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14. ABSTRACT

For over sixteen years, Remotely Piloted Aircraft (RPA) have been extensively used to support counter-terrorism (CT) and counter-insurgency (COIN) operations in permissive environments across the globe. Recently, the unique security environment often referred to as the *gray zone* has perplexed operational commanders and staffs with the ambiguous line between war and peace. It is in this zone of operations where near-peer competitors are exploiting uncertainty, and the U.S struggles to identify means to compete with those challenges. RPAs give the Joint Force Commander (JFC) a tangible asset to gain battlefield clarity and keep the conflict below the threshold of conventional war. Through the employment of conventional, stealth, and swarm RPAs, the JFC gains operational tools to accomplish deterrence, information dominance, and achieve mass on the gray zone battlefield. This paper explores new opportunities for current and emerging RPA technology and invalidates the argument that their use in near-peer geographic areas is of little benefit. In fact, there is a high-likelihood the world will see an increase in gray zone conflicts, further enticing adversaries to abandon escalatory actions in favor of avoiding conventional war. Integration of RPAs into gray zone conflicts requires a balancing of operational factors to develop concepts for global joint operations in gray zones, advocacy for swarm technology to achieve economy of force, and multi-role carrier-based RPAs.

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RPAs in the Gray Zone: An Asymmetric Advantage for the Operational Commander

John Zaimis

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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Contents

Abstract

For over sixteen years, Remotely-Piloted Aircraft (RPA) have been extensively used to support counter-terrorism (CT) and counter-insurgency (COIN) operations in permissive environments across the globe. Recently, the unique security environment often referred to as the *gray zone* has perplexed operational commanders and staffs with the ambiguous line between war and peace. It is in this zone of operations where near-peer competitors are exploiting uncertainty, and the U.S struggles to identify means to compete with those challenges. RPAs give the Joint Force Commander (JFC) a tangible asset to gain battlefield clarity and keep the conflict below the threshold of conventional war. Through the employment of conventional, stealth, and swarm RPAs, the JFC gains operational tools to accomplish deterrence, information dominance, and achieve mass on the gray zone battlefield. This paper explores new opportunities for current and emerging RPA technology and invalidates the argument that their use in near-peer geographic areas is of little benefit. In fact, there is a high-likelihood the world will see an increase in gray zone conflicts, further enticing adversaries to abandon escalatory actions in favor of avoiding conventional war. Integration of RPAs into gray zone conflicts requires a balancing of operational factors to develop concepts for global joint operations in gray zones, advocacy for swarm technology to achieve economy of force, and multi-role carrier-based RPAs.

The United States is involved in military operations throughout the world and in varying security environments. On one end of the spectrum, there are low-intensity conflicts in permissive environments above Iraq, Afghanistan, and Africa countering violent extremist organizations (VEO) and insurgencies. On the other end of the continuum are preparations for full-scale war against near-peer adversaries in highly-contested environments, requiring the full suite of advanced military capabilities. For the operational commander and planning staffs, both ends of the spectrum require consideration to encompass the vast array of threats. However, it is the unique security environment often referred to as the gray zone that requires additional focus due to its ambiguous nature. With the growing probability of future warfare in complex gray zone environments, the capabilities of conventional, stealth, and swarm Remotely-Piloted Aircraft (RPA), also known as Unmanned Aerial Vehicles (UAVs) or by the less descriptive term *drones*, require employment to their full potential. The advantages of RPAs must be clarified for military and political leaders since RPAs offer more than persistent attack and reconnaissance in permissive environments.

In order to improve the Joint Force Commander's (JFC) ability to counter aggression in gray zone security environments, it is imperative they consider using RPAs in innovative ways to achieve advantages on the battlefield. At the operational level, RPAs provide three asymmetric advantages to commanders during the conduct of military activities in the gray zone—*deterrence, information dominance, and mass*. First, RPAs can successfully deter a peer adversary in the gray zone through persistence and perception in a way that remains credible. Second, RPAs offer unsurpassed endurance and connectivity in achieving information dominance, a core element to optimize decision making. Third, RPA technology

provides the operational commander a cost-effective advantage in the principle of mass, both in the number of platforms and in their massing of battlefield effects.

BACKGROUND

The gray zone presents unique challenges to operational commanders and requires efforts to develop appropriate responses to aggression. The U.S. is increasingly confronted with an intense adversarial competition with other world powers such as China and Russia, in addition to the regional agitators of Iran and North Korea.[1] The aggressors have deliberately confined the scope and scale of their actions to remain below the level that would instigate traditional warfare. Gray zone belligerents employ conventional and unconventional warfare methods inclusive of all the instruments of national power to accomplish objectives while keeping hostilities below the level of traditional war.[2] Chairman of the Joint Chiefs of Staff General Dunford stated, "Our traditional approach where we are either at peace or at war is insufficient to deal with that dynamic. . . . [this is an] adversarial competition with a military dimension short of armed conflict."[3] RPAs are uniquely poised to exploit this gray zone with their long-endurance, real-time updates, low-cost, and low-risk to force.

Recent examples of gray zone warfare include Russia's annexation of Crimea and China's antagonistic actions in the South China Sea marked by disputes over islands and territorial waters. Russia used unidentifiable soldiers dubbed "little green men" to infiltrate and play vital roles inside of Crimea and eastern Ukrainian territory. Likewise, China is behaving aggressively in the South and East China Seas by militarizing artificial islands and employing a maritime militia and coast guard rather than using their Navy.

As noted by Alfred Mahan, the U.S. military must commit forces abroad to keep adversaries "far away from our coasts."[4] Both China and Russia are near-peer aggressors

who expose U.S. forces to potentially contested environments on unclear battlefields. Therefore, innovative approaches to complex problems, such as the introduction of conventional, stealth, and swarm RPAs, are required to achieve objectives while minimizing risk to force. Potentially contested is an environment where an adversary can contest the air, land, sea, cyber, or space domains but does not overtly challenge them; instead, the adversary limits the scope of operations to remain below the imprecise threshold of war. RPAs have a vital role supporting operations in the gray zone through human-machine interfaces which adaptively fuse traditional airpower with multi-source information. These tools maximize John Boyd's Observe, Orient, Decide, Act (OODA) loop—gaining the advantage in decision making. With the high probability of perpetual gray zone warfare, operational commanders need RPA integration to enhance operational deterrence, information dominance, and mass.

OPERATIONAL DETERRENCE—RPA Battlefield Effects in the Gray Zone

RPAs provide commanders a deterrence mechanism against peer adversaries in the gray zone through persistence by forward presence, and shaping adversary perception in a way that is credible and less costly than traditional instruments. Joint Publication (JP) 5-0 defines deterrence activities as, "those actions or operations executed specifically to alter adversaries' decision calculus. . . . These actions or operations may demonstrate US commitment to a region, ally, partner, or principle."[5] This definition is structured upon the theoretical elements of deterrence: capability, credibility, and communication. To amplify the JP 5-0 definition, deterrence is the application of various instruments to influence adversaries to choose to act in alignment with acceptable international behaviors and norms. For example, the primary operational deterrence instruments used to dissuade China from using military force to prosecute their South China Sea claims are U.S. Navy ships conducting

freedom of navigation operations (FONOPS).[6] RPAs are well suited to accomplish this same deterrence mission through aerial reconnaissance and battlefield over-watch. Through persistence and perception, RPAs build upon the foundational deterrence elements and afford the commander with precisely the type of novel method needed to improve effectiveness. Today's status quo of employing large, manpower intensive ships, such as Arleigh Burke-class destroyers with crews consisting of over 320 personnel, may be an outdated method of providing deterrence for disputed areas like the Spratly Islands. The unmanned nature of an RPA has deterrent effects and offers a new approach to the strategy.[7] James Perry states, "If adversaries perceive that the United States can act against them without risking the capture or death of aircrew, or political embarrassment, then US airpower may be more 'usable' and have a greater deterrent effect when unmanned rather than manned aircraft are employed."[8]

Through the advantage of *persistence*, RPAs can demonstrate resolve in gray zone conflicts. JP 3-0 explains that persistent presence contributes to deterrence while signifying a commitment to allies and furthers access.[9] One advantage of RPAs is the ability to remain on station much longer than manned aircraft, increasing economy of force for airpower while minimizing overtly aggressive behavior and vertical conflict escalation. For example, the MQ-9 Reaper has a max endurance of 27 hours, delivering *persistent stare* for ISR collection, weapons delivery, and decision superiority.[10]

In addition to the RPA's ability to provide a sustained forward presence, stealth variants offer another layer of deterrence with capabilities for contested and politically sensitive environments. Gray zone environments have the potential, though low likelihood, to present themselves as contested; therefore, commanders should look not only at conventional RPA platforms but also stealth RPAs as another layer of deterrence. However, because no

two geographic areas are contested to the same degree or intensity, conventional RPAs should not be immediately discounted. Stealth platforms have a high deterrence value, and a fleet of long-range RPAs provides a credible means to assure allies of U.S. resolve.[11] Stealth RPAs offer increased survivability in high-threat areas through signature reduction to limit the effective range of enemy air defenses. Moreover, all RPAs should be included in the broader Flexible Deterrence Options (FDO) developed by commanders. JP 5-0 highlights intelligence, surveillance, and reconnaissance (ISR) as examples of military FDOs—inherent strengths of conventional and stealth RPAs.[12] The ability to deter adversaries lies not just in airpower's ability to impose destruction, but in its ability as a persistent force—an *unblinking eye*. However, for deterrence to work, the enemy must perceive the instrument as credible.

The operational deterrence of RPAs is communicated through the *perception* of its capabilities and the resolve of U.S. leadership to employ the platform. Generating this perception brands RPAs as credible deterrence instruments. Michael Green states, "The task of changing adversary perceptions and calculations is thus vital to effective deterrence."[13] RPAs have exhibited their destructive potential since the MQ-1's first weapon strike in 2001. Research of the counter-terrorism fight outside areas of active hostilities uncovers numerous examples of U.S. resolve and willingness to employ RPAs to defend interests and mold adversary perception. According to the Director of National Intelligence (DNI), between 2009 and 2015 the U.S. conducted 473 strikes killing 2,500 enemy combatants in areas outside of Afghanistan, Iraq, and Syria.[14] A necessary component of RPA deterrence credibility is the perception of its ability to inflict substantial costs on the attacker and an ability to deny achievement of enemy objectives. For conventional RPAs, the considerable cost levied on the adversary may come from the perception that every movement, special

operation, or buildup of forces in an objective area is being watched and potentially targeted. Since the U.S. fused RPAs into CT missions, they have influenced adversary behavior by limiting the enemy's ability to communicate and train. In fact, enemy combatants routinely restrict cell phone use and avoid open area gatherings for fear of strikes.[15] Application to near-peer environments may show similar behavioral modifications from the adversary and afford the U.S. an advantage. RPA operational deterrence complements other instruments through its uncanny ability as a persistently present platform with a reduced risk to force.

Equally crucial to achieving deterrence through persistence and perception is exhibiting resolve with RPAs, which contests the traditional paradigm that manpower is the primary signal of credibility. According to Michael Green, "The most obvious way to convey a costly deterrent message is for the deterrer to put its forces at risk and therefore accept a cost that serves as a credible signal."[16] However, this deterrence approach relies on the sacrificial indicators of the deterrent mechanism and has not adapted to the current security landscape of the gray zone.[17] Commanders should consider the RPA's capabilities and reduced risk to force as an instrument of coercion and a credible signal. Thomas Schelling states, "Deterrence involves setting the stage – by announcement, by rigging the trip-wire, by incurring the obligation – and *waiting*. . . . The overt act is up to the opponent. . . . The act that is intrusive, hostile, or provocative is usually the one to be deterred."[18] The traditional practice of amassing troops at a rear base for deterrence is both slow and costly. For example, the U.S. deployed thousands of soldiers in Germany during the Cold War to act as a trip wire, not to defeat the Soviet Union.[19] Instead, the troop presence signaled to all parties that any invasion by the Soviet Union would harm U.S. troops and pull the U.S. military arsenal into war.[20] Additionally, posturing carrier strike groups as the U.S. did during the 1996 Taiwan

Strait crisis drives escalation and creates a higher risk of crossing the line from gray zone to traditional war. When applied to RPAs in potentially contested environments during gray zone warfare, the U.S. eliminates the risk of losing a pilot over the adversary's territory while still executing its mission. Commanders also benefit from the RPA as the "trip wire" deterrence mechanism, forcing the enemy to make a hostile act or maintain activity below the threshold of war. RPA's afford the JFC a deterrence platform to demonstrate resolve by putting *skin* in the game in more places and for an extended period of time.

RPA capabilities also nest tightly with the future deterrence construct and will influence adversary behaviors and beliefs based on their perception of U.S. resolve. The National Research Council describes future deterrence as, "Possession of a demonstrated capability that is affordable, does not violate basic national tenets, and whose readiness for employment is apparent but does not interfere with international intercourse and the conduct of our nation's daily life."[21] While RPAs provide a capable and credible deterrence instrument to operational commanders through persistence and perception, the use of this technology to achieve information dominance on the battlefield is equally important.

INFORMATION DOMINANCE—RPAs and Decision-Making in the Gray Zone

Information dominance in the gray zone is advanced by RPAs and allows a decisive advantage for actions and reactions to battlefield conditions at a rate faster than the opponent. While redefining information dominance is not within the scope of this paper, it is important to note that scholars often choose to focus attention on the cyber domain. Instead, this section will consider information dominance, achieved through all domains, as a condition to optimize decision making. The Navy defines information dominance as "the operational advantage gained from fully integrating the Navy's information functions, capabilities, and

resources to optimize decision making and maximize warfighting effect."[22] Additionally, Dr. Milan Vego posits, "Information dominance is the principal aim to ensure the advantage in terms of time and achieving freedom of action."[23] The products and outputs from RPA sensors, including imagery intelligence (IMINT) and signals intelligence (SIGINT), are delivered in real-time or near-real-time, facilitating targeting, freedom of action, and most importantly optimizing speed and quality for decision making.[24]

RPAs with their unsurpassed endurance, flexibility, and connectivity support a holistic approach to achieving information dominance in the gray zone. Precisely aligned with the second goal of the U.S. Navy's strategy, "Persistent, Predictive Battlespace Awareness," RPAs offer JFCs real-time updates to adversary situations and updates to red capabilities.[25] Even more, RPAs give a unique insight into adversary behavior directly to commanders through full-motion video (FMV), signals intelligence, and other sensors.[26] This perspective is essential to information dominance and enables the JFC to accelerate their OODA loop against adversaries in the gray zone to gain the decision-making advantage. For example, the MQ-9 has a robust suite of sensors to include the multi-spectral targeting system (MTS) providing FMV in TV, infrared, image-intensified TV, a laser target marker, designator, and illuminator.[27] Further, the aircraft operates a Synthetic Aperture Radar (SAR) and a SAR Ground Moving Target Indicator (GMTI) and a suite of data-fusion and communication hardware and software on the aircraft and in the cockpit. Moreover, specialized equipment and sensors are available to the JFC to meet specific operational needs. Long-duration flights with mission-tailored RPAs gives the JFC flexibility and enhances quality and timeliness of decision making and achievement of information dominance in the gray zone.

RPAs can organically conduct the Find, Fix, Track, Target, Engage, Assess (F2T2EA) kill chain, maximizing U.S. advantages of information dominance and the factor *time* in gray zone operations. In previous conflicts, the information chain was lengthy and required multiple platforms to transfer information to and from the battlefield and commanders. For example, during the 1991 Gulf War, a Joint Surveillance and Target Attack Radar System (JSTARS) aircraft identified two Iraqi divisions 50 miles from the Kuwaiti border.[28] This information was relayed to an E-3 Airborne Warning and Control Aircraft (AWACS) which coordinated with leadership at the Combined Air Operations Center (CAOC) and called in coalition strike aircraft to destroy the targeted Iraqi vehicles.[29] Applied to the gray zone, RPAs of today can conduct cross-domain operations and integrate all-source intelligence with firepower to minimize delays in the information chain. For instance, over Crimea in 2015, RPA real-time intelligence and FMV information would have advanced information dominance thereby providing additional clarity to the battlefield and optimizing decision-making for leadership.

The Joint Staff Capstone Concept for Joint Operation (CCJO) provides a vision of the future operating environment highlighting complexity, uncertainty, rapid change, and persistent conflict in-line with the gray zone described in this paper.[30] This interwoven landscape demands immediate exploitation of RPA capabilities to maintain the advantage in the physical and informational environments. In addition to conventional RPAs, those with stealth attributes deliver information dominance in potentially-contested and politically sensitive environments. Remaining ahead of the adversary's decision cycle with a persistent presence delivering timely and accurate information will facilitate further force projection and sustainment should conflicts deteriorate and close the gap between competition and war.

RPAs bolster the asymmetric advantage of information dominance in the schism between war and peace and are uniquely postured to provide a cost-effective approach to achieving the principle of mass.

MASS—Low-Cost, Concentrated Force for Gray Zone Conflicts

In addition to deterrence and information dominance, conventional and swarm RPAs deliver the principle of mass to operational commanders through an evolutionary means to rapidly mobilize a cost-effective force at a decisive point. Air Force Basic Doctrine defines, "The purpose of mass is to concentrate the effects of combat power at the most advantageous place and time to achieve decisive results."[31] At the operational level of war, "The speed, range, and flexibility of airpower—complemented by the accuracy and lethality of precision weapons and advances in information technologies—allow it to achieve mass faster than other forces."[32] RPAs and swarms bring a quantitative advantage in both the number of systems deployed and their ability to mass effects on the battlefield. By applying technology to the fundamental principles of war, RPAs can shed stereotypical confinement to permissive CT and COIN activities while enhancing gray zone warfare in near-peer regions.

Distinctively, RPAs in the gray zone present a significant and complex problem to the adversary in the form of mass and swarming tactics. In fact, swarms of RPAs provide "a deliberately structured, coordinated, and strategic way to strike from all directions by means of a sustainable pulsing of force and/or fire, close-in as well as from stand-off positions."[33] For decades, technological superiority has been a key foundational component of the U.S.' military supremacy.[34] Swarm technology combines the ability to mass forces and effects simultaneously through advanced network integration and semi-autonomous processes to disrupt the enemy. As weapons delivery platforms and in concert with manned platforms,

"RPAs can increase the survivability and combat power of manned aircraft formations."[35] RPA swarms provide the commander with a means to saturate and overwhelm enemy air defenses, creating both a targeting and attrition problem for the enemy. Vego posits, "The offense can mass, at a chosen time and place, forces sufficient to overwhelm the defense, which must attempt to defend everywhere."[36] Swarm technology offers operational planners a lower-risk and lower-cost approach to create a corridor of access for air, sea, and land forces in contested or potentially-contested environments. Moreover, swarms may offer a defensive capability, and commanders may be able to apply lessons from the U.S. Navy's employment of the MK-15 Phalanx close-in weapons system (CIWS).[37] The Navy describes, "[the] Phalanx is the only deployed close-in weapon system capable of autonomously performing its own search, detect, evaluation, track, engage and kill assessment functions."[38] Using this logic, a defensive RPA swarm to defend and or maintain air superiority or sea control may prove acceptable.[39] RPA swarms promise to deliver significant advantages in the gray zone; however, operations may still prescribe kinetic warfare, further obscuring the thresholds of conflict.

Despite attempts to maintain activities below the threshold of kinetic operations, RPAs provide the commander with a flexible response option should those endeavors fail. Massed and concentrated strikes are a primary method of destroying enemy air and sea power. RPA technology, including conventional, LO, and swarm, provide an increased range for weapons delivery while reducing the number of sorties and aircraft necessary to disrupt or destroy targets on land and sea.[40] Vego suggests the destruction or neutralization of enemy air power "should be conducted with the largest available force and from different directions."[41] Vego's assessment exemplifies swarm technology's ability to smartly mass

forces and conduct multi-axis attacks based on net-centric threat updates from on and off-board cueing systems. In line with airpower doctrine, RPAs combine endurance, range, weapons, and information to complicate the adversary's problem and give commanders an asymmetric advantage in achieving mass within peer-competitor gray zones.

RPA Vulnerabilities—Perhaps the Wrong Choice for Potential A2/AD Arenas

Although the battlefield capabilities of RPAs are well known, research shows RPAs may not be able to provide advantages for the commander in near-peer gray zones because they are vulnerable to Anti-Access/Area Denial (A2/AD) threats. Joint Publication 3-0 summarizes A2/AD as a defense in depth where A2 are long-range capabilities preventing entrance to an operational area and AD limits a forces freedom of action in the area once overcoming the A2 challenge.[42] This geographic area seemingly prohibits the use of conventional RPAs without defensive equipment. Since the 9/11 attacks and the initiation of Operation Enduring Freedom (OEF), RPAs have operated in skies dominated by U.S. and coalition aircraft. RPA should operate in areas where the U.S. maintains air superiority, and where the enemy has limited or no air defense capability, based on their poor ability to survive in contested areas. As RPAs are unchallenged by enemy air defenses in the counter-terror fight, the majority of today's RPAs, "have had little or no survivability features incorporated into their designs."[43] Conventional RPAs (e.g., MQ-9), are relatively slow and fly at medium to high altitudes making them susceptible to adversary air defense systems.[44]

Further, conventional RPAs lack the exquisite suite of stealth and defensive apparatus present in today's fifth-generation aircraft (e.g., F-22, F-35). The NATO Joint Air Power Competence Centre (JAPCC) conducted a vulnerability study on RPAs and concluded that Medium and High Altitude Long Endurance RPAs (e.g., MQ-9, RQ-4) present a minimal

challenge for Surface-Based Air Defense (SBAD) systems.[45] JAPCC's study also asserted, "Operating in an IADS environment requires a combination of stealth and stand-off capabilities to penetrate adversary SBAD systems . . . such performance is only demonstrated by the F-22A and the B-2A."[46] Correspondingly, in 2013 the Commander of Air Combat Command, General Mike Hostage said the fleet of MQ-1 and MQ-9 RPAs are worthless in a contested environment and noted that even a small and weak country with a minimal air force could easily deal with the threat of these aircraft.[47] These vulnerabilities suggest that injecting RPAs into potentially contested environments presents too high of a risk to operational commanders with minimal if any benefit. For example, China's robust A2/AD capability concentrated on the East China Sea consists of fighter aircraft and an array of networked air and surface missile defense assets produced organically and include Russian S-300s.[48] The disputed Senkaku Islands are located in this area and within a Chinese Air Defense Identification Zone.[49] This type of near-peer gray zone A2/AD environment, capable of targeting RPAs, obstructs JFCs from using conventional RPAs in these regions.

RPA Strengths—Benefits Outweigh Vulnerabilities in Potential A2/AD Areas

The uniqueness of the gray zone environment, underscored by the adversary's desire to avoid significant conflict escalation, allows for the benefits of RPA effects to outweigh the vulnerabilities of operating in potentially contested environments. The circumstances of the gray zone warrant a change in the way we plan and employ the arsenal of RPAs. The debate on applicable mission sets for RPAs are as old as the platforms themselves. Critics citing system vulnerabilities deliver sound analysis of platform limitations paired against specific threats. However, when operating below the threshold of kinetic war, the low likelihood of enemy attack enables RPAs to thrive and deliver the operational commander low-risk options

with high-reward outcomes. In fact, their low-cost and ability to quickly replace individual RPAs reduces vulnerabilities at the operational level. RPAs started as an unconvincing novelty which, through a period of stereotyping and flaw identification, led to the relative acceptance of its warfighting capabilities in permissive environments. Further, the application of current and emerging RPA technologies and platforms should not be solely focused on counter-VEO and counter-insurgency operations; rather, commanders should consider RPA use to exploit potentially contested gray zone environments. Since the termination of WWII, the U.S. has preserved a successful strategy to maintain conflict levels below the threshold of conventional war against existential threats. As explained by Isaiah Wilson, "the cost of major aggression has become so severe, and economic and social interdependence so powerful, that states with some degree of aggressive intent arguably will be in the market for alternative ways to achieve their goals."[50]

Today, U.S. military superiority deters adversaries from conventional warfare forcing adversary reliance on irregular warfare, such as Russia's backing of separatists in Ukraine. Using this logic, the likelihood of significant conflict in the Western Pacific, Eastern Europe, or Persian Gulf A2/AD environments is low. In this gray zone, with a low-likelihood of an enemy's kinetic response, the U.S. should include RPAs to limit the use and exploitability of our high-end capabilities. The advantage of using RPAs far outweighs the risk and offers a new level of battlefield awareness only seen in the Middle East and Africa.

CONCLUSION

Through the asymmetric advantages of deterrence, information dominance, and mass, operational commanders can apply current and emerging RPA technology to counter aggression during gray zone competition. Notably, events sparked by gray zone actors

including China, Russia, and Iran will test U.S. resolve and pressure U.S. action in all corners of the globe. To overcome and remain ahead of threats posed by gray zone competition, operational commanders should look to RPAs as innovative concepts and approaches in countering adversarial behaviors. The National Defense Strategy highlights why the creative efforts are needed now, "The central challenge to U.S. prosperity and security is the reemergence of long-term, strategic competition by what the National Security Strategy classifies as revisionist powers [China and Russia]."[51]

Against China, RPAs can conduct operations to rebut adversary assertions over disputed land and waters similar to the execution of FONOPS and overflights by Maritime Patrol and Reconnaissance Aircraft (MRPA). In 2017, the USS McCain performed a FONOPS sortie, closing within 12 miles of the disputed Spratly Islands. The United Nations Convention on the Law of the Sea dictates that nations must give "due regard for the rights and duties of other states, including in the exercise of freedom of navigation and overflight."[52] These naval and air sorties do not merely collect intelligence on adversary behavior and actions. They also send a message of U.S. resolve and rebuttal of China's peacetime coercive behaviors and assertion of maritime rights over disputed land features—this message and resolve can be sent with RPAs.

It is in the gray zone where commanders have an opportunity to exploit RPA capabilities to their full potential. Through persistence and perception, RPAs can deter adversary behaviors and demonstrate resolve in the gray zone based on their track record of sustained usage outside theaters of active armed conflict. Additionally, with impressive endurance and tailorable payloads, RPAs occupy a vital role in achieving information dominance—optimizing decision making with superior information. Moreover, current and

emerging RPAs enable rapid massing to obtain a concentration of force at a decisive point in the gray zone. Not only do RPAs provide these three advantages, but they have the ability to exhibit these capabilities over a large battlespace—and are not solely limited to permissive environments. The asymmetric advantages of deterrence, information dominance, and mass improve the operational commander's ability to conduct operations in the gray zone.

RECOMMENDATIONS

The use of RPAs provides a persistent ISR and strike platform to the JFC's portfolio. These platforms offer multi-role functionality including the opportunity to use the same aircraft to provide visible deterrence and then, should deterrence fail, be immediately employed in a kinetic role.[53] Advantages of including RPAs in gray zone conflicts against near-peer competitors are described throughout this paper and the following recommendations, based on analysis of operational factors, are offered for consideration.

Deterrence: Conventional RPAs for the Gray Zone: Based on their unique optimization of space and time, commanders should consider introducing conventional RPAs (e.g., MQ-9) into areas where gray zone tactics are used such as the South and East China Seas to gain clarity and provide deterrence. These aircraft bestow a tremendous advantage in time and an opportunity for the commander to gain instant and persistent battlefield updates for decision making. An orchestrated effort to develop concepts of operation in coordination with naval assets will facilitate joint operations for gray zone conflicts and add options for commanders.

Information Dominance: Land and Sea-Based RPAs: Commanders should not look only to land-based RPAs to gain information dominance; in fact, carrier-based RPAs can provide a niche capability delivering airpower to the fight without the need for host-nation

basing approvals. DoD leadership should consider carrier-based RPA requirements to include both low and high-end capabilities to ensure the JFC has ample options to confront gray zone challenges. The U.S. Navy's announcement of the MQ-25 as a "persistent, sea-based, multi-mission aerial refueling [RPA]," is a welcome addition to the RPA enterprise that should be optimized and immediately exploited to assist with information dominance in gray zones.[54]

Mass: Space and Force in the Gray Zone: Looking forward to the incorporation of swarm RPAs to achieve mass, JFCs should advocate quick delivery of concepts and prototypes to theaters of operation. The DoD's Third Offset Strategy contends the acquisition process requires acceleration since the U.S. can assume that a technological advancement's shelf-life as an advantage will be no more than five-years.[55] Swarm technology promises to provide the JFC with an innovative method to achieve mass in the vast forward presence areas comprising gray zones. JFCs should consider CONOPS to maximize space and force as RPAs improve commander's options for gray zone conflicts.

The recommendations above are certainly not all-encompassing but they provide the JFC with a point of departure to consider using RPAs in gray zone. The operational level of war offers an opportunity to use current and emerging RPA technology to combat coercive behavior and maintain the conflict below the threshold of conventional war. Through the three operational gray zone advantages of deterrence, information dominance, and mass, JFC's can view the asymmetric advantages offered by RPAs against a peer adversary.

NOTES

[1] Isaiah Wilson and Scott Smitson, "Solving America's Gray-Zone Puzzle," *Parameters* no. 46 (2017): 55.

[2] Bradley DeWees et al., "Toward a Unified Metric of Kinetic and Nonkinetic Actions," *Joint Forces Quarterly,* no. 85 (2017): 20.

[3] Wilson and Smitson, "Gray-Zone Puzzle," 56.

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