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NO END IN SIGHT FOR AIRCRAFT CARRIER DIPLOMACY

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Service Paper

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NO END IN SIGHT FOR AIRCRAFT CARRIER DIPLOMACY

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AIM

1. The aim of this service paper is to emphasise the continued and future relevance of aircraft carriers in the face of advancements in missile and drone technologies will not negate the need for such a power-projecting asset during future operations. Its relevance will endure even as missile and drone technologies advance at an astonishing rate and these new technologies should be seen as complementary rather than rendering aircraft carriers obsolete.

INTRODUCTION

2. Targeting, and the tools employed to conduct targeting, has become a much discussed subject as the Canadian Armed Forces (CAF) continue to develop their expertise in the domain and fine-tune its competencies and procedures. In today's modern warfare environment, targeting is constantly in flux of being revolutionized by advancing technologies. Begging the question of which capabilities may become obsolete as technology marches on. This service paper addresses such a current and relevant topic posed by Canadian Joint Operation Command Targeting. It will take a critical look at the premise that technological advancements in missile and drone technology will negate *aircraft carrier diplomacy* in the future. It is to be understood that the CAF themselves do not operate aircraft carriers and this service paper does not intend to justify their acquisition. However, the pertinence of this service paper lies in the relevance of drone and missile technology as challengers to the force-projecting asset that is the aircraft carrier and how it may affect Canadian assets.

3. To address this issue, this service paper will explore the arguments suggesting the imminent obsolescence of carriers in contrast to relevant arguments to suggest the opposite. Tampering the concerns of the high cost and increased vulnerability of carriers to emerging missile and drone technologies are the substantial limitations and vulnerabilities of these systems. Furthermore, the distinctive advantages of crewed aircraft and ships offer support to the counter argument, suggesting rather that aircraft carriers will continue to remain relevant. Through this examination, evidence will demonstrate that drone and missile advancements are of concern, but remain complementary to aircraft carrier diplomacy's operational and strategic value.

4. Due to the sensitive nature of some key considerations, this service paper will address these key considerations by examining them in broader terms. It will reference open source material for descriptions and operational details, avoiding precise specifications for security classification reasons. This approach does not negate the relevance of the topic and arguments presented herein.

DISCUSSION

5. According to David W. Wise, "carriers as a force projection instrument were made possible by the ability of such behemoths to operate close to shore with impunity."¹ However, the fact that carriers have sailed with impunity since the end of the Second World War is a consequence of the United States (US) Navy not engaging another navy in battle that has seriously contested it.² The Battle of Midway, the only real carrier fleet affront, and its impact on the war in the Pacific highlights the significant advantage of employing carrier fleets against an enemy navy and in support of land battles: even in contested seas. Perhaps it is more a question of whether the age of uncontested carriers is over. Wise approaches the future of carrier fleets through the lens of a cost analysis, highlighting that personnel costs and the exorbitant cost of each carrier depletes the navy's ability to crew their entire fleet. This is a challenge compounded in peacetime with budgetary constraints, as many armed forces can attest. However, the financial and staffing burden of carrier fleets is not the only concern leading to the idea of carriers losing their relevancy.

6. United States Navy Captain Henry J. Hendrix also addresses this issue from a vulnerability and a technological standpoint. Arguing that the carrier fleet becoming obsolete "has become more likely as the Navy continues to emphasize manned carrier aircraft at the expense of unmanned missiles and aircraft."³ He further suggests that "satellite imagery and long-range precision strike missiles" will hinder its survivability and force carriers farther out to sea, limiting its ability to operate its crewed aircraft effectively.⁴ Therein lies the hypothesis for aircraft carrier diplomacy approaching obsolescence: one predicated on costs outweighing their benefits as they become increasingly vulnerable to advances in missile and drone technology. It would be unreasonable to assert the opposite. With advances in technology, the aircraft carrier has become more vulnerable and the seas it once sailed with impunity, more contested. Yet, the simple fact that an asset has become increasingly vulnerable should not spell its demise.

7. Colin S. Gray tackles the core concept of this very issue, contending that "[t]he twenty-first century [as] the missile, space, and cyberspace age(s) [with] airpower [being] one of yesterday's revolutions" is one of nine airpower fallacies.⁵ While he acknowledges the new age of missiles, drones and cyber space and their practicality, even granting that they will undoubtedly become increasingly present and relevant to modern warfare, he dismisses the idea that crewed aircraft will become obsolete for the simple fact that they remain "too useful, too adaptable and flexible, to be abandoned."⁶ This astute observation

¹ David W. Wise, "The Navy Must Accept That The Aircraft Carrier Age Is Ending: And Start Making Plans For It," *The National Interest*, 26 February 2020.

² *Ibid.*

³ Henry J. Hendrix, "At What Cost a Carrier?" *Center for a New American Security*, March 2013, 3.

⁴ *Ibid.*

⁵ Colin S. Gray, "Understanding Airpower: Bonfire of the Fallacies," *Strategic Studies Quarterly*: SSQ 2, no. 4 (2008), 72.

⁶ *Ibid.*, 79.

by Gray is also quite relevant to the concept of crewed carrier aircraft and ultimately, aircraft carrier diplomacy. Their continued relevance, therefore, is not to be discounted.

8. The Royal Canadian Navy stipulates that “[e]very warship deployment and port-of-call is laden with symbolic and diplomatic meaning’ and “provides an impressive and “up close”[sic] example of national “hard power”[sic] competence.”⁷ None more so impressive than a carrier fleet capable of deploying 75 fighters⁸ and launching missiles from anywhere in the world. Mike Griffin, the US Under Secretary of Defence for Research and Engineering, understanding that these assets are a known quantity to adversaries, sees these as determinative assets that if the US “were to cede . . . or fail to continue to support them, [they] would be ceding ground to [their] adversaries that [they] cannot afford.”⁹ In perhaps what may appear as a self-licking ice cream cone theory, the diplomatic power of carrier strike groups is the reason this discussion is occurring. Hendrix argues that the deployment of “two carrier strike groups near Taiwan in 1996 in response to Chinese provocations taught the People’s Republic of China a valuable lesson:” to hold the US at bay and “regain a margin of supremacy within its historical sphere of influence in the western Pacific,” China needed to develop a buffer weapon system.¹⁰ Today, that weapon system is revealed through the DF-17, China’s new hypersonic missile capable of defeating missile defence systems with a range capability between 1,800 and 2,500 kilometers.¹¹ This ultimately means China is capable of reaching both US bases and ships far beyond the horizon of its coastlines.

9. The fact that technological advances now increase the threat to assets that have been unopposed for nearly 80 years does not equate to them being obsolete. Nonetheless, Hendrix’s observation is justified insofar as carrier fleets now need to concern themselves with their survivability. Yet, much like the *unstoppable* tanks of the great wars led to an increase in antitank weapons which then in turn led to an increasingly advanced tank, carriers must now do the same. In this context, Gray’s observation that “[t]his is indeed the missile age but increasingly it will be the missile-defense age also”¹² highlights the concern by providing the common-sense solution. Technology can help defend these juggernauts of the sea by exploiting the vulnerabilities of its threats. The DF-17 for example, while it does present considerable challenges by flying below radar, it is “considerably slower in the final stages of [its] flight than most [re-entry] vehicles on a

⁷ Canada, Royal Canadian Navy and Department of National Defence. *Leadmark 2050: Canada in a New Maritime World* (Ottawa: National Defence, 2017), 21.

⁸ Aircraft Compare, “How Many Planes Does an Aircraft Carrier Hold? (Countries Compared),” last accessed 7 February 2021, <https://www.aircraftcompare.com/blog/how-many-planes-on-aircraft-carrier/>.

⁹ David B. Larter, “Will ground-based hypersonic missiles replace aircraft carriers in the defense budget?” *Defense News*, last accessed 23 January 2021, <https://www.defensenews.com/naval/2019/10/14/will-ground-based-hypersonic-missiles-replace-aircraft-carriers-in-the-defense-budget/>.

¹⁰ Hendrix, *At what Cost the Carrier?*, 4.

¹¹ Ankit Panda, “Introducing the DF-17: China’s Newly Tested Ballistic Missile Armed with a Hypersonic Glide Vehicle,” *The Diplomat*, 28 December 2017.

¹² Gray, *Understanding AirPower* . . . , 74.

ballistic trajectory [which] may leave them vulnerable to interception by advanced terminal point defense systems.”¹³ This of course will take some effort and political will from the national security establishment, which Hendrix notes is struggling to come to grips with the realities of advancing technologies.¹⁴ His view that “[uncrewed] combat aerial vehicles . . . in combination with long-range precision strike missiles”¹⁵ is the way of the future for the US navy may lie in an overestimation of their advantages while ultimately underestimate their intrinsic vulnerabilities.

10. The inclusion of drones on the battlefield has highlighted some of their considerable advantages. By integrating them into modern warfare, armed forces have increased their capabilities and capacity to acquire and locate targets, collect and collate data, produce intelligence and to engage targets of all shapes and sizes. Their cost alone would suggest a considerable advantage when comparing to crewed aircraft. With unit costs of larger drones around \$15.9 million (MQ-9) and cruise missiles around \$1.4 million (TLAM), it is evident that more of these systems could be fielded compared to fighters ranging from \$35 million (CF-18) up to \$115.5 million (F-35 variants).¹⁶ It becomes even more economically advantageous when considering the cost of aircraft carriers could cover 1,227 DF-21Ds missiles.¹⁷ Additionally, drone autonomy and range varies from minutes to days and from few kilometers to thousands. This has unquestionably benefited the sense function and is increasingly relevant to the targeting processes by increasing loiter time of intelligence surveillance and reconnaissance (ISR) assets, creating a better understanding of the operational environment and significantly improving the collateral damage estimation in the process with minimal risk to human life. Yet these advantages do not lift drone and missile technology above reproach.

11. When considering speed, advanced missiles may have comparable speeds to fighter aircraft yet, their single purpose and lack of flexibility in flight limits their applicability when compared to crewed aircraft. Technology may well improve these limitations in the future, but it will nonetheless require human intervention. Furthermore, most advanced missiles are capable of launching from ships sailing in carrier fleets as their security force as well as carriers themselves. This consideration merely highlights that while missiles may offer some advantages to crewed fighters, they can offer said advantage while carrier fleets sail, complementing the attributes of crewed fighters from aircraft carriers. Notwithstanding, there is no debate over the speed advantage of crewed fighters over drones. Again, this may well change in the future with *fighter drones*, but it

¹³ Panda, *Introducing the DF-17* . . .

¹⁴ Hendrix, *At What Cost the Carrier*, 3.

¹⁵ *Ibid.*

¹⁶ Winslow Wheeler, “The MQ-9’s Cost and Performance,” *Time*, 28 February 2012, last accessed 5 February 2021, <https://nation.time.com/2012/02/28/2-the-mq-9s-cost-and-performance/>, and Gillian Rich, “What is the F-35 Fighter And How Much Does It Costs?” *Investor’s Business Daily*, 25 March 2019, last accessed 5 February 2021, <https://www.investors.com/research/f35-fighter/#:~:text=The%20F%2D35%27s%20acquisition%20price,F%2D35C%20is%20%24107.7%20million.>

¹⁷ Hendrix, *At What Cost the Carrier*, 8.

is not currently a reality. For instance, the US plans to make its first trial of an autonomous fighter drone against a crewed fighter in July 2021.¹⁸ Even so, the expectations of this test are not that this autonomous fighter could defeat a crewed fighter. Rather, it is about learning what it would take to build such a type of system.¹⁹ Furthermore, drone fighters themselves would not negate the practicality of an aircraft carrier to launch them. When comparing fighters to current drones with strike capabilities such as the MQ-1 Predator and MQ-9 Reaper, the speed factor is considerable. The MQ-9 being the faster of the two²⁰ is outclassed when compared to the US navy's F/A-18 Super Hornet, which can fly nearly four times faster.²¹

12. Platform speeds have considerable impacts when dynamically re-tasking ISR or strike assets. This can be the difference between missing and capitalizing on critical opportunities, ultimately affecting operational and strategic objectives. OPERATION INHERENT RESOLVE presented many fleeting opportunities to engage high value targets that required otherwise committed assets to be reassigned, supporting this argument.²² Successful engagement of targets with time constraint relied on speed of action for which dynamically re-tasking fighters rather than slower drones offered a more viable solution. Such dynamic changes in tasks were enabled by the crewed aircraft's flexibility, adaptability, and responsiveness. The fighter's advantage in this domain is also more considerable as it can hold a significantly larger payload, enabling it to strike a target in one area, move on to the next and strike another. A drone's ability to do so is often limited to smaller less powerful ordnance while missiles are single use.

13. Other vulnerabilities to drones and, to a lesser extent, missiles, include electronic warfare, weather conditions, and in the case of future autonomous drones and weapons systems, algorithm limitations and ethical dilemmas. Yet, a human in the pilot seat can palliate most of these vulnerabilities, granting advantage to crewed aircraft in these domains. Of course, this is likely to be addressed with future technological advances. However, as drones become increasingly autonomous with increasing performance, ethical dilemmas are likely to remain. The US Air Force has already looked at this aspect by developing and testing a "jet-powered drone . . . that could someday accompany human-piloted fighter jets on missions."²³ The idea in this project is that rather than

¹⁸ Ryan Pickrell, "The US Air Force Wants to Put an AI Drone Up Against a Fighter Pilot in a Dogfight that could Change Aerial Combat," *Business Insider*, 5 June 2020, last accessed 7 February 2021, <https://www.businessinsider.com/us-air-force-to-have-drone-dogfight-a-fighter-jet-2020-6>.

¹⁹ *Ibid.*

²⁰ Savio Koman, "Fastest Military Drones in the World," *Owlcation*, 6 December 2020, last accessed 5 February 2021, <https://owlcation.com/misc/Fastest-Military-Drones-in-the-World>.

²¹ NASA, *NASA - F-18 Performance / Specifications*, last accessed 21 January 2021, <https://www.nasa.gov/centers/armstrong/aircraft/F-18/performance.html>.

²² Based on authors recent operational experience.

²³ Andrew Liptak, "The US Air Force's Jet-Powered Robotic Wingman Is like Something out Of a Video Game: The XQ-58A Valkyrie is designed to operate as a loyal wingman," *The Verge*, 9 March 2019, last accessed 5 February 2021, <https://www.theverge.com/2019/3/9/18255358/us-air-force-xq58-a-valkyrie-prototype-robotic-loyal-wingman-drone-successful-test-flight>.

having multiple crewed fighters, one crewed fighter would be complemented by multiple autonomous drone fighters. Such advancements would also address personnel costs as highlighted by Wise as a reason for the impending demise of carriers.

CONCLUSION

14. The impression that missiles and drones will unseat the airpower of crewed airframes, ultimately leading to the obsolescence of crewed aircraft and aircraft carrier diplomacy may be an appealing question; however, as Gray highlights, it is a fallacy supported by the continued value of crewed fighters and limitations of missile and drone technology. As technology evolves and decreases drone and missile vulnerabilities, they may very well become “genuine rivals to [crewed] aircraft for nearly all intelligence gathering and strike roles.”²⁴ It is more likely however that they will be complementary to crewed fighters. Nevertheless, the force projection capability of a carrier fleet is unrivaled. With their aircraft capacities, aircraft carriers bring considerable firepower to any theater of operations and is a considerable diplomatic statement and deterrent for opponent nations.

RECOMMENDATION

15. Advancement in missile and drone technology is of the utmost importance if the CAF and its allies are to remain relevant and credible threats to our opponents. The CAF should continue to explore relevant technologies in this domain as they offer considerable advantages for modern operations at a fraction of the cost and with limited risk to troops. However, their limitations and vulnerabilities ultimately highlight concerns mitigated through continued development and employment of modern crewed aircraft. The CAF must continue to develop and employ crewed fighters as a part of its airpower while also complementing them by advanced missiles and drones. As drone technology evolves, it would be wise to consider how these drones could complement crewed fighters in future operations rather than replace them, keeping an attentive eye on trials such as the one to be conducted by the US in July 2021. Finally, this service paper does not make the recommendation for Canada to acquire aircraft carriers. However, mitigating the threat from these advancing technologies on Canadian warships should be at the forefront of new naval acquisitions. Much like aircraft carriers will continue to make a considerable symbolic and diplomatic statement, so too will Canadian warships. Their relevance will endure and as their own technologies develop, so too should their contribution to the Canadian targeting initiative.

²⁴ Gray, *Understanding Airpower* . . . , 75.

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