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THE BEST DEFENSE IS A GOOD LOW GRAVITY OFFENSE

Squadron Leader Mark Wilson, RAAF

JCSP 49

Exercise Solo Flight

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PCEMI n° 49

Exercice Solo Flight

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CANADIAN FORCES COLLEGE - COLLÈGE DES FORCES CANADIENNES

JCSP 49 - PCEMI n° 49
2022 - 2023

Exercise Solo Flight – Exercice Solo Flight

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INTRODUCTION

As new powers emerge in a world that is driven by technology, the ability to fight in all domains, including space and cyber, has become critical. However, there is a reluctance from the international community to prepare for offensive operations in space due to the inherent vulnerability of the space domain. This paper will pose the question: is the Combined Space Operations (CSpO) alliance mentally and physically prepared for a war in space? It will argue that if war breaks out, CSpO must be the first to strike in space. This paper will make this case in four sections: firstly, by identifying the need for CSpO unity; secondly, by discussing the importance of adjusting the will of the alliance to fight a war in space; thirdly by suggesting that the CSpO must obtain the capability and be physically prepared to strike first in space in the event of war, and finally, by providing a useful fiction scenario to reinforce the thesis statement.

For context, this author will begin by reiterating the importance of the space domain in modern military warfare. The global economy is also heavily reliant on space capabilities and should not be forgotten, it just will not be discussed here. Military operations in space is not a new concept; countries across the globe have been utilizing space-based assets to support national interests for decades.[1] With increasing technology and the scope of a nation's interests no longer limited to just localized regions, modern militaries have become more reliant on space enabling effects.[2] Hennigan, a National Security Correspondent at Time Magazine, highlights that the United States (US) have taken a step in the right direction with the creation of Space Force in 2019. However, he argues that there is still a long way to go, particularly in the areas of strategy and law.[3] The idea of multi-domain operations, to include both cyber and space effects, has only just started to appear in the Five-Eyes nation's doctrine.[4] For many, this has required a significant shift in traditional warfighting mentality. Often, what space effects can provide a military and why they are important in modern warfighting is not consistently understood across all levels, this is especially concerning when it comes to those in pivotal decision-making roles.

Space force enhancement (SFE) is a term used to describe how space-based systems can enable a warfighter.[5] Broadly speaking, this involves three categories. The first is satellite communications (SATCOM), which is the utilization of satellites in varying orbits to ensure global connectivity. The second, positioning, navigation and timing (PNT), is the utilization of satellites to provide location and timing data. An example of this is the Global Positioning System (GPS) constellation that is managed by the US Space Force. Lastly is intelligence, surveillance and reconnaissance (ISR), or the utilization of satellites to provide data on activities occurring on any part of Earth with no legal restrictions of overflight. This information can come in the form of imagery, synthetic aperture returns, infrared (IR) data, or signals intelligence

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[1] Drew II, Major Jerry V. "Visualizing the Synchronization of Space Systems in Operational Planning." Military Review. 99, 1 (January-February 2019): 106-114.
[2] *Ibid.*
[3] Hennigan, WJ. "yes, there really is a Space Force." Time (Chicago, Ill.) 196, no. 5/6 (2020): 56.
[4] *Ibid.*
[5] Dolman, Everett Carl. "Air-space integration." Chapter 16 in Routledge Handbook of Air Power, edited by John Andreas Olsen, 191-202. New York: Routledge, 2018.

(SIGINT).[6] However, satellites looking down is only half of the picture. The other half is looking up, and understanding what is actually orbiting Earth. This is called space situational awareness (SSA) and is a critical factor that will be discussed in the interest of considering space as a warfighting domain.[7]

CSPO UNITY

As is the case in conventional international relations, strong and credible alliances are critical within the space domain. Alliances represent the message of unity through combined wills and values and creates strength through shared capabilities. With this in mind, the CSpO alliance was formed in 2012 with the nations that form the enduring Five-Eyes alliance: Australia, Canada, New Zealand, the United Kingdom (UK) and the US.[8] In response to the increasing threat to operations in the space domain and in the interest of international unity, the CSpO has recently grown to include both France and Germany, making it a Seven-Eyes alliance fortifying a foothold in Europe.[9]

The alliance is based on space domain information and capability sharing, utilizing both ground and space-based assets, where the nation's geographic location also plays a significant role. As an example, the US manages the Combined Space Operations Centre (CSpOC), which also acts as the headquarters for CSpO and is represented by liaison officers from all member nations.[10] A valuable product that the CSpOC provides is a space catalogue; a comprehensive database that tracks and monitors all objects orbiting Earth over the size of 10cm, to aide in the SSA mission. Member nations use their unique capabilities and geography to help maintain the catalogue, including Canada's invaluable but ageing space-based Sapphire constellation, in turn, gaining access to all of the information that the database provides.[11]

The unity and might of an alliance such as CSpO is essential for strategic level credible deterrence in space. Offensive actions in space are not ostentatious as one might imagine, they can be kinetic or non-kinetic, covert and difficult to distinguish,[12] this understated approach leaves deterrence as the most efficient solution. Effective deterrence requires both the ability to detect and attribute a transgression, as well as an ability to punish that transgression with a proportional response in any domain. Both of which are easier to achieve with a larger group of likeminded countries with specific capabilities.[13] Boyce, a Senior Space Warfighting Engineer at ExoAnalytic Solutions, succinctly states that: "effective twenty-first century deterrence needs to

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[6] *Ibid.*

[7] "United States Creates the U.S. Space Command and the U.S. Space Force to Strengthen Military Capabilities in Space." The American Journal of International Law 114, no. 2 (2020): 323-326.

[8] Canada. Department of National Defence. Combined Space Operations Vision 2031 - Royal Canadian Air Force: Government of Canada, 2022, https://www.canada.ca/en/air-force/corporate/space/combined-space-operations/vision-2031.html.

[9] *Ibid.*

[10] *Ibid.*

[11] Weeden, Charity. Strong, Secure, Engaged in a Threatened Space Domain. Calgary: Canadian Global Affairs Institute, May 2018. https://www.cgai.ca/strong_secure_engaged_in_a_threatened_space_domain

[12] Moltz, James Clay. "The Changing Dynamics of Twenty-First-Century Space Power." Strategic Studies Quarterly 12, no. 1 (Spring 2019), 15-43.

[13] *Ibid.*

be national and multinational, multidiscipline, and multidomain, combining diplomatic, informational, military, and economic (DIME) means to prevent terrestrial conflicts from extending to space."[14] In other words, modern day space deterrence is not easy and requires multinational and lateral solutions.

Unified deterrence is also important as the space domain is more valuable to some nations more than others, depending on reliance.[15] Put differently, a more technologically advanced nation such as the US or China relies more on the effects that space-based assets can provide more than a nation such as North Korea, who have had multiple failed attempts in placing a useable satellite in low earth orbit (LEO).[16] Hypothetically speaking, a nation such as North Korea could launch a nuclear weapon into medium earth orbit (MEO) to wipe out heavily relied upon PNT satellites, including GPS, something that is assumed to be well within their capability,[17] to level the playing fields in a conflict. This enforces the argument that united alliance deterrence from nations that would be most affected by such a space attack, is the most effective way to prevent such an occurrence.

However, deterrence is not always enough. Alliances need more than just a shared vision to be truly effective. When push comes to shove, there must be no doubt or grey areas when considering a unified action or response. In the Air and Space Power Journal, Harris argues that international law in space has not kept up with the increasingly complex space domain, and that this can be fixed by introducing an international code of conduct to guide space activities.[18] This author sees some application in a code to govern appropriate actions in space, however it raises questions such as: who will police these codes? Not to mention the fact that most actions taken in space are below the threshold of armed conflict, can be achieved covertly and without attribution, expanded further in the next section. Therefore, what is required to enable effective unified action in space for an alliance such as CSpO is a shared list of tactics, techniques and procedures (TTP) to quickly draw upon in the event of a conflict on Earth. These TTPs, which will be discussed in more depth in the next section, are required to cover both offensive and defensive actions in space, and cannot be confined to just being reactive. Hence, if a war breaks out on Earth, CSpO cohesion and initiative, that is swift and effectual, will be key.

Finally, just as is the case for any alliance, the bigger the better. Strength in numbers is a huge player in today's environment of strategic competition. It reinforces the strategic message, increases combined military might and is a key factor in maintaining credible deterrence.[19] It

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[14] Boyce, Bryan. "Twenty-First Century Deterrence in the Space War-Fighting Domain: Not Your Father's Century, Deterrence, Or Domain." Air & Space Power Journal 33, no. 1 (2019): 34-49.

[15] Johnson-Freese, Joan. Space Warfare in the 21st Century : Arming the Heavens. New York, NY: Routledge, 2017. Print.

[16] "North Korea Set to Launch More Satellites into Space: NORTH KOREA MISSILES." EFE News Service, 2017.

[17] USA. NASA. Nuclear Weapon Effects in Space: Government of USA, https://history.nasa.gov/conghand/nuclear.htm#:~:text=If%20a%20nuclear%20weapon%20is,as%20usually%20defined%2C%20also%20disappears.

[18] Harris, Albert C. "Maintaining Space Superiority." Air & Space Power Journal 28, no. 1 (2014): 68-82.

[19] Boyce, Bryan. "Twenty-First Century Deterrence in the Space War-Fighting Domain: Not Your Father's Century, Deterrence, Or Domain." Air & Space Power Journal 33, no. 1 (2019): 34-49.

also enables technology sharing and encourages national spending towards unified goals.[20] From a CSpO perspective, it would be beneficial to move away from a small Five-Eye alliance type mindset and expand to more of a North Atlantic Treaty Organization (NATO) type mind set. Introducing France and Germany was a step in the right direction, however this should not end here. Given the current global climate, the next logical step will be to invite like-minded countries such as Japan. Japan, who is already a member of the Indo-Pacific Quad alliance with Australia, India, and the US, shares similar views as CSpO and is already active in many CSpO activities such as the Schriever Wargame,[21] a coalition strategic level table top exercise that will be expanded upon later in this paper. Other countries such as Italy have communicated a desire to join CSpO and should also be seriously considered.[22] To summarize, a unified CSpO coalition, with a larger member base is the foundation required to win a war in space.

CSPO MINDSET SHIFT

Now that the requirements for a solid, unified alliance foundation have been established, there is a need for a CSpO mindset shift. In order to have the appropriate mindset to strike first in space during the early stages of a war, CSpO is required to unequivocally classify space as a warfighting domain. This section will support this case by firstly discussing SSA and the congested and contested nature of space, secondly by speaking to the complexity of current space fighting tactics and capabilities, and finally by arguing that in the event of a war, CSpO should fight in space the same as they would within the classic domains of land, air and sea.

As previously discussed, space situational awareness (SSA), otherwise known as space domain awareness (SDA), is knowing exactly what is up there and more importantly, why.[23] Effective CSpO SSA is the result of combined capabilities contributed by all member nations, both ground-based and space-based. It is the most critical capability to master when considering space as a warfighting domain as space is both congested and contested.[24]

Space is congested. The aforementioned space catalogue actively tracks over 13,000 objects orbiting Earth. This includes both space junk and satellites.[25] Firstly, space junk makes up the majority of the clutter and poses a significant threat to all orbiting satellites. The Chinese inadvertently added thousands of pieces to this after they successfully conducted a direct ascent anti-satellite (ASAT) missile test against one of their own defunct satellites in LEO in 2007.[26] Most of these pieces will take centuries to decay, if at all. However, the Chinese, and indeed all

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[20] Boyce, Bryan. “Twenty-First Century Deterrence in the Space War-Fighting Domain: Not Your Father's Century, Deterrence, Or Domain.” Air & Space Power Journal 33, no. 1 (2019): 34-49.

[21] Swaine, Michael D., Mike Mochizuki, Michael L. Brown, Paul S. Giarra, Douglas H. Paal, Rachel Esplin Odell, Raymond Lu, Oliver Palmer, and Xu Ren. China's military & the US-Japan alliance in 2030: A Strategic net assessment. Carnegie Endowment for International Peace, 2017. Japan: Defense posture, spending and trajectories.

[22] *Ibid.*

[23] "United States Creates the U.S. Space Command and the U.S. Space Force to Strengthen Military Capabilities in Space." The American Journal of International Law 114, no. 2 (2020): 323-326.

[24] Steer, Cassandra, and Matthew H. Hersch. War and Peace in Outer Space: Law, Policy, and Ethics. Ed. Cassandra Steer and Matthew H. Hersch. First edition. New York, NY: Oxford University Press, 2021. Print.

[25] Hennigan, WJ. "yes, there really is a Space Force." Time (Chicago, Ill.) 196, no. 5/6 (2020): 56.

[26] Firth, Niall. "How to Fight a War in Space (and Get Away with it)." Technology Review (1998) 122, no. 4 (2019): 36-39.

space users, have since learned that this was irrational, as it threatened their space use as much as it did other space-faring nations. The Russians on the other hand, saw no issue with conducting a similar test in 2021 with parallel effects. This pugnacious behavior could be attributed to their declining space capability and hence reduced reliability on space effects.[27] Secondly, the space catalogue tracks all active satellites. Most are located within the three primary orbits of LEO, MEO and geosynchronous orbit (GEO), the latter where real estate along the equator is highly valuable and extremely limited.[28] The most important result of this tracking and awareness is defining the satellite's purpose, something that is not always easily discernable.[29]

Space is contested. In recent years, multiple countries have invested heavily in ASAT capabilities, particularly China and Russia.[30] ASATs can be in the form of direct ascent missiles which are fired from Earth and can reach up to GEO, LASERs that can either temporarily dazzle or permanently destroy a payload or solar panel, or co-orbital varieties such as robot arms.[31] Adding to this complexity, is the fact that offensive actions in space are often unattributable and below the threshold of armed conflict making response difficult to justify. One example is a signals intelligence (SIGINT) satellite being 'parked' next to a key SATCOM or intelligence satellite, where its intentions cannot be proven. Another example is an adversary satellite colliding with and effectively taking out an invaluable alliance satellite. The adversary then only needs to claim it as an error or accident and that they had simply lost control of their satellite. The fact that it was intentional would be almost impossible to prove and contentious to challenge.

Space is a complex warfighting domain; firstly, space tactics are not just confined to space. Satellite ground stations or GPS receivers can be attacked by both kinetic and non-kinetic means.[32] Additionally, the signals from satellites, weakened after travelling 100's to 1000's of kilometers from satellites to Earth, are highly vulnerable to jamming and spoofing.[33] Secondly, space tactics are not limited to the space domain. As Firth puts it in their MIT Technology Review article, satellites are simply computers floating in space,[34] and just like all computers, they rely upon cyber support and are susceptible to cyber offensive operations. Like land, sea, air and cyber, all domains are intertwined with each other and should not be stove-piped. The concept of multi domain operations (MDO) is therefore crucial. Thirdly, space tactics are not limited to the tactical, operational or strategic level. Operations can range from tactical satellite tampering in space to political level messaging.[35] Finally, space tactics are not just limited to military organizations. The military use of commercial or privately-owned satellites for combat

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[27] *Ibid.*
[28] Hennigan, WJ. "yes, there really is a Space Force." Time (Chicago, Ill.) 196, no. 5/6 (2020): 56.
[29] "United States Creates the U.S. Space Command and the U.S. Space Force to Strengthen Military Capabilities in Space." The American Journal of International Law 114, no. 2 (2020): 323-326.
[30] Firth, Niall. "How to Fight a War in Space (and Get Away with it)." Technology Review (1998) 122, no. 4 (2019): 36-39.
[31] *Ibid.*
[32] Hennigan, WJ. "yes, there really is a Space Force." Time (Chicago, Ill.) 196, no. 5/6 (2020): 56.
[33] *Ibid.*
[34] Firth, Niall. "How to Fight a War in Space (and Get Away with it)." Technology Review (1998) 122, no. 4 (2019): 36-39.
[35] *Ibid.*

purposes blurs the line between who is considered a combatant.[36] Consequently, it is not always military satellites that are targeted by adversaries.

Other more severe ideas support the argument that space is a warfighting domain. As mentioned before, the potential of a nuclear weapon being used in space for terrestrial advantage is one. Another is the potential for satellites to be armed with weapons that can be deployed against ground targets, with little warning and no restrictions of overflight.[37] To the point, complex battles are constantly occuring in space in many forms that affect both space operations and operations on Earth. Bowen, a space policy expert from the University of Leicester, shares a similar view, however claims that even though wars can be fought in space and are deeply influential to international relations, they are never actually won in space.[38] Once the CSpO alliance can cohesively classify space as a warfighting domain, it can work towards planning on how to fight in that domain in the event of a war.

The final discussion point for this section is that that in the event of a war, CSpO should fight in space the same as they would within the classic domains of land, sea and air. In other words, strike in space as would be done on Earth. This is not a new concept and there are many published opinions to support this argument. Senior Fellow and Strategist, Klein, suggests that space strategy should be treated like maritime strategy due to their inherent similarities.[39] In fact, many space laws are similar to the laws of international waters.[40] Others propose that space is merely an extension of airspace and as such should be treated that way, drawing links from air superiority to space superiority.[41] In the Air & Space Power Journal 32, Thompson et al., goes on to argue that "warfighting principals of war of maneuver, security, and offense apply to space. A construct to fight a war that extends to space must blunt aggression, seize the initiative, and terminate a conflict on terms favorable to US national interests."[42]

So why is striking on Earth during a conflict acceptable, as long as it is within the constraints of international law and the laws of armed conflict (LOAC), whereas lawful striking in space is taboo? This author believes the trepidation is a result of CSpO being made up of all democratic societies, with the moral values they avow and are accustom to, underlying the driving mindset against such action. A mindset that may need to change in the event of a war. There are always going to be more ethical and socially supported options however these may not be the most effective. This brings to mind famed philosopher Phillppa Foot's idea of the ethical trolly - does performing an action that harms someone in order to prevent a greater number of

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[36] Steer, Cassandra, and Matthew H. Hersch. War and Peace in Outer Space: Law, Policy, and Ethics. Ed. Cassandra Steer and Matthew H. Hersch. First edition. New York, NY: Oxford University Press, 2021. Print.

[37] Thompson, David "D.T.", Gregory J. Gagnon, and Christopher W. McLeod. "Space as a War-Fighting Domain." Air & Space Power Journal 32, no. 2 (Summer 2018), 4-8.

[38] Bowen, Bleddyn E. War in Space: Strategy, Spacepower, Geopolitics. Edinburgh: Edinburgh University Press, 2020. doi:10.3366/j.ctv1453js4.

[39] Klein, John J. Understanding Space Strategy: The Art of War in Space. 1st;1; ed. Vol. 1. Milton Park, Abingdon, Oxon;New York, N.Y;: Routledge, 2019.

[40] *Ibid.*

[41] Harris, Albert C. "Maintaining Space Superiority." Air & Space Power Journal 28, no. 1 (2014): 68-82.

[42] Thompson, David "D.T.", Gregory J. Gagnon, and Christopher W. McLeod. "Space as a War-Fighting Domain." Air & Space Power Journal 32, no. 2 (Summer 2018), 4-8.

people being harmed make that action right?[43] However, in this instance, the trolley is much larger with the potential to cause harm on a global scale. Regardless of the answer, CSpO must have these discussions now so if the situation warrants it, the hard decisions can be made without hesitation.

With the focus on the bigger picture, CSpO may have to attack a commercial satellite that is providing products to the adversary, or conduct offensive orbital actions that put other neutral satellites at risk. The bottom line is that rapidly removing an adversary's space capability, when they are heavily reliant on those capabilities to enable operations, may end the war early, preventing terrestrial combat, and hence saving lives and protecting the societies in which they exist. In short, CSpO must be unified in their will to conduct swift, overt and above the threshold activities in space in the event of a war.

CSPO PHYSICAL PREPARATION

If the CSpO alliance is to be ready for a war in space, mental preparation is only half of the story. There is also a requirement to be physically prepared, through the maintenance of leading-edge capability and the conduct of appropriate training. This section will expand on both the significance of maintaining a technological edge in space as well as running comprehensive, alliance-based space exercises. Although importantly, as US Space Force Officer Major Drew reiterates, keeping the advantage in the space domain requires the synchronization of actions across all of the domains.[44] That is to say, that space preparation will always need to be viewed and enacted utilizing an MDO lens.

Regarding space capability, the author will only discuss space control, or the ability to gain and maintain the freedom to operate in space, and not the ability to use space-based assets to support the warfighter through PNT, ISR and SATCOM. Space control consists of maintaining the alliance's freedom to operate in space or defensive space control (DSC) and taking away the adversary's freedom to operate in space or offensive space control (OSC).[45]

The CSpO alliance must assume the adversary, whether a space-faring nation or not, will attempt to gain the advantage in space by any means necessary in the event of a war. Some might argue that the best offense is a good defense. However, preparing to defend against such an attack is difficult in the complex environment that is space. Effective DSC therefore must be considered early in the technology design and operational planning process, using the principles: redundancy, hardening and resilience.[46]

An example of redundancy in the space domain can include using different satellite constellations in different orbits for the same effect, similar to how the Chinese operate the PNT

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[43] Duignan, Brian. Britannica, T. Information Architects of Encyclopedia. "Trolley problem." Encyclopedia Britannica, April 15, 2023. https://www.britannica.com/facts/trolley-problem.

[44] Drew II, Major Jerry V. "Visualizing the Synchronization of Space Systems in Operational Planning." Military Review. 99, 1 (January-February 2019): 106-114.

[45] Hennigan, WJ. "yes, there really is a Space Force." Time (Chicago, Ill.) 196, no. 5/6 (2020): 56.

[46] Firth, Niall. "How to Fight a War in Space (and Get Away with it)." Technology Review (1998) 122, no. 4 (2019): 36-39.

satellites, Beidou-2, in both MEO and GEO.[47] Another is the use of hundreds or even thousands of cheaper cube satellites in LEO to make it extremely difficult to remove the entire constellation, much like SpaceX's Starlink.[48] This also contributes to the idea of deterrence by denial, in other words, sending the message that an attack in space would be futile as it would have little effect on overall capability.[49] Hardening refers to making the satellite itself less susceptible to attack such as nuclear fallout protection or shields that protect against the dazzling effects of LASERs.[50] Lastly, examples of redundancy can include the use of irregular orbits to support operations or the terrestrial warfighter simply having the ability to utilize tools and methods other than the PNT, SATCOM or ISR that is provided by space-based assets.[51]

Of course, as per this thesis statement, having the ability to strike first through OSC will be critical. Professor of sociology at the University of New York, Lachmann, contends that the US has not won a war since the Cold War, and it is its reliance on expensive, high-tech weapons is a large part of the reason.[52] This author argues that operations in the space domain inherently require expensive and high-tech equipment. However, OSC actions do not have to be complex or extravagant, and are certainly not limited to just the actions taken in space. Whether it would be using a robot arm to nudge a satellite away from its desired orbit, using a LASER on earth to disable an imagery payload or jamming a SATCOM ground station on Earth, the critical factor is that OSC actions will need to be taken quickly, and with alliance unity. To maintain such an expensive capability, appropriate financial commitment (or buy in) and technical contribution from all contributing CSpO members will be essential.

The second part of being physically prepared for a war in the space domain involves the conduct of specialized training and education. USAF Major Harris states that the first priority for successful MDO is to "know your domain, and know it well."[53] This is indeed true and is applicable to both space operators/decision makers as well as all warfighters that utilize enabling functions that space-based effects can provide, which coincidently is all warfighters. For CSpO, all member nations must continue to invest heavily in combined, tactical and operational level exercises such as Space Flag, or the strategic level, capstone table top exercise the Schriever Wargame.[54] Australian National University (ANU) space law and security lecturer, Steer, and Harvard professor, Hersch, offer a differing opinion that exercises such as Schriever Wargame should be renamed to 'Peacegame' and concentrate on de-escalation and other peaceful

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[47] Harris, Alberts "AC", III. "Preparing for Multidomain Warfare: Lessons from Space/Cyber Operations." Air & Space Power Journal 32, no. 3 (Fall 2018).
[48] *Ibid.*
[49] Weeden, Charity. Strong, Secure, Engaged in a Threatened Space Domain. Calgary: Canadian Global Affairs Institute, May 2018. https://www.cgai.ca/strong_secure_engaged_in_a_threatened_space_domain
[50] Firth, Niall. "How to Fight a War in Space (and Get Away with it)." Technology Review (1998) 122, no. 4 (2019): 36-39.
[51] Dolman, Everett Carl. "Air-space integration." Chapter 16 in Routledge Handbook of Air Power, edited by John Andreas Olsen, 191-202. New York: Routledge, 2018.
[52] Lachmann, Richard. "Why the Most Powerful Nation in World History Keeps Losing Wars (and How That Could Affect Biden's Foreign Policy)." Los Angeles Review of Books (2021), https://lareviewofbooks.org/article/why-the-most-powerful-nation-in-world-history-keeps-losing-wars-and-how-that-could-affect-bidens-foreign-policy/.
[53] Harris, Alberts "AC", III. "Preparing for Multidomain Warfare: Lessons from Space/Cyber Operations." Air & Space Power Journal 32, no. 3 (Fall 2018).
[54] Australia. Department of Defence. 2016 Schriever Wargame – Post Activity Report: Government of Australia, 2021.

solutions.[55] It is this author's opinion that both peaceful and warlike scenarios should be exercised, so that CSpO is equipped with an array of diverse tools for action depending on the situation.

Education and training of all warfighters is a little more difficult as often the general space domain knowledge is so poor that the operator is not even aware that they are utilizing a capability that is being provided by a space-based asset. Based upon this author's space operations and exercise planning experience, broad space awareness training across all basic training, targeted higher learning space courses, and inclusion in most, if not all exercises is required. Increased CSpO alliance knowledge can be achieved by introducing concepts such as 'a day without space' training in exercises such as Red Flag or Talisman Sabre where the rewards are twofold; the warfighter can learn the value and vulnerability of space effects and also train to operate without the reliance of those effects.

USEFUL FICTION

The author will now utilize the final section of this paper to emphasize the thesis statement using useful fiction. Useful fiction, as the name suggests, is very handy to play out hypothetical situations in the future where there are no historic examples. For the emerging space domain where an all-out war has never taken place, this is ideal. The story is the author's opinion only and is based on information learned from the readings for this essay and over a decade of experience as a space operations officer in the Royal Australian Air Force (RAAF). The scenario will begin as China initiates a hard power invasion of Taiwan set in the year 2036. During this time, CSpO membership has only grown to Nine-Eyes, with the inclusion of Japan and Italy. This story is told from a war in space perspective, and will describe a situation where CSpO does not take the initiative and act quick enough to ensure its freedom of movement in space.

For some weeks it has become evident that a Chinese military invasion of Taiwan was imminent. Some member nations of CSpO argued that it was time to act in space and conduct some form of OSC on both Chinese military satellites and the commercial satellites that are known to be assisting the People's Liberation Army (PLA). However, some member nations cannot agree if the actions should be permanent or temporary, whilst others take moral issue with the conduct of any type of attack on commercial satellites. No agreements are made and days before any boots hit the ground in Taiwan, China begins its space offensive. CSpO ISR and SATCOM satellites in LEO, both military and commercial, are extensively jammed and dazzled with precision, both permanently and impermanently. As a result, and for preservation, commercial satellite organizations either turn their payloads away from Earth or discontinue their support to CSpO, effectively blinding the alliance from space.

With intelligence limited, the alliance is unaware of the fact that China has moved two large direct ascent ASAT missiles onto a launch platform. However, even if the alliance had observed it, the lack of cohesion at the strategic level stalls any prevention actions as some members do not think China would actually go ahead with the strike due to the fact that it would detrimentally affect Chinese capability as much as CSpO's. Without hesitation, China fires the

[55] Steer, Cassandra, and Matthew H. Hersch. War and Peace in Outer Space: Law, Policy, and Ethics. Ed. Cassandra Steer and Matthew H. Hersch. First edition. New York, NY: Oxford University Press, 2021. Print.

ASAT missiles to an altitude of 20,200 kilometers into two separate GPS satellites in MEO, creating over 7000 pieces of debris. This transforms MEO into an unusable minefield and effectively wipes out CSpO's PNT capability. While this also wipes out China's Beidou-2 MEO satellites, they still maintain a capability with their PNT satellites located in GEO. Speaking of GEO, previously ignored Chinese satellites that were feigning as communication satellites, inch closer to Space Based Infrared Systems (SBIRS) satellites and physically drag them off orbit with robotic arm technology. These satellites do not have enough propellant to move back into a useable orbit, effectively wiping out allied missile warning. GEO-based SATCOM systems suffer a similar fate when robot arms disable payloads with kinetic force.

It is only now, with the alliance's space-based capability crippled, that the Chinese make their move against Taiwan. PLA offensive actions and maneuvers are unobserved and the PLA has little issues gaining and maintaining air superiority in the South China Sea, restricting alliance intelligence capabilities further. Deployed alliance's command and control (C2) systems are jammed and defensive systems easily taken out. The alliance's Carrier Strike Groups are blind to a barrage of incoming anti-ship missiles and any counteroffensive, kinetic or non-kinetic, is made extremely difficult without appropriate global secure communications. Amidst crippling jamming and without GPS, navigation and timing functions of both UAVs and missiles make these capabilities ineffective. After only a short period of time, three alliance ships including one carrier is destroyed, and the loss of life alone is enough for NATO and other alliance Governments to withdraw support. The war is as over as quickly as it started.

This piece of useful fiction, paints a grim picture of what could happen if CSpO was not mentally and physically prepared to swiftly strike first in space. Firstly, it emphasizes the value of space-based effects to enable operations within the other domains. Secondly, it highlights the vulnerability of space-based assets. Thirdly, it stresses the need for effective DSC, specifically through the principles of redundancy, hardening and resilience. Lastly, it displays the importance of unity of will within the CSpO alliance and the criticality of having OSC TTPs exercised and ready to use. In other words, in space, the best defense can sometimes be a good offense.

CONCLUSION

This paper sought to stress the criticality of the CSpO alliance being prepared to shift to an offensive mindset in the space domain. It argued that if war breaks out, CSpO must be the first to strike in space. It made this case in four sections: firstly, by identifying the need for CSpO unity; secondly, by discussing the importance of adjusting the will of the alliance to fight a war in space; thirdly by suggesting that the CSpO must obtain the capability and be physically prepared to strike first in space in the event of war, and finally, by providing a useful fiction scenario to reinforce the thesis statement.

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