Governing Contemporary Security Challenges: The Canadian Approach to Polyvalent Security in Outer Space

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From both a security and governance perspective, space has grown in prominence following several high-level events including the intentional destruction of satellites by China in 2007 and the United States in 2008 and the collision of two satellites in 2009. But space as a security concept is contested, reflecting the evolution of security to include non-military/non-state issues, and thus marked by competing claims from the perspective of state security, human security, and corporate security. Examining these various versions of space security, however, demonstrates that while there are clear tensions between them, they also overlap in many ways, which I suggest resembles Karin Fierke's concept of a security cluster. Drawing on this idea of a security cluster is not only instructive analytically, but also sheds on light on alternative formulations of security governance, which are reflected in Canada's approach to space security as security *of* space. Rather than view governance narrowly from the perspective of independent security claims, the Canadian approach emphasizes the unifying component of various space security claims, which is based on the value of space as an instrumental resource. While this formulation poses a challenge for traditional, comprehensive approaches to security governance, it is possible to see at least nascent governance based on the restraint of behaviour taking place through a 'regime complex' model whereby competing visions and mechanisms of security overlap and restrain one another. Together, I argue that these two concepts – a security cluster and a regime complex – are instructive for contemporary security governance, providing the basis for what I call polyvalent security, bridging the security claims of competing referents, but not eliminating the tensions between them. To illustrate the plausibility of this approach, I draw on two examples of polyvalent security approaches, the prevention of space debris and the non-weaponization of space. I conclude by considering the extent to which a polyvalent approach to security might serve as a guide for similar issue areas such as the Arctic, as well as its limitations.

The Challenge of Contemporary Security Governance

The nature of contemporary security issues such as outer space, which are marked not only by competing national security claims but also competing visions of security based on the broadening of the concept in the post-Cold War era, pose a challenge for security governance. Emanuel Adler and Patricia Greve define security governance as *"a system of rule conceived by individual and corporate actors aiming at coordinating, managing, and regulating their collective existence in response to threats to their physical and ontological security. This system of rule relies primarily on the political authority of agreed-upon norms, practices, and institutions, as well as on the identities, rationalities, technologies, and spatial forms, around and across which international and transnational security activity takes*

place."[1] This formulation suggests certain coherence – a basic agreement about the nature of the security referent and its threats, in addition to the instruments of governance, derived from at least a loose common identity. This begs the question, how do we govern areas of contested security? I draw on the Canadian formulation of space security as 'security of space' as a starting point for thinking about what I term polyvalent security governance, which brings together different security referents. The fragmented and contested nature of security in outer space, while posing a problem for governance in so far as a comprehensive approach is possible, suggests that nascent forms of governance might first be achieved through the very tensions that exist between various versions of security, resembling a regime complex.[2]

Outer Space as a Security Cluster

Space as a governance issue is characterized by competing space security discourses that have sought to securitize space from the perspective of different referents including national security, human security, corporate security, and the space environment. These tensions first emerged in the early days of the space age and are embedded in the cornerstone framework guiding the use of space, the Outer Space Treat. However, these various perspectives share a unifying logic: space as an instrumental value. Whether in service to the nation, individuals, or corporations, space is valued for its use. Reflecting this logic, Canadian space policy has sought to transcend the differences by emphasizing this common basis, articulating a vision of space security based on the *security of space*: "secure and sustainable access to and use of space."[3] This shift reflects the notion of a 'security cluster' developed by Karin Fierke, which emphasizes security as a field of relationships that connect competing subjects and objects of security.[4] This approach to space security emerged in response to a key lacuna in the governance of outer space, namely the question of weaponization, which is addressed in neither the Outer Space Treaty nor subsequent agreements regulating how space is used. By bringing competing security discourses together around a shared value, and by extension widening space security beyond traditional military connotations, the intention is to create a common basis for the discussion of governance gaps including the non-weaponization of space. To illustrate, the following is an overview of competing but overlapping space security claims, which all depend on continued access to and use of space that is threatened by both increasing space debris and the potential weaponization of space.

Space as a National Security Value:

[1]Emanuel Adler and Patricia Greve, "When Security Community Meets Balance of Power: Overlapping Regional Mechanisms of Security Governance," *Review of International Studies* 35, no. S1 (March 2009): 64.

[2] Kal Raustialia and David G. Victor, "The Regime Complex for Plant Genetic Resources," *International Organization* 58, no. Spring 2004 (Spring 2004): 277-309.

[3] Foreign Affairs and International Trade Canada, "Space Security," *Foreign Affairs and International Trade Canada*, March 3, 2011, http://www.international.gc.ca/arms-armes/non_nuclear-non_nucleaire/space_security-securite_spatiale.aspx?lang=eng. This definition of space security is embodied by the Space Security Index, an annual report published by an international research consortium sponsored by the Government of Canada. *Space Security 2010*, Space Security Index (Waterloo, Ontario: Spacesecurity.org, 2010), 7, http://www.ploughshares.ca/libraries/Abolish/SS2010.pdf.

[4] Karin M. Fierke, *Critical Approaches to International Security* (Cambridge: Polity, 2007), 46.

Space has predominantly served traditional national security purposes, which emerged in the context of the Cold War following the launch of the first satellite, Sputnik-1, by the Soviet Union on 4 October 1957. Viewed through the lens of the existential competition between the United States and the Soviet Union, Sputnik was interpreted as a threat to the survival of the nation similar to iconic events such as Pearl Harbor and the development of the atomic bomb; as the ultimate weapon in a do-or-die competition for the world.[5] This view quickly infiltrated government lexicon through the efforts of individuals such as Lyndon B. Johnson, who referred to outer space as the "ultimate high ground" and described the emerging space race as a "race for survival."[6] This security discourse was largely replaced with a complimentary focus on techno-nationalism and prestige that operated on both sides of an emerging race for space.[7] From the Soviet perspective, Sputnik was a symbol of the superiority of the Soviet system and of its triumph in science and technology as part of a global struggle with the United States for 'hearts and minds.'[8] Likewise, the establishment of the US National Aeronautics Space Administration (NASA) in 1958 and the ensuing mission to the Moon was aimed in large part at national prestige and securing its place as the leader of the free world.[9] But the use of space as an instrument for the military security of the state continued, albeit in silence. Popular terms such as 'peaceful use' and 'freedom of space,' which were institutionalized within the international framework for space activities set out in the Outer Space Treaty, became euphemisms for military use because of what they did not mean – no military use – thereby serving as rhetorical mask for what was a race for the narrow, military security of two nations.[10]

Consequently, national military competition became the primary driver of the development of space capabilities. Under the guise of 'peaceful uses' the US and Soviet Union developed extensive, 'non-aggressive' military space programs that were the silent financial and technological drivers of the space race, turning space into a strategic asset for national security.[11] These programs supported a wide range of military functions including surveillance and reconnaissance, communications, early-warning, and navigation, and were very much linked to the survival of the state in face of the nuclear standoff between the US and Soviet Union. By the end of the Cold War, the US and Soviet Union together had launched over 2,000 dedicated military satellites.[12]

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[5] Robert A. Divine, *The Sputnik Challenge*, (New York: Oxford University Press, 1993), xiv-xv, 37.
[6] Lyndon B. Johnson cited in Divine, p. 79.
[7] Joan Johnson-Freese, *Space as a Strategic Asset (*New York: Columbia University Press, 2007), 198.
[8] Iina Kohonen, "The Space Race and Soviet Utopian Thinking," *Sociological Review* (2009), p. 114-115; Walter A. McDougal, "Technocracy and Statecraft in the Space Age," *The American Historical Review* 87(4) (October 1982), 1017.
[9] Roger D. Launius, "Introduction" in J.D. Hunley ed., *The Birth of NASA: The Diary of T. Keith Glennan,* (Washington: NASA, 1993), xx-xxvii.
[10] The development and use of these terms is described in M. J. Peterson, *International Regimes for the Final Frontier*, (Albany: State University of New York Press, 2005), 125-134, 50-52.
[11] Peterson, *International Regimes for the Final Frontier,* 132, 140; Michael Sheehan, *The International Politics of Space.* (New York: Routledge, 2007), 38; Johnson-Freese, *Space as a Strategic Asset*.
[12] *Space Security 2010*, 128-29.

The dominance of space as an instrument for national security continues long after the Cold War. Although rhetorically toned down in the most recent version, the US National Space Policy released in 2006 states:

> In this new century, those who effectively utilize space will enjoy added prosperity and security and will hold a substantial advantage over those who do not. Freedom of action in space is as important to the United States as air power and sea power…The United States considers space capabilities -- including the ground and space segments and supporting links -- vital to its national interests.[13]

Similarly, the European Space Policy adopted in 2007 describes space as "a strategic asset contributing to the independence, security and prosperity of Europe and its role in the world" and stresses the importance of independent access to space.[14] China's 2006 White Paper on Space Activities claims that space is intended, among other things, to "protect China's national interests and rights, and build up the comprehensive national strength."[15] Space also remains a strong focus of national prestige and techno-nationalism, particularly for emerging space states such as China, which became the third country to conduct human spaceflight, indicated by the growing number of independent space programs in countries such as Brazil, Nigeria, and Venezuela. Techno-nationalism is a pillar of India's space program, which for decades was aimed to providing public goods to its citizens, but has recently shifted toward large-scale projects including lunar probes and human spaceflight.[16] Similarly, Iran's recent foray into space when it launched its first domestic satellite in 2009 has been hailed in terms of the prestige and power of the nation.[17]

Indeed, military programs remain a driver of almost all national space efforts, with the most extensive systems developed by European states (particularly France, Germany, Italy, Spain, and the United Kingdom), the European Space Agency, China, and India.[18] Even those states without dedicated military space programs such as India are generally acknowledged to use their space assets for military purposes.[19] Indeed, over half of all global spending on space, recently estimated at $62-billion, is attributed to military programs, which excludes classified spending as well as dual-use of civilian or commercial systems.[20] Space as an instrument is very much in the service of national security.

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[13] Office of Science and Technology, Executive Office of the President, "US National Space Policy," (2006).
[14] European Space Agency, "Resolution on the European Space Policy," (June 2007).
[15] Information Office of China's State Council, "China's Space Activities in 2006," (October 2006).
[16] Sheehan, *The International Politics of Space,* 10; "ISRO Eyes Manned Moon Mission by 2015, Awaiting Government Approval," *Hindustan Times,* (22 October 2008).
[17] Parviz Tarikhi, "Iran's Space Program: Riding High for Peace and Pride," *Space Policy* 25 (2009), 160-173.
[18] See *Space Security 2010*, 119-140.
[19] G. Madhavan Nair, Secretary in the Department of Space and Chairman of Indian Space Research Organisation, quoted in Fresh News, "India ready for launch of satellite with military applications" (21 September 2007), http://www.freshnews.in/india-ready-for-launch-of-satellite-withmilitary-applications-15639. This was also made clear in statements at a conference on space security organized by the Centre for Defence and International Security Studies in New Delhi, November 2007.
[20] Euroconsult, Media Release, "Government Space Program Expenditures Worldwide Hit a Record $62 billion" (18 December 2008).

The implications of this traditional approach to security in space have been critical for managing how space is and is not used, particularly with regarding weapons. National military assets in space are vulnerable to the use of force by other states and difficult to defend, a threat that has largely been mitigated by a shared recognition of the instrumental value of space, which like sovereignty has been protected through a corollary of the principle of non-intervention.[21] Extensive anti-satellite programs were developed by both the US and the Soviet Union during the early years of the space race, but as Clay Moltz explains, space became too valuable for war, creating a stable space regime based on the norm of non-interference and several arms control measures.[22] However, recent events have signalled that the stability of this system is once again under threat as more extreme formulations of space *as* national security, first articulated by Lyndon B. Johnson, as opposed to space *for* national security, re-emerge. This idea is reflected in the findings of the 2001 Rumsfeld Commission on the state of US national security in space, which warned of a potential space 'Pearl Harbor' due to American dependence and vulnerability.[23] Along these lines the US Air Force Doctrine 2-2.1 "Counterspace Operations," calls for both offensive and defensive capabilities in space to maintain US superiority, and hints at pre-emptive action in space "to preclude an adversary from exploiting space to their advantage."[24] This version of space security also reflects the shifting military value of space from defensive and strategic to offensive and tactical, which first became evident during the First Gulf War popularly called the first 'Space War' when 10 percent of weapons were connected to space systems – a figure that has since jumped to over 90 percent.[25] Because these capabilities represent a direct threat to the security of other states they present inviting military targets, which threatens to destabilize the strategic stability of the Cold War.

The governance implications of this shift are notable. The abrogation of the Anti-Ballistic Missile Treaty by the United States in 2002, which had served to limit the development of anti-satellite systems and by extension a major motive for the placement of weapons in space, and the deliberate destruction of a satellite by China in 2007, which ended a long-standing moratorium against the testing of such weapons, both suggest that the principle of non-interference may be giving way. Moreover, there are ongoing research efforts, which appear to be most advanced in the US, aimed at controlling space and being able to deny the use of space by other actors.[26] China is also developing programs to interfere with space systems during conflict.[27] The consequences of this competitive and mutually-exclusive approach to the use of space for national security purposes is extremely destabilizing, and could conceivably lead to

[21] Jill Stuart, "Unbundling Sovereignty, Territory, and the State in Outer Space: Two Approaches," in Natalie Bormann and Michael Sheehan eds., *Securing Outer Space*, (Milton Park; New York: Routledge 2009), 12.
[22] Laura Grego, "A History of Anti-Satellite Programs," Union of Concerned Scientists (2003). James Clay Moltz, *The Politics of Space Security,* (Stanford: Stanford University Press, 2008), 125.
[23] Report of the Commission to Assess United States National Security Space Management and Organization, (11 January 2001), 8.
[24] US Air Force Doctrine 2-2.1 "Counter Space Operations" (August 2004), 31.
[25] "Now It's Really Space War," *Business Week* (24 March 2003), http://www.businessweek.com/magazine/content/03_12/b3825078.htm.
[26] *Space Security 2010*, Chapter 7, "Space Systems Negation."
[27] Johnson-Freese, *Space as a Strategic Asset,* 222-223.

active conflict and the use of weapons in space. The implications, however, extend beyond military security and affect the use of space for non-military purposes.

Space as a Human Security Value

In response to growing military tensions in space and awareness that space is valuable beyond national security, new voices, predominantly within civil society, emphasize the importance of space for achieving human security goals. This narrative reflects the cosmopolitan notions of citizenship and sovereignty reflected in the Outer Space Treaty's emphasis on the benefit to all mankind, peaceful purposes, and non-appropriation.[28] In 1985, Sikke A. Hempenius and Ceasar Voute from the International Institute for Aerospace Surveys and Earth Sciences called for a new form of Space Age ethics that viewed space as a "unifying element for mankind" and required the use of outer space to benefit every single individual on Earth.[29] This relationship between space and humanity was later more clearly articulated in the Vienna Declaration on Space and Human Development, which culminated the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space in 1999. The Declaration called for a program

> involving the protection of the Earth's environment and the management of its resources; using space applications for human security; development and welfare; protecting the outer space environment; increasing developing countries access to space science and its related benefits; raising public awareness; strengthening the United Nations space activities; and promoting international cooperation.[30]

These themes have been central to developing a human security dimension to the use of space, in large part driven by the United Nations Institute for Disarmament Research, which holds an annual meeting on space security. The report on the 2006 conference "Building the Architect for Sustainable Space Security" is replete with mentions of 'humanity.'[31] Moreover, the value of space in this new discourse is often articulated in terms of its importance to daily life. As expressed by Sergey Batsanov, Director of the Pugwash Conferences on Science and World Affairs, "Outer space has become indispensable in many aspects of daily life, and any damage to space assets will deal a heavy blow to humanity."[32] More specifically, space applications have been described as essential to United Nation's goals and targets, including the achievement of the Millennium Development Goals.[33]

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[28] United Nations, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies," (1967); Stuart, "Unbundling Sovereignty," 15.

[29] Sikke A. Hempenius and Ceasar Voute, "Human Development and the Conquest of Space," *Space Policy* 1(2) (1985), 179. See also Yash Pal, "Viewpoint: Space and Human Security," *Space Policy* 13(3) (1997), 179-185.

[30] Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space, "Declaration on Space and Human Development," (July 1999).

[31] United Nations Institute for Disarmament Research, "Building the Architecture for Sustainable Security in Outer Space," Conference Report, Geneva, Switzerland (30-31 March 2006).

[32] Sergey Batsanov, "The Outer Space Treaty – Then and Now," in United Nations Institute for Disarmament Research, "Celebrating the Space Age: 50 Years of Space Technology, 40 years of the Outer Space Treaty," Conference Report, Geneva, Switzerland (2-3 April 2007), 5.

[33] Yvette Stevens, "Space Security: The Need to Safeguard Space for the Next Generation," in United Nations Institute for Disarmament Research, "Security in Space: the Next Generation," Conference Report, Geneva, Switzerland (31 March – 1 April 2008), 25.

Although still minor compared to military uses of space, prominent examples of how space systems support human security and development include the use of space data for agriculture through capabilities to monitor crops, predict weather, and track potential natural disasters such as locusts.[34] The use of satellites also facilitates wider access to health care for some rural and remote communities, via tele-health and tele-education for doctors.[35] Violations of personal security, community security, and political security are often monitored via satellite imagery by a number of human rights groups, including Amnesty International.[36] Environmental security is perhaps the most significant and systematic contribution that space technology makes toward human security, via early-warning of natural disasters, resource management and monitoring of environmental degradation, and the collection of data on climate change. Several efforts are underway to make two of the most critical space capabilities for human security, remote sensing and communication, more widely available around the world, in particular the International Charter on Space and Major Disasters and the Operational Satellite Applications Program (UNOSAT) of the UN Institute for Training and Research.[37]

However, the use of outer space to support human security initiatives remains state-based and is tightly coupled with nation-building and military activities. The Indian Space Research Organisation is demonstrative: in 2006 it adopted a Citizen's Charter stating that "the Department of Space has the primary objective of promoting development and application of space science and technology to assist in all-round development of the nation."[38] China's civilian space program is likewise attuned to the development needs of the country.[39] Similarly, the two flagship programs of the European Space Agency, the Galileo satellite navigation program and the Global Monitoring for Environment and Security Program are also linked to achieving a range of collective human security goals within Europe.[40] Thus, space as an instrument for achieving human security goals cannot necessarily be severed from national security and the project of the nation. Indeed, despite rhetoric of international cooperation and benefits to mankind, space is used directly only by a small fraction of the world's countries, although a growing number of them are sharing some of the data from their space systems through the United Nations, aid programs, and bilateral arrangements.[41] But the use of space remains by and large a national endeavour with national benefits whether they are aimed at the security of individuals or the state.

[34] Ibid., 29.
[35] Ibid., 29.
[36] Eyes on Darfur, Website http://www.eyesondarfur.org/about.html; Amnesty International, "Zimbabwe: Satellite Images Provide Shocking Evidence of the Obliteration of a Community," (30 May 2006), http://www.amnesty.org/en/library/info/AFR46/008/2006.
[37] International Charter Space and Major Disasters, Website http://www.disasterscharter.org/home; United Nations Institute for Training and Research, "Operational Satellite Applications Program," http://www.unitar.org/unosat/who-we-are.
[38] Indian Space Research Organization, "Citizen's Charter," http://www.isro.org/scripts/citizencharter.aspx.
[39] Johnson-Freese, *Space as a Strategic Asset,* 197; "Chinese White Paper on Space Activities."
[40] Johnson Freese, *Space as a Strategic Asset,* 186.
[41] *Space Security 2010,* Chapter 3, "Civil Space and Global Utilities," Trend 3.2 and 3.3.

The argument that space security is important for human security seeks to highlight the threats posed to human security by the dominance of national military security as the primary referent in space. Because satellites are dual-use, meaning the data that they provide is often used to support military, civil, and commercial functions, satellites that serve civilian and humanitarian purposes face the same potential physical threats from other states as those that serve national military functions. Moreover, the use of space to meet international human security needs is significantly dependent on states to mobilize the resources needed to build, launch, and operate satellite systems. National security concerns often pose an obstacle to the provision of this data, which is seen as sensitive and secret. And the dual-use nature of space applications for both military and civilian purposes puts civilian uses at risk in the event of military conflict in space. Thus space as an instrument of the nation and space as an instrument for humanity overlap but exist in constant tension.

Space as a Corporate Value

Corporate interests in space is a relatively new security discourse, but one that reflects the overwhelming role that the private sector has had in the development of space programs and systems, from the first commercial telecommunications satellite launched in 1962 to the development of commercial space launch, navigation, Earth observation, and hardware manufacturing services today.[42] The security interests of the private space sector largely reflect a concern with the safety of hundreds of commercial satellites operating in orbit. Global spending on space is estimated at $261.1-billion in 2009, with commercial satellite services representing 35 percent of this figure, and most other sectors relying on the private space sector in some way.[43] However, like human security, corporate security interests in space cannot be viewed in isolation of other uses. For example, much of the access to space for human security applications and the everyday uses of space by individuals around the world are provided by commercial operators, particularly through telecommunications and Earth observation services.[44] The private sector is even more critical to military uses of space, not only through its manufacturing capability, but also through the dual military use of commercial satellites. To illustrate, the US Department of Defense spends more than $1-billion on commercial satellite bandwidth each year, and relies on this service for 80 percent of its broadband use in Iraq and Afghanistan.[45] Along this line, many spacefaring nations have linked their commercial space industries to national security, including the United States, the European Union, and China.[46] But like civilian uses of space, these corporate services

[42] Most national space capabilities are actually located within the private sector. For an overview of the extensive activities of commercial actors in space see *Space Security 2010*, Chapter 4.
[43] *The Space Report 2010*, The Space Foundation (2009).
[44] "State of the Satellite Industry Report," Futron Corporation (June 2010).
[45] Bob Brewin, "Satellite Development Delays Cost DOD $1B," Federal Computer Week (26 January 2007), http://www.fcw.com/article97492-01-26-07-Web; David Cavossa, Satellite Industries Association Executive, cited in Jerome Bernard, "US Using Space Supremacy to Wage Combat in Iraq, Afghanistan," *Defense News* (23 June 2006).
[46] The Clinton Administration first linked the commercial space industry to national security and critical infrastructure in the 1996 space policy. See Linda L. Haller and Melvin S. Sakazaki, "Commercial Space and United States National Security," Prepared for the Commission to Assess United States National Security Space Management and Organization," (2006), http://www.fas.org/spp/eprint/article06.html#rft54; "China's Space Activities in 2006," Information Office of the State Council of the People's

are at risk of attack in the event of a military conflict in space, and the close relationship between commercial and military space uses means that service providers can be stymied by national security concerns through the imposition of national trade restrictions on technology and data.[47]

From a governance perspective, satellite operators such as Intelsat are becoming increasingly active. For example, following the Chinese satellite destruction in 2007, David McGlade, CEO of Intelsat, provided an op-ed in the influence *Space News* publication calling for better governance efforts to preserve the space environment.[48] Representatives from the commercial space sector have also been active in efforts to develop an international space traffic management system, and a code of conduct for outer space activities sponsored by the European Union.[49] But the governance perspective of the commercial sector remains rather narrowly focused on the prevention of space debris and the provision of space traffic management.

A Polyvalent Approach: Space Security as the Security *of* Space

Various space security discourses that have sought to securitize space from the perspective of national security, human security, corporate security, share a unifying logic: space as an instrumental value. Whether in service to the nation, individuals, or corporations, space is valued for its use. But this use can also threaten space security in so far as competing claims create both a tragedy of the commons and a security dilemma. These challenges are likely to increase in the future as space becomes even more valuable through the creation of new space applications and the spread of capabilities. In the face of this predicament, it is tempting to prioritize a particular use of space in a way that mirrors traditional debates about the value of security referents: is human security more valuable than the state or the corporation, or are international uses more valuable than national ones? But this question misses the point illuminated by the concept of the security cluster: that competing security claims are also deeply entwined. In order to reflect this reality, and to develop the concept of polyvalent security beyond the state, the Canadian approach to space security is instructive.

Canada's vision of security in space is most clearly articulated in the Space Security Index: "secure and sustainable access to and use of space."[50] Reflecting the common values that unite competing discourses of space security – the ability to use and access space – this definition seeks to broaden the concept of security in space in such a way that polyvalent claims are compatible with one another. This is in some ways similar to the idea of a security community in so far as it views security as more than

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Republic of China (12 October 2006), online: People's Daily Online, http://english.people.com.cn/200610/12/eng20061012_311157.html; *Resolution on the European Space Policy,* ESA Director General (June 2007) at 9; http://www.esa.int/esapub/br/br269/br269.pdf.

[47] *Space Security 2010,* Chapter 4, Trend 4.3.

[48] David McGlade, "Commentary: Preserving the Orbital Environment," *Space News* (17 February 2007), 27.

[49] Gerard Brachet. "CD PAROS," Presentation to the Conference on Disarmament, Geneva (2008) (provided to the researcher); Richard DalBello and Joseph Chan. "Linking government and industry efforts to increase space situational awareness," Presentation at workshop on the state of space security, George Washington University, Washington, DC, April 2008.

[50] *Space Security 2010.*

military and is aimed broadly at overcoming the challenges of competing security claims.[51] But Canada's concept of space security extends beyond the pluralist security of states, bringing together not only competing claims for national security but also the security claims of other referents such as human security and corporate actors. However, in contrast to the strong order generated by a security community's sense of identity and we-ness, the behavioural implications of polyvalent security are less strenuous, relying instead on the recognition of common interests based on the instrumental use of space as a global commons. Thus, while the foundation of order within a security community is the expectation of peaceful change, order based on polyvalent security is less cohesive, based on restraints imposed by competing security claims rather than the more positive governance mechanism of the security community. This system of restraint is perhaps best expressed through the idea of a regime complex.

Kal Raustiala and David Victor define a regime complex as "a collective of partially overlapping and nonhierarchical regimes" that is driven by what they perceive as the growing legalization of world politics and density of international institutions.[52] The idea is that over time broad rules are developed that create a whole out of the many pieces, although inconsistencies and gaps may remain. Examining this idea from the perspective of polyvalent security, it is the competing but overlapping security claims of various actors in space that seems to drive behaviour beyond the commonly noted gaps in the legal and institutional framework.[53] While the outer space regime is commonly criticized for lacking coherence, I suggest that the fragmented pieces of governance and competing security claims form a regime complex, with the key driver of order being restraint rather than community. As a means of governance, the development of principles, rules and decision-making processes on the basis of a polyvalent regime complex can range from quite strong to weak, demonstrated by the following two examples. Although initially based on a weak sense of order generated exclusively by restraint, the protection of the space environment has since emerged with more robust, albeit voluntary, governance mechanisms. In contrast, the non-weaponization of space continues to exist as a weak and more precarious principle maintained almost exclusively by a system of restraint.

Polyvalent Security and the Space Environment: From Restraint to Rules

A specific example of a polyvalent security perspective, and a component of Canada's approach to the security of space, is the effort to secure the space environment. Reflecting national, humanitarian and corporate interests, environmental approaches to space governance view outer space instrumentally, arguing the need to protect the ability of the space environment to support the space-based capabilities and applications that are valued by competing uses of space. A more narrow component of the broad Canadian approach to space security, this discourse has been used as a means to unite competing

[51] Emanuel Adler and Michael Barnett, "Security Communities in Theoretical Perspetive," in *Security Communities*, ed. Emanuel Adler and Michael Barnett (Cambridge UK; New York: Cambridge University Press, 1998), 4-7.
[52] Raustialia and Victor, "The Regime Complex for Plant Genetic Resources," 279.
[53] Government of Canada, Working Paper, "A Gap Analysis of Existing International Constraints on Weapons and Activities Applicable to the Prevention of an Arms Race in Outer Space Agenda Item of the Conference on Disarmament," (2006) http://www.reachingcriticalwill.org/political/cd/papers06/9JuneCanadaWP.pdf.

interests in space and to stabilize the potential for conflict by focusing on a common threat, gradually shifting from restraint-based behaviour to a more formalized systems of rules and governance.

Environmental concerns have been an underlying theme of security in outer space since the early days of the Space Age in the context of nuclear contamination. The United States secretly conducted the first nuclear tests in space in 1958, which culminated with the Starfish Prime test of a 1.4-megaton hydrogen bomb that disrupted radio transmissions in California and Australia, contaminated the Van Allen belts around the earth with additional radiation,[54] disabling at least six satellites.[55] The long-term damage that nuclear explosions posed to the ability of the United States and Soviet Union to use outer space for national military purposes led to the first restraint on nuclear testing, the Partial Test Ban Treaty of 1963. This treaty specifically references environmental concerns, citing a desire to "put to an end the contamination of man's environment by radioactive substances."[56]

Contemporary environmental concerns revolve around the issue of space debris. The laws of physics make space a uniquely sensitive and hazardous environment in which to operate, with debris being one of the greatest hazards. Debris includes human-made objects in space left behind by launches, defunct satellites that remain in orbit, fragmentation of satellites from purposeful or accidental destruction, collisions, and the break-up of large pieces of debris. Once created, pieces of debris both small and large stay in orbit travelling at high speeds posing a serious, indiscriminate risk to all spacecraft in its path.[57] The potential for contamination of the space environment to hinder use by humans has mobilized a discourse of space security focused on the environment that is often used to compliment the human security argument as an alternative to national security,[58] but which also gives voice to other interests in space such as scientists and corporate operators.[59] Indeed, protection of the space environment has become the pre-eminent concern for space security, galvanizing intense interest following three high-profile events that crystallized the threat: intentional destruction of satellites by China and the United States in 2007 and 2008 respectively, and the collision of two orbiting satellites in 2009. The risk posed by the testing and use of weapons against satellites in outer space is particularly acute, as demonstrated by the Chinese anti-satellite test in 2007, resulting in the largest intentionally-created debris cloud to date, which will remain in orbit for decades to come.[60]

Consequently, Clay Moltz, one of the leading advocates of an environmental approach to space security, argues that protection of space as an environment is more fruitful than focusing on the narrow interests

[54] The Van Allen belt is a radiation belt of charged particles around the Earth that damages electronics on spacecraft and human spaceflight vehicles that must travel through it.
[55] Moltz, *The Politics of Space Security,* 67, 119.
[56] United Nations, "Treaty Banning Nuclear Tests in the Atmosphere, in Outer Space, and Under Water," (1963).
[57] William J. Broad, "Orbiting Junk, Once a Nuisance, Is Now a Threat," *New York Times* (6 February 2007).
[58] See United Nations Institute for Disarmament Research, "Space Security 2009: Moving Toward a Safer Space Environment," Conference Report, Geneva, Switzerland (15-16 June 2009).
[59] Intelsat has been particularly active in this discussion. See for example David McGlade, "Commentary: Preserving the Orbital Environment."
[60] Center for Space Standards and Innovation, "Chinese ASAT Test," (5 December 2007), http://www.centerforspace.com/asat/.

of states, and could once again help to stabilize relations in space through a common interest.[61] Indeed, environmental protection has become the focus of recent efforts to regulate the use of space. International best practices on debris prevention were first put forth by the Inter-Agency Space Debris Coordination Committee in 2002,[62] which became the basis for those adopted by the United Nations Committee on the Peaceful Uses of Outer Space in 2007.[63] Debris and the sustainability of the space environment are also the basis on which several advocates are promoting a ban on the use of *certain* weapons in space, including the Union of Concerned Scientists.[64] And debris is also the driving force behind proposals for an international system of space traffic management.[65]

Polyvalent Security and the Non-Weaponization of Space: Fragile Restraint

Turning to the governance challenge posed by the potential weaponization of space, which although touched upon by the issue of space debris is broader and more contentious in scope. Neither the use of force or nor the placement of weapons in outer space are banned by the Outer Space Treaty or any of the other specialized legal agreements that govern the use of outer space. This gap is one of the key reasons why the Government of Canada initially sponsored the Space Security Index project as a means of moving toward agreement on this issue by starting with the recognition of polyvalent security interests. And indeed, despite lack of a formal prohibition, considerable restraint in behaviour seems to indicate a principle against the use of weapons in space. The specific example of the destruction of a failed satellite by the United States in 2008 is demonstrative of the positive although perhaps precarious effects of a weaker, restraint-based polyvalent regime. One year following the intentional destruction of a satellite in orbit by China in 2007 that broke a long-standing moratorium on anti-satellite testing, the US military modified its Aegis anti-missile system to intercept the National Reconnaissance Office's failed US-193 satellite, which was falling back towards Earth's orbit, destroying it on 21 February 2008. Although many commentators dismayed this action and saw it as a failure of the outer space regime's ability to prevent such behaviour,[66] it can also be view as an example of order driven by the restraint imposed by competing and overlapping security claims, based on the extent to which the American

[61] Moltz, *The Politics of Space* Security, 126, 137, 40.
[62] Inter-Agency Space Debris Coordinating Committee, "Space Debris Mitigation Guidelines," (15 October 2002), http://www.iadc-online.org/docs_pub/IADC-101502.Mit.Guidelines.pdf.
[63] United Nations Committee on the Peaceful Uses of Outer Space, *Report of the Committee on Peaceful Uses of Outer Space*, UNGAOR, 62nd Sess., Supp. No. 20, UN Doc. A/62/20 (2007).
[64] Union of Concerned Scientists, "Open Letter to Prime Minister Stephen Harper on Banning ASAT Weapons," (27 March 2007), http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/policy_issues/open-letter-to-canadian-prime.html; Bruce MacDonald, "A Prohibition on the Testing and Use of Debris-causing Kinetic Energy Anti-Satellite Weapons," in UNIDIR "Space Security 2009."
[65] Corrine Contant Jorgenson, Petr Lala, and Kai-Uwe Schrogl, "The IAA Cosmic Study on Space Traffic Management," *Space Policy* 22(4) (November 2006), 283-288; "Draft Code of Conduct for Outer Space Activities," *Space Policy* 25 (2009), 144-146.
[66] Noah Shachtman, "Experts Scoff at Sat Shoot-Down Rationale (Updated), *Wired*, 15 February 2008, http://www.wired.com/dangerroom/2008/02/fishy-rationale/; Marc Kaufman andJosh White, "Satellite Fuel's Risks Are Disputed," *Washington Post* (21 February 2008), 3; WMD Insights, "U.S. Satellite Shoot-Down Evokes International Concern and Criticism," Issue 24 (April 2008), http://www.wmdinsights.org/I24/I24_G1_US_Satellite.htm.

government took steps to justify it in a number of different venues and from a number of different security perspectives.

The primary argument that the US provided to justify the destruction of the satellite was based on environmental and human security concerns due to the threat posed by the satellite's fuel tank.[67] Prior to the event, the US government advised the international community of its intentions, taking great care to cite consistency with international law, briefing COPUOS on its efforts to comply with voluntary Debris Mitigation Guidelines, and the Conference on Disarmament on its adherence to the Outer Space Treaty, the Liability Convention, and the Rescue Agreement and stressing that the event was not to be viewed as an anti-satellite test.[68] Assurances thus covered the broad range of security interests in space, and although the activity took place despite civil society and media fears that it would escalate tensions in space, there were clearly constraints placed on the US through the need to maintain security assurances to other actors, and reactions from foreign governments were relatively muted.[69] And perhaps most importantly, this action has not spurred a spiral of reciprocal behaviours. Thus, while there is not one single instrument outlining the ways in which space should be used, or banning the deployment of weapons specifically, there is reason to believe that the complex of overlapping interests and governance mechanisms and the tensions between them are serving to govern space and prevent weaponization by imposing restraints on behaviour, but that this principle remains fragile.

Conclusion: Polyvalent Security as a Path to Governance?

Reflecting on the issues of environmental protection and the non-weaponization of space, which respectively represent a strong and a weak example of governance based on the polyvalent perspective of space security promoted by the Canadian government, this appears a plausible if not ideal approach to security governance. In terms of the non-weaponization of space – a long-noted but contentious lacuna of space governance – mutual restraint appears to be supporting a principle against the use of force in outer space, albeit one that is clearly precarious. Moreover, the behaviour of the United States

[67] David A. Fulghum, "US Considering Shooting Down Satellite," *Aviation Week and Space Technology* (12 February 2008).

[68] NASA, *Space Debris Assessment for USA-193*. Presentation to the 45th Session of the Scientific and Technical Subcommittee Committee on the Peaceful Uses of Outer Space United Nations, 11-22 February 2008, http://www.oosa.unvienna.org/pdf/pres/stsc2008/tech-16.pdf; UNGA, *Report of the Scientific and Technical Subcommittee on its forty-fifth session, held in Vienna from 11 to 22 February 2008*, http://www.oosa.unvienna.org/pdf/reports/ac105/AC105_911E.pdf, 4; Ambassador Christina Rocca, Statement to the Conference on Disarmament, 15 February 2008, http://www.unog.ch/80256EDD006B8954/(httpAssets)/DE7EEEEB629D982FC12573F0004A1E07/$file/Statement+by+Ambassador+Rocca.pdf.

[69] AFP, "US satellite shoot-down part of space 'arms race: Russia," 17 February 2008, http://afp.google.com/article/ALeqM5glO8NOCFzDgV7U_hdEkpXxjgrx8Q; WMD Insights, "U.S. Satellite Shoot-Down Evokes International Concern and Criticism," Issue 24 (April 2008); Tom Bowman, "China Protests after U.S. Shoots Down Satellite," NPR, 21 February 2008, http://www.npr.org/templates/story/story.php?storyId=19246330; WMD Insights, "U.S. Satellite Shoot-Down Evokes International Concern and Criticism," Issue 24 (April 2008); Ministry of Foreign Affairs of the People's Republic of China, "Foreign Ministry Spokesperson Liu Jianchao's Remarks on the US Plan to Destroy Malfunctioning Satellite," 18 February 2008, http://www.fmprc.gov.cn/eng/ewfw/s2510/2511/t409230.htm.

in the wake of its decision to intentionally destroy a satellite in orbit suggests that this restraint is based in large part on the several different security interests that are tied to outer space, and the various for a in which they are represented. Nonetheless, restraint is not governance, and the ability to shape more formal rules around this principle has proven persistently problematic. But restraint is preferable to conflict. Moreover, as the example of environmental space governance demonstrates, restraint can in some instances lead not only to more robust norms, but also to formal rules governing behaviour, albeit to date these rules are voluntary. Thus in the absence of more comprehensive security governance, both of these examples demonstrate the plausibility of drawing on a polyvalent definition of security and the common interests and tensions that it entails, at least as a means of restraining behaviour and containing conflict, and possibly leading to more robust forms of governance.

However, polyvalent security does not transcend the tensions between competing security claims, and it should not mask the fact that trade-offs between various uses of space remain. This is perhaps most evident regarding the non-weaponization of space, which is currently upheld in principle, but clearly there is resistance by states to eliminating the option of weapons in the future, regardless the implications for other actors. Even the more robust agreements to prevent the further production of space debris do not transcend these tensions, demonstrated by the fact that anti-satellite development and testing continues. Strong provisions for either humanitarian or corporate access to space must necessarily come at the expense of options for national security uses of space, as in many cases these are not forthcoming. Thus, while polyvalent security provides at least some basis for restraining behaviour in space and perhaps event leading to formal rules of governance, it is still a second-best option when compared to more comprehensive agreements that seek to resolve security tensions; it can serve to patch but not eliminate the fissures of a fragmented governance regime.

Nonetheless, this model might prove useful for similar types of security issues, such as the Arctic. While polyvalent security may not be the ideal approach, it is a feasible alternative when these means of governing are not available. Moreover, it responds to the growing challenge and complexity of contemporary security governance created by the broadening of security claims beyond the state, of which space as well as the Arctic are demonstrative. Not only are there competing national security interests at stake, but concerns for the security of individuals and the environment also demand attention and can be difficult to formally reconcile. Rather than viewing them separately or solely as competing, it is useful to look at the relationships between them – both the ties and the tensions – to understand the cluster of security interests at stake. In turn, recognizing this cluster may encourage a form of governance through restraint based on the common interests and threats that weave it together, creating a sort of regime complex. This polyvalent view of security is reminiscent of the Canadian approach to space security, which not only recognizes the many claims to security that are made on outer space, but seeks to find a commonality across them based on the instrumental use of space, defined as “security and sustainable access to and use of space,” while acknowledging the tensions between them. As an increasingly prominent security issue, space is thus not only demonstrative of the contemporary challenge of governing security, but also of an alternative model.