**Powered Paragliders and the Air Assault Threat to Israel**

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The Hamas attack on October 7, 2023, incorporated powered paragliders as a tactical element in an air assault on Israel, enabling terrorists to glide over the ground barrier along the border and thereby amplify the attack’s impact. Despite Israel’s air superiority, this successful air assault exposed vulnerabilities within Israel’s advanced defense systems. This article examines the threat of air assault on Israel via parachuting and gliding to assess its potential impact and evaluate Israel’s preparedness to counter it. The article argues that the Israeli Air Force had not previously recognized air assault as a substantial threat and was therefore unprepared to respond to it on October 7. To support this claim, the article explores Hamas’s development of powered paragliders as a technological reduction strategy designed to limit Israel’s ability to fully leverage its air defense systems during the attack. It then traces the evolution of fighter deployment platforms, with a focus on powered paragliders and the distinctive features that make them effective tools for air assault operations. The article proceeds to discuss the factors heightening Israel’s vulnerability to such threats, assessing the country’s current readiness and exploring the broader implications for international security. Finally, the article offers recommendations for countering the specific air assault risks posed by powered paragliders.

**Keywords**

Powered paragliders, air assault, force-building strategy, technological superiority, air defense

**Introduction**

Powered paragliders (also known as paramotors) were incorporated as a tactical element during Hamas’s incursion into Israeli territory on October 7, 2023. Despite Israel’s advanced air defense system, which is based on a network of radars and weapons systems designed to intercept a variety of threats at different ranges, several of these paragliders managed to breach the border in the early hours of the attack. They took advantage of ground assaults and heavy indirect fire on Israel, with their relatively short airtime making detection and interception challenging (Shoval, 2024; Janes, 2023). Hamas paragliders glided over the ground barrier Israel had erected along the border, bypassing it to reach targets close to northern area of the Gaza Strip (at Netiv HaAsara) and central Gaza (at Kibbutz Kfar Aza and around Kibbutz Re’im), where they participted in the massacre of 300 Israelis at the Nova Festival.

Despite being slow, noisy, and based on outdated technology, Hamas’s use of powered paragliders achieved the military objective of air assault (also known as vertical envelopment). Western military doctrines have traditionally defined air assault as the transport of friendly assault forces by rotary-wing aircraft, with the goal of directly engaging and destroying enemy forces (e.g., CJCS, 2021, p.9; Government of Canada, 2016; UK Ministry of Defence, 2020). While the IDF does not differentiate between the terms, most modern militaries distinguish between air assault, which primarily relies on the firepower, mobility, and transport capacity of helicopters, and airborne assault, which involves assault forces parachuting from transport planes into the battlefield (CJCS, 2021, p.10). However, Hamas’s coordinated, large-scale air assault challenges the prevailing assumption that technological advancement - particularly in connectivity, automation, and cyber capabilities - is necessary for battlefield superiority (e.g. Gat, 2023; Lewis, 2022). Operatives from Hamas’s military wing demonstrated that an effective air assault can be carried out without helicopters, using powered paragliders as a far more affordable, simple, and accessible substitute.

As the threat of powered paragliders has been relatively uncommon and unfamiliar to most countries until now, its potentially wide-ranging impact on future battlefields has not been sufficiently researched. However, Hamas’s powered paraglider assault serves as a warning for what may lie ahead. Contributing factors include the global attention garnered by Hamas’s attack, which has inspired Israel’s adversaries worldwide, as well as the rapid learning capabilities of non-state organizations and the realization that this is a civilian technology that is easy to conceal, as will be discussed further below (Mann, 2023).

In the wake of Hamas’s air assault on October 7, this article examines the threat posed by powered paragliders, aiming to assess the level of risk they present to Israel and whether Israel is prepared to address it. The article bridges current knowledge gaps regarding powered paragliders and their use in assault operations, offering fresh insights to advance the discourse on the role of technology in asymmetric warfare and to stimulate discussion on defense strategies to counter such threats. The article’s central argument is that the Israeli Air Force, despite its multi-layered defense system, did not consider air assault as a significant threat and was therefore unprepared to respond on October 7. This argument is supported by an analysis of the evolution of air assault as a military tactic, along with insights from Israel’s accumulated experiences from the 1980s to the October 7 attack. Together, these lay the groundwork for a broader discussion on the current implications of this threat, both for Israel and for international security. For the first time, lessons from the events of October 7 enable an *a posteriori* discussion of powered paragliders on the modern battlefield. Thus, this article’s primary contribution lies in examining a phenomenon that has been scarcely studied as an academic field, particularly within security studies and in the contexts of military force-building, reductive technologies, and combat strategies. Practitioners will find this article a comprehensive resource on the subject, addressing both conceptual and operational gaps and outlining possible approaches for addressing this threat.

Accordingly, the second section of the article outlines the theoretical framework, explaining Hamas’s strategic choice to develop powered paragliders for air assault as an advanced example of offensive technological reduction in military force-building. The third section traces the progression of platforms for deploying fighters in air assault operations, with a focus on powered paragliders and the key features that make them a lethal and efficient reductive technology. The fourth section examines how this threat has evolved within Israel’s strategic landscape, analyzing Hamas’s efforts to develop air capabilities using powered paragliders. Building on this, the fifth section explores the territorial, geographic, and topographic factors that make Israel particularly vulnerable to air assault threats involving gliding and parachuting. Next, the degree of threat to Israel is evaluated in two stages, analyzing the strategic impact Hamas sought to achieve on October 7 through the deployment of powered paragliders. This analysis is juxtaposed with the IDF’s current air defense strategy and the Air Force’s operational capability to counter this threat. Finally, a discussion on Israel’s preparedness and the broader implications for international security is presented, concluding with recommendations for addressing the air assault threat posed by parachuting.

**Theoretical Framework: From the Democratization of Terror to Technological Reduction in Military Force-Building**

With the development and widespread availability of advanced technologies over the past three decades, most terrorist attacks on Western nations have relied on basic weapons such as knives, cars, and firearms (Bergema & Kearney, 2020). This choice is largely pragmatic, driven by the availability, effectiveness, and resistance to regulation of these tools. The use of simple, low-cost technologies in terrorism escalated with 21st-century advancements in technology and globalization, resulting in what Fareed Zakaria (2003) describes as the democratization of terror. This democratization is marked by easy access to information, a lowered entry barrier for adopting technology, advances in mass communication and encryption, and the ability to transform everyday objects into lethal weapons (Neumann, 2009).

Today, the core body of research on technology and terrorism focuses on a range of advanced technological applications that terrorist organizations employ in asymmetric conflict, such as drones for attack and intelligence purposes or the use of precision weaponry (e.g., Brown, 2023; Johnson, 2009; von Rosenbach, 2021). An emerging branch within this body of research examines the technological aspect of terrorist organizations’ evolution and how they develop adaptive strategies that alter the dynamics between the weaker and stronger sides in modern conflicts. For example, Dominic Johnson argues that for any competing entity, an adaptive process occurs based on the principles of natural selection, where effective adjustments to strategies and technologies provide a competitive advantage (Johnson, 2009). According to Johnson, in armed conflicts, the advantage of the stronger side can diminish when the weaker side has a wide and diverse capacity for innovation and is pressured to adapt quickly to shift the balance. Andrew Brown further illustrates how asymmetric conflicts encourage the weaker side to adopt strategies incorporating dual-use technologies, which increase their autonomy by minimizing interactions with the adversary that could lead to interference or disruption (Brown, 2023, p. 209).

Complementing these concepts is the theory of technological reduction in force-building, which draws on principles from the democratization of terror but focuses specifically on the strategic dimension of organized military force-building by the weaker side in a conflict. This theory introduces a strategic approach at the early stages of force development, explaining how a strategy takes shape to maximize available technologies under conditions of inferiority. It illustrates how, in a setting of technological asymmetry, a combatant with limited technological sophistication facing a highly advanced adversary will adopt a sly, simple, and low-cost strategy to counter or offset the opponent’s reliance on advanced technology (Matanya & Sari Levy, 2021). The theory provides a framework for understanding the evolution of the threat in the Israeli context and the factors that led Hamas to establish an air assault capability. Within this framework, Hamas’s strategy involving the use of powered paragliders can be seen as an advanced example of offensive technological reduction in military force-building, where Hamas’s inferior technological sophistication drove it to maximize low-tech solutions, specifically ones that would challenge Israel’s air defense systems and limit their advantage during the assault.

**Air Assault**

The concept of air assault first emerged as a tactical solution to break the deadlock of trench warfare that characterized World War I. Its objective was to bypass enemy defensive lines and land behind them, initially leading to the development of military parachuting and gliding, and later to the evolution of helicopter-based assault capabilities (Dougherty, 1999). World War II saw the first significant and large-scale use of combat parachuting for assault purposes, initially by the Soviet Union and subsequently by Germany (e.g. the invasion of Crete in May of 1941), and then by the Allies (e.g. the Normandy invasion in June of 1944) (Theotokis, 2020; Weeks, 2013). Even after the war, militaries worldwide continued to use this capability, most notably the Americans, in the Korean and Vietnam Wars and in the invasions of Grenada, Panama, Afghanistan, and Iraq (Theotokis, 2020).

Unlike parachuting, where soldiers are dispersed over a large area and must regroup after landing, gliders can land with greater precision and carry several soldiers, allowing the force to be assembled and combat-ready immediately upon landing (U.S. Marine Corps, 1996, pp. 20-3, 20-5). The first glider-borne assault was conducted during World War II by the Germans, who had developed military gliding capabilities between the wars, as the Treaty of Versailles restricted them from producing aircraft for military use [Oglethorpe, 2010; Treaty of Versailles, 1919 (Articles 198-202); Yekutiel, 1985]. German gliders were towed by transport aircraft to the desired altitude and then released to silently glide toward their target. North Korea has recently been observed developing glider capabilities, conducting military exercises likely intended as preparation for a potential invasion of South Korea (U.S. Department of the Army, 2020). While parachuting remains a widely used tactical method among state militaries, gliders have largely been phased out, despite their unique advantages, particularly with the rise of helicopter assault technology (Torrisi, 2000).

Lessons from World War II and the recognition of the need to develop and refine air assault capabilities led the U.S. Navy, particularly the Marine Corps, to establish new assault methodologies using helicopters. Over time, these became a primary assault platform and the prevailing method for conducting assaults in the U.S. military and other armed forces (Dougherty, 1999; Shurkin, 2014; Theotokis, 2020). This shift was intentional, and driven by clear advantages: helicopters offer robust transport capabilities (for soldiers, artillery, and weaponry), firepower, and exceptional mobility, with the ability to land vertically to swiftly secure strategic points (Durand et al., 2012). These strengths embody the principles of force concentration, surprise, and combat efficiency, fully aligning with the core objectives of air assault (Tovi, 2017, p. 41).[[2]](#footnote-2)

Powered paragliders were invented in the 1960s in Canada and France by engineers and amateur parachutists and have since undergone advancements (Laver & Mei-Dan, 2013). Unlike traditional parachutes, which are designed primarily to slow a parachutist’s descent, paragliders allow for more precise maneuvering and landing. Built with a wing-shaped nylon canopy that inflates with airflow, they offer quiet flight and a low radar signature. Additionally, they are simple to operate, requiring only about one to two weeks of training to achieve proficiency (Krytskyi et al., 2023; Steele, 2021). Powered paragliders include a suspended load, or “gondola,” which is the frame connecting the canopy to the control mechanism, and are piloted using air currents or a small engine connected to a propeller (Babinsky, 1999). These paragliders are highly compact, lightweight, capable of carrying significant loads, and can achieve rapid takeoff without infrastructure by facing into the wind, jumping, or being towed by a vehicle (USHPA, n.d.). The powered paragliders used by Hamas terrorists included both single- and two-seater models, the latter comprising a pilot and a gunner who used simple equipment such as mobile phones for communication and navigation, as well as grenade drops and light firearms. Due to the simplicity of the equipment and technology, the cost of a powered paraglider ranges from $1,500 to $5,000, depending on configuration, engine type, material quality, and performance capabilities.[[3]](#footnote-3) These characteristics make powered paragliders effective for both military and civilian applications, such as aerial chemical spraying, low-speed and low-altitude photography, and serving as relay stations for radio communication (Goodrick et al., 1973).

Military forces around the world have recognized the potential of paragliders, which are currently used primarily by special forces units, including those in the IDF (Keinar, 2013). Traditionally, paragliders have been deployed in covert commando operations, launched from planes or helicopters (Weeks, 1978). In recent years, however, there has been a notable shift towards using powered paragliders as a low-cost alternative for border defense or as a means of deploying large raiding forces in countries that cannot sustain a large air fleet (Yonhap, 2017). Western militaries are also investing in this capability, working to develop advanced powered paraglider models with expanded functionality. In the United States, for instance, the Army is advancing a personal air mobility system aimed at supporting small assault units in complex, densely populated areas, thereby freeing helicopters for other essential missions (Marines, 2024; Trevithick, 2024). Additionally, in preparation for high-intensity conflict, U.S. Special Forces recently conducted an exercise simulating the use of powered paragliders to detect and neutralize swarms of drones (Altman & Trevithick, 2024).

**The Threat of Parachuting and Gliding by Terrorist Organizations against Israel**

Israel has a long history of dealing with the threat posed by parachuting and gliding infiltrations, with unique factors that make it particularly vulnerable to these types of attacks. In April 1981, for example, there was an unsuccessful infiltration attempt from southern Lebanon using a hot air balloon (Tovi, 2019, p. 356, footnote no. 107). Three years later, a Palestinian terrorist from Lebanon entered Israel using a glider and surrendered himself. In 1987, two terrorists crossed from Lebanon using gliders, with one attacking a military base and killing six IDF soldiers in what became known as the “Night of the Gliders” (Vilnai, 1987). Two decades later, during Operation Defensive Shield (2002), paragliders intended for an attack were discovered in the city of Hebron (Globes, 2002). During Operation Protective Edge (2014), a Hamas operative from the Izz al-Din al-Qassam Brigades was arrested in Gaza and revealed that he had joined a covert unit of around ten operatives who trained in paragliding in Malaysia and Gaza (Leong, 2023; The Meir Amit Intelligence and Terrorism Information Center, 2015). These parachuting systems were likely smuggled into the Gaza Strip from Egypt, possibly with Iranian involvement (Sela, 2023; Smyth, 2023).

Over time, a series of events prompted Hamas to concentrate on developing air assault capabilities that could exploit vulnerabilities in Israel’s defense system. Operation Northern Shield (2018) along the Lebanese border, during which the IDF destroyed Hezbollah tunnels, the construction of a ground and underground barrier around Gaza (Roff, 2023), and the IDF’s significant disruption of Hamas’s naval capabilities (Zeitoun, 2021) all underscored the strategic value of powered paragliders for Hamas as part of the Izz al-Din al-Qassam Brigades’ aerial attack strategy. The October 7 attack demonstrated that this capability had been extensively developed and integrated into Hamas’s structured approach to building its air force. A formal document from Hamas outlining its vision for an air force revealed plans to promote powered paragliding as a civilian sport, which would allow for military experimentation and training under a civilian guise, effectively pushing the enemy to accept their operational use (Weinthal, 2024). Accordingly, Hamas worked to establish a civilian paragliding sector to train its operatives for quiet infiltration into Israeli territory. The civilian cover for this activity served to reduce experimentation costs and allowed access to civilian parachuting and gliding clubs, which provided valuable skills and knowledge in these methods.

**What Makes Israel Particularly Vulnerable to the Threat of Parachuting and Gliding?**

For decades, terrorist organizations have persisted in their attempts to carry out a high-impact air assault against Israel. The motivation to develop assault capabilities using these relatively simple means stems, among other factors, from the combination of territorial control and the unique geographic and topographic features along Israel’s borders.

Israel faces a lack of territorial depth, leaving its entire sovereign area under constant threat. Numerous strategic assets, including civilian infrastructure and military bases, are situated close to vulnerable border regions - along the Gaza border, near Lebanon, and in the West Bank area - where the proximity of Arab communities to Israeli towns provides fertile ground for terrorist activity (Sadeh, 2023).

Topographically, southern Lebanon is characterized by steep mountains, deep river valleys, dense vegetation, and civilian road infrastructure connecting villages. Hezbollah has taken advantage of this challenging terrain to establish a network of hidden military infrastructure in areas that are difficult to detect by radar or where it identifies gaps in IDF force deployment and intelligence coverage (Shapira & Beeri, 2024). Likewise, the West Bank is a mountainous region (rising at least 1,000 meters above sea level) that overlooks critical areas in central Israel and includes numerous fence-adjacent communities. Combined with the knowledge sharing and collaboration between terrorist-supporting states and terrorist organizations operating in Israel’s strategic environment, these factors have the potential to intensify the threat (Gilat, 2024; Jaspersen & Montibeller, 2020; Kettle & Mumford, 2017; Ortal & Peleg, 2019). Indeed, for a significant period following the October 7 attack, the fear of hostile paraglider incursions led to numerous reports to security forces, disrupting daily life for tens of thousands of residents across the Sharon region and northern Israel due to concerns over potential hostile paraglider operations (Abramzon, 2024; Ynet, 2023).

**The Threat Level of Powered Paragliders to Israel**

In light of the aspects reviewed thus far, the potential for individuals, organizations, and semi-military groups engaged in promoting terrorism to make extensive use of paragliders in the future remains very real. The impact of this threat can now be measured against Israel’s defense capabilities as they stood on the eve of October 7. Up until then, the IDF’s defense strategy was based on four key components (Halevi, 2020): (a) intelligence capabilities to provide early warning of enemy intent to carry out a large-scale operation; (b) a ground barrier designed not only to delay or prevent enemy incursions but also to assist in detecting any approach to Israeli territory, both above and below ground; (c) precise interception and attack capabilities; and (d) technological superiority enabling the implementation of these components. However, on the morning of the attack, there was no specific warning of Hamas’s intentions. The barrier failed to detect or delay Hamas assault forces, and despite its technological inferiority, Hamas successfully leveraged inexpensive, low-tech solutions to conduct complex, multi-dimensional operations that offset the IDF’s technological advantage. In this scenario, the Israeli Air Force found itself without the ability to intercept or strike Hamas forces effectively.

Assessing the potential use of paragliders presents a challenge in evaluating enemy capabilities, as they have dual-use applications in both civilian and military contexts. Therefore, the mere presence of paragliders not only fails to indicate an operational military capability but also creates a reality where the civilian sphere can be exploited for military gains, making paragliders less conspicuous and increasing the difficulty of intercepting them.

Regarding intelligence warnings based on enemy movements indicating paraglider use before takeoff - powered paragliders generally have a minimal logistical footprint. The deployment time from command to execution is extremely short, as they require almost no preparation. There is no need to store these units at a central base, as operatives can keep the system at home or even in their car, eliminating the need to move them to the frontline. If deployment is necessary, the system can be concealed and transported in any vehicle, making it challenging to identify preparations for a paraglider-based operation.

As for detection during flight - paragliders have a low radar cross section, making them difficult to detect via radar, which is the primary tool in aerial detection systems. Additionally, since communication between the parachutist or the vehicle and a ground station is unnecessary, signal intelligence is unlikely to detect them.

Indeed, in the documented cases of paraglider operations mentioned above, reports often came from civilians who spotted them or from ground observation units, rather than from the aerial detection system. Moreover, the low cost of paragliders enables the easy deployment of multiple decoys for deception or distraction, as well as explosive-laden units in large numbers, which further strain detection and interception systems. In addition, paragliders (like drones) operate close to the ground, at the boundary of responsibility between the Air Force and the ground forces, allowing terrorist organizations and militant groups to exploit this gap and the Air Force’s focus on strategic fire threats (Heller & Shelah, 2023).

Israel’s technological superiority led to the perception that certain actions, including air assault operations, were beyond the enemy’s capability due to their technological inferiority. Lessons from past events and developments in aerial threats in recent decades seem to have led to the dismissal of paragliders as a minor, sporadic phenomenon. Under this perception, airborne assault operations (involving planes, helicopters, or parachuting) aimed at deploying large numbers of fighters beyond enemy barriers require aerial platforms that are inherently expensive as well as ground infrastructure and maintenance systems, making this capability typically available only to organized militaries of resource-rich nations. However, the addition of a propulsion system to paragliders, enabling them to take off without ground infrastructure and travel long distances without high-altitude drops, transformed them into a low-cost alternative to traditional air mobility platforms. This adaptation provides a capability for large-scale assault or covert infiltration, allowing special forces to be deployed deep within enemy territory.

**Discussion and Conclusions: Is the IDF Prepared to Counter the Threat of an Air Assault Raid?**

Faced with constraints in building conventional air capabilities, Hamas has used powered paragliders to establish the airspace as an additional combat domain. This approach aligns with modern theories on the agility and adaptability of terrorist organizations and their ability to innovate under pressure. By leveraging the unique advantages of paragliders, Hamas has transformed them into autonomous, lethal combat systems that, much like helicopters, add strategic value to air assault operations while adhering to key principles essential for success: force concentration, surprise, and combat effectiveness.

The characteristics of the democratization of terror and Hamas’s demonstration of air power capabilities using low-tech solutions have turned the threat of powered paragliders into a new challenge for nations worldwide, as the threat of air assault by terrorist organizations is not unique to Israel alone. Other countries with limited territorial depth that need to protect border-adjacent communities or strategic assets near their borders are also vulnerable. The widespread availability of knowledge, the exchange of tactics between terror-supporting states and terrorist organizations, as well as the “civilianization” of paragliders, make them a potentially lethal tool for undermining national security across a range of scenarios, quickly elevating them from a secondary to a primary threat. Such scenarios could include seizing or damaging strategic assets such as nuclear facilities, sensitive military bases, government institutions, and large-scale attacks in civilian areas, which would severely impact national sovereignty and could constitute a *casus belli*. Currently, in the case of Pyongyang and Seoul, the threat of air assault using parachuting and gliding is a very real concern (Eun-jung, 2023; The Korean Times, 2024). Moreover, in recent years, North Korea has developed a combat strategy involving air assaults on South Korea using powered paragliders, has conducted training for such scenarios, and has even supported Hamas with weapons procurement and tactical guidance for these operations (U.S. Department of the Army, 2020).

The October 7 attack revealed that relying solely on advanced technology for aerial defense is insufficient for intercepting low-tech threats such as paragliders, particularly in the absence of additional backup systems that provide redundancy also under extreme conditions. The challenge is to create conditions that allow for effective responses across a variety of scenarios at any given moment. Currently, Israel’s primary airspace defense strategy relies on a multi-layered system designed to intercept targets using missiles and planes (Ministry of Defense, 2024). However, due to the detection difficulties and unique flight characteristics of paragliders, it appears this defense system is inadequately prepared to counter the threat of an air assault raid. In fact, in previous isolated incidents requiring a response, attack helicopters were often scrambled to intercept parachutists.

This occurred for example, over the skies of Karmiel in November 2018 and near Zikhron Ya’akov in September 2019 (Kubovich, 2019; Maariv Online, 2018).[[4]](#footnote-4) On October 7, however, the IDF’s combat helicopters were occupied with other missions and did not intercept the threat, as the Air Force had reduced its fleet of attack helicopters over the years (Kan News, 2023). This was compounded by the ability of paragliders to take off without infrastructure and be covertly advanced to the front lines, enabling rapid deployment - often too swift for detection and interception systems to respond effectively, especially if those systems are engaged in other operations.

The IDF Ground Forces already possess optical equipment capable of detecting paraglider infiltrations (Cohen & Spiegel, 2015). However, this equipment is primarily intended for ground rather than aerial border defense. When it comes to intercepting paragliders, the ground forces lack suitable tools, especially for large-scale interception (Winter, 2022). The limited systems they do have are mainly designed to counter a relatively small number of drones, with their primary role centered on force protection rather than on intercepting aerial threats (Cohen, 2023). These gaps stem from a force-building approach that divides responsibilities between the Air Force, which is tasked with defending the nation’s airspace - including low-altitude zones - and the ground forces, responsible for land defense (Ein-Dar, 2020; Finkel, 2022). Thus, while the IDF and Air Force appear prepared to counter a limited manned aerial infiltration by a terrorist organization or a large-scale assault involving drones, missiles, and rockets, as demonstrated in the events of April 14, 2024,[[5]](#footnote-5) they are less equipped to handle a large-scale air assault raid by terrorists or semi-military groups.

In conclusion, while powered paragliders do present a potential threat, countering it does not require the IDF to implement major changes or develop new advanced technologies. The first crucial step is to acknowledge the reality of this threat and its potential to escalate into a strategic risk - not only in extreme scenarios such as the events of October 7 - a lesson that might otherwise be missed. Second, a reassessment, and if necessary, adjustments in Israel’s border defense strategy should be undertaken, particularly in defining responsibilities between the ground and air forces. This includes bolstering detection and interception capabilities and increasing the autonomy of the ground forces, as suggested by Assaf Heller and Ofer Shelah (2023). Existing optical detection technologies, including artificial intelligence for automatic and autonomous recognition, are already in use along borders and just need to be directed toward aerial threats as well. Additionally, a simple, low-cost acoustic detection network could be set up using smartphones mounted along the border barrier or on ground platforms in the area, similar to Ukraine’s approach for identifying drones and cruise missiles (Barnes, 2024). The anticipated deployment of laser interception technology should provide a low-cost solution for simultaneously intercepting multiple targets, including paragliders (INSS Israel, 2023). In the meantime, until laser technology is fully developed and operational, a mobile cannon system - already been proven effective against multiple low-altitude targets - could be reinstated (Phocas & Mitchell, 2024).

**Hebrew References**

Abramzon, A. (2024, June 22). After the scare: The Civil Aviation Authority to further restrict and enforce regulations on paraglider operators in the Sharon region. *Israel Hayom*. <https://tinyurl.com/mrpyyzbb>

Cohen, G., & Spiegel, N. (2015, October 25). An Israeli Arab crossed into Syria via parachute, likely to join the fighting there. *Haaretz*. <https://tinyurl.com/mb735hry>

Cohen, S. (2023, December 5). With a smart targeting system for moving targets, the IDF is trying to counter Hamas drones. *TheMarker*. <https://tinyurl.com/yx35xs5z>

Ein-Dar, A. (2020). Air superiority: control of the skies - A vital necessity for a winning army. *Bein Haktavim, 28–30*, 43–60. <https://tinyurl.com/3ckx5v3t>

Finkel, M. (2022). *Air Force Headquarters*. Ministry of Defense.

Gat, A. (2023). *The future of battle and the land battlefield*. Special publication,Institute for National Security Studies. <https://tinyurl.com/379jru9j>

Gilat, A. (2024). Victory in the learning race will lead to victory in battle. *Maarachot, 501*, 4–9. <https://tinyurl.com/mwsj79r>

Globes (2002, June 30). *The IDF discovered two paragliders in Hebron; Palestinian fugitives were hiding in ambulances*. <https://tinyurl.com/2d2k5vht>

Halevi, H. (2020). Multi-dimensional defense. *Bein Haktavim, 30–28*, 254–241. <https://tinyurl.com/nsyh6tvy>

Heller, A., & Shelah, O. (2023). Land-based air operations: The solution for optimal integration of aerial assets in ground combat. *Strategic Update, 26(2)*, 21–34. <https://tinyurl.com/3n9vczdu>

INSS Israel. (2023, May 24). *Podcastrategy 247: Regional Detente | Laser Beam in Service of the IDF* [Video]. YouTube. <https://tinyurl.com/4vemkb5w>

Kan News – Israeli Public Broadcasting Corporation (2023, December 21). *Where were the attack helicopters on October 7?* [Video]. YouTube. <https://tinyurl.com/3bt8839t>

Keinar, N. (2013, March 3). *How do you learn to jump from 20,000 feet?* Mako. <https://tinyurl.com/bdzdtajv>

Kubovich, Y. (2019, September 24). The Air Force fights paragliders: Scrambles attack helicopters to a civilian gliding site. *Haaretz*. <https://tinyurl.com/b7ek5zdj>

Maariv Online (2018, November 17). *IDF Spokesperson: “Attack helicopters were scrambled after five unidentified paragliders.”* <https://tinyurl.com/yckcjcen>

Matanya, A., & Sari-Levy, A. (2021). With Sling and Stone: A Strategy of Technological Reduction. Strategic Update, 24(2), 3­–15. https://tinyurl.com/y55vmk3n

Meir Amit Intelligence and Terrorism Information Center (2015, May 6). *Hamas Activity in Malaysia: The military wing of Hamas recruits students from Judea and Samaria studying in Malaysia. Prior to Operation Protective Edge, military operatives from Gaza were sent to Malaysia for paraglider training in preparation for an attack in Israel.* <https://tinyurl.com/4j52k57r>

Ministry of Defense (n.d.). *Multi-layered defense*. <https://tinyurl.com/mr35ntje>

Ortal, A., & Peleg, D. (2016). “From Small Beginnings Come Great Things” - Missed opportunities in the General Staff: The tunnel threat and underground domain as a case study. *Bein Haktavim, 22–23*, 33–61. <https://tinyurl.com/55rtv8ex>

Roff, N. (2023, January 25). *One year since the completion of the Gaza barrier: A status report*. IDF website. <https://tinyurl.com/mrevk3pk>

Sadeh, Y. (2023, August 30). Details revealed: The national priority map will expand to cover 53% of the population. *Calcalist*. <https://tinyurl.com/4n7vbchx>

Sela, A. (2023, November 12). How did Hamas manage to smuggle so much weaponry into Gaza, and who failed to prevent it? *Haaretz*. <https://tinyurl.com/36ntw24j>

Shoval, L. (2024, January 26). Defense officials estimate: Hamas has only a few hundred rockets left. *Israel Hayom*. <https://tinyurl.com/2h2abfwt>

Tovi, T. (2017). Vertical flanking as a military revolution. *Maarachot, 474–475*, 36–43. <https://tinyurl.com/bdhf5swm>

Tovi, T. (2019). “A nasty perfume, as long as it gets the job done” ­- Shaping the defense strategy on Israel’s eastern border: 1967–1968. *Yesodot, 1,* 327–357.

Vilnai, M. (1987). *Summary of the investigation* *of the Night of the Gliders*. IDF Archive, File 205/1113/1991.

Winter, G. (2022). Will tactical anti-aircraft defense make a comeback? The recurring need for ground forces air defense. *Bein Haktavim, 37*, 1–8. <https://tinyurl.com/2s4bcfp5>

Yekutiel, Z. (1985, December 21). *Ibn-Amal: The vertical flanking maneuver that marked a strategic turning point.* Maarachot*.* <https://tinyurl.com/3s6825da>

Ynet. (2023, October 11). *Sirens in the Carmel, fears of terrorist infiltration in the Upper Galilee*. <https://tinyurl.com/2cccjx35>

Zeitun, Y. (2021, May 16). *The IDF destroyed Hamas’s autonomous explosive submarines*. <https://tinyurl.com/bdezr8h8>

**English References**

Altman, H., & Trevithick, J. (2024, May 8). *Marine special operations paragliding capabilities emerge at demonstration in Tampa*. The Warzone. <https://tinyurl.com/ysh88mdb>

Babinsky, H. (1999). The aerodynamic performance of paragliders. *The Aeronautical Journal*, *103*(1027), 421-428.

Barnes, J. (2024, March 26). How Ukraine is using mobile phones on 6ft poles to stop drones. *The Telegraph*. <https://tinyurl.com/3p5deewt>

Bergema, R., & Kearney, O. (2020). *Rise O Muwahhid, wherever you may be: An analysis of the democratization of the terrorist threat in the west*. ICCT.<https://tinyurl.com/3s3y8ew8>

Brown, A. (2023). Terror, tech, and transformation: Will emerging technologies revolutionize terrorism? *Comparative Strategy*, *42*(2), 308-320. <https://doi.org/10.1080/01495933.2023.2182113>

CJCS – The Chairman of the Joint Chiefs of Staff (2021). *Dictionary of military and associated terms*. <https://tinyurl.com/yn55nk57>

Dougherty, K.J. (1999). The evolution of air assault. *Joint Force Quarterly*, 22, 51-58. <https://tinyurl.com/2tkwaarf>

Durand, E., Michel, B., & Tenenbaum, É. (2012). *Helicopter warfare: The future of airmobility and rotary wing combat*. Institute Français des Relations Internationales (IFRI). <https://tinyurl.com/3t6th5v8>

Eun-jung, K. (2023, October 17). *N. Korea appears to be linked to Hamas in arms trade, other military areas: JCS*. Yonhap News Agency. <https://tinyurl.com/f2k72uan>

Goodrick, T., Murphy, JR, A., & Pearson, A. (1973). *Analysis of various automatic homing techniques for gliding airdrop systems with comparative performance in adverse winds*. In 4th Aerodynamic Deceleration Systems Conference (p. 462). DOI <https://doi.org/10.2514/6.1973-462>

Government of Canada (2016). *Chapter 3: Air Attack (B-GA-403-000/FP-001, Canadian Forces Aerospace Shape Doctrine*). <https://tinyurl.com/yvk7kc9p>

Jaspersen, J.G., & Montibeller, G. (2020). On the learning patterns and adaptive behavior of terrorist organizations. *European Journal of Operational Research*, *282*(1), 221-234. <https://doi.org/10.1016/j.ejor.2019.09.011>

Jennings, G. (2023, October 9). *Hamas uses paragliders to breach Israeli border*. Janes. <https://tinyurl.com/ye28d2x9>

Johnson, D. (2009). Darwinian selection in asymmetric warfare: The natural advantage of insurgents and terrorists. *Journal of the Washington Academy of Sciences*, *95*(3), 89-112. <http://www.jstor.org/stable/24536315>

Kettle, L., & Mumford, A. (2017). Terrorist learning: A new analytical framework. *Studies in Conflict & Terrorism*, *40*(7), 523-538. <https://doi.org/10.1080/1057610X.2016.1237224>

Krytskyi, D., Karatanov, O., Pohudina, O., Shevel, V., Bykov, A., Pyvovar, M., & Plastun, T. (2023). Information technology for determining the flight performance of a paraglider wing. In M. Nechyporuk, V. Pavlikov, & D. Krytskyi (eds.), *Information technologies in the design of aerospace engineering*. Studies in Systems, Decision and Control, Vol. 507 (pp. 1-42). Springer. <https://doi.org/10.1007/978-3-031-43579-9_1>

Laver, L., & Mei-Dan, O. (2013). Paragliding. In O. Mei-Dan & M. Carmont (eds.), *Adventure and extreme sports injuries* (pp. 247-272). Springer. <https://doi.org/10.1007/978-1-4471-4363-5_12>

Leong, A. (2023, October 9). *Hamas' motorised hang gliders unearth previous claims that Malaysia trained their members in paragliding*. The Rakyat Post. <https://tinyurl.com/yu6ujb5e>

Lewis, J.A. (2022, April 19). *Technology and the shifting balance of power*. Center for Strategic and International Studies. <https://tinyurl.com/yt784mc8>

Mann, Y. (2023, October 31 ). *The newest cast member of antisemitic symbols: Hamas paraglider*. Ynet. <https://tinyurl.com/29w88wb9>

Marines (2024, August 12). *Powered paraglider interim policy message. MARADMINS 364/24*. <https://tinyurl.com/ybtv85hp>Neumann, P. (2009). *Old and new terrorism*. Polity Press.

Oglethorpe, J. (2010). Gliding off to war: The use of gliders as weapons in World War II. *Journal of the Royal United Services Institute*. <https://tinyurl.com/2nmpmm6h>

Phocas, B., & Mitchell, P. (2024, March 14). *The return of tactical antiaircraft artillery: Optimizing the army inventory for the era of small drone proliferation*. Modern War Institute. <https://tinyurl.com/t4ewdjke>

 Shapira, B., & Beeri, T. (2024, May 16). *Hezbollah: Methods and flight modes challenge Israel's UAV interception capabilities*. Alma. <https://tinyurl.com/5e34n6c9>

Shurkin, M. (2014, October 17). *France's war in Mali: Lessons for an expeditionary army*. Rand Corporation. <https://tinyurl.com/5rcynddw>

Smyth, P. (2023). The path to October 7: How Iran built up and managed a Palestinian 'Axis of Resistance'. *CTC-Sentinel*, *16*(11), 25-40. <https://tinyurl.com/4f7y8xje>

The Korean Times. (2024, April 30). *NIS sees possibility of N. Korean terrorist attacks involving drones, paragliders*. <https://tinyurl.com/rucukxtz>

Theotokis, N. (2020). *Airborne landing to air assault: A history of military parachuting*. Pen and Sword Military.

Torrisi, S.A. (2000). *Gliders– Rethinking the utility of these silent wings for the next millennium*. Air University. <https://tinyurl.com/36ncmp9p>

Treaty of Versailles (1919). Treaty of peace with Germany (Treaty Series No. 4), Articles 198-202. https://tinyurl.com/52nar6h5

Trevithick, J. (2024, August 20). *U.S. Army has a plan for paragliding paratroopers*. The Warzone*.* <https://tinyurl.com/4teve3km>

Trevor Steele (2021, March 1). *What is a paramotor and how do they work*? [video] YouTube. <https://tinyurl.com/mrra8ewb>

UK Ministry of Defence (2020). *Joint Doctrine Note 1/16. Air maneuver*. <https://tinyurl.com/nkmu9b8k>

US Department of the Army Headquarters (2020). *North Korean tactics. ATP 7-100.2, P.B-13*. <https://tinyurl.com/mrx8mujm>

USHPA – US Hang Gliding and Paragliding Association (n.d.). *What are hang gliding, paragliding, and speedflying*? <https://tinyurl.com/2srdfa4u>

U.S. Marine Corps. (1996). *Static line parachuting: Techniques and training* (MCWP 3-15.7, FM 57-220). <https://tinyurl.com/4zd2cbwk>

von Rosenbach, A. (2021). Fighting fear and the future of technology-enabled terrorism. *Atlantisch Perspectief*, *45*(3), 31-35. <https://www.jstor.org/stable/48638243>

Weeks, J. (1978). *Assault from the sky: The history of airborne warfare 1939–1980s*. Putnam publishing.

Weinthal, B. (2024, August 12). *Exclusive: Hamas document reveals devious paraglider terrorism attack plan.* Fox News Digital. <https://tinyurl.com/35ws7dhx>

Yonhap News Agency. (2017, October 10). *N.K. special forces conduct drills to paraglide into Combined Forces Command*. <https://tinyurl.com/3mehwuha>

Zakaria, F. (2003). *The future of freedom: Illiberal democracy at home and abroad*. W.W. Norton & Company.

1. **Ehud Langer** is a master’s student in the Security Studies program at Tel Aviv University. [↑](#footnote-ref-1)
2. For further insights into helicopters’ features and their versatility as combat platforms, see Alex Dan’s article, “Should Israel Equip Itself with Attack Helicopters?” which can be found in the current issue, p. XX. [↑](#footnote-ref-2)
3. For example, see the costs of powered paragliders in the civilian market based on purpose, materials, technology, and more: <https://tinyurl.com/48ywdw7c> [↑](#footnote-ref-3)
4. In both cases, these were criminal events, later determined to be unauthorized flights along civilian air routes, conducted without coordination and in violation of Israel’s civil aviation laws. [↑](#footnote-ref-4)
5. On the night of April 14, 2024, Iran launched an attack on Israel involving hundreds of missiles, cruise missiles, and drones. This event marks the world’s first successful interception of one of the most concentrated and rapid missile barrages in history directed at a single country. [↑](#footnote-ref-5)