

Kyiv Dialogue

KONRAD ADENAUER STIFTUNG

UKRAINE AIR WAR MONITOR

Analyses for the Protection of Ukrainian Cities and Infrastructure

VOL XXII

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RUSSIA'S ATTACKS ON ENERGY SUPPLY — UKRAINIAN STRIKES ON ARMS INDUSTRY AND DATA CENTERS — SPOTLIGHT: EARLY WARNING FROM SPACE

Data and Analysis:
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2 November 2026

SUMMARY

Ahead of winter, Russia is stepping up its attacks on Ukraine's civilian population and energy infrastructure.

In October, Russian forces attacked civilian targets in Ukraine with long-range drones more than 6,000 times. The waves of attacks, stretching over several days and nights, are meant to make everyday life in the country untenable. Kyiv in particular is under heavy pressure from ballistic missile strikes. The lack of early warning makes it even harder to protect civilians and to defend against incoming attacks.

The attacks focus on energy infrastructure, which Russia is targeting more intensively than ever. But smaller businesses, the railways and shipping are increasingly being hit as well: In the Black Sea alone, at least 40 seafarers have been killed since the beginning of the year — more than in any other body of water in the world. Off the coasts of Bulgaria and Romania, at least four merchant ships sank in October after drone attacks attributed to Russia. Shipping traffic in the ports around Odesa has collapsed by more than 97% since the summer.

With its attacks on civilians, the leadership in Moscow evidently aims to increase pressure on Ukraine and destroy the foundations of the Ukrainian economy. Ahead of winter, the goal is to intensify terror against the population, distract from Ukrainian battlefield successes and force Ukraine to capitulate. Analysts, however, consider the success of such a strategy unlikely. The Ukrainian population has shown remarkable resilience in previous winters as well.

Ukraine, too, is relying on economic pressure: It is increasingly directing its long-range strikes at hard-to-replace arms components, data centers and the Russian air force.

In doing so, however, it has run up against political limits: Under U.S. pressure, attacks on refineries were temporarily scaled back, and restrictions on the Starshield satellite service hampered mid-range strikes. Dependence on U.S. satellite infrastructure is thus becoming a strategic risk — for Ukraine as well as for Europe (see Spotlight section).

KEY FIGURES ON RUSSIAN ATTACKS — OCTOBER 2026

LAUNCHED LONG-RANGE DRONES — October 2026

6,310

PREVIOUS MONTH 6,322 ▼ -0.3%

MONTHLY AVERAGE 2026 5,819

INTERCEPTION RATE ALL DRONES

85%

PREVIOUS MONTH 83%

INTERCEPTION RATE GERAN TYPES — October 2026

TYPE GERAN-4 / GERAN-5

77%

PREVIOUS MONTH 60%

TYPE GERAN-2

91.5%

PREVIOUS MONTH 90%

STRUCK LOCATIONS* — October 2026

524

PREVIOUS MONTH 581 ▼ -9.8%

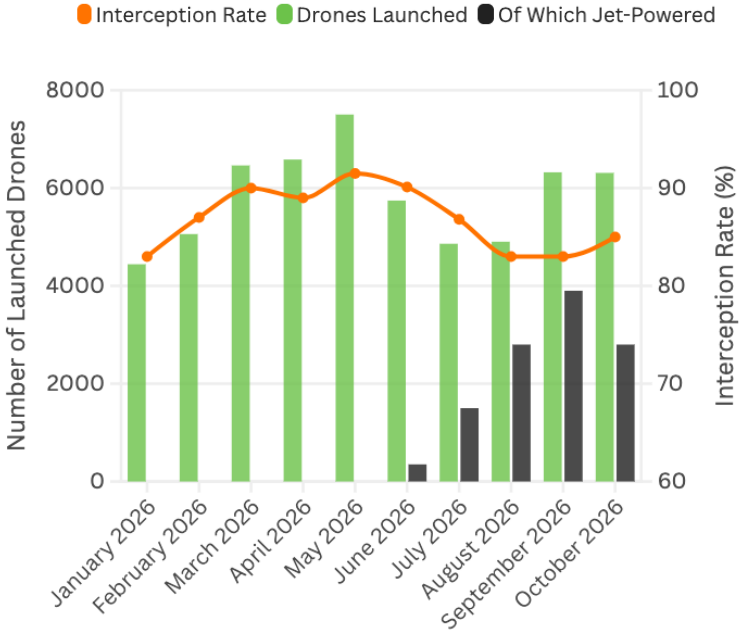
MONTHLY AVERAGE 2026 430

* Number of locations struck by Russian long-range drones, cruise missiles and ballistic missiles

SITUATION IN OCTOBER
ANALYSIS AND TRENDS

In October, Russia launched 6,310 long-range drones against civilian targets in Ukraine, according to our count, which is based on data published daily by the Ukrainian Air Force (previous month: 6,322; peak in May: 7,503). Only in four months of this war were more drone attacks recorded. The General Staff reports a different figure of 6,473 drone attacks (↗ General Staff ZSU, 2.11.2026). Our count matches that of the Institute for the Study of War (ISW) except for minimal deviations (↗ ISW, 2.11.2026). According to our count, around 45% of the attacks (about 2,800) were carried out with faster Geran-4 and Geran-5 drones, which are harder to intercept (↗ Monitor Vol. XXI) — significantly fewer than in the previous month (3,900).

Russia used significantly fewer jet-powered drones in October than in the previous month



Data: Perspectus Analytics, KPSZSU, ISW Daily Reports

Russia likely depleted its reserves of jet-powered drones significantly in September and is now replenishing them for the winter (↗ Monitor Vol. XXI). This is supported by the assessment of Ukraine's military intelligence service HUR that **Russia can currently produce around 10,000 drones per month, including 4,000 jet-powered and 2,000 Geran-2 drones**. HUR puts Russia's operational Geran reserves at about 6,200. According to HUR, missile stocks remain at roughly the July level despite intensified waves of attacks (↗ NV.ua, 20.10.2026).

SHARP RISE IN CIVILIAN CASUALTIES IN 2026

Since the start of the year, Russian long-range attacks have killed or injured more than 7,500 civilians, almost 50% more than in all of 2025 (↗ ISW, 2.11.2026). The attack on Dnipro railway station on 29 October showed how dangerous even a small number of not intercepted drones can be: Although the air force shot down three of four jet-powered drones, the fourth hit a commuter train, killing at least 13 people and injuring 13 more (↗ KPS ZSU, 29.10.2026). On 26 October, a ballistic missile hit a university campus in Kyiv; a second strike (a so-called double tap) followed as rescue workers arrived (↗ Kyiv Independent, 26.10.2026).

RUSSIA'S STRATEGY OF ATTRITION THROUGH DAYS-LONG ATTACKS

According to the ISW, Moscow wants to increase pressure on the civilian population before winter sets in while distracting from Ukraine's recent battlefield successes — over the past two months, Russia has lost more territory than it has gained and suffered around 100,000 killed and wounded (↗ ISW, 2.11.2026). Moscow wants to force Ukraine to capitulate (↗ ISW, 29.10.2026). A hallmark of this strategy is prolonged strike packages lasting several days and nights, combining jet-powered drones with lightweight Banderol quasi-cruise missiles, which cost less than conventional missiles (↗ Monitor Vol. XIX).

The modernized drones penetrate air defenses more easily and allow Russia to **conserve its stocks of cruise missiles and ballistic missiles and concentrate them on a few high-value targets**. The ISW expects Russia to use this operational approach against energy infrastructure in winter to make civilian life untenable. Success is nonetheless uncertain, as the Ukrainian population has shown remarkable resilience in previous winters as well (↗ ISW, 7.10.2026).

DRONE INTERCEPTION RATE IMPROVES SLIGHTLY

The average **interception rate** for long-range drones was 85% in October (previous month: 83%) and 77% for jet-powered drones (previous month: 60%), continuing the trend of gradual improvement. The number of drones not intercepted fell to 970 (previous month: 1,090) and the number of targets hit to 524 (previous month: 581).

Technical innovations continue to put pressure on air defense. Russia is currently fitting Gerbera-2 drones with additional incendiary warheads (↗ Militaryaviation, 18.10.2026). Recent speculation about a new long-range drone model (Geran-6) with a ballistic trajectory and an alleged explosive payload of up to 600 kg, however, cannot be conclusively confirmed and is hardly realistic in physical terms: The existing Geran types cannot carry a warhead of more than half a ton (↗ Oboz.ua, 16.10.2026).

ANTENNAS FROM CHINA MAKE ATTACKS ON KYIV EASIER

Russia remains dependent on Chinese technology for producing Geran drones but is increasingly moving production to its own territory. Jam-resistant CRPA antennas with 32 elements were found in a drone shot down over Kyiv; as a result, Ukraine needs twice as many jammers as before (↗ Beskrestnov, 9.10.2026). They apparently come from Russia's main drone production plant in Alabuga but are copies of Chinese Harxon models; Telefly TF-TJ2000A jet engines are also assembled in Alabuga from Chinese kits (↗ ISW, 9.10.2026). Problems procuring Chinese engines directly could be due to sanctions. In addition, Beijing will in future require export licenses for drone engines and certain navigation components (↗ Ukrainska Pravda, 27.10.2026).

RUSSIA DOUBLES BALLISTIC AND CRUISE MISSILE ATTACKS

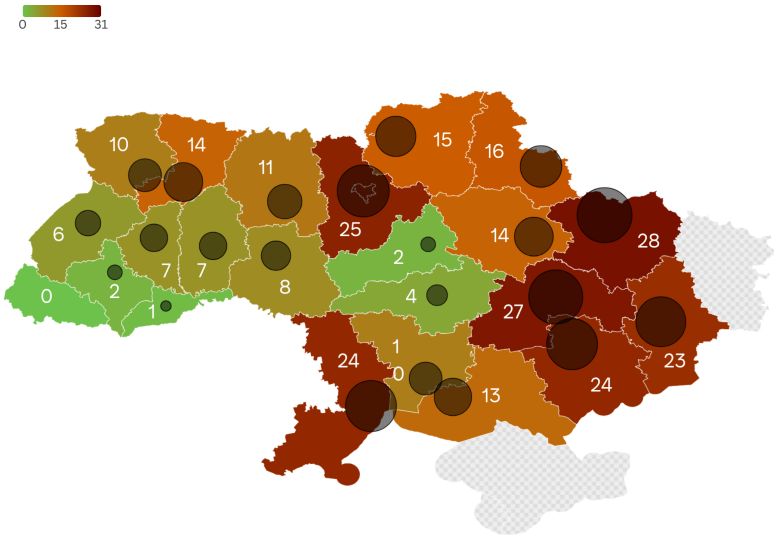
Figures on the ballistic and cruise missiles used in attacks remain only partially available (↗ Monitor Vol. XX). According to President Zelenskyy, more than 100 ballistic missiles were fired at Kyiv Oblast within two weeks from mid-October (↗ Zelenskyy, 27.10.2026) — about twice as many as in spring. Information from Ukraine's military intelligence service HUR

suggests that **Russia can currently produce around 200 cruise missiles and ballistic missiles** with a range of more than 350 km per month.

ATTACKS ON WESTERN UKRAINE ARE INCREASING

In October, Kyiv ranked only third among the hardest-hit oblasts, behind Kharkiv and Dnipropetrovsk (↗ Monitor Vol. XXI); attacks on Zaporizhzhia, Rivne and the west of the country (Lviv, Ternopil, Ivano-Frankivsk, Chernivtsi) increased sharply.

Russian attacks on western Ukraine increased in October



Data: Perspectus Analytics, Diverse data sets

WHAT RUSSIA IS ATTACKING: DAMAGE AND STRATEGY

ENERGY: WINTER CAMPAIGN AGAINST THE ENTIRE GRID

In October, energy supply moved to the top of the target list. According to Prime Minister Koretskyi, Russia has attacked Ukrainian energy facilities 2,147 times since mid-July (↗ Suspilne, 19.10.2026). The "energy ceasefire" announced by U.S. President Trump on 11 October changed nothing: According to President Zelenskyy, Russian forces carried out at least 170 more attacks by 22 October (↗ ISW, 22.10.2026).

Russia is now particularly targeting substations and power lines around major cities, overloading urban grids (↗ Ukrenergo, 9.10.2026). On 14 October, ballistic missiles hit all three of Kyiv's combined heat and power plants; scheduled power outages have applied nationwide since 18 October. A Russian planning document revealed by RFE/RL lists 60 strategic targets, including the lines for electricity imports from the EU, the power supply of cities such as Kyiv, Kharkiv and Odesa, as well as water and heating supply (↗ RFE/RL, 8.10.2026).

After the major steelworks came to a standstill in September (↗ Monitor Vol. XXI), Russia is **now hitting medium-sized businesses almost daily**, strikingly often those with foreign ownership. As a result, German cable systems manufacturer Kromberg & Schubert had to halt production in Lutsk (↗ Kyiv Independent, 18.10.2026). Shopping centers, DIY stores and warehouses were also hit. According to Agriculture Minister Vysotskyi, the **Ukrainian railways** have hardly any spare locomotives left and depend on replacement deliveries from Europe (↗ FT, 5.10.2026).

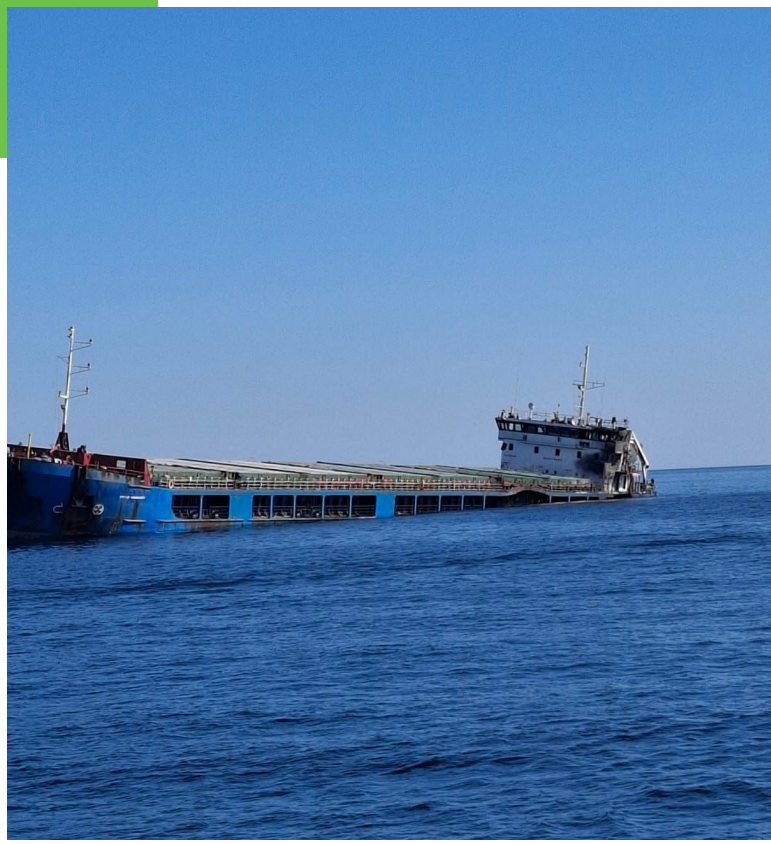


Image: The Turkish cargo ship Royad Mammadov sinking in the Black Sea after a drone attack (↗ ARSVOM, 5.10.2026).

BLACK SEA: THE WORLD'S DEADLIEST SHIPPING ROUTE

According to the International Maritime Organization (IMO) and the British maritime security company Ambrey, more than 570 ships have been hit in the Black Sea this year, 387 of them between July and September alone. Russia is responsible for 90% of the attacks since 10 September. Since the start of the year,

at least 40 seafarers have been killed in the Black Sea — more than in any other body of water in the world, even the Strait of Hormuz.

The consequences are visible in the ports of the greater Odesa area: According to the Ukrainian port operator TIS, fewer than 10 ships called at these ports in September, compared with around 400 in July — a decline of 97% (↗ FT, 25.10.2026). At the same time, the attacks are expanding geographically and now also hit ships anchored off the Romanian coast (↗ ISW, 15.10.2026). In October, at least nine merchant ships were also hit in Bulgarian and Romanian waters, four of which sank. A NATO official said the attacking drones were "of Russian origin" (↗ ISW, 15.10.2026).

UKRAINE'S DEFENSE OPTIONS

What matters most is how quickly Ukraine can produce new interceptor systems in large numbers. Our OSINT research has identified 15 different types of such systems. Demand is more than 1,000 fast interceptor drones per week; the biggest bottleneck is jet engines, of which Ukraine currently produces only up to 500 per month (↗ WSJ, 16.10.2026).

Cost is just as important: Production of interceptor missiles should not exceed USD 20,000 each, and individual prototypes such as the F-Jet 80 currently under development could be produced for around USD 7,000 (↗ NYT, 15.10.2026). By Ukrainian estimates, this compares with unit costs of about USD 70,000 for a Russian Geran-2 drone and at least USD 100,000 for a jet-powered drone (↗ Business Insider, 21.10.2026).

Drone defense currently relies on tactical aircraft (F-16, Mirage, MiG-29) and — owing to a lack of guided missiles — on "light air defense": anti-aircraft gun systems such as Gepard and Skynex, man-portable air defense systems (MANPADS) and interceptor drones (↗ General Staff ZSU, 28.10.2026).

However, about half of Ukraine's F-16 fighter jets are undergoing maintenance (↗ Monitor Vol. XXI): Inspections in Belgium currently take up to 40 weeks, compared with two to six weeks in the US (↗ WSJ, 29.9.2026). Belgian Prime Minister De Wever pledged 10 more F-16s by the end of 2026 (↗ IWI, 28.10.2026).

In addition to expanding its own defenses, Ukraine aims to stop Russian air attacks at their point of origin. On the night of 29 October, it again struck the drone launch site near Navlya in Bryansk Oblast, around 70 km from the Ukrainian border (↗ Kyiv Independent, 29.10.2026). Such strikes are part of a broader campaign against Russia whose profile changed significantly in October.

ATTACKS ON RUSSIA: NEW TARGETS UNDER POLITICAL PRESSURE

On 10 October, U.S. President Trump had demanded an immediate end to attacks on Russian refineries and floated the idea of replacing President Zelenskyy (↗ RBK, 10.10.2026). Regardless, the largest drone attack on St. Petersburg since 2022 took place (↗ Kyiv Independent, 18.10.2026); in addition, all four Moscow airports had to be closed due to drone attacks (↗ United24, 23.10.2026).

The pressure from Washington still had an effect: From mid-October, Ukraine unofficially suspended its refinery attacks. The *Wall Street Journal* suggested this could apply until the U.S. midterm elections on 3 November (↗ WSJ, 29.10.2026). In fact, the pause ended on 30 and 31 October at the latest with hits on refineries in Novokuibyshevsk and Ufa (↗ ISW, 31.10.2026).

An analysis of our database shows that mid-range attacks and attacks on Crimea declined significantly in October. Long-range strikes on Russian territory, by contrast, continued to hit numerous targets. Oil infrastructure became less important, while the arms industry and data centers moved into focus — with consequences in a wide range of sectors.



Image: Burning oil refinery in Kstovo, Russia, after a drone attack (↗ FirePoint, 1.11.2026).

CRIMEA

After attacks on the Taman substation, which bundles all four lines of the "energy bridge" from the Russian mainland, Crimea and all occupied territories lost power on 24 October. In Sevastopol, only 40% of residential buildings had electricity, and water supply in Crimea was restricted (↗ ISW, 24.10.2026). Attacks on the land route to Crimea, stepped up since May, are particularly impactful: Instead of 2,000-3,000 trucks, only 600-800 now travel to the peninsula each day on the M-14 highway — a decline of around 70% (↗ ISW, 31.10.2026).

PUBLIC FINANCES

In October, the Russian central bank kept its key interest rate at 14% for the second month in a row, now expects GDP growth of only 0.5 to 1% in 2026 and cites fuel as one factor affecting price developments (↗ ISW, 23.10.2026). The Ministry of Finance increased its foreign currency and gold purchases fivefold, which the ISW sees as an attempt to offset falling oil revenues through a weaker ruble (↗ ISW, 6.10.2026). State corporation Rosatom took over the logistics group Delo, whose port operations in Novorossiysk had been severely disrupted by the attacks (↗ Reuters, 7.10.2026).

ARMS INDUSTRY

While chemical and drone plants were the focus of Ukrainian attacks in September, the targets are now factories for components that are hard to replace because of export controls, such as microelectronics, titanium and solid rocket fuel. The Proton plant in Oryol, which was attacked, supplies power electronics for Iskander-M missiles and the Pantsir-S1 air defense system; the AVISMA plant in Berezniki produces around 96% of Russia's titanium sponge, from which titanium for military aircraft and missiles is made. The *Voronezhsintezkauchuk* chemical plant in Voronezh, which produces dual-use goods, was also hit (↗ Militarnyi, 1.11.2026), as was drone manufacturer Roboavia in Rostov Oblast (↗ Ukrainska Pravda, 17.10.2026).

AIR FORCE

In October, the Ukrainian navy used Neptune cruise missiles to strike the Borisoglebsk and Marinovka military airfields; the SBU domestic intelligence service attacked Khanskaya airfield with drones. In total, Russia lost at least seven Su-34 fighter-bombers — the main platform for glide bomb strikes (↗ Militarnyi, 1.11.2026). Russian milbloggers are calling for these aircraft to be moved at least 400 km from the frontline (↗ BF, 15.10.2026). This would lengthen approach routes, reduce the number of sorties and give Ukrainian air defense more warning time (↗ ISW, 15.10.2026). Although continued production has brought Russia's Su-34 fleet close to its prewar level, the October losses equal around 40% of the 2025 annual production (↗ Migflug, 8.9.2026).

Strikes on missile systems add to this: After hits on eight Iskander and S-400 launchers in September, Russia had to postpone planned large-scale attacks, according to Ukrainian Defense Minister Khmara (↗ ISW, 12.10.2026). In October, Ukraine attacked a repair base for Iskander-M launchers near Kondrinka in Kursk Oblast (↗ Militarnyi, 13.10.2026) and an Iskander-M launcher near Fatezh (↗ General Staff ZSU, 30.10.2026).

DATA CENTERS AS A NEW TARGET

Attacks also hit five data centers: three belonging to Russian internet company Yandex and one each belonging to state-owned Sberbank and the social network *VKontakte* (↗ Euronews, 23.10.2026). The strikes on three Yandex data centers within four days alone cost its cloud service around 78% of its response capacity, with disruptions reaching as far as Belarus, Kazakhstan, Armenia and Serbia (↗ ISW, 11.10.2026). In response, online retailers called for emergency rules, and Yandex scrapped its revenue forecast for 2026.

SPOTLIGHT

EARLY WARNING AND SPACE: EUROPE'S BLIND SPOT

Between 12 and 19 October, Russian ballistic missiles reached Kyiv without the usual early warning — amid growing tensions with Washington over Ukrainian strikes on Russian energy facilities (↗ Ukrainska Pravda, 15.10.2026). The U.S. government denied withholding information about imminent attacks. President Zelenskyy said on 20 October that data sharing had resumed after a phone call with U.S. Secretary of State Marco Rubio (↗ Euromaidan Press, 20.10.2026).

The night of 14 October, when Russia attacked with 39 ballistic missiles and more than 120 drones, showed how serious the information gap was (↗ Ukrainska Pravda, 15.10.2026): Without early warning, air defense had only seconds instead of minutes, and the population had hardly any time to seek shelter.

According to missile expert Fabian Hoffmann, the data outage may also have had technical causes: The S-400 missiles used in ground-attack mode on 12 October were probably difficult for the **U.S. infrared satellites (SBIRS)** to detect, as their motors burn only briefly and cloud cover further dampens the infrared signature. However, Hoffmann does not rule out that the government in Washington may have deliberately withheld the data to put pressure on Ukraine (↗ Missiles Matters, 18.10.2026).

Whatever the cause, the incident shows how heavily Ukraine depends on U.S. space infrastructure. The US does not provide raw data but processed warnings with information on missile type, launch site and expected impact area. Since Ukraine is probably not a formal partner in the U.S. **Shared Early Warning System (SEWS)**, it presumably receives these processed warnings via a largely automated data stream that the U.S. government can filter. Whether Ukrainian air defense receives early warning is therefore ultimately in Washington's hands.

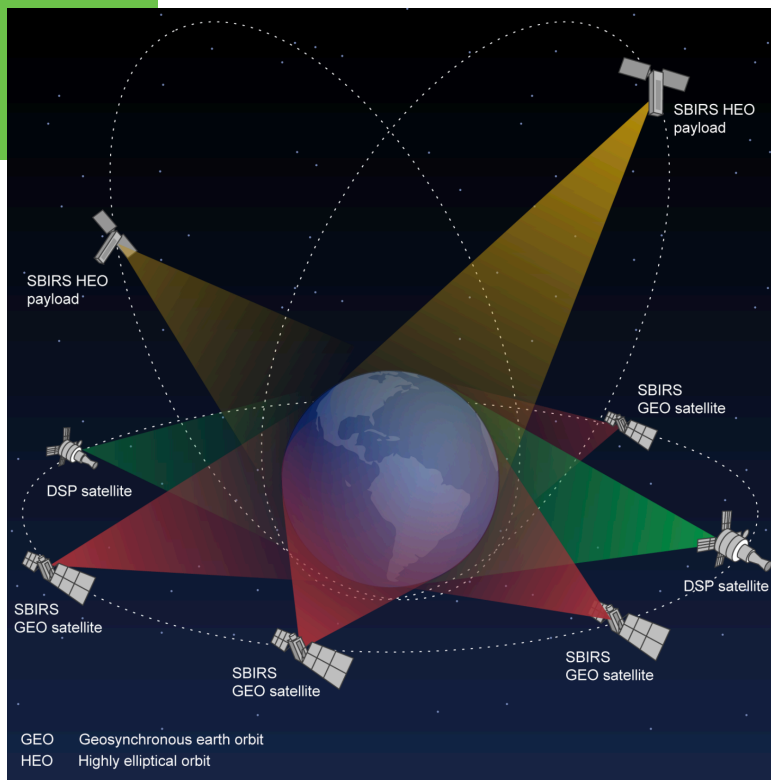


Figure 3: The infrared early warning constellation includes satellites of the Space-Based Infrared System (SBIRS) and the Defense Support Program (DSP), graphic: Lockheed Martin 2007 (↗ GAO, 4.2015).

Even more serious is that **Europe has no comparable capability** and will not have one for the foreseeable future. The German-French **Joint Early Warning for a European Lookout (JEWEL)** program, launched in October 2025, envisages one to two geostationary infrared satellites per country plus supplementary ground-based radars, to become operational from the 2030s — although France has not scheduled its only geostationary satellite until 2035.

Germany plans to invest around EUR 35 billion in space security by 2030 but has not yet publicly awarded a contract for geostationary early warning satellites. The **Odin's Eye II study**, funded by the European Defence Fund, is currently designing the architecture of a European early warning system and is due to be completed at the end of 2026; no funding for a prototype has been announced so far.

Even the planned system would have gaps: Without satellites in low orbits, the launch of hypersonic weapons could be detected, but not their further flight path. Whether a first-generation system can reliably detect missiles with short burn times, such as those fired by S-400 or Iskander systems, remains to be seen. What is clear is that for the rest of the decade, Ukraine and Europe will remain dependent on Washington's willingness to share its satellite data (↗ Missiles Matters, 18.10.2026).

This dependence also makes Ukraine vulnerable in other ways: From 14 to 24 October, speed restrictions imposed by SpaceX on *Starshield*, the military-grade version of *Starlink*, caused drones to lose connection at around 160 km/h. According to Ukrainian forces, interceptor drones could no longer fly fast enough to shoot down Russian jet-powered Geran drones (↗ WSJ, 24.10.2026).

On 19 October, Russia maneuvered its military satellite Cosmos-2612 to within 26 meters of the Finnish-American radar satellite ICEYE-X36, which supplies Ukraine with reconnaissance imagery (↗ ISW, 19.10.2026).

Space has long been part of the air war: Whoever controls early warning, communications and reconnaissance from space helps determine how effectively a country can defend itself on the ground. Unless Europe invests significantly more in this field, its security, like Ukraine's, will remain dependent on decisions made in Washington.

ABOUT THE MONITOR

The monthly newsletter **"Ukraine Air War Monitor—Analyses for the Protection of Ukrainian Cities and Infrastructure"** provides analyses on ongoing Russian air strike campaigns, identifies emerging trends, and enables assessments of Russia's evolving military strategy and capabilities.

The Monitor is based on a database of all Russian air strikes on cities and civilian infrastructure in Ukraine and currently records over 135,500 attacks since September 2022.

The **Ukraine Air War Monitor** is published by Kyiv Dialogue in cooperation with OSINT and data analyst Marcus Welsch and the Konrad Adenauer Foundation.

The current issue, as well as further information about the series and methodology, can be found on our website (↗ kyiv-dialogue.org).

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Marcus Welsch is an independent analyst, documentary filmmaker, and publicist.

Since 2014, he has focused in particular on the Russian war against Ukraine, military and foreign policy issues, and the German public discourse surrounding them. He runs the data and analysis platform ↗ Perspectus Analytics.

ABOUT KYIV DIALOGUE

Kyiv Dialogue is a civil society platform founded in 2005 to promote German-Ukrainian cooperation, and an international conference format.

Since February 2022, its work focuses on military support for Ukraine and Western sanctions policy.

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Cover photo: Emergency crews extinguish a burning warehouse in Kirovohrad Oblast after a Russian attack (↗ DSNS, 22.10.2026).

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