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FEAR THE DRONES: REMOTELY PILOTED SYSTEMS AND NON-STATE ACTORS IN SYRIA AND IRAQ

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ABSTRACT

On today's battlefield, a whole set of new capabilities has appeared. This calls for a mandatory understanding of how much of a potential game-changer Remotely Piloted Systems, commonly known as drones, are or will be. The porous border between civil and military technologies is one key explanation and has contributed to drone proliferation. Their dual character, presenting a new regulatory challenge, allowed for drone technology to be easily accessible on the market notably for non-state actors seeking air-based capabilities. This paper aims to emphasize the emerging threat posed by the use of Remotely Piloted Systems by non-state actors operating in the Levant, essentially but not only in Syria and Iraq. Studying RPS and their military implications help to design future trends in drone warfare. What happens in Syria and Iraq might be helpful to think how France, and generally speaking NATO and EU member states, should deal with this imminent and continually evolving threat, whether on the tactical, operational, or strategic levels, by taking into consideration the rapid proliferation of drone technology and its use by potential adversaries.

CONTENT

A WORLD OF DRONES

Recent headlines highlight the importance of drones, used by state and non-state actors. Be it over Syria, in Iraq, or over the Strait of Hormuz, these systems have reached a new stage in terms of affordability, availability, and lethality, being therefore increasingly used and becoming part of any military arsenal in this part of the world. This paper argues that proliferation of drones – or more precisely of Remotely Piloted Systems in order to include both aerial and ground systems – might be one critical game-changer. As several studies have underlined, acquiring this technology is driven by operational needs as well as by a geopolitical and domestic environment that should convince France, NATO countries and EU member state to closely watch, monitor and maybe manage hotspots for "drone warfare" such as the Middle East turns about to become.[1]

The deployment of Remotely Piloted Systems, commonly known as drones, by conventional forces is not recent history, as first tests were carried out by British forces in 1917. During the Cold War, their military use was restricted to reconnaissance missions, such as those carried out by the U.S. military in Vietnam, with some tactical use as experienced by the Israeli Air Force during the Yom Kippur War (1973) and *Operation Mole Cricket* (1982). Israeli drones served as decoys aimed at confusing Syrian and Egyptian air defense systems thus allowing main attack formations to slip through air defenses and to destroying them.[2]

However, the 9/11 attacks and the Global War On Terror (GWOT) resulted in an increasing use of these systems by both the intelligence community and armed forces. A 2012 report to the U.S. Congressional Research Services identified 7,494 drones in the U.S. Department of Defense inventory in 2011-2012, to be compared to the less than 50 units a decade ago.[3] Remotely Piloted Systems – especially aerial vehicles – have demonstrated their effectiveness in conducting surveillance and attack missions thus qualifying as a "weapon of choice" for tracking and striking insurgents and terrorists in Iraq, Afghanistan and elsewhere.[4] The GWOT also featured the first field tests of Remotely Piloted Systems for ground operations (e.g. the armed MARCbot[5]), notably during the Iraqi counterinsurgency period in 2004-2008, nevertheless without the same success as it was never being fully implemented due to various reasons.[6]

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1. S. Kreps, M. Fuhrmann, & M. Horowitz, "Drone Proliferation in the Twenty-first Century," in A. Gheciu & W. Wohlforth, *The Oxford Handbook of International Security*, Oxford, Oxford University Press, 2018.

2. United States General Accouting Office, *DOD's Use Of Remotely Piloted Vehicle Technology Offers Opportunities For Saving Lives and Dollars*, Washington, DC, 1981.

3. J. Gertler, *U.S. Unmanned Aerial Systems*, Washington, DC, Congressional Research Service, 2012.

4. Between 2009-2016 former U.S President Barack Obama authorized about 473 drone strikes including Yemen, Pakistan and Somalia killing between 2,372 and 2,581 combatants (S. Shane, "Drone Strike Statistics Answer Few Questions, and Raise Many," *The New York Times*, 2016, July 4).

5. The Multi-Function Agile Remote-Controlled Robot (MARCbot) was entrepreneurially armed with jury-rigged claymores and deployed by a U.S. infantry to clear insurgents strongholds in urban terrain.

6. The Special Weapons Observation Remote Direct-Action System (SWORDS) – an armed TALON robot – was pulled out from the Iraqi battlefield due to mechanical aiming glitches (3 units were deployed with the U.S. Army's 3rd Infantry Division).

The porous border between civil and military technologies mainly contributed to drone proliferation. Their dual character, presenting a new regulatory challenge,[7] allowed for drone technology to be easily accessible on the market notably for non-state actors seeking air-based capabilities.[8] In the Middle East, more and more actors, including asymmetrical, non-state actors (e.g. Hezbollah, Hamas, ISIL[9]), have gained therefore access to RPS, either through off-the-shelf procurement, or domestically-built prototypes.

Today, a whole set of new capabilities has appeared on the battlefield which calls for understanding how much of a potential game-changer RPS are or will be. In the hands of non-state actors, Remotely Piloted Systems might become an essential element of asymmetric/hybrid warfare and tactics, blurring furthermore the line between conventional forces and insurgents, and transforming the lethality of future battlefields. In the air, as on the ground, the technological superiority long enjoyed by conventional military can be eroded due to the proliferation of asymmetric capabilities.

This paper aims to emphasize the emerging threat posed by the use of Remotely Piloted Systems by non-state actors operating in Syria and Iraq. This environment is interesting not only because it sees both state and non-state actors deploying RPS but it also underlines how this part of the world has become a place to study, elaborate and transform current doctrines and materiel. Accordingly, the Syria/Iraq theater of operations deserves a special interest for three main reasons:

– NATO member states, such as the United States and France, and NATO itself, in an indirect manner, have deployed their military assets in the fight against ISIL (Operation *Inherent Resolve*, Operation *Chammal*). Accordingly, these state actors did not only rely on RPS in conducting missions but also they have been exposed to RPS threat.[10]

– The same goes for other state actors, such as Russia and Iran, who used the same theater of operations as a training ground through a strong military involvement and resorted to drone warfare while fighting ISIL.[11] Consequently, it seems interesting to study how these actors have used their own systems and which lessons learned it draws for future conflicts.

– Finally, this paper comes in a context where the concept of Lethal Autonomous Weapons Systems (LAWS) is a subject of debate among international institutions, especially when regarding the concept of autonomy as well as its compliance with international laws.

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7. M. Schulzke, "Drone Proliferation and the Challenge of Regulating Dual-Use Technologies," *International Studies Review*, 2018, p. 1-21.

8. D. Gormley, "UAVs and Cruise Missiles as Possible Terrorist Weapons," in James Clay Moltz, ed., *New Challenges in Missile Proliferation, Missile Defense, and Space Security*, Occasional Paper No. 12, Monterey, CA, Monterey Institute's Center for Nonproliferation Studies, 2003, p. 3-9.

9. The Islamic State in Iraq and the Levant, commonly known as Daesh.

10. T. Gibbons-Neff, "ISIS drones are attacking U.S. troops and disrupting airstrikes in Raqqa, officials say," *The Washington Post*, 2017, June 14.

11. Russia and Iran were fighting ISIL as a part of the 4+1 Joint intelligence sharing cooperation which was established as early as September 2015. The alliance was comprised of four state actors (Russia, Iran, Iraq and Syria) as well Lebanon's Hezbollah.

Being a timely issue, studying RPS and their military implications help to design future trends in drone warfare. What happens in Syria and Iraq might be helpful to think how France, and generally speaking NATO and EU member states, should deal with this imminent and evolving threat, whether on the tactical, operational, or strategic levels, by taking into consideration the rapid proliferation of drone technology.

Defining the concept of Remotely Piloted Systems

The concept of Remotely Piloted Systems, is meant to embrace a wide of range tools, materiel, and technologies, unlike the term "drone" considered too broad and often confusing. Based on the existing definition of Remotely Piloted Aircraft Systems, already being used by the International Civil Aviation Organization (ICAO),[12] "Remotely Piloted Systems" are defined as a set of configurable elements consisting of a Remotely Piloted Vehicle (RPV), a Remote Pilot Station (RPS), a command and control (C2) link and any other system elements as may be required.

This definition replaces the earlier concept of Unmanned Systems,[13] which reinforced the popular fantasy of a fully autonomous and dehumanized system. On the contrary, RPS recall how dependent these systems are on human operators for conducting a number of tasks such as drone piloting, implementing sensors, analyzing collected data and maintenance.[14]

Nevertheless, one can further break down the nature and maturity of these systems, based on their accessibility as well as the required infrastructure/technological base to be produced/operated. Three separate groups of RPS appear:

i) hobbyist drones that are pre-assembled or assembled from components parts without the need for formal infrastructure or training to be operated,

ii) midsize military and commercial drones that are not generally available to individuals due to costs or infrastructure requirements yet, they can be sold or transferred to foreign militaries or non-state actors.

Finally, iii) large military specific drones – often including armed drones – requiring substantial military infrastructure to be operated and are not generally accessible by actors beyond major militaries. These systems represent a high level of technological sophistication, with a greater range, endurance and payload capacity than both hobbyist and midsize drones.[15]

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12. The International Civil Aviation Organization, *Remotely Piloted Aircraft System (RPAS) Concept of Operations for International IFR operations*, Montreal, 2017, p. 7.

13. It is worth noting that the ICAO considers RPAS as a subset of Unmanned Aerial Systems (UAS). The term UAS encompasses all aircraft flown without a pilot on board that operate as part of a larger system including both RPAS, autonomous aircraft and model aircraft. Autonomous aircraft differs from RPAS in that they do not permit intervention of a human pilot to fulfill their intended flight (The International Civil Aviation Organization, *Remotely Piloted Aircraft System (RPAS) Concept of Operations for International IFR operations*, *op. cit.*, p. 7).

14. J.-B. Jeangène Vilmer, preface in O. Entraygues, *L'Âge du drone*, Le Polémarque, 2017, p. 8.

15. K. Sayler, *A World of Proliferated Drones: A Technology Primer,* Washington, DC, Center for a New American Security, 2015, p. 5.

Rapid proliferation of drone technology around the globe, in both military and civilian spheres, allows these systems to be operated in at least 90 nations and by non-state actors.[16] This includes about 15 nations currently operating armed drones.[17] Additionally, numerous R&D efforts around the globe are focusing on introducing Remotely Piloted Systems in land warfare[18] (e.g. Russia's Uran-9, the US' Robotic Combat Vehicles) as well as in undersea warfare (e.g. DARPA's sea hunter).

With several regional tensions and military confrontations involving state and non-state actors, the Middle East proves to be a promising market for drone technology. However, the strict U.S. drone export control policy adopted under the Bush and Obama administrations, aimed at preventing drones from falling in hostile hands, being used in suppressing civil unrest or even eroding Israel's military dominance[19] has pushed some U.S. middle eastern allies to resort to other drone exporting nations, such as China[20] and Israel, or to produce their own Remotely Piloted Systems (e.g. Emirates, and Turkey) as shown in table 1 below.

Besides, drone technology is seen as a "must-have" for today's modern militaries[21] while other nations, such as Iran, have chosen drone warfare as their "*fer de lance*" to achieve some kind of military competitiveness. Additionally, the regional ambitions of these countries have led to the proliferation of asymmetric military means, including drone technology, to some non-state actors. This includes the Lebanese Hezbollah, who can be qualified as an early adopter as it was the first non-state actor to operate, since 2004, a military sized Remotely Piloted Systems for conducting surveillance and attack missions.

16. M. Horowitz, S. Kreps, & M. Fuhrmann, "Separating Fact from Fiction in the Debate over Drone Proliferation," *International Security*, 41(2), 2016, p. 11.

17. Drone Wars UK, *Who has Armed Drones?*, 2019, June.

18. In July 2019, the U.S. Army Futures Command have declared their intention to develop an optionally-manned fighting vehicle, aimed at replacing the Bradley Infantry Fighting Vehicle, as well as variety of small medium and large Robotic Combat Vehicles (RCV) (P. Tucker, "Robot Roadmap: US Army's Newest Command Sketches Priorities," *Defense One*, 2019, July 21 [retrieved July 2019]).

19. A. Bassiri Tabrizi, & J. Bronk, *Armed Drones in the Middle East Proliferation and Norms in the Region*, London, Royal United Services Institute for Defence and Security Studies, 2018.

20. China has benefitted from this context to establish itself as an increasingly influential player in the market, thus exporting its drones to several middle Eastern countries such as Iraq, Saudi Arabia, the United Arab Emirates and Jordan. However, the adoption of Chinese drones has met with mix results due their incompatibility with western supplied C2 and ISR systems (A. Bassiri Tabrizi, & J. Bronk, *Armed Drones in the Middle East Proliferation and Norms in the Region, op. cit.*).

21. U. Franke, "The global diffusion of unmanned aerial vehicles (UAVs), or 'drones'," in M. Aaronson, W. Aslam, T. Dyson, & R. Rauxloh, *Precision Strike Warfare and International Intervention Strategic, Ethico-Legal and Decisional Implications*, Oxon, Routledge, 2015, p. 264.

Table 1

Non exhaustive list of drones operated in the Middle East by state and non-state actors[22]

Drone	Type	Country of Origin	Operators	Comments
CH-4	Reconnaissance/ attack	China CASC	Egypt (CH-4B)	
			Iraq (CH-4B)	Made its first combat mission in October 2015 against ISIL militants in the Anbar province
			Jordan (CH-4B)	Unveiled in May 2018, but procured in 2016
			United Arab Emirates	
			Saudi Arabia	CH-4 drones would be built in Saudi Arabia as a part of a partnership agreement signed between the King Abdul-Aziz City for Science and technology with China's Aerospace Science and Technology Corporation (CASC)
Wing Loong	Reconnaissance/ attack	China AVIC	Egypt	Revealed by the Egyptian army on 14 October 2018 during the Egyptian Air Force's 45th anniversary
			Saudi Arabia	Exported to Saudi Arabia in 2014
			United Arab Emirates	The first variant of the Wing Loong has been sold to the UAE in 2011 Considered as the launch customer for the Wing Loong II, the UAE has been operating the system since October 2017 in the ongoing conflict in Yemen as well as in Libya where it provides air support for the LNA from the Al Khadim base
IAI Harop	Reconnaissance/ loitering munition	Israel	Israel	Destroyed a Syrian Pantsyr S-1 (SA-22) in May 2018
IAI Heron	Reconnaissance	Israel	Israel	Israeli Heron drones were allegedly spotted in south Turkey in assistance to the PKK
			Turkey	
Shahed-129	Reconnaissance/ attack	Iran	Iran	Firstly reported in Syrian 2014 during a surveillance mission, the Shahed was reported to be carrying a strike mission since February 2016. Ever since, several Shahed have been shot down by US forces in Syria
			Syria*	
			Hezbollah*	
Ababil	Reconnaissance	Iran	Iran	
			Hezbollah	Has been operating variants of the Ababil since the 2006 confrontation with Israel
			Yemen	The Houthis and their allies (Saleh aligned forces) are reported to operate variants of the Ababil (dubbed Qasef-1) against the Arab coalition
			Syria	
			Hamas	Hamas has flown variants of the Ababil over Gaza during its first public demonstration in July 2014

22. Compiled by Authors. It is worth mentioning that drones deployed by the United States and Russia in the Region (whether in Hmeimym or Al-Udeid) were not mentioned due to the fact that these systems could be deployed elsewhere.

Mohajer	Reconnaissance	Iran	Syria	Operated by the Syrian Army since February 2012 to track the Free Syrian Army rebels into their strongholds in Homs and Hamah
			Hezbollah	Operated since November 2004 for reconnaissance missions over Israeli territories (dubbed Mirsad-1)
Saegheh	Reconnaissance/ attack	Iran	Iran	Operated by the Islamic Revolutionary Guard Corps (IRGC) from the Syrian T-4 Airbase, the Saegheh's incursion into the Israeli airspace was the main reason leading to the February 2018 Israel - Syria incident. This led to the downing of an Israeli F-16 by Syrian air defenses as well as the destruction of a number of Syrian Air defenses sites
Yasir	Reconnaissance	Iran	Iran	
			Syria	The Yasir made its first documented appearances in the Syrian sky in November 2013
			Hezbollah*	
			Iraqi PMU factions	Several People Mobilization Unit (PMU) factions, including kataeb Hezbollah al Nujaba, have received a number of Yasir Remotely Piloted Systems
Anka S	Reconnaissance/ attack	Turkey	Turkey	The Anka S undertook its first strike mission against the Kurdistan Workers' party (PKK) on July 12 2017
Bayraktar-TB2	Reconnaissance/ attack	Turkey	Turkey	Recorded its first kill on September 2016, during an operation against the PKK
			Qatar	Qatar became the first country to procure the Bayraktar drones under a contract signed on march 2018 covering military vehicles, ships as well as six Bayraktar TB-2 drones
			Libya	At least 3 Bayraktar TB-2 drones are allegedly operated by GNA-aligned forces from the Mitiga airport as well as from the Misrata airbase
Yabhon United 40	Reconnaissance/ attack	United Arab Emirates	United Arab Emirates	
			Russia*	In 2013, the Russian Ministry of Defense considered the procurement of "*at least two United 40 Block 5 models*"
ScanEagle	Reconnaissance	United States	Iraq	Contract awarded for Boeing on august 2016 for a total of six systems
DJI Phantom Qadcopter	Reconnaissance	China	Syria	Believed to be used by several rebels factions as well as by Syrian governmental troops in reconnaissance missions
			ISIL	ISIL used a modified version of the DJI drone for reconnaissance missions. Broadcasted images also served for propaganda purposes
			Hezbollah	
Skywalker Drones	Reconnaissance/ attack	China	ISIL	ISIL modernized its variants of the Skywalker drones to drop explosives

* Alleged User.

Hezbollah: An "early adopter"

The Lebanon-based militant group Hezbollah is considered to have the longest history in operating Remotely Piloted Systems for a non-state organization. Hezbollah's first successful deployments, conducted on November 2004 and April 2005, consisted in short-range ISR missions over northern parts of Israel using an updated version of the Iranian Mohajer drone[23] dubbed (Mirsad-1[24]). During these deployments, Mirsad-1 managed to elude Israeli air defense systems, unable to engage small slow-moving targets back then, before returning going to base. This success marked a first use of drones by a non-state actor against a sovereign state and opened the door for a whole set of capabilities that could be deployed on the battlefield.

In 2006, the 34-day confrontation between Hezbollah and Israel Defense Forces was an opportunity for the militant group to demonstrate its transition from being a non-state actor with irregular capabilities to a state-sponsored actor capable of deploying hybrid capabilities.[25] Hezbollah's drone warfare means benefited among other capabilities[26] from this transition since, unlike previous occasions, drones were intended to be used for offensive purposes during the second Lebanon war. Accordingly, the militant group deployed in August 2006 three Ababil Drones, each carrying a 40-50 kilogram warhead, with the aim of using them as a poor man's cruise missile against Israeli strategic assets.[27]

Hence, Hezbollah's drone capabilities have set a new precedent for non-state actors. Their accumulated experience and know-how was later on passed to other Iranian-backed actors such as i) Al Qassam Brigades, the military wing of the Palestinian organization Hamas, who started deploying its Ababil-1 drones for ISR missions since Operation *Protective Edge* in 2014,[28] as well as ii) the Houthis who deployed their Qasef-1 drones[29] against the Saudi-led coalition's Patriot missile systems as well as some Saudi strategic assets (e.g. Saudi Aramco oil refineries in the Jizan province[30]). However, Hezbollah's drone capabilities gained significantly during its direct involvement in the Syrian conflict.

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23. Iranian drones were previously used for reconnaissance, and some strike, missions during the first Gulf War using the first generation of the Mohajer drones (Mashreghnews, "Exploring the unknown role of talash and mohajer drones during karbala-5 and dawn-8," 2011, October 10).

24. M. Hoenig, "Hezbollah and the Use of Drones as a Weapon of Terrorism," *Public Interest Report,* 67(2), 5, 2014, Spring.

25. D. Johnson, *Military Capabilities for Hybrid War Insights from the Israel Defense Forces in Lebanon and Gaza,* Santa Monica, RAND Corporation, 2010.

26. The evolution in Hezbollah's military capabilities also included the possession of long and medium-range rockets as well as ballistic missiles it received from Iran and Syria. Additionally, the organization received several C-802 anti-ship missiles from Iran (B.-J. Uri, "Israel's Military Intelligence Performance in the Second Lebanon War," *International Journal of Intelligence and CounterIntelligence,* 20(4), 2007, p. 583-601).

27. B. Lambeth, *Air operations in Israel's war against Hezbollah: learning from Lebanon and getting it right in Gaza*, Santa Monica, RAND Corporation, 2011.

28. C. Abbott, M. Clarke, S. Hathorn, & S. Hickie, *Hostile drones: The use of civilian drones by non-state actors against British targets*, London, Remote Control Project, 2016.

29. According to a CAR report, the Qasef-1 drone is believed to be Iranian-manufactured as it shares a number of similarities in terms of design and construction with the Ababil-CH/Ababil-T drones manufactured by Iran's Aircraft Manufacturing Industrial Company (Conflict Armament Research, *Iranian Technology Transfers To Yemen,* London, Conflict Armament Research, 2017).

30. S. Kalin, & S. Dadouch, "Saudi says it shot down Houthi missiles over Riyadh and southern cities," Reuters, 2018, April 11 (retrieved April 16, 2018).

DRONE WARFARE IN THE LEVANT FOLLOWING THE SYRIAN CRISIS

The Syrian Crisis, with its ramifications and implications, has mutated from a local armed conflict to an international power struggle involving several regional and international actors. It also witnessed the rise of the Islamic State in Iraq and the Levant as a new regional security threat. Additionally, the multilateral involvement in the Syrian crisis, whether it concerns state actors (Russia, the US, Turkey) or non-state actors (Hezbollah, IRGC, ISIL) took at someplace the form of military engagement. The latter implied the involvement of various tactics and strategies including drone warfare.

To understand the logic and the whereabouts of some of the actors involved in the conflict, a closer look to the *modus operandi* of three actors involved in the Syria Iraq theater of operations is worth: ISIL, Hezbollah, and the Russian conventional forces.

ISIL in Iraq/Syria

The Islamic State in Iraq and the Levant has resorted to "innovative terrorism"[31] on the battlefield to extend its presence over Syrian and Iraqi territories. The non-state actor stressed on the importance of Remotely Piloted Systems' deployment as well as on their operational effects on the battlefield, whether it concerns the group's communication and/or military tactics.

Accordingly, ISIL established a formal, institutionalized and resourced drone program as early as 2015.[32] Under the latter, numerous fixed-wing (mainly Skywalker X8) and quadcopter drones (mainly DJI Phantom) were procured on the civilian market before being heavily modified and modernized. These upgrades provided the ability to conduct reconnaissance missions, using high-quality cameras, as well as dropping explosives.[33]

ISIL's drone warfare capabilities were officially demonstrated on 23 August 2014, when a modified DJI Phantom FC40 quadcopter, was deployed on a reconnaissance mission against a Syrian army base in northern Syria prior to a ground assault. Remotely Piloted Systems also provided real-time imagery of ISIL's attacks on Fallujah, Iraq (August 2014) and later on during the attacks on Kobani, Syria (September 2014). Captured images primarily served at that moment for both their Command, Control, and Communication (C3I) structure as well as for online propaganda purpose.

Additionally, Remotely Piloted Systems played a non-negligible role in ISIL's offensive tactics as they served in curbing the opposing forces 'offensive as well as inflicting casualties/material damage. The group's first drone attack was carried out on September 2016

31. S. Balkan, *Daesh's drone strategy: Technology and the rise of innovative terrorism,* Ankara, SETA Foundation For Political, Economic and Social Research, 2017.

32. D. Rassler, M. Al-Ubaydi, & V. Mironova, *The Islamic State's Drone Documents: Management, Acquisitions, and DIY Tradecraft*, Combating Terrorism Center at West Point, 2017, January 31, p. 7.

33. *Ibid.*

against Turkish troops carrying out Operation *Euphrates Shield*.[34] It was shortly followed by the detonation of an improvised explosive device (IED) planted inside a drone that was encountered by Peshmerga units in the city of Mosul. The detonation resulted in the death of two Peshmergas troops and the serious wounding of two French Special Forces units.[35] It is worth notifying that ISIL's drone deployment has been intensified since the first quarter of 2016 notably with the multiplication of battlefronts.[36]

Hence, the rise of ISIL as a new regional security threat and its use of drone warfare as a pillar of its asymmetric/hybrid tactics proved the importance of this type of technology for asymmetrical, non-state actors as well as the effects of dual technologies on drone proliferation. However, ISIL was not the only actors witnessing an evolution of its military tactics on the Syrian battleground.

Hezbollah's military transformation in Syria

Hezbollah's direct military involvement in Syria has had a major impact on its military transformation. As of now, the organization is maintaining thousands of personnel in Syria on multiple fronts fighting alongside the Syrian army, the IRGC, Iraqi groups and, starting September 2015, the Russian army. The complexity of the Syrian theater of operations allowed for Hezbollah to gain significant military experience including its drone warfare capabilities.

Accordingly, Hezbollah carried out on 21 September 2014, its first aerial strike, using an Ababil-3 drone, against a Jabhat al-Nusra command post located on the Lebanese-Syrian border. The airstrike was probably carried out from a newly established airbase, located in the northern Bekaa Valley,[37] designed to accommodate Iranian-made drones such as Ababil-3 and the Shahed-129 (already being operated by the IRGC). This event, illustrating Hezbollah's technological leap in terms of drone warfare capabilities, marked two major developments: i) the group's ability in conducting airstrikes using a Remotely Piloted System, thus reinforcing its "early adopter" status and ii) the fact that the attack has been orchestrated against another non-state actor.[38]

The nature of the conflict pushed the non-state actor to resort to off-the-shelf drones in order to carry out some over-the-hill reconnaissance missions in Syria's battlefields as well as some remote bombing attacks.[39] Moreover, Hezbollah's close coordination with IRGC,

34. S. Balkan, *Daesh's drone strategy: Technology and the rise of innovative terrorism*, *op. cit.*, p. 10.

35. N. Guilbert, "Irak : Paris confirme qu'un drone piégé a blessé deux membres des forces spéciales françaises à Erbil," *Le Monde*, 2016, October 11 (retrieved July 2019).

36. The Peak of ISIL's drone threat occurred in spring 2017. At that time the militant group was conducting between 60 and more than 100 aerial drone bombing attack per month, spread across both Iraq and Syria (D. Rassler, *The Islamic State and Drones: Supply, Scale and Future Threats*, Combatting Terrorism Center at West Point, 2018, p. 4).

37. A. Rosen, *Here's Hezbollah's game-changing secret drone base*, Business Insider France, 2015, April 24 (retrieved March 11, 2018).

38. E. Santoro, & A. Plaw, "Hezbollah's Drone Program Sets Precedents for Non-State Actors," *Terrorism Monitor*, XV(21), 2017, November 10, p. 3.

39. As it was the case on August 2016 when a modified quadcopter dropped two Chinese-made MZD-2 sub-munition bombs over rebel positions in northern Syria (J. Ari Gross, "Video appears to confirm use of attack drones by Hezbollah," *The Times of Israel*, 2016, August 11 [retrieved March 11, 2018]).

the Syrian army, and the Russian forces is allowing it to draw the necessary lessons from their drone missions, alongside its own, to get a better understanding of drone warfare.[40] Accordingly, Hezbollah's drone operators will become more familiar with their systems, including their capabilities and limits, while commanders will likely be more adept at coordinating drones' deployments alongside grounds forces as well as improving battlefield intelligence. The latter would be possible through better analysis and the incorporation of drone imagery with other sources of intelligence (SIGINT/ELINT/OSINT).[41]

Russian intervention in Syria: a drone perspective

Following the war with Georgia in 2008, the Russian forces' post-conflict assessment acknowledged the importance of Remotely Piloted Systems in modern warfare. The key shortfalls and issues identified during the week-long conflict[42] included poor interoperability between different army corps (notably between the air force and ground troops), poor communication capabilities and the low resolution of Russian reconnaissance systems, especially drones.[43]

The Russian Ministry of Defense addressed the situation by trying to reduce its technological and operational gaps, especially when compared with its western counterparts. In this perspective, Russia's domestic drone development strategy turned to complement indigenous efforts with foreign technology acquisition, notably from Israel, to accelerate the development of domestically-built drones.[44] This strategy was illustrated through a $400 million signed agreement between IAI and Oboronprom that would allow for the latter to produce under license the Bird-Eye 400 (Zastava) and Searcher MK II drones (Forpost).[45]

At the same moment, the Russian army increased its reliance on Remotely Piloted Systems by stepping-up the number of military exercises involving these systems as well as the number of drone deployments, which was doubled between 2013 and 2014.[46] Results began to show up a few years later when Russian forces covertly used drones, notably the Orlan-10, in support of the insurgents fighting in eastern Ukraine. The displayed tactics in eastern Ukraine showed a sophisticated integration of drones, electronic warfare, and artillery which presented major challenges for the Ukrainian forces.[47] The massive use of drones

40. N. Pollak, *The Transformation of Hezbollah by Its Involvement in Syria,* Washington, DC, The Washington Institute for Near East Policy, 2016, August.

41. *Ibid.*

42. During the 2008 conflict with Georgia, the lack of reliable drones and satellite imagery led the Russian air force to send a Tu-22 bomber in a reconnaissance mission deep into Georgian territory where is was shot down by Georgian air defenses.

43. A. Cohen, & R. Hamilton, *The Russian Military And The Georgia War: Lessons And Implications,* U.S. Army War College/Strategic Studies Institute, 2011, p. 49.

44. I. Facon, *Proliferated Drones: A Perspective on Russia,* Center for a New American Security, Washington, DC, 2016.

45. It is worth mentioning that Russia also tried to procure medium altitude long endurance (MALE)-class Heron drones from Israel. However, this proposal was rejected due to American pressure as well as to the consequences this deal could've had on Israel's' arms exports to Russia's neighbors.

46. I. Facon, *Proliferated Drones: A Perspective on Russia, op. cit.*

47. J. Gould, "Interview: US Army Europe's Lt. Gen. Ben Hodges," Defensenews, 2015, August 18 (retrieved September 28, 2018).

to spot for artillery or for reconnaissance led to an increasingly challenged and contested airspace, where Russians proved how effective and deadly the combination between spotting and firing all-out barrage.[48]

The following engagement of Russian forces next to the Syrian army, starting September 2015, was considered an opportunity to put into practice untested tactics against non-state actors, to test new systems and to draw lessons from both allies and opponents' experience when regarding drone warfare.[49]

The Russian drone fleet in Syria was primarily comprised of Orlan-10 and Forpost drones.[50] Their primary role consisted of conducting ISR missions, due to the lack of a drone strike capability, which included target reconnaissance prior to airstrikes as well as conducting battle-damage assessments.[51] Drones also served as airborne spotters for both Russian and Syrian artillery systems such as long-range MLR systems (i.e. Smerch) as well as sub-strategic missiles (i.e Kalibr cruise missiles) since both systems have been equipped with automated artillery fire control systems.[52] Other missions included collecting aerial imagery and 3-D mapping in support of humanitarian convoys and S&R operations. Orlan-10 Drones proved to be efficient in quickly locating and extracting a surviving Russian pilot from a mountainous rebel-held area near the Turkish border after a Turkish fighter jet downed his Su-24M2 bomber jet. It is worth noting that most missions were conducted using the heavier Forpost drones due to its more powerful optics. This allowed the observation of high-value targets from higher altitudes thus avoiding the risk of detection by enemy forces as lighter drones, such as the Orlan-10, needed to fly at a lower altitude for similar results.[53]

Additionally, the Syrian theater of operations was considered as an opportunity to test Russia's latest land systems, ranging from the BMPT Terminator to Remotely Piloted Systems. This was illustrated by the first deployment of the Uran-6 mine clearance vehicle by the Russian combat engineer detachment in Palmyra following its liberation from ISIL. The Russian Ministry of Defense also acknowledged the deployment of the Uran-9 combat system in Syria following the publication of several conflicting regarding its publication.[54]

Uran-9's deployment did not only allow testing its capabilities in real combat scenarios but also witnessing its problems and deficiencies.[55] Russian operators noted that

48. S. Freedberg, *Russian Drone Threat: Army Seeks Ukraine Lessons*, Breaking Defense, 2015, October 14 (retrieved July 2019).

49. P. Hilsman, "How Israeli-Designed Drones Became Russia's Eyes In The Sky For Defending Bashar Al-Assad," *The Intercept*, 2019, July 16 (retrieved July 2019).

50. Russian version of the Searcher MK II drone developed by Israel's IAI.

51. Center for Analysis of Strategies and Technologies, *Russian UAVs in Syria,* Moscow, 2017.

52. *Ibid.*

53. *Ibid.*

54. The only instance documenting the Uran-9 participation in Syria is a blurry video published by Hezbollah's Military Media Center in which some analyst confused the Uran-9 profile with that of a T-62M (also provided to the Syrian army) Source: K. Atherton, "Russia confirms its armed robot tank was in Syria," C4ISRNET, 2018, May 7 (retrieved May 10, 2018).

55. The Uran-9 deficiencies were revealed by A.P. Anisimov, a Senior Research Officer from the 3rd Central Research Institute (Russian MoD), during discussions held at a Russian security conference entitled "Actual Problems of Protection and Security".

Uran-9 was not capable of performing the tasks it was designed for in combat operations. This was mainly due to its short control distance (300 to 500 meters instead of the rumored 3 km range especially in dense urban areas), the loss of control over the vehicles, chassis related issues (that lead to forced in-field repairs) and sensors related issues (causing the inability to identify, track and engage targets located no further than 2 kilometers away).[56]

Finally, Russians benefited from their allies' drone warfare experience notably when it came to the deployment of armed drones, currently lacking in their inventory. This was the case of Iran who operated, via its IRGC, several Remotely Piloted Systems (e.g Shahed-129 and Ababil) from the T4 Airbase located in Homs. In this perspective, the cooperation between both countries, starting in October 2013,[57] allowed Russia to evaluate a number of Iranian systems and probably benefit from Iranian drone technologies with the aim of developing a Russian drone strike capability.[58]

THE DEPLOYMENT OF REMOTELY PILOTED SYSTEMS BY NON-STATE ACTORS: ASSESSMENTS AND RECOMMENDATIONS

Following the examination of the Remotely Piloted Systems' deployment by non-state actors in the Syria/Iraq theater of operations, a number of assessments should be made regarding the capabilities conferred by this kind of systems on the battleground.

ISR Missions

Considered as a primary mission, Remotely Piloted Systems were deployed by non-state actors to conduct reconnaissance missions over military facilities and units. Hezbollah has been conducting several ISR missions over Israeli territories since 2004 while ISIL deployed his drones over Syrian and Iraqi military bases before shelling the area or conducting a ground assault.

Additionally, drones have been deployed by ISIL for real-time surveillance to conduct suicide attacks with high precision. Accordingly, instructions provided by drone operators over protected areas allowed for VBIED drivers to navigate through labyrinth caused by security measures and to reach their targets.

56. Defense Blog, "Combat tests in Syria brought to light deficiencies of Russian unmanned mini-tank," 2018, June 18 (retrieved June 20, 2018).

57. V. Karnozov, "Russia and Iran Cooperate on UAVs, UCAVs," AINonline, 2017, June 15 (retrieved March 1, 2018).

58. The acquisition of Iranian drone technology is primarily due to the striking resemblance between Shahed-129 and the Orion-E drones, as the latter was unveiled during the international aviation and Space Salon MAKS-2017 (J. Kester, "Russian Drone Tech May Include Help From Iran," *Foreign policy*, 2017, May 10 [retrieved July 2019]).

PSYOPS and propaganda

Remotely Piloted systems have proved to be an efficient tool for psychological warfare. Accordingly, Hezbollah's drone deployment over Israeli territories was meant to signal that the constant violation of the Lebanese airspace by Israel was not to be tolerated and that the group had the means to retaliate. Similarly, further drone deployments conducted by Hamas (drone demonstration in July 2014[59]) and Hezbollah (drone reconnaissance of the Demona nuclear weapons complex in October 2012) were aimed at sending a warning message to Israel confirming their possession of armed drones capable of targeting strategic assets. This warning message was mainly meant to threaten Israel for deterrence and behavioral changing purposes.[60]

Drones were also used as ISIL's main propaganda tools as they serve to capture video imagery of suicide bombing as well as ground attacks on several cities in Syria and Iraq. These videos were formerly uploaded on the group's main media for propaganda purposes.

Suicide missions/IED delivery platform

Acting like a poor man's cruise missile, Remotely Piloted systems could be used as IED delivery platforms. As previously mentioned, Hezbollah attempted targeting Israeli strategic assets using drones equipped with explosive payloads. Similarly, ISIL used this *modus operandi* to target Peshmergas and Turkish troops.[61]

Consequently, drones could be used to target the opposing forces' center of gravity. This capability may improve/ evolve if combined with a swarming factor in a context where new technologies would allow to simultaneously control multiple units.

Drones as Strike platforms

The Use of Remotely Piloted Systems in its weaponized version and thus as strike platforms is considered as a way for non-state actors to compensate for the lack an air force and to mimic the far more robust drone capabilities already being operated by technologically superior states. The presence of this type of capabilities in the hand of non-actors marks another step in terms of asymmetric and hybrid capabilities.

Accordingly, Hezbollah's drone strike capabilities marked a new leap its military evolution as it demonstrated its abilities in providing the necessary infrastructure and manpower, usually used on a state level, for fielding this type of technology. Similarly, ISIL's Remotely Piloted Systems deployment was efficiently incorporated into its asymmetric

59. I. Kershner, & P. Lyons, "Hamas Publishes Photo of a Drone It Says It Built," *The New York Times*, 2014, July 14.
60. R. Bunker, *Terrorist and Insurgent Unmanned Aerial Vehicles: Use, Potentials, and Military Implications,* U.S. Army War College/Strategic Studies Institute, 2015.
61. U. Franke, "Flying IEDS: The Next Big Threat?," *War On The Rocks*, 2016, October 13.

warfare doctrine.[62] Drone attacks were primarily conducted with the aim of confusing enemy troops thus disrupting their counter-insurgency tactics. Dropped ammunition occasionally inflicted casualties among opposing forces and even disabled military hardware thus rendering them ineffective in the fight. ISIL also coupled coordinated its drones and VBIED attacks, with the latter being also coordinated by a drone operator, against withdrawing units to increase the number of casualties.

It is worth noting that the drone attack orchestrated on January 2018 against Russia's main airbase in Northwestern Syria could represent a future trend in the deployment Remotely Piloted Systems by non-state actors as it had three main characteristics: i) the ability to deploy a drone swarm aimed at launching an assault wave against a single target, ii) the inability to neither identify the accountable actors, as the attack hasn't been claimed by any armed groups in Syria, nor the exact location from which drones where originally launched[63] and iii) the origin of the Remotely Piloted Systems, used the attacks, marks a new potential trend in insurgency practices. This comes in a context where some press reports have mentioned that a seller in a rebel social media arms market based in Idlib has posted an advertisement for drones sharing similarities in terms of design and ammunitions with those used in the Hmeymim attack.[64]

This first of a kind practice has the potential to evolve into a future trend in terms of national security challenges. One of the possible scenarios consists in the establishment of a drone black market from which any group or individual, willing to commit destabilizing attacks, can be equipped. Therefore, the scenario, under which an unknown actor carrying out a drone attack against a governmental or a military target, should be seriously considered.

RECOMMENDATIONS

This series of observations and analysis of major trends in Remotely Piloted systems' deployment by non-state actors in the Syria and Iraq should lead to a set of recommendations in a context where France, NATO and EU militaries might face similar threats while being engaged in future theaters of operations.

Recent history underlines that prior intellectual preparation and doctrinal integration seem essential to counter the threat of the use of drones systems; the IAF's approach during the second Lebanon war offers a brilliant case study in intercepting and downing Hezbollah's Ababil[65] drones before they had reached their respective targets. The success

62. D. Rassler, M. Al-Ubaydi, & V. Mironova, *The Islamic State's Drone Documents: Management, Acquisitions, and DIY Tradecraft*, *op. cit.*

63. The Russian defense ministry official Krasnaya Zvezda newspaper mentioned that drones were most probably launched from muazzara village, in southern Idlib, which is controlled by "moderate rebels".

64. A. Rawnsley, & C. Triebert, "Black Market Sold Drones Used in Russian Base Attack," *Daily Beast*, 2018, January 10 (retrieved April 26, 2018).

65. Two of the Ababils were downed over Israel's northern territory (one on the outskirts of Haifa and another in Western Galilee) while the third, launched on August 13th, ended up crashing inside Lebanon near Tyre (B. Lambeth, *Air operations in Israel's war against Hezbollah: learning from Lebanon and getting it right in Gaza*, *op. cit.*).

of Israeli air-to-air engagements, a first in the IAF's history[66] is attributed to two factors: i) A prior knowledge of Hezbollah's potential drone capabilities which implied on the Israeli side to take some preemptive measures such as the deployment of F-15 and F-16 CAP,[67] near the Lebanese borders, to intercept potential drone incursions and ii) the extensive work done by IAF tacticians, who developed specific tactics and technics allowing to counter this type of threats.

Accordingly, these recommendations would imply numerous changes on the strategic, tactical and operational levels.

Re-adapting military tactics

The deployment of Remotely Piloted systems by non-state actors in Syria and Iraq proved that they can confer offensive and defensive capabilities. As previously mentioned, ISIL's *modus operandi* in terms of drone deployment proved their ability in curbing the opposing forces' momentum, whether by inflicting casualties and/or disabling military hardware, thus causing the postponement or canceling of a potential military operation.

However, current Tactics, Techniques and Procedures (TTP) adopted by NATO countries seem to insufficiently take into account new capabilities being acquired by non-state actors, notably in terms of drone warfare. Therefore, NATO members should work on a new set of military tactics/strategies that would allow coping with emerging threats in the context of drone technology proliferation.

Generally speaking, countering Remotely Piloted Systems is always seen through a particular lens. Accordingly, a recently released document by the U.S. Army provided planning considerations for defending against "LLS[68] air threats" during operations.[69] The document, emphasizing on the "overwhelming effects on maneuver forces" caused by an RPS' mass deployment by enemy forces calls for a series of quick adaptation procedures such as:

– Training the force to recognize and neutralize RPS threat before the attack. If the attack is imminent, the force must be trained to quickly use the right countermeasures available to defeat or to degrade the effects of the potential attack.

– Implementing passive defense measures aimed at deceiving enemy observation. This includes camouflage, cover, concealment, and hardening.

– Conducting collaborative and integrated planning of sensors and warning capabilities as well as shared intelligence to detect, identify and confirm the threat posed by RPS.

66. It is worth mentioning that the IAF's downing of the Ababil was not the first time a combat aircraft managed to engage and shoot down a UAV. The first encounter of this type goes back to 2003 when an Iraqi MiG-25 downed a U.S. Air Force RQ-1 Predator during Operation Southern Focus.

67. Combat Air Patrols.

68. Low Slow and Small.

69. The United States Army, *Army Techniques Publication (ATP) 3-01.81 Counter-Unmanned Aircraft System (C-UAS) Techniques*, 2017, April (retrieved July 2019).

– Ensuring efficient airspace management for updated intelligence and defense support to minimize potential casualties/material damage.

Consequently, the possibility of an asymmetric low-level air threat has to be taken into consideration when deployed in future theaters of operations. This calls for the reintroduction of some All-Arms Air Defense (AAAD)[70] tools and techniques once practiced by all soldiers.

Boosting R&D strategy and efforts on counter-drone systems

The deployment of Remotely Piloted systems by non-state actors in Syria and Iraq has emerged as a new form of threats that needed to be immediately dealt with in a scenario similar to the one leading to the rapid deployment of MRAP vehicles on the battlefield following the emergence of IED threat in Iraq and Afghanistan.

Accordingly, the emerged threat has led to a surge in terms of anti-drone solutions, mostly based soft-kill electronics attacks.[71] However, the "standalone" solutions are considered to be inefficient in this "cat and mouse game" as they require to locate and target drone individually, thus making it unsuccessful against a swarming pattern. Current anti-drone solutions are also considered as short term solutions because the rapid evolution of drone technology will render them resistant against this type of counter-measures. Also, military history showed that the development and implementation of efficient counter-measures usually necessitates a decent amount of time and resources. This explains the innovative approach adopted by some defense institutions, such as DASA,[72] to accelerate this process by organizing a 2 million pound competition aimed at finding a counter-drone solution.[73] Furthermore, current solutions are prioritizing the aerial segment of drone warfare without taking into consideration potential land or sea threats.

Therefore, it would be essential for NATO members to mutualize efforts and establish a joint R&D strategy focused on anti-drone solutions. Such projects being tackled by both military and civilian companies, could call for further mutualization, such as pooling and sharing, in the framework of existing mechanisms such as PESCO, on the European level, or even through NATO's Defense Planning Process, that helps countries to identify and then acquire critically needed capabilities. Research efforts should also be oriented towards multi-layered solutions as their efficiency has been demonstrated by the Russian experience in Hmeymim. Accordingly, Russian forces managed to counter the threat of a swarming drone attack by relying on a multilayered defense system comprised of short-range ground-to-air defense systems (mainly Pantsyr-S1 systems), electronic warfare systems (krasukha-4[74]) , and cyber warfare to neutralize or land the drones (six drones out of

70. Also known as LATTA (Lutte Antiaérienne des Troupes Toutes Armes) in the French army.
71. The "soft kill" approach aims at disrupting the signal received by the drone thus causing it to fall.
72. The UK's Defense And Security Accelerator.
73. G. Corfield, "MoD plonks down £2m on table in exchange for anti-drone tech ideas," *The register*, 2019, April 9 (retrieved July 2019).
74. Krasukha-4 ground based EW system has been deployed on October 2015 while other assets such as *khibiny* and *Leer-3* may have been moved in and out in support of operations or to experiment with the A2/AD mix (R. Mc-

thirteen were intercepted and taken control by Russian electronic warfare assets among which three landed successfully).

This paper provides an overview of a current security debate which tries to address the issue from a renewed perspective. Whether the discussion about Remotely Piloted Systems usually tackles their use by conventional forces and military, this paper covers their use and deployments by asymmetrical, non-state actors in Syria and Iraq. This analysis demonstrates the increasing level of threat posed by these systems, due to the proliferation and maturation of this technology. Accordingly, France, NATO and EU member state should take the appropriate measures on the tactical, operational and strategic levels to understand how this type of threats might impact their future operations. The superior technology on which the West has long stood is more and more fragile, even in domains that were once its sole preserve. But above all, what is currently at stake is a change of paradigm as non-state actors possess the ability to challenge our military in every military-recognized domain. Following two decades of air supremacy, troops have almost forgotten the meaning of being threatened from the skies. Accordingly, the use of RPS by non-state actors further erodes our military might and calls for a mandatory adaptation.

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