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WA/11/25

THE AIR-SURFACE LITTORAL : TOMORROWS KURUKSHETRA (BATTLEGROUND)

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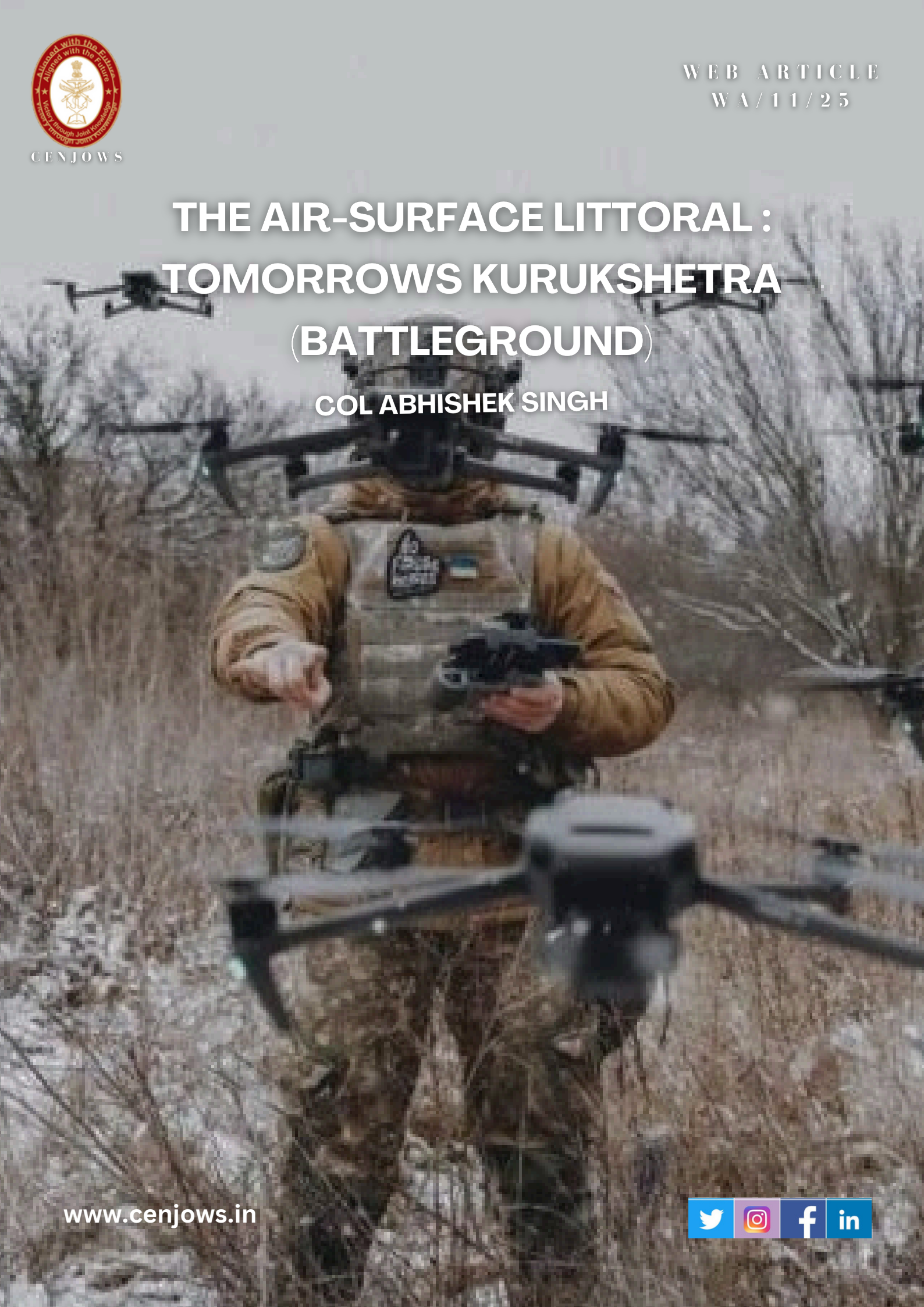

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'The work we do hasn't just changed our war. It's changed all wars, forever'.[1]

- Darwin

Ukrainian Ace FPV Drone Pilot

Introduction

Pablo Chovil, an infantry officer of the US Army, supporting the Iraqi operation to recapture Mosul from the Islamic State in 2016-17 witnessed the first ever large-scale use of small commercial drones by ISIL for reconnaissance and dropping grenades on the Iraqi forces which severely impacted Iraqi momentum and progress. The officer made a prophetic observation - "Previously irrelevant to conventional air superiority paradigms, the strip of sky between ground forces and high-end air assets has become highly coveted terrain. Conventional air supremacy does little good against the capabilities of modified off-the-shelf drones, which now contest airspace under 2,000 feet".[2]

This ‘strip of sky’ or the Air-Surface Littoral has emerged as a domain unto itself in the Russia-Ukraine war and the countless drones operating ceaselessly in it have completely transformed the conventional battlefield, irreversibly changing the character of war. Russia today has air superiority but still does not control the skies over the battlefields. The mighty Russian Black Sea Fleet has been rendered ‘functionally inactive’[3] and pushed out of its traditional base at Sevastopol by a nation with practically no navy to boast of. The situation on land is most severe with ground forces on both sides being forced to constantly adapt their tactics, techniques and procedures (TTPs) because of the persistent drone threat over the tactical battle area (TBA).

Ground Realities

Drones are playing varied roles in the ongoing war, ranging from reconnaissance, surveillance, direction of long-range engagements, casualty evacuation and direct attacks. Drones have in fact played a huge role in the stalemate that has gripped the Russia-Ukraine battlefront for some time now. Grieco and Bremer highlight the persistent presence of drones over the battlefields which prevents both sides from concentrating or manoeuvring their forces and in turn makes achieving a decisive breakthrough on the front under such circumstances as “almost impossible”.[4] Stacie Pettyjohn also reports that “Commercial drones are making it more difficult to concentrate forces, achieve surprise, and conduct offensive operations. By providing greater visibility into enemy troop movements beyond the front lines, drones have made it difficult for the Ukrainian and Russian militaries to mass forces”.[5]

Ukrainian drone units have been instrumental in defending complete sectors on the war front. Kirichenko reports “Ukrainian drone units are holding entire parts for the frontline like in Chasiv Yar. The Ukrainian drone unit Yasni Ochi, part of the 23rd Mechanized Brigade in the Avdiivka sector, in a six-month period, the 150-strong team eliminated over 1,500 Russian soldiers, either killed or injured, while incurring minimal casualties.”[6] Ukrainian President Zelensky has also stated that “Repelling ground assaults is primarily the task of drones”.[7]

No arm of a field army has been spared this storm of change. In a region considered ideal tank country, both sides are today forced to hold their armoured forces back. Kirichenko reports that “Ukraine withdrew US-provided M1A1 Abrams tanks from the

frontline due to their vulnerability to drone attacks. Ukrainian tank units in areas like Toretsk have shifted to primarily artillery roles to minimize exposure".[8] Cheap kamikaze drones, costing as little as $500, have achieved what million-dollar anti-tank missiles and attack helicopters failed to do for decades - push the tank back from the battlefield.

An Australian Army Research Centre report highlights that the use of drones has drastically increased the operational tempo of artillery engagements by 'shortening time-critical targeting and firing cycles from about 30 minutes to 3-5 minutes'.[9] Air Defence dynamics and economics have also gone awry with a whole range of small low altitude aerial targets now defying detection and the existing air defence systems not being cost-effective for engagement of such cheap drones. In another consequential first, Ukrainian FPV drones have been credited with downing two Russian helicopters in 2024.[10]

Infantry is also bearing the full brunt of drone warfare now as cheap kamikaze drones, courtesy additive manufacturing, have become so plentiful that they are being used to hunt individual soldiers. A Ukrainian media outlet - Kyiv Independent's video released in December 2024 of a Ukrainian drone unit committing four FPV drones to hunt and kill a single Russian soldier is commentary enough on the ground situation today.[11] Kirichenko in his latest December 2024 report highlighted that- "In the battle for Chasiv Yar, as many as 90 percent of the wounded Ukrainian soldiers who have made it to a stabilization point were hit by an FPV drone or by explosives dropped by a drone".[12] The battlefield is so infested with these low flying drones that it has turned the no-mans-land between the forces from a "grey-zone" into a "death-zone" with Ukrainian and Russian troops having "little ability to move on the battlefield without being spotted, and blown up".[13]

Drone warfare itself has evolved considerably over the last three years of the war. The most significant of these changes has been the shift from the use of high-cost-high-end Unmanned Aerial Systems in the initial phases of the war, such as the Byraktar TB2 which operated at higher altitudes, were vulnerable to enemy air defence systems and costly to replace, to the use of low-cost drones which operate in a narrow strip of air above the battlefield, not extending beyond a few thousand feet, are less vulnerable to air defence systems and are cheap and plentiful.[14] With enhancement on both sides in Electronic-Warfare (EW) and anti-drone jamming systems, both sides have

increasingly leaned towards AI and autonomous drones which are capable of executing strikes independent of any human operator and are much less susceptible to EW interference.[15] The recent introduction of fibre-optic wire guided drones by Russia has added another dimension to this contest. In December 2024, Ukraine claimed to have successfully conducted the world's first ever all-unmanned system military operation, successfully eliminating Russian positions, using only unmanned ground vehicles (UGVs) and FPV drones - an achievement which decidedly foretells the contours of future conflicts.[16]

'Air-Surface Littoral' - A New Domain of War Emerges

The fact that small armed drones have carved out a narrow strip of air above the battlefield, be it land or sea, as a distinct operational arena existing between the forces operating on ground/ sea and the high-end fighter aircraft operating at high altitudes is reinforced by the developments witnessed in the Russia-Ukraine war. Grieco and Bremer, in their prophetic 2021 Paper 'The Air Littoral: Another Look'[17], clearly highlight that there is now an obvious distinction and 'decoupling' between the blue skies and the narrow low-altitude region over the battlefield where these drones are operating.[18]

This region was first christened the 'Air Littoral' by Grieco and Bremer who defined it 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".[19] They scaled the Air Littoral as 'generally' the airspace lying below 10000 feet. This definition comes from an Air Force perspective and Grieco and Bremer put the onus on the Air Force to vie for authority over operations in this new domain. Giffen highlights that the US Army uses the term 'Air-Ground Littoral' for this domain and places its ceiling to be lower at around 5000 feet.[20] Giffen, while acknowledging that this is a 'joint problem (as) it exists on a seam between force component regions of responsibility', puts the onus of leading operations in this domain on the Army as it 'affects the land domain most acutely'.

The term 'Air-Surface Littoral' is however, a more apt description for this domain as it acknowledges that the domain straddles land, sea and air and that the drones and systems operating in this domain may not necessarily only be airborne but could also be terrestrial or maritime. While the current Russia-Ukraine war experience suggests

that 5000 feet is a fairly accurate ceiling for the Air-Surface Littoral, in future, as more potent unmanned systems populate the skies, this ceiling may need a revision itself. The Air-Surface Littoral would become increasingly congested and contested in future wars, possibly becoming the principal domain of conflict itself, as the side which controls it would in-turn control the TBA. The responsibility, thus, to exercise operational control over it cannot be vested with the Army, Air Force or the Navy which would already be preoccupied with operations in their respective domains. The solution lies in taking the radical (and inevitable) step of creation of a dedicated force for this domain, as already done by Ukraine which established its Unmanned Systems Force (USF) in June 2024.[21] The Russians also followed suit by establishing their own Unmanned System Forces in 2024, having realized the inescapable requirement of this entity on the modern battlefield.[22] The emergence of this new critical domain of war has not been lost on the Chinese PLA as well which is increasingly discussing the importance of 'low-altitude control' in order to extend 'the initiative of land warfare'.[23]

The emergence of the Air-Surface Littoral as 'key-terrain' for military operations and the evolved character of war necessitates a comprehensive organisational introspection which stretches from our military doctrines down to the infantry rifle section training precis and spans all facets from organisational structures to projected capital procurement projects.

Adapting to the Change

The Indian Armed Forces Joint Doctrine needs to define the domains in which our forces would be required to fight tomorrow, including the Air-Surface Littoral. It needs to establish the interplay between these domains and how the services are expected to inter-mesh to execute Multi Domain Operations in the next war. There is a need to review our fundamentals such as the Principles of War like concentration of force, surprise and security which are directly affected by the advent of drone warfare in the Air-Surface Littoral. This new domain has also put to question a plethora of important operational percepts which each of the services would need to reexamine and redefine.

Grieco and Bremer point out that the Air Force needs to review its concepts of Air Control and Air Superiority itself and undertake a 'significant revision in US Air Force

thinking and operations' or risk losing air control of the Air-Surface Littoral to the enemy.[24] The Russia-Ukraine war has amply demonstrated that these concepts have indeed lost their conventional relevance and the Indian Air Force (IAF) too needs to review them. Air operations such as Counter Surface Force Operations (CSFO) and Close Air Support (CAS) will also need to be reviewed as these roles are increasingly executed by drones. There is also merit in studying the concept of 'Tactical Air Control',[25] under discussion in the US military circles, which would allow for a deconfliction of control between the blue skies and the Air-Surface Littoral.

On similar lines, the Navy may also need to review its definitions of Sea Control and Sea Denial. The successful use of long-range kamikaze drone boats by Ukraine against Russia's Black Sea Fleet at Sevastopol has altered naval warfare forever. Since similar maritime dynamics also exist with India's shared coastline with Pakistan, Indian Navy's offensive options and a revised threat assessment of India's naval bases is warranted. Unmanned Service Vessels (USVs) are already scouring the oceans and in the future, we will likely see dual-domain drones which can fly and subsequently land to move on land or over the surface of water or vice versa, thereby considerably enhancing their operational ranges. Such advancements, rapidly improving power management solutions and AI infusion will soon bring even the high seas under a more active ambit of the Air-Surface Littoral and this too requires that a long hard look be given today to what shape maritime operations will take 5-10-15 years down the line.

The Army is the most affected by the current evolution of the battlefield, as Grieco and Bremer put it - "For ground forces, the close battle now includes not only the area immediately in front of ground troops, but also the area immediately above them".[26] The Army too needs to undertake an immediate bone-deep review of all its operational concepts pertaining to all operations of war, as also the employment of various arms under the changed paradigm. Drills and tactics pertaining to employment of mechanised forces and artillery in the high threat Air-Surface Littoral need to be taken back to the drawing board. There is an urgent need of re-structuring the field formations to integrate drone companies and teams down to unit level as has been implemented by Ukraine wherein 'almost every fighting brigade has an assault drone company, while most units have small reconnaissance drones'.[27] Creation of special drone units such as the Ukrainian 'Typhoon' and 'Achilles' battalions which may be deployed as Corps assets in our context, also deserves serious consideration.[28]

All tactical and sub-tactical drills need a review as evident from the decimation of North Korean troops on the Kursk front in December 2024 by Ukrainian FPV drones when caught advancing in classical assault lines in the open.[29] Training on use of FPV drones for attacking targets is being undertaken in earnest by the PLA and we cannot afford to lag behind in this field as well.[30] The innumerable instances of soldiers committing suicide when hunted by drones or surrendering to them during the ongoing Russia-Ukraine war highlights the psychological angle of operating in the Air-Surface Littoral.[31] This vital aspect too needs urgent address in the form of conditioning of soldiers through awareness campaigns and response training regimens, to prepare them to operate under the psychological stress of a battlefield abuzz with small hunter-killer drones.

The US Army cancelled its manned Future Attack Reconnaissance Aircraft (FARA) project in its 2025 budget, against severe criticism and despite having already invested $2.4 billion on it in the past few years.[32] The US Army Chief of Staff justified the Army's decision - "We are learning from the battlefield, especially Ukraine, that aerial reconnaissance has fundamentally changed" and announced that it would instead divert the funding to 'increase investment in its Future Tactical Unmanned Aircraft System (FTUAS) program, its Launched Effects effort, and its commercial small Unmanned Aerial Systems (UAS) efforts' in order to speed up introduction of UASs into the Army.[33] There is merit to conduct of a similar review of our future planned military investments as well. The need to invest in development of modern cost-effective anti-drone systems which can be deployed en masse with field units to counter the ever-increasing menace of small killer drones over the battlefield is also an operational urgency today. Finally, the creation of a new force to contest the Air-Surface Littoral, akin to the Ukrainian USF, and fusing it with the Integrated Theater Command structure presents itself as an obvious course of action for the future.

Conclusion

Ukraine's most successful combat FPV Drone Pilot, fighting in the world's 'first drone war',[34] has the apt call sign 'Darwin'. It is drone operators like Darwin who are spearheading the modern day evolution of warfare and the contest for domination of the Air-Surface Littoral. It is this contest which will play a major role in deciding the victor and the vanquished in future wars. Nations which go to war tomorrow without

acknowledging or adequately preparing for this momentous change are doomed to suffer costly reverses.

DISCLAIMER

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