Iran's "UAV Army" – A Global Threat

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****on the front page – an aerial image taken from an Iranian UAV above Shayrat airport in Syria**

What goes on in the Middle East doesn't stay in the Middle East

The purpose of this special report is to present the existing threat deriving from the Iranian "UAV army" in the Middle East. In addition to the direct use of the "UAV Army" by the Iranians themselves, the threat manifests itself in the extent of the arsenal, the deployment and accessibility of "UAV army" for use by Iran's proxies in Lebanon (Hezbollah and Hamas), in Syria (Hezbollah and Shiite axis militias), in Iraq (Shiite axis militias), in Yemen (Houthis) and in the Gaza Strip (Hamas and Islamic Jihad).

It's worth mentioning that Iranian UAVs also operate on the African continent and south of the United States. Venezuela is known to have UAVs ostensibly produced locally, but in reality, they are Iranian UAVs. These drones are used to secure their oil fields and belong to the Mohajer 6 and Mohajer N2 type model.

The Venezuelan UAV is an Iranian Mohajer 6 UAV. It has a flight duration capacity of 12 hours, a flight velocity of 200 km/h, and a flight range of 2000 km (GPS-based). The Mohajer 6 has the ability to carry precision armaments.

Figure 1 The Venezuelan Mohajer 6 UAV

We'll mention that Venezuela, which is located in the United States' "backyard," is considered a close ally of Iran, and symbolically, the Iranian leadership considers Venezuela to be part of the radical Shiite axis. Just as the area of southern Syria is a geographical platform used by Iran to create a nearby physical front against Israel ("*The Little Devil*"), so can the territory of Venezuela be a geographical platform for Iran to operate against the United States ("*The Great Satan*") from the air. The aerial distance between Venezuela and Florida is about 2,000 kilometers. We know that Iran transfers weapons to Venezuela regularly and that these deliveries may also include missiles. We also understand that Venezuela, in particular and South America, in general, has become a base for the IRGC Quds Force activities. While mentioning Iran's air capabilities regarding Venezuela, it is worth noting that Puerto Rico, whose inhabitants are American citizens, is only about 500 miles away from Venezuela...

The nature of the threat

Iran's "UAV Army" includes many thousands of UAVs used for intelligence gathering and attacking purposes (missile-carrying UAVs, bomb-dropping UAVs, or "suicide" UAV used for striking ground or air targets. UAVs with the ability to carry and transport explosives from place to place, as was done by Quds Forces in February 2018 using a "Shahed 141" UAV launched from Syria's T4 airbase, with an explosive device intended for terrorist elements in the territory administered by the Palestinian Authority). Some Iranian UAVs destined for their proxies in the Middle East are developed and manufactured, creating differentiation from known Iranian UAVs not identified or presented in Iran.

More about the connection between the Shiite Axis and Venezuela:
What is Iran sending to Venezuela?

Iran – The "Shia axis": one illustration – one meaning; Who is more important and who is less important?

This report will present 9 UAV types and a total of 48 UAV models (see Appendix - A). It is important to note that not all of the Iranian UAV arsenal is used by its proxies. Some of the arsenal presented in this report is in the planning/experimental stages and may be intended only for show purposes, serving as information warfare.

Lebanese Hezbollah has been using UAVs since the 1990s. **Hezbollah operates UAVs in the internal Lebanese arena, in the Syrian arena, and against Israel. As a significant proxy, Hezbollah received and will receive advanced UAVs from Iran, while, with the assistance of the Iranians, has succeeded in developing independent manufacturing capabilities** (see Appendix -B). In light of this, we estimate that the "UAV Army" abilities in the northern arena of Israel (Lebanon and Syria) are constantly improving.

According to the information in our possession**,** and professional assessments made on its basis, in a very high probability, **Hezbollah today possesses approximately 2000 UAVs.**

Hamas and PIJ in the Gaza Strip also have independent UAV manufacturing capabilities (see Appendix-C). Unit 340 of the Quds Force is responsible for assisting in the research and development of the autonomous production capabilities of its proxies.

Iran's "UAV Army" capabilities in general and its proxies' independent production capabilities constitute a significant, central, and very troubling military challenge for Israel.

The "UAV Army" is operated with outstanding professionalism. It is activated against airports and oil fields in Saudi Arabia (by the Houthi insurgents in Yemen and by the Iranians themselves), against American forces in Iraq and Syria (by the Shiite axis militias), and Israeli owned merchant ships in the Persian Gulf (by the Iranians themselves), and opposition forces and ISIS in Syria (by Hezbollah and by the Shiite axis militias), and against Israeli targets in Israeli territory (by the Iranians themselves from Syria or Iraq, by Hezbollah from Lebanon and by Hamas and the Islamic Jihad from the Gaza Strip).

Activity in various arenas in the Middle East

Iran realized that it could not provide a military response throughout the Middle East in general and against Israel, in particular, facing an air force operating war planes. Therefore, it sought to develop two alternatives in recent decades: the first, a precision surface-to-surface missile system, and the second, a "UAV Army." These two alternatives grant Iran a "long operational arm," which can reach everywhere in the Middle East. The advantage of the "UAV Army" is its ability to gather intelligence and attack. From the proxies' point of view, the benefit is manifested in the precision of an attack since the Missile Precision Project (emphasizing Hezbollah) encountered technical and logistical difficulties.

Recently there have been three prominent instances in three different arenas in which the "UAV Army" capabilities were apparent. On October 20, 2021, Shiite militias initiated a UAV attack on the American base in al-Tanf, located in southeastern Syria, near the border with Jordan and Iraq. The base was attacked by five suicide UAVs, apparently from the Shahed type. The Shiite militias operated the UAVs in participation with the Quds Force. In this case, the "UAV Army" attack was initiated to send an Iranian message to the United States and create a new equation in the region: Iran would attack American forces in Syria also in response to Israeli airstrikes in Syria.

On November 07, 2021, in Iraq, the residence of the country's prime minister in Baghdad's Green Zone was attacked by three bomb-carrying UAVs. The Iraqi prime minister, who was at home at the time of the attack, survived the attack unscathed. Although elements of the radical Shiite axis led by Iran condemned the incident, it was likely an operation carried out by Iraqi Shiite militias. The assault was apparently carried out on the background of the results of the Iraqi parliamentary elections, in which representatives of the militias were defeated.

On November 08, 2021, a Hamas reconnaissance UAV launched from the Gaza Strip was intercepted and shot down. It is unclear whether this UAV was launched as a technical experiment or intended to carry out an intelligence mission against Israel. The UAV was intercepted and shot down by an Iron Dome battery falling into Mediterranean waters.

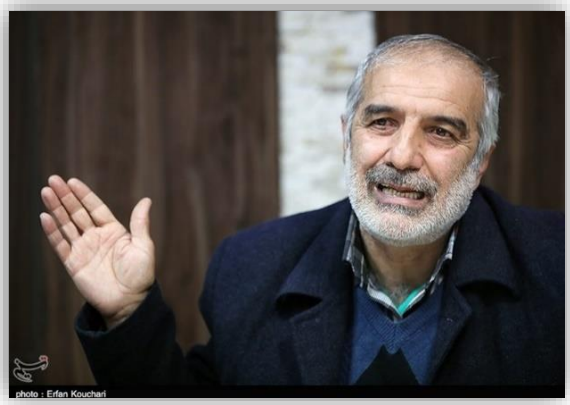
In September 2021, Israeli Defense Minister Benny Gantz referred to the Iranian "UAV Army," noting that "this is one of the most significant tools developed by Iran." It's "an array of deadly, precision weapons that, like a ballistic missile or a plane, can cross thousands of miles. The Iranians produce and export these aircraft to their proxies, in coordination and led by the IRGC Air Force and Quds Force".

The history of the Iranian UAV industry

In early 1984, Iran raised the need to establish a UAV unit for frontline observation of the enemy. Iran's enemy then was Iraq, led by Saddam Hussein. Until that year, Iran's aerial observation capability relied on the outdated problematic RF4 reconnaissance aircraft.

At the same time, students from Esfahan University developed a UAV with photographing abilities. The Revolutionary Guards were enthusiastic about the aircraft built by the students and decided to adopt and develop additional models of it. After several adjustments, this aircraft was the first to be used in battles against Iraq and received the name "Ra'ad" (thunder in Farsi). These first aircraft models were the basis for establishing the Iranian "UAV Army" manufacturing industry.

After the acceleration of the project, a decision was made to establish an all-out battalion of UAVs, whose first commander was Majid Mokhtarzadeh. The battalion was named after the first aircraft built, the "Ra'ad" battalion. The battalion worked in cooperation with the Iranian aero industry. The battalion began as an aerial reconnaissance battalion. In 1987, the battalion also acquired combat capabilities, which were eventually not activated during the Iran-Iraq War. The Iranians assembled a self-destructing explosive inside the UAV to prevent the possibility of leaking information into the hands of the Iraqis should the UAV fall. **Subsequently, a type of model called "Talash" was manufactured based on radio signals control.** The operational capabilities of this series were low, with a range of only 5 km and a velocity of only 120-140 km/h.



Saj Forouzandeh (left) and Syed Mujtaba Mahro (right) , ex commanders of the UAV Battalion.

Parallel to the "Talash," the "Mohajer" type, a major type of UAVs, began to be produced in Iran from the early/mid-1980s to the present day. Other well-known model types include "Shahed" and "Samed" (KAS-04), "Karrar," "Ababeel," "Kaman," "Saegheh," "Hodhod," and "Kian." In addition, additional models of UAVs were developed separately, not associated with any particular type.

Exposed locations

In Kashan, north of Isfahan, the Iranian training base serves as the main base for training Iranian and proxy operators of the "UAV Army." According to the Israeli Defense Minister, the base is the cornerstone of Iran's air terror export system in the Middle East.

On October 06, 2021, The National Council of Resistance of Iran, NCRI, in the United States revealed new details regarding the deployment of UAV army bases in Iran, the manufacturing industry of the "UAV Army" in Iran, and its accessibility to the Iranian proxies in the Middle East. Seven UAVs storage and launch sites and eight manufacturing industry sites were uncovered. We have additional information on twenty other launch and storage sites used by the "UAV Army" in Iran, Iraq, Syria, and Lebanon (see Appendix - D).

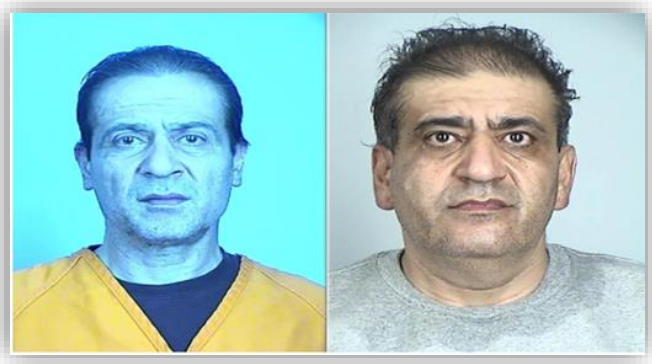
Manufacturing and procurement

Some of the UAVs manufacturing plants are directly owned by the Revolutionary Guards and do not just have business relationships with them. **Among the manufacturers are:** Ghazanfar Roknabadi Industries, Quds Air Industries, Fajr Industries Group, Iran Aircraft Manufacturing Co., Shahid Basir Industry, Bespar Sazeh Composite Co., Paravar Pars Co., and an unidentified special drone production operation in the Iranian city of Semnan.

The Revolutionary Guards logistics directorate is in charge of transporting and deploying the "UAV Army" throughout the Middle East and their distribution to the various proxies in Iraq, Yemen, Syria, Lebanon, and the Gaza Strip.

The Iranian UAV manufacturing industry is unaffected by international sanctions, and the proof of this is the actual growth of the "UAV Army." The main reason for the sanctions' inefficiencies is that many components used in this industry are standard shelf components that are easily purchased on the internet. For example, on the "Alibaba" site, the price of a Chinese DLE-111 engine installed in several UAVs is $500.

The acquisition is carried out, among other ways, through procurement agents living in Western countries. The agents purchase the various components where they live and send them to the representatives of the radical Shiite axis. The transportation of the parts worldwide is carried out via the Iranian diplomatic postal platform. For example, Osama and Assam Hamada confessed in 2020, during their trial in the United States, of purchasing UAV parts from 2009 to 2013 in the United States and handing them over to Hezbollah.



Procurement agents - Osama and Assam Hamada (credit: Sherburne County)

Today, nearly 40 years after developing the first UAV in 1984**,** the Iranians have very advanced development and operational capabilities. **The Iranian ability was acquired mainly independently based on many years of development, production, and combat experience. However, some of the knowledge was also obtained by mimicking Western capabilities** due to American and Israeli UAV technology falling into Iranian hands.

A prominent example of such an imitation is the Iranian UAV 171. It is an Iranian imitation of the American UAV RQ-170 brought down in December 2011 by the Iranians by means of electronic warfare (EW). This model was introduced in 2014. We should note that it also bears a remarkable resemblance to the "Saeqeh-2" UAV.

Figure 2 The American UAV RQ-170

Despite the above, it is essential to emphasize that the Iranians were not dependent on "western UAV" technology to reach their development and operational capacity today.

Technology performance and capabilities

Pictures of an Iranian attack UAV in the service of the Houthi insurgents in Yemen, which was used in the attack on the Saudi oil facilities, were posted on social media in September 2020. It seems to be carrying a combat warhead weighing about 15 kg, with a flight range of at least 750 km and a striking precision of about one meter from the designated target.

The UAV attacking model – in service of the Houthi insurgents in Yemen (courtesy of Tal Inbar/ "Mosaic" - Technical Intelligence Brief)

On February 10, 2021, the Houthi insurgents in Yemen attacked the Abha airbase in Saudi Arabia using UAVs. The attack damaged a passenger plane parked on the tarmac and a nearby building. The attack was carried out by at least two unmanned aerial vehicles, and once again, this attack demonstrated the Houthis' improved operational and intelligence capabilities. An analysis of the materials from the attack indicates that the attack was carried out using the UAV QASEF-1 originating in Iran (a version of the Ababeel UAV that is also in Hezbollah's arsenal). It is possibly an attack model with **homing capabilities**. In any case, **the attack proved high-quality accuracy capabilities.**

Damage to the aircraft and the attacking UAV model (courtesy of Tal Inbar/ "Mosaic"- Technical Intelligence Brief)

On April 24, 2021, Iran unveiled a "suicide" attacking UAV designed to operate in a pack/swarm of up to 10 UAVs. It's a small UAV with a combat warhead weighing between 5-15 kg. Its operational radius is 400 Km. These UAVs can ride piggyback of other UAVs in order to bring them closer to the target.

The attacking "swarm" UAV model (courtesy of Tal Inbar / "Mosaic"- Technical Intelligence Brief)

On May 21, 2021, Iran unveiled a new MALE UAV (Medium Altitude Long Endurance) named "Gaza."

Presumably, the name was chosen in light of the fighting that took place at the time between Israel and Hamas (Operation Guardian of the Walls). The original nickname of the UAV may be Shahed 149. It is a large UAV, similar to the configuration of the American *Reaper* UAV.

The "Gaza" model (courtesy of Tal Inbar / "Mosaic" - Technical Intelligence Brief)

In the absence of an Iranian communications satellite, communication with this UAV is based on commercial satellites – therefore, it's exposed to detection and disruption.

On June 26, 2021, several UAVs were reported to have attacked targets near the Iraqi city of Irbil, about 3 km from the U.S. consulate that opened there. Several UAVs exploded, while one fell almost entirely intact - there was a claim that it was shot down. This type of UAV had never been seen before this incident. This UAV has unique characteristics that allow us to determine, most likely, that it is an Iranian product intended for export to various terrorist organizations it supports while demonstrating differentiation from known Iranian UAVs not identified or presented in Iran.

This UAV is well constructed, to a high standard reminiscent of Western instruments. The UAV is built from segments – which allow for easy transportation and assembly by unskilled operators. Identification stickers guide the user in assembling the UAV.

These are yellow stickers with black inscriptions – similar to the yellow stickers that appear on an Iranian NLOS 358 missile seized by the U.S. Navy en route to Yemen at the end of 2018. The UAV is equipped with a Chinese engine, like other Iranian UAVs.

The UAV that attacked in Irbil (courtesy of Tal Inbar / "Mosaic" – Technical Intelligence Brief)

On July 30, 2021, the oil tanker MT *Mercer Street*, owned by an Israeli businessman, was attacked while sailing in the waters of the Gulf of Oman. The attacking UAV was identified as a Shahed 136, fixed with a Delta wing; its flight range is around 2000-2200 km.

The person directly responsible for the attack is Saeed Ara Jani, head of the UAV array in the IRGC's air force (in the photo below).

On October 29, 2021, **the U.S. Treasury Department imposed sanctions on prominent figures related to the Iranian "UAV Army."** The sanctions were imposed on Saeed Ara Jani and on the head of the IRGC's research director, Abdullah Mehrabi, who mainly deals with procurement and development.

The U.S. Treasury Department described the expansion of the "UAV Army" in the region **"as a threat to peace and destabilizing international stability."**

In our assessment, the development, production, and operational capability of the Iranian "UAV Army" deployed throughout the Middle East cannot be thwarted. The United States, Israel, and the moderate Arab states can now only disrupt and interfere with these processes.

Disruption and interference can be carried out by utilizing protection and by initiating attacks. Protection involves using defensive means, advanced electronic warfare (EW), and weapons such as the Iron Dome, laser technology, electromagnetic beams, sensors, and cyber warfare. Attacks can be carried out based on an accurate and ongoing intelligence picture. This suggests conducting continuous attacks on "UAV Army" deployment and storage sites**. It is important to note that both defense and attack policies will never be airtight.**

Disruption and interference of the "UAV Army's" operations should be one of the main objectives of the military Campaign Between Wars (CBW). As noted above, what goes on in the Middle East does not remain in the Middle East. Indeed, Iran's "UAV Army" capabilities directly endanger Israel, moderate Sunni states, and international forces operating in the Middle East; however, the "UAV Army" capabilities pose a risk also to countries in Europe and Africa. As noted, Iran's "UAV Army" capabilities also directly endanger the U.S. (Venezuela).

Implementation of this goal will become ideal by establishing a joint task force consisting of the relevant countries, which will act in a coordinated and joint manner against the Iranian "UAV Army" throughout the Middle East in particular and around the world in general.

We would like to thank Mr. Tal Inbar, for his assistance and technical advice in writing this report. Mr. Inbar is a Senior Research Fellow and an expert for missiles, missile defense, space, and UAVs. The editor and founder of "Mosaic" – technical intelligence reports.

Appendix A – Iranian UAV types and models

"Mohajer" type

Mohajer 1:

- UAV for photographic missions with a maximum flight range of 30 km.
- Takeoff and landing are similar to a regular aircraft (with a spare parachute).

An improved version of the Mohajer 1 from 1985

- Capable of carrying 6 RPG missiles.
- Apparently, it is able to broadcast visuals in real-time.

Mohajer 2 (developed in 1996)

- GPS-based
- Built out of composite materials
- Autopilot capability
- Equipped with 3 cameras
- Max. flight velocity 210 km/h
- Max. flight range 50 km.
- Max. flight duration- 1.5 hr.
- Weight 85 kg (approx.) payload capacity - a third of its weight - can carry 12 RPG missiles (approx.).
- It is usually launched from a dedicated platform, landing by parachute or on a runway.
- It can be controlled by using a command trailer (manually) or by preconfiguring (automatic) en-route GPS or a combination of the two.

An upgraded version of the UAV (commonly known as N2) was unveiled in 2014:

- Max. flight capability - 6-hour within 150 km.
- Max. flight velocity 180 km/h
- Camera with 360^0 motion capability.
- An additional source suggests that the upgraded version also can carry out suicide attacks up to 250 km away.
- Venezuela bought this UAV to secure its oil fields.

Mohajer 3 (nicknamed "Dorna")

It was designed differently from its predecessors. This UAV's max. flight duration is 2-3 hours with a max. flight range of 100 km and a max. flight velocity of 180 km/h.

Mohajer 3 did not go into production because it was developed parallel with the following generation of UAVs.

Mohajer 4

- Combat capability along with reconnaissance and intelligence gathering capabilities.
- Capable of identifying targets as far as 150 km.
- Max. flight velocity: 200 km/h.
- Max. flight altitude: 15000 feet.
- Lightweight (175 kg), made of composite materials, and shock-resistant. Very low radar signature.
- Length 2.87 meters
- It can be operated automatically or semiautomatically.
- Is equipped with two advanced cameras.
- Launched from a launching platform.
- The Syrian Army purchased 4 UAVs of this model.
- This UAV is in the service of Hezbollah.

Mohajer 4B (nicknamed "Saeqeh")

This new model is an improved version of the Mohajer 4. Armed with air-to-air missiles, its developers extended its flight duration at the expense of its flight velocity. According to the Iranians, it has enhanced photograph capabilities: a spatial 3D product

(photogrammetry) can be derived from its images**.**

Mohajer 4B

Mohajer 5:
Like the Mohajer 3, it did not go into serial production but was developed in parallel with the following model.

Mohajer 6 (used in Venezuela):

- Publicly disclosed in 2017. Its serial production began in 2018.
- It is a very large UAV that weighs 600 kilograms, has a length of 5.67 meters and a wingspan of 10 meters.
- Max. flight duration - 12 hours at 200 km/h and max. flight range of 200 km when operated from a command trailer or 2000 km with GPS operation.
- Max. flight altitude 5500 meters.
- Armament payload ability - 40 Kg.
- It can also be operated for reconnaissance and intelligence missions.
- It is equipped with precision armaments that can penetrate fortifications and is also equipped with a smart system that can correct the angle of fire in case of tremors.
- As of September 2022, UAVs of this type were transferred by the Iranians for Russian use in the war against Ukraine.

<u>"Shahed" type</u>

Shahed 123

- A very large UAV - 8 meters long.
- Max. flight range - 750 km and max. flight altitude - 7500 meters.
- Max. flight velocity - 700 km/h.
- Manufactured by the Iranian company HESA.
- Landing configuration: on wheels or skis.
- Operated significantly in Syria but was replaced by the next generation.
  Revised in 2019.

Shahed 129

- A very large UAV- 8 meters long, wingspan 16 meters.

Pay attention to the "hunchback" on the front of the UAV serving as a canopy covering the communications relay.

- Max. flight range - 1700-2000 km, 24-hour flight duration.
- Max. flight altitude - 24 thousand ft. (8 km).
- Capable of carrying a munitions payload of anti-tank weapons (up to 8 precision "Sdid" armaments).
- Includes an infra-red night vision system.
- Sustains a radar warning system.
- Used operationally in Syria.
- As of September 2022, UAVs of this type were transferred by the Iranians for Russian use in the war against Ukraine.

*Pay attention to the "hunchback" on the front of the UAV serving as a canopy covering the communications relay.

Shahed 136

As of September 2022, UAVs of this type were transferred by the Iranians for Russian use in the war against Ukraine.

Shahed 171

An Iranian imitation of the US UAV RQ-170 shot down by Iran in December 2011 by means of EW. The replica was introduced in 2014. Note its resemblance to the UAV "Saeqeh 2" (to be displayed later in this report).

"Karrar" type

Suicide UAV type. Their goal is to disrupt airstrikes. The various models are also capable of dropping bombs. The first UAVs in the series were introduced in 2010.

Karrar 1

- Max. flight velocity 700 km/h.
- Max. flight range 1000 km.
- Max. flight altitude 12000 meters.
- Max. armaments payload capacity - 250 Kg.
- Includes an enemy aircraft interception system.
- Reconnaissance and photography ability.
- Has automatic control ability (pre-task programming) that can be changed and manually controlled in real-time.
- Launched with a solid propellant accelerator rocket from a launch platform.
- In the event the suicide attack doesn't occur, the UAV can land by parachute.
- Capable of carrying a variety of armaments, including bombs (possibly guided bombs – not yet witnessed) and even anti-ship missiles with a range of 25 km.

Karrar 3 (No verified photo found):

- Upgrade of Karrar 1.
- Max. flight altitude 40 thousand ft. (13 km).
- Max. flight velocity 900 km/h.
- Communications range of 200 km to command trailer.
- Max. flight range 800-1000 km in automatic pilot configuration.

Karrar 4

- Anti-aircraft suicide UAV.
- Unveiled in 2014.
- Supersonic flight velocity.
- 3,600 launch points for this type of UAV are expected to be built in Iran to prevent air intrusion threats.

<u>"Ababeel" type</u>

Ababeel 2

- Suicide UAV- can carry an explosive device payload up to 45 kg that explodes on impact with a target.
- Max. flight altitude 14 thousand ft. (approx. 4.5 km).
- Max. flight velocity 300 km/h.
- 150 km operational range from command trailer.
- Launched from a truck with a mobile platform.

Ababeel 3

- Max. flight altitude: 15 thousand ft. (5 km).
- Max. operational range 250 km.
- Continuous fight duration of approx. 4 hours (according to an additional source: up to 8 hours).
- Max. flight velocity 200 km/h.
- Suicide attacking UAV. It is also used for EW, observation, and reconnaissance (transmits images in real-time to a ground station). It is most likely a copy of the South African UAV *Denel Dynamics Seeker*.

- It can fly in all weather conditions and has night vision ability.
- Besides launching from a platform on a truck, it can be launched from a platform installed on a ship.
- This UAV can also be equipped with smart "Kayim" bombs with striking accuracy of about half a meter from its target (these bombs can also be launched from various other UAVs mentioned such as the Shahed 129 and the Mohajer 6).
- Became operational in 2010.
- This type of UAV was positioned at the Hama base during the Syrian civil war.
- The Iranians use this UAV for reconnaissance and photography purposes against American forces in the waters of the Persian Gulf.

The "Ababeel" type also includes the Ababeel 5, T, R, and B models. These models are less usable, and the standard model of this type is the "Ababeel 3".

Ababil 3 (right) *South Africa Denel Seeker (left)*

"Kaman" type

Kaman 12

- Max. flight velocity - 200 km/h.
- Max. fight duration - 10 hrs.
- Max. flight range -1000-2000 km (depending on the mission).
- Can carry a payload of up to 100 kg (armaments or photography equip.).
- Has a short takeoff capability of 400 meters (operational advantage).

- Has an automatic or manual operating mechanism option, similar to the description presented in previous UAVs
- Capable of carrying precision "Akhgar" missiles (a range of 30 km).

Kaman 22

- Unveiled in February 2021 and is considered the current flagship of the Iranian Aerospace Industries.
- Max. flight range - 3000 km (the Iranians boast that they are the first to reach this flight range with a UAV).
- Carrying a capacity payload of up to 300 kg (armaments and photography equip.).
- Max. flight duration 24 hrs.
- Has the ability to perform a wide range of tasks and is equipped with a diverse range of equipment such as EW components, advanced monitoring devices, long-range attacking abilities, and more.

<u>"Saegheh" type</u>

Saegheh 1

- Introduced in 2016.
- Bears a noted resemblance to the "Shahed 171" UAV.
- Notice that there is an Iranian manned airplane with the same name.
- According to Iranian reports, this UAV participated in airstrikes in Syria.

- It is believed to be a copy of the U.S. RQ-170 *Sentinel* that Iran seized in 2011.
- It can carry four Sadid 1 anti-tank missiles (presumably a replica of the US *Spike* missile).

- In February 2018, this UAV model was launched from the T-4 base in Syria towards Israel. It was intercepted by an Israeli Air Force Apache helicopter upon its infiltration into Israeli airspace south of the Sea of Galilee.

Saegheh 2 (also known as "Shahed191")

- Upgrade of Saegheh 1.
- Takes off using a launch platform and lands using special skis on a runway.
- Max. flight velocity - 300 km/h.
- Max. flight duration - 4.5 hours.
- Max. flight range - 450 km.
- Payload carrying capacity - 50 kg.
- Max. altitude - 25 thousand feet (about 8 km).
- Took part in the Syrian civil war.

"Hodhod" Type – small observation UAVs

Hodhod 1

- Small UAV (1.5X1.9 m.).
- Max. flight duration - approx. 1.5 hr.
- Max. operating range approx. 30 km.
- Used for photography and reconnaissance.
- Most commonly used by the Houthi insurgents in Yemen.
- Resembles the Israeli "*Sky Rider*" UAV.

Hodhod 3

- Takes off and lands vertically without the need for a launching platform.
- Max. velocity - 70 km/h.
- Max. flight time - less than an hour.
- Max. payload capability - 3 kg.
- Its development began in 2015 in alliance with Sharif University in Tehran.

"Kian" type

Kian 1

- Officially introduced in 2019.
- Max. flight altitude - 5 km.
- Max. operating range - 1,000 km.
- Ability to carry several types of ammunition.
- Mainly used to intercept enemy aircraft at high speed with high-precision firing ability.
- The aircraft is launched from a dedicated platform from the ground or vehicle.

Kian 2

- A version specially adapted for observation missions.
- Suitable also for long-range tasks.

"Hazem" type

This UAV type has diverse purposes. Each UAV of this type can be used for observation and reconnaissance purposes and bombing or suicide attack missions (carrying explosives and possibly missiles). UAVs "Hazem 1, 2, and 3" are within this type, used for long, medium, and short ranges.

We do not have any further details or photos.

Additional UAVs (not associated with any type)

"Sofreh Mahi" (stealth UAV) - as of now, this UAV is not operational and probably will not be)

- Design started in 2010.
- Advanced radar detecting - can identify targets up to a range of 350-400 km.
- Designed velocity – 920 km/h.
- Max. flight altitude - 9 Km.
- Designed flight range - 750 km.
- Designed for observation and reconnaissance purposes but can also be equipped with bombs and missiles.

"Khodkar" (reconnaissance and photography)

- Jet-powered UAV.
- Installed with two cameras, one in front of the UAV and one on the bottom fuselage.
- It has been announced that it has been operational since 2019.
- No photos were found.

"Roham" (reconnaissance and photography)

- Also used to prepare three-dimensional geographical products (photogrammetry) that include topography.
- Takes off and lands vertically.
- Capable of maneuvering in any terrain (sea, mountains, forests, etc.).
- No photos were found.

"Zohal" (reconnaissance and photography)

- Flying saucer configuration.
- Has diverse abilities with a focus on photography and reconnaissance.
- Equipped with imaging and GPS systems.

"Mobin" (attacking - suicide)

- It can be launched from a suitable platform, either from land or a fighter jet. Its uniqueness is that it's a stealth aircraft, on the border between a UAV and a cruise missile.
- Max. flight time – 45 min.
- Max. flight altitude: 45000 feet (15 km).
- Max. velocity - 900 km/h.
- Max. flight duration - 45 minutes.
- Revealed at a Russian air show in 2019.
- A relatively small warhead, which renders it more accurate.
- Length: 3 meters, 670 kg, 120 kg payload carrying capacity.
- It bears a resemblance to the "Karrar" UAV mentioned above.

"Malmaha" (reconnaissance and assault, also known as "Hamase")

- Exposed in 2013.
- Can carry missiles and heavy bombs.

"Fotros" (reconnaissance and photography)

- Max. flight duration – 30 hrs.
- Max. flight range - 2000 km.
- Max. flight altitude - 25000 feet (8 km).
- Photogrammetric and combat capabilities.
- Equipped with EW and satellite communications.
- Automatic or semi-automatic control.

"Pelican 2" (Farpad - reconnaissance, and battle)

- Developed by the Iranian Navy (2019).
- Capable of vertical takeoff and landing, even on water.
- Launching capability from vessels – equipped with command control.

"Sarir 1" (also known as H-110, reconnaissance and combat UAV)

- Capable of carrying air-to-air missiles.
- Capable of performing extremely sharp maneuvers and having a high maximum flight velocity.
- Capable of evading radar and stealth abilities.
- Capable of flying long distances.

Sarir 1(Credit: M-ATF)

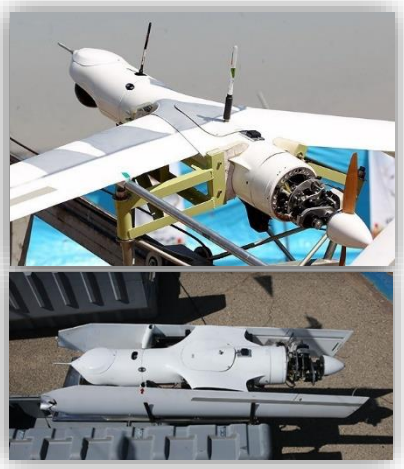
"Ra'ad - 85" (suicide attacking and photography)

- Developed in 2013.
- Max. velocity - 450 km/hr.
- Most of its activity is performed as a suicide UAV, but it can also gather visual intelligence.
- Max. flight range - 100 km.
- High striking accuracy of about 5 meters of the intended target, also designed to hit moving targets such as aircraft/helicopters/tanks.

- If the mission is canceled, it can return to its base by using its semi-automatic control.
- Manufactured in assorted sizes.

"Yasir" (or "Yaser" - reconnaissance and photography)

- Imitation of the US *ScanEagle* UAV that fell into Iranian hands in 2012.
- Delivered as a gift to the Russian military attaché in Iran.
- Max. flight range 200-400 km.
- Max. flight altitude 4500 meters.
- Max. flight duration - 8 hours.
- Equipped with high-quality cameras: HD, infrared night vision.
- EW defense abilities.
- Platform-takeoff.
- In possession of the Shi'ite militias in Iraq**.**



"Sadegh -1"

- There is uncertainty about the exact identification of this UAV: It may be an upgrade of the "Mohajer" type, or it may be more like the "Ababeel."
- The description of its characteristics differs between different sources.
- It may be one of these two UAVs in the photo on the right.

"Simorgh" (combat UAV with reconnaissance and photography capabilities):

- Revealed in 2019, its main function - naval ships support.
- It is a replica of the Israeli *Hermes 450* (the picture below is of the Israeli UAV; we could not find a photo of the actual Simorgh.
- Can carry missiles.
- Max. flight duration - 24 hr.
- Max. flight range - 1500 km.
- Max. flight altitude - 25000 feet (about 8 km).
- EW capabilities.

"Meraj" (reconnaissance and photography)

- Introduced in September 2019.
- Max. velocity - 140 km/hr.
- Max. flight altitude - 12000 feet (4 km).
- Max. flight range - 1000 km.
- Max. flight duration - 10 hours.
- Launched from a platform-installed vehicle.
- A small UAV weighs only 35 kg and can carry an additional 5 kg.
- Has a 3.6 meters wingspan.
- Has the ability to land on any surface.

"Siraf" (reconnaissance with combat capabilities)

- Max. flight range – 100 km.
- Can carry 105mm "Ayar" missiles.
- Entered into service in 2016.
- Unverified photo:

"Shaheen" (reconnaissance with combat capabilities)

- An upgrade of the "Mohajer 4".
- Max. effective flight range - 150 km.
- Ability to send images immediately to the control center.
- The rest of its capabilities are similar to the Mohajer 4.

"Farpad" (reconnaissance)

- Production began in 2019.
- A small reconnaissance UAV with no combat capabilities.
- Automatic or manual flight control to choose from.
- EW capabilities.
- Full manual launching.

"Chamaran-2" (suicide UAV):

- Max. flight velocity - 250 km/h.
- Has an option to program targets before takeoff (automatic control).
- Low flying.
- Made of materials that absorb radar emissions (stealth properties).

"Sayeh" (Another version of the "Yasir")

- A local version of the US-style *ScanEagle* UAV.
- Max. flight duration – 8 hr.
- Max. flight velocity - 120 km/h.
- Max. flight altitude - 15000 feet (5km).
- Max. flight range - 100 km.

"Nazer" (surveillance:)

- A small unmanned helicopter.
- Used also for civilian uses such as traffic control.

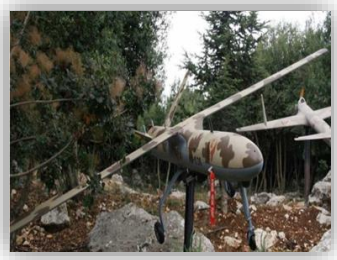
Appendix B - UAV models and drones in Hezbollah's service and their "public appearances" in the arena

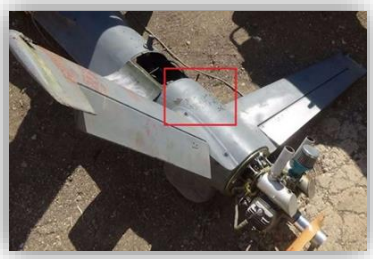
Hezbollah's aerial force insignia

UAV models in Hezbollah's service

"Ayub" – based on the Iranian "Shahed 129. Apparently, this is a model that was "inspired" by the Israeli "Hermes 450" model that fell in Beirut during the Second Lebanon War in the summer of 2006.

We have documentation (the photos on the right and center) of a similar UAV intercepted near the southern Syrian city of Deraa in 2016, which was sent on an intelligence-gathering mission near the Jordanian border. This UAV is very similar to the "Ayub," which was publicly presented by Hezbollah (on the left).





"Mirsad 1" – In Hezbollah's service since 2002. Based on some of our sources, this UAV is based on the Iranian "Mohajer 2", except for a few external differences. Other sources in our possession claim this UAV originates from the Ababeel model.

"Mirsad 2" – In Hezbollah's service since 2003. Based on the Iranian "Mohajer 4" model.

Ababeel" – During the Second Lebanon War (August 2006), the IDF shot down a UAV (in the bellow photo on the left), which is defined as an "Ababeel" (the UAV was not carrying any explosives). The UAV shot down is probably a version of the "Ababeel T" (in the bellow photo on the right), which bears a striking resemblance to the "Mirsad."

"Ma'arab" is the Iranian "Yasser" model – It was used in Syria by Hezbollah.

"Rami 1" – a replica of the Iranian UAV **"Ra'ad 1."**

We estimate that Hezbollah most likely has additional advanced UAV models, such as the "Mohajer," "Shahed," and "Samed" (KAS-04), "Karrar," and "Saegheh" types. As we noted, in Hezbollah's arsenal about 2000 UAVs in total.

In addition, Hezbollah (as well as Hamas and Islamic Jihad in the Gaza Strip) possess and use dozens of drones, mostly Chinese-made, that can be purchased in the civilian market. Hezbollah adapts these drones to its needs, both for photography and carrying and dropping bombs.

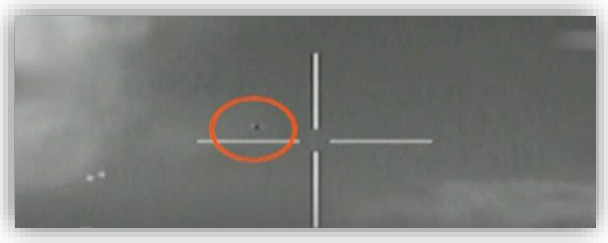
These drones' flight range (up to a few kilometers) and flight time (a few minutes) are limited. However, these are small and low-noise devices, features that make them difficult to detect. Some drones are equipped with a system that allows them to be launched by entering coordinates in advance to carry out their mission in a pre-entered geographical trajectory and automatically returning them to their launch site. This reduces the exposure potential of the force launching the drone since the launching party does not need to stay static during the execution of the mission, only during the launching.

"Public appearances" of UAVs and drones used by Hezbollah

1. November 2004: Hezbollah succeeds in sending a "Mirsad" UAV, which wanders the northern Israeli skies for 18 minutes, returning to its base safely. A similar incident occurred in April 2005.

2. July-August 2006: During the Second Lebanon War, Hezbollah made a few attempts to send UAVs into Israeli territory. All the attempts were intercepted, including the afore-mentioned "Ababeel T."

3. October 2012: Hezbollah launches a UAV via the Mediterranean Sea, which reaches the Negev region of Israel and is intercepted by warplanes.



4. April 2013: Hezbollah launches a UAV that is intercepted near Haifa Bay.

5. January 2014: Hezbollah launches a UAV over Samir Geagea's house, apparently for intimidation. Hezbollah defines Samir Geagea as public enemy number one in the internal Lebanese arena. We estimate that Samir Gahgah is still under close Hezbollah intelligence surveillance.

6. May 2015: Hezbollah attacks in the al-Qalamoun area in Syria with a UAV capable of firing precision-launched missiles. (The act is documented and published in "al-Manar," the Lebanese satellite television station).

7. August 2016: A video of Hezbollah drones attacking Aleppo shows Chinese MZD2 bombs dropped from cheap Chinese drones that can be bought for $600.

8. August 2017: An unknown UAV attacks in al-Qalamoun Syria, dropping inaccurate explosive devices in free fall. Hezbollah's combat media released the attack images:

9. October 2019 – Hezbollah claimed that a Hezbollah reconnaissance and intelligence UAV managed to fly over the Galilee area in Israeli territory during an IDF exercise.

10. February 2022 – Hezbollah took responsibility for a reconnaissance and intelligence UAV that penetrated Israeli air space to Rosh Pina and the Kinerret area. The UAV managed to evade interception and returned to Lebanon.

11. July 2022 - Hezbollah took responsibility for launching "three unarmed UAVs of various sizes..." as they put it, towards the Karish gas fields in the Israeli economic exclusion zone. The responsibility of Hezbollah for operating the UAV is that of their air unit. The operation was named after two Hezbollah operatives killed in 1994 (Jamil Sakaf) and in 2013 (Mahdi Yari) who may have belonged to the air unit.

For our full report on "The Iranian UAV Army", click here https://israel-alma.org/2021/12/21/irans-uav-army-a-global-threat/

Appendix C – UAV and drone models used by Hamas and the PIJ in the Gaza Strip and their "public appearances" in the arena

Hamas possesses the Ababeel 1 (A1). This UAV has three versions:

- A1A: reconnaissance
- A1B: dedicated to dropping explosive devices (see below photo)
- A1C: a suicide UAV. This UAV is based on the Iranian model "Sarir 110".

A Tunisian aeronautical engineer named Mohammed al-Zawari was responsible for its development and production. Zawari was eliminated in 2016 by an unknown entity.

Ababeel 1

Ababeel A1B

Mohammed al-Zawari

The Sarir – 110 UAV

During a Hamas military parade in 2014, a Hamas UAV was seen flying over the parade area. This UAV is similar to the Iranian model "Ababeel 3" (see Appendix A).

The Iranian "Sarir - 110" model (see appendix A) can carry air-to-air missiles, perform ultra-sharp maneuvers at high flight speeds, and is equipped with evading radar stealth features, and is capable of long-distance flying. Hamas' Ababeel 1 may have inherited some of these capabilities.

We are familiar with three incidents where Hamas UAVs were shot down or their activities thwarted.

- During Operation "Protective Edge" in July 2014, a UAV was shot down over the city of Ashdod.
- During Operation "Guardian of the Walls" in May 2021, a UAV launch squad was thwarted, and the UAV itself was destroyed.

- The last incident mentioned in the opening remarks of this report occurred in November 2021, when an Iron Dome battery downed a Hamas UAV over the Mediterranean Sea. It is unclear whether the UAV was on an operational mission or flown by Hamas as a technical experiment.

In addition to the UAVs, Hamas also develops and manufactures drones with offensive capabilities. As early as October 2013, a Hamas terrorist cell in Hebron (not the Gaza Strip) that planned to launch an explosive drone at Israel was thwarted. We are familiar with several Hamas attempts to drop improvised bombs from suicide drones on IDF forces stationed in the Gaza Envelope during 2018.

Very little is known about the PIJ's UAVs, and they have hardly been publicly displayed. It is not clear how authentic the PIJ's publications are on the subject, and it is unclear whether the PIJ has any UAVs at all. PIJ UAVs may be from the model type called "Talash," based on radio signals control. The operational capabilities of this series are low, with a flight range of only 5 km and a velocity of 120-140 km/h.

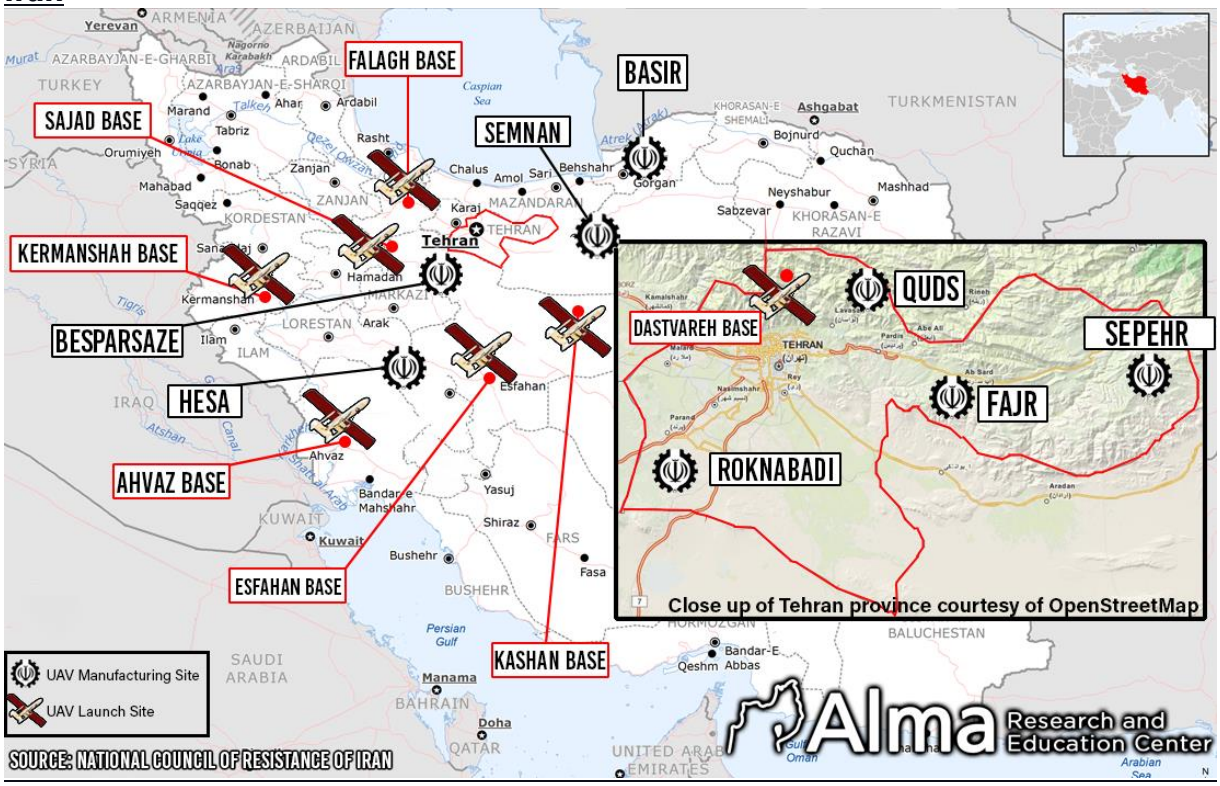
From at least two events, it is understood that the PIJ has the ability to operate drones that are capable of dropping explosive devices:

- The first incident was revealed in January 2020: In May 2019, an RPG-29 rocket launched from a Matris 600 drone (see below photo) was propelled against an IDF tank. Previously, the same drone fell in the Gaza Strip when in use of the IDF. The drone was repaired by Hamas, who returned it to operational activity controlling it from the ground. This type of drone can carry 15-20 kg of explosives and was adapted by Hamas to carry the anti-tank rocket. The rocket fell on the tank's turret, which was closed, and did not explode. We believe that in this incident, the drone was activated by the PIJ since the tank attack occurred during tensions between Israel and the PIJ.
- The second incident occurred in September 2019, when the PIJ launched a suicide drone at an IDF position. There were no casualties in this event.

**Note: We are currently working on a separate and in-depth study on the PIJ and its intensification. We estimate that we will be able to uncover additional materials regarding its UAV array, it's units, training, etc.

Appendix D – "UAV Army" Launch and Storage Sites in Iran/Iraq/Syria/Lebanon:

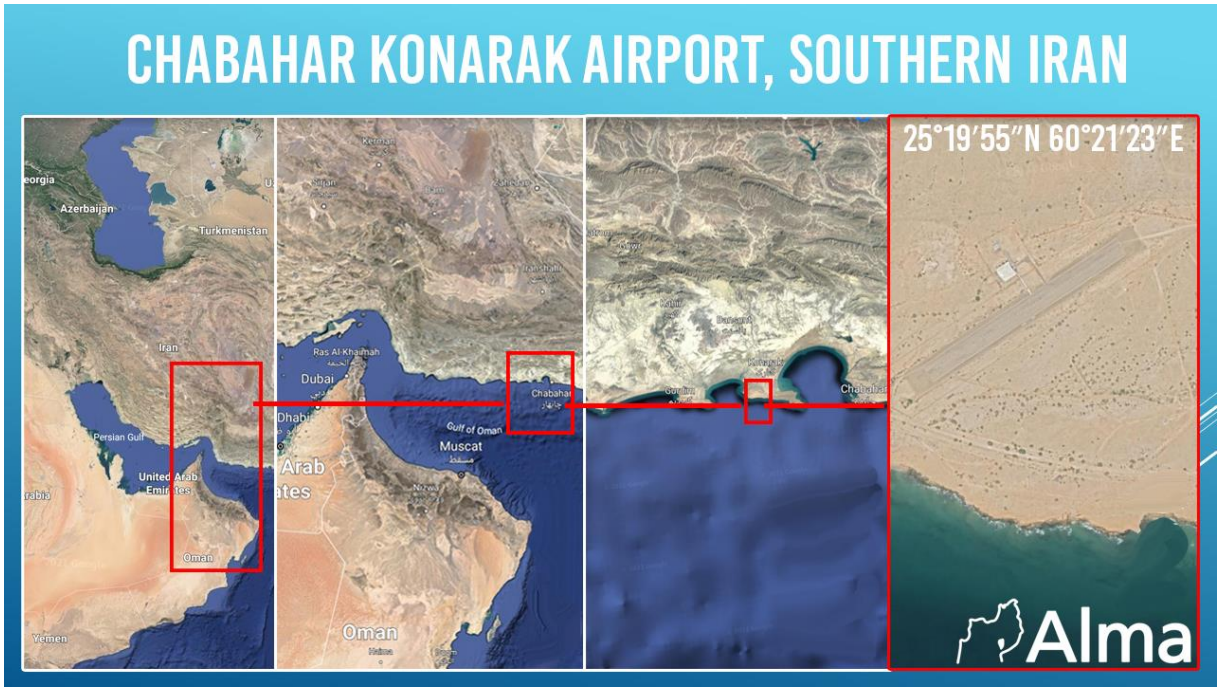
Iran



Additional airports used by the "UAV Army" in Iran, some only about 100 miles from the Gulf states:

Qeshm Island Airport is located southwest of the city of Masan. On this site, there is an IRGC array of Shahed type suicide UAVs. It is known that from this field, UAVs were launched to strike merchant ships in the Gulf of Oman.

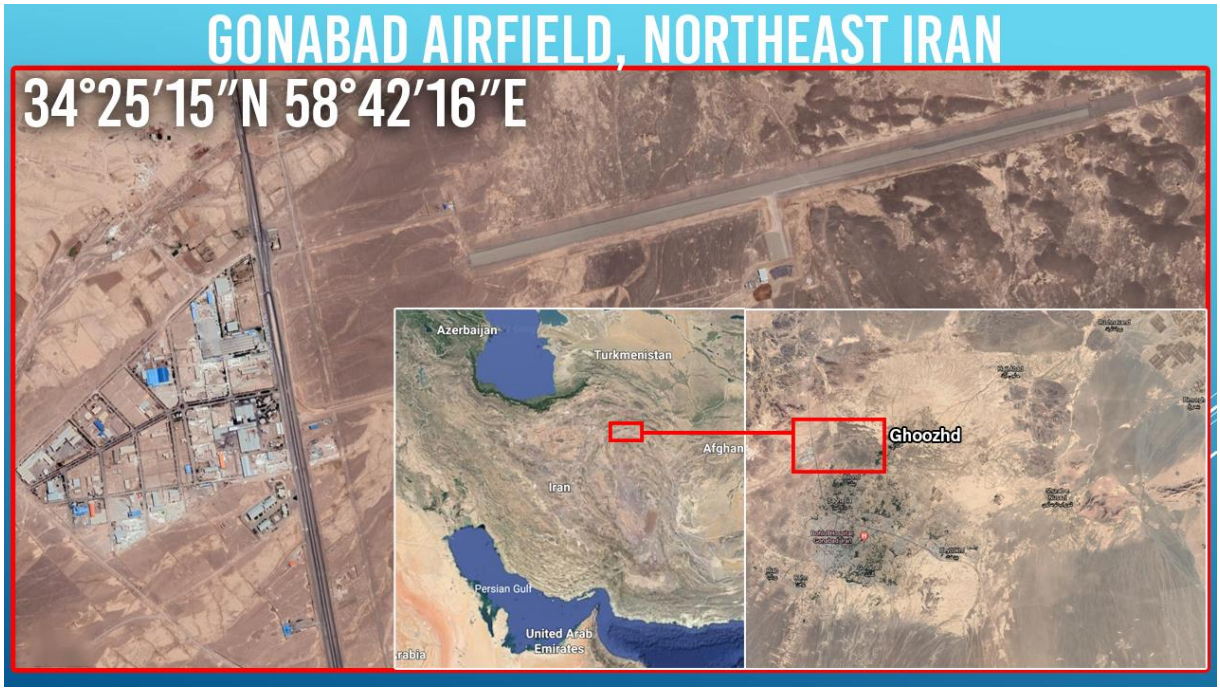
Konarak Civil Airport, located east of the city of Chabahar in southern Iran. This airfield also hosts a "Shahed" type UAV array.



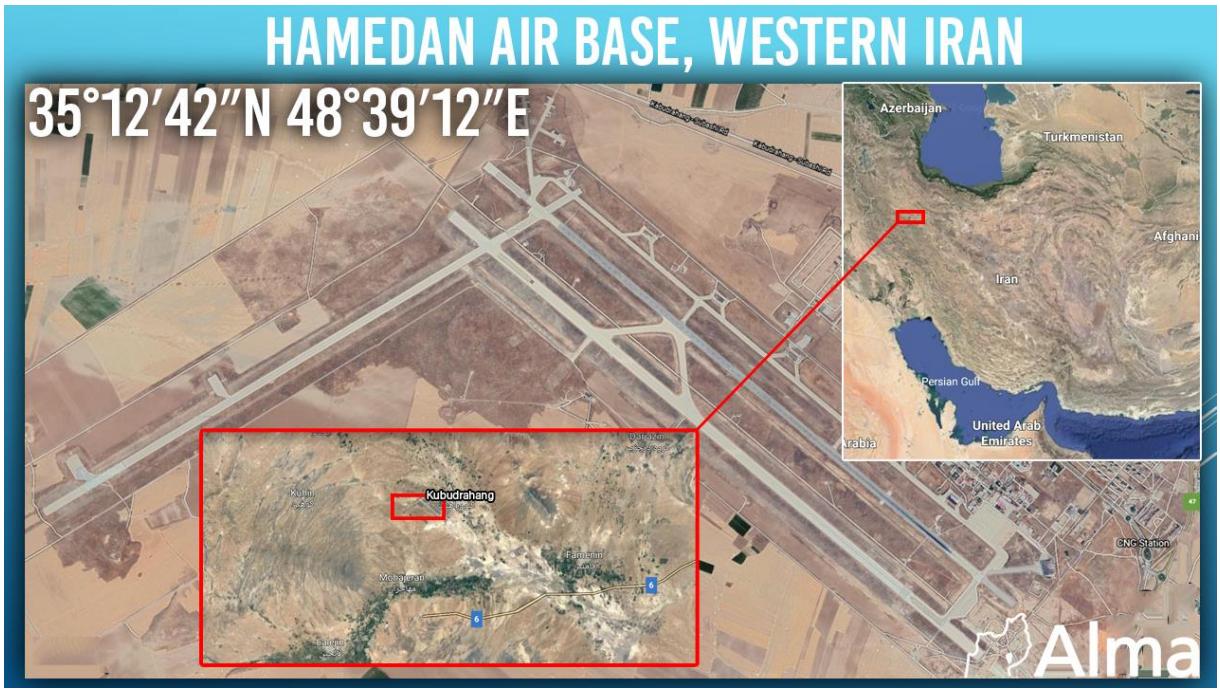
Bandar Abbas Airport:

Choghadak Airfield:

Gonabad Airfield:



Hamedan Air Base (Mohajer 4 UAV's):

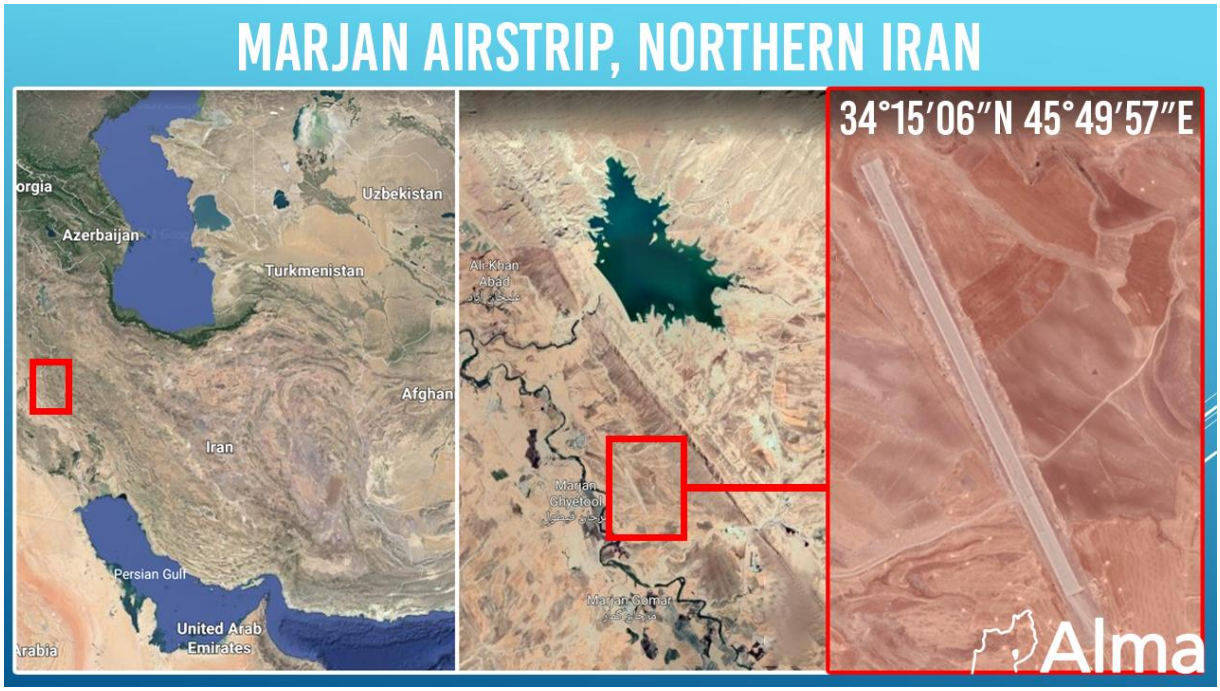


Jakigur Airport:

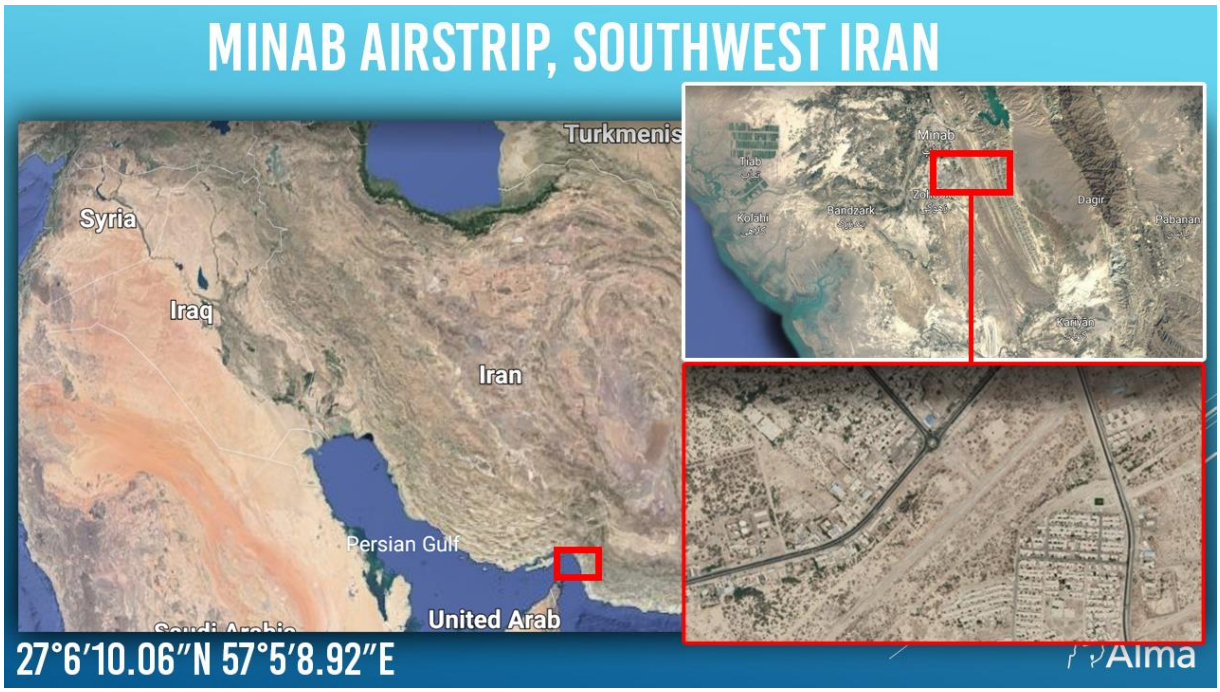
Jask Airport:

Kushke Airport (UAV's training base):

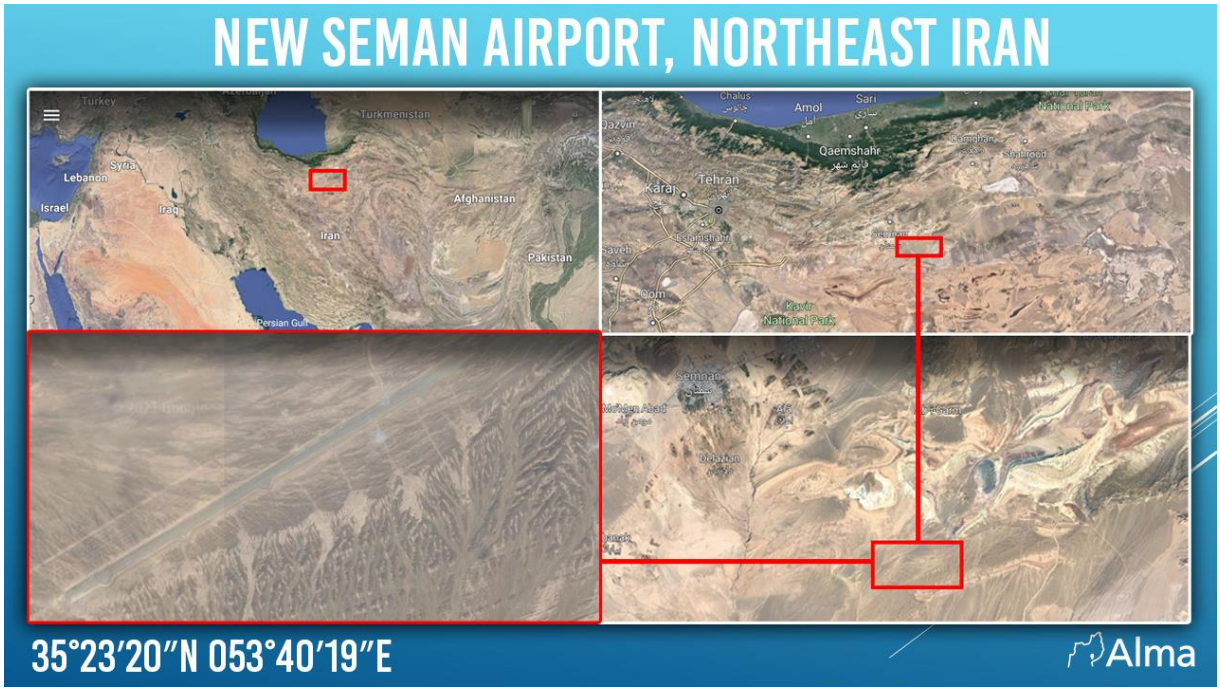
Marjan Airstrip:



Minab Airstrip:

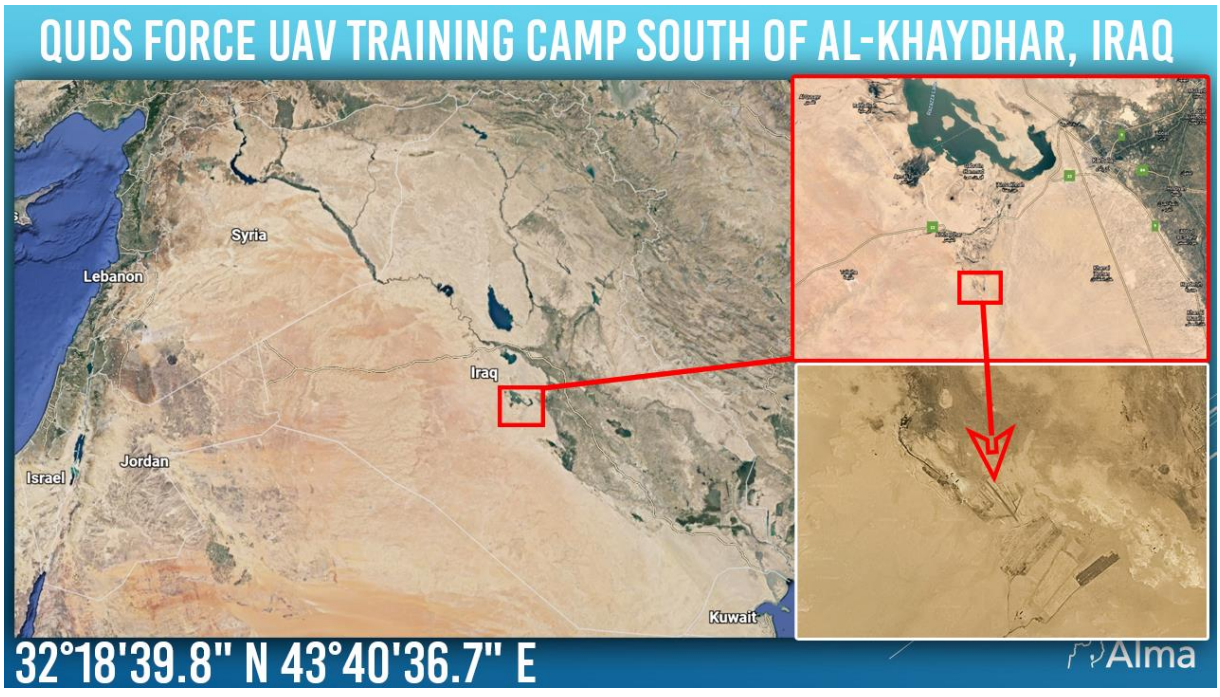


Seman Airport:



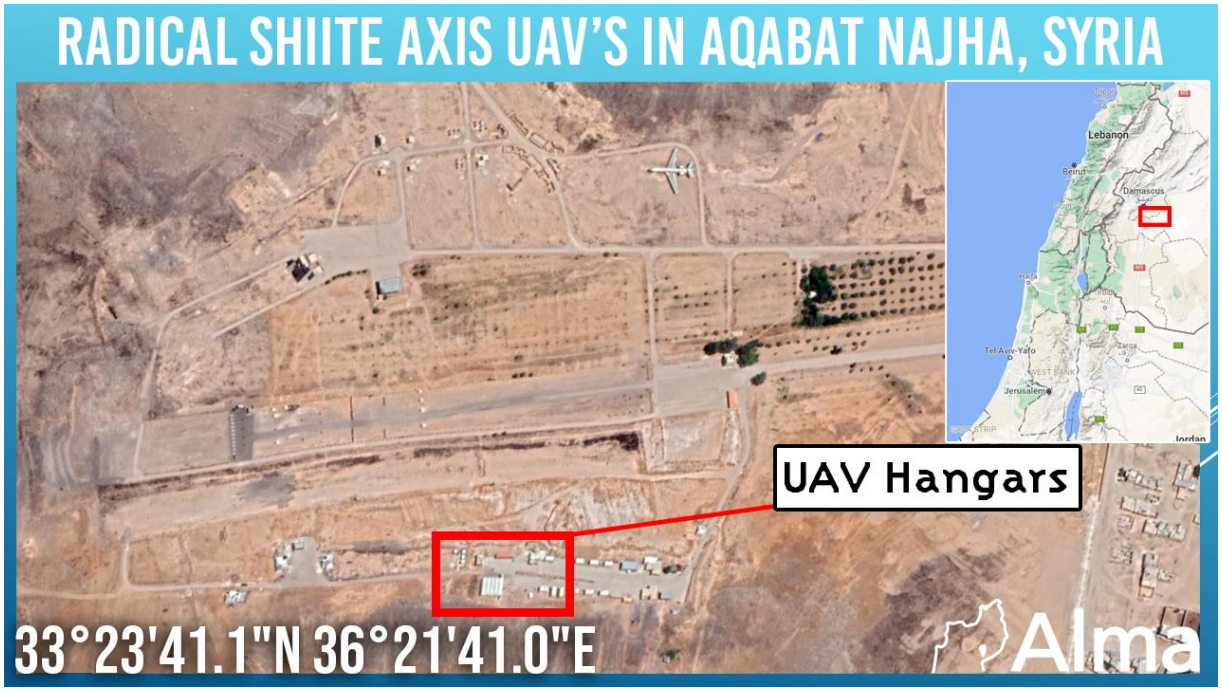
Iraq

In September 2021, Iraqi and Syrian officials revealed that in the deserts of Karbala, Iraq, the Quds Force, in cooperation with Hezbollah experts, were operating a UAV training complex. The complex provides operations and decoding courses of UAVs. Each course lasts between 30 and 45 days. The complex has a 300-meter runway.



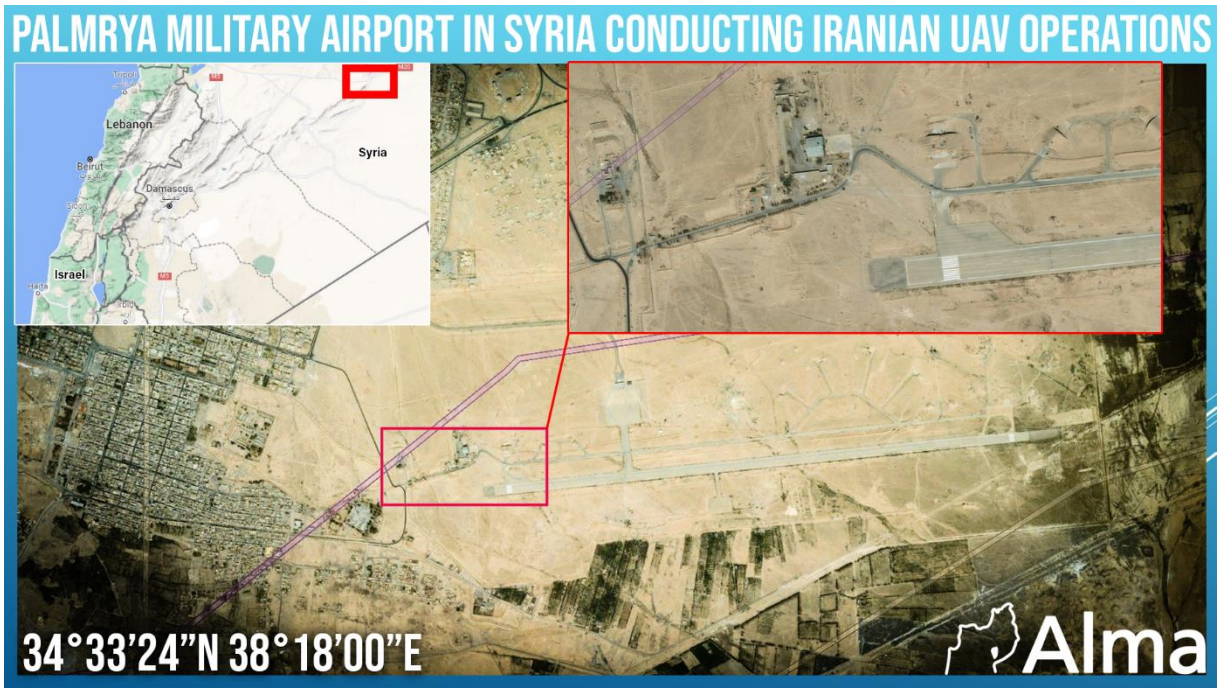
Syria

An indication from March 2020 reveals that Hezbollah and Shiite militias are using a small military airfield south of Damascus, near the towns of Sayyidah Zaynab and Khirbet al-Ward. The base was established in 2012 to benefit the Syrian Army's UAVs. The base was expanded under Hezbollah's control in 2014 when Mohajer 4 UAVs were positioned there. In time, Shiite militias joined the site.



Another airport used by the UAV Army is located near the town of al-Qusayr:

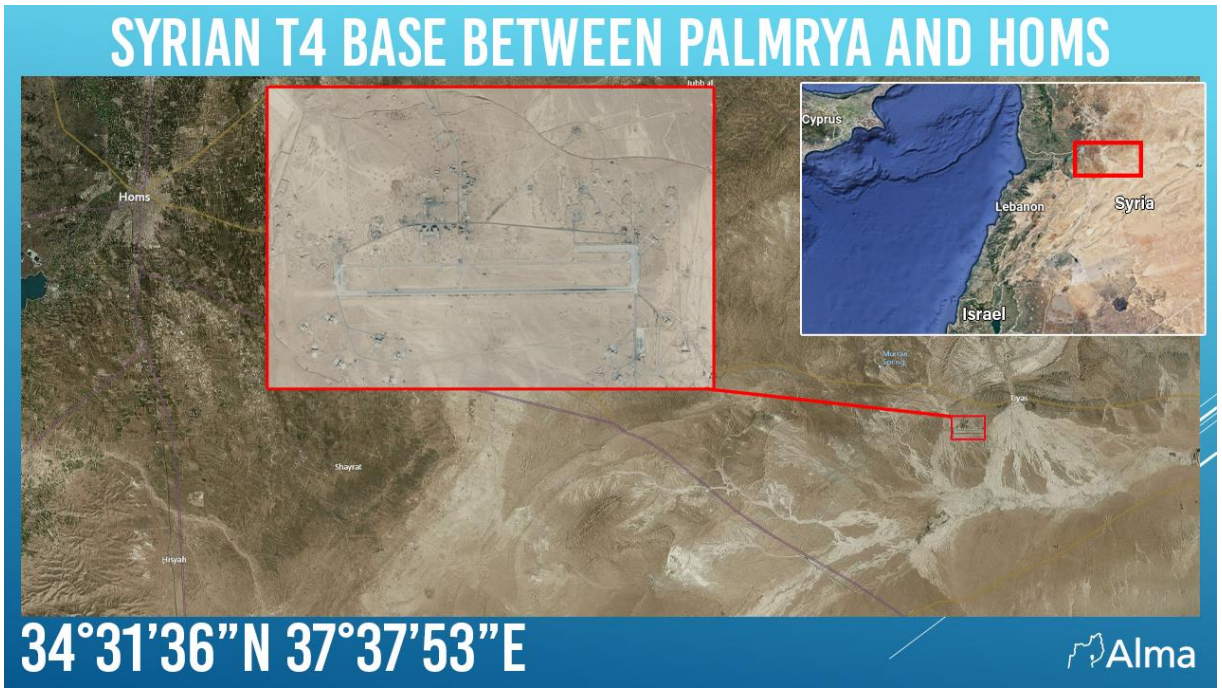
Palmyra Military Airbase serves as a central Iranian military base within the land corridor and operates a central headquarters for the radical Shiite axis. Shahed 129 UAVs operate there, gathering intelligence on U.S. forces in northeastern Syria.



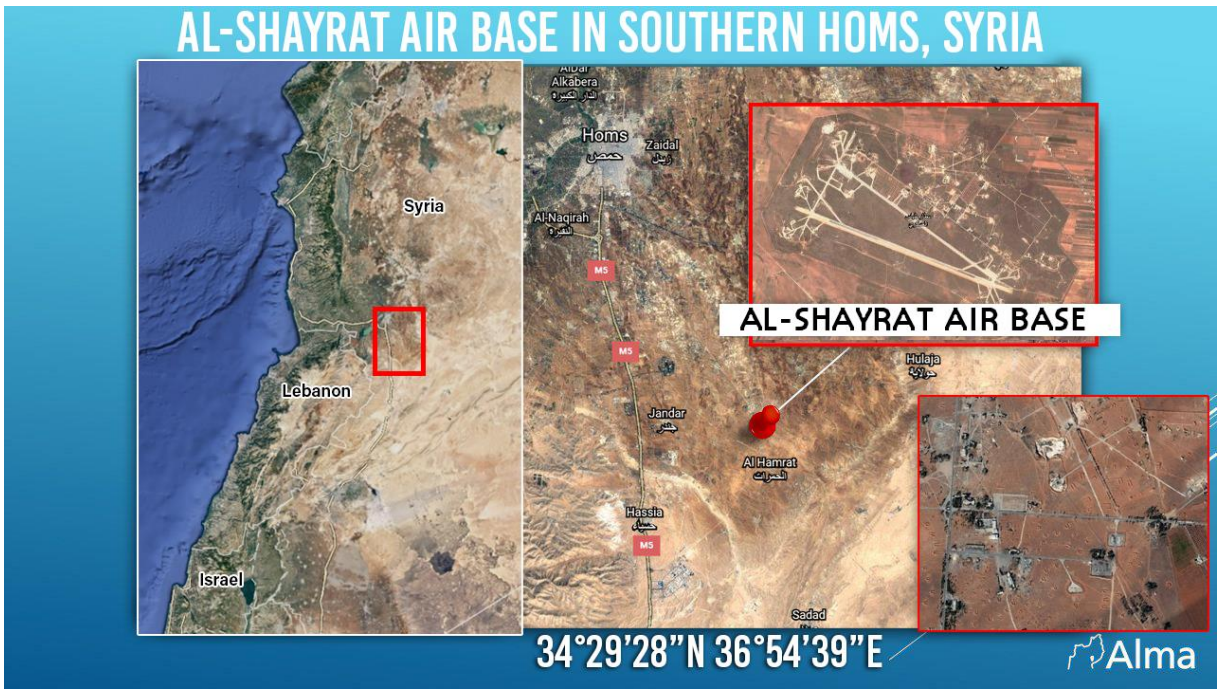
T4 airport is located near the road connecting the city of Palmyra in the east with the city of Homs in the west, about 60 km west of the city of Palmyra. The airport is named after the oil pump station in the area, which is part of the oil pipeline connecting the Iraqi city of Kirkuk in the east and the Syrian city of Banias in the west.

The base is known as a location where there is military activity of the radical Shiite axis headed by Iran. The site is identified as a center for the Shiite axis UAV array (operation and storage). We have recently received indications that the radical Shiite axis is clearing the base and that Russian forces are entering instead. As of now, it is not clear whether these are authentic indications or whether it is part of an information warfare. On the other hand, based on indications from December 13, the radical Shiite axis continues to operate from T- 4. During the first two weeks of December, a number of new UAVs arrived through the land corridor in trucks, from Iran via Iraq and entered Syria via the Al-Bukhmal crossing. The UAVs are activated from the field for missions against ISIS squads east of Homs.

On February 10, 2018, an Iranian attack UAV was launched from T4 airport towards Israel. The Israeli Air Force shot down the UAV upon entering Israeli territory south of the Sea of Galilee. The Iranian UAV launch vehicle, which operated from the T4 airport, was attacked and destroyed. In addition to this attack and the last attack from two days ago, we know of four more attacks against T4 airport from 2018 to 2020, targeting weapons depots and UAVs.

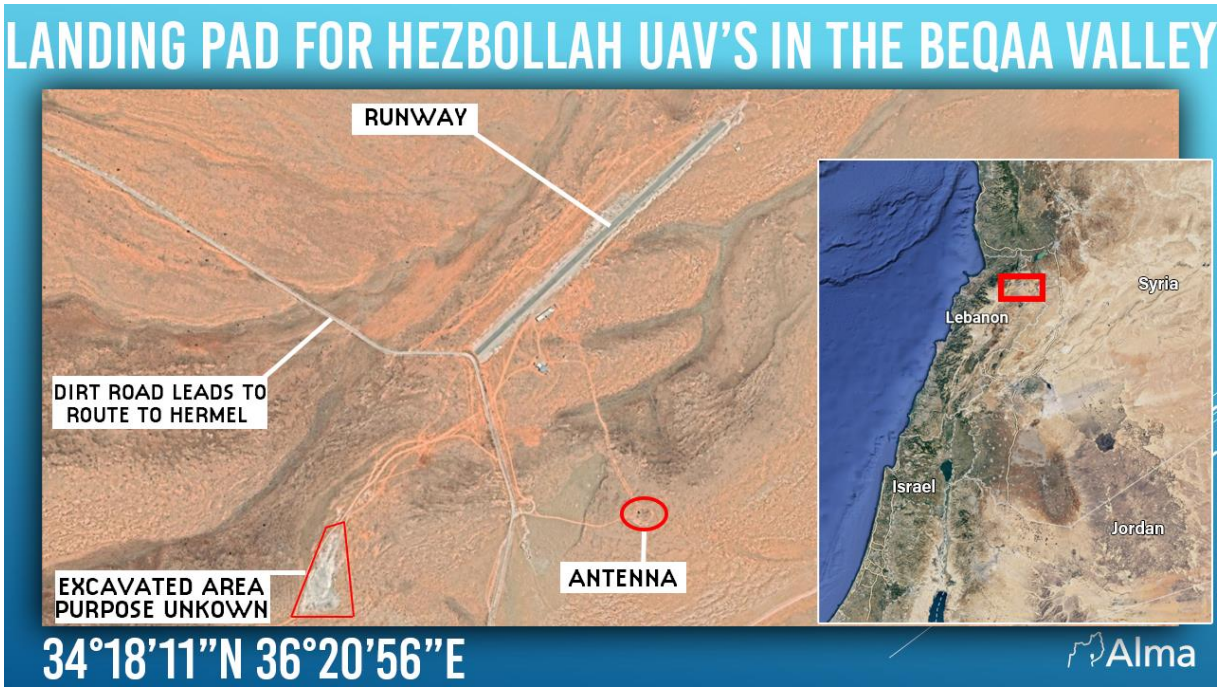


Al Shayrat airbase – located south of Homs and according to the above indications, regarding the alleged evacuation of the T4 base, this is the airbase to which the radial Shi'ite axis equipment and weapons are to be transferred.



Lebanon

In April 2015, IHS Jane's magazine unveiled a dedicated airstrip for Hezbollah's UAVs. **The airstrip is located near the town of Aiiyat in The Beqaa** and contains a 2200-foot runway. There are several buildings and probably a control trailer with an antenna. The airstrip was fitted to support Hezbollah's air operations in Syria.



Another runway several hundred meters long is located north of the town of Aiiyat on the outskirts of Baalbek. This runway is also used for UAVs air operations in Syrian territories. It is not clear if the place is active all the time or just as needed. There are indications that Syrian refugees are in the field (see: https://youtu.be/zsxdMDLaQEw). If so, it is a human shield and a perfect cover for Hezbollah. When Hezbollah has to operate the field, it will not be difficult to evacuate the refugees.

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