exploration would benefit the United States in a variety of ways. Those who might wish to characterize the U.S.-China space relationship as some sort of more symbiotic partnership, including mutual understanding on both fronts, will note that the U.S. has nothing to lose in participating in cooperative space exploration. At the same time, those who may distrust the Chinese and their motives and emphasize national security concerns should also note a potential benefit to increased space interaction between Washington and Beijing. To quote Joan Johnson-Freese, a professor of national security affairs at the Naval War College:

> If one believes that China and the United States are not inherently enemies, then working together on space projects -- with technology transfer controls -- will benefit both countries. If one believes that China is inherently a threat to the United States, then the adage "keep your friends close and your enemies closer" comes to mind. The script for U.S.-China relations -- and space relations in particular -- is constantly evolving. The United States can

> influence the direction, but only if we engage and persuade the Chinese to engage with us. It's one way of preventing a scenario of a galactic Wild West in which China has become the world's leader in space.[12]

According to Freese, cooperation between the United States and China can and will bring a variety of benefits to both sides of the Pacific partnership. Specifically, the U.S. could gain from China's recently increased space budget and its potential for voluntary cooperation. What must be examined next is the capability of China in space, the motivations for cooperation on both fronts, and the necessity or possibility of increased communication between the United States and China regarding space activities. The relationship is dependent upon a variety of historical, economic, communicative and national security-related barriers.

Few would argue with the claim that the current geopolitical relationship between the United States and China is highly complex, with a wide variety of social, economic, cultural and ideological differences separating the two superpowers by a wider margin than the Pacific Ocean itself. Within the scope of the overarching East-West relationship in its current form, cooperation on international trade issues, human rights concerns, and the proper place for military expansion might seem more immediate concerns than outer space exploration. However, national security concerns and the desire to increase communication between the U.S. and China should convince U.S. policymakers that cooperation would prove much more productive than harmful for the United States. Regardless of large-scale differences between the two powers, I believe that the ability to cooperate on space exploration would benefit the United States.

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[12] Abbey, George and Leroy Chiao. "Time for the US to Partner with China on Space?" Discovery News: <http://news.discovery.com/space/opinion-nasa-partner-china-politics-spaceflight-gap-121127.html>

I therefore largely agree with Johnson-Freese's characterization of the future relationship between the U.S. and China on outer space exploration. Any form of constructive, cooperative relationship between the two superpowers will result in increased communication, fewer international surprises such as the 2007 ASAT testing, and a lessened potential for large-scale political or trade malevolence in the short term. While the two nations' space ambitions are still somewhat unclear in the long term, I believe that for now it is in the best interest of the United States to seek to build the basis for a positive, but limited working relationship with China on outer space. Preventing the transfer of dual-use technologies, as well as creating new and improved outlets for increased bilateral communication, will serve to deepen trust between the innately suspicious United States and China.

However, it is also important to acknowledge the reality of today's environment for space cooperation. On the U.S. side, short-term budget cuts and congressional actions will in all likelihood severely limit the prospect for cooperation. Any cooperative efforts must be viewed as long-term goals rather than short-term possibilities. In Chapter Five of this thesis, I will analyze possible avenues for cooperation and their likelihood in both the short term and the long term. It is key to note that the many barriers to U.S.-China cooperation must be navigated and taken into consideration before any positive cooperative framework can take place.

Chapter Two: *An Overview of the U.S. and Chinese Space Programs*

U.S. Space Accomplishments and Significant Space Cooperation

On October 4, 1957, the USSR successfully launched Sputnik 1, the world's first artificial satellite, into orbit. This event single-handedly shocked the world and catalyzed the U.S. space program into action. After the passage of the National Aeronautics and Space Act of 1958, history was made through the successes of the *Mercury*, *Gemini* and *Apollo* programs. The culmination of human aerospace efforts occurred on July 20, 1969, with Neil Armstrong's epic "small step" on the moon. Further post-Apollo missions included Skylab, the Apollo-Soyuz test program, and the Space Shuttle, which was in operation from 1982 through August 2011.[13]

An important side note in the master narrative of U.S. space activity was the Apollo-Soyuz test program. This episode illustrated the willingness and ability for sworn enemies, United States and the Soviet Union, to reach a common understanding on space exploration even at the height of the Cold War. According to the NASA History Office, this "final flight of the Apollo program was the first spaceflight in which spacecraft from different nations docked in space."[14] In July 1975, a U.S. Apollo spacecraft carrying a crew of three docked with a Russian Soyuz spacecraft with its crew of two. After docking, the crews collaborated on several experiments over a two-day period, and eventually returned to Earth successfully. At the same time that China was embroiled in the Cultural Revolution, two enemy powers found the political willpower to work the first-ever joint mission in outer space. Today, the

[13] http://www.space.com/12804-nasa-space-shuttle-program-officially-ends.html
[14] Redmond, Charles. "The Flight of Apollo-Soyuz." NASA History Office. Oct. 22, 2004. Web. 20 February 2013. <http://history.nasa.gov/apollo/apsoyhist.html>

Russians are an integral component to the International Space Station effort, and as of 2009 the Russian Soyuz spacecraft is responsible for the transport of U.S. astronauts to and from the ISS.

The International Space Station merits discussion on its own as stark evidence that international cooperation is not only conceivable, but works. The ISS is a collaborative effort with fifteen participating nations, with the United States, Russia, Europe, Japan, and Canada at its forefront. The ISS was originally designed for during the cold war with competition in mind, enabling the U.S. and its allies to "demonstrate technical superiority over the U.S.S.R"[15] through the 1988 International Space Station (ISS) Intergovernmental Agreement. After the dissolution of the Soviet Union, the ISS instead evolved into a peaceful, civilian outlet for the U.S. and Russia to make use of significant space resources and capabilities. Today, the collaborative effort is even considering opening its doors to new space powers such as China. In 2012, Jean-Jacques Dordain, director of the European Space Agency (ESA), said he hopes the International Space Station partnership would be open, adding it would benefit from co-operation with China: "I am in favour of seeing how we can work together with China… It will take some steps, but it will come, I am sure… [the ISS] is not a closed partnership, it is an open partnership and anyone who can help support this partnership is more than welcome."[16] The United States also presented a polite refutation to potential Chinese involvement with the ISS. According to NASA Administrator Charles Bolden, "NASA is an organization that looks at international co-operation, but it's prohibited by Congressional action from any bilateral activities with

[15] Joanne Gabrynowicz. "The Meaning of Mars." E-International Relations. Sep. 15, 2012. Web. 3 Dec 2012.
[16] Rakobowchuk, Peter. "Some space station partners appear ready to welcome China into the group." The Canadian Press. GlobalMontreal.com. Mar 1, 2012. Web. Feb 20, 2013.

China."[17] In addition, Bolden expressed his hope that "the space partners will continue their conversations with the Chinese — and if a relationship does develop, it's a peaceful one."[18] However, there is little hope for adding China to the ISS in the short term. The Congressional action to which Administrator Bolden refers above is Section 1340 of NASA's 2011 budget, which prohibited NASA and the White House Office of Science and Technology Policy (OSTP) from spending funds to "develop, design, plan, promulgate, implement, or execute a bilateral policy, program, order, or contract of any kind to participate, collaborate, or coordinate bilaterally in any way with China or any Chinese-owned company."[19] Section 1340 also prohibits the hosting of "official Chinese visitors" at any NASA facility.[20]

A History of China in Space

China's Space Origins: Qian Xuesen, Military Motives and the Cultural Revolution

In stark contrast to the United States, the Chinese history in space has continually displayed a more relativistic, long-term approach, and space activities and launches developed slowly. At the same time, Chinese space activities are backed by both the funding and the strategic vision to continue steadily throughout the next decade. Where the United States has diverted funding away from outer space research and exploration toward domestic economic issues and wars in the Middle East, the Chinese have not only increased the controlled number and frequency of space launches, but also steadily increased military and

[17] Rakobowchuk 2012
[18] Rakobowchuk 2012
[19] Joan Johnson-Freese. "US-China Space Cooperation: Congress' Pointless Lockdown." 10 Jun 2011. Web. <http://www.chinausfocus.com/peace-security/us-china-space-cooperation-congress%E2%80%99-pointless-lockdown/>
[20] Johnson-Freese 2011

space spending. However, truly understanding the Chinese space program necessitates an understanding of its beginnings, development, and future outlook. Only by understanding the developmental history of the Chinese space program can we begin to predict its potential for cooperation or even interaction with the United States. From the 1950s onward, the Chinese space saga has been a gradual transition from military to civilian, from missiles to human spaceflight and exploration.

No discussion of China's foray into long-range missile development and eventual outer space exploration is complete without mentioning the Chinese-born rocket scientist Qian Xuesen, who during World War II extensively aided the United States in the research and development of missiles. A graduate and research fellow at the California Institute of Technology, Qian actually aided in a U.S.-led survey of the German missile industry after World War II and even actively sought U.S. citizenship at war's end. However, in what was perhaps one of the greatest mistakes of 1950s McCarthyism, Qian was instead denied citizenship as a suspected Communist and placed under house arrest for a period of five years, despite a complete lack of evidence against him.[21] He eventually escaped across the Pacific back to China, where he proceeded to become one of the most influential scientists in the nation and become known as the "father of Chinese astrophysics." Due to his rather understandable sense of betrayal by the United States, Qian came to play a pivotal role in China's foray into long-range ballistic missile development and eventually headed the Chinese artificial satellite and ICBM programs.[22]

The earliest relevant example of Chinese space cooperation could be considered China-Soviet space cooperation. In the early years of Chinese missile development, in

[21] Joan Johnson-Freese, *The Chinese Space Program: A Mystery Within a Maze*, 1996:
[22] Feng Feng(冯凤), Professor at Zhejiang University of Technology, "Qian Xuesen," 2012. Trans. Jessica Sewell, 2012

addition to Qian Xuesen, Soviet advisors stationed in Beijing also aided Chinese scientists in the development of a rudimentary missile program designed to counter the perceived threat coming from a U.S. "enemy" armed with nuclear warheads and ICBMs. According to Joan Johnson-Freese, the Chinese space program was indeed initially founded as an integral component of Chinese Cold War defense policy. This militaristic aspect is evident in Chinese descriptions of the early space program: "Especially the development of the ballistic surface-to-surface missiles laid a foundation for the development of space launch vehicles."[23] Missiles were researched as a stepping-stone towards militarized outer space capability and ICBMs. To respond to a perceived U.S. nuclear threat, weapons research and missile development were "juxtaposed and singular" in a single strategic program[24] led by the Fifth Academy, a research and development initiative that in 1958 merged into the National Defense Science, Technology and Industry Commission (NDSTIC).

From the beginning, the Chinese space program was military on an organizational level. This is evident in the fact that the Chinese Central Military Commission, a branch within the Chinese Defense Ministry, funded NDSTIC. The Fifth Academy first worked with live missiles through the Soviet aid through the secret transfer of Soviet R-1 and R-2 missiles to China, which were received in 1956 and 1957 respectively. However, after the Soviets launched Sputnik in 1957, Chairman Mao Zedong changed the trajectory of the Fifth Academy toward satellite research and development while maintaining the military missile development focus. The *Dong Fang Hong* series of satellites began in this manner.

Around the same time, the *Dong Feng*-2 (DF, or East Wind) was designed as a short-range ballistic missile capable of reaching Japan and built on the basis of Soviet technology.

[23] Zhang Xinzhai, "The Achievements and the Future of the Development of China's Space Technology," Aerospace China, Summer 1996, 22
[24] Joan Johnson-Freese, *The Chinese Space Program: A Mystery Within a Maze*, 1996:

The Dong Feng missile program, which began in 1958, was a stepping-stone program designed to eventually create ICBMs capable of reaching the United States.[25] The first Chinese Intermediate-Range Ballistic Missile (IRBM), the DF-3, was designed by Qian Xuesen himself[26] and had a range capable of targeting U.S. bases in the Philippines. The subsequent DF-4 and DF-5 would be capable of hitting Guam and the U.S. West Coast. Here, at the height of the Cold War, the military implications of the Chinese space program as a military deterrent were increasingly evident, and the mere idea of international cooperation with the non-Red West entirely untenable. It is clear in retrospect that the Chinese space and missile initiatives were military or quasi-military in nature; even those individuals working in missile factories in the 1950s through the mid-1960s wore PLA uniforms.[27]

In 1960, the Soviet Union broke with China, largely due to the fact that Mao had released statements welcoming nuclear war and Khrushchev wanted nothing to do with that.[28] Around that time, China began an indigenous missile program under the series CSS (Chinese surface-to-surface, or 地对地 missiles) that would later serve as a platform for the Chinese civil-application launch series, the Long March rockets. In 1965, the DF-2A, China's first guided missile, was successfully launched.

As stunning as these achievements might seem, given their timescale relative to the Soviet and U.S. space programs, this transient success was to be cut short. The chaos of China's Cultural Revolution, specifically beginning in 1966, "obliterated" China's space

[25] Johnson-Freese, 1996: 47
[26] Feng Feng(冯风), Professor at Zhejiang University of Technology: "The Dong Fang Missile Series and the Fifth Academy," 2012. Trans. Jessica Sewell, 2012
[27] Joan Johnson-Freese. *The Chinese Space Program: A Mystery Within a Maze*, 1996: 45
[28] Mao Zedong on the prospect of nuclear war (1957): "We may lose more than three hundred million people. So what? War is war. The years will pass and we'll get to work producing more babies."

advancements of the 1960s.[29] Mao Zedong's Red Guards, who particularly targeted engineers and scientists as "bourgeois" intelligentsia, wiped out entire groups of space workers and scientists.[30] In 1968, a distinguished metallurgist and head of the Beijing Research Institute of Materials Technology, Yau Tongbin, was beaten to death by Red Guards. The late 1960s and early 1970s witnessed enormous devastation on a national level, and the Chinese space program was not excluded from the persecution and fighting. This political climate had a destructive influence on the development of launch vehicles. In the words of an individual responsible for aerospace systems at the time, Zhang Aiping, the CZ launch vehicle program in the early 1970s was "born in troubled times and inherently deficient."[31]

However, with some government protective details, the first Chinese artificial satellite was somehow successfully launched in 1970 on a Long March 1 (LM-1, or 长征一号) rocket. China's first scientific satellite was launched the next year, also on an LM-1.[32] In 1975, China even achieved the landmark of launching its first recoverable satellite, or *Fanhui Shi Weixing* (FSW).[33]

A Space Program in Transition: Recovery, Civilian Development and International Cooperation

After the chaos of the Cultural Revolution, China began a structured foray into civilian space technology and exploration. The first communication satellite program was initiated in the early 1970s, and the political environment for cooperation between China

[29] Johnson-Freese, 1996: 48
[30] Feng Feng. "The Cultural Revolution and Chinese Space Development," Spring 2012. Trans. Jessica Sewell
[31] Ibid.
[32] Johnson-Freese, 1996: 54
[33] Feng Feng. "The Cultural Revolution and Chinese Space Development," Spring 2012. Trans. Jessica Sewell

and the West became somewhat more favorable after President Nixon visited China in 1972. In 1978 China, in its first instance of international space cooperation with a nation other than the U.S.S.R., used the Franco-German Symphonie satellite to conduct transmissions tests for telephone and media purposes. At the same time, simultaneous military and civilian efforts through the (military) Shanghai Bureau of Astronautics and the (civilian) First Academy in Beijing worked on a dual-use DF-5 ICBM/satellite launch vehicle.[34] The civilian use, or LM-2, was comparatively more successful and led to the development of the LM-3, capable of launching geostationary satellites. The LM-3 was successfully launched out of the Xichang Space Launch Center (XSLC) in Sichuan Province. LM-3 was soon followed by the LM-4, which used storable propellants and has been used ever since to launch meteorological satellites.

In 1985, the civilian aspects of the Chinese space program were made into a higher priority. Satellite communications became a high government priority, and the civilian-natured LM-2E provided launch vehicle capable of entering low-Earth orbit. China researched three main varieties of satellite technology, which are still in use today: recoverable scientific exploratory technological experimental satellites (LM-2), DFH-series communication and broadcast satellites (LM-3, originally launched in 1986), and satellites for physical exploration.[35]

The "civilianization" and commercialization of China's space program is directly attributable to Deng Xiaoping's policy of "Reformation and Opening Up," known in China as *gaige kaifang*, which was set forth in March of 1978. As a direct result of the Reformation and Opening Up policy, Chinese defense industry and space sectors were

[34] Joan Johnson-Freese. *The Chinese Space Program: A Mystery Within A Maze*, 1996: 49
[35] Johnson-Freese, 1996: 52

required to focus on economic growth and development. State-owned space industries witnessed immediate budget cuts, moving much space technology into the private sector.[36]

The commercialization of the Chinese space industry and its opening up to the outside world began in full in 1985, when the Long March series was made available on the international market. As a result, commercial international cooperation became a space reality for the Chinese. The Chinese commercial space launch industry witnessed varying degrees of success in the early 1990s, due in part to increased international trade controls, and more importantly to a relatively high number of launch failures which lessened consumer confidence in the LM launch vehicle. Despite a tense political atmosphere, Western economic sanctions, and international outcry following the Chinese government's crackdown on student protesters in *Tian'anmen* Square in 1989, the early 1990s witnessed successful international cooperative efforts between China and foreign partners.

The Australian Aussat program "set the precedent for launching foreign spacecraft in China."[37] The first takers on the LM launch vehicle were the Australian "Aussat" and the British-Chinese collaborative AsiaSat satellite-launch programs. In 1990, AsiaSat-1 was launched successfully on a LM-3 rocket, officially bringing China into the commercial satellite launch sector. The AsiaSat program was a collaborative effort between British and Chinese, sponsored by a joint venture known as Asia Satellite Telecommunications that was formed by China International Trust and Investment Corporation (CITIC), the British Cable and Wireless PLC, and the Hong Kong Huchison Whampoa Limited.[38] Some western powers felt economically threatened by the comparatively cheaper LM launch vehicle, so

[36] Johnson-Freese, 1996: 54
[37] Johnson-Freese, 1996: 82
[38] Johnson-Freese, 1996: 77

under threat of trade sanctions, the Chinese launch service negotiated a pricing and launch frequency Memorandum of Agreement to take effect from 1988 to 1994.

In November 1988, the Great Wall Corporation in signed a deal with the Australian Hugh Corporation to launch the "Aussat" commercial satellite on a newly redesigned CZ-2 launch vehicle.[39] The Aussat manager responsible for negotiating the deal described the process of launching cooperatively with China, displaying "illustrating attitudes and philosophies which can still come into play if so deemed appropriate by the United States in response to what it considers actions which could contribute to proliferation,"[40] namely the launch, and thereby "transfer," of potentially dual-use Western satellite technology. Worried about the potential transfer of Western dual-use technologies to China, the United States began to implement trade restrictions on China through the Office of Defense Trade Controls (OTDC) in the 1990s. In addition, the U.S. pressured China to adhere to the Missile Technology Control Regime (MTCR), a policy originally announced in 1987 by seven governments desiring to limit the spread of nuclear missile capability.[41]

A small degree of U.S.-China satellite launch cooperation occurred in the 1990s. After the CZ-2's successful initial launch in 1992, research began into the CZ-3B, China's highest-thrust rocket that would be ready to launch satellites by 1997. In 1993, China agreed to launch six iridium satellites for the U.S. Motorola Corporation.[42] The satellites were successfully launched in 1997 on a CZ-2C launch vehicle. In August 1997, the Chinese CZ-3B launch vehicle launched the U.S. "Laura" Company-made Philippine satellite into orbit, and launched a second satellite two months later. These successful

[39] Feng Feng, "Ministry of Space Industry Developments," Spring 2012. Trans. Jessica Sewell, Fall 2012
[40] Joan Johnson-Freese, *The Chinese Space Program: A Mystery Within A Maze*, 1996: 81
[41] Johnson-Freese, 1996: 81
[42] Feng Feng, "The Chinese Aerospace Science and Technology Corporation," 2012. Trans. Jessica Sewell, Fall 2012

launches reaffirmed foreign investors of the reliability of the CZ series[43] and could set a precedent for future commercial space interaction between the U.S. and China.

The Twenty-First Century and Human Spaceflight

China has made "steady, although unremarkable progress"[44] in human space exploration since the successful spaceflight of the first taikonaut[45] Yang Liwei on October 15, 2003.[46] The *Shenzhou* (SZ) series of space launch vehicles originated in the 1990s and was built on the basis of the CZ-5. SZ-6 sent two Chinese taikonauts into orbit on a five-day mission in October 2005. SZ-7 launched in September 2008 and introduced China to extra-vehicular "spacewalk" activities.[47]

Construction of China's *Tiangong* (TG), or "Heavenly Palace" space laboratory began on September 29, 2011 with the launch of the TG-1 capsule on a LM-2 rocket.[48] The *Tiangong* program emerged as a response to China's exclusion from the International Space Station (ISS) project. TG-1 will be followed by two larger space laboratories, TG-2 and TG-3, together creating a functioning space station. In June 2012, the SZ-9 was launched from the Jiuquan Satellite Launch Center (JSLC) in Inner Mongolia, bringing a crew of three Chinese taikonauts to dock with TG-1 in China's first human space docking.[49] Notably, however, Chinese *Shenzhou* spacecraft are fitted with the correct rendezvous and

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[43] Feng Feng, "The Chinese Aerospace Science and Technology Corporation," 2012. Trans. Jessica Sewell, 2012

[44] Logan, Jeffrey: "China's Space Program: Options for U.S.-China Cooperation." CRS Reports for Congress, 2008

[45] The term "taikonaut" is frequently used in English-language documents to distinguish Chinese space explorers from astronauts and cosmonauts. The Chinese equivalent is *yuhangyuan* (宇航员), or the more formal *hangtianyuan* (航天员).

[46] Logan, 2008

[47] Logan, 2008

[48] David, Leonard. "China Details Ambitious Space Station Goals." Space.com. 7 Mar 2011. Web. 20 Feb 2013. <http://www.space.com/11048-china-space-station-plans-details.html

[49] Amos, John. "Shenzhou-9 Docks with Tiangong-1." BBC World News. 18 Jun 2012. Web. <http://www.bbc.co.uk/news/science-environment-18481806>

docking technology to dock at the ISS,[50] should China's inclusion in that multinational collaborative effort become a reality in the future. In addition to the human spaceflight program, China in the 2000s also began launching lunar probes, quite possibly laying the foundation for future lunar exploration.

Implications of Contrasting Spaceflight Histories for a Collaborative Future

The trajectories of the two space programs seemingly fail to align, and both have differing strengths and weaknesses. For the Chinese, the lack of a solid legal framework[51] for space development and technological inferiority to more established space powers, as well as decades of political turmoil in the form of the Cultural Revolution and *gaige kaifang*, have slowed the growth and development of space activities. At the same time, the Chinese have steadily poured funds into their space activities, and the PRC government still overwhelmingly financially supports the space industry. Each of China's launches, to China, represents an embodiment of Chinese national pride. For this reason, it is unlikely that China will choose to defund space activities in the near term and will likely maintain the level of budgetary commitment necessary to continue more ambitious space developments in the future- possibly even cooperation with the U.S.

Conversely for the U.S., domestic economic woes and politics have slowed space developments and international cooperation, although some developments are still taking place. Specifically, the March 2013 economic sequester seriously drained the budgets of government agencies and might threaten the long-term outlook for more ambitious NASA

[50] Logan, 2008
[51] Yongliang, Qi. 33 Journal of Space Law 405 (2007)

missions. Despite these economic challenges, however, international cooperation is still happening. For example, the International Space Station is still being funded, and since cooperation budgets are allocated years in advance, than any sequestration impact on international space cooperation is in the future. At the same time, a new policy directive in the U.S. today is to transfer much of space launch activities to the private sector through commercial firms such as SpaceX.

The long-term goals of the Chinese program, contrasted with the short-term nature of U.S. space interests, combine to form an interesting blend of perspectives. Both space programs have track records of international cooperation and have the potential to cooperate in the future if what the Chinese prefer to call "mutual benefit" is to be achieved. The Chinese in the past have exploited ties with the former Soviet Union to the benefit of their space program during times of Russian financial duress, mainly because they possessed the capital and backbone necessary to acquire necessary space technologies. Because of this, the U.S. might quite correctly fear that the Chinese will acquire too much of U.S. space technology since such a trade might not be mutually beneficial. China could stand to gain much on both a civilian and military level if the U.S. is willing to provide the right technologies.

While the Chinese space program's military origins might flash a glaring red light in the face of some U.S. policymakers today, the current model of the program, as opposed to its Cold-War-era form, instead blends civilian and military organization. Unlike the U.S. space program, however, military and civilian components are interrelated from the research and development stage onward, making distinction between military and civilian aspects of the program difficult. It is quite possible that the Chinese today use civilian-use space

technologies for Chinese military development purposes, which for some blurs the lines defining exactly the Chinese intend for their space program's future, and deters cooperation from the standpoint of national defense. However, further research displays that despite the ambiguity surrounding China's space development and probable goals, there is still reason to believe that cooperation between the United States and China is possible as a long-term goal.

Chapter Three: *The Legal, Political, and Cultural Environment of Space Cooperation*

Introduction to Space Laws, Policies, and Agreements

Outer space is loosely defined as the void between celestial bodies, without specific lines of demarcation.[52] From a legal perspective, the U.S. Department of State Legal Subcommittee on the Peaceful Uses of Outer Space further indicated, "defining or delimiting outer space is not necessary."[53] The exploration and potential for ownership of outer space and celestial bodies, while occasionally subject to debate, have been formally established through United Nations treaties. These UN treaties, coupled with individual nations' treatises on outer space exploration, form the foundations of international space law.

Space laws regulate space activities, maintain a peaceful space environment, and hold space powers to uniform international standards. Therefore, at least a surface-level understanding of international space law is necessary in examining the Chinese space program and the potential for peaceful cooperation between the United States and China. With regard to an international legal framework regulating space use and exploration, what are the international legal guidelines on outer space exploration, and has China abided by those guidelines? In my understanding, and with the exception of the 2007 ASAT testing,

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[52] Dainton, Barry (2001), "Conceptions of Void", *Time and space*, McGill-Queen's Press. Google Books. 18 Feb 2013. <http://books.google.com/books>

[53] United States. Dept. of State. Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space. "U.S. Statement, Definition and Delimitation of Outer Space And The Character And Utilization Of The Geostationary Orbit," Digest on International Space Law, April 2001. <http://www.state.gov/s/l/22718.htm>

the answer to these questions is a hesitant yes. According to existing international space law, space is not sovereign territory. Furthermore, every country that is a State Party to the Outer Space Treaty and that is capable of producing or purchasing the necessary technologies has the right to peacefully use and explore outer space. These two pivotal guidelines were originally laid out in the United Nations Outer Space Treaty, signed December 19, 1966. Article I of the United Nations' 2222 (XXI) "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies," more commonly known as the Outer Space Treaty, states: "Outer space, including the moon and other celestial bodies, shall be free for exploration and use by all States without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies."[54] Thus, every country that has ratified the Outer Space Treaty has the right to peacefully explore outer space, the moon, and other celestial objects without fear of censure or discrimination. Likewise, China, like the United States, is a State Party to the treaty and has every legal right to use and explore space in the first place.

In turn, Article II indicates, "outer space, including the moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[55] This language should be enough to deter those who claim that China means to use its space program to somehow take over the moon or Mars. Even if China were to defy the United Nations and lay claim to territories in outer space, doing so would be a violation of existing space law and would create an international legal nightmare for China, the United Nations, and space policymakers worldwide. At present, it

[54] Outer Space Treaty, UNOOSA.org
[55] Outer Space Treaty, UNOOSA.org

seems apparent that China lacks both the technology and the willpower to attempt to territorialize the moon or any other outer space object, such as an asteroid. It is important to keep in mind that even colonizing the moon would fall outside of UN guidelines, since doing so would qualify as "occupation" under Article II of the Outer Space Treaty. Should China wisely choose to abide by existing space law and truly intend to maintain a peaceful, cooperative presence in outer space, the Outer Space Treaty guarantees both China's right to explore and use outer space and reiterates the international community's opposition to territorial motives in space.

Military presence and personnel in space are permissible but restricted by Article IV of the Outer Space Treaty. According to the Treaty, "the establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden."[56] At the same time, the "use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited."[57] Therefore, the military structural organization of the Chinese space program is legally permissible from an international standpoint.

China also has the right to launch and maintain orbital satellites, as long as such launches are registered and documented accordingly. In regards to the launch of orbital satellites, the UN Committee on the Peaceful Uses of Outer Space (Report of the Legal Subcommittee on its forty-fifth session, held in Vienna from 3 to 13 April 2006) says specifically, "the use of the geostationary orbit, which was a limited natural resource,

[56] UNOOSA.org: Outer Space Treaty
[57] UNOOSA.org: Outer Space Treaty

should, in addition to being rational, be made available to all countries" (V.79).[58] The document goes on to confirm "geostationary orbit should be provided to States on equitable conditions" (V.81). Thus, China has the right just like any other country to launch and maintain satellites. Satellite launches, therefore, are a regulated and viable option for space cooperation that falls within the competency of the International Telecommunications Union that operates as part of the UN.

In addition to the UN Outer Space Treaty, China has been a signatory or participant in several other committees and some, but not all agreements regarding space activities. From a historical perspective, China has participated in cooperative committees responsible for space cooperation and the regulation of sensitive exports. China was under Western pressure to adhere to the Missile Technology Control Regime (MTCR) back in the 1980s in order to prevent further missile, or more specifically ICBM, proliferation. As of 2012, the MTCR currently has 34 partners, not including China.[59] China instead accepted status as an informal "adherent" to MTCR principles in the late 1980s, but has yet to pursue full membership in the MTCR.[60] China is also a member of the United Nations 1540 Committee to the Security Council, a committee which deals with the administration of international technology export regulation.[61]

These treaties and legal considerations are pivotal to a deeper examination of the potential, motives, and benefits of increased U.S.-China space cooperation. The fact that both China and the United States are members of the United Nations Security Council and

[58] United Nations Office for Outer Space Affairs. "Report of the Legal Subcommittee on its forty-fifth session, held in Vienna from 3 to 13 April 2006". 2006. Legal Subcommittee: Online Reports. UNOOSA.org. <http://www.oosa.unvienna.org/oosa/COPUOS/Legal/repidx.html>
[59] "MTCR Partners." Missile Technology Control Regime. <http://www.mtcr.info/english/partners.html>
[60] Johnson-Freese, 82
[61] United Nations Security Council. "1540 Committee Composition." Web. <http://www.un.org/en/sc/1540/committee/composition.shtml>

are both party to the same UN agreements concerning space exploration is also crucial to further analysis of the space relationship. If the Chinese choose to venture into internationally unsound space pursuits, they will be held to the same international standard as other UN signatories.

U.S. Politics and Space Cooperation with China

Especially in the U.S., the domestic political environment determines much of space policy, from NASA's funding to the potential for international cooperation. Specifically during the past few years, turmoil and controversy concerning space policy has become increasingly noticeable on the U.S. side. While the Chinese view their space program as a physical embodiment of the ever-growing Chinese presence on the world stage, many U.S. policymakers either ignore the entire space issue or brush it off as an unnecessary expense to be handled by the private sector. In the context of the 2012 Presidential election, this shift was largely due to a parallel shift in energies within the voting public from the Cold War-era goal of U.S. dominance of space to those concerns closer to home, namely, the economy. In the words of *The Space Review* contributor Jeff Foust: "Contrary to the beliefs of some space enthusiasts, space policy simply isn't that important an issue. The [2012 Presidential] election will likely revolve around a few major issues, with the *state of the economy* at the forefront."[62] Politicians, therefore, noted in 2012 that few voters considered space a primary or even secondary concern in their voting decisions, and as such there was little motivation for any of the candidates to focus on space as a policy goal. Instead, they chose to focus more of their resources and attention on those topics, such as job creation, that would "swing

[62] Foust, Jeff. "Space Policy in the Campaign Shadows." *The Space Review: Essays and Commentaries about the Final Frontier*. September, 2012. <http://www.thespacereview.com/article/2149/1>

a larger number of voters."[63] International space cooperation, in this context, would seem even further outside the realm of most policymakers' decisions and essentially remains a nonissue to many in the U.S.

An example of the inhospitable U.S. space policy environment occurred in the lead-up to the Republican primaries in January 2012, when potential candidate Newt Gingrich was scoffed for his ambitious plans for a strengthened NASA with expanded responsibilities and lofty goals. Among other wide-ranging potential accomplishments, Gingrich advocated for the United States to "have the first permanent base on the moon" and by the end of 2020 to create "the first continuous propulsion system in space" capable of allowing humans travel to Mars.[64] Had this debate taken place in the Cold War context of the 1960s and 1970s, surely Gingrich's commentary would have taken hold in the hearts of the U.S. public and garnered support for such policies. However, set against the context of recovery from an economic recession and a much less immediately evident "space race," Gingrich's plans failed to earn him any points in the polls. Instead, a majority of voters, as well as Gingrich's competitor, Republican nominee Mitt Romney, derided Gingrich's plan as "a big idea, but not a good idea" in today's economy.[65]

Nevertheless, the United States would be unwilling to allow China to so easily surpass it entirely in space exploration, and maintenance of "space dominance" remains a hot topic in political discourse, albeit to a somewhat diminished extent. What prevailing political opinions that do exist regarding U.S.-China space relations are often filled with

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[63] Foust, Jeff. "Space Policy in the Campaign Shadows." *The Space Review: Essays and Commentaries about the Final Frontier*. September, 2012. <http://www.thespacereview.com/article/2149/1>
[64] Moe, Alex. "Gingrich Criticizes Romney-Ryan Space Plan." NBC News. http://firstread.nbcnews.com/_news/2012/09/23/14049265-gingrich-criticizes-romney-ryan-space-plan
[65] Moe, Alex. "Gingrich Criticizes Romney-Ryan Space Plan." NBC News. September, 2012. <http://firstread.nbcnews.com/_news/2012/09/23/14049265-gingrich-criticizes-romney-ryan-space-plan>

budgetary constraints and subtle political maneuvering. Most recently, in the lead-up to the 2012 U.S. Presidential election, the competitive atmosphere elicited many politically charged statements regarding NASA's funding and America's future in space. For example, Republican presidential nominee Mitt Romney mentioned space policy and his disagreements with the Obama administration's policy decisions in a white paper released in September 2012, claiming that the President "has failed to deliver a coherent policy for human space exploration and space security."[66]

On the other hand, President Obama also mentioned space policy in a white paper released in September 2012, though his specific remarks focus more on detailing his administration's prior accomplishments rather than providing lucid details on his plans for the U.S. space program, expanded, contracted or otherwise.[67] Interestingly, China was not referenced in his discussion, perhaps as a way to maintain a surface-level "cooperative" front and avoid demonizing the Chinese. Encouraging cooperation between the United States and China on space, even if such cooperation occurs to the most limited of extents, would provide Washington with yet another means of keeping tabs on the Chinese and staying informed of their intentions and goals. It makes sense for Washington to present an outwardly friendly, helpful face to the emerging competitive power of China, regardless of true ambitions. In this light, Barack Obama's win in the November 2012 presidential election is pivotal to the political aspect of my analysis. The Obama victory decided the direction and the ideas that will be implemented in future U.S. space policy, particularly concerning China. For Obama, space is not a top priority. The National Space Policy issued by the Obama Administration played down the importance of NASA and instead laid plans

[66] Romney, Mitt and Paul Ryan. "Securing U.S. Leadership in Space." September, 2012
[67] Obama, Barack. "President Obama's First Term: Key Accomplishments for NASA and Space." September, 2012

to "use commercial space capabilities and services to the maximum practical extent." At the same time, the statement indicated a willingness to increase international cooperative space efforts. The following language laid out in the document indicates a comparatively cooperative attitude. According to the statement, the United States will "pursue" the following goal: "Expand international cooperation on mutually beneficial space activities to: broaden and extend the benefits of space; further the peaceful use of space; and enhance collection and partnership in sharing of space-derived information."[68]

As of Fall 2012, the U.S. "Executive Branch's proposed planetary exploration has been greatly reduced with no Mars missions provided for beyond the 2013 MAVEN orbiter," and in March 2013, failure of Congress to reach a newly balanced budget ushered in additional "massive automatic across-the-board cuts in the defense budget"[69] through the "sequester" that will begin to take effect during fiscal year 2013.

To Obama's credit, and in direct opposition to Gingrich's goals for a strengthened NASA, the President has encouraged many present and future U.S. space efforts to be led by the private sector. At this time, many U.S. space activities are not run entirely by that one big government-funded, centralized department, but instead work as a symbiotic partnership between a smaller NASA and private sector firms. Privatizing aspects of space exploration benefits the U.S. because competition between firms reduces launch costs and stimulates growth. This particular trend also indicates a potential avenue for launch cooperation between the U.S. and China originating in the private sector.

It is also important to note that the sort of political argumentation ongoing between Democrats and Republicans in the United States is not present in Chinese discourse.

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[68] United States. Executive Branch. Office of the President. *The White House*. By Barack Obama. N.p., 28 June 2010. Web. <http://www.whitehouse.gov/sites/default/files/national_space_policy_6-28-10.pdf>.
[69] Joanne Gabrynowicz. "The Meaning of Mars." E-International Relations. Sep. 15, 2012. Web. 3 Dec 2012.

Nevertheless, the murky political environment surrounding China's space activities and China's desire and potential for cooperation merits further discussion in the next section.

Do the Chinese Even Want to Cooperate?

Famed for its opaqueness, the Chinese government has released few official statements regarding outer space, and even fewer space-related political remarks from famed individuals have been publicized. This obscurity has resulted in lack of transparency concerning the Chinese attitude about cooperating with the United States. In examining the potential for U.S.-China space cooperation in the short term, the most pressing question we must ask in regards to China is as follows: do the Chinese even want to cooperate with the U.S. on space exploration? If so, to what extent would they be willing to cooperate? There are reasons to believe that, despite the opaque nature of Chinese political discourse, Beijing wishes to pursue a cooperative space relationship with Washington, either through increased channels of communication or perhaps through even more involved means. It is apparent that China would benefit from cooperation even more than the United States because of China's largely inferior technology, and thus would be very willing to cooperate in some way. At the same time, however, certain exclusions of information, as well as actions undertaken by the Chinese in space, serve as subtle reminders of China's potential reluctance to cooperate.

Most, if not all, of China's publicized speeches and government documents list a desire to increase Chinese involvement in international ventures in some way.[70] An examination of the most recently released Chinese official government documents that

[70] Joan Johnson-Freese. The Chinese Space Program: A Mystery Within a Maze, 1996: 101

mention space cooperation is necessary to discern the PRC government's opinion on cooperation with the United States on space exploration. Chief among these documents is the December 2011 Chinese White Paper entitled "China's Space Activities in 2011,"[71] released by the Information Office of the State Council. This document delineates major Chinese accomplishments in space exploration that took place in the period 2006-2011. It also presents some rather vague goals and ambitions for China in space for the short- and long-term future. Throughout the document, there appears to be an odd collusion of attitudes, including a pervading undercurrent of international cooperation that is interspersed with specific emphases on the independent nature of China in space. For instance, Section V. Item 1, entitled "International Exchanges and Cooperation," outlines the Chinese emphasis on "supporting activities regarding the peaceful use of outer space within the framework of the United Nations," as well as "actively participating in practical international space cooperation."[72]

At the same time, the document stresses the importance of China's "independent development" in which China must "keep to the path of independence and self-reliance"[73] in developing and modernizing the national space industry. There is a nationalistic ring to this "independent" trajectory. If China is capable of independently developing space technologies and is able to participate in space activities without the so-called "meddling" interference or influence of other nations, then Beijing can prove to itself not only the superiority of Chinese space technology, but also, and more importantly the primacy of the CCP. After all, to China space activities largely serve the nationalistic purpose of providing

[71] Boucher, Marc. "China Releases White Paper - China's Space Activities in 2011." *Space Quarterly Magazine*. DBA SpaceRef International Group, 29 Dec. 2011. Web. 20 Oct. 2012.
[72] Boucher
[73] Boucher

a rallying point of popular support for the central government. A government that can enter space without major help from other countries sets itself apart and deserves the people's respect. This nationalistic aspect is integral to further consideration of the potential for U.S.-China space cooperation. The lines between China's desire for independent development and for international cooperation are fuzzy at best. While seemingly contradictory, these twin aspects of Chinese space activities are curiously interwoven.

Dean Cheng, a research fellow at the Heritage Foundation's Asian Studies Center, wrote an editorial for the Washington Times regarding potential motives and results of cooperation between the United States and China. His comments directed at the U.S. in space in regards to China particularly take into account the roles of the conflicting messages of "independent, indigenous development" and "international cooperation":

> Be cautious in engaging in space cooperation and interaction [with China]. Many Americans embrace the idea of international cooperation in space, especially when it comes to manned missions. But China's emphasis on *indigenous development* suggests that Beijing will focus more on political than budgetary burden-sharing. It also suggests that China will pursue technological "cooperation" that favors itself in any joint space ventures, such as demanding establishment of R&D facilities in China and preferential transfers of technology… Cooperation needs to be mutually beneficial.[74]

The juxtaposition of independent development and peaceful international cooperation is key to the understanding of Chinese motives in space. While China certainly wishes to present a peaceful, cooperative façade to the United Nations and the outside world, continued stress on China's capability to develop independently emphasizes the competitive nature of the Chinese space program. The goals and purposes of this message are two-fold. On the one hand, China is using space as a powerful tool for national prestige,

[74] Cheng, Dean. "China's Space Challenge to America." Editorial. *The Washington Times*. N.p., 4 July 2012. Web. 16 Oct. 2012.

emphasizing the necessity and desire for international cooperation as key to advancement of the Chinese space program. On the other hand, China wants to prove that it can pull its weight in the international sphere with or without the assistance of more seasoned space powers. Furthermore, if inputs from other powers are received, China will attempt to manipulate these benefits for its own benefit. Cooperating with China would benefit the U.S. by increasing the level of transparency surrounding this sort of ambiguity in Chinese discourse. However, Cheng's comments indicate the need for the U.S. to tread carefully in regards to cooperating with China. International cooperation should not impede U.S. national interests or result in the transfer of trade secrets.

China has no desire to be seen as a less-developed country trying on the shoes of a superpower; China, instead, wants to be that superpower admired and envied by other nations. To create a sense of heightened national prestige, Item 2 of the 2011 White Paper, "Major Events," discusses many instances of existing international space cooperation attempts that occurred in the period 2006-2011. China emphasizes the necessity for less-developed countries to have access to "inclusive" space development through cooperation with China, and also stresses the need for increased regional space cooperation worldwide. Such language seems to indicate that China is willing to cooperate if cooperation takes place on China's terms, and the Middle Kingdom's national prestige will be elevated as a result. At the same time, China also sets out a detailed list of past cooperative efforts with other nations, emphasizing the necessity of China's cooperation to the successes of those efforts. For example, China signed a long-term cooperation plan with Russia, signed the "Status Quo of China-Europe Space Cooperation and the Cooperation Protocol" with the European Space Agency (ESA), and has established cooperation framework agreements with such

nations as Brazil, France, Britain, Germany and even Venezuela. The tone of this section of the document clearly indicates that China is willing to cooperate with certain countries on space exploration and research if and only if China stands to benefit from the relationship, and mutual benefit might be inferred. However, throughout the "International Exchanges and Cooperation" section, a detailed reference to cooperation with the United States is conspicuously absent. This is likely due to the fact that instances of cooperation between the U.S. and China are so remarkably few.

In the entire official document, mention is made only once of the United States to hint at the potential for an expanded, cooperative relationship. In Section V. Item 2, "Major Events," the U.S. is referenced in terms of major events that "supported international space commercial cooperation." China's only new development in cooperation with the U.S., according to the 2011 White Paper, is as follows: "The director of the U.S. National Aeronautical [sic] and Space Administration (NASA) visited China and the two sides will continue to make dialogue regarding the space field." This statement refers to NASA administrator Bolden's visit to the PRC in October, 2010 to discuss increased communication and cooperation between the U.S. and China on space exploration.[75]

The inclusion of NASA Administrator Bolden's visit in this particular official document is curious. It appears that the Chinese could be making several different statements with this admission of information. First, the phrase "continue to make dialogue" could be construed one of two ways. On the one hand, language that emphasizes *dialogue* as opposed to cooperation, trade, or any other type of stronger relationship is interesting. Perhaps this word "dialogue" should be taken at face value and interpreted literally. The

[75] David, Leonard. "NASA Chief's Trip to China Sparks Controversy." *Space.com*. TechMediaNetwork, 13 Oct. 2010. Web. 07 Feb. 2013. <http://www.space.com/9321-nasa-chief-trip-china-sparks-controversy.html>.

mere mention of dialogue implies speech and communication. Could this emphasis on dialogue as a form of cooperation mean that the Chinese intend to literally somehow strengthen communication between CNSA and NASA on space developments in their respective countries? In this case, communication would serve as a form of cooperation. Hopefully China does intend to improve channels of communication to some extent, since at the very least increased communication could be one of the most beneficial ways that both sides could prevent future international surprises such as the ASAT testing in 2007. Increased communication would aid international space cooperation at the most basic level, and both sides would benefit from this more simple form of cooperation.

On the other hand, it is possible that the emphasis on dialogue does represent something more than the word's literal, dictionary definition. Perhaps dialogue represents some sort of more involved and symbiotic relationship that could theoretically take place between the U.S. and China. The particular choice of words in this one line of "China's Space Activities in 2011" is surprisingly reminiscent of the choice of words selected by President Hu Jintao of the PRC and U.S. President Barack Obama in the "U.S.-China Joint Statement" released during Obama's state visit to China of November 15-18, 2010. Space relations were mentioned briefly in the document, appearing a mere six short paragraphs into the discussion. According to the Joint Statement:

> The United States and China look forward to expanding *discussions* on space science cooperation and starting a *dialogue* on human space flight and space exploration *[emphasis added]*, based on the principles of transparency, reciprocity and mutual benefit. Both sides welcome reciprocal visits of the NASA Administrator and the appropriate Chinese counterpart in 2010.[76]

[76] United States. The White House. Office of the Press Secretary. President Barack Obama and President Hu Jintao, 17 Nov. 2009. Web. 1 Feb. 2013. <http://www.whitehouse.gov/the-press-office/us-china-joint-statement>.

Note the similarities in diction between this joint statement and the 2011 White Paper's stance on U.S.-China cooperation. Again, there is emphasis on communicative language: dialogue, discussions, and visitations are each presented as desirable events and outcomes that would serve to benefit both parties. It seems that these particular words serve to indicate that steps are being taken in pursuit of a deeper cooperative effort between the two powers. Why else would China reference one brief meeting, one that resulted in no new treaties, cooperative frameworks, or joint exploration projects? In doing so, China could be attempting to play up the extent of space exploration interaction taking place with the U.S. and indicate a desire for such interaction to continue to develop.

In fact, the addition of the word "transparency" in the joint statement is also particularly meaningful. "Transparency" is a distinctly Western value, and it is not necessarily valued in the same way in China. That transparency is even mentioned in the Joint Statement is significant, and further serves to communicate the desire for increased collaboration and understanding on both sides of the space relationship. Increasing transparency would benefit the U.S. by providing a clearer insight into what the Chinese are doing in space and why.

At the same time, it is also quite possible to read too much into particular language in these two particular official statements. This is especially true when one takes into account that the documents were at least partially created by the Chinese government, widely known to espouse propaganda and release only that information which might further China's goals, is considered. There exists a distinct probability that the two lines in question in no way reflect on any desire to change existing levels of U.S.-China space cooperation. Since the U.S. space program, while in decline, is still widely regarded worldwide as the leading

competitor in outer space exploration, it would seem odd for the Chinese to ignore the U.S. entirely. From a foreign policy standpoint, it would be much more of a competitive, rather than cooperative, indicator if China were to leave out the United States entirely from the official statement. Perhaps the two-line description of the NASA Administrator's visit was nothing more than lip service to the reigning space superpower and has no bearing on potential cooperation whatsoever. The noticeable contrast in the White Paper between much more intimate cooperative efforts taking place with other countries, compared with little to no cooperation acknowledged between the U.S. and China, could even serve as an indicator of China's perceived independence in regards to the U.S. in outer space development and China's unwillingness to split its share of the space prize with the United States or depend on a foreign power to advance its own goals. It is important to note, in this light, that partly due to their exclusion from the U.S.-led International Space Station effort, the Chinese are building their own space station, *Tian Gong*— another manifestation of "independent development" as an alternative to cooperation with the United States.

However, it seems more likely that the emphasis on dialogue as seen in the 2011 White Paper and the 2009 U.S.-China Joint Statement indicates not only that steps are being taken toward a more cooperative relationship, but that the Chinese genuinely wish to pursue increased communication as a strategic goal. It is very possible that the Chinese would like to increase communication on space policy, further engage the United States, and cooperate more fully in international space commercial cooperation. While the Chinese would likely desire to manipulate any cooperative efforts to China's particular benefit, any steps toward increased international cooperation would improve U.S.-China relations and grant the United States a strategic advantage over China. The mention of the United States in the

2011 White Paper likely serves no purpose other than to indicate the increased potential for further interaction between the U.S. and China on space exploration, improving communication and more.

It is clear that limited cooperation with China could benefit the United States in a variety of ways. However, whether or not China will prove a willing and cooperative partner remains to be seen. While China has successfully entered into cooperative relationships with several European and South American nations, the fact remains that the U.S.-China relationship differs from these relationships on many levels. From an optimistic perspective, past instances of cooperation between the U.S. and other nations and between China and its partners could serve as the foundation for improved space cooperative relations between the United States and China going forward. At the same time, special circumstances in the U.S.-China relationship, such as disagreements over policy, shares of dual-use technology, proliferation and human rights concerns, continue to plague the U.S.-China space relationship.

Past and Ongoing Cooperation Attempts between the U.S. and China

Specific examples of space cooperation efforts between the U.S. and China are fairly limited, but each deserves specific attention in the context of space policy and current affairs. In 1989 and again in 1995, the U.S. and China signed Memoranda of Agreement regarding international trade in commercial launch services.[77] In the 1990s, a "small number

[77] United Nations Office for Outer Space Affairs. "INTERNATIONAL AGREEMENTS AND OTHER AVAILABLE LEGAL DOCUMENTS RELEVANT TO SPACE-RELATED ACTIVITIES." <http://www.oosa.unvienna.org/pdf/spacelaw/intlagree.pdf>

of space projects" built up a fledging relationship between the United States and China.[78] U.S. space industry businesses were aware of the tremendous market potential in China, and wished to increase cooperation "from a Chinese perspective"[79] while adhering to government controls on technology transfer.

In 1993, the Great Wall Corporation signed an agreement with the U.S. Motorola Corporation to launch six iridium satellites.[80] The satellites were launched successfully on a CZ-2C launch vehicle capable of launching multiple satellites at once,[81] and this joint venture displayed an unprecedented level of cooperation between the U.S. and China. However, the U.S. government lost trust in Chinese space intentions in the mid-1990s, when certain U.S. companies were accused of transferring potentially sensitive military information to China.[82] In addition, increasing domestic outcry in the U.S. over alleged Chinese human rights abuses dimmed the chances for more cooperative commercial endeavors to take place.

Individualism vs. Collectivism: The Socio-Cultural Framework of Space Cooperation

In regards to the potential cooperation between the U.S. and China on any front, it is important to bear in mind the impact of different cultural contexts on the potential for cooperation. This crucial angle to examining in the United States-China space relationship is

[78] Joan Johnson-Freese, The Chinese Space Program, 102
[79] Covault, Craig. "China Seeks Cooperation, Airs New Space Strategy," Aviation Week & Space Technology, 14 October 1996, 31. Web. Feb 07 2013.
[80] Feng Feng, "The Chinese Aerospace Science and Technology Corporation," 2012. Trans. Jessica Sewell, Fall 2012
[81] Ibid.
[82] Shirley Kan: "China: Possible Missile Technology Transfers under U.S. Satellite Export Policy – Actions and Chronology," CRS Report 98-485

the impact and influence of polar opposite cultural contexts: individualism versus collectivism. In evaluating the potential for cooperation between East and West, it is important to note these key social, cultural and intellectual differences in U.S. and Chinese mentalities and the potential role those differences might play in formulating any sort of more cooperative space partnership. The intellectual differences between the U.S. and China are examined in great detail in Richard Nisbett's *The Geography of Thought: How Asians and Westerners Think Differently*. According to Nisbett:

> In the Chinese intellectual tradition there is no necessary incompatibility between the belief that A is the case and the belief that not-A is the case…. Events do not occur in isolation from other events, but are always embedded in a meaningful whole in which the elements are constantly changing and rearranging themselves. [In the Chinese approach to reasoning,] to think about an object or event in isolation and apply abstract rules to it is to invite extreme and mistaken conclusions.[83]

Here, Nisbett distinguishes the Western tendency to approach events and situations from a short-term perspective, with the occurrence of each and every event distinctly unique and significant, from the Chinese approach. Chinese reasoning, influenced by Taoism and Buddhism, tends to evaluate events in the context of their long-term, big-picture significance rather than their immediate effects. For the issue of space activities and space cooperation, this intellectual distinction is significant for two reasons. From this intellectual perspective, the 2007 ASAT launch failed to alarm the Chinese and elicit the exact same degree of surprise as it did in the West, perhaps because of the Chinese longer-term outlook to interpreting events and their significance. In addition, the Chinese are more prone to examine and plan the goals and accomplishments of their space program on the basis of ten,

[83] Nisbett, Richard, *The Geography of Thought: How Asians and Westerners Think Differently ... and Why.* New York: Free Press, 2003, ISBN 978-0-7432-1646-3

twenty, or even fifty years from the present. Slow but steady progress in outer space more closely aligns with this intellectual framework.

Additionally, some believe that the innate socio-cultural differences between the U.S. and China are also significant factors in evaluating the space relationship. While the arguments from this perspective are not necessarily the most convincing, they still merit discussion as notable features of the U.S.-China relationship. According to this socio-cultural perspective, the individualistic mentality of Western and U.S. culture is at odds with the collectivism that permeates East Asian society. Individualism "implies the assumption that individuals are independent of one another,"[84] and individual achievements, personal liberties, and advancement of the self are highly valued. The central emphasis for most activities, in this light, is on the short term and that which provides immediately evident benefits. In contrast, East Asian collectivism implies that "groups bind and mutually obligate individuals,"[85] resulting in much more group-centered societies with a tendency to value that which will promote the overarching benefit of the group at large. The emphasis or goal of most activities, therefore, will tend to be placed on more long-term projects, and may worry less about the advancement of individual members of the "group" if such advancement would in any way hinder the efforts of the benefit of overall society. The Chinese are considered "both less individualistic and more collectivistic"[86] than the U.S., and this key difference deeply influences U.S.-China interactions.

[84] Oyserman, Daphna et. al.: "Rethinking Individualism and Collectivism: Evaluation of Theoretical Assumptions and Meta-analyses." 2002.
[85] Oyserman, Daphna et. al.: "Rethinking Individualism and Collectivism: Evaluation of Theoretical Assumptions and Meta-analyses." 2002.
[86] Oyserman, Daphna et. al.: "Rethinking Individualism and Collectivism: Evaluation of Theoretical Assumptions and Meta-analyses." 2002.

Collectivism also implies a sort of "us vs. them" mentality- those within and outside of a "group" are treated differently. The needs of those outside of the immediate "group" are of little concern to collectivists. This displacement of outsiders is an important consideration when evaluating China's perception of space cooperation with the United States, since the Chinese will likely approach any sort of strategic partnership with a desire for the collective advancement of China's interests, even if such advancement implies that the U.S. would somehow suffer as a result. Granted, one-sided advancement of national interests is a feature of both collectivism and individualism, but nonetheless the clash between collectivism and individualism as contrasting social and cultural ideologies is pivotal in the formulation of Chinese and U.S. national goals. The ideology gap between collectivism and individualism is also said to cause conflict between nations representing these contrasting ideologies.

Samuel P. Huntington explored this individualism-collectivism clash to a great extent in his now somewhat dated 1992 *Foreign Affairs* article, "The Clash of Civilizations." Huntington believes that different "civilizations," such as individualistic U.S. civilization and communalistic *Sinic* (or Chinese) civilization, display inherent differences and controversies that inevitably lead to conflict. According to Huntington, "at the macro-level, states from different civilizations compete for relative military and economic power, struggle over the control of international institutions and third parties, and competitively promote their particular political and religious values."[87] Huntington's thesis states is that the differences between civilizations, rather than the similarities, are more likely to influence policy decisions and long-term national goals. Specifically, Huntington believes that East

[87] Huntington, Samuel P. "The Clash of Civilizations?" *Foreign Affairs* 72.22 (1992-1993): 22-49. *Hein Online*. Web. 20 Nov. 2012.

Asian *Sinic*, or Chinese civilization, due to its rapid economic growth, is attempting to culturally assert itself and its values relative to the West. In this sense, China wishes to reassert itself as a regional hegemon and influence the development of other countries in the region to follow China's example, as opposed to embracing the individualism and pluralism valued in the West.[88] China thus seeks to expand its collectivist influence and forge itself into a new superpower, not simply regionally but also on a global scale.

China's development of a viable space program, therefore, could be interpreted as an act of communalistic achievement to further China's national and political goals. The achievement of China's space program serves to further this mission of influencing regional and world politics, increasing Chinese cultural dominance in East Asia, and providing a rallying point for nationalistic pride within China's borders. For this reason, from Huntington's perspective, cooperation between the United States and China on space exploration might be difficult or unlikely, as such cooperation might negate the "competitive promotion of cultural values" and national achievements of the Chinese.

Huntington's opinion is certainly not the only one concerning the role of cultural differences in influencing policy. Other aspects, such as economic and political concerns, also play a significant, perhaps larger role in the formulation of a space relationship. Nonetheless, we must still pay attention to the cultural aspect of United States-China space cooperation, since innate cultural differences could subtly sculpt the long-term structure of any sort of space relationship and could cause misunderstandings or disagreements in future years.

[88] Huntington, Samuel P. "The Clash of Civilizations?" *Foreign Affairs* 72.22 (1992-1993): 22-49. *Hein Online*. Web. 20 Nov. 2012.

It is critical to note the role of collectivism in characterizing the long-term focus of the Chinese space program, as it is likewise essential to note the individualistic characteristics of the U.S. space program. These subtle cultural differences play a key role in evaluating the long-term goals and potential for cooperation between the U.S. and China, and could possibly influence the space relationship in its current state. Perhaps the key to cooperative efforts and increased communication between the U.S. and China is not military or political, but instead grounded in a cultural context. Nevertheless, while the differences between individualism and collectivism might play a role in misunderstandings and disagreements between the two powers in the past, it seems somewhat presumptuous to assume the cooperative difficulties between the U.S. and China can be attributed to a mere "clash of civilizations."

The role of individualism verses collectivism as an aspect of U.S.-Chinese cultural differences could most likely be attributed to the vastly different roles of the private sector in the Chinese and U.S. space programs. Private sector companies such as SpaceX play a wide and crucial role in the development of the U.S. space program. For example, by March 2013, the SpaceX Company had already sent three remote-controlled spacecraft to deliver shipments from the U.S. Kennedy Space Center to the ISS. While NASA is still responsible for planetary missions and exploration, the emerging trend in the U.S. space program today is a shift away from the nationalization of all space activities and a move toward transferring some technological and financial burdens of low and mid-Earth orbit space activities to the private sector. The role of individualism in this context is a focus on individual, private-sector entrepreneurs through their uniquely "American" spirit rising against the grain and

into outer space. Decentralization of space activities in the U.S. is an innately and perhaps uniquely U.S. tendency, one that will likely continue into the near future.

On the other hand, the collectivist mentality of China has influenced the organization and structure of the Chinese space program, especially concerning the role of the private sector. The current form of the Chinese space program is characterized by a near monopoly of the state. Private-sector companies play an extremely limited role in Chinese space activities, and their influence is accepted to a much smaller degree. For a collectivist society, it makes more sense for the government to sponsor space activities for the good of the nation. Centralized military and space development would be better for the "group" that is Chinese society, and it would seem more appealing to a collectivist society than individualistic, private-sector endeavors.

Chapter Four: *The "China Threat," National Security Concerns and Other Barriers to U.S.-China Space Cooperation*

Legal Barriers to Cooperation

China Lacks National Aerospace Legislation

China's national aerospace legislation has yet to be codified. Because of this, the legal environment of space activities in China remains nebulous at best. Even legal scholars and experts on the intricacies of Chinese methodology have struggled to define the exact legal terms regulating China's space program. Perhaps the most enlightening take on China's legal intricacies is an article by Qi Yongliang, director of the Chinese Institute of Space Law, which appeared in the University of Mississippi School of Law's *Journal of Space Law*. According to Qi, "China's aerospace legislation has long been emphasized by the State overseeing authorities and experts in the fields." However, "it is no longer adequate for China to rely solely on the regulations and the management of the government's administrative means in carrying out certain important aerospace activities."[89] Qi urges China to "bring about the aerospace legislation as early as possible."

According to Qi Yongliang, there has been some research in China into formalizing space laws in the past. In 1993, CNSA prepared an aerospace bill and consulted the NPC's Commission of Law Enforcement and the Bureau of Laws and Regulations of the State Council for opinions on space law. In 1998, COSTIND was put in charge of Chinese aerospace activities. Later, in March 2008 China restructured the ministries and "COSTIND was canceled as a ministerial-level department and renamed as the State Bureau of Science,

[89] Qi Yongliang. "Aerospace Legislation in China." Journal of Space Law Vol. 32, No.2. The University of Mississippi School of Law, Winter 2007: 405-410

Technology and Industry for National Defense (BUSTIND), becoming an independent institution of the newly established Ministry of Industry and Information Technology, BUSTIND is now responsible for the administration and management of the industry for national defense."[90] Research studies were released in following years on the possibility of aerospace law, but none of these propositions has been finalized.

According to Qi, standardized, formal legislation for China in space, from a legal standpoint, is necessary for three reasons. First, China's aerospace activities take place on a considerable scale. The large number of internal managerial regulations within the bureaus of the Chinese space agencies would lay a good foundation for China's aerospace legislation. Second, the many international treaties China has joined into through the United Nations, as well as bilateral and multilateral agreements on aerospace activities signed by the Chinese government with many other countries, regulate the rights and responsibilities in carrying out space activities. These documents and agreements could also contribute to the formation of successful Chinese space law. Third, China's extensive research studies, especially those of COSTIND (and later BUSTIND), created a "favorable environment" for aerospace legislation.[91]

Since drafting, negotiating and implementing laws can be a complicated and lengthy process in any country, Qi also notes that "making administrative rules" could be a favorable alternative to formalized, national aerospace law put to paper in the short term.[92] Nevertheless, it is evident that without a stated national legal code regulating space exploration, China will continue to experience difficulty in seeking cooperation with the

[90] Joanne I. Gabrynowicz, "The Pacific Rim National Space Law Summit." 35 Journal of Space Law, 2009: v. Web. <http://www.spacelaw.olemiss.edu/jsl/pdfs/articles/jsl-35-ii-foreword.pdf>
[91] Qi Yongliang. "Aerospace Legislation in China." *Journal of Space Law*, Vol. 32 No.2. The University of Mississippi School of Law, Winter 2007: 405-410
[92] Qi Yongliang, 410

United States. The U.S. and the international community should pressure China, as a responsible, involved "space power," to speed the process of formalizing aerospace legislation in order to create a more transparent environment for other nations to work in and around.

U.S. Space Legislation from the NAS Act to Today

In direct contrast to China's nebulous legal environment, the United States has abided by the same framework of national space law for the past sixty years, steadily growing and revising those laws to suit the transition from Cold War mentality to modern commercialization. University of Mississippi School of Law Professor Joanne Gabrynowicz published an article in the Harvard Law and Policy Review concerning the development of U.S. space legislation in the past sixty years. According to Gabrynowicz, the development of U.S. space law was "catalyzed in large part by technological and geopolitical advances."[93] For example, the U.S. first addressed the question of space law after the successful launch of Sputnik I on October 4, 1957. This incident drove the U.S. to pass the National Aeronautics and Space Act of 1958 (NAS Act), passed by the U.S. Congress and signed by President Eisenhower in response to what appeared to be a credible Soviet outer space threat.[94] The NAS Act determined the nature and organization of the U.S. space program. United States space activities would be peaceful in nature, with aeronautical and space activities directed by a civilian agency. The Department of Defense (DOD) would direct only those activities specifically associated with weapons systems or military operations.

Further legislation laid the foundations for expanded commercial activities in space.

[93] Joanne I. Gabrynowicz, "One Half Century and Counting: The Evolution of U.S. National Space Law and Three Long-Term Emerging Issues." Harvard Law and Policy Review, Vol. 4 No. 2, Summer 2010: 405-426
[94] Gabrynowicz 2010: 407

The 1962 Commercial Communications Satellite Act of 1962 (Comsat Act) provided the basis upon which the U.S. telecommunications industry would be built and authorized U.S. participation in Intelsat, an international communications satellite organization.[95] In the 1980s, legislation was drafted and expanded to shift much space activity to the private sector and allow for the commercial use of space. The 1984 Commercial Space Launch Act (Launch Act) addressed "licensing and regulation, liability insurance requirements, and access to government launch facilities by private launch companies."[96] The Commercial Space Launch Amendments Act of 2004 authorized "space tourism," allowing for private and commercial passengers to engage in space travel and engage in suborbital flights.[97] Further regulatory refinement of remote sensing, commercial human spaceflight, and U.S. participation in the ISS took place in the 2000s, and the mature space law was codified in 2009.[98]

Present U.S. space legislation has been in effect in some way or another for more than sixty years, evidencing the clear U.S. emphasis on the role and importance of legal frameworks for international activities. The absence of a similar importance in the Chinese school of thought could present fundamental challenges to efforts at increased cooperation. Basic differences between the U.S. and Chinese beliefs in the importance of legal systems and rule of law could hinder efforts at increased cooperation between the two space programs. For example, should the U.S. and China decide to enter into a technology-sharing program or a joint venture, exactly what legal guidelines would regulate Chinese activities in space? Would U.S. policymakers and businesspersons be satisfied with mere

[95] Gabrynowicz 2010: 409
[96] Gabrynowicz 2010: 411
[97] Gabrynowicz 2010: 413
[98] Gabrynowicz 2010: 420

"administrative rules" on the part of the Chinese regulating Chinese activity in space? Clearly, from a legal standpoint, much remains to be done in order to level the U.S.-China playing field in outer space activities. It is difficult to imagine cooperative efforts that somehow meet the needs of both parties in the absence of parallel legal doctrines concerning space activities.

Technological Barriers to Cooperation

Surprise, Surprise: China's 2007 ASAT Testing

On January 11, 2007, China "launched a missile into space, releasing a homing vehicle that destroyed an old Chinese weather satellite."[99] This singular incident in China's history in space shocked the world and in doing so called into question the Chinese space program's purpose, goals, and transparency. The ASAT, or Anti-Satellite technology involved in this particular launch represented a technological breakthrough for China, since China now has the capacity to destroy satellites. By not announcing the launch in advance, China failed to comply with the United Nations Registry of Space Objects and launched a debate about the motives and goals of the Chinese space program. The debate inspired by the ASAT launch continues to influence U.S. discourse on space policy to this day. To some, the launch of what could potentially be an anti-satellite missile appeared as a military gesture, announcing China's capability to wipe out foreign (i.e. U.S.) communications satellites in a wartime setting. Taking out U.S. satellites could theoretically have a detrimental impact on the U.S. economy, communications infrastructure, and military assets.

[99] MacDonald, Bruce W. *China, Space Weapons, and U.S. Security*. CSR Rep. no. 38. New York: Council on Foreign Relations, 2008. Print.

Others, including the Chinese government itself, conclude that the test was simply a poorly planned effort on the part of a few (promptly fired) Chinese government scientists to test out an underdeveloped and quite possibly under-researched new technology. In this regard, it is important to note that the ASAT test increased orbital space debris by ten percent, as discussed earlier in this thesis. Most believe that the debris generated by this launch was merely the result of poor calculation on the part of Chinese scientists. China, Russia, and the U.S., among other nations, have agreed to nonbinding guidelines to minimize space debris, and "deliberate destruction" is an accepted method of removing outdated orbital debris.[100] For this reason, perhaps the 2007 ASAT could represent a step forward in the monitoring of orbital space debris. However, the fact that the launch was not previously announced or registered with UNOOSA still casts doubts on the exact purpose of the testing.

The more alarming of these possibilities is the potential military implication of the militarization of space. If the anti-satellite test was indeed a display of Chinese military prowess intended to show the United States what China is capable of, then this instance represents a huge leap backward in international communication and cooperative efforts. Many current U.S. military and intelligence assets, not to mention civilian communications and global positioning services, are satellite-based. New York City journalist Taylor Dinerman noted that in the context of today's high technology, satellite-based military status quo, it follows that "governments that thrive on confrontation… now have every incentive to use their space launch capability to attack the space assets of their enemies."[101] For this

[100] MacDonald, Bruce W. *China, Space Weapons, and U.S. Security*. CSR Rep. no. 38. New York: Council on Foreign Relations, 2008. Print.
[101] Dinerman, Taylor. "Proliferating Space in 2013 and Beyond." Space.com. Feb. 11, 2013. <http://www.thespacereview.com/article/2236/1>

reason, many in the United States reacted negatively to China's ASAT testing. To these individuals, the test appeared to be a threatening display of Chinese military dominance. Should the U.S. not act in China's best interest, China has the demonstrated ASAT capability to similarly annihilate key U.S. communications, global-positioning, and military-use satellites, striking a huge blow against U.S. economic and military development.

On the international stage, the United Nations reaction to China's ASAT test was immediate. Almost immediately following the launch, UN General Assembly adopted the Resolution , "Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects," reminding the international community (and specifically China) of the necessity of registering launches with the Register of Objects Launched into Outer Space, which was established under article III of the Registration Convention.[102] This call for responsibility, preemptive notification and transparent communication is repeated throughout subsequent annual doctrines on "International cooperation in the peaceful uses of outer space." Another General Assembly Resolution includes the implementation of "the Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space," calls for states to "pay more attention to the problem of collisions of space objects" and "[develop] improved technology for the monitoring of space debris" and provide said information to the Scientific and Technical Subcommittee; and "*Urges* all States, in particular those with major space capabilities, to contribute actively to the goal of preventing an arms race in outer space as an essential condition for the promotion of international cooperation in the exploration and use of outer

[102] UNGA, "Recommendations on enhancing the practice of States and international intergovernmental organizations in registering space objects" Dec 17, 2007 http://www.oosa.unvienna.org/pdf/gares/ARES_62_101E.pdf

space for peaceful purposes."[103]

Dual-use Technology Transfer: Policy Analysis and Overview

Another important technological barrier to U.S.-China space cooperation is the fact that many space technologies could be used for military purposes, essentially barring those technologies from uncomplicated, legal transfer to China. In order to promote U.S. national security, the trade and transfer of such technologies— and even some technologies that might be adapted to potentially serve some military purpose— is rightly subject to heavy regulation and protections. U.S. legislation from the Arms Export Control Act (AECT) to the International Traffic in Arms Regulations (ITAR) denotes specifically what procedures must be applied to sensitive or dual-use technologies in order for any trade or transfer to take place. Should a U.S. private-sector company wish to take part in a joint commercial satellite launch with the Chinese space program, since China is a non-NATO ally then that technology "transfer" would require "special export controls" as outlined in Section 124.15 of the International Traffic in Arms Regulations.[104] According to ITAR, these special export controls apply to "any satellite or related item."[105]

Problems with dual-use technology transfer have arisen in the past when parties either neglected or violated the ITAR or AECT. For example, in March 2013 a Chinese national working for NASA was intercepted by U.S. government agents at the Washington Dulles airport after he booked a one-way flight to Mainland China. The individual was

[103] UNGA "International cooperation in the peaceful uses of outer space" Dec 18, 2012. < http://www.oosa.unvienna.org/pdf/gares/A_RES_67_113E.pdf >
[104] United States. Dept. of State. Office of Munitions Control. *International Traffic in Arms Regulations*. By Bureau of International Security and Nonproliferation (ISN/EX/TD). Directorate of Defense Trade Controls, 31 Dec. 2012. Web. 6 Mar. 2013.
[105] Ibid.

arrested on account of lying to federal agents and was found in possession of electronics containing sensitive NASA information.[106] It has been estimated that as many as 5,000 of these sorts of secret technology transfers have occurred since the 1990s, which remains a cause for concern.

At the same time, 10th District of Virginia Republican Congressman Frank R. Wolf, among other members of Congress, have worried that U.S. satellite-exporting firms have directly aided the development of ballistic missiles and space exploratory equipment through trade and export in recent years.[107] The Export-Administration Act (EAA) of 1979, which lapsed in August 2001,[108] also restricted exports on dual-use technologies that could pose a threat to U.S. national security. Since 2001, dual-use technology export legislation responsibility has transferred to the President's invocation of emergency powers under the International Emergency Economic Powers Act.[109]

To the credit of these members of Congress, the possibility of U.S. technologies in Chinese hands creating a national security threat should not be completely disregarded. For example, according to national security defense policy specialist Shirley Kan: "Congress has been concerned about whether U.S. firms, in exporting satellites, provided expertise to China for use in its ballistic missile and space programs and whether the Administration's policies might facilitate transfers of military-related technology to China."[110] In addition, according to the wording of the Export-Administration Act, "the EAA provides the statutory

[106] Associated Press. "Former NASA Contractor Arrested On Plane to China." *Foxnews.com*. Fox News, 18 Mar. 2013. Web. 19 Mar. 2013.
[107] Shirley Kan: *China: Possible Missile Technology Transfers from U.S. Satellite Export Policy – Actions and Chronology*, 2001
[108] Bureau of Industry and Security: *Export Administration Act*, Bureau of Industry and Security, US Department of Commerce
[109] Bureau of Industry and Security: *Export Administration Act*, Bureau of Industry and Security, US Department of Commerce
[110] Shirley Kan: *China: Possible Missile Technology Transfers from U.S. Satellite Export Policy – Actions and Chronology*, 2001

authority for export controls on sensitive dual-use goods and technologies: items that have both civilian and military applications, including those items that can contribute to the proliferation of nuclear, biological, and chemical weaponry."[111] Naturally, the development of any of these threats would be far outside the scope of interest for pursuers of U.S.-China cooperation on space, and the possibilities for proliferation of U.S. weapons technologies to third parties or for Chinese military development as a result of trade or technology transfer must be considered in formulating space policy.

According to Brian Weeden, a technical consultant for the Secure World Foundation and former US Air Force officer with a background in space surveillance and ICBM operations, the "weaponization" of space is a possibility because "China seeks to develop technologies and doctrine to counter the perceived capabilities of the United States." Specifically:

> Both the United States and China recognize the immense socioeconomic value and benefit that peaceful uses of space can provide. Both recognize the benefits to military power and international influence space can provide. Both are developing the technologies to counter each other's military power and international influence. Both accuse each other of hiding space weaponization behind a veneer of peaceful uses. Both deny there is an arms race. Unless there is a change of policy on this issue towards transparency and cooperation, both states will remain on this untenable collision course in space. And the end result could negatively affect space security and sustainability for not only both nations but all of humanity's as well."[112]

[111] Ian F. Fergusson: The Export Administration Act: Evolution, Provisions, and Debate, 2009
[112] Weeden, Brian. "China's BX-1 microsatellite: a litmus test for space weaponization". Space.com. Oct. 20, 2008. <http://www.thespacereview.com/article/1235/1>

Weeden's theory of a weaponized space war, while certainly alarming, is overstated. China has far too many economic resources invested in the United States to even consider this sort of all-out weaponization of space. If anything, the Chinese interest in U.S. military or dual-use technology serves a more domestic purpose of increasing national confidence and prestige in the primacy of Chinese technologies. Were the weaponization of space, in direct violation of UN space regulations, actually a feasible if clandestine policy goal for the Chinese, then perhaps Weeden's comments would seem more relevant.

Chapter Five: *Future Outlook for the U.S.-China Space Relationship*

Cold War "Space Race" vs. Today's Space Environment

Today's U.S.-China space relationship is significantly detached from the Cold War context of the 1960s-1970s. China, unlike the Soviet Union, is in no way a sworn enemy of the United States. And even at the height of the Cold War, a joint U.S.-Soviet space docking exercise in 1975, the Apollo-Soyuz Mission, achieved important technical and political breakthroughs that helped alleviate the shaky relationship. Today, that basis of cooperation has evolved to the point that present-day Russia is an avid contributor to the International Space Station, and Russian Soyuz spacecraft help deliver U.S. astronauts to and from the ISS.

In this context, it is evident that despite a barrage of political and other barriers, international cooperation between space powers is a long-term possibility. Considering that a handful of joint commercial satellite launches occurred in the 1990s, as mentioned in Chapter Three, the U.S. and China have even greater precedent for some form of increased cooperation than even the sworn enemies of the U.S. and USSR during the Apollo-Soyuz Mission. Certain existing barriers to cooperation, however, must first be addressed for cooperation to occur.

At present, the biggest challenges to cooperating with China are doctrinal legal inconsistencies between the two nations, domestic political and legislative obstacles, the possibilities for inadvertent technology transfer and moral compromise, and what some consider a dearth of benefit for the U.S. Basically, China's lack of codified law concerning

space activity and events like the 2007 ASAT testing diminish the possibility for greater U.S.-China cooperation in the short term- at least concerning intergovernmental cooperative efforts. Budgetary legislation such as Section 1340 of the 2011 Federal Budget prohibit NASA from explicitly undertaking joint missions with Chinese at any point in the near future. China is also frequently criticized for its stances on human rights, religious freedom, non-democratic governance, and stance on proliferation, especially considering allies of sorts in Pakistan, Iran, and North Korea. To the U.S., in this regard, any stance on collaboration that might improve the standing of the authoritarian PRC government might be considered unacceptable.[113] Bilateral relations between the U.S. and China in regards to these issues must also play a role in the development of a more cooperative space relationship.

In addition, individuals such as Congressman Wolf (R-Va) assert that any amount of cooperation with China would be detrimental to U.S. national security. Given that Chinese nationals have attempted to steal sensitive material from NASA in the past, it can be difficult for U.S. policymakers and NASA officials to trust China enough to go forward with cooperative efforts. However, I believe that increasing dialogue between the U.S. and China would actually lessen the possibility for further Chinese attacks on sensitive U.S. technological information. If China is provided with *something*, for example, a satellite utilizing old or outdated technology, to be launched by the *Shenzhou* launch vehicle, then a symbolic understanding is reached. Beijing and Washington could have an Apollo-Soyuz-like moment of cooperation that would serve a more symbolic than strictly scientific purpose. In that case, Beijing would feel that it has benefitted from the exchange by

[113] Logan, Jeffrey: "China's Space Program: Options for U.S.-China Cooperation." CRS Reports for Congress, 2008

receiving U.S. technology; hence, in Chinese eyes, "mutual" benefit (meaning Chinese benefit) is achieved. At the same time, a door, albeit a small door, can open between the U.S. and China for increased communication and trust. Any amount of increased transparency strategically benefits the U.S. because of the current opaque nature of Chinese space policy and research. Opening a window into the concrete walls surrounding China's space program would provide the U.S. with unprecedented insight and leverage.

Thus, in this debate, the U.S. must not overlook the opportunity for strategic advantage that can be achieved through some form of cooperation with China. For the U.S., despite myriad barriers to space cooperation, increasing space dialogue or perhaps even embarking on joint private-sector commercial launch activities would give the U.S. further insight into China's space program and its plans, as well as more clearly reveal any Chinese military motives in space.

On the Chinese front, joint commercial launches seem a viable alternative route to international cooperation. In March 2013, a spokesperson for the Chinese space program indicated that China intends to "increase its share of the global commercial satellite launching business, targeting a 15 percent share by 2020."[114] This admission indicates that China plans to become more and more involved in commercial satellite launches on an international scale. Therefore, China might be more open than some might think to the possibility of cooperating with the U.S. on space activities, particularly through the avenue of joint private-sector satellite launches.

Likely Avenues for Cooperation and their Potential Benefits and Challenges

[114] Guo, US News "China targets 15 pct of satellite

The most viable options for U.S.-China space cooperation are commercial satellite launch interaction, information and data sharing, space policy dialogue, non-commercial joint activities, and the International Space Station (ISS). Below is a list of the pros and cons of each method:

Commercial Satellite Launch Interaction

China and the U.S. have participated in joint activities in the commercial satellite launch market in the past, as discussed in Chapter 2. These efforts met with success and stimulated the growth of a commercial cooperation environment, and provided a historical precedent for more commercial satellite launch interaction between the U.S. and China. At that time, Chinese launch vehicles were comparatively cheap and companies that wanted to pay as little as possible were ready and willing to utilize Chinese launch vehicles. From an economic perspective, this sort of launch interaction made sense.

Commercial interaction between the U.S. and China, especially joint satellite launch programs for commercial purposes, could serve as a viable option for increased interaction between the two nations. Of course, such programs would need to be closely monitored to prevent too much technology transfer and would likely meet with staunch opposition from individuals such as Cong. Wolf. Nevertheless, joint launches could not only provide cost-saving measures to the U.S., but would also further open up U.S. firms to the competitive and appealing Chinese market. At present, the greatest barriers to similar development in the near future are political and economic. With the immense cuts in defense spending ushered in during the March 2013 "sequestration" debacle, cost-sharing between NASA-sponsored, private-sector U.S. launch companies and Chinese organizations would be a financially appealing choice.

Commercial cooperation could also serve as a diplomatic tool, deterring aggressive or military space activities and softening relations between the U.S. and China. According to the U.S. Council on Foreign Relations, cooperation between the U.S. State Department, NASA, and China on greater commercial and civilian space cooperation on a "quid pro quo basis" would also serve as a "confidence-building measure" between the two governments.[115] Encouraging non-military, commercial joint activities in the private sector would benefit both the U.S. and China to some degree. On a strategic level, commercial interaction between the two countries would lessen the potential for armed conflict in the long term and create a stable space environment. For the U.S., Chinese launch vehicles would provide a cost-effective alternative delivery system for U.S. satellites and would lessen NASA's budgetary load. China would in turn benefit from exposure to U.S. satellite technologies, international recognition of China's commercial space capabilities, and closer relations with one of its top trading partners.

The main concern here is that careful guidelines would need to be established on the U.S. side to prevent the transfer of particularly sensitive technologies to the Chinese. For this reason, domestic U.S. political discourse might delay or prevent the successful regulation of commercial launch interaction. While some might argue that U.S. space commerce has suffered from the shutting-out of China from many commercial deals, policymakers like Congressman Wolf would distrust China and discourage any space cooperation whatsoever on the grounds of preventing the transfer of sensitive technologies. However, commercial interaction as a mid-term goal should be considered in order to improve U.S.-China relations.

[115] MacDonald, Bruce W. *China, Space Weapons, and U.S. Security*. Council Special Report No. 38. New York: Council on Foreign Relations, 2008. Print.

Information and Data Sharing

Information and data-sharing techniques of cooperation would mainly serve the purpose of building confidence between the U.S. and China. This sort of data sharing could include information sharing on debris management, environmental and meteorological conditions, and navigation in order to build trust. This method would result in improved transparency for the U.S. and China, better channels of communication, but also would allow the two nations to work together toward mutual, worldwide goals of reducing space debris output, monitoring natural disasters, and avoiding large-scale international conflict.

While information sharing might seem to walk a fine line between increasing communication and accidentally sharing sensitive information, there could be In fact, it could be argued that many U.S. technologies would have ended up in Chinese hands anyway, and attempts to isolate China from any U.S. information concerning space are only worsening the situation. Most recently, the U.S. government discovered in March that the activity of certain high-level Chinese hackers, or *hei ke*, had resulted in the theft of many blueprints and business plans from government contractors. Also in this vein, Congressman Wolf himself noted many instances of NASA "security breaches," many likely on the part of Chinese parties. For these reasons, any information or data sharing would need to be stringently regulated in order to maintain a sense of international, rather than strictly Chinese, benefit and prevent the transfer of sensitive information. Regardless, sharing meteorological, climatic or space debris-related data could improve U.S.-China relations and the global environmental situation by increasing bilateral awareness of these issues.

Space Policy Dialogue

The method of space policy dialogue as a form of space cooperation is based on Joan Johnson-Freese's theory of "strategic communication,"[116] which advocates more openness and transparency between the two programs not only as a cooperative mechanism but also as a strategic tool. Dialogue as a form of cooperation, in the short term, is the method most backed up by my research and would be my first recommended policy for increasing communication and cooperation with China. "Dialogue" might include establishing "ground rules" for space, setting a "code of conduct" in space cooperation, or any other attempts for deeper bilateral understanding. The University of Mississippi has put forth efforts in this regard, including international conferences and scholarly exchanges, which have increased communication and understanding between the U.S. and China. In addition, on the dialogue front there have also been "modestly beneficial exchanges between U.S. and Chinese military leaders"[117] that could be expanded in the future. Exchanges between war colleges or even military simulation centers could improve communications between the U.S. and China. Also, Admiral Timothy J. Keating and General Peter Pace (Ret) have both paid visits to China in order to encourage peaceful, non-military space development.[118]

Strategic dialogue could help the U.S. and even China each understand its counterpart more fully. The current U.S.-China relationship is rife with "mutual uncertainty and mistrust over space goals"[119] that could be alleviated through improved dialogue. In fact, the foundation for this dialogue was set in 2010 with Presidents Barack Obama and Hu Jintao's joint statement outlining mutual cooperative space policy goals, in which dialogue

[116] Joan Johnson-Freese. "Strategic Communication with China: What Message about Space?" China Security, World Security Institute, 2006
[117] MacDonald, Bruce W. *China, Space Weapons, and U.S. Security*, 2008: 29
[118] MacDonald, 2008: 29
[119] Logan, Jeffrey: "China's Space Program: Options for U.S.-China Cooperation." CRS Reports for Congress, 2008

was specifically referenced as a desirable goal. Furthermore, dialogue would also give the U.S. a bigger window into Chinese thought concerning space activities, and in turn would improve Western understanding of China's military motives in space, if any.

Non-Commercial Joint Activities

The classic picture of international space cooperation is two national space agencies coming together in a symbolic moment of harmony and accomplishing a wide range of unprecedented space activities. However, for the U.S. and Chinese governments to join together in a fully cooperative effort on the scale of the Sino-Soviet cooperation in the 1950s would be extremely unlikely, especially given Section 1340 budgetary restrictions, NASA's limited budget, and negative discourse concerning China's space program in Washington. However, hypothetically speaking, from a political standpoint this sort of inter-governmental interaction would also be the most interesting and most complex type of cooperation. According to analyst Jeffery Logan, non-commercial joint activities "would probably require strong political commitments and confidence building measures in advance,"[120] such as the development of a definitive code of space law for China and lessened domestic political turbulence surrounding space activities and their funding for the U.S. Some of the possible avenues of cooperation from this angle might be bi- or multi-lateral partnerships involving environmental observation and monitoring; joint exploration of the solar system, nearby asteroids, or Mars; lunar expeditions; or even allowing China to join the International Space Station (ISS). Despite its near-term or even long-term improbability, this method would be helpful to the U.S. for the following reasons.

[120] Logan, 2008

First, non-commercial joint activities would provide the U.S. with an unprecedented amount of political and technological leverage. Joint ventures would offset the China's need or desire for unilateral space development and would bring the traditionally isolationist, nationalist, and non-interventionist China into what Joan Johnson-Freese refers to as the "Family of Nations."[121] Doing so would allow the U.S. to keep the still technologically inferior China dependent on U.S. technological breakthroughs, which would spur U.S. technological development and simultaneously keep the Chinese in check. Cooperation of this nature would appear mutually beneficial for the U.S. and China while providing the U.S. with a strategic tool to keep tabs on Beijing.

Second, non-commercial interaction would be beneficial to the U.S. for financial reasons. China has the global economic footprint and sufficient capital from fast-paced economic growth to support joint space cooperation. Cost sharing of joint projects could help NASA or even private-sector U.S. firms manage more challenging workloads, making a return trip to the moon or even a mission to Mars much more of a reality. Increased funds for space activities might in turn spark a renewed public interest in outer space exploration that could help stimulate the U.S. economy and create new jobs in science, engineering, and other fields. Cooperation with China as a mechanism for more aggressive outer space exploration could also benefit the U.S. financially by increasing demand for translators and other jobs facilitating cooperation. However, this job stimulation could also occur through Chinese cooperation with the private sector, which at this time seems a much more likely avenue for cooperation.

The International Space Station (ISS): An Avenue for Cooperation?

[121] Joan Johnson-Freese, The Chinese Space Program: A Mystery Within a Maze, 1996: 119

An important aspect that merits discussion is the possibility of China joining the ISS effort. Letting the Chinese space program into the ISS might seem the most ready avenue for increased financial and political interaction between the U.S. and China. However, there are two main reasons why this method remains a very distant possibility. First, there are reasons to believe that China has chosen to follow the track of independent development in pursuing a space station, since the U.S. has turned down Chinese attempts to join ISS many times. As a result, China has begun construction of its own *Tiangong* space station effort. Second, at this time Section 1340 of the 2011 U.S. National Budget explicitly prohibits the inclusion of China into any NASA-led international effort. For this reason, commercial space interaction seems a much more likely possibility for U.S.-China space cooperation in the near term. However, a glimmer of hope for Chinese involvement in ISS remains: not only have space policymakers spoken out about the need to incorporate China into the International Space Station, but the Chinese *Shenzhou* series of spacecraft notably has the capability to dock with ISS.

Sharing Space: Conclusions and Future Outlook

Each of the aforementioned options presents unique potential benefits and challenges, and perhaps a blend of them is necessary to create a truly cooperative relationship between the U.S. and China. At present, however, both parties are a long way away from achieving this sort of relationship. As laid out in this thesis, myriad legal, political, cultural and organizational barriers still bar the formation of entirely peaceful relations between the U.S. and China concerning space policy. While some small-scale exchanges have occurred in the past, specifically NASA Administrator Mike Griffin's 2006

visit to China and the joint Motorola satellite launches of the 1990s, the precedent is still not enough to overrule the influence of domestic U.S. politics and nebulous Chinese intentions in space. In fact, at this time there are no U.S.-China cooperative space efforts in the works.

In any case, improved space policy dialogue with China would undoubtedly benefit the U.S. in the near term and should be considered as a policy goal. It would be unwise for the U.S. to continue to treat China like the Middle Kingdom of tradition, entirely excluded from the affairs of the international community. A much better path is to take steps towards incorporating China into the outside space community, which will make China's motives and methods more transparent to the outside world. While complete non-commercial, inter-governmental cooperation remains a very distant possibility, other short to mid-term measures could make the eventual sharing of space with China a peaceful reality. As a mid- to long-term goal, commercial satellite launch interaction would be a feasible path to cooperation that at some point could simultaneously bridge the gap between East and West, strike both the U.S. and China as mutually beneficial, and work around the many legal and legislative barriers to inter-governmental U.S.-China space cooperation. However, in the short term, increasing space policy dialogue between the U.S. and China is the most realistic, tangible, and attainable path to someday "sharing space." Hopefully, increases in international exchanges, scholarly cooperation, and cooperative attitudes between Washington and Beijing will build the foundation for a rejuvenated international space relationship, one possessing both the willpower and capital necessary to make the next giant leaps for mankind.

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