The Securitization of Outer Space: Challenges for Arms Control

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Debates on space security and arms control are currently predicated on the vexed issue of distinguishing between the 'militarization' and 'weaponization' of outer space. Radically different visions of arms control follow depending on which of these characterisations is adopted. Yet, this paper argues, the militarization versus weaponization debate in many ways fails to capture to vagaries of contemporary space security, and the consequent extent to which discussions of arms control are necessarily embedded in a broader context. An increasing number of international actors now argue that the infrastructure of modern society – communications, media, and environmental monitoring – is crucially reliant upon satellite technologies. As a result, this paper argues that it is now more accurate to say that outer space is becoming ever more 'securitized': that is, access to space is now commonly framed as crucial to the military, economic and environmental security of leading states and international organizations. On the one hand the increasing securitization of outer space poses serious challenges from an arms control perspective: if outer space is conceived primarily within a security lens, then this may put the broader civilian applications of outer space at increased risk by introducing the dynamics of threats and countermeasures traditionally associated with military security issues. However securitization of outer space, if configured around an alternate vision of space security, might also be seen as a potential spur to new thinking on controlling the means of violence in and from outer space. This paper reviews the challenges for arms control in the current context, and explores the possible strengths and limitations of rethinking the issues of space security and arms control via the lens of 'securitization' as a alternative framework for analyzing these challenges.

Introduction

The context in which outer space is viewed and used by international actors is evolving rapidly and in potentially divergent directions. Most prominently, the increased use of space-based technologies to provide critical elements of national and international infrastructure (such as media, communications and environmental monitoring) has been accompanied by growing dependence on space-based elements of military support such as reconnaissance, military surveillance and targeting. At the same time, the variety of actors with an interest in access to, and use of, outer space is also proliferating rapidly to include states, regional organizations, and private enterprise.[1] The combination of these developments raises the question of whether outer space is the site of a nascent 'security dilemma', wherein even ostensibly non-military uses of outer space may generate dynamics of military competition due to the latent 'dual-use' potential of many commercial space technologies.[2]

In light of the above, a strong argument can be made that the existing regulation of the use of outer space (originally developed within the Cold War context and the era of the 'space race' between the US and USSR)[3] needs to be reviewed, revised and updated, particularly in light of the emergence of new space powers such as China, India and, as a regional actor, the EU.[4] Before this can proceed, however, greater research needs to be undertaken into how key international actors actually view outer space and how they perceive and construe their interests in this regard. In terms of the current state of the field of space security, academic considerations of this subject recurrently tend to break down into a distinction between 'militarization' and 'weaponization'.[5] Space militarization denotes the use of space-based technology and infrastructure for the purposes of supporting military operations and functions (including reconnaissance, navigation, and use of satellite targeting systems for terrestrial weapons). Space weaponization is usually taken to refer to the actual placement of weapons in outer space, although the precise definition of the term is often muddied by issues of whether targeting from space itself represents *de facto* weaponization, and considerations of whether the capacity to attack satellites with land-based ballistic missiles (or other such forms of rudimentary Anti-Satellite Attack Technologies (ASATs)) constitutes a latent form of space weaponization.

As a result, academic analysis has tended to become bogged down in debates over the finer points of distinguishing between militarization and weaponization. By contrast, this paper proposes the introduction of the alternative concept of 'securitization' from the field of critical security studies as a better means of capturing the exact relationship between space and security within the contemporary policy discourses of major space-faring powers, and as means to open up a broader discussion of 'Controlling the Means of Violence' (CMV) in relation to outer space. 'Securitization' refers to the discursive processes by which a particular issue comes to be spoken and thought of as a security issue, with particular reference to the ways in which policy makers successfully employ securitizing moves or 'speech acts'.[6] In this sense it is possible to argue that outer space is rapidly becoming 'securitized' in important aspects that are largely missed by current academic accounts, and this has implications both for thinking through more traditional forms of arms control and the more expansive CMV perspective suggested in this special issue.

To make this argument, the paper maps the current context of space arms control and the contemporary challenges it faces, assessing key definitional issues with regard to debates over space security and arms control in further detail. It then outlines an alternative framework for understanding and conceptualising space security based on the idea of securitization, illustrating this via an analysis of space securitization in US and EU space policy discourses. Here it compares the historical understanding of space security in the established discourse of US space policy with the more recently emergent discourse of the EU. This comparative analysis is used to generate critical reflections on the idea of 'space securitization' and its implications for thinking through both arms control (in a more traditional understanding) and the more expansive idea of 'Controlling the Means of Violence' (CMV) with regard to outer space. In particular, the concluding section of the paper uses the previous analysis to open up a broader debate on whether the securitization of outer space is to avoided or encouraged from a CMV perspective.

Space Arms Control in the current context

Historically, the two major arms control agreements relating to space and missile defence technologies are the Outer Space Treaty (OST) of 1967 and the Anti-Ballistic Missile (ABM) Treaty of 1972, and both had until recently been seen as major achievements.[7] However a short review of recent discussions of arms control establishes the extent to which outer space arms control is viewed as an area of severe and continuing unease.[8] The OST is seen to constitute 'the basic legal foundation for the regulation of space activities' and is adhered to by over 100 states.[9] Formed as an elaboration of UN General Assembly resolution 1884 adopted in1963, and actively promoted first by the Kennedy and then Johnson administrations in the US, the OST 'prohibits the placing in earth orbit of any objects carrying nuclear weapons or any other kinds of weapons of mass destruction (WMD), as well as the installation of such weapons on celestial bodies or the stationing of them in space in any other manner.'[10] Although not explicitly defined as such in the Treaty itself, the WMD category here is conventionally taken to subsume nuclear, chemical and biological weapons. The OST is thus seen to proceed in the spirit of preserving space for 'peaceful use', although this is also understood to allow for 'passive' military use such as the use of military satellites for reconnaissance, surveillance, early warning and communications.[11] In this sense it can be argued that the OST bears the hallmarks of the Cold War context in which it was developed. Directed primarily at preventing the nuclear arms race spilling over into space, the provisions for passive use were also intended primarily to enhance nuclear deterrence and stability between the superpowers in particular.

Of current concern, however, is the fact that 'The [OST] said nothing about putting conventional weapons in orbit, sending ballistic missiles with nuclear warheads through space, or deploying most types of anti-satellite weapons (ASATs).'[12] These three areas constitute the points at which the Treaty is potentially weakest. As is discussed below, developments in non-nuclear weapons and weapons platforms are an increasing source of concern to those who oppose the 'weaponization' of outer space. The Treaty prohibits states 'from placing in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction or from installing such weapons on celestial bodies'.[13] However, this applies only to nuclear weapons and other WMD. The taboo[14] that has existed on using and placing *other*

types of weapons not covered by the OST in space is arguably under pressure from a number of sources as is discussed further below. Finally, the OST does not explicitly cover the deployment of ASATs, an area of renewed concern in the wake of Chinese and US tests of such weapons.

The ending of the ABM Treaty in December 2001 (when it was abrogated by the US under the George W. Bush administration) also has significant implications in this regard. Some have argued that the ABM Treaty 'helped to avert an arms race in outer space'[15], although the actual extent to which the now defunct ABM Treaty constituted a means of controlling arms in space is still debated. Article II.1 prohibited development, testing and deployment of space-based components of ABM systems 'to counter strategic ballistic missiles or their flight elements in flight trajectories',[16] and was supplemented by the so-called 'non-interference' clause of the Treaty, by which the US and USSR agreed not to interfere with the other's 'national technical means of verification' – in other words, the reconnaissance satellites used by each side to monitor Treaty compliance with regard to the deployment of ABM systems.[17] Some, such as Wulf von Kries, argue that the ABM Treaty had only a negligible role in constraining the military uses of space during the Cold War. The non-interference clause effectively meant that both parties to the Treaty implicitly assented to the use of satellites for reconnaissance. More substantively, von Kries argues that the ABM Treaty left the door wide open to research and development of anti-satellite weapons; even if the use of such weapons would have constituted 'interference', the ABM Treaty did not explicitly prohibit research and testing of such systems. Hence, 'The ABM Treaty, albeit implicitly, sanctioned the most important category of passive military space use – observation…At the same time, the Treaty did nothing to stop the ascent of ASATs, thus setting the legal scene for a possible satellite war.'[18] Indeed, although the US initially pursued encouragement of mutual restraint in ASAT testing, the USSR tested such weapons in the late 1970s and the US under Reagan effectively performed a *volte-face* with its National Space Policy which authorised the deployment of an operational ASAT capability 'at the earliest practical date'.[19]

The reasons for the lack of a 'satellite war', von Kries argues, have little to do with the ABM Treaty itself. They relate more to the fact that both the US and USSR realised early on that the potential use of nuclear-tipped missile interceptors in space envisaged in early missile defence systems, would have the unintended effect of indiscriminately destroying friendly and enemy satellites alike (by creating an electromagnetic pulse)[20], and the prohibitive costs of testing and developing the alternative non-nuclear variants pursued by the Reagan administration. Even von Kries concedes, however, that the failure to replace the ABM Treaty with a new regime on missile defence *and* anti-satellite weapons is potentially problematic. The ABM Treaty may not have explicitly inhibited the development of ASAT weapons but, as is discussed below, its abrogation has allowed the US to pursue a range of missile defence projects that further complicate the picture with regards to arms control and outer space.

There is, in keeping with the general discussion in the introduction to this issue, a legitimate question as to whether the era of grand multilateral arms control agreements in relation to outer space is, if not 'over', in its dying phases (as the protracted discussions of the PAROS – Prevention of an Arms Race in Outer Space – within the UN attest to). Indeed some have argued that areas of 'soft law' – 'non-

binding governance tools including principles, resolutions, confidence-building measures, and policy and technical guidelines'[21] – have, in an *ad hoc* fashion, largely superseded a focus on multilateral space treaties between states. With the theme of controlling the means of violence in mind, though, both from a more traditional arms control perspective and the CMV approach suggested in this special issue, this current situation is less than ideal. The risk associated with an *ad hoc* approach to the control of arms in and from space is that, in significant instances, 'de facto international law will be made by the unilateral actions of states'[22], with law consequently led by precedent. This becomes problematic in the light of both Chinese and US demonstration of anti-satellite weapons capability (in January 2007 and February 2008 respectively), as well as in regard to ongoing research into more ambitious space-based weapon systems.[23] It is in this context that many have made the argument for a more binding 'rules of the road' than currently exists with regard to space security.[24]

Militarization vs. Weaponization

Even before we can begin addressing the question of reconceptualising space arms control, though, we have to acknowledge the problematic nature of conceptualising 'space arms' in the first place. The definitional terrain associated with space arms control and the subject of space weapons more generally is notoriously fraught. Key points of contention include the question of what constitutes a space weapon or an ASAT, the vagaries of the potential 'dual-use' functions of ostensibly non-military space technologies, and the issue of whether a meaningful distinction between the militarization and weaponization of space can be drawn and maintained. One commentator even argues that '[this] definitional bickering expands the gray area for allowable program development'[25], suggesting that the failure to come to terms with the issue of space weapons is itself partly constitutive of the failings of arms control in this area.

What constitutes a space weapon? Currently there is 'no single definition of "space weapons" that is appropriate in every context.'[26] Indeed the OST has been criticized for its ill-defined use of the term 'weapon' within its provisions, as it has for the use of the ambiguous term 'peaceful purposes', which could cover a multitude of practices. The placement of weapons in space – using satellites as a launch platform for conventional or nuclear weapons, for example – would constitute an obvious instance of weaponization. At issue, though, is the question of whether terrestrially based weapons capable of hitting space assets should be considered as 'space weapons'; whether space-based components of terrestrial weapons systems should also be included within the category, and hence, within the remit of arms control; and whether non-military satellites and space vehicles, which could be used as rudimentary projectiles against space assets, should also be included within the category at its most elastic – the dual-use conundrum that plagues efforts to define space weapons with any finality. Generally speaking, proponents of space weaponization make the case that the potential dual-use function of non-military satellites already constitutes a de facto form of weaponization; hence efforts to prevent weaponization of outer space are said to be doomed before they begin since the potential for using satellites and space craft as weapons of a sort is already latent.[27] Conversely, most arms control proponents argue that a distinction can be

made between passive systems (militarization) and active systems (weaponization), and that in this sense the 'Space Rubicon' has yet to be crossed entirely.[28]

In the US context, where debate on space security and arms control has been particularly prominent, the militarization/weaponization question overlaps with and informs a further distinction within perspectives on arms control between what might be termed as 'space worriers' and 'space warriors'. As identified by Mike Moore, 'space warriors' are those 'men and women who believe that conflict in space is inevitable.' Though not exclusively limited to the US context this school of thought has exerted its presence, often in science fiction style proposals for space weapons, in US strategic circles from the earliest days of the space age.[29] Space warriors tend to doubt that there is a sustainable distinction between the 'militarization' and 'weaponization' of space, assuming that even the passive military use of space, and use of space more generally, is likely to generate conflict dynamics.[30] Consequently, one of the further assumptions of the space warrior position is that constraints on US abilities to develop weapons in and from space are ill-advised.

Traditionally advocacy of space weaponization and aggressive military use of space has been contrasted with the idea of space as 'sanctuary': outer space as a weapons - free zone.[31] Although this has sometimes been represented as a form of opposition to the military use of space in general, the vast majority of 'space worriers' – those who fear that weapons in space would create 'a powder-keg of global instability'[32] and advocate strengthening space arms control provisions as a consequence – acknowledge that some military use of space is unavoidable, and that complete 'de-militarization' of space is both unrealistic and, for the US at least, potentially detrimental. As the US owns more than half the eight-hundred-plus scientific, commercial and military satellites (and has the most 'passive' military space assets) more expansive prohibition of ASATs and self-restraint in terms of new weapons systems would also seem to be in its interests.[33] Such perspectives generally align with Michael E. O'Hanlon's contention that space should be 'Neither Star Wars nor Sanctuary'[34], and that both US policy and leadership on the regulation of the use of outer space should chart a *via media* between complete de-militarization and outright weaponization. From this viewpoint, arms control is both in the US *and* the global interest. As Joan Johnson-Freese puts it, 'At this point, the United States both has the highest capabilities and is the most dependent on those capabilities. This makes protecting those assets imperative.'[35]

Beyond this broad agreement in sentiment between space worriers, however, there are significant differences of degree that need to be further thought through. Moore, for example, advocates strengthening space arms control but at the same time endorses enhancement of US global strike capabilities for the purposes of executing 'quick' wars, and in that respect proposals for force application from space appear, on the surface at least, a more attractive option. For those advocating less reliance on nuclear forces, space based conventional precision capabilities might similarly present a viable alternative to be managed rather than restricted out of hand.[36] At a more general level, there is the issue of working through the finer points of the relationship between arms control and the militarization of space, in which the theme of controlling the means of violence becomes more explicit: Which forms of militarization are acceptable? How would they be codified and verified? Are expectations of best practice in mitigating the effects of space debris (which can

potentially damage and even destroy space-based assets[37]) enough, or is a more formal PAROS-style agreement necessary to assure to address the security concerns of space-faring states and prevent the development of familiar "action-reaction" and "security dilemma" dynamics?[38]

The Securitization of Outer Space?

The picture of space arms control painted above is further complicated by what might be termed as the 'securitization of outer space', which, it is argued here, captures a range of dynamics that fall beyond the militarization/weaponization debate. The concept of securitization is primarily associated with the group of scholars commonly referred to as the 'Copenhagen School', which is usually taken to consist of Barry Buzan, Ole Wæver and the collective authors of works such as Wæver *et al* [39] and Buzan *et al* [40]. Recent decades have seen a rapid and extensive 'broadening' of the contexts in which concept of security is applied and in the range of issues it is seen to cover. From a relatively circumscribed historical association with military threats and issues, the concept of security is increasingly used in reference to 'non-traditional' issues, such as migration and environmental degradation, in both policy and academic discourse. The Copenhagen School argue that, irrespective of whether it is appropriate or not, or whether we agree with it or not, non-military issues are now frequently treated as security issues. This is what Ole Waever *et a*l refer to as the 'securitization' of an issue. Securitization is, in broad terms, the process through which a non-military issue comes to be seen as an issue of security. When an issue comes to be treated as an issue of national security, it is justifiable to use exceptional political measures to deal with it. It is 'securitized': that is, treated with the same degree of urgency as military threats have been historically.

Importantly, the Copenhagen School adopt a constructivist approach to the concept of security, meaning that they refute the claim that there are (any) inherent security issues. Rather, security is a particular form of conceptual identification that is intersubjectively constructed. They do suggest , though, that security, as a concept, has a particular 'modality' – of 'threat-defense sequences' – that arises out of it's 'classical' use in relation to national security in a traditional, military sense. Hence there is 'a mode of thinking, a set of rules and codes from the field of "security" as it has evolved and continues to evolve': there may not be any 'objective' security issues as such, but there is a particular field and set of historical connotations associated with the concept informed primarily by its classical military usage.[41]

Buzan *et al* consequently argue that security, as a concept, is fundamentally about survival: it is when an issue is represented as posing an *existential threat* to the survival of a referent object. Here the term 'referent object' can be defined simply as 'that to which one can point and say, "It has to survive, therefore it is necessary to…"'.[42] This is the same basic principle that underpins the conventional focus of national security and defence: war threatens *the very existence* of a referent object, the state. Within the concept of national security it is assumed that the state 'has to survive', therefore it is assumed that it is necessary for the state to maintain standing armies, weapons production and procurement, intelligence agencies and so on. One of the ways we can distinguish an existential threat, then, is the level of response it generates. When an issue is successfully presented as an existential threat, it legitimises the use of exceptional political measures. A classic (military) example in

international relations is a state's right to self-defence: if a state is under attack, it can legitimately use extraordinary measures that go beyond normal day-to-day politics. A state under attack can declare a state of emergency during which it suspends or changes its functions. It may declare martial law, for example, ration the provision of certain services, close roads and schools and so on. Commonly, the (discursive) identification of existential threats set in chain a number of effects that characterize the specific quality of security problems: urgency – the issue takes priority; and extraordinary measures – authorities claim powers that they would not otherwise have, or curtail rights and liberties that might otherwise apply.[43] On this basis, Buzan *et al* argue, the meaning of security is in many ways secondary to 'the essential quality of security in general'[44] that resides in the *act* of saying 'security' rather than in any essential meaning of the word:

> That quality is the staging of existential issues in politics to lift them above politics. In security discourse, an issue is dramatized and presented as an issue of supreme priority; thus, by labelling it as *security*, an agent claims a need for and a right to treat it by extraordinary means.[45]
>
> Threats and vulnerabilities can arise in many different areas, military and non-military, but to count as security issues they have to meet strictly defined criteria that distinguish them from the normal run of the merely political. They have to be staged as existential threats to a referent object by a securitizing actor who thereby generates endorsement of emergency measures beyond rules that would otherwise bind.[46]

In short, securitization is used in attempts to legitimate the application of extraordinary measures by positioning an issue as equivalent to with a threat to (military) national security as it is more traditionally understood.

Waever argues that we can think of this process of securitization in terms of spectrum that runs from nonpoliticized (meaning that an issue is not a political issue), through politicised (meaning it is part of a public policy debate) to securitized (meaning that the issue is thought of as an existential threat and therefore justifies responses that go beyond normal political practices). The movement of an issue along the spectrum from 'politicized' to 'securitized' is initiated through what is known as a speech act: a securitizing speech act – or, 'securitizing move' – occurs when an issue not previously thought of as a security threat come to be *spoken of* as a security issue by key political actors. As is noted by Buzan, Waever and de Wilde, 'The obvious method [for the analysis of securitization] is discourse analysis, since we are interested in when and how something is established by whom as a security threat.'[47] This is particularly apposite to discussion of space security, where policy currently tends to lead practice,[48] and hence discursive constructions, and not just technical capabilities and space physics, are important when considering the prospects for international cooperation on the issue of space security.[49]

Rigidly interpreted, then, we might say that the application of a securitization framework to space policy involves an assessment of the extent to which outer space has become 'securitized' within these policy discourses: that is, the degree to which the current use, access and dependence on outer space has become framed as an 'existential threat' and has come to be accepted as such by a relevant audience.[50] In methodological terms, Buzan, Waever and de Wilde in their original formulation of

securitization theory argue that securitizing moves will follow the 'grammar' of security: that is, securitizing speech acts will present an issue in terms of threats and countermeasures to reduce or defeat identified threats.[51] In turn, the members of the Copenhagen School, particularly Ole Waever, suggest a normative preference for '*de*securitization' of issues: that is, in this case, the extent to which states and international organizations seek to move issues related to outer space into the 'ordinary public sphere' of politicization rather than view them in terms of threats and countermeasures associated with securitization.[52]

Although generally drawing on the same terminology and sharing the same perspective, more recent applications and extensions of securitization theory have focused less exclusively on the 'speech act' formula suggested by the Copenhagen School, looking additionally to ways in which technocratic and institutional practices can entrench securitization,[53] and on the role visual media (as well as speech) can play in securitization.[54] In keeping with these approaches to securitization theory, this paper, although adhering broadly to the framework outlined by the Copenhagen School, focuses less on the 'success' of securitizing moves (in terms of audience reception) than it does on the presence, occurrence and implications of these moves within space policy. In short, the emphasis in this paper is more on the *political effects* of such securitizing moves within space policy, particularly with regard to arms control and the regulation of outer space more generally. The reasoning behind this introduction of securitization theory is that the militarization/weaponization debate only partially captures (at best) the multiple ways in which outer space is being linked to security in the policy discourses of leading states – ways that encompass not only 'traditional' military security but also the security of economic, environmental, scientific and technical infrastructures. In this sense it is possible to argue that outer space is rapidly becoming 'securitized' in important aspects that are potentially missed by current academic debates focused on the vagaries of space militarization versus space weaponization. Such securitizing moves have, as is illustrated below, been used to justify particular shifts in space policy, and are an important feature of the current context that debates on arms control/CMV need to take account of.

Securitization and US Space Policy

It is worth stressing that what can be termed as the 'securitization of outer space' is, in itself, not a novel phenomenon or development. The extent to which ostensibly civil uses of outer space have been driven by, and have overlapped with, national security functions historically – or, as in the case of the space race between the US and USSR, have acted as a surrogate for direct military engagement – is well documented.[55] Similarly, the characterization of the Sputnik launch in 1957 as placing the US 'in the greatest danger in its history' suggests that the representation of space technologies as potential existential threats is not entirely new either.[56] What is of significance, though, is the intensification, expansion and entrenchment of 'securitizing moves' as features of national space policies. The Space Security Index report *Space Security 2009*, in its overview of national policies, explicitly noted that, on the one hand, 'National space policies consistently emphasize international cooperation and the peaceful uses of outer space', but on the other hand that there is a 'Growing focus within national policies on the security uses of outer space'.[57] The report cited as evidence: Japan's 2008 space law framework, which lifted its previous ban on national security and military space activities; China's 2006 National Defense

White Paper, which identifies national security as principle of China's emerging space programme; France's White Paper on Defense and National Security, which calls for an overhaul of its national space strategy; and the renewed priority on 'space for security' within EU policy.[58]

Within recent US space policy securitization has been most noticeably prevalent, which is significant given the continued pre-eminence of the US as a space power. As is noted in one recent assessment, around fifty countries, intergovernmental consortia, and nongovernmental organizations have at least one satellite in space, 'mostly for reasons that have more to do with economic performance and Earth monitoring than with military applications.'[59] The same assessment notes, though, that current patterns of space utilization 'have not yet lived up to the predictions made in the late 1990s that market forces would overwhelm military factors in shaping investment choices, technology, development, and regulatory rules.'[60] In spite of the increasing diversity of interests in space and the increased range of functions space-based technologies now fulfil, the US defence budget still remains the single largest source of investment in space technologies. In part this sustained investment arises out of US deployment and development of missile defence systems. Space security and missile defences have been intimately connected issues historically and there are obvious technological overlaps between the two. Missile defence systems, including the ground-based system (Ground-Based Midcourse Defence or GMD) currently deployed by the US at sites in Alaska and California, are dependent on satellite and space-based tracking technologies to detect and track incoming missiles, and there is a possibility that the future connection between missile defence and space will be even stronger if current plans for missile defence are pursued to their fullest extent. Two such systems are already in the early stage of their development: the Space-Based Laser (SBL), which, like the Strategic Defence Initiative or 'Star Wars' proposals of the 1980s, envisages using lasers to shoot down missiles in flight;[61] and the "NFIRE" or Near Field Infrared Experiment, a proposal to launch interceptor missiles not from the ground, as in the currently deployed GMD, but from space.[62]

These proposals to place missile defence intercept technologies in space are, it should be noted, currently in a very early stage of development. To date programmes such as the SBL and NFIRE have been plagued by development problems and their future prospects, along with the that of the US Missile Defense Agency's space test bed for space based interceptors, remain somewhat uncertain, particularly in light of budgetary constraints.[63] Even a conservative estimate puts the full cost of a 20-satellite constellation of Space-Based Lasers at a prohibitive '$40 billion, plus launch costs.'[64] Yet even if the status of space-based missile defence interceptors remains uncertain, the currently deployed ground-based system also poses a complex issue in terms of arms control. Though ostensibly intended for defensive purposes, ground and sea-based components of US missile defence could theoretically be employed as an ASAT – Anti-Satellite attack – device. The fear that has been expressed by critics of the US, particularly those in Russia and China, is that it is effectively using missile defence as a cover for ASAT development,[65] and the use of sea-based 'Aegis' ballistic missile defence capabilities and its Standard Missile 3 (SM3) to shoot down the malfunctioning USA-193 spy satellite in February 2008 has done little to dispel concerns over the offensive applications of current missile defence capabilities.[66] In addition to potential dual applications of missile defense systems, the US also conducts research into more 'exotic' forms of space weaponry, and funds a variety of

technologies aimed at creating a 'force application' capacity from space. Although the actual status of such programmes is opaque, the Department of Defense has reportedly explored several high-concept space weapons systems such as 'Hypervelocity Rod Bundles' (tungsten rods dropped on targets from space that would theoretically use gravity as accelerant in a manner akin to a meteor, or "rods from God" as they are also colloquially known), the 'Experimental Spacecraft System' (XSS) (a manoeuvrable microsatellite weighing only 100 kilograms which could prospectively be used to attack other satellites), and the 'Common Aerospace Vehicle' or CAV (this so-called 'Spaceplane' would be unmanned and would orbit the earth, entering the atmosphere when needed to deploy precision guided munitions against selected targets). [67]

Such programmes with possible space weapons applications (beyond ground-to-space ASAT capabilities) are still in their relative infancy, and the technical prospects for such technologies, as with the more "exotic" missile defence proposals outlined above, are far from certain.[68] Yet much of the rhetoric emanating from the US in recent years has made expansive claims to 'space dominance', and has often tended to lead reality in terms of the capabilities that are claimed. In short, rather than seeking to control the means of violence in and from space, much of the military discourse on space has generally cast the US as a "trailblazer" in this regard, with exotic systems cited as a necessity for future military dominance in and from space.[69] Historically these claims have tended to emanate primarily from the Air Force and Air Force Space Command. In 1998, Space Command defined the control of space ('space control') as 'The ability to assure access to space, freedom of operations within the space medium, and an ability to deny others use of space, if required'[70], and space was also considered as part of the remit for 'full spectrum dominance' in Joint Vision 2020.[71] Space warriors within and beyond the US military also make frequent reference to '…importance of dominating space in peace and war.'[72]

Yet, 'The decision to weaponize space does not lie within the military (seeking short-term military advantage in support of national security) but at the higher-level of national policy (seeking long-term national security, economic well-being, and worldwide legitimacy of US constitutional values).'[73] Instances of the securitization of outer space within military circles are hardly surprising, given vested interests and the perceived utility of space support for US forces[74]; what is more significant though is the extent to which national policy, though stopping short of explicit advocating space weapons, has tended to similarly maintain the centrality of space for national security. As Moore's 'biography' of the idea of unilateral space dominance in the US attests to, this line of thinking has long held a prominent place in American strategic thinking.[75] Of significance, though, is the extent to which this type of thinking has migrated into official policy, portraying US access to, and dominance of, outer space as key to national survival in the process. The tenure of the George W. Bush administration in particular saw military and policy discourse move much closer in terms of goals and language used, entrenching securitization within US space policy as a whole. In the terms used above, the views of 'space warriors' made much greater inroads in recent times into US space policy, and this has had a significant bearing on how the US has positioned itself in terms of arms control and how other states – particularly China and Russia – have defined their own positions.[76]

Recent official US discourse on outer space attests to this subtle shift. In 2001, the 'Commission to Assess United States National Security Space Management and Organization', or Rumsfeld Space Commission as it is often referred to owing to Donald Rumsfeld's position as chair, pointed out that a number of states hostile to the United States could attain ASAT capabilities, and, notoriously, warned that if the US did not secure space it would face a 'Space Pearl Harbor'. Members of the Bush administration subsequently went on to effectively endorse the 'space control' concept, asserting the primacy of space for security by openly linking its potential civil *and* military uses (and thus suggesting only a minimal distinction between the two). Then Deputy Secretary of Defense Paul Wolfowitz argued in a 2002 speech on missile defence that 'as we look ahead we need to think about areas that would provide higher leverage. Nowhere is that more true than in space. Space offers attractive options not only for missile defense but for a broad range of interrelated civil and military missions. It truly is the ultimate highground.'[77] The culmination of this line of thinking in policy terms came with the release of the National Space Policy (NSP) in August 2006, which stated that:

> The United States considers space capabilities – including the ground and space segments and supporting links – vital to its national interests. Consistent with this policy, the United States will: preserve its rights, capabilities, and freedom of action in space; dissuade or deter others from either those rights or developing capabilities intended to so; take those actions necessary to protect its space capabilities; respond to interference; and deny, if necessary, adversaries the use of space capabilities hostile to US national interests.[78]

The framing of the arguments from those within the Bush administration thus clearly aligns with the dynamics of securitization as identified by Buzan *et al.* The idea of a 'Pearl Harbor from Space' invokes the nightmare scenario of a surprise attack on US interest in or from space, and was accompanied in the Rumsfeld Commission's report by the sense of urgency characteristic of securitizing moves: 'the present extent of US dependence on space [and] the rapid pace at which this dependence is increasing and the vulnerabilities it creates, all demand that US national security space interests be recognized as a top national security priority.'[79] The Pearl Harbor analogy implies a focus on a surprise attack itself, but the rest of the report stresses the radical implications of such an attack, suggesting a potential 'existential threat' to US commerce, society and, ultimately, way of life. As the report noted, 'Space enters homes, businesses, schools, hospitals and government offices through its applications for transportation, health, the environment, telecommunications, education, agriculture and energy. Much like highways and airways, water lines and electric grids, services supplied from space are already important an important part of the US and global infrastructures.'[80]

In turn, the NSP of 2006 repeated many of these same moves. It elevated national security functions of US space policy, declaring these as 'vital' to 'national interests', and national security as 'critically dependent upon space capabilities…this dependence will grow.' Similarly, the NSP described US space systems as 'critical' to '…a wide range of civil, commercial, and national security users', identifying the wider security implications of space as well as its more direct military uses.[81] Crucially, this securitization of space was then used to justify exceptional measures

with regards to arms control and the previous era of multilateral space agreements. Among the 'actions necessary' to protect space capabilities the NSP declared that:

> The United States will oppose the development of new legal regimes or other restrictions that seek to prohibit or limit US access to or use of space. Proposed arms control agreements or restrictions must not impair the rights of the United States to conduct research, development, testing, and operations of other activities in space for US national interests.[82]

This sentiment had effectively been put into practice even before its formalization in the NSP 2006, with the US abstaining from votes on the UN General Assembly PAROS (Prevention of an Arms Race in Outer Space) resolution in 2000 and an amended version in 2003, and then voting against it in 2005.[83] In this sense the 2006 NSP functioned as a kind of retrospective justification of the 'exceptional' stance adopted – on security grounds – by the Bush administration in relation to space law and arms control.

Securitization and EU Space Policy

In relation to the US discourse, outer space is heavily securitized in a fairly conventional manner. That is, in official policy space tends to be conceived and spoken of as an issue of national (military) security as illustrated previously in traditional threat-defence terms. Yet elsewhere the concept of space security is being much more broadly understood and, by consequence, the securitization of space is much more expansive. With regard to the emerging space policy of the EU in particular, the idea of controlling the means of violence also has to take account of an increasing assumption that space capabilities are vital to the provision of security in a more 'comprehensive' sense. This is not to say that more traditional security concerns are entirely absent. Some, for instance, have argued that 'the weaponization of space will, in the long term, constitute a real threat for our own space systems. Europe should thus take this new dimension into account in its future plans for the use of space, whether the applications are essentially civil or concern its defence directly.'[84] Comparators to the 'Space Pearl Harbor' envisaged in US discourse are, however, only one part of the more fluid and expansive conception of space security to be found in emerging EU space policy. The President of the European José Manuel Barroso has, in this vein, argued that Europe needs 'more security *in* and *from* space', defining this in ways that encompass traditional fears of attacks on space assets as an 'existential threat', but also goes beyond this to include a range of other issues:

> Our space assets and infrastructure are indispensable for our economy and security and we need to protect them. The EU should develop an independent capacity to monitor satellites and debris orbiting the Earth and the space environment, and tackle possible hazards. We should also exploit the potential of space infrastructure (already available, for example, through GMES [Global Monitoring for Environment and Security]) to protect our citizens and our ground infrastructure against natural and madmade hazards and to be at the service of European Security and Defence Policy goals. These capacities should be developed in partnership with Member States.[85]

Understanding security in this more expansive and comprehensive sense, 'the key question [is] whether Europe can offer a viable, alternative path' to the space

‘dominance’ strategy that follows from Rumsfeld’s Pearl Harbor analogy.[86] Here it has been argued that the EU could prospectively act as a ‘normative’ space power, preserving outer space as a global ‘public good’ via initiatives such as the European Council’s ‘Draft Code of Conduct for Outer Space Activities’, which reiterates the belief that ‘all states should actively contribute to the promotion and strengthening of international cooperation’ and ‘the need for the widest possible adherence to relevant existing international instruments that promote the peaceful uses of outer space in order to meet emerging new challenges.’[87]

The EU’s positioning as a lead advocate of multilateral frameworks for ‘the preservation of a peaceful, safe and secure environment in outer space’[88] is, however, made more complex by the extent to which it has simultaneously privileged space as key to European security. The European Commission has in the past articulated its interest in the area of space policy both in terms of pan-European cooperation in the commercial sector and, taking note of the US model, the potential utility of augmenting the EU’s military capabilities through integration of both existing and new space systems.[89] The Commission’s 2003 Green Paper on European space policy made the argument that the development of the Common Foreign and Security Policy (CFSP), the European Security and Defence Policy (ESDP), and the capabilities required to fulfil the ‘Petersberg Tasks’[90] all necessitate the development of a European space capability with military applications. Referring to the potential advantages in intelligence, surveillance, reconnaissance and military coordination conferred by the use of space, the Green Paper argued that:

> A space component supporting a rapid capability for decision making will contribute to a credible and effective CSFP… To a certain extent, the critical shortcomings of current crisis management are directly linked to a space technology capability, and this applies to all players - civilian and military - involved in crisis management, whether they act together or separately.[91]

These points were subsequently reiterated in a 2003 White Paper which again stressed the benefits space-based assets would have for the EU – more effective surveillance of the EU’s borders, conflict prevention through early warning monitoring, and more effective conflict management in humanitarian situations – all contributing ultimately to greater ‘credibility’ for the Union’s security dimension.[92]

In attempting to achieve these goals, the Commission has sought greater linkages with the European Space Agency and to incorporate its flagship programmes such as GMES and Galileo, with emphasis on the potential to adopt the ‘security’ component of GMES into the ESDP as a part of a ‘comprehensive’ approach to security that would include, for example, changes in the environment as a potential cause of future resource conflicts (the future development of GMES envisages using ‘targeted Earth observation services to cover the needs of European citizens in the areas of environment, security, emergency response and climate change’)[93]. For its part the ESA has, to some extent, accepted this rationale with a view to the extension of its own competences: ‘Instead of continuing to rely on national approaches or possibly setting up a second European space agency for security and defence, there is the potentially attractive option of the European Space Agency (ESA) taking full advantage of the dual-use nature of space through a cooperative arrangement with the EU.’[94] Problematic here has been the fact that the ESA charter explicitly restricts its activities to peaceful purposes and the fact that its membership includes several

historically neutral countries such as Switzerland and Ireland[95], yet the agency claims to have 'undertaken to officially revaluate the legal meaning of its statute, concluding that the Convention does indeed not restrict ESA's capacity to launch and implement space programmes for defence and security purposes or dual purposes or for national or international public bodies in charge of security and defence.'[96] Security needs are 'connected to […] technological progress', the European Space Agency (ESA) argues, and 'Space systems are a fundamental aspect of "technological security": they offer extremely versatile solutions in a global, international dimension.'[97] Both these arguments (that the need for increased European military space capabilities is security and technology led respectively) complement a final argument, which is that military space can become a catalyst of further European integration: 'Security applications provided by space technologies are a linchpin of European policy. But Space security goes far beyond this utilization logic: Space technologies directly contribute to the building of an EU political project.'[98]

In short, within EU space policy, security (and the securitization of space in relation to a wide range of political and environmental issues as well as military uses) functions as a justification for European level integration of existing member state space policies and capacities.[99] 'Security' is in this sense a key concept in an ongoing effort to forge a 'real European space strategy'[100], with widespread emphasis on the potential security applications of current space assets in policy documents. The EU space policy discourse does not discuss space as a possible site for new weapons capabilities, and also seeks to move discussion of space security away from a narrow emphasis on the vulnerabilities of space systems. In the process, though, 'security' – in a broader sense – is becoming a permanent feature of EU space policy discourse, and here the military dimension is still very much a presence even as the understanding of security used is extended to include non-military issues. In contrast to the US, the major source of investment and development in space capabilities within the EU is civilian rather than military. In this respect, the Council of Europe and European Commission function as key securitizing actors, and openly encourage discussion of potential dual-use application of existing civil space systems. In 2004, the Council approvingly noted that 'On the civilian security side, significant steps have been taken by the European Communities [sic] to include security objectives in civilian space programmes, as illustrated by the Global Monitoring for Environment and Security (GMES). It must be noted that, although not driven by military needs, almost all space programmes have a multiple-use capacity that could provide solutions to some military needs.'[101] In turn, more recent Commission statements have sought to identify 'relevant user requirements for GMES security services' that might include 'border surveillance, maritime surveillance, support to EU external action' and 'security of information', and while a European Parliament Resolution 'Urges that under no circumstances should European space policy contribute to the overall militarisation and weaponisation of space' it too establishes the necessity of an integrated European space security infrastructure.[102]

Controlling the Means of Violence in and from Space: Desecuritization or Re-Securitization?

The form of securitization evident in EU space policy discourse, though different to the recent US emphasis on 'space dominance' in both its understanding of security and its allusions to multilateral arms control, still poses something of a dilemma in

terms of 'controlling the means of violence' in and from space. The quandary is that whilst on the one hand the EU promotes the idea of a multilateral code of conduct that 'eventually aims at a legally binding treaty'[103], on the other hand it simultaneously securitizes space in its attempts to develop a European space capacity. Doing so potentially induces 'new vulnerabilities', as the Council notes, where there is 'too much reliance on space based assets, including in the economy sector',[104] but these 'vulnerabilities' and how they are to be addressed are given much less mention and discussion than the perceived security functions of space assets. There is little recognition, for instance, that the Council and Commission's explicit endorsement of the dual-use functions of systems such as GMES and Galileo may actually exacerbate the challenge of space arms control by effectively accepting and promoting the 'security' (including military) applications of civil satellites. Although the military uses of US space assets are more historically and institutionally embedded, a similar argument can be made with regard to how the Obama administration is developing its own space policy. The president has reportedly given strong indications of a inclination towards a global 'ban' on 'weapons that interfere with commercial and military satellites' in contrast to the stated antipathy for arms control in the NSP of 2006.[105] In turn, the National Security Strategy of 2010 (NSS 2010), whilst noting the continued dependence of US military and civilian infrastructure on the space capabilities that 'power our daily lives', has recast this dependence as a spur to cooperation rather than as grounds for unilateralism:

> Across the globe, we must work in concert with allies and partners to optimize the use of shared sea, air, and space domains. These shared areas, which exist outside exclusive national jurisdictions, are the connective tissue around the globe upon which all nations' security and prosperity depend. The United States will continue to help safeguard access, promote security, and ensure the sustainable use of resources in these domains. These efforts will require strong multilateral cooperation, enhanced domain awareness and monitoring, and the strengthening of international norms and standards.[106]

This way of framing the connection between space and security would seem to move the position of the Obama administration much closer to that espoused in EU policy discourse, and this is further evidenced in the new National Space Policy of 2010 (NSP 2010).[107] In contrast to the Bush administration's NSP of 2006, the NSP 2010 reverts to an emphasis on civil, commercial and scientific applications as the key pillars of US space policy. The position on arms control is also softened markedly as compared to the NSP 2006, albeit with qualifications, with the new space policy stating that 'The United States will consider proposals and concepts for arms control measures if they are equitable, effectively verifiable, and enhance the national security of the United States and its allies'.[108] In the process, though, the NSS 2010 and the NSP 2010 also both display a similar internal tension to that identified in EU space policy discourse: as well as restatement of principle of space for 'peaceful purposes', commitment is also made to making sure the US military continues to have the 'necessary capabilities across all domains', including space, [109] and, most notably, the NSP 2010 declares that '[The Secretary of Defense shall] Maintain the capabilities to execute space support, force enhancement, space control, and force application missions'.[110]

Once again, then, commitments to 'peaceful' uses of outer space coexist with more bellicose allusions to the maintenance of space for more traditional military security

functions including, in this instance, 'space control' and 'force application missions'. At issue here is the question of the particular 'referent object' – that which has to survive – that is being securitized and the policy implications that follow. What we see in both EU space policy discourse and in at least some of the recent rhetoric of the Obama administration is, put bluntly, an alternation between 'global security' and 'national/regional' security. In the former type of securitizing move, the globe (sometimes taken to include the space environment itself) is identified as the referent object, and a more multilateral approach to space security is advocated as a consequence (as in the passages from the NSS 2010 and NSP 2010 cited above and in the EU's 'Draft Code of Conduct'). In the latter type of securitizing move, though, the referent object is national (as in the case of the US) or regional (in the case of the EU). Following this form of securitizing move, more protectionist responses are advocated that seek to maintain space for national security, including traditional military purposes, and in some ways undermines visions of 'global' space security by privileging national and regional security interest. These two forms of securitization thus co-exist somewhat uneasily within the space policy discourses of the US and the EU, and it might be argued that the difficulty of reconciling the two is a key challenge for contemporary arms control.

In terms of the broader agenda of Controlling the Means of Violence (CMV) as set out in this special issue, the above challenges for arms control are also enveloped in the longer term goal of reducing militarism and promoting 'cultures of peace'. From the CMV perspective, even a form of arms control agreement that could manage to reconcile global and national/regional space security interests is unlikely to be sufficient, as it would still likely seek security in and through an armed, militarized world. Taking this view, it is far from clear-cut as to whether the securitization of outer space is entirely objectionable, or only objectionable in particular forms. Stated differently, the general question might be raised as to whether 'less' securitization with regard to space policy (prospectively institutionalized through new instruments of arms control) might be normatively preferable in terms of reducing the likelihood that space assets come to be seen in terms of threat and defence. Proponents of securitization theory have tended towards the view that securitization is something to be avoided. The optimal situation is one is which an issue is not thought of in security terms at all; when it has been securitized (as the case of outer space), 'desecuritization' – attempts to move an issue into the realm of 'normal' political haggling – becomes the preferred strategy. In a similar vein James Clay Moltz asserts that 'effective coordination among a range of actors and activities may be the most serious emerging space challenge. This is a fundamentally *political* task'[111], suggesting alignment with Waever's preference for desecuritization as a more 'effective' way of dealing with an issue.[112] On this view, familiar instruments of arms control such as confidence-building measures, codes of conduct and formal treaties might all be seen as practical measures for desecuritizing space.[113]

From a CMV perspective, however, it may be that a 'thicker' understanding of space security – contributing to a 'transformatory politics' with regard to outer space – is required. In this light, it could be argued that a less anthropocentric form of securitization, aimed at preserving space as an environment in its own right rather than simply a resource to be used for terrestrial goals, might still be productively employed. Some have, for instance, suggested a 'consequentialist' approach to securitization that distinguishes between 'positive' and 'negative' forms of

securitization (and desecuritization).[114] In parallel with debates on the merits and disadvantages of 'environmental security' more generally,[115] on this understanding securitization might be viewed as 'positive' where it mobilizes more fundamental attempts to understand and control the means of violence in and from space based on greater awareness of space as an environment. In spite of his stated preference for treating use of space as a fundamentally political task, Moltz elsewhere seems to encourage this kind of 'positive' securitization and sees it as a historical driver of previous international cooperation: 'In space, interdependence was not a lofty, ideologically motivated goal but a practical concern brought on by environmental factors such as orbits, debris and mutual vulnerability.'[116] Where securitizing moves highlight the inherent fragility of space-based assets within this environment, then, they might be regarded as a potential supplement to controlling the means of violence in and from space and promoting a culture of peace based on space environmentalism rather than space militarism. A useful starting point for the CMV perspective in this regard is, as was suggested here, in interrogating the understandings of space security currently employed in policy discourse as means of opening up a broader debate on what place the idea of space security might have within a broader, transformative political agenda.

[1] Andrew T. Park, 'Incremental Steps for Achieving Space Security: The Need for a New Way of Thinking to Enhance the Legal Regime for Space', *Houston Journal of International Law*, Vol. 28, No.3 (2006) pp.871-911.
[2] Ibid, p.885; Columba Peoples, 'Assuming the Inevitable? Overcoming the Inevitability of Outer Space Weaponization and Conflict', *Contemporary Security Policy*, Vol. 29, No. 3 (2008) pp. 503-521.
[3] See Stuart Croft, *Strategies of Arms Control: A History and Typology* (Manchester: Manchester University Press, 1996), p.117; Michael Sheehan, *The International Politics of Space* (Oxon: Routledge, 2007) pp.20-54; James Clay Moltz, *The Politics of Space Security: Strategic Restraint and the Pursuit of National Interests* (California: Stanford University Press, 2008) pp. 124-175.
[4] Michael Krepon and Christopher Clary, *Space Assurance or Space Dominance? The Case Against Weaponizing Space* (Washington DC: The Henry L. Stimson Center, 2003); Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security* (Cambridge, MA: American Academy of Arts and Sciences, 2008); Nina Tannenwald, 'Law versus Power on the High Frontier: The Case for a Rule-Based Regime for Outer Space', *The Yale Journal of International Law*, Vol. 29 (2004) 363-422.
[5] See, for example, Helen Caldicott and Craig Eisendrath, *War in Heaven: The Arms Race in Outer Space* (New York: Norton, 2007); Joan Johnson-Freese, *Space as a Strategic Asset* (New York: Columbia University Press, 2007); Moltz, *The Politics of Space Security* (note 3).
[6] Barry Buzan, Ole Waever and Jaap de Wilde (1998) *Security: A New Framework for Analysis* (London: Lynne Rienner, 1998).
[7] For more detailed account of international treaties relating to space see Jozef Goldblat, 'Efforts to Control Arms in Outer Space', *Security Dialogue*, 34:1 (2003) pp.103-8 and Gerardine Meishan Goh, 'Keeping the peace in outer space: a legal framework for the prohibition of the use of force', *Space Policy*, 20 (2004), pp.259-278.
[8] See Park, 'Incremental Steps' (note 1); and especially Adam G. Quinn, 'The New Age of Space Law: The Outer Space Treaty and the Weaponization of Space', *Minnesota Journal of International Law*, Vol. 17, No.2 (2008) pp.475-502.
[9] Gallagher and Steinbruner, *Reconsidering the Rules for Space Security* (note 4) p.9.
[10] Article IV of the OST as summarised in Goldblat, 'Efforts to Control Arms in Outer Space'(note 7) p.103.
[11] Ibid, p.104.
[12] Gallagher and Steinbruner, *Reconsidering the Rules for Space Security* (note 4) p.10.
[13] 'Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies', available from http://www.fas.org/nuke/control/ost/text/space1.htm [accessed 01 July 2010].
[14] Taboo is used here in the sense of a 'normative prohibition' – see Nina Tannenwald, 'The Nuclear Taboo: The United States and the Normative Basis of Nuclear Non-Use', *International Organization*, Vol. 53, No. 3 (1999) pp.433-468. See also Karl P. Mueller, 'Totem and Taboo: Depolarizing the Space Weaponization Debate', *Astropolitics*, Vol.1, No.1 (2003), pp.4-28.

[15] PG Alvarez, as cited in Wulf von Kries, 'The demise of the ABM Treaty and the militarization of outer space', *Space Policy*, 18 (2002), pp.175-178, p.176.
[16] See von Kries, 'The demise of the ABM Treaty'(note 15) p.176.
[17] Gallagher and Steinbruner, *Reconsidering the Rules for Space Security* (note 4); von Kries, 'The demise of the ABM Treaty'(note 15) p.177.
[18] von Kries, 'The demise of the ABM Treaty'(note 15) p.177.
[19] As cited in Gallagher and Steinbruner, *Reconsidering the Rules for Space Security* (note 4) p.13.
[20] The US experimented with HAND – High Altitude Nuclear Detonation – in its 'Starfish Prime' exercise in 1962, which disabled six of its own satellites; see Mike Moore, *Twilight War: The Folly of US Space Dominance* (Oakland, CA: The Independent Institute, 2008), p.52.
[21] Space Security Index, *Space Security 2009*, available from http://www.spacesecurity.org/publications.htm [accessed 09 June 2010] p.10.
[22] Ibid.
[23] China used a ballistic missile to destroy one of its weather satellites – for details see Gregory Kulacki and Jeffrey G. Lewis, 'Understanding China's Antisatellite Test', *Nonproliferation Review*, 15:2 (2008) pp.335-347; the US employed it sea-based 'Aegis' ballistic missile system to shoot down its malfunctioning USA 193 spy satellite – see Pavel Podvig, 'The US satellite shootdown: An unnecessary action', *Bulletin of the Atomic Scientists* (February 2008) available from http://www.thebulletin.org/web-edition/columnists/pavel-podvig/the-us-satellite-shootdown-an-unnecessary-action [accessed 01 July 2010]
[24] Gallagher and Steinbruner, *Reconsidering the Rules for Space Security* (note 4); Tannenwald, 'Law versus Power on the High Frontier: The Case for a Rule-Based Regime for Outer Space' (note 4).
[25] Johnson-Freese, *Space as a Strategic Asset* (note 5) p.137.
[26] Mueller, 'Totem and Taboo'(note 15) p.5.
[27] One pro-weaponization blog quotes US STRATCOM Commander General Kevin P. Chilton as follows: 'Let's say you build a craft capable of pulling alongside a satellite, extending a robotic arm, and plucking the satellite's solar panels off, thereby disabling it. Would you consider that a space weapon? Well, if so, that would mean the US space shuttle is a space weapon.' – see http://closingvelocity.typepad.com/closing_velocity/2009/01/obama-to-ban-space-shuttle-astronauts.html [accessed 01 July 2010].
[28] See for example, Johnson-Freese, *Space as a Strategic Asset* (note 5) p.106.
[29] Moore, *Twilight War* (note 20) p.xvi.
[30] Staeve Lambakis, 'Space Cops: Reviving Space Arms Control', *Astropolitics*, 1:2 (2003) pp.75-83, p.76.
[31] What Mueller designates as 'sanctuary idealism', 'Totem and Taboo' (note 14) p.9-10.
[32] See Bruce M. DeBlois, 'Militarization, Weaponization and Space Sanctuary: Past Dialogues, Current Discourse, Important Distinctions', November 2002, available from http://www.ploughshares.ca/libraries/Abolish/OuterSpaceConfGeneva02/DeBloisConf2002.htm [accessed 01 July 2010]
[33] See Johnson-Freese, *Space as a Strategic Asset* (note 5) and Moltz *The Politics of Space Security* (note 3) for extended versions of this argument.

[34] Michael E. O'Hanlon, *Neither Star Wars Nor Sanctuary: Constraining the Military Uses of Space* (Washington, DC: Brookings Institution, 2004)
[35] Johnson-Freese, *Space as a Strategic Asset*, p.91.
[36] See Bruce M. DeBlois, Richard L. Garwin, R. Scott Kemp and Jeremy C. Marwell, 'Space Weapons: Crossing the US Rubicon', *International Security*, 29:2 (2004) pp.50-84.
[37] On the potential impact of space debris, including that caused by the destruction of satellites, see Kelly Young, 'Anti-Satellite test generates dangerous debris', *New Scientist*, January 2007, available from http://www.newscientist.com/article/dn10999-antisatellite-test-generates-dangerous-space-debris.html [accessed 01 July 2010].
[38] Thanks to Nancy Gallagher for pointing out some of these complexities in email correspondence with the author.
[39] Ole Wæver, Barry Buzan, Morton Kelstrup and Pierre Lemaitre, *Identity, Migration and the New Security Agenda in Europe* (London: Pinter, 1993).
[40] Buzan *et al*, *Security: A New Framework for Analysis* (note 6).
[41] Ole Wæver, 'Securitization and Desecuritization', in Ronnie D. Lipschutz (ed.) *On Security* (New York: Columbia University Press, 1995) p.51.
[42] *Security: A New Framework for Analysis* (note 6) p.36.
[43] Wæver, 'Securitization and Desecuritization' (note 41) p.51.
[44] *Security: A New Framework for Analysis* (note 6) p.26.
[45] Ibid.
[46] Ibid, p.5.
[47] Ibid, p.176.
[48] See Peoples, 'Assuming the Inevitable?' (note 2) p.503.
[49] Cf. Moltz, *The Politics of Space Security* (note 3) p.38; p.61.
[50] *Security: A New Framework for Analysis* (note 6) p.25.
[51] Here Buzan *et al* draw explicitly on John L. Austin *How to do Things with Words* (Oxford: Clarendon Press, 1962).
[52] *Security: A New Framework for Analysis* (note 6) p.29; see also Waever, 'Securitization and Desecuritization' (note 41).
[53] Jef Huysmans *The Politics of Insecurity: Fear, Migration and Asylum in the EU* (London: Routledge, 2006) p.4.
[54] Williams, Michael C. (2003) 'Words, Images, Enemies: Securitization and International Politics;, *International Studies Quarterly*, Vol. 47, No. 4, pp.511-31.
[55] See, for example, Paul Stares, 'US and Soviet Military Space Programs: A Comparative Assessment', *Daedalus*, Vol. 114, No. 2 (1985) pp.127-145.
[56] From the *Washington Post* of the time, cited in Sheehan, *The International Politics of Space* (note 3) p.45.
[57] Space Security Index, *Space Security 2009* (note 21) p.10.
[58] Ibid.
[59] Gallagher and Steinbruner, *Reconsidering the Rules for Space Security* (note 4) p.5.
[60] Ibid.
[61] See 'Space Based Laser (SBL)', available from http://www.globalsecurity.org/space/systems/sbl.htm [accessed 01 July 2010]
[62] See 'Near-Field Infrared Experiment (NFIRE)' available from http://www.globalsecurity.org/space/systems/nfire.htm [accessed 01 July 2010]
[63] See Victoria Samson, 'Space-Based Missile Defence Still Uncertain Despite MDA's Support', available from http://www.cdi.org/program/issue/document.cfm?DocumentID=4384&IssueID=77&S

tartRow=1&ListRows=10&appendURL=&Orderby=DateLastUpdated&ProgramID=6&issueID=0 [accessed 01 July 2010]; and Theresa Hitchens and Victoria Samson, 'Space Weapons Spending in the FY 2009 Defense Budget', available from <http://www.cdi.org/pdfs/SpaceWeaponsFY09.pdf> [accessed 01 July 2010]

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[65] Johnson-Freese, *Space as a Strategic Asset* (note 5); DeBlois *et al* 'Space Weapons: Crossing the US Rubicon'(note 36).

[66] See Pavel Podvig, 'The US satellite shootdown: An unnecessary action' (note 23)

[67] Johnson-Freese, *Space as a Strategic Asset* (note 5) p.90; Mike Moore, *Twilight War* (note 20) p.85.

[68] Moltz, *The Politics of Space Security*, p.293.

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[80] Ibid, p.11.

[81] US National Space Policy 2006 (note 78) p.3.

[82] Ibid, p.2.

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