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# Defending the Sky: A Historical Analysis of Israeli Drone Use, 1971-2014

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## ABSTRACT

*This article analyses the history of Unmanned Aerial Vehicle (UAV) operations by the Israel Defense Forces (IDF), illustrating the pivotal role of drones from their initial deployment in the 1970s to their sophisticated employment in irregular warfare by 2014. Such an examination allows evaluation of the effectiveness of UAV missions in a variety of scenarios and the extent to which they provide a solution to the strategic threats that Israel faces.*

## Introduction

Since the first decade of the twenty first century, numerous reports detail the offensive use of Unmanned Aerial Vehicles (UAVs), including, since October 2023, such use by the Israeli Air Force (IAF) in fighting against Hezbollah and Hamas. The use of UAVs has also occurred in other conflicts around the world, such as the war between Azerbaijan and Armenia and in the Russia-Ukraine war. However, uniqueness lies in Israel's use of UAVs for various offensive missions: support for ground forces; targeted killing operations; and striking various military targets. Before 2022, Israeli military censors prevented the Israeli media from publishing the IAF operation of UAVs in offensive missions or disclosing the type of aircraft, despite reports in various media channels around the world that attributed Israeli attacks to UAVs.<sup>1</sup>

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<sup>1</sup>Uzi Mahnaimi, 'Israeli drones destroy rocket-smuggling convoys in Sudan', *The Sunday Times*, March 29, 2009, <https://www.thetimes.co.uk/article/israeli-drones-destroy-rocket-smuggling-convoys-in-sudan-rp5sgvbp5jt>. Accessed 10 March 2024; The Economist, 'Dome Warfare', *The Economist*, November 24, 2012, <https://www.economist.com/middle-east-and-africa/2012/11/24/dome-warfare>.

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Israel's use of UAVs in offensive missions represents a continuation and development of the missions assigned to these platforms since its inception. The first documented use of unmanned aircraft by Israel was in 1971 following the lessons learned from the 1969-1970 war with Egypt.<sup>2</sup> At the end of that war, the Egyptian air defence was shooting down Israeli fighter jets and the Israeli air force sought new ways to perform intelligence, surveillance, and reconnaissance (ISR) missions without risking its pilots. Initially, Israel based the UAV array on acquisition from the United States but during the second half of the 1970s Israeli defence industries began to develop UAVs both for local military use and for export.<sup>3</sup> Over the years the Israel Defence Forces (IDF) increased the use UAVs both at the tactical and strategic levels. As mentioned, the apex of this process is the operation of UAVs in strikes.<sup>4</sup>

This article analyses the operational history and use of UAVs in the IDF, demonstrating the growing importance and operational contribution of UAVs. The chronological scope of the article is the period from the early 1970s until the operation against irregular forces in the early years of the twenty first century. This development raises a historical issue that is central to the article. Until the beginning of the second decade of the twenty first century Israel was still preparing for the scenario of another large-scale conventional war against Arab countries. However, since 1973, apart from a few days in the summer of 1982, the IDF has only fought irregular forces (Fatah, Hezbollah, Hamas, Islamic Jihad, and others).<sup>5</sup> Therefore, alongside the preparation for a conventional war, daily fighting has continued, requiring operational adjustments and especially the integration of conventional warfare weapons, including UAVs, in the fight against irregular forces. This conflict took place in a wide range of terrain and topographical conditions: from the dense urban space of the Gaza Strip and city centres in Judea and Samaria, to the complex mountainous areas of southern Lebanon. Most of the literature on the IAF focuses on the operations of its fighter jets during the wars and the inter-war years. Indeed, the main strength of the IAF lies in its fighter jet squadrons. However, like any modern air force, the IAF also employs a wide variety

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<sup>2</sup>In Israel the war is known as The War of Attrition. In Egypt the name of the war is *Ḥarb al-Istinzāf* (also meaning as war of attrition).

<sup>3</sup>John F. Kreis, 'Unmanned Aircraft in Israeli Air Operations', *Air Power History* 37 (4) 1990: 46.

<sup>4</sup>In this context, Israel operates UAVs armed with various types of air-to-ground missiles (probably the Rafael Advanced Defense Systems Spike variants), such as the Hermes 450/900, as well as Loitering Munitions like the Harop and Harpy: Drone Wars UK, *Israel and the Drone Wars: Examining Israel's Production: Use and Proliferation of UAVs*, (Oxford: Oxford University Press, 2014), p. 4, p. 8. Loitering Munitions represent an intermediate category between cruise missiles and attack UAVs.

<sup>5</sup>This includes fighting with the Syrian army during the 1982 Lebanon War: Operation Peace for Galilee.

of planes and helicopters for other missions, including air defence. The purpose of this article is to describe a less well known part of IAF history through the analysis of the development and integration of the UAV array and the operations in which it participated.

The article consists of two parts. The first part examines the years in which the operational focus of the IDF was war against regular Arab armies (1971-1982) and the operational contribution of the UAV array during this period. The second part examines the operational use of UAVs during the period of Israel's fighting against irregular forces. Thus, the article provides an historical analysis and a discussion on the development of the UAV array in Israel, while examining the various missions performed by this weapon system, along with the operational change following the transition from fighting against regular armies to fighting against irregular forces.

This is an historical article and does not claim or try to dispel the secrecy surrounding Israel's military use of UAVs. Based on a variety of open sources, the main intention of the article is to examine the dynamics and mutual relations between the accumulated operational experience, military needs, technology, and innovation deployed against a complex threat system in a changing strategic reality. Furthermore, the article does not address issues of morality, ethics, and international law arising from the use of UAVs.

### **UAVs in the Period of Conventional Wars: 1971-1982**

During a visit to a model airplane store in the United States, Shabtai Brill, an officer in the Intelligence Directorate of the IDF (IDF-J2), proposed the use of UAVs. Brill believed that model airplanes could be equipped with cameras for military purposes, and he managed to convince senior Israeli intelligence officials to fund such an experiment. The initial experiments started in 1969 by IDF-J2 and involved flights to photograph Egyptian and Jordanian outposts. Following the success of these experiments, the IAF established a permanent unit, Squadron 200, and acquired advanced Firebee drones from Ryan Aeronautical which were equipped with various types of cameras. This placed Israel alongside the United States, which had operated a massive UAV array during the Vietnam War, primarily for collecting intelligence on North Vietnamese air defences.<sup>6</sup> The establishment of Squadron 200 was part of the IAF's attempt to find safe ways to gather intelligence on the Egyptian military, especially

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<sup>6</sup>Regarding the operation of drones during the Vietnam War, see: John D. Blom, *Unmanned Aerial Systems: A Historical Perspective*, (US Army Combined Arms Center, Fort Leavenworth, KS: Combat Studies Press, 2009), pp. 58-64; Paul. J Springer, *Military Robots and Drones*, (Santa Barbara: ABC-Clio, 2013), pp. 15-16.

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after the Egyptian air defences had managed to shoot down several Israeli fighter jets towards the end of the 1969-1970 war.<sup>7</sup>

During the 1973 Yom-Kippur war the IAF used Northrop Chukar (QBM-74) drones, mainly as decoys against the Syrian air defence.<sup>8</sup> The goal was twofold: firstly, to make the Syrian radar operators of missile batteries and anti-aircraft artillery (AAA) believe that they were under aerial attack, thus turning off their radar systems to prevent anti-radiation missiles (ARM) from homing on their radars. The second goal, in the event the Syrians fired missiles, was to deplete the Syrian missile stockpile. The IAF integrated these goals into Israel's use of air power, primarily in close air support (CAS) and air interdiction missions. Additionally, the IAF continued to operate Firebee drones in intelligence collection missions. On the Sinai front, the IAF primarily used drones as decoys, which led to a decrease in the number of manned planes shot down by anti-aircraft missiles. IAF pilots developed a wide range of flight and attack tactics that helped reduce the probability of the enemy hitting the Israeli planes. However, the missile threat was only eliminated after Israeli ground forces crossed the Suez Canal and began destroying Egyptian missile sites located on the western bank of the canal.<sup>9</sup>

In the early days of the war, when the Syrian and Egyptian armies had the offensive initiative, numerous operational shortcomings and defects made it difficult for the IAF to fully exert its combat power. The main problem was the dense, multi-dimensional air defence system employed by the Syrian and Egyptian armies. These were integrated air defence systems (IADS) that combined stationary (SA-2/3) and mobile (SA-6) missile batteries, along with shoulder-launched missiles (SA-7) and radar-guided anti-aircraft artillery (AAA).<sup>10</sup> The Arab IADS covered a large volume of space in altitude and distance, causing AAA fire to hit aircraft that attempted to fly at low altitudes in order to avoid missiles. Both the Egyptian and the Syrian IADS exacted a heavy toll

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<sup>7</sup>Blom, *Unmanned Aerial Systems*, p. 72. See also: Kreis, 'Unmanned Aircraft in Israeli Air Operations', pp. 46-47; Kenneth P. Werrell, *Archie to SAM: A Short Operational History of Ground-Based Air Defense*, (Maxwell AFB, AL: Air University Press, 2005), pp. 148-149.

<sup>8</sup>Blom, *Unmanned Aerial Systems*, p. 72.

<sup>9</sup>For a discussion of the learning process and close cooperation with ground forces, see: Lon Nordeen, *Fighters over Israel*, (New York: Orion Books, 1990), pp. 141-142. Also see: Werrell, *Archie to SAM*, pp. 153-154.

<sup>10</sup>For a review of the Syrian and Egyptian air defence arrays, see: Edward Luttwak and Dan Horwitz, *The Israeli Army*, (London: Penguin Books, 1975), pp. 347-350; Antony H. Cordesman and Abraham R. Wagner, *The Lessons of Modern War (Vol. 1): The Arab-Israeli Conflicts, 1973-1989*, (Boulder: Westview, 1990), pp. 73-82; Nordeen, *Fighters over Israel*, pp. 123-124; Werrell, *Archie to SAM*, pp. 149-153.

from the IAF, with about a hundred aircraft lost. Attempts to drive the IADS from the air failed, and the IAF continued to provide CAS to ground forces and carried out hundreds of air interdiction sorties, albeit with less than full effectiveness.

On 7 October 1973, the second day of the 1973 Yom-Kippur war, the IAF launched Operation Doogman-5, with the goal of destroying the Syrian missile batteries so that the IAF could operate freely over the Golan Heights, especially in the southern sector.<sup>11</sup> Due to intelligence and operational failures, the IAF only hit two stationary batteries, while the mobile SA-6 batteries were not damaged at all. The IAF's planes failed to locate them due to out-of-date target intelligence. The IAF lost six F-4 Phantom aircraft, and ten more were damaged.<sup>12</sup> Two crews were killed, and nine more were captured by the Syrians. An additional contribution to the failure was the absence of an airborne electronic warfare (AEW) system, which would have disrupted and misled the Syrian radar systems.<sup>13</sup> Squadron 200 was too early in the launching of the decoy Chukar drones, consequently, although the Syrians launched anti-aircraft missiles against the drones, the IAF attacks did not follow immediately and take advantage of the reload cycle. This left Squadron 200 without any operational decoy UAVs.

The failure of Operation Doogman-5 highlighted the difficulty in dealing with multi-layered IADS and drove the IAF to find operational solutions to the problem. The solution comprised a mix of standoff weapons, AEW and accurate combat intelligence, which created a synergistic attack system. Therefore, the IAF invested considerable resources in the intelligence field, including the establishment of ground observation systems that could transmit the locations of the mobile missile batteries to the attack planes in real-time.<sup>14</sup> The IDF complemented this system by upgrading the UAV array, both in ISR missions and in designating targets for attack. As we will later see, this

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<sup>11</sup>Regarding the fighting in the Golan Heights theatre, see: Trevor N. Dupuy, *Elusive Victory: The Arab-Israeli Wars, 1947-1974*, (New York: Harper & Row, 1978), pp. 445-461. For the actions of the IAF in the Golan Heights theatre during the first two days of the war, see: Nordeen, *Fighters over Israel*, pp. 124-125.

<sup>12</sup>Tal Tovy, *Tomcats and Eagles: The Development of the F-14 and F-15 in the Cold War*, (Annapolis: Naval Institute Press, 2022), pp. 154-155.

<sup>13</sup>The airborne electronic warfare units were in the Sinai front, in preparation for a similar operation (Tagar-4) against the Egyptian air defence; Itai Brum, 'Israeli Air Power', John A. Olson, ed., *Global Air Power*, (Washington, D.C.: Potomac Books, 2011), p. 154; Shmuel L. Gordon, 'Air Superiority in the Israel-Arab Wars, 1967-1982', Olson, *A History of Air Warfare*, pp. 144-145; Tovy, *Tomcats and Eagles*, p. 155.

<sup>14</sup>David Rodman, *Sword Shield of Zion: The Israeli Air Force in the Arab-Israeli Conflict, 1948-2012*, (Brighton: Sussex Academic Press, 2013), pp. 60-61.

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operational mix was successfully applied against the Syrian IADS during the 1982 Lebanon War.

After 1973, Israel turned to two directions for UAV acquisition. The first direction was the use of American military aid to acquire UAVs from American manufacturers.<sup>15</sup> The second direction was local production in Israel with three goals in mind.<sup>16</sup> The first goal stemmed from the persistent fear that United States would stop military aid or that an embargo could be imposed on certain weapon systems. The second goal was to save on procurement costs, and the third was the desire to gain a foothold in the global arms market, thus helping to strengthen the Israeli economy. In 1974, Israel Aerospace Industries (IAI) began to develop drones, and in 1979 its first UAV, the Scout, entered operational service for ISR missions. At the same time, another Israeli company, Tadiran, began developing the Mastiff, a competitor for the Scout.<sup>17</sup>

Two military trends characterised IDF operations during the second half of the 1970s. The first trend was a learning process, in understanding the lessons of the 1973 war, which influenced the IDF's procurement and armament plans.<sup>18</sup> In parallel, preparations for a possible renewal of the war went on. Simultaneously, as a second trend, the day-to-day war against Palestinian organisations, which had strengthened their grip on southern Lebanon, continued. Within this dual strategic framework, the IAF had a central role, with the developing UAV array integrated into both preparations for another regular war and the ongoing fight against the Palestine Liberation Organisation and other organisations.

The IAF drew several lessons from the 1973 Yom Kippur war. The main lesson was the difficulty in achieving air superiority against an integrated dense, multi-dimensional air defence.<sup>19</sup> After the war, the IAF acted in three directions to improve its ability to efficiently cope with such a system and the operational challenges it presented. The focus was on creating a doctrine that would lead to the suppression of enemy air defence (SEAD). The first direction was to acquire attack helicopters that would provide CAS and also repel and defeat attacking armoured columns, thus allowing the fighter planes to focus on missions beyond the immediate frontline.<sup>20</sup> The second

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<sup>15</sup>Andrew Feinstein, *The Shadow World: Inside the Global Arms Trade*, (New York: Farrar, Straus and Giroux, 2011), pp. 373-394.

<sup>16</sup>Blom, *Unmanned Aerial Systems*, p. 72. See also: Hoyt, *Military Industry and Regional Defense Policy*, pp. 90-98.

<sup>17</sup>Hoyt, *Military Industry and Regional Defense Policy*, p. 102.

<sup>18</sup>Cordesman and Wagner, *The Lessons of Modern War (vol. 1)*, pp. 110-114.

<sup>19</sup>Nordeen, *Fighters over Israel*, pp. 179-180.

<sup>20</sup>During that period, there was also a lot of thinking in the US military about ways to stop the Soviet armoured mass in the event of an attack in Central Europe. This

direction taken by the IAF was the development of offensive tactics to destroy an IADS. The third direction was the development of improved ISR capabilities, which would provide accurate real-time intelligence on the locations of the mobile missile batteries. This was a direct lesson from the Yom Kippur War, which also caused IDF-J2 to establish, in 1976, a unit that operated various UAV models already used by the IDF.<sup>21</sup>

Against the backdrop of studying and implementing the lessons of the 1973 war, there were also preparations for the possibility of another conventional ground war against Palestinian organisations entrenched in southern Lebanon near Israel's border. The Palestinian operations from this area combined rocket fire against towns and agricultural settlements in the Galilee and infiltrations into Israeli territory. The IDF mostly engaged in ground operations employing various force sizes, but the intensification of the attacks on Israel from 1974 to 1982 led the IAF to become more dominant. This was mainly due to the desire to avoid casualties to the ground forces in the challenging topography of southern Lebanon.

The IAF operations focused on bombing the Palestinian organisations' facilities using fighter aircraft and attack helicopters. Within this operational framework, the UAVs served in ISR missions for ground forces, and in damage assessment after the air strikes. However, the drones operated in ISR missions just as they would have operated in a conflict against conventional Arab armies. It is important to note that during this period, the technological capabilities of the UAV as a system continuously improved, and there was also the introduction of Israeli-made UAVs into service.<sup>22</sup>

The operation of drones in ISR missions continued throughout the second half of the 1970s and the early 1980s, and they played a vital role in monitoring the Syrian missile batteries in the Beqaa Valley during the summer of 1981.<sup>23</sup> By the summer of 1982, the Syrians added SAM batteries to the defence of the Beqaa Valley, eventually their

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thinking led to the development of the AirLand Battle doctrine, which integrated new weapons systems, one of the most prominent being the advanced AH-64 Apache attack helicopter. The USAF also equipped itself with tougher aircraft for CAS (Close Air Support) missions, notably the A-10 Thunderbolt II. Tal Tovy, *The Changing Nature of Geostrategy: The Evolution of a New Paradigm*, (Maxwell Air Force Base: Air University Press, 2015), pp. 66-71.

<sup>21</sup>During its years of operation, the unit operated the Mastiff (Tadiran), Scout (IAI), and the Searcher (IAI). Yuval Shoam and May Efrati '40 Years without a Pilot', *IAF Journal* 200 (September, 2011),

<sup>22</sup>*Ibid.* The IDF integrated the Mastiff during 1978, and the Scout a year later.

<sup>23</sup>The Syrian Air Force also used jet fighters in an attempt to shoot down the UAVs patrolling over its forces or territory.

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number reached 19, and included mobile SA-6 batteries. That year, the drones played a decisive role as the Mastiffs and Scouts routinely monitored the Syrian IADS. Israel also operated drones as decoys to draw off anti-aircraft missile fire, and some may have even been shot down. However, the payoff, besides the important fact that no pilots were lost or injured, was accurately locating the missile batteries, as well as the detecting the frequencies and electronic signatures of the Syrian radar systems. In this way, the UAVs assisted in developing EW devices that would ultimately be used to neutralise the Syrian radars. All the collected information was integrated into the IDF's attack plan, while the forces awaited the command to strike which arrived in early June 1982 with Operation Mole Cricket 19. As part of the opening moves in the Lebanon War, Operation Peace in Galilee, over three days (June 9-11) the IAF destroyed the Syrian missile array in the Beqaa Valley and shot down more than eighty Syrian aircraft which had been launched to defend the missile batteries.<sup>24</sup>

As mentioned, the Syrian IADS consisted of several operational components, integrated with each other. Therefore, the solution was a combination of several ground and aerial weapon systems that attacked the missile batteries from outside their effective range, along with the integration of EW, real-time intelligence, and deception measures. Within this operational mix, the UAVs played an important role in collecting accurate imagery intelligence (IMINT) on the locations of the missile batteries and radar wagons, as well as exposing the electronic profile of the radar systems.<sup>25</sup> The information arrived in real-time, allowing for the targeting and disruption of radar systems during the attack by EW and ARM. The IAF also operated drones as decoys which simulated the radar profile of a fighter jet, causing the Syrian operators to launch missiles at them. This exposed the precise locations and electronic profiles of the batteries in real-time, allowing the pilots to launch ARMs against them. Simultaneously, ground-based and airborne electronic systems located the batteries and directed both ground fire and air attacks by F-4 Phantoms against the missile sites. After the radar systems had been destroyed, the missile launchers were attacked from both the ground and from the air by general purpose and cluster munitions targeting the battery crews.<sup>26</sup> The drones provided the air and ground fire-control system with real-time updates on the damages incurred, so that batteries that had not been neutralised could be attacked again. Operational efficiency improved, and repeat attacks were only performed where necessary.

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<sup>24</sup>Cordesman and Wagner, *The Lessons of Modern War (vol. 1)*, pp. 110-119.

<sup>25</sup>IMINT is the technical, geographic, and intelligence information derived through the interpretation or analysis of imagery and collateral materials. See: Chairman of the Joint Chiefs of Staff: Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms*, (Washington, 2016), p. 107.

<sup>26</sup>Benjamin S. Lambeth, *Moscow's Lessons from the 1982 Lebanon Air War*, (Santa Monica: RAND, 1984), pp. 5-8; Kreis, 'Unmanned Aircraft in Israeli Air Operations', p. 48.

During the attacks on the missile batteries, there was an operational paradox. After about half an hour from the start of the Israeli air offensive, the Syrian command realised that its missile array was being destroyed. To protect it, the Syrian command launched its fighters to intercept the Israeli attacking aircraft. The UAVs provided VISINIT of the Syrian aircraft taking off from their airfields in Syria. This information was immediately relayed to the IAF's ground-based and airborne control units (Northrop Grumman E-2C Hawkeye), assisting the controllers in vectoring IAF aircraft to intercept the Syrian MIGs. The F-4 aircraft stopped the attacks and made way for the IAF's F-15 and F-16 fighters, which shot down twenty-three Syrian aircraft without the IAF losing a single aircraft.<sup>27</sup>

At the end of the first day, the Syrians moved additional missile batteries to the front, including, for the first time, advanced SA-8 batteries. On 10 and 11 June 10, the IAF resumed its campaign, destroying both the batteries that survived the first day's attacks and the new batteries that had arrived in the Beqaa Valley during the night. The Syrian Air Force continued to launch its aircraft against the attacking aircraft, but the Israeli escort fighters shot down their MIGs. In total, 30 SAM batteries, and some 85 Syrian aircraft were shot down. The IAF lost two aircraft to ground fire. No single component had a decisive influence on the air campaign's results. The attack plan integrated most of the components of the IAF's capabilities, thus creating a lethal operational synergy, in which the UAV array fulfilled several roles.

The air supremacy that the IAF achieved over Lebanon affected the ground operations by allowing the IAF to conduct highly effective CAS missions.<sup>28</sup> Later in the war and in support of ground forces, the UAVs, especially the Mastiff – which had been designed as a tactical drone for collecting real-time combat intelligence – provided 'beyond the hill' capabilities for ground force commanders. The UAVs transmitted real-time information on the locations and movements of Syrian and PLO units, and this data helped to plan and carry out operations that are more effective. To some extent, the UAVs helped reduce the friction of war.<sup>29</sup> The operation of the UAV array as part of the ground campaign marked a new chapter in air-land joint operations.

The successful participation of the drones in the Lebanon War led the Israeli defence industries to develop more sophisticated models. In 1986, the RQ-2 Pioneer, a joint

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<sup>27</sup>Nordeen, *Fighters over Israel*, pp. 170-176.

<sup>28</sup>Brereton Greenhous, 'The Israeli Experience', Benjamin F. Cooling (ed.), *Case Studies in the Achievement of Air Superiority*, (Washington D.C.: Center for Air Force History, 1991), pp. 599-600; Cordesman and Wagner, *The Lessons of Modern War (vol. 1)*, p. 203.

<sup>29</sup>Rodman, *Sword Shield of Zion*, pp. 85-86.

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development of the IAI and an American company, based on the Mastiff and the Scout, entered operational service in the United States. Its main missions were patrolling, collecting intelligence, locating targets, and assessing damage from attacks. The operational need for such a platform became apparent to the US Navy after the bombing of Hezbollah targets in the Beqaa Valley by US Navy aircraft in 1983, and the Pioneer carried out similar missions during the Gulf War.<sup>30</sup> Paul Springer notes, 'The Pioneer represents a rare case of the United States purchasing and adopting an advanced military system from a foreign developer.'<sup>31</sup> This is indeed clear proof of the operational effectiveness of Israeli-made drone systems.

After 1982, the IAF continued to acquire improved drone systems. In 1992, the Searcher I (IAI) became operational, and in 1998 the Searcher II, which was larger than the Mastiff and the Scout and was equipped with advanced optical systems. These drones marked another operational milestone during the IDF's prolonged stay in the security zone in southern Lebanon (June 1985 – May 2000), where the main combat during this period was against the Hezbollah organisation, which continuously improved its combat capabilities. The second part of the article will focus on the fighting against Hezbollah.

### **From the Security Strip to the Gaza Strip: 1982-2014**

The IDF's stay in southern Lebanon was characterised by three modes of action. The first was the ongoing security activity, which was mainly defensive in nature.<sup>32</sup> The second, concurrent with the first, involved initiating small-scale operations such as raids and ambushes with varying force sizes in Hezbollah-controlled territory. The third was initiating large-scale offensive operations following a military escalation that Israel was not prepared to tolerate.<sup>33</sup> On 16 February 1992, a Scout drone participated in the targeted attack on the convoy of Hezbollah Secretary-General Sheikh Abbas al-Musawi. The drone provided real-time IMINIT and once the drone had identified the convoy, AH-64 Apache helicopters armed with AGM-114 Hellfire missiles attacked his car.

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<sup>30</sup>Blom, *Unmanned Aerial Systems*, pp. 72, 88.

<sup>31</sup>Springer, *Military Robots and Drones*, p. 189.

<sup>32</sup>Within the security zone, the IDF established a chain of outposts manned by infantry, combat engineering, and armoured troops. The outposts received artillery support and, if necessary, air support. For a comprehensive review of the IAF activity during this period, see: Raphael Rudnik and Ephraim Segoli, 'The Israeli Air Force and Asymmetric Conflicts, 1982-2014', John A. Olsen (ed.), *Airpower Applied: U.S., NATO, and Israeli Combat Experience*, (Annapolis: Naval Institute Press, 2017), pp. 285-336.

<sup>33</sup>Rodman, *Sword Shield of Zion*, pp. 54-57.

During Operation Accountability (25-31 July 1993) and Operation Grapes of Wrath (11-27 April 1996) the UAV array conducted dozens of ISR sorties over southern Lebanon in an attempt to locate Hezbollah's short-range rocket launchers.<sup>34</sup> The information was rapidly transferred to air and ground forces, mainly artillery, in order to strike the launchers and their operators. Some of the IDF's attacks, mainly against stationary targets such as training camps, weapons depots, and command posts, relied on intelligence gathered before the operations had started. Other attacks, mainly against mobile targets such as vehicles transporting troops and rocket launcher sites, were based on intelligence gathered during the operation itself. As yet it has not been made public whether the UAVs also activated laser designators for guiding precision-guided munitions (PGM) launched from attack aircraft and helicopters, but drones in the IDF's use are known to have such capabilities.

The drones continued operational success led to increased use of these platforms, and the IAF acknowledged that '...new weapons systems were absorbed into the UAV squadron.'<sup>35</sup> At the beginning of the twenty first century, additional operational drones were introduced which upgraded the IDF's operational capabilities, notably, the Hermes 450 and Hermes 900, both are manufactured by Elbit System, as well as the Heron 1 and Heron 2, manufactured by IAI. The integration of these drones enhanced the IDF's strategic capabilities in the ISR domains, especially because of their ability to carry multiple technological payloads, fly long distances, and remain in the air for a long time, sometimes up to forty hours or more. The Hermes 450, Hermes 900, and Heron 2 also have air-to-ground missile launch capabilities. In parallel with the integration and operation of these strategic UAVs, tactical UAVs were also developed to support ground forces, particularly the Skylark-I mini-UAV, made by Elbit System for short-range ISR missions and artillery targeting. The introduction of these additional models for various and diverse missions led to an expansion of the UAV array. In 1999, Squadron 166 was established, which operated the Hermes 450 and currently operates the Hermes 900. In 2010, Squadron 210 (Heron 2) was established, and in 2012, a fourth squadron, Squadron 161, was established, taking over the operation of the Hermes 450. In the late 1980s, Israeli defence industries began developing various models of loitering munitions, such as the Green Dragon, Harpy, and Harop.<sup>36</sup> However, no information is available on their operational use by the IAF during the period covered by this article.<sup>37</sup>

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<sup>34</sup>Rudnik and Segoli, 'The IAF and Asymmetric Conflicts' pp. 290-291, pp. 294-296.

<sup>35</sup>Drone Wars UK, *Israel and the Drone Wars*, p. 10.

<sup>36</sup>Bill Yenne, *Drone Strike!: UCAVs and Aerial Warfare in the 21st Century* (Manchester: Specialty, Press, 2017), pp. 106-107.

<sup>37</sup>However, there is information on the use of Israeli-made loitering munitions (Harop) in the ongoing conflict between Azerbaijan and Armenia over control of the Nagorno-Karabakh region. In 2016, Azerbaijan attacked an Armenian military bus and made

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In the first decade of the 21 Century, the UAV array underwent a reorganisation. In 2000, the IDF-J2 UAV unit merged into IAF Squadron 200. In the same year, Unit 5252 was established under the Artillery Corps, which operated the Hermes 450. The unit's role is to provide intelligence, target designation for IAF, and precise fire support for manoeuvring forces. In 2010, Unit 5353 was established in the Artillery Corps. Its main mission is to provide VISINIT to tactical manoeuvring forces, and it operates the Skylark I LE 10 UAV made by Elbit. All these units, along with the platforms at their disposal, have operated extensively in the following years.

In September 2000, the *Al-Aqsa Intifada* broke out in Judea, Samaria, and the Gaza Strip. The uprising quickly spilled over into Israeli territory with a murderous dynamic of suicide bombings in city centres. Over the next 15 years, the IDF launched several large-scale operations, in addition to the war against Hezbollah in the summer of 2006. The intensive fighting led to increased use of UAVs, gradually acquiring new missions on top of the continued operation of the drones in ISR and target designation missions.<sup>38</sup>

On 29 March 2002, the IDF launched Operation Defensive Shield. It was a large-scale operation in Judea and Samaria following a terror attack in the city of Netanya, where thirty civilians were killed (The Passover massacre 27 March 2002). This was the climax of a month in which more than 130 Israeli civilians were killed in a series of terror attacks. The main goal of the operation was to strike the Palestinian terrorist infrastructure in Judea and Samaria and to stop the attacks. The operation was seen as a success and marked a turning point in the Second Intifada, after which terrorist attacks and Israeli casualties significantly decreased. During the operation, it was reported that attack helicopters, hidden by the mountainous topography of Judea and Samaria, would suddenly emerge and launch missiles, precisely striking Palestinian targets. These reports claim that this tactic was made possible by efficient collaboration between the attack helicopters and the drones.<sup>39</sup> However, it is not known if the drones also performed independent attack missions.

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extensive use of this weapon during the Second Nagorno-Karabakh War (27 September - 10 November 2020): Raf Sanchez, '“Suicide drone” used for first time in fighting between Azerbaijan and Armenia', *The Telegraph*, 8 April 2016, <https://www.telegraph.co.uk/news/2016/04/08/suicide-drone-used-for-first-time-in-fighting-between-azerbaijan/>. Accessed 10 March 2024.

<sup>38</sup>Benjamin S. Lambeth, *Air Operations in Israel's War against Hezbollah*, (Santa Monica: RAND, 2006), pp. 111-112; Ralph Sanders, 'An Israeli Innovation', *Joint Forces Quarterly* (JFQ) 33 (Winter 2002-2003): p. 117.

<sup>39</sup>Drone Wars UK, *Israel and the Drone Wars*, p. 10.

In November 2001 it was reported in the United States that a drone had conducted an attack in Afghanistan.<sup>40</sup> This was the first documented instance of a drone carrying out an attack mission and going beyond the traditional ISR and target designation missions. Although many foreign sources identified Israel as the first to use UAVs in attack missions, the first credible report of a drone being used for a strike appeared in the press during 2004, following eyewitness testimonies of attacks against Hamas and Islamic Jihad activists in the Gaza Strip.<sup>41</sup> Reports of attacks by an 'IAF aircraft' continued to appear in the press in the following years. However, much secrecy, stemming from military censorship orders, surrounds the tactics that Israel employs in combat against irregular forces and its use of targeted killing. After such attacks, official reports still used the terminology 'IAF aircraft'. Since Israel has never officially admitted the use of drones for attacking targets in Gaza, southern Lebanon, or other areas, the credit for the first use must go to the United States. Nonetheless, Israel has confirmed the close cooperation of drones, attack helicopters, and the security services in targeted killing operations.

In the summer of 2006, and in response to the kidnapping of two soldiers, Israel launched a military operation against Hezbollah. This later turned into a war – the Second Lebanon War (12 July – 14 August 2006). In the Second Lebanon War, the IAF focused on bombing Hezbollah's strategic targets throughout Lebanon and attempting to destroy the organisation's short-range rocket-launching capability. The drones' mission was to obtain real-time intelligence on short-range rocket launch sites, so they were virtually always present over southern Lebanon, from where the rockets were launched. In this war, the Heron I logged many thousands of flight hours, and the Hermes 450 about 15,000 hours. Lebanese sources reported that drones of these two types had both launched missiles, but Israel neither confirmed nor denied such operational use.<sup>42</sup>

On the first night of the war (13 July), the IAF launched Operation Specific Gravity, popularly known as 'the night of the *Fajrs*'. During the operation, which lasted about half an hour, a large part of Hezbollah's long-range rocket array was destroyed. The success of the operation was partly due to the acquisition of quality and accurate intelligence regarding the deployment and location of the rockets throughout southern

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<sup>40</sup>Notably, the first American drone attacks were carried out by the CIA rather than by the military. See: Thomas G. Mahnen, *Technology and the American Way of War since 1945* (New York: Columbia University Press, 2008), pp. 201-202.

<sup>41</sup>Drone Wars UK, *Israel and the Drone Wars*, p. 10, p. 25.

<sup>42</sup>See: Anthony H. Cordesman, *Lessons of the 2006 Israeli-Hezbollah War*, (Washington D.C.: CSIS Press, 2007), p. 107; Lambeth, *Air Operations in Israel's War against Hezbollah*, pp. 121-122. For more on the IAF's operations in the Second Lebanon War, see: Rodman, *Sword Shield of Zion*, pp. 44-46.

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Lebanon. It seems that the UAVs not only marked the targets for the attack aircraft but also patrolled the attack areas to provide battle-damage assessment. The around-the-clock ISR capabilities of the various drone platforms reinforce the notion that they were a critical component in the early collection of precise intelligence, enabling the operation's success and effectively neutralizing Hezbollah's strategic arm, preventing it from striking deep into Israeli territory during the war.<sup>43</sup>

The IDF also heavily used drones in three operations against Hamas in the Gaza Strip: Operation Cast Lead (27 December 2008 - 18 January 2009), Operation Pillar of Defense (14-21 November 2012), and Operation Protective Edge (8 July - 26 August 2014). The second operation is particularly noteworthy because IDF ground forces did not enter the Gaza Strip. In this operation, standoff weapons, mainly various types of missiles, carried out a substantial part of the attacks. For instance, the targeted killing of Ahmed Jabari, which essentially started Operation Pillar of Defense, was performed, by the Hermes 450.<sup>44</sup> The long loitering capability of the drones greatly assisted in strikes on the Hamas rocket launchers aimed at the Israeli population and strikes on the Hamas and Islamic Jihad troops moving throughout the Gaza Strip.<sup>45</sup>

As mentioned, the Hermes and Heron drones provide Israel with strategic capabilities, stemming from their long flight range and their loitering capability. In early 2009, Sudan reported that unidentified aircraft had attacked convoys moving within its territory on three different occasions. According to Israeli and other Western intelligence assessments, Iran was sending weapons to Hamas to help rebuild the organisation after the severe blow it had suffered during Operation Cast Lead. The weapons arrived by ships from Iran, which unloaded their cargo at Port Sudan, and from there went by truck through Egypt and the Sinai Peninsula to the border of the Gaza Strip.

The attack was made public on the American CBS network at the end of March 2009, but the exact dates of the attacks are not known, although the Sudan government

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<sup>43</sup>Stephen Biddle and Jeffrey A. Friedman, *The 2006 Lebanon Campaign and the Future of Warfare: Implications for Army and Defense Policy*, (Carlisle, PA: Strategic Studies Institute, U.S. Army War College, 2008), pp. 29-30; Cordesman, *Lessons of the 2006 Israeli – Hezbollah War*, pp. 10-11; Rudnik and Segoli, 'The IAF and Asymmetric Conflicts', pp. 308-312.

<sup>44</sup>Jabari, served as the acting commander of the Hamas military forces; Drone Wars UK, *Israel and the Drone Wars*, pp. 14-15. See also: Rodman, *Sword Shield of Zion*, pp. 47-48.

<sup>45</sup>World Tribune, "Israel sets combat drones against missile launchers in Gaza," *World Tribune*, May 8, 2007,

<https://web.archive.org/web/20070513201916/http://www.worldtribune.com/worldtribune/07/front2454229.238888889.html>. Accessed 10 March 2024.

mentioned 17 January and 11 February as the dates on which two of the three attacks took place. The United States, aware of the weapon convoys, warned Sudan against further cooperation with Iran, but denied having had anything to do with the attacks. Israel officially denied any involvement, but various statements made by the Israeli Prime Minister at the time, Ehud Olmert, hinted that Israel would strike terrorist infrastructure anywhere it could be reached and that there was essentially no place, where the State of Israel could or would not operate. The flight range of the Hermes and Heron corroborates Olmert's statement.<sup>46</sup>

Information about the operation of drones as combat platforms capable of launching various types of missiles is shrouded in secrecy.<sup>47</sup> However, the testimonies of those exposed to Israeli air attacks, along with the analyses of military analysts and commentators and the examination of drone characteristics, as they appear on various internet sites, reinforce the assessment that Israel operates drones for attack missions, in addition to the 'traditional' ISR missions. In addition, since it is known that there is an ongoing exchange of operational information and mutual learning between the United States and Israel, and that the United States has operated drones in attack operations in southwest Asia, it can be inferred that Israel, too, had similar capabilities during this period.

## **Conclusions**

This article examines, with information taken from open sources, Israel's operational experience in the field of UAV deployment. UAV operation began as an operational need in the early 1970s, and in the five decades since, the Israeli UAV array has developed in several directions. The main area was ISR, including a real-time combat intelligence picture, and helping, to some extent, decrease the phenomenon of battlefield friction and uncertainty.

Historical analysis of the doctrine and technology highlights the dynamic reciprocal relationships and the military tension between the two concepts. Sometimes operational needs, stemming from doctrine, lead to the development of new technologies. At other times, new technologies create new possibilities, thus necessitating the development of new doctrines or at least the adaptation of existing ones. If this is not done, the gap between technology and doctrine would widen, potentially disrupting, perhaps severely, the military's operation during conflict. The information revolution, as a dominant factor on the battlefield in recent decades, is becoming one of the critical foundational elements of modern warfare. However, the advantages of this revolution can be nullified if information technology is not integrated into a doctrine that harnesses relevant technological developments. It can be asserted

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<sup>46</sup>Springer, *Military Robots and Drones*, p. 100.

<sup>47</sup>Drone Wars UK, *Israel and the Drone Wars*, p. 14.

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that the side that better understands the implications of new weapon systems and integrates them into appropriate doctrines will gain a tremendous military advantage over an opponent with similar weapon systems but without a relevant doctrine.

Israel began operating drones in response to an urgent operational need and quickly understood their inherent operational advantages. A clear expression of this was the integration of drones as an important component in the SEAD doctrine developed by the IAF to eliminate Syrian SAM batteries in June 1982 as well as drone use as a critical component in the concept of targeted killings. In fact, the different UAV models, both in the strategic dimension (supporting IAF operations) and in the tactical dimension (supporting ground forces), constitute an integral platform in IDF operations, thus successfully maximizing the advantages of the technology.

One of the most important quality factors in achieving military power is the technological component or dimension. This can also be considered as one of the critical foundational elements of warfare. Historically, Israel has always, and still does, put a heavy emphasis on quality in a wide range of fields, including the fighting capabilities of its soldiers and commanders, but also the acquisition and deployment of advanced weapons systems. These areas constitute force multipliers that amplify the IDF's strength against the quantitative and qualitative armament of its regular and irregular adversaries.<sup>48</sup> Israel deals with operational challenges posed by irregular forces on a daily basis while preparing for a possible escalation on various fronts, including a strategic threat to Israel from the launching of long-range surface-to-surface missiles. Yet, in each of these modes of conflict, the IDF has found ways to integrate various types of drones into the endless task of maintaining the security of the State of Israel.

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<sup>48</sup>Rodman, *Sword Shield of Zion*, pp. 7-9.