BEYOND AIR SUPERIORITY

The Growing Air Littoral and Twenty-First-Century Airpower

Michael P. Kreuzer

This article proposes a fundamental reexamination of the nature of airpower in the twenty-first century. The development and diffusion of technology democratizing airspace and increasing both offensive and defensive capabilities have served to significantly expand the air littoral in the past 20 years, upending decades of assumptions about airpower. Airmen today must see airpower as bigger than manned flight, neither inherently offensive nor defensive, not contingent on first gaining air superiority to exploit airpower effects, and neither a necessary nor sufficient condition for success in modern military operations.

January 28, 2024, marked a particularly somber day for the US Air Force. Beyond the loss of three comrades to terrorists in the Middle East, the uncrewed aerial system attack against US service members at a military base near Jordan marked a dark but long-anticipated epoch for airpower: the first time in nearly 70 years that the US military lost ground combatants to an adversary airstrike, excluding missile attacks and attacks of the nature of 9/11.[1] As the US Air Force looks to a future sixth-generation of fighter aircraft and advanced bombers with the Next Generation Air Dominance plan aimed at establishing "continued air dominance," Russia's ongoing war in Ukraine, and recent experiences in the Middle East and Central Asia, it remains evident that tactical and operational air dominance is fleeting and in danger of being lost in the air littoral.[2]

Given these experiences and lessons, it is time to fundamentally re-evaluate some of the stale assumptions that serve as the foundation of airpower theory. Italian army general and airpower theorist Giulio Douhet's argument that strategic bombardment is a morale killer rather than an operational capability to degrade adversaries is weak

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1. C. Todd Lopez, "3 U.S. Service Members Killed, Others Injured in Jordan following Drone Attack," US Department of Defense (DoD), press release, January 29, 2024, https://www.defense.gov/.

2. IDGA Editor, "Flying into the Future: The NGAD Program Explained," Institute for Defense and Government Advancement, February 7, 2024, https://www.idga.org/.

at best.[3] Most importantly, the US military's experience since the First Gulf War makes clear that local and expeditionary limited wars, not direct great power conflict, will likely remain the key operational challenge of all-domain forces under great power competition.[4]

This article proposes rethinking the role of air forces in great power competition, using the lessons of 20 years of US experiences in the war on terror, recent air operations in Ukraine and related conflicts, and the backdrop of airpower in the Cold War as cause to rethink fundamental assumptions. The development and diffusion of technology democratizing airspace and increasing both offensive and defensive capabilities have served to significantly expand the air littoral in the past two decades, complicating battlespace geometry, threatening command-and-control relationships, and ultimately minimizing the vision of airpower within the US Air Force to the high-end fight for air superiority against a near peer.

Air superiority is defined in this article according to US Air Force doctrine; it is "that degree of control of the air by one force that permits the conduct of its operations at a given time and place without prohibitive interference from air and missile threats."[5] This definition is somewhat elusive, as "prohibitive interference" is ill-defined, so this article further interprets air superiority to be an air domain situation more in favor of US and Allied forces than "parity" or "contested" airspace, but not to the level of control as defined by *air supremacy*, "that degree of control of the air wherein the opposing force is incapable of effective interference within the operational area using air and missile threats."[6]

The ability to exploit the air domain in order to coerce adversaries is significantly more complex than manned fighters and bombers, and absent an active Air Force voice in shaping doctrine and ideas within the air littoral, skeptics are likely to grow louder in their critique both of the need for advanced airpower weapons and the need for an independent air service.[7]

Challenges of the Classic Airpower Paradigm

The US Air Force has from its inception relied largely on the core assumptions of Douhet, who stated in the interwar years, "Nothing man can do on the surface of the

3. See Mitt Regan, "Drone Strikes and Evidence-Based Counterterrorism," *Lawfare*, June 2, 2022, https://www.lawfaremedia.org/; and Robert A. Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell University Press, 2014), https://doi.org/.

4. "Eight 'Hot' Wars during the Cold War," Council on Foreign Relations, CFR Education, last updated May 25, 2023, https://education.cfr.org/.

5. See "Air Force Doctrine Advisory: Control of the Air" (Maxwell AFB, AL: Curtis LeMay Center for Doctrine Development and Education [LeMay Center], July 31, 2017), https://www.doctrine.af.mil/; and *Counterair Operations*, Air Force Doctrine Publication (AFDP) 3-01 (Maxwell AFB, AL: LeMay Center, June 15, 2023), 2, https://www.doctrine.af.mil/.

6. AFDP 3-01, 2.

7. See David Barno and Nora Bensahel, "Drones, the Air Littoral, and the Looming Irrelevance of the US Air Force," *War on the Rocks*, March 7, 2024, https://warontherocks.com/.

earth can interfere with a plane in flight, moving freely in the third dimension" and "[c]onquering the command of the air implies positive action—that is, offensive and not defensive action, the very action best suited to airpower."[8] This sentiment was expanded upon by Army Brigadier General Billy Mitchell, who in his magnum opus *Winged Defense* stated, "No missile-throwing weapons or any other devices have yet been created or thought of which can actually stop an air attack, so that the only defense against aircraft are other aircraft which will contest the supremacy of the air by air-to-air battles."[9]

This perspective manifests itself today in the foundational documents of the US Air Force. Air Force Doctrine Publication (AFDP) 1 notes the evolution of airpower "stems from the Airman's original vision of combat from a distance, bypassing the force-on-force clash of surface combat."[10] This vision lays out a system of airpower where command of the air is a prerequisite for control of the surface beneath the air—that the air domain must be controlled before it can be exploited, and therefore the initial and potentially decisive campaign of any conflict is the initial air war. Indeed, AFDP-1 lists the first "truth" of the Airman's perspective as "control of the air is a necessary precondition for control of the surface." It notes that "the "first mission of an air force is to defeat or neutralize the enemy airpower so friendly operations in all domains can proceed."[11]

Since the initial articulations of Douhet, Mitchell, and others, the majority of airpower scholarship has focused on how command of the air should be exploited. For Douhet, the command of the air meant "to be in a position to wield offensive power so great it defies human imagination," which included not just the ability to destroy the efficient operations of the army and the navy, but to take the war directly to the civilian population through conventional and gas bombing, as "all of their citizens will become combatants, since all of them will be exposed to the aerial offensives of the enemy."[12]

In contrast to this position, the bulk of American conventional doctrine to date is ultimately derived from the interwar Air Corps Tactical School and follows through modern theorists John Warden and David Deptula, emphasizing parallel warfare against the adversary's "vital centers," including leadership, industrial production, infrastructure, and then ultimately populations and fielded forces.[13]

The specifics have evolved through multiple iterations over recent decades, but the core principles of precision engagement of critical nodes beyond the battlefield remain the essence of airpower discussion. That said, echoes of Douhet remain, in both

8. Giulio Douhet, *The Command of the Air*, trans. Dino Ferrari (Maxwell AFB, AL: Air University Press [AUP], 2019), 9, 17, https://www.airuniversity.af.edu/.

9. William Mitchell, *Winged Defense* (Tuscaloosa: University of Alabama Press, 2010), 8–9.

10. Charles Q. Brown Jr., *The Air Force*, AFDP 1 (Maxwell AFB, AL: LeMay Center, March, 10, 2021), 7, https://www.doctrine.af.mil/.

11. AFDP 3-01, 8.

12. Douhet, *Command of the Air*, 20, 9.

13. Michael P. Kreuzer, *Drones and the Future of Air Warfare: The Evolution of Remotely Piloted Aircraft* (New York: Routledge, 2016).

the nuclear deterrence strategy of theorist Bernard Brodie and even modern airpower leaders who see enemy morale as the most critical vital center. In the words of one recently retired Air Force general, "There's nothing like the morale-killing nature of air-delivered weapons to destroy an enemy's will to fight."[14]

The assumptions of early airpower theorists were logical given the technology and strategic culture at the dawn of the age of airpower. Absent the invention of radar, which would not be operationalized for air threats until the years immediately preceding World War II, the ability to exploit the third dimension of airspace and the vastness of the air simply offered opportunities for early theorists to hypothesize how the air domain could be exploited to avoid the stalemate of the trenches of World War I. Speed, maneuver, and the lack of a capability to intercept incoming aircraft meant that "the bomber would always get through," and that "the only defence is in offence, which means that you have got to kill more women and children more quickly than the enemy if you want to save yourselves."[15]

Rockets and missiles did not appear until World War II, and though drones existed in small numbers for limited missions dating to the interwar years they would not be a factor in most combat situations until the late twentieth century. Airpower meant relatively limited manned aviation in an environment absent significant warning capabilities.

A century of air and combined arms warfare demonstrated flaws in this perspective. The first major case of strategic bombing theory, the Combined Bomber Offensive of World War II, produced mixed results that remain highly contested today. From a material perspective, one World War II historian argued strategic bombing absorbed significant resources that could otherwise have been used on the Eastern Front, while the *US Strategic Bomber Survey (Europe War)* considered attacks on railways and waterways "the decisive blow that completely disorganized the German economy."[16] This perspective has its share of critics, however—notably one critique that the conventional wisdom oversimplified the relationship between a state's economic output and military power, likely owing to the nature of the capitalism versus communism rivalry at the core of post–World War II international relations.[17]

From an "offense is the essence of airpower" perspective, both the United Kingdom and Luftwaffe demonstrated key nodes could be effectively defended by aircraft, rendering the Combined Bomber Offensive an aerial frontal assault against a fortified adversary position in a number of ways. High losses for the Eighth Air Force in particular challenged the myth that the bomber would get through. Even though it was thought

14. Bruce Wright, "Airpower Is the Key to Victory in Ukraine," *Air & Space Forces Magazine*, February 28, 2023, https://www.airandspaceforces.com/.

15. Stanley Baldwin, "A Fear for the Future: Speech before the House of Commons of the United Kingdom, November 10, 1932" (reproduced online by Center for Strategic & International Studies [CSIS]), Missile Threat, accessed October 17, 2023, https://missilethreat.csis.org/.

16. Richard Overy, *The Bombers and the Bombed: Allied Air War over Europe, 1940–1945* (New York: Viking, 2013); and *The United States Strategic Bombing Survey: Summary Report* (1945; repr., Maxwell AFB, AL: AUP, October 1987), 30, https://www.airuniversity.af.edu/.

17. John Kenneth Galbraith, *The Affluent Society* (New York: Houghton Mifflin, 1958).

that at least some bombers out of many would pass through the defenses, the works of Douhet and other interwar contemporaries paired with this observation led to a common belief in the run-up to World War II that bombers would be nearly invulnerable.

From a morale perspective, most observers—to include both the US and UK bomber surveys—found that contrary to prewar expectations, morale was not significantly impacted by vulnerability to strategic bombing, with the minority of more recent scholarship holding that surveys in Germany late in the war suggested bombing was effective in convincing the German population that the war was lost.[18] The Battle of Britain meanwhile proved the value of defense and denial against the Luftwaffe while further undercutting the preposition that strategic bombing weakens, rather than hardens, civilian morale.

The US Air Force spent much of the 1950s building a force prepared to rapidly intercept Soviet bombers over the North Pole while expanding its own nuclear delivery capabilities. Instead of fighting and winning that planned air war over the pole, the result was a stream of proxy wars and airpower frustrated in limited conflicts in Vietnam, Afghanistan, and Iraq, where forces had to rapidly adapt to adversaries lacking fixed industrial infrastructure that were thus able to evade the industrial targeting models.[19]

At the same time, wars fought between conventional air forces against traditional military targets ran into significant roadblocks as air defenses rapidly grew. Egypt, with Soviet integrated defense systems, left Israel unable to replicate its decisive Six Day War air campaign successes in the 1973 Yom Kippur War.[20]

The threats of anti-access/area denial continue to menace US Air Force strategy in both Europe and the Pacific well into the third decade of the twenty-first century.[21] While airpower arguably was the decisive factor in conflicts in Yugoslavia during the 1990s, air supremacy did not guarantee success in Afghanistan or Iraq, and the "shock and awe" campaign was of limited utility against Saddam Hussein in 2003. The current Air Force desire to template the Desert Storm strategy ignores both the contested legacy of the Gulf War's success and the fact that America's adversaries learn and adapt their strategy accordingly.[22]

Despite the historical record showing numerous challenges to the premise that command of the air will ensure victory in future conflicts, the underlying appeal of offensive

18. John Buckley, *Air Power in the Age of Total War* (London: UCL Press, 1998).

19. Shane P. Hamilton and Michael P. Kreuzer, "The Big Data Imperative: Air Force Intelligence for the Information Age," *Air & Space Power Journal* 30, no. 2 (January 2018), https://www.airuniversity.af.edu/.

20. Robert P. Givens, "Chapter 3: 1973 Yom Kippur War," in *Turning the Vertical Flank: Airpower as a Maneuver Force in the Theater Campaign*, Cadre Paper (Maxwell AFB, AL: AUP, 2022), https://www.jstor.org/.

21. Andrew Krepinevitch, Barry Watts, and Robert Work, *Meeting the Anti-Access and Area-Denial Challenge* (Washington, DC: Center for Strategic and Budgetary Assessments, 2003), https://csbaonline.org/; and Luis Simón and Alexander Lanoszka, "The Post-INF European Missile Balance: Thinking about NATO's Deterrence Strategy," *Texas National Security Review* 3, no. 3 (2020), http://dx.doi.org/.

22. Mike Fowler, "The Rise of the Present Unconventional Character of Warfare," Strategy Bridge, November 4, 2019, https://thestrategybridge.org/.

airpower's potential to bypass land operations for decisive air campaigns remains the elusive goal of air forces. The AFDP-1 pronouncement of the vital need first to gain control of the air, echoing Douhet and Mitchell, may hold true under limited conditions. It is likely true that air superiority, achieved through neutralizing enemy airpower, is necessary for conventional offensive military operations. For all other operations, including defensive operations and irregular warfare, the pursuit of control of the air may not just be unnecessary, but counterproductive.

The Expanding Air Littoral

Scholarly analysis has highlighted the immediate challenge to US airpower theory, defining the air littoral generally as the area from the coordinating altitude to the Earth's surface, which must be controlled to support land and maritime operations and can be supported and defended from the air and/or the surface.[23] The air littoral in this construct represents a transdomain region similar to the maritime littoral, where there is overlap in mission and projection capabilities between two or more domains.

Though the terminology is new, the challenges of the air littoral have existed for decades. US doctrine defines the land domain as "[t]he area of the Earth's surface ending at the high-water mark and overlapping with the maritime domain in the landward segment of the littorals," and the air domain as "[t]he atmosphere, beginning at the Earth's surface, extending to the altitude where its effects upon operations become negligible."[24]

Though the land domain speaks only to surface territory, analysts readily observe the US Army has nearly as many aircraft as the US Air Force, with approximately 4,400 and 5,200 total aircraft, respectively.[25] The Air Force's focus on air superiority and targeting beyond the battlefield had the effect of leaving much of tactical aviation—particularly rotary wing and tactical surveillance and reconnaissance—to Army aviation, and with it significant operational and doctrinal challenges.

Figure 1 illustrates the historically narrow air littoral, noting the traditional fire support coordination line (FSCL), forward edge of battle area (FEBA), and forward line of troops (FLOT), defining battlespace geometry for operational coordination and deconfliction.

23. Maximilian K. Bremer and Kelly A. Grieco, "The Air Littoral: Another Look," *Parameters* 51, no. 4 (Winter 2021–22), https://press.armywarcollege.edu/.

24. Michael P. Kreuzer, "Cyberspace Is an Analogy, Not a Domain," Strategy Bridge, July 8 2021, https://thestrategybridge.org/.

25. *World Air Forces 2021* (London UK: FlightGlobal, 2020), https://www.flightglobal.com/.

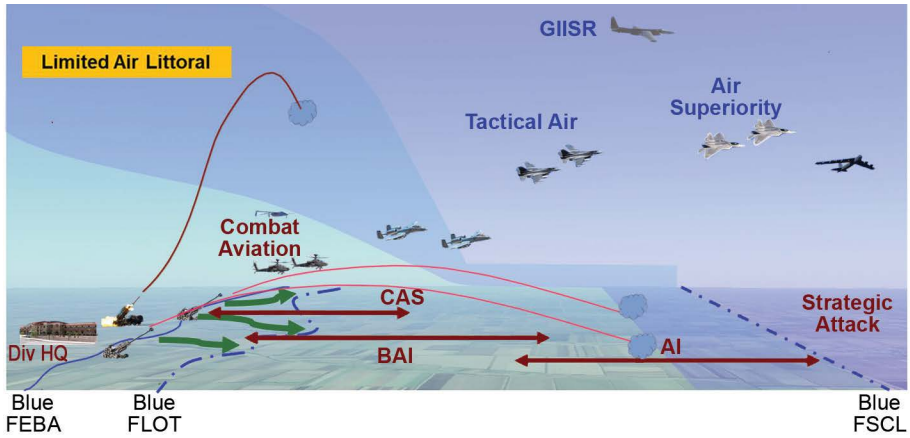

Figure 1. Limited overlap in air domain and land domain air operations, deconflicted through control mechanisms

The challenge of deconflicting air roles and missions is a struggle that predates the US Air Force's service independence in 1947, raged throughout the Cold War, reached a tenuous consensus in the aftermath of Desert Storm, and only to a degree lay dormant through much of the war on terrorism as the absence in most cases of a deep fight left many of the debates seem antiquated.

The Joint Chiefs of Staff have issued multiple memoranda to deconflict modern allocation of roles and missions—from the 1948 Key West Agreement to the Pace-Finletter Memorandum of Understanding and McConnell-Johnson Agreement—but no formal codification of a boundary exists.[26] Generally, the Air Force owned fixed-wing combat roles and intercontinental ballistic missiles, while the Army retained rotary-wing combat roles, air defense, and rockets/missiles of intermediate range or closer.

The lack of a formal division of roles, mission, and battlespace geometry presented challenges to operators historically, with most having to be resolved in the commands executing operations. From the Army's perspective, the Air Force has explicitly delineated the close air support (CAS) function as one of its most vital with respect to Army operations.[27] But there have been multiple reports for years that the Air Force would rather not perform CAS and has only acquiesced to holding onto the A-10 and other CAS assets to prevent that mission from reverting to the US Army.[28] This has led the Army to hedge in recent years with armed drones, expanded rotary-wing capabilities, and longer-range missiles to interdict operations.

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26 Mike Pietrucha, "Slaying the Unicorn: The Army and Fixed-Wing Attack," *War on the Rocks*, December 9, 2019, https://warontherocks.com/.

27. John Matsumura, John Gordon IV, and Randall Steeb, *Defining an Approach for Future Close Air Support Capability* (Santa Monica, CA: RAND Corporation, 2017), https://www.rand.org/.

28. See Tom Temin, "Is the Air Force Abandoning Its Close Air Support Mission?," Federal News Network, February 2, 2023, https://federalnewsnetwork.com/; and Stephen Bryen, "US Air Force in a Big Lie about the A-10," *Asia Times*, May 2, 2023, https://asiatimes.com/.

Russia's war in Ukraine is teaching militaries around the world many lessons in modern warfare, which may or may not all be relevant for future conflicts, particularly the prospect of naval and island warfare in the Pacific. But one clear lesson that airpower theorists and advocates must take from recent conflicts is that war within the air domain has profoundly changed, owing to the development of modern drones, loitering munitions, and longer-range land force fires.

These innovations and their successful demonstration in combat portends the dramatic widening of the air littoral and an end to the day where ambiguous doctrine and ad hoc deconfliction at the operational level will be effective in Joint campaign planning. Figure 2 illustrates the new challenges of the expanded air littoral, from crowded tactical airspace and new threats to a more distant, or even potentially nonexistent, fire support coordination line.

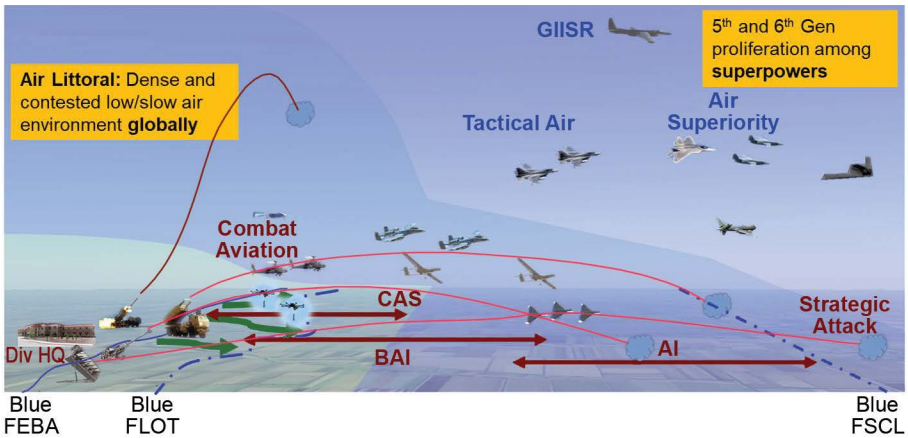

Figure 2. Significant overlap in airspace and potential land targets, leading to heavily congested tactical airspace and significant overlap of potential ground targeting

As noted previously, US Soldiers and Airmen faced sharp divisions throughout the Cold War and to the 1991 Gulf War over the meaning and interpretation of the FSCL.[29] For Airmen it was a demarcation line dividing areas of operations between Air Force targeting and Army artillery targeting. For Soldiers it represented the range of artillery and the limit of their internal fires.

These doctrinal disagreements reached a temporary truce in the 1990s, with the Army recognizing that "deep battle" is not simply support for the close fight and the Air Force increasing its focus on air interdiction and CAS, but Soldiers and Airmen retained different attitudes about this shift. Airmen saw the Army yielding to the Air Force vision when the Air Force only conceded the line did not explicitly serve as an area of operations boundary, but rather a measure to "facilitate the expeditious engagement of targets

29. David E. Zook III, "The Fire Support Coordination Line: Is it Time to Reconsider Our Doctrine?" (master's thesis, US Army Command and General Staff College, Fort Leavenworth, KS, 1992), https://apps.dtic.mil/.

of opportunity beyond the coordinating measure."[30] This truce has likely only survived to date as the character of US operations since then have rendered the FSCL largely moot, with Joint Task Force fire control elements managing virtually all targeting in a close environment.[31] Of note, the updated version of Joint Publication 3-09 eliminated the FSCL term.

The modern close air environment, characterized by a significant uptick in drone, missile, loitering drone-powered munitions, and rocket-propelled artillery is likely to reinvigorate the debate over the status and nature of the FSCL. Add to that pressure from ground commanders to extend the FSCL based on their increased land asset ranges and the situation is ripe for a breakdown in targeting and mission coordination between close air assets and targeting, from deep interdiction to strategic attack. The further prospect of a greater role for land domain munitions to reach strategic targets has the potential to strike at the core argument for US Air Force independence, namely that the Air Force can more efficiently and economically execute long-range precision-strike missions than other components of the US military.[32]

Reconceptualizing Airpower for Twenty-First Century Operations

Although to date the US Air Force has been perceived as reluctant to play a greater role in CAS and light attack and still yields air defense to the Army, the expanding air littoral is an opportunity for the Air Force to ask some tough questions of itself about the real meaning of airpower and what air domain operations mean in the twenty-first century. This article's argument is not that Mitchell was outrightly wrong but that his ideas and the models that stem from his works are based on assumptions that have been overtaken by events. To this end, this article proposes a new set of fundamental premises for the study of airpower in the twenty-first century.

Airpower is the ability to make others do what the Air Force wills through the exploitation of the air domain. Strength or capability—measured in number of aircraft, sortie generation, and other quantifiable metrics—is a common means of measuring military power and has strong applications when a western nation-state-centric conventional/Jominian conflict defines the war.

But strength alone is not power. Power is the ability to make another do one's will. Strength is a critical component, but it must be leveraged in time and space against an adversary's pressure points sufficient to change their behavior. The adversary's fielded

30. R. Kent Laughbaum, *Synchronizing Airpower and Firepower in the Deep Battle*, Cadre Paper (Maxwell AFB, AL: AUP, January 1999), https://media.defense.gov/; and *Joint Fire Support*, Joint Publication 3-09 (Washington, DC: Chairman of the Joint Chiefs of Staff [CJCS], 2010), A-2, https://api.army.mil/.

31. Mike Benitez, "How Afghanistan Distorted Close Air Support and Why It Matters," *War on the Rocks*, June 29, 2016, https://warontherocks.com/.

32. Mark Gunzinger and Lukas Autenried, *Building a Force That Wins: Recommendations for the 2022 National Defense Strategy* (Arlington, VA: Mitchell Institute for Aerospace Studies, June 2021), https://mitchellaerospacepower.org/.

forces, industrial production, or fixed government locations may not be critical targets for many adversaries as recent conflicts have shown time and again. Airpower strategy must see beyond industrial webs, Five Rings, and quantitative network-centric analysis to determine how the air domain can bring a diverse set of adversaries to a culminating point, which may be independent of state status or temporary capability to resist.[33]

The effectiveness of airpower is best judged from its ability to achieve effects on the surface. As Royal Air Force Marshal John Cotesworth Slessor observed, the air situation has no importance in war except in how it affects the situation on the ground.[34] This includes land forces, naval forces, and the political calculus of war termination. This can be through direct action via weapons employment or indirect effects via intelligence and supply among other means. Balance of power in the air for purposes of determining the status of air superiority is one means to the ends of airpower—a measure of performance—but is not a measure of airpower effectiveness.

In some cases, excessive strength may even be counterproductive to favorable war termination. It matters little that multiple conflicts between strong state actors and weak nonstate actors have demonstrated the ability to hit the adversary increasingly harder when escalation of violence, and of collateral damages, may in practice be the adversary's strategy.

Air superiority is highly desirable but is neither a necessary nor sufficient condition for victory. Air superiority is a condition that makes it easier to exploit the air domain, but relative capability to exploit the air domain does not guarantee victory. Strength in the air domain does not automatically equate to power over adversaries. In some cases, airpower effects will need to be delivered well before even localized air superiority can be attained. In other cases, mutual denial of airspace may be sufficient to deter aggression. Airpower theory and strategy must address these scenarios rather than focus all efforts on attaining air superiority as a prerequisite for further action.

Airpower exists at all levels of war and produces effects at all levels of war. Large fixed-wing airpower assets, owing to speed, endurance, airframe-specific maintenance requirements, and exploitation of the third dimension of the operating environment, largely exist at the level of the theater commander or of global strategy. Rotary-wing aircraft, tactical drones, and light-attack assets exist at the tactical level of war. All assets can hold an enemy's strategic, operational, and center of gravity and critical vulnerabilities at risk immediately but can also produce negative effects when strength is not directly tied to fulfilling an operational/strategic objective or is otherwise misused.

Airpower is neither inherently offensive nor defensive. To early airpower scholars, airpower was inherently offensive as air attack was seen as impossible to guard against on the one hand, and airfields were vulnerable to attack on the other. The basing vulnerability may remain true for manned operational aircraft, but improved air defenses, the

33. John Warden, "The Enemy as a System," *Airpower Journal* 9, no. 1 (Spring 1995), https://www.airuniversity.af.edu/; Jon R. Lindsay, *Information Technology and Military Power* (Ithaca, NY: Cornell University Press, 2020); and Kreuzer, *Drones*.

34. John Cotesworth Slessor, *Air Power and Armies* (Tuscaloosa: University of Alabama Press, 2010).

prospect of drone walls in future airspace, and the limited basing needs of many tactical aircraft make air denial as important an air domain mission as offensive attack.

Beyond "Great Contests for Control of the Air"

For the Air Force, the prospect of abandoning the air littoral in favor of a focus on air superiority operations yields critical battlespace to Allies and other domains to cover, decreases its priority and overall probability of success, and plays into the hands of critics of the independent Air Force who see it as operationally irrelevant despite its strategic deterrent success.[35]

Successful modern air forces must be shaped to both deter conventional war through fifth- and sixth-generation air superiority operations and readily flex to expeditionary combined arms air littoral operations. This means not a return to full-spectrum dominance as cost-prohibitive over-extension but shaping doctrine, organizations, and equipment to flex to small wars under mutually deterred great power competition. "Full-spectrum dominance" was a prominent feature of the US military's *Joint Vision 2020*, published in 2000.[36]

"Contesting airspace" in the modern operating environment is only partially through air-to-air engagement for air superiority. More often, it is through evasion and denial of air supremacy assets. Small drones have successfully contested Russia's formidable air defense network in Ukraine not by defeating their adversaries in the air but by shifting the cost curve away from theater missile defenses and manned fighter aircraft with smaller weapons platforms in higher volume.[37] Launching an S-300 or S-400 against a small drone may not be the equivalent of using a $2-million-missile to hit a camel in the butt, but it does make an elaborate integrated air defense system cost prohibitive against smaller threats in greater numbers.[38]

Air superiority may be necessary for successful conventional offensive operations, but the experience since 1991 has readily demonstrated that America's adversaries have learned to bypass that prospective course of action, with mixed results for airpower even in the best cases. This hider-finder competition as the dominant feature in modern air warfare should be the essential lesson of 30 years of air combat post–Desert Storm.[39]

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35. Diane Tedeschi, "Is it Time to Abolish the US Air Force? A Political Scientist Says Yes," *Smithsonian Magazine*, October 2015, https://www.smithsonianmag.com/.

36. See Scott N. Romaniuk and Tobias J. Burgers, " 'Full Spectrum Dominance': US National Security Doctrine in the New Global Security Environment," in *The Future of U.S. Warfare*, ed. Scott N. Romaniuk and Francis Grice, 1st ed. (New York: Routledge, 2017); and *Joint Vision 2020* (Washington, DC: CJCS, June 2000), https://apps.dtic.mil/.

37. John Grady, "Russian Forces Unprepared to Protect against Drones, Lack Adequate Command and Control, Panel Says," *USNI News*, November 1, 2022, https://news.usni.org/.

38. *Wired* Staff, "Blasted Camel!," *Wired*, December 7, 2001, https://www.wired.com/.

39. Antonio Calcera et al., "Why Drones Have Not Revolutionized War: The Enduring Hider-Finder Competition in Air Warfare," *International Security* 46, no. 4 (Spring 2022), https://doi.org/.

The Ukraine conflict has clarified the implications of new technology and the democratization of violence that has come with many of these innovations.[40] These technologies were untested and never held out as a viable deterrent threat prewar, with US and NATO Allies relying predominantly on conventional, economic, and information forms of extended deterrence to dissuade conflict before Russia's most recent invasion of Ukraine. Though extended deterrence failed in 2022, the lessons from this failure have in turn shown significant future deterrence benefits.[41]

China has watched the events unfold in Ukraine with great interest and is taking the lessons of the new calculus to heart. Space infrastructure, to include the civilian Starlink network, and land combined arms threats like Javelin, small drones, high-mobility artillery rocket systems, and other threats to China's military equipment will play a greater role in a Taiwan invasion than previously believed, likely driving up the costs for China of invasion and forcing it to make key force structure changes.

To some researchers, the integrated military application of US, Allied, and civilian partnerships creates a combined-arms challenge that China is unable in the near term to match. Despite the battlefield in Ukraine today largely existing in what Thomas Schelling dubbed a "brute force world," where no current negotiating ground exists between the factions, the costs being imposed through drone activity are readily causing other powers, notably China, to reconsider the probability of success through lower intensity conflicts.[42]

In the twenty-first century, airpower strategists and theorists must see the entirety of the air operating picture, and they must see conflict in the air as a contested operating environment, particularly at the tactical and operational levels. While air superiority is desirable for air operations, as superiority is desirable in any military domain, airpower strategy and theory must move beyond gaining control of the air/air superiority as a starting prescription and work to build a new picture for exploiting and projecting air domain effects from within the contested environment. This will mean more Joint collaboration and embedded Airmen with surface combatants, more reliance on Joint fires, a greater understanding of the defensive and denial applications of airpower, and a greater emphasis on the importance of the air littoral for future conflict.

Conclusion

After 80 years, the ghosts of Douhet and Mitchell continue to haunt the US Air Force. Seventy years of conflict post–World War II should demonstrate that winning command of the air is neither a necessary nor sufficient condition for victory in war. It

40. See Olafimihan Oshin, "NATO Chief: China Is 'Learning Lessons' from Putin's Invasion of Ukraine," *Hill*, January 31, 2023, https://thehill.com/; and Ben Blanchard, "Taiwan Sees China Taking Lessons from Russia's Ukraine Invasion," Reuters, February 23, 2023, https://www.reuters.com/.

41. Benjamin Jensen, "The Two Sides of Deterrence in Ukraine," CSIS, March 30, 2022, https://www.csis.org/.

42. Thomas C. Schelling, *Arms and Influence* (1966; repr., New Haven, CT: Yale University Press, 2008).

is vital to the American way of war to gain air superiority as rapidly as possible to facilitate military operations, but adaptive adversaries playing against US strengths have readily shown the ability to neutralize the inherent advantages afforded by command of the air in ways that Douhet, Mitchell, and others did not foresee.

As the operating environment expands and air assets have shrunk in both physical size and detectability, the flexibility to deny the adversary localized freedom of movement through the air in some cases must trump the desire to gain theater air superiority through long-range fast movers alone. The first step to air superiority, and with it control and exploitation of the air domain, must be the ability to deny access to the adversary, at all levels of conflict. Even as the US Air Force must plan to defeat threats to the United States and its Allies, it must simultaneously plan to lead in air operations inside the growing air littoral. *Æ*