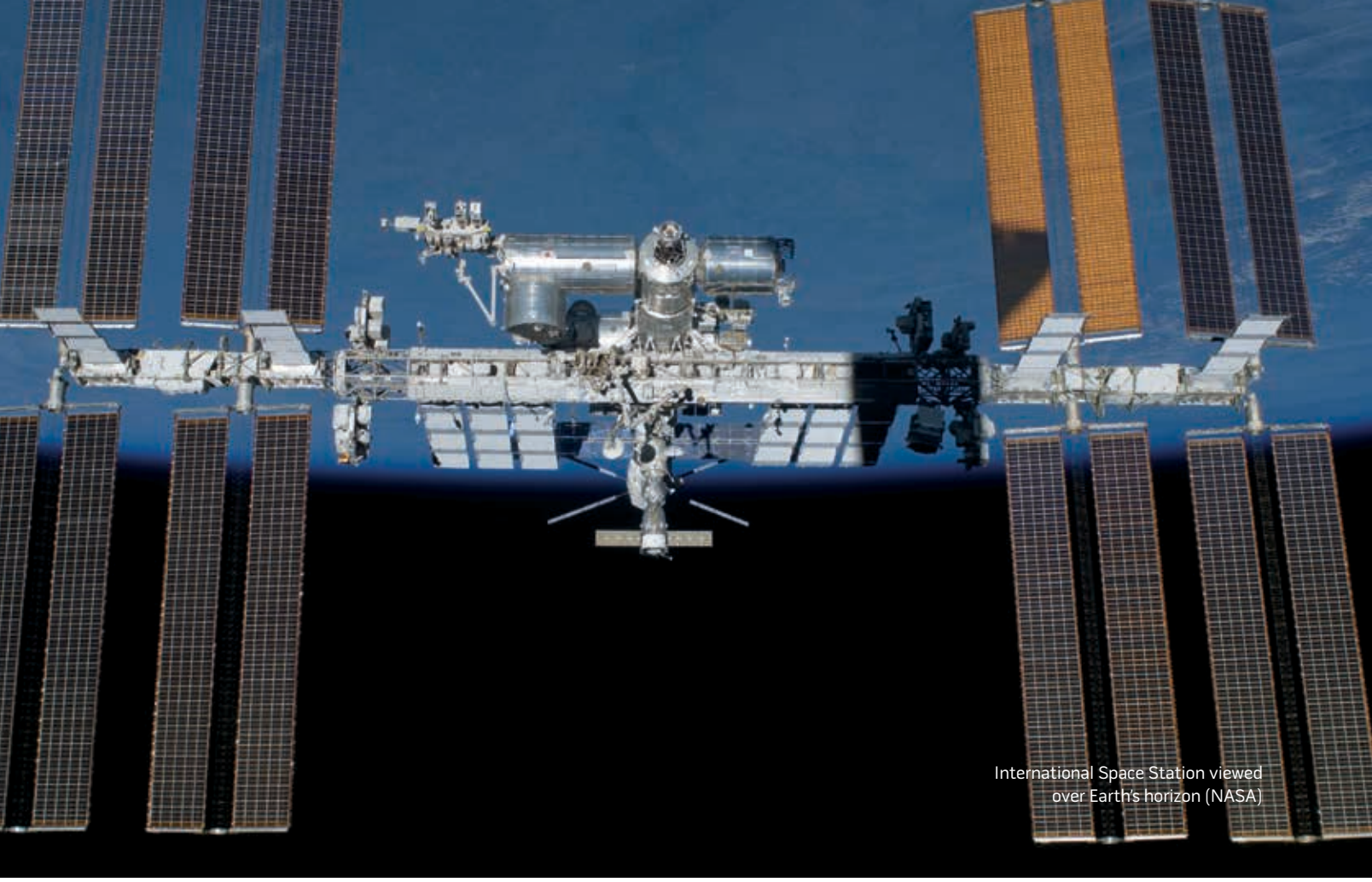

International Space Station viewed over Earth's horizon (NASA)

Defining and Regulating the Weaponization of Space

By David C. DeFrieze

The creative conquest of space will serve as a wonderful substitute for war.

—James Smith McDonnell
Founder, McDonnell Aircraft Corporation

Space is a contested, congested, and competitive domain. Each year the international community relies ever more on space-based technology for defense, civil, and commercial purposes. Accordingly, the weaponization of space has increasingly become an issue of concern. Space is an international common and is thus easier to protect through international cooperation. Since the beginnings of humanity's venture into space, the international community has made attempts to define and regulate the placement and use of weapons there, but with only limited success.

This article discusses the international interest in controlling the weaponization of space and prior attempts to define and

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regulate it.[1] It then offers an approach to better achieve the international cooperation needed to meet global concerns over space weapons.

Increasing Reliance on Space

The international community has a great interest in maintaining space as a peaceful arena and a secure place to conduct international activity. This has been recognized in treaties and policy statements involving almost all countries with an interest in space. The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (the Outer Space Treaty) sets forth as its opening statement, "The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind."[2] Such interest in peaceful uses of space is understandable; it is a fragile environment. Physics dictates that satellite orbits and space launches are easy to observe and understand. Like sand castles, spacecraft are difficult to build but easy to destroy. Yet much of the world increasingly relies on space for such peaceful purposes as communications (cell phones, satellite television and radio, banking transactions), transportation (GPS and air traffic control), environmental management, observations relating to resources, weather analysis and predictions, climate change, surveillance of natural disasters, and minimally invasive verification of international treaties. Furthermore, commercial industry currently has a greater presence in space than state actors, and global economic development is tied to the peaceful space capabilities identified.

The peaceful side of military power is also reliant on space. Self-defense against military buildup, invasion, or missile attack is enhanced by surveillance from space. Such visibility of aggressive military actions can serve as a deterrent against aggression by providing targeted nations time to react and verify their concerns in international discussions. Finally, orderly regulation of space weaponization can help avoid a costly and potentially devastating arms race. Space, after all, is a congested and contested domain. If we do not establish order there, the struggle for availability of limited assets may render it a cause for Earth-bound conflicts. For these and other reasons, the international community has been attempting to regulate the use of space, and specifically to define and regulate the weaponization of space.

Treaties and Proposals

The Outer Space Treaty. In 1966, efforts began in the United Nations (UN) to establish an agreement to regulate activity in space resulting in the Outer Space Treaty being signed in 1967. Relevant provisions included the overarching interest stated in Article I that the use of outer space shall be for the benefit and use of all countries; Article III that activities shall be carried out in accordance with international law; Article IV that no nuclear weapons or weapons of mass destruction shall be placed in orbit around the Earth or placed on any celestial body; and Articles VI and VII that responsibility and liability shall be placed for damage caused by an object launched or by its components on Earth.[3] This treaty laid the foundation for international cooperation and further treaties between states.[4] However, the ban on weapons in space was limited to nuclear and other weapons of mass destruction as these types of weapons were of most concern during the Cold War era when the treaty was created.[5] This treaty only addressed weapons that were "placed in orbit" or on a celestial body, and liability was not clearly spelled out. A relevant treaty addressing liabilities for damages caused in space is the Convention on International Liability for Damage Caused by Space Objects.[6]

Chinese and Russian Proposal. In February 2008, China and Russia jointly submitted to the UN Conference on Disarmament a draft Treaty on Prevention of the Placement of Weapons in Outer Space and of the Threat or Use of Force against Outer Space Objects (PPWT). This proposal attempted to define and prohibit the proliferation of weapons in space and provided definitions of prohibited weapons. The PPWT defines a *weapon in outer space* as "any device placed in outer space, based on any physical principle, which has been specially produced or converted to destroy, damage or disrupt the normal functioning of objects in outer space, on the Earth or in the Earth's atmosphere, or to eliminate a population or components of the biosphere which are important to human existence or inflict damage on them."[7] The United States rejected the PPWT in 2008, but both China and Russia continue to propose this treaty.[8]

UN Resolution. The Prevention of an Arms Race in Outer Space (PAROS) is a UN resolution seeking a ban on the weaponization of space. It was originally proposed in the 1980s from an ad hoc committee of the Conference on Disarmament. The proposal was reintroduced in recent years and is voted on annually, with the United States being the only country to oppose it.[9]

European Union Policy Proposal. In 2008 the European Union proposed a "Space Code of Conduct," a voluntary set of rules regarding matters such as space debris and operation of crafts or satellites in space. It was rejected by most significant space nations including the United States, China, Russia, and India.[10]

The international community has rejected all three of these proposals in one form or another. Specific reasons are difficult to assess since security and political issues cloud the true intent. However, it is conjectured that concerns lie in the unknown aspects of space and the desire of countries not to unduly limit themselves on future access, especially considering emerging technologies and defensive needs. Specific definitions of what physical properties or specific functions an object in outer space contains would be too specific considering all the potential technological developments that might arise.

Problems

If the international community were to rely solely on the definition of

"weapon" as set forth in the Chinese and Russian proposal, other means of destruction could still be used. We cannot outlaw hammers because they could be used as a blunt instrument to kill, nor can we prevent killing by outlawing only items exclusively designed to kill because those bent on killing will still have hammers. We must therefore outlaw the killing and attempts to kill. Similarly, we cannot punish only the possession of articles designed to kill others as people with hammers could still commit the offense. It is widely recognized that any definition of what constitutes a weapon in outer space must be driven in terms of what the object is used to do (that is, its instrumentality) rather than its physical properties. This makes common sense as one could not define a weapon on Earth by physical properties or what specific functions it is capable of. When discussing weapons and aggression, we need to look at the interests to be protected and find a means of enforcing those interests rather than the means chosen to assault those interests.

According to John Pike, "The profession of arms remains the old art of killing people and breaking their things."[11] A man with a hammer can smash the neighbor's property or injure the neighbor's family. In our society, there are civil penalties to compensate the injured person and criminal sanctions to protect society as a whole, including taking away the criminal's freedom. With the commons of space, there is currently no international "police force" armed with a means to enforce. Similarly, like the argument over gun control, if we outlaw all guns, only criminals will have guns and the rest will be helpless against them. It is therefore impossible to protect vital concerns over defense and security by defining and regulating against a "weapon" in space. Instead we need to define and protect the interests to be achieved and the behavior that is considered unacceptable.

Once interests and behaviors are defined, there must be a mechanism to identify who is responsible when poor behavior is observed, and a tribunal or adjudicator to provide professionalism, credibility, and equity to disputes relating to responsibility. Finally, there must be a means of enforcement; if there is no consequence once responsibility for violations is fixed, the behavior of states will not be molded to foster the cooperation and protections desired.

Regulating Interests and Behaviors. The attempts to outlaw certain types of technology in space are not without value. As identified earlier, the original Outer Space Treaty forbids the placement of nuclear weapons and weapons of mass destruction in space. Like certain U.S. gun control laws, the reasonableness of these prohibitions lies in balancing the potential damage with the peaceful purposes these objects can cause. While an argument can be made that these objects are placed in space for "deterrence or defense," any aggressive use would create massive destruction or loss of life, and there would be no time to mitigate or halt the damage.

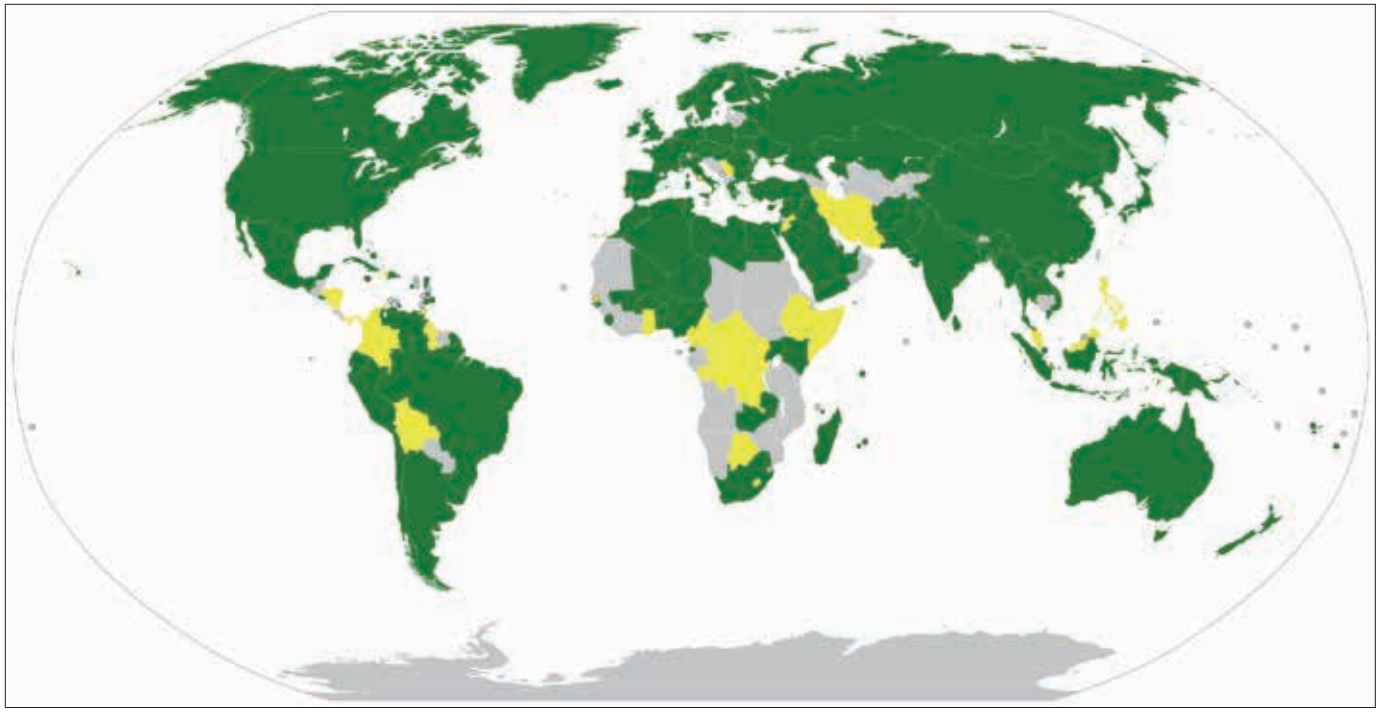
As noted earlier, however, beyond massively destructive technologies, the best approach to controlling the weaponization of space is by regulating and punishing behavior. The Outer Space Treaty initiated this approach by making states liable for damage caused by an object launched.[12] This concept was further developed in the Convention on International Liability for Damage Caused by Space. According to that treaty, the "term 'damage' means loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organizations."[13] This treaty does well at laying out liabilities for signing states: they are absolutely liable for damage caused on the surface of the Earth or to aircraft, and liable for other damage only if due to fault. However, it also exonerates a party if the damage is due to "gross negligence or from an act or omission done with intent to cause damage on the part of a claimant State or of natural or juridical persons it represents."[14] This provision presumably addresses defensive actions taken to counter aggression.[15]

While there may be differing opinions as to whether the specific language is adequate to address all concerns, these two treaties alone provide a foundation for allocating responsibility and liability for unnecessary aggression and improper behavior in space. What is currently lacking is a means to monitor, adjudicate, and enforce these responsibilities.

Monitoring, Adjudication, and Enforcement. According to a distinguished speaker on a space law panel, "International disputes on space matters have most often been settled through diplomatic channels rather than by court decisions. Therefore, judicially determined resolutions to many matters of space law have yet to be developed."[16] While such international matters are certainly difficult and complicated, the ability to monitor and adjudicate violations is not without precedent. The World Trade Organization (WTO) currently serves similar functions relating to international trade. The WTO got its start in 1945 after World War II in an attempt to reduce the tariffs and nationalist/protectionist practices that had permeated the international community since the Great Depression.[17] WTO functions include:

- facilitating negotiations between nations for development and enhancement of international agreements
- implementing and monitoring through ensuring visibility, compliance with regulations, and periodic reviews of policies and practices
- settling disputes as well as interpreting terms and responsibilities of agreements
- building capacity, that is, assisting developing countries with technology, disputes, establishing standards, and increasing their opportunities in the industry.[18]

A similar international organization with expertise and credibility in outer space issues could serve a similar role and go a long way toward helping regulate the behavior of states and nonstate actors in space. The most logical organization to take on this mission is the UN, with a standing committee under the Convention on Disarmament, driven by the legal



Countries that signed and ratified Outer Space Treaty as of January 1, 2013, are indicated in green, countries that only signed in yellow, and those that did not sign in grey

subcommittee of the UN Committee on Peaceful Uses of Outer Space. As noted by Frans von der Dunk, expert and professor of space law at the University of Nebraska, "Despite its shortcomings, [the United Nations] still presents us with the only more or less global organization having considerable experience in such issues."[19] The UN Committee on the Peaceful Uses of Outer Space has 69 members, and all UN nations can join. However, their authorities and responsibilities would need to be bolstered and resourced, and a more concrete means of enforcement would need to be in place. Over time, the capabilities, credibility, and effectiveness of the UN committee would grow, similar to the WTO.

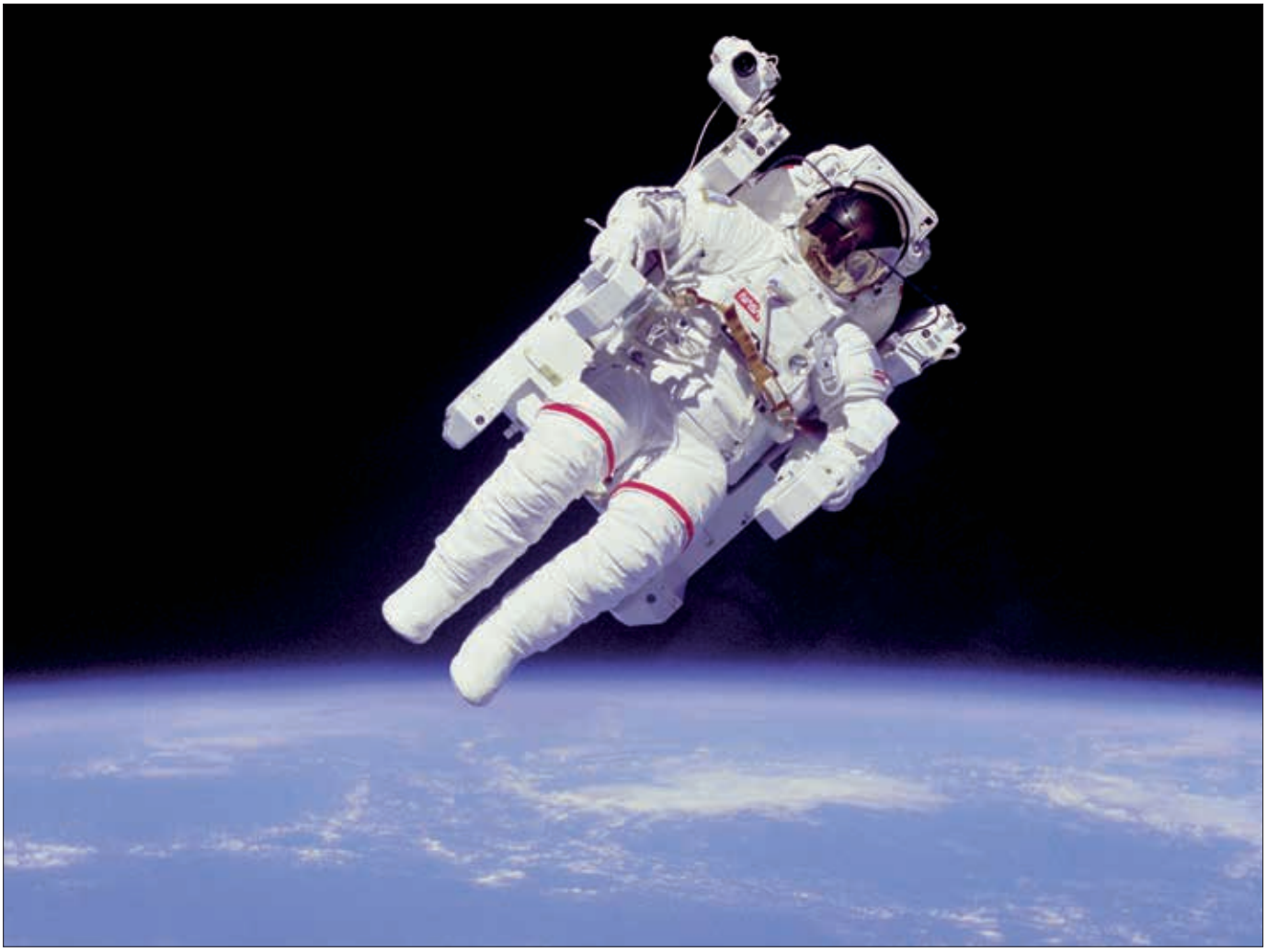
The Convention on International Liability already provides a basic framework for filing and adjudicating claims for damages caused by objects launched into space. Under Articles IX and XI, states can file a claim either with the launching state or the Secretary-General of the United Nations, or they can use the court system of the alleged offending state. Under Articles XIV and XV, if diplomacy does not settle the claim, states can mutually establish a claims commission with a member from each state and a mutually agreed chairman. It is noted, however, that a state can withdraw from the treaty with a year's notice under Article XXVIII.

This claims adjudication system is similar to a binding arbitration approach. The weakness in this system is enforcement. Currently, a state might refuse to recognize any claim or engage in the UN claims adjudication process. Even if a state agrees to adjudicate a claim for damages, forcing it to pay still rests in diplomatic channels. The more challenging or expensive the issue, the less likely it is that a state will be willing to diplomatically agree to payment and will use politics and arguments of unrelated inequities to justify its nonpayment. Under such circumstances, the fear of retribution for irresponsible or aggressive actions in space is undermined and thus is less likely to create conforming state behavior.[20]

It is for this reason, and the fact that damages are paid by economic and monetary means, that a solution might be to invoke the enforcement power of the WTO as a last resort forum if valid adjudicated claims go unpaid and diplomatic avenues fail. As all space-capable countries are reliant on world trade to support their economies, and as much of the space arena is morphing into commercial and commercial-like transactions, the WTO would be a familiar forum for imposing measurable economic trade sanctions to punish the liable state, and in part would compensate the damaged state.[21] Enforcement under these conditions is not reliant on voluntary payment, but the sum can be extracted by the international community. As in all standing tribunals, precedent would provide clarity of what is considered a violation and what the likely consequences would be for offending actions. Intentional offenses can have a "punitive damages" approach to increase the economic impact to the offending states. Additionally, as expertise and experience grow, the costs for even large egregious actions such as the 2007 China antisatellite missile test debris field might be calculated and placed as an economic threat to any nation contemplating such action.

Conclusion

Nations have gone a long way to identify and deter the weaponization of space. In short, the concerns over



Astronaut conducts space walk

weaponization involve the potentially destructive nature of space weapons. It is impossible to define what constitutes a space weapon, and controlling an arms race based on definitions of what constitutes a weapon is doomed to failure with the exception of those weapons clearly posing a substantial risk to humanity, such as nuclear and other weapons of mass destruction. For all other concerns, we should attempt to regulate and control the destructive behavior of nations rather than attempting to limit their technology. It is how they use their technology that matters. We will never completely prevent countries from engaging in war. However, we can bolster peaceful dispute methodologies to prevent escalation of such conflicts and provide deterrence against aggressive or irresponsible behavior.

Current international agreements do not offer an enforceable means of addressing claims for destructive activity, for while there is a forum for adjudication, participation and enforcement continue to rely heavily on diplomacy. A standing committee is needed to provide a credible, knowledgeable, and equitable forum for regulating, monitoring, and adjudicating claims and disputes relating to the damage caused by objects launched into space, whether they are designed for destruction or not. A logical place for this committee would be the United Nations. As current deterrence and enforcement of adjudicated claims currently rest solely in diplomatic, or in extreme cases military, channels, a third option is needed such as using the current economic deterrence and enforcement capability of the World Trade Organization to address and collect on unresolved adjudicated state liabilities. **JFQ**

Notes

[1] The discussion of weaponization of space and the reasons for individual state objections to defining and limiting weapons in space are limited in this article because security and political intent are not publicly discussed and can only be addressed through speculation. As Nancy Gallagher and John D. Steinbruner state, "Because the leading edge of technical accomplishment is obscured by security classification, even the most detached public assessment is subject to some uncertainty." See Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security* (Cambridge, MA: American Academy of Arts and Sciences, 2008), 33.

[2] Treaty on Principles Governing the Activities of States in the Exploration and Use of

Outer Space, Including the Moon and Other Celestial Bodies," opened for signature January 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205, available at <www.oosa.unvienna.org/pdf/publications/STSPACE11E.pdf>.

[3] Ibid.

[4] Other treaties include the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Resolution 2345 [XXII], annex), adopted December 19, 1967, opened for signature April 1968, entered into force December 3, 1968; Convention on Registration of Objects Launched into Outer Space (Resolution 3235 [XXIX], annex), adopted November 12, 1974, opened for signature January 14, 1975, and entered into force September 1976; and Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Resolution 34/68, annex), adopted December 5, 1979, opened for signature December 18, 1979, and entered into force July 11, 1984, available at <www.oosa.unvienna.org/pdf/publications/STSPACE11E.pdf>.

[5] "International Space Law Panel," *The Whitehead Journal of Diplomacy and International Relations*, Summer/Fall 2010, available at <http://blogs.shu.edu/diplomacy/files/2012/05/002_Panel_Layout-11a.pdf>.

[6] Convention on International Liability for Damage Caused by Space Objects (Resolution 2777 [XXVI], annex), adopted November 29, 1971, opened for signature March 29, 1972, entered into force September 1, 1972.

[7] Ibid.

[8] Michael Listner, "An Exercise in the Art of War: China's National Defense White Paper, Outer Space, and the PPWT," *The Space Review*, April 25, 2011, available at <www.thespacereview.com/article/1828/1>.

[9] Federation of American Scientists, "Prevention of an Arms Race in Outer Space," November 26, 2012, available at <www.fas.org/programs/ssp/nukes/ArmsControl_NEW/nonproliferation/NFZ/NP-NFZ-PAROS.html>.

[10] Michael Listner, "U.S. Rebuffs Current Draft of EU Code of Conduct: Is There Something Waiting in the Wings?" *The Space Review*, January 16, 2012, available at <http://thespacereview.com/article/2006/1>.

[11] John Pike, "American Control of Outer Space in the Third Millennium," Federation of American Scientists, November 1998, available at <www.fas.org/spp/eprint/space9811.htm>.

[12] The Outer Space Treaty, Article VII.

[13] Convention on International Liability for Damage Caused by Space Objects, available at <www.faa.gov/about/office_org/headquarters_offices/ast/media/Conv_International_Liab_Damage.pdf>.

[14] Ibid.

[15] Bob Preston et al., "Space Weapons Earth Wars," *Project Air Force*, MR-1209-AF (Santa Monica, CA: RAND, 2002), 19.

[16] "International Space Law Panel," 16.

This true-color image shows North and South America as they would appear from space 35,000 km (22,000 miles) above the Earth (Image created by Reto Stöckli, Nazmi El Saleous, and Marit Jentoft-Nilsen, NASA GSFC).

[17] World Trade Organization (WTO), "Understanding the WTO: Basics—The GATT Years: From Havana to Marrakesh," available at <www.wto.org/english/thewto_e/whatis_e/tif_e/fact4_e.htm>.

[18] WTO, "Understanding the WTO: What We Do," available at <www.wto.org/english/thewto_e/whatis_e/what_we_do_e.htm>.

[19] "International Space Law Panel."

[20] This article deals with acts of aggression typically addressed by diplomatic and economic means. Military deterrence, defense, and response will always be present in the international community.

[21] I do not discuss the liabilities of commercial and nonstate actors since the current treaties make the site-of-launch state responsible, and "[s]o far, the major space-faring powers have developed sophisticated licensing and regulations to insure that private actors in space adhere to the UN treaty principles." See "International Space Law Panel."