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CRIMEA, UKRAINE, IRAN. THE EUROPEAN DIMENSION OF AVIATION SECURITY

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ABSTRACT

The need to make progress, improve security policies, and enhance global aviation security has been a priority for this sector, spanning industry, economic development, mobility, and scientific research.

The constant evolution of public policies, involving the assessment of existing ones and the emergence of a need for new, modern policies capable of responding to changing inputs, has prompted nations and international organisations to collaborate with industry specialists on their development.

The growing interdependence among nations and the technical nature of certain fields have necessitated the identification and establishment of coordinated, harmonized actions at both global and regional levels.

The states comprising these intergovernmental international organizations have played and continue to play a significant role, both in drafting constituent instruments and in adopting documents issued within the organization; such documents become operational only after ratification by a specific proportion of member states. By accepting and ratifying the constituent instruments of intergovernmental international organizations, member states enable these organizations to "act" as legal entities under domestic law.

Addressing this subject is relevant for highlighting the influence civil aviation currently has on diplomatic and military affairs, given its potential to play a n very important role at any moment.

Whether considering the situation in Crimea, Ukraine, or Iran, or focusing on identifying best practices for international cooperation in civil aviation and adjusting public policies, this analysis is both compelling and necessary.

KEYWORDS: *aviation, security, Europe, airspace, safety.*

J.E.L. Classifications: L93, R41, H56, F55.

INTRODUCTION

Given the specific nature of the topic, its international significance, the allocated resources, the bodies involved, and the anticipated expectations, I consider this subject to be of particular importance, distinctive, innovative, and bold especially since the available bibliographic resources and specialized literature lack significant diversity.

The data and information resources available, accessible in both physical and electronic formats, consist primarily of regulations, laws, and official reports from international and national bodies. An analysis of these materials, combined with an in-depth study aimed at formulating concrete outputs, is imperative, at least at the national level.

Engaging with subject-matter experts, experienced representatives, and members of relevant authorities to gather viewpoints, forecasts, medium- and long-term visions, and legislative requirements is essential; the findings will be presented in a structured manner to serve as the foundation for and support the scientific research.

The United States took the initiative to explore the need to bring the world's major powers together to formulate public policies for aviation, aimed at protection against terrorist threats and other risks.

The invitation extended to 52 nations for the 1949 Chicago Convention introduced a novel approach to civil aviation: the pursuit of standardized regulations, procedures, and organizational structures in response to the post-World War II landscape.

The imperative to advance, improve security policies, and enhance global aviation security became a priority for this sector which is vital to industry, economic development, mobility, and scientific research.

The constant evolution of public policies involving the assessment of existing measures and the need for new, modern ones capable of addressing emerging demands prompted nations and international bodies to collaborate with industry specialists on their development.

None of these efforts would have been possible without a diplomatic approach rooted in communication, relationship-building, and a commitment to identifying and addressing the sector's needs.

CRIMEA, UKRAINE, IRAN. THE EUROPEAN DIMENSION OF AVIATION SECURITY

1. A view of aviation security

European aviation security must today be analysed through a broader logic than the purely technical one. In the past, the main emphasis fell on flight safety, on maintenance, on crew training, on air traffic control and on the prevention of accidents caused by operational errors or technical failures. After 2014, this approach is no longer sufficient. The Crimea crisis, the downing of flight MH17 in eastern Ukraine, the Russian invasion of 2022 and the downing of flight PS752 in Iran have shown that civil aviation can be directly exposed to military, political and diplomatic risks. For this reason, European aviation security must be understood as a domain in which safety, security, strategic intelligence, international law and civil-military cooperation directly influence one another (European Parliament & Council of the European Union, 2018; ICAO, 2023).

Crimea represents the first major moment of this transformation. After the annexation of the peninsula by the Russian Federation in 2014, control over the airspace of the Simferopol flight information region became contested. The problem was not only political. It produced a concrete operational risk. The FAA showed that the Russian Federation had attempted to unilaterally establish a new flight information region within the Simferopol FIR, while Ukraine continued to be recognised as the air traffic service provider for that airspace. Under these conditions, civil aircraft could receive contradictory instructions from different air traffic service providers. The FAA considered this situation a danger to civil flights and prohibited certain operations by U.S. operators in the affected area (Federal Aviation Administration, 2014).

The Crimea case shows that sovereignty over airspace is not an abstract problem. For civil aviation, it has direct consequences for route planning, for air-ground communications and for the way crews interpret the instructions they receive. The FAA emphasised that

contradictory instructions coming from Ukrainian and Russian providers could create confusion in the cockpit. More seriously, following the instructions of one of the parties could lead to a civil aircraft being wrongly identified as a threat by the other party (Federal Aviation Administration, 2014). Thus, Crimea became a clear example of the link between territorial conflict, air traffic control and aviation security.

The downing of Malaysia Airlines flight MH17, on 17 July 2014, amplified this problem. The Boeing 777 aircraft was flying from Amsterdam to Kuala Lumpur and was shot down over eastern Ukraine. The Dutch Safety Board report established that the aircraft was struck by a 9N314M warhead launched by a Buk surface-to-air system, which detonated to the front and left of the cockpit. All 298 people on board died (Dutch Safety Board, 2015). This case demonstrated that a civil aircraft at cruising altitude can be vulnerable when flying over a conflict zone in which anti-aircraft systems capable of reaching high altitudes are present.

MH17 changed the way Europe views overflight of conflict zones. The Dutch Safety Board showed that, before the accident, many air operators implicitly assumed that open airspace is safe airspace. This assumption proved to be wrong. If the responsible state does not close the airspace, operators must nonetheless independently assess the overflight risk. The Dutch Safety Board recommended improving the exchange of threat information, more rigorous risk assessment and greater attention to the evolution of the military conflict on the ground (Dutch Safety Board, 2015). In the 2019 follow-up report, the same institution showed that after MH17 states and airlines began to pay more attention to conflict zones, and operators moved to more structured risk assessments (Dutch Safety Board, 2019).

The European institutional response to MH17 led to the strengthening of EASA's role in managing risks arising from conflict zones. Regulation (EU) 2018/1139 provides, in Article 88, for cooperation between the Commission, EASA and the Member States when there are interdependencies between civil aviation safety and security. The same article allows EASA to disseminate information and recommendations regarding risks to civil aviation arising from conflict zones (European Parliament & Council of the European Union, 2018). On this basis, EASA publishes CZIBs, Conflict Zone Information Bulletins, and information notes for operators. These do not replace the responsibility of operators, but they provide a common European framework for identifying and communicating risks (European Union Aviation Safety Agency, 2016; European Union Aviation Safety Agency, n.d.).

The Russian invasion of Ukraine on 24 February 2022 transformed regional risk into a systemic problem for European aviation security. EASA published CZIB-2022-01R13 for the airspace of Ukraine, in which it mentions the Lviv, Kyiv, Dnipro, Simferopol and Odesa FIRs as affected airspace. The bulletin indicates that these regions are closed to civil flights and that the affected airspace must be treated as an active conflict zone. EASA points to risks of intentional targeting, misidentification and the use of ground and airborne combat systems capable of affecting civil flights at all altitudes (European Union Aviation Safety Agency, 2026a).

The war in Ukraine has produced effects beyond Ukraine's borders as well. EASA issued a separate bulletin for the airspace of the Russian Federation, in particular for the area located west of longitude 60° East. In this document, EASA shows that the activation of Russian anti-aircraft defence systems, in response to Ukrainian missiles and drones, can affect civil flights, including in the vicinity of international airports. The document also mentions the risks of GNSS jamming and spoofing, especially in areas close to the conflict and in areas targeted by drone attacks (European Union Aviation Safety Agency, 2026b). This element is important for Europe because interference with satellite navigation directly affects route safety, positioning accuracy, approach procedures and the ability of crews to maintain an accurate picture of the aircraft's position.

The legal and diplomatic dimension of the MH17 case complements the operational dimension. The criminal investigation was carried out by a Joint Investigation Team made up of the Netherlands, Australia, Malaysia, Belgium and Ukraine. The Public Prosecution Service of the Netherlands states that this team investigated the persons involved in the downing of flight MH17 and that several suspects were prosecuted (Netherlands Public Prosecution Service, n.d.). In 2025, the European Court of Human Rights found, in the case of Ukraine and the Netherlands v. Russia, that Russia was responsible in the context of the conflict in Ukraine and in connection with the downing of MH17, including through the absence of an effective investigation and through non-cooperation with international proceedings (European Court of Human Rights, 2025).

Iran introduces another dimension of aviation security: the risk produced by rapid military alert and by the misidentification of civil aircraft. On 8 January 2020, Ukraine International Airlines flight PS752 took off from Imam Khomeini Airport in Tehran bound for

Kyiv. The final report of the Aircraft Accident Investigation Board of the Islamic Republic of Iran shows that the aircraft was misidentified by an anti-aircraft defence unit near Tehran, and two missiles were launched at it. All 176 people on board died (Aircraft Accident Investigation Board of the Islamic Republic of Iran, 2021). The report states that the aircraft was operated by a qualified crew, was under Iranian air traffic control and had received take-off clearance after coordination with the military sector (Aircraft Accident Investigation Board of the Islamic Republic of Iran, 2021).

The PS752 case is relevant to European aviation security even though the accident occurred outside Europe. The aircraft belonged to a Ukrainian operator, the passengers held several citizenships, and the lessons concerned the entire international civil aviation system. The Iranian report formulated recommendations regarding the distribution and collection of information, risk assessment and the application of protective measures when military activities may endanger civil aviation (Aircraft Accident Investigation Board of the Islamic Republic of Iran, 2021). Canada criticised the responsibility of the Iranian authorities and emphasised the consequences of the civil and military decisions that allowed flights to be operated in a context of heightened military tension (Government of Canada, 2021).

The link between PS752 and the European aviation security system is also seen in the way EASA treats the airspace of Iran and the Persian Gulf region. In CZIB 2026-03-R14, EASA recommends that operators not operate in the airspace of Iran, Iraq and Lebanon at all altitudes and flight levels. The document mentions the high state of alert of Iranian air defence and the increased probability of misidentification in the Tehran FIR. EASA recommends continuous monitoring, updated risk assessments and contingency plans for operators flying in the region (European Union Aviation Safety Agency, 2026c).

ICAO provided the international methodological framework for this approach through Doc 10084, the Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones. The manual explains risk management processes, threat assessment, mitigation measures, the closure or reassessment of affected airspace and examples of good practice for states and industry (International Civil Aviation Organization, 2023). For Europe, this manual is important because it provides a common language between authorities, operators and international bodies. It enables the move from isolated reactions to a standardised process of identifying, assessing and reducing risks in conflict zones.

The European dimension of these cases lies in the European Union's capacity to transform tragic experiences into operational mechanisms. Crimea highlighted the risk of contested air control. MH17 highlighted the risk of overflying a conflict zone in which high-performance anti-aircraft systems are used. The war in Ukraine extended the risk to the regional level and introduced additional problems, such as airspace closure, diversionary routes, the activation of anti-aircraft defence and GNSS interference. PS752 showed that a civil aircraft can be shot down even in open airspace, when civil-military coordination fails and anti-aircraft defence operates under pressure. Together, these cases show that European aviation security can no longer be separated from geopolitics, diplomacy and strategic risk management.

Crimea, Ukraine and Iran must be treated as markers of a structural change. In all three situations, the aviation risk did not arise from an isolated aircraft malfunction. It arose from conflict, from a lack of coordination, from contested air control, from the use of military systems and from the incomplete communication of threats. The European response, through EASA, the European Commission, the Member States and the mechanisms of joint assessment, confirms that modern aviation security must be built on up-to-date information, international cooperation, documented risk assessments and rapid decisions concerning airspace (European Union Aviation Safety Agency, 2016; European Union Aviation Safety Agency, n.d.; International Civil Aviation Organization, 2023).

2. Airspace in Conflict Zones

Military conflict generates direct and indirect risks for civil aviation, through the militarisation of airspace, the activation of anti-aircraft defence systems, the degradation of civil-military coordination and the increased probability of misidentifying civil aircraft.

Airspace in conflict zones is one of the most sensitive themes of contemporary aviation security. In a normal operating regime, airspace functions as invisible infrastructure for mobility, trade, tourism, logistics and international connectivity. In an armed conflict, the same airspace becomes a zone of risk. It can be contested, fragmented, militarised, closed, jammed, or used simultaneously by civil aircraft, military aircraft, anti-aircraft systems, missiles and drones. For this reason, the analysis of airspace in conflict zones must go beyond the technical approach of air traffic management. It must include the assessment of military risks, the

responsibility of states, civil-military coordination, the exchange of information and the ability of air operators to make rapid decisions.

The International Civil Aviation Organization treats operations over or near conflict zones as a distinct risk-management problem. ICAO (2023) shows that states and operators must assess threats, apply risk-reduction measures and decide, when the situation requires it, to close or avoid airspace. The ICAO Doc 10084 manual is important because it shifts the analysis from the simple question “is the airspace open?” to the correct operational question: “is the airspace sufficiently safe for civil aviation?” (International Civil Aviation Organization [ICAO], 2023).

In conflict zones, legally open airspace is not necessarily operationally safe airspace. This principle became evident after the downing of Malaysia Airlines flight MH17, on 17 July 2014. The Dutch Safety Board (2015) showed that the existing system of responsibilities did not produce an adequate assessment of risks for civil flights crossing eastern Ukraine. In its follow-up report, the Dutch Safety Board (2019) emphasised that the recommendations issued after MH17 addressed three directions: airspace management, the exchange of threat information and risk assessment. These three directions still define the core of aviation security in conflict zones today.

A first characteristic of airspace in conflict is the loss of predictability. In peacetime, the planning of an air route is based on cost, distance, wind, sector capacity, overflight charges and published restrictions. In conflict, the operator must include in the decision risks that are not always visible in standard aeronautical data. Ostroumov, Ivannikova, Kuzmenko and Zaliskyi (2025) show that the closure of volumes of airspace forces operators to reconfigure aircraft trajectories, which increases route length, flight time, aircraft costs and the final price borne by passengers. Their study treats the Russo-Ukrainian war as a case of structural modification of the global air transport network, not as a mere regional disruption.

In this sense, airspace in conflict zones produces safety effects and economic effects simultaneously. The primary risk concerns the lives of passengers and crews. The secondary risk concerns the viability of transport networks. When a zone closes, traffic does not disappear completely. It moves to other corridors, increases the load on the sectors that remain open, increases the distance travelled and can produce imbalances between airlines. Ostroumov et al. (2025) show that Ukrainian airspace was closed to any civil use from 24 February 2022, and

that the airspace of the Russian Federation and Belarus became restricted because of sanctions and military risk. The authors include in the same risk category airspace in the Middle East, such as Afghanistan, Iran, Iraq, Syria and Yemen, where armed conflicts or military instability maintain a high risk for civil aviation.

The war in Ukraine offers the clearest recent example of the closure of a large-scale airspace. EASA (2026a) indicates that bulletin CZIB-2022-01R13 for Ukraine remains active and refers to the Lviv, Kyiv, Dnipro, Simferopol and Odesa FIRs. This confirms that Ukrainian airspace continues to be treated as a conflict zone for civil aviation. In practice, the closure of these FIRs forces airlines to redesign the Europe-Asia, Europe-Caucasus and North America-Asia connections. EASA recommends that operators avoid airspace in which military systems, missiles, drones or anti-aircraft defence can generate misidentifications or attacks on civil aircraft.

The notion of FIR is central to this subchapter. A flight information region is not merely a delimitation on a map. It defines responsibilities for flight information, alerting and coordination services. In the context of Crimea, the problem of the Simferopol FIR demonstrated that a dispute over territorial control can produce direct operational confusion. The FAA (2014) prohibited certain U.S. civil aviation operations in the Simferopol FIR because aircraft could receive contradictory instructions from Ukrainian and Russian air traffic service providers. This situation shows that contested airspace can become dangerous even before an actual attack on an aircraft occurs.

The Crimea case shows the link between sovereignty, air control and safety. If two authorities simultaneously claim the ability to provide air traffic services in a given airspace, crews may receive conflicting instructions. In a situation of military tension, confusion can lead to misidentification, to uncontrolled deviation or to entering an airspace where one party considers the aircraft unauthorised. The FAA (2014) treated this combination of contradictory ATC instructions and military tension as a hazard for civil flights. From this perspective, Crimea is a case of risk produced by contested air control, while MH17 is a case of risk produced by the overflight of a conflict zone with active anti-aircraft systems.

MH17 changed the way airspace in conflict zones is assessed. The Dutch Safety Board (2015) established that the Boeing 777 aircraft was shot down over eastern Ukraine, and that all 298 people on board died. The report showed that the risk to civil flights had not been

adequately recognised by the parties involved. The Dutch Safety Board (2019) revisited the recommendations and found that overflying conflict zones remains a current risk for aviation. This case showed that the mere existence of a restriction ceiling, for example the prohibition of flights below a certain altitude, is not sufficient when a zone contains surface-to-air systems capable of reaching cruising altitudes.

After MH17, the central question became who should assess the risk. The state controlling the airspace bears the primary responsibility, but the air operator cannot limit itself to that responsibility. ICAO (2023) treats risk assessment as a joint process, in which the state of overflight, the state of the operator, the aviation authorities, the intelligence services and the operators must all contribute relevant data. This is essential because the state affected by the conflict may not have the capacity, the will or the political freedom to close the airspace in time. In such situations, the absence of a closure decision cannot automatically be interpreted as the absence of risk.

The European response to this problem was the strengthening of EASA's role. Regulation (EU) 2018/1139, through Article 88, provides for cooperation between the Commission, EASA and the Member States when there are interdependencies between civil aviation safety and security. This provision offers the basis for the exchange of information and for issuing recommendations regarding conflict zones (European Parliament & Council of the European Union, 2018). In practice, EASA uses Conflict Zone Information Bulletins, that is CZIBs, for high-risk airspace, and other forms of information for different levels of risk.

EASA's CZIBs are important because they transform security information into an operational tool for operators. They describe the affected airspace, the level of risk, the types of threats and the recommendations for operators. For Ukraine, EASA (2026a) maintains the recommendation to avoid the affected airspace, and for the Russian Federation, EASA (2026b) points to risks related to anti-aircraft defence, misidentification and GNSS interference in the western area of Russia. This approach shows that airspace in conflict should not be viewed only through the borders of the state in which the fighting takes place, because military, electronic and operational effects extend into neighbouring airspaces.

GNSS interference represents a distinct threat. It does not physically destroy the aircraft, but it can degrade navigation, generate false warnings, affect satellite-based procedures and increase crew workload. Ostroumov et al. (2025) include the jamming and spoofing of

navigation signals among the threats that can affect civil aircraft not only in the conflict zone, but also in neighbouring airspaces. For Europe, this aspect is important because the war in Ukraine has produced an increase in reports of navigation interference in Eastern Europe, in the Baltic Sea, in the Black Sea and in the vicinity of active military airspace.

Another effect of the conflict is the increase in route complexity. Ostroumov et al. (2025) use the Horizontal Flight Efficiency indicator, HFE, to assess how inefficient a trajectory becomes when the aircraft must circumnavigate closed or restricted airspace. The authors calculate the difference between the resulting trajectory and the ideal great-circle trajectory. The greater the HFE, the greater the inefficiency of the trajectory. This approach makes it possible to quantify the effect of an airspace closure, not merely to describe it in general terms.

In the case of the Russo-Ukrainian war, the effect is not limited to Ukraine. Ostroumov et al. (2025) show that the combined airspace affected by the closure of Ukraine and the restriction of the airspaces of Russia and Belarus forms a very large barrier for flights between Europe, North America and Asia. The authors estimate that the area involved represents one of the largest airspace segregations since the Cold War period. Consequently, airspace in conflict must be analysed as network infrastructure. The closure of one zone produces effects in other zones, even if they are not directly involved militarily.

The same idea appears in Martín-Domingo, Ersöz and Martin (2026), who analyse Russia's air connectivity after the restrictions imposed following the invasion of Ukraine. The authors show that, after 24 February 2022, 36 countries, including the European Union, the United Kingdom and the United States, closed their airspace to Russian airlines, and Russia responded with reciprocal bans. In the first month, Russia's international capacity fell by 41%, but by January 2023 it had returned close to the previous level, with a total decline of only 4%. This recovery was achieved by reorienting connections towards markets that remained accessible, in particular Turkey and the United Arab Emirates.

This result has an important implication for aviation security. Airspace closure does not necessarily eliminate the connectivity of the targeted state. It changes the geography of connectivity. Martín-Domingo et al. (2026) show that the number of countries connected by air with Russia fell from 64 to 34, and that the most affected connections were the European ones. Nevertheless, alternative markets grew. Turkey, the United Arab Emirates, Armenia and other states absorbed part of the flows. This shows that airspace restrictions have strategic effects

different from their operational effects. From an operational point of view, they reduce the risk for operators who avoid a zone. From a geopolitical point of view, they can be circumvented by reconfiguring the network.

The reconfiguration of routes has direct effects on costs. Martín-Domingo et al. (2026) note that the restrictions on Russian airspace forced European operators flying to Asia to use longer routes, and some connections, such as Paris-Tokyo, required additional flight time. Ostroumov et al. (2025) confirm the same phenomenon through the analysis of increased trajectory length and total flight time. In such cases, aviation security produces operational costs, and operators must choose between more expensive but safer routes and shorter but risk-exposed routes.

Civil-military coordination is the second pillar of airspace in conflict zones. Mostarac, Rešćić, Mihetec and Novak (2022) show that European airspace is fragmented, and that fragmentation produces congestion. The authors explain that the flexible use of airspace is based on civil-military cooperation and on the coordination of airspace use. This idea is useful for conflict zones because it shows that a complete separation between civil and military aviation no longer reflects operational reality. Even in peacetime, military airspace structures must be activated, deactivated or adjusted according to civil traffic. In times of conflict, this coordination becomes vital.

Mostarac et al. (2022) describe three levels of airspace management: strategic, pre-tactical and tactical. The strategic level establishes flexible structures and priority rules. The pre-tactical level operates through a joint civil-military airspace management cell. The tactical level involves real-time cooperation for the activation, deactivation or reallocation of airspace structures. In conflict zones, these levels must function rapidly. If information about a missile launch, a drone attack or the activation of anti-aircraft defence does not reach the civil authority, aircraft may remain on dangerous routes.

The PS752 case shows the consequences of the failure of civil-military coordination. The Aircraft Accident Investigation Board of the Islamic Republic of Iran (2021) reported that Ukraine International Airlines flight PS752, which took off from Tehran for Kyiv on 8 January 2020, was misidentified by an anti-aircraft defence unit, and two missiles were launched at the aircraft. All 176 people on board died. The report is relevant because the civil aircraft was operating on a departure procedure, in open airspace, in a context of heightened military tension.

PS752 shows that an airspace can be formally open but operationally unsafe. In a military alert regime, defence systems may misinterpret the trajectory of a civil aircraft. In such situations, the decision to keep the airspace open must be supported by very good coordination between the civil authority, anti-aircraft defence and air operators. EASA (2026c) explicitly mentions that Iran maintains a high level of alert for its air forces and anti-aircraft defence units, which increases the probability of misidentification in the Tehran FIR. For this reason, EASA recommends that operators not operate in the airspace of Iran, Iraq and Lebanon at all altitudes and flight levels, in the context described in CZIB 2026-03-R14.

This recommendation shows that modern aviation security does not concern only the flight itself. It includes airport infrastructure, air traffic services, command centres, military systems and communications networks. EASA (2026c) emphasises that the risks for aircraft operating in the region can be reduced through proactive airspace management and contingency plans, but that these measures do not completely eliminate the vulnerability of ground-based aviation infrastructure. This formulation is important because it extends the analysis from the aircraft to the aviation ecosystem.

Within this framework, assessing the impact of airspace blockage becomes an essential technical component. Srivastava, St. Clair and Pan (2018) propose a “what-if” analysis method for rapidly estimating the impact of blocking volumes of airspace. Their study does not refer strictly to war, but to potentially hazardous operations, such as space launches, yet the method is relevant to conflict zones. The authors show that users can draw a blocked airspace volume on a map, can modify its size, position or activation time, and can rapidly receive indicators regarding the affected traffic. Such logic can support decisions regarding the closure, reopening or restriction of airspace in crisis situations.

Srivastava et al. (2018) use the concept of a route segment density map. Real trajectories are divided into segments between known waypoints, and crossings are aggregated over hourly intervals. Thus, when a volume of airspace is blocked, the model can rapidly estimate how many flights intersect that zone. The authors show that the method allows an instantaneous assessment of the impact of blocking an arbitrary airspace, with a low loss of accuracy compared with real data. For conflict zones, such an instrument would allow the comparison of several scenarios: total closure, altitude restriction, transit corridor or complete avoidance.

Nevertheless, technical models cannot replace security judgement. Srivastava et al. (2018) show that traffic prediction is affected by season, day, hour, weather, ATC strategies and operator behaviour. In conflict zones, these uncertainties increase, because additional factors appear: the activation of anti-aircraft defence, missile attacks, drones, electronic jamming, political decisions and rapid changes to NOTAMs. Therefore, an impact-assessment system must be integrated with security information, not used in isolation.

Drones add a new dimension of risk. Wallace, Winter, Rice, Kovar and Lee (2023) analysed cases of dangerous proximity between unmanned aircraft systems and manned aircraft, using objective UAS detection data and ADS-B. Their study shows that pilots' visual reports are limited, because they depend on the crew's ability to observe the object and to correctly estimate its distance and altitude. In conflict zones, this problem becomes more serious. Drones can operate in large numbers, at different altitudes, with unpredictable flight profiles and sometimes without electronic cooperation.

The use of military drones, improvised drones and loitering munitions changes the nature of airspace in conflict. Ostroumov et al. (2025) mention that the automatic flight of military unmanned aerial vehicles represents a serious hazard for civil aviation in conflict zones. Unlike a piloted military aircraft, a drone may have a reduced radar signature, low altitude, a fragmented trajectory and a limited avoidance capability. If these systems operate in the vicinity of civil routes or airports, the risk is not confined to the actual combat zone.

A useful concept for analysing airspace in conflict zones is “risk stratification”. Not all altitudes carry the same risk. Not all regions of a FIR are equally exposed. Not all threats have the same range. Long-range surface-to-air missiles can affect cruising altitudes. Small drones mainly affect low altitudes, the vicinity of airports and arrival or departure procedures. GNSS jamming can affect extensive areas and can cross borders. Anti-aircraft defence on alert can produce misidentifications at any flight level. For this reason, the closure decision must combine geographic analysis, vertical analysis and temporal analysis.

In practical terms, a mature assessment of airspace in conflict must answer several questions. The first question is whether there are weapon systems capable of reaching civil altitudes. The second question is whether there is intent or a probability of mistaken engagement. The third question is whether the civil authority receives military information in time. The fourth question is whether the operator has independent sources of information. The

fifth question is whether the alternative route is available and economically sustainable. ICAO (2023) and the Dutch Safety Board (2019) support this logic through their emphasis on threat identification, information exchange and risk assessment.

For Europe, airspace in conflict zones has a strategic dimension. The European Union does not directly administer all the airspaces in its neighbourhood, but European operators fly to, from or near these zones. For this reason, EASA functions as a hub for collecting, assessing and communicating risks. EASA (2026a) and EASA (2026b) show that Ukraine and the west of the Russian Federation remain critical zones for flight safety, and EASA (2026c) shows that the Middle East can move rapidly from tension to active conflict. This continuity of risks confirms that European aviation security depends on the geopolitical neighbourhood.

The legal dimension must not be separated from the operational one. After MH17, state responsibility became part of the discussion about aviation security. The Government of the Netherlands states that both the European Court of Human Rights and the ICAO Council found Russia responsible for the downing of flight MH17 and for the deaths of the persons on board. This legal development is relevant because it confirms that the use of weapons against civil aircraft is not merely an operational accident, but also a serious breach of the international obligations of states.

Nevertheless, legal liability usually arises after the tragedy has occurred. The purpose of aviation security is prevention. For this reason, the management of airspace in conflict zones must be anticipatory. Mostarac et al. (2022) offer a useful lesson through the idea of proactive planning of the flexible use of airspace. The authors show that choosing intervals with reduced civil traffic can diminish the impact of military activities on civil traffic. In conflict zones, the same logic can be applied in reverse: when military activity increases, civil traffic must be reduced, diverted or suspended before the risk becomes critical.

Closing the airspace is the firmest protective measure, but it is not the only one. There can be altitude restrictions, mandatory routes, temporary corridors, prohibitions during certain hours, additional monitoring requirements, contingency plans and rapid communication procedures. However, the experiences of MH17 and PS752 show that partial measures can fail if the threat assessment is wrong. If there are anti-aircraft systems capable of striking cruising altitudes, or if air defence operates at a high state of alert, simply maintaining civil corridors may be insufficient.

Airspace in conflict zones must be understood as vulnerable infrastructure, not as a neutral surface. It can be affected by military decisions, sanctions, territorial claims, weapon systems, jamming technologies, drones and a lack of coordination. The cases of Crimea, Ukraine, MH17 and PS752 show that risk can take different forms. In Crimea, the risk arose from contested air control. In eastern Ukraine, the risk arose from overflying a zone with active anti-aircraft systems. After 2022, the risk arose from an extended conflict that closed airspaces and reconfigured global routes. In Iran, the risk arose from the misidentification of a civil aircraft by anti-aircraft defence.

Consequently, the security of airspace in conflict zones depends on four conditions. The first is accurate information about threats. The second is real civil-military coordination. The third is the operators' capacity to turn information into a routing decision. The fourth is the existence of an international framework that obliges states to communicate risks and to avoid the use of weapons against civil aircraft. ICAO, EASA, the FAA and national authorities have different but complementary roles. ICAO provides the global framework. EASA provides the European alerting mechanism. The FAA provides the example of direct prohibitions for U.S. operators. Air operators apply the final decision in flight planning.

Airspace in conflict zones cannot be treated merely as a routing problem. It represents a point of intersection between aviation, security, international law and geopolitics. The closure of a FIR affects not only the country concerned. It alters the global network, operating costs, market access and the distribution of traffic across the corridors that remain open. At the same time, the failure to close a dangerous airspace can produce irreversible consequences. The central lesson is clear: in conflict zones, the aviation decision must be preventive, documented and internationally coordinated.

CONCLUSIONS

Ensuring civil aviation security has been a matter of constant concern for the civil aviation community since the Cold War era, a period, however, marked by an inability to reach a consensus on successfully combating crimes directed against civil aviation.

The issue of aviation security was first addressed by the International Civil Aviation Organization and subsequently by the European Civil Aviation Conference and the European

Union, with the latter taking its first steps in this regard following the attacks of September 11, 2001.

To gain an overview of the international community's efforts to suppress acts of unlawful interference, I have analyzed the key documents issued to achieve this objective. This analysis highlights the legal responsibilities and obligations of States regarding the prevention of acts of unlawful interference and underscores that combating this phenomenon is impossible without the proper and prompt implementation of these regulations.

Since 1963, the International Civil Aviation Organization has adopted a series of documents aimed at curbing the commission of these offenses on an international scale. These documents took the form of international conventions and technical annexes, the latter incorporating Standards and Recommended Practices, with the specific document relevant to this study being Annex 17, "Safeguarding International Civil Aviation against Acts of Unlawful Interference," to the Convention on International Civil Aviation (the first edition of which was adopted in 1974).

To ensure aviation security at the regional level, the European Civil Aviation Conference, an organization with a mandate in the field of aviation security, adopted the first edition of Document 30 in 1985.

The European Union revised its air transport policy following the attacks of 11 September 2001 by adopting a series of regulations aimed primarily at ensuring the protection of citizens using this transport system. This new policy was implemented through the adoption of Regulation (EC) No 2320/2002 of the European Parliament and of the Council of 16 December 2002 establishing common rules in the field of civil aviation security; Commission Regulation (EC) No 820/2008 of 8 August 2008 laying down measures for the implementation of common basic standards on aviation security; Regulation (EC) No 300/2008 of the European Parliament and of the Council of 11 March 2008 on common rules in the field of civil aviation security and repealing Regulation (EC) No 2320/2002; and Commission Regulation (EU) No 185/2010 of 4 March 2010 laying down detailed measures for the implementation of the common basic standards on aviation security. Pursuant to Article 249 of the Treaty establishing the European Community, these regulations have general application, are binding in their entirety, and apply in every Member State of the European Union.

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