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Army Futures Command

Land Warfare and the Air-Ground Littoral

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Ground combat in Ukraine has proven just as lethal as it was in World War II or Korea. The same has been true in the air.

Surface-to-air arsenals of both sides have made air operations – rotary and fixed-wing – very risky. The result has been a stalemate in the sky, as neither side wants to send manned aircraft across the forward lines of their own troops.

A Change In Land Warfare

Any serious professional concerned with ground warfare should be studying the use of drones in Ukraine. After the first invasion, in 2014, the Ukrainians started using small unmanned aerial systems (sUAS) for reconnaissance, targeting, and direct attack. After the full-scale invasion, in February 2022, there was an explosive proliferation of sUAS on both sides.

Today, they are used everywhere along the front for reconnaissance, targeting, attack, and communications.

What has emerged is a new arena of combat. The air-ground littoral is the airspace from the ground to a few thousand feet above it. This is where sUAS operate. It is where they engage and are engaged by ground forces. Increasingly, it is where sUAS fight one another. Today, above every Russian and Ukrainian unit along the 800-mile line of contact, there is a battle fought by and against sUAS, in the air-ground littoral. That contest is so intense the Royal United Services Institute (RUSI) estimated Ukrainians are losing sUAS at a rate of up to 10,000 per month.

An Air Launched Effects (ALE) system is launched from a UH-60L Black Hawk as part of capabilities testing during Project Convergence at Yuma Proving Ground, Arizona.

This is just the beginning, and it is bigger than sUAS. About 25 years ago, new technologies began disrupting warfare in the air domain. About five years ago, this spread to the maritime domain. Now, technology has advanced to the point that we are seeing disruption in the land domain. Small UAS are important, but the air-ground littoral phenomenon is only the leading edge of how AI-enabled, robotic systems will allow human-machine integrated formations to change land warfare.

Implications of the Air-Ground Littoral for the U.S. Army

Ground formations must be organized, trained, and equipped to



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Unmanned aerial systems, more commonly known as drones, like this one are becoming more capable, cheaper, modifiable, and potentially more dangerous.

attack and defend—including by air-to-air engagements—in the air-ground littoral. This requires changes to Army and Joint doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P). We do that kind of change best when we lead with doctrine.

In the past, U.S. Army maneuver commanders were concerned with airspace in a limited sense, to deconflict their fires and air movements. To a lesser extent, they understood air defense. Now, they need to be thinking about performing tactical tasks in three dimensions. Controlling terrain means also controlling the near-earth airspace. Managing terrain includes managing large airspace coordination areas (ACAs). sUAS give ground commanders new ways to attack, and new threats and avenues of approach to defend against.

Ground forces organized, trained, and equipped to exploit the air-ground littoral can sense and strike further and faster. They can gain and maintain contact with large numbers of attritable systems, communicate over wider

areas, and have new ways to achieve and sustain a vertical envelopment. The air-ground littoral is an exception to the rule that technology is making defense stronger. It is easier to attack through the air-ground littoral than to defend against attack from it. And, because action in the air-ground littoral will be continuous, action on the ground will be continuous.

Implications for Army Aviation

The air-ground littoral is a new term, but it is not a new space for Army aviators. This is where rotary wing aircraft have operated since their inception. But the space is now cluttered with friendly and enemy sUAS. Some sUAS will even hunt helicopters. Already, we see first person view (FPV) drones being employed in a counter-air mode. Rotary wing formations need protection against Group 1-3 unmanned aerial systems. And they should be able to employ sUAS in offensive counter-air operations while still piloting their aircraft in the performance of traditional Army aviation tasks. This may require AI-enabled systems, to

help identify and defeat sUAS threats without the intervention of air crew, or to reduce cognitive load during offensive operations.

Aviation units must be designed for continuous operations with systems that can be easily replenished. Because combat in the air-ground littoral is 24 hours a day, Army aviation formations, to include their command posts, forward arming and refueling points, and other sustainment elements will be under constant observation and in constant contact. Attrition for their own sUAS will be high. And they will need a steady resupply of counter-UAS materiel.

Adapting Faster

In the 21 months since the large-scale Russian invasion, sUAS operating in the air-ground littoral have gone through four generations of technology, from simple commercial off the shelf drones, to 3D printed bomblet-dropping drones, to sUAS semi-hardened against electronic warfare and FPV attack. This rapid evolution of tactics and technologies will continue and accelerate.

The U.S. Army must develop the ability to adopt and integrate technologies faster. Today, we are developing the Army Warfighting Concept for 2030-2040. That concept will set the avenue of approach for Army transformation. Within that broad approach, we need to be agile, especially in areas where technology is evolving rapidly. There is no better example than sUAS and their enabling information technologies. The Army needs to be able to integrate an existing technology into an operational unit as a holistic, DOTMLPF-P integrated capability, within about 18-24 months of recognizing an opportunity. This competence will be even more important and require even greater speed during war.

In many cases, we are allowing the aspirational to stand in the way of the doable. There are technologies that would be useful in our formations right now but are not yet fielded because we are waiting until they can do even more. New technologies with game-changing potential should be in operational units as soon as they are useful, even if only in small quantities of minimum-viable products. This accelerates development of the

technology. But it also lets us learn how to best employ it, and how to adapt our formations and training accordingly. Most importantly, it gives leaders experience using the technology as it evolves.

We can do this because one of our asymmetric advantages over any army in the world is our people. Our Soldiers and civilians are not only the best trained and educated, but they are the most innovative. This, if skillfully combined with our country's unparalleled civil innovation base – American industry and academia – gives us an innovation advantage no adversary can replicate. We have only to leverage it.

A Systems of Systems Approach

Warfare in the air-ground littoral will be systems of systems warfare. UAS are not employed independently. They are components of larger systems. Some sUAS are part of a fires system, acting as reconnaissance and targeting drones that show artillery and other systems where to strike and then allow battle damage assessments. Other sUAS are part of an intelligence system, providing intelligence, surveillance,

and reconnaissance. Others are the lethal part of a kill chain. These should not be separate systems –all should be integrated into a larger whole.

This extends from the battlefield all the way to the industrial base. We need a fully integrated, enterprise-level, system of systems that procures components, manufactures sUAS, and moves them through contested supply lines to the point of need. And we need a training pipeline for the Soldiers who operate or enable those systems.

Conclusion

Just as it has been since the inception of Army aviation, operations in the air-ground littoral are inextricably interrelated with operations on the ground. However, maneuver commanders, accustomed to thinking about the near-earth airspace in only a limited way, need to make the mental leap to all arms maneuver warfare in three dimensions. This is just one example of how technology is driving change in the character of warfare. And technology will punish unskilled commanders and untrained formations.

Transforming the Army for that future is about more than the technology. It is about fielding formations that are organized, trained, and equipped to fully exploit the potential of that technology. This requires action across DOTMLPF-P, and it requires a system of system approach. Most importantly, it requires embracing that changes in technologies relevant to land warfare will be rapid and continuous. By leveraging asymmetric advantages in our people and in our country's civil innovation base, we can adapt faster than any army in the world.

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