

Study of hostile events and State practices in regards to the use by civil aviation of airspace over conflict zones

Flight Safety Foundation

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1. Introduction

1.1. Background

Flight Safety Foundation is an independent, nonprofit, international organization exclusively chartered to provide impartial research, education, advocacy, and communications in the field of aviation safety. Founded in 1947, the Foundation brings together aviation professionals from all sectors to help solve safety problems facing the industry. With membership throughout the world, the Foundation brings an international perspective to aviation issues for its members, the media and the traveling public.

The Foundation is in a unique position to identify global safety issues, set priorities and serve as a catalyst to address these concerns through data collection and information sharing, training, safety standards, best practices and toolkits. The Foundation strives to bridge proprietary, cultural and political differences in the common cause of advancing global aviation.

Many of the safety issues the Foundation has addressed over the decades have evolved as air travel has grown and technology and training have improved. The stellar safety record of the aviation industry speaks to the progress that has been made.

One of the issues that the Foundation has focused on involves the risk to civil aircraft that fly over conflict zones. Threats to civil aviation due to hostile activity in conflict regions around the world are a continuing concern. In 2020, there were two such occurrences. On 8 January 2020, Ukraine International Airlines Flight 752 was shot down shortly after takeoff from Tehran Imam Khomeini International Airport, resulting in 176 fatalities. On 4 May 2020, an East African Express Airways aircraft was shot down on approach to Berdale airport in Somalia, resulting in six fatalities.

The Foundation has long been involved in working to mitigate civil aviation conflict zone risk. In August 2014, just weeks after the downing of Malaysia Airlines Flight MH17 over eastern Ukraine, the Foundation's chairman was chosen to lead the International Civil Aviation Organization's (ICAO) Task Force on Risks to Civil Aviation Arising from Conflict Zones (TF RCZ). The task force produced important recommendations to mitigate the risks to civil aviation which were incorporated into ICAO's *Risk Assessment Manual for Civil Aircraft Operations Over and Near Conflict Zones* (Doc 10084).

The Foundation continues its global campaign to raise awareness of, and encourage action on, conflict zone risk to civil aviation. In 2020, as part of an inquiry commissioned by the Ministry of Foreign Affairs of the Kingdom of the Netherlands, the Foundation conducted analyses of conflict zones, hostile events and State practices regarding the use by civil aircraft of airspace above conflict zones. This document is a technical note summarising some of the Foundation's findings and capabilities and was produced with reference to an inquiry performed by the Foundation.¹ Within the context of a still-prominent risk, this report attempts to advance the understanding of risk assessment of attacks from the ground on civil aircraft and on the state processes for integrated airspace security risk assessment.

1.2. Scope

The following elements are covered within the scope of this technical note:

- A study of hostile events involving civil aviation in and around conflict zones over a 35-year period beginning in 1985. The study excluded the July 2014 Malaysia Airlines Flight MH17 accident from the scope of the hostile events analysis because the above referenced inquiry involved research into the circumstances that led to a partial closure of the airspace prior to the shootdown of that flight.
- A study of state practices over a 25-year period prior to 2014 regarding the use by civil aviation of airspace above conflict zones. The time period for this specific part of the study was determined by the objectives of the inquiry with reference to which this technical note has been produced.

The findings from the hostile events analysis and from the historical conflict zones analysis are based on the information discovered by the Foundation from public sources.

1.3. Definitions

For the purpose of this report, existing ICAO definitions were adopted. When the following terms are used in this document, they have the following meanings:

Air-to-air missiles (AAMs) — Missiles fired at an aircraft from another aircraft.

¹ The inquiry was commissioned by the Ministry of Foreign Affairs of the Kingdom of the Netherlands, as announced in the letter the Ministry sent to the Netherlands' House of Representatives on 1 May 2020: <https://www.rijksoverheid.nl/documenten/kamerstukken/2020/05/01/kamerbrief-inzake-diverse-onderwerpen-inzake-mh17-dossier>.

Civil aircraft — Non-state aircraft (pursuant to Article 3 of the Chicago Convention). This could include passenger airliners, cargo aircraft and business or private aircraft.

Conflict zones — Airspace over areas where armed conflict is occurring or is likely to occur between militarized parties and is also taken to include airspace over areas where such parties are in a heightened state of military alert or tension, which might endanger civil aircraft.

Hazard — A condition or an object with the potential to cause or contribute to an aircraft incident or accident.

MANPADS (man-portable air defence systems) — Shoulder-launched surface-to-air missiles. These are widely available in many countries, particularly in conflict areas; are portable; and can be used with relatively limited training. MANPADS are capable of bringing down aircraft, but not of reaching cruising altitudes.

Overflying — Passing over terrestrial areas (land or sea) at cruising altitude.

Risk — The potential for an unwanted or calculated outcome resulting from an occurrence. Risk can be estimated by considering the likelihood of threats, vulnerabilities and consequences or impacts.

Surface-to-air missiles (SAMs) — Any weapon that may be fired at an aircraft from the ground (including MANPADS), but in this context, is taken to mean advanced military equipment that is capable of attacking airborne targets at altitudes of at least 25,000 ft.

Threat — A man-made occurrence, individual, entity or action that has, or indicates, the potential to harm life, information, operations, the environment and/or property.

Vulnerability — Factors or attributes that render an entity, asset, system, network or geographic area open to successful exploitation or attack or susceptible to a given threat or hazard.

In this report, in accordance with ICAO and the other referenced sources, the terms “airspace restriction”² and “airspace closure”³ are used interchangeably. Wherever applicable, these terms are used with the addition of their vertical limits.

² As described in ICAO “Air Traffic Services Planning Manual”

³ As used in ICAO “Aeronautical Information Services Manual”

2. Overall Framework

The conceptual framework for this study is provided in Figure 1 below.

The conceptual framework defines two study spaces: *risk situation* and *state practices*. These study spaces are described below.

Risk situation defines the objective evolution of the circumstances associated with civil aviation security or safety risk above conflict zones. It should be noted that the ICAO definition of *conflict zones (CZ)* is restrictively confined to armed conflict that is occurring or is likely to occur between militarized parties. The conceptual framework acknowledges that there may be *other situations (OS)* that do not fall within the ICAO CZ definition but that can still be associated with civil aviation security threats. An example of an OS is a situation associated with insurgents or terrorists that is not an armed conflict.

A *security threat (ST)* can be associated with conflict zones or other situations and can be assessed with the help of the following groups of indicators:

- *Capability to attack* — this study will not exclude other capabilities but will be mainly focused on the presence

of long-range SAMs and AAMs that can hit an aircraft flying at cruising level⁴.

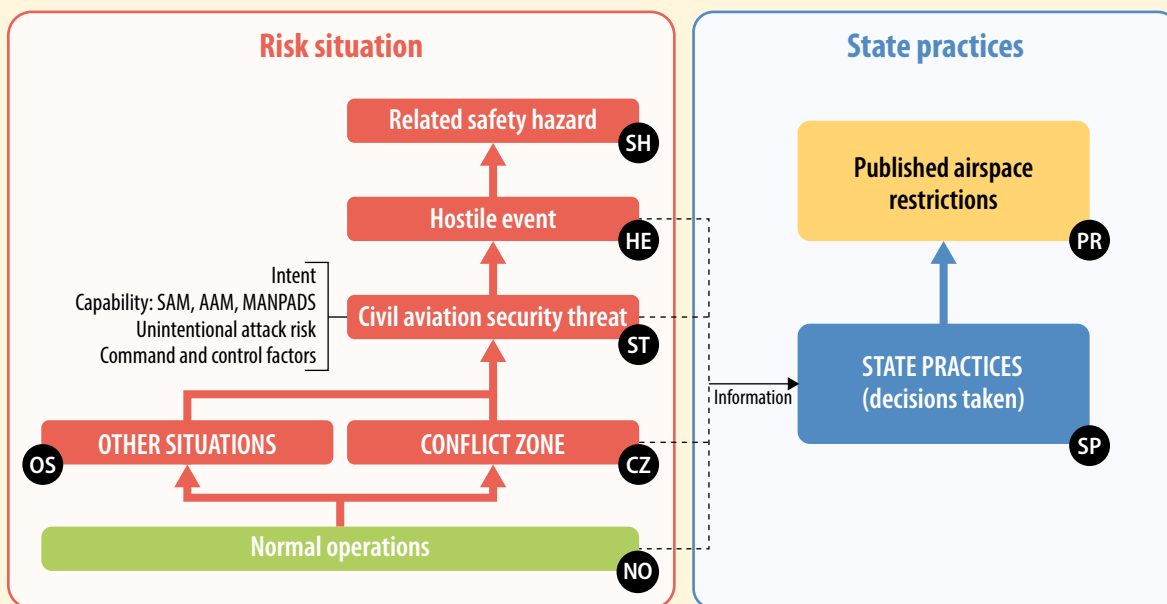
- *Intent to attack* — the plan for a deliberate act against civil aviation
- *Possibility of an unintentional attack* — shaped by the presence of one or more risk factors.
- *Conflict parties' command and control* — the rigorosity and reliability of the command and control procedures and practices for authorizing a capability launch.

A security threat associated with a security risk situation may be dormant and never materialise. Whenever it is actively manifested, however, the security threat usually materialises in a *hostile event (HE)*. Hostile events are intentional or unintentional engagement of a capability against civil aviation. Hostile events can lead to aircraft damage and/or injuries to flight crew and/or passengers, but also can be inconsequential.

A hostile event and, in some instances, the actions of the involved actors to manage the security threat, can lead to *safety hazards (SH)* that are part of the overall consequence

Figure 1

Study Conceptual Framework



⁴ Some anti-aircraft artillery (AAA) systems are capable of reaching cruising levels, but these are generally of lower lethality than SAMs and are discounted from this analysis.

of a risk situation and may need also to be assessed. An example of a safety hazard is a civil flight in dangerous proximity to military flights.

State practices (SP) are the actions of bodies and organisations authorised by the state to manage the airspace over which the state has sovereignty. It should be noted that state practices can be explicitly coded into rules and procedures but also can be an implicitly established way of working.

Airspace published restrictions (PR), as part of airspace management practices, are normally promulgated through:

- *Aeronautical Information Publications (AIPs)*, which generally are used for information of a permanent or lasting nature, as well as for temporary changes of long duration; or
- *Notices to airmen (NOTAMs)*, which are used to disseminate information of a temporary nature and of short duration or when operationally significant permanent changes, or temporary changes of long duration, are made at short notice. NOTAMs do not include extensive text and/or graphics.

State practices also may concern airspace over which the state does not have sovereignty and may be directed at aircraft operators that have been issued an air operator certificate (AOC) by that state (authority). In this case, the state may elect to publish various forms of state advisories or restrictions covering operations in particular airspace. These advisories and restrictions are outside the scope of this study.

Optimally, and as shown in Figure 1, for states to determine what type of state practice to apply to a given risk situation, they need to possess information about the elements of the risk situation — such as information about the characteristics of the conflict zone and the level of escalation; information about the existing security threat as determined by the presence of intent, capability, risk factors for an unintentional attack, command and control rigorousness and reliability; and information about previous hostile events.

This study will use the above-defined framework to analyse the threat and the corresponding airspace restrictions.

3. Hostile Events Analysis: 1985–2020

3.1. Purpose of the Hostile Events Analysis

At the outset of the project, the Foundation gathered and analysed data on 57 hostile events involving civil aviation in and around conflict zones over a 35-year period beginning in 1985. The period was selected based on the information for the hostile events that the Foundation was able to collect. Included in the sample were intentional and unintentional attacks from the ground on commercial air transport and general aviation operations. Hostile events, as illustrated in Figure 2, are the intentional or unintentional engagement of a capability to attack⁵ against civil aviation.

Within the context of this study, the purpose of the hostile events analysis is twofold: to provide an empirically based context for the study and to inform the selection of conflict zones for further analysis. These two purposes are explained further.

The analysis of civil aviation hostile events would provide the necessary, data-defined context for the conflict zone security risk situation. In order to study the conflict zones, it is necessary to study their potential worst outcome — hostile events. Additionally, considering that most hostile events are associated with flights in nonrestricted airspace, this part of the inquiry was an important source of information about the failure of state practices to restrict the airspace.

The security threat associated with a security risk situation may be dormant and may never materialise. Whenever it is actively manifested, however, the security threat usually

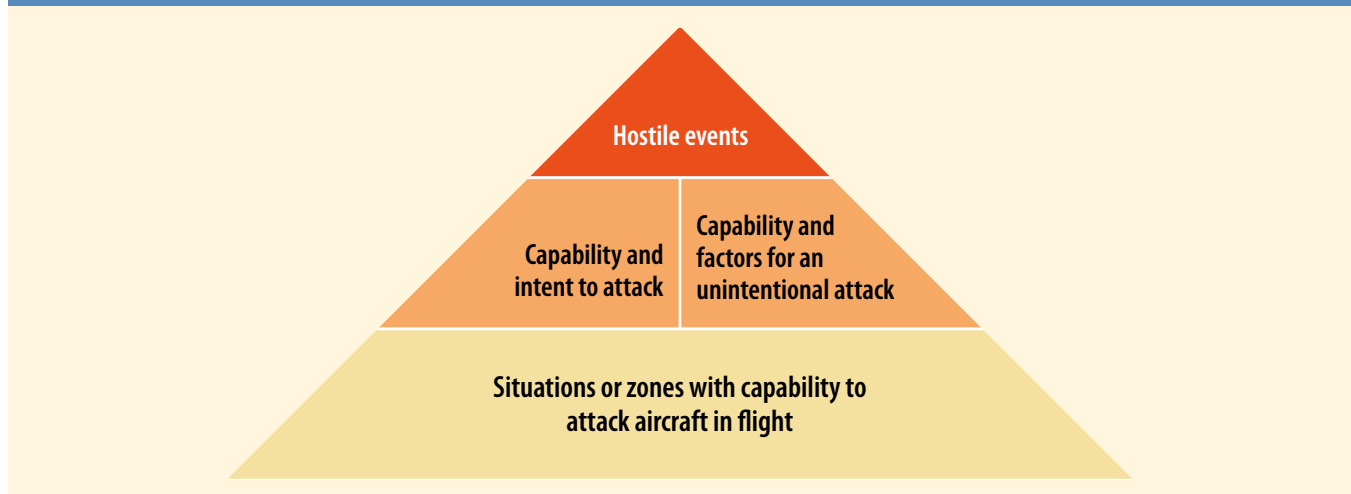
materialises in a hostile event. Hostile events, as illustrated in Figure 2, are the intentional or unintentional engagement of a capability against civil aviation. Hostile events can lead to hull loss, multiple fatalities, aircraft damage and/or injuries to flight crew and/or passengers, but they also can be inconsequential (i.e., a failed attack).

Hostile events are “the tip of the iceberg,” and for each hostile event that occurred, there were many more precursor situations that sometimes were and sometimes were not associated with a conflict zone (for example, a terrorist act not in a conflict zone).

For each hostile event that occurred, there were many more precursor situations with factors that could lead to a hostile event — capability and intent to attack and/or capability and factors for an unintentional attack — were present, but the situation did not actually result in a hostile event. This is represented in the security threat layer of the security risk pyramid in Figure 2.

At the bottom of the security risk pyramid, there are multiple states and zones where the capability to attack aircraft in flight exists but where there is neither an intent to attack nor factors for unintentional attack. In general, the higher the situation is on the security risk pyramid, the higher is the associated security risk. One can study all types of situations associated with the above-illustrated security risk pyramid, including its lower layer of “normal situations” or the higher risk situations represented by the upper layers.

Figure 2
Hostile Events Pyramid



⁵ E.g. MANPADS or SAMs

This study proposes an analysis of the “tip of the pyramid” — the hostile events. It is acknowledged that this is the least populated layer of the security pyramid, and because of that, the associated sample will be the smallest. However infrequent, hostile events are the actual manifestation of the security threat and their study, together with the airspace-related information, is necessary but not entirely sufficient for a systematic, fact-based and data-driven study of conflict zone state practices.

The second purpose of the hostile events analysis is to inform the selection of conflict zones for further analysis. Conflict zones belong to the second layer of the security risk pyramid and occur more frequently than hostile events because there are more situations in which both the capability and intent to attack or capability and factors for unintentional attack are present.

The hostile events analysis can clearly indicate some (but not all) conflict zones with either intent to attack or present factors for an unintentional attack.

3.2. Hostile Events Sample

The sample of hostile events was selected in compliance with the following study-specific requirements:

- Attack occurred during the review period, 1985–2020.
- Attack involved civil aviation flights, including commercial air transport (both scheduled and non-scheduled) and general aviation (for example non-commercial business aviation, aerial work and pleasure flying).

- Global scope.
- Attack could be either intentional or unintentional.
- Attacks considered were not restricted to a specific capability to attack (for example, MANPADS or SAMs) in order not to restrict the possibility for comparative analysis.

Using publicly available resources and a dedicated Foundation database of “hostile events in civil aviation” and considering the above-defined scope of the sample, research concluded that there were at least 57 occurrences during the studied period.

An extract from the Foundation database of hostile events is provided in Table 1 (p. 7).

3.3. Airspace Restrictions and Hostile Events

Airspace restrictions analysis is a key element of this study. The results of the hostile events analysis, illustrated in Figure 3 below, show that most hostile events took place over conflict zones when the airspace was not restricted.

There was only one occurrence in the analysed sample (29 August 1999, Ethiopia) that took place in previously closed airspace. In this case, a business jet deviated from its route and flew deep inside the Ethiopian no-fly zone from Eritrea’s airspace and was shot down by Ethiopian military with SA2 and/or SA3 SAMs.

Only eight occurrences out of the sample of 57 events are not associated with conflict zone and/or insurgency activity and, because of that, could have not been prevented by an restricting the airspace above and around a conflict zone.

Figure 3

Airspace Restrictions

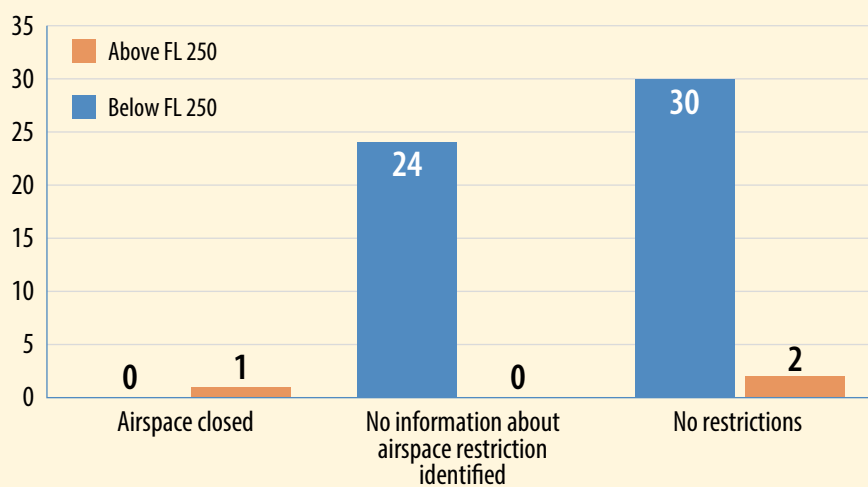


Table 1
An Extract from FSF “Hostile Events in Civil Aviation” Database

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/Uninjured
04-Apr-85	Greece	Fuselage holed, no explosion	Royal Jordanian Airlines	RPG7	Abu Nidal and Black September	Takeoff	Ground	B727	0/0/75
04-Sep-85	Afghanistan	Hit after climbing overhead KDH before setting course, fire, subsequent crash.	Bakhtar Afghan	Shorts Blowpipe	Hezb-i-Islami faction	En route	12,500 ft	AN26	52/0/0
08-Jun-86	Angola	Veer off and wing fire during landing due to damage.	TAAG	UIDM	UNITA	Landing	n/k	L100	0/0/5
16-Aug-86	Sudan	Crashed	Sudan Airways	SA-7	SPLA	Initial climb	<3,000ft	F27	60/0/0
05-May-87	Sudan	Crashed	SASCO Air Charter	MANPADS	SPLA	Initial climb	n/k	C404	13/0/0
11-Jun-87	Afghanistan	Crashed	Bakhtar Afghan	MANPADS	Hezb-i-Islami	En route	n/k	AN26	53/2/0
14-Oct-87	Angola	No. 3 engine hit, caught fire, subsequent crash.	Zimex	MANPADS	MPLA or UNITA	Climb	5,000 ft	L100	6/0/0
06-Nov-87	Mozambique	Crashed	Air Malawi	MANPADS	Mozambique Armed Forces	En route	n/k	SC7	10/0/0
03-Jul-88	Iran	Crashed, missiles fired from ship; flight on airway A59 in accordance with Iranian ATC clearance.	Iran Air	2 x SM2	U.S. Navy	Climb	13,500 ft	A300	290/0/0
10-Dec-88	Pakistan	Crashed	Ariana Afghan	n/k	Pakistan Armed Forces	En route	n/k	AN26	25/0/0
xx Feb-89	Angola	Right wing fire; return to Dundo airport where wing burned off — whole later replaced.	TransAfrik	MANPADS	UNITA	En route	n/k	L100	0/0/X
08-Apr-89	Angola	No. 2 engine disabled and smoke on flight deck; crash landing and fire destroyed aircraft.	TransAfrik	Small arms	UNITA	Approach	<2,000 ft	L100	0/0/4
05-Sep-89	U.S.	Aircraft hit by gunshot while landing, bullet pierced door and grazed passenger’s head.	USAir	Small arms		Landing			0/1/??
21-Dec-89	Sudan	Crashed	MSF	SA7	SPLA	Takeoff/initial climb	<1,000ft	BN2	4/0/0
28-Dec-89	Romania	Crashed after suspected missile exploded in vicinity causing LOC; cause initially hidden by Romania, revealed in 2014.	TAROM	MANPADS	n/k	En route	n/k	AN24	7/0/0
05-Jan-90	Angola	Emergency landing after no. 4 engine hit and collateral damage to no. 3 engine 3, returned to land.	Angola Air Charter	SA7?	UNITA	Climb	n/k	L100	0/0/7
12-Jun-90	Afghanistan	Two engines shut down, then emergency landing on unpaved runway en-route.	Aeroflot	RaytheonFIM-92 Stinger	n/k	En route	FL255	IL76	0/0/10
13-Feb-91	Angola	Damaged on final, normal landing completed	TransAfrik	n/k	UNITA	Approach	n/k	DC8	n/k

AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MPLA = People’s Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People’s Defence Forces; UNITA = National Union for the Total Independence of Angola

Table 1
An Extract from FSF “Hostile Events in Civil Aviation” Database (continued)

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/Uninjured
16-Mar-91	Angola	Crashed	TransAfrik	Stinger	UNITA	En route	FL170	L100	9/0/0
29-Mar-91	Angola	Hit left wing/engine; flight completed.	Zimex	MANPADS	UNITA	En route	n/k	DHC6	0/0/11
10-Jul-91	Peru	Both pilots killed by police gunfire just after takeoff, 13 passengers killed in subsequent crash.	Aerochasqui	Small arms	Illegal action by National Police	Initial climb	75ft	C212	15/0/0
10-Sep-91	Rwanda	Minor aircraft damage; flight completed.	Scibe Airlift Cargo Zaire	MANPADS	RPF	En route	n/k	F27	0/0/14
17-Sep-91	Somalia	Empennage hit, temp LOC, recovery and diversion to Djibouti.	Zimex	MANPADS	n/k	En route	9,600 ft	D228	0/0/5
28-Jan-92	Azerbaijan	Attackers targeted aircraft after “assuming” it was carrying weapons.	Azal Azerbaijan Airlines	Heat seeking missile	Armenian Resistance	En route	n/k	Mi8	44/0/0
27-Mar-92	Azerbaijan	Middle engine disabled, resultant fire, diversion to Yerevan completed.	Armenian Airlines	Gunfire	Azerbaijan Air Force	Initial climb	n/k	YK40	0/0/34
09-May-92	Azerbaijan	Both pilots injured; aircraft caught fire and diverted to Sisian, Armenia; crash landing.	Ararat Avia	Su25	Azerbaijan Air Force	En route	n/k	YK40	0/0/33
29-May-92	Afghanistan	Missile hit runway ahead of aircraft, one pilot injured by shrapnel from explosion, but landing completed. Afghan president on board.	Ariana Afghan	MANPADS	n/k	Approach	700 ft	T154	0/0/17
27-Aug-92	Turkey	Continued to destination with nine bullet holes in fuselage.	THY	Gunfire	PKK	Initial climb	<3,000 ft	A310	0/0/128
23-Jan-93	Angola	No. 3 propeller blown off, returned to land, no other damage.	TransAfrik	RPG	UNITA	Initial climb	<2,000 ft	L100	0/0/X
26-Apr-93	Angola	Left engine hit, turned back but crew conducted forced landing in field.	for UNWFP	MANPADS	UNITA	En route	FL160	AN12	1/2/5
21-Sep-93	Georgia	Missile fired from boat; LOC, crashed.	Transair Georgia	Strela-2 (SA7)	Abkhazian Insurgents	Approach	1,000 ft	T134	27/0/0
22-Sep-93	Georgia	Damaged on short final, crash landed on runway, fire destroyed aircraft.	Orbi Georgian AW	n/k	Abkhazian Insurgents	Approach	n/k	T154	108/24/0
28-Jan-95	Angola	Right engine hit just after takeoff, followed by crash landing.	SAL	Raytheon FIM-92 Stinger	UNITA	En route	<1,500 ft	BE20	2/0/4
02-Sep-98	Angola	Engine fire, initial attempt to divert to MEG but then forced landing.	Permtransavia	MANPADS	UNITA	En route	n/k	AN26	24/0/0
29-Sep-98	Sri Lanka	Crashed	Gomelavia	n/k	LTTE	Climb	FL140	AN24	55/0/0

AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MLPA = People’s Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People’s Defence Forces; UNITA = National Union for the Total Independence of Angola

Table 1
An Extract from FSF “Hostile Events in Civil Aviation” Database (continued)

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/Uninjured
10-Oct-98	DRC	Attempted crash landing in jungle after the rear engine was struck.	Lignes Aeriennes Congolaises	Strela-2 (SA7)	Tutsi Militia	Climb	<6,000ft	B727	41/0/0
14-Dec-98	Angola	Crashed	Khors Air	n/k	UNITA	En route	FL150	AN12	10/0/0
26-Dec-98	Angola	Crashed	TransAfrik	anti-aircraft missile	UNITA	En route	n/k	L100	14/0/0
02-Jan-99	Angola	Crash landing in enemy-held territory during turnback.	TransAfrik	MANPADS	UNITA	En route	n/k	L100	9/0/0
12-May-99	Angola	Engine hit; forced landing; crew captured by UNITA.	Volga Atlantic AL	MANPADS	UNITA	En route	n/k	AN26	0/0/4
01-Jul-99	Angola	Crashed	Savanair	MANPADS	UNITA	En route	n/k	AN12	1/0/4
29-Aug-99	Ethiopia	Hit by proximity missile after proceeding into NOTAM-closed airspace.	Corporate Jets	SAM	Ethiopian Army Targeting Error	En route	FL410	LJ45	2/0/0
31-Oct-00	Angola	Crashed (UNITA claimed shoot down; CAA and military blamed a technical problem).	Ancargo NS	n/k	UNITA	En route	n/k	AN26	49/0/0
04-Dec-00	Burundi	Flight continued to normal landing, 13 bullet holes in fuselage.	Sabena	gunfire	Insurgents	Approach	350ft	A332	0/2/168
08-Jun-01	Angola	Aircraft from World Food Program hit in one engine; crew regained control and landed safely at Luena.	TransAfrik	anti-aircraft missile	Rebels (Unita admitted the attack)	En route—Approach	FL 150, 15000 ft (16,404 ft)	B727	0/0/3
04-Oct-01	Black Sea	On Airway B145; crashed, missile fired from Feodosia overshoot intended target at 18 nm by 140 nm after locking onto it.	Sibir Airlines	S-200 (SA5c)	Ukraine Armed Forces	En route	FL360	T154	78/0/0
28-Nov-02	Kenya	Missile missed the airplane, no damage; pilot decided to continue to Tel Aviv. Not a conflict zone.	Arkia	2 SA-7 - Strela 2	al-Qaida	Initial climb	3000ft	B757	0/0/271
22-Nov-03	Iraq	Continued with wing fire, no hydraulics, no fight controls; turned back, flapless only thrust-controlled landing, gravity drop for landing gear, runway excursion.	European Air Transport (DHL)	SA14 - Strela 3	Insurgents	Climb	8000ft	A300	0/0/3
09-Mar-07	Somalia	Projectile hit aircraft on the left hand side of fuselage near main landing gear. Fire caused smoke inside the airplane, which landed safely.	TransAVIAexport Airlines	most likely an RPG	Rebels on a boat. Islamist militia claimed the attack	Approach	490 ft	IL-76TD	0/0/15
23-Mar-07	Somalia	Crashed	TransAviaExport Airlines	n/k	Rebels on boat	Initial climb	<3,000 ft	IL76	11/0/0

AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MLPA = People’s Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People’s Defence Forces; UNITA = National Union for the Total Independence of Angola

Table 1

An Extract from FSF “Hostile Events in Civil Aviation” Database (continued)

Date	State	Consequences	Aircraft Operator	Capability	Perpetrator	Flight phase	Altitude	Type	Killed/Injured/Uninjured
15-Oct-09	Colombia	Flight.	SADELCA	gunfire	FARC	En route	n/k	DC3	0/1/X
17-Apr-13	Libya	Bullet entered flight deck.	Buraq Air	gunfire	n/k	Approach	2,000ft	B738	0/0/155
24-Jun-14	Pakistan	15-plus bullets; 2 cabin crew, 1 passenger hit; passenger died.	PIA	gunfire	n/k	Approach	n/k	A310	1/2/187
26-Jan-15	Iraq	3-4 bullet holes	FlyDubai	Small Arms Fire	n/k	Approach	<2,000ft	B738	0/2/X
08-Jan-20	Iran	Proximity missile; aircraft destroyed,	Ukraine International Airlines	2x TorM1 (SA15)	Iranian Armed Forces	Climb	8,100ft	B738	176/0/0
04-May-20	Somalia	Going around because of animals on or near the runway; soldiers believed it was a suicide plane and shot it down.	African Express Airways or East African Express	ZU-23 anti-aircraft cannon	Ethiopian troops stationed as part of AMISOM	Approach	2,230ft	E120	6/0/0
25-May-20	Somalia	Continued for a landing. All occupants disembarked uninjured. The aircraft sustained damage by bullets penetrating wings and cabin.	Aeronav/Kenya School of Flying	Small arms fire	Ethiopian troops misidentified the aircraft and opened fire	Approach	<1,200ft	L410	0/0/X

AMISOM = African Union Mission to Somalia; ATC = air traffic control; CAA = civil aviation authority; DRC = Democratic Republic of the Congo; KDH = Ahmad Shah Baba International Airport; LOC = loss of control; MANPADS = man-portable air defence system; MEG = Malange Airport; MLPA = People’s Movement for the Liberation of Angola; n/k = not known; NOTAMs = notices to airmen; RTO = rejected takeoff; SPLA = South Sudan People’s Defence Forces; UNITA = National Union for the Total Independence of Angola

Finding 1: Foundation analysis shows that most of the hostile events involving surface-to-air attacks against civil aviation flights that took place during the period of 1985–2020 could have been prevented by restricting the airspace above or around the conflict zone and by adherence to the restrictions.

3.4. Targeted Aircraft

An analysis of the hostile events indicates that turboprops are a more frequent target than jets, as can be seen in Figure 4. A possible explanation is that turboprops fly lower and slower than jets, including during their approach to land or initial climb following takeoff. The slower speed and engine signature make them easier to hit with less sophisticated and more readily available weapons (MANPADS vs. SAMs).

While potential launch areas around airports can be more easily secured and protected against attackers, the relatively low cruising altitudes of turboprops are within the engagement altitude limits for some MANPADS. Data reviewed show that of the 32 occurrences involving turboprops, only nine were during approach to land or initial climb phases of flight and 20 were during the en route phase.

Also, turboprop-powered aircraft often are used for humanitarian aid/relief flights and in various government utility operations, which often occur in circumstances where security and political stability are sub-optimal.

3.5. Capability to Attack

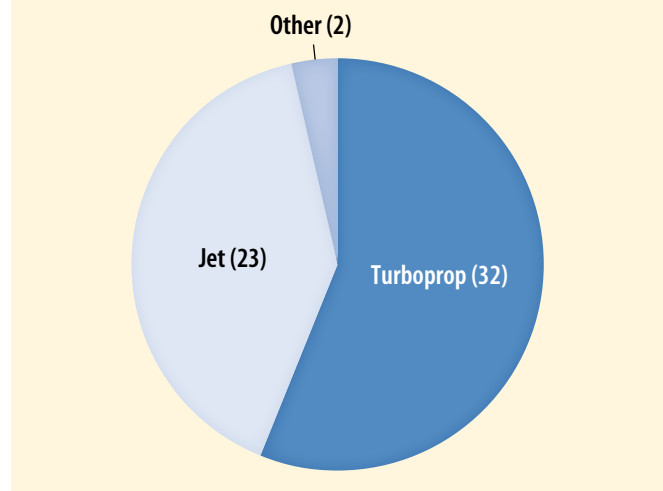
The Foundation's research showed MANPADS are the most common weapon used against civil aviation. Figure 13 shows the number of events in the sample associated with a given capability to attack. MANPADS generally are easier to obtain and use than larger, non-man-portable SAM systems.

However, the size of the warhead for most MANPADS (less than 2 kg for some common MANPADS) and their typical infrared homing guidance, which biases attacks toward aircraft engines, means that a catastrophic outcome (i.e., the aircraft being shot down) is not certain. By comparison, the four SAM events identified (five, including Flight MH17) show that a catastrophic outcome from an effective SAM attack is highly probable, at least in part because of the larger warhead (as much as 70 kg in some missiles).

It also should be noted that small arms attacks against aircraft at lower altitudes likely are the most frequent form of attack simply because of the prevalence of these weapons across the world. However, it is extremely difficult to accurately target an aircraft in flight with small arms, such as assault rifles; any damage tends to be minor; and attacks are difficult to detect. Therefore, it is noted that the number of

Figure 4

Type of Aircraft



small arms attacks in our sample may not be representative of the overall population of such events in the world (Figure 5, p. 12).

Finding 2: Based on an analysis of reported surface-to-air attacks against civil aviation flights for the period of 1985–2020, MANPADS are the most common weapon used against civil aviation. MANPADS are generally easier to obtain and use than larger, non-portable SAM systems. However, the size of most MANPADS warheads means that a catastrophic outcome is not certain. By comparison, the SAM events identified show that a catastrophic outcome from an effective attack is highly probable. The presence of SAMs should therefore be a key indicator in any airspace risk analysis and avoid/overfly decision.

3.6. Risk and Capability Engagement Altitude

In 34 of the hostile events in the Foundation “Hostile Events in Civil Aviation” database, information about the engagement altitude was found. The engagement altitude for the hostile events in the Foundation database is presented in Figure 6 (p. 12). The Flight MH17 event is also indicated on the figure for reference.

Three (four, including the Flight MH17 event, which was not considered in the hostile events analysis) of the events occurred above Flight Level (FL) 250 and 19 occurred below FL 50.

There were five occurrences, depicted in red in Figure 6, identified as involving a SAM attack. Two of these events (Iran Air, 1988, and Ukraine International Airlines, 2020)

Figure 5
Number of Events in the Sample Associated With a Given Capacity to Attack

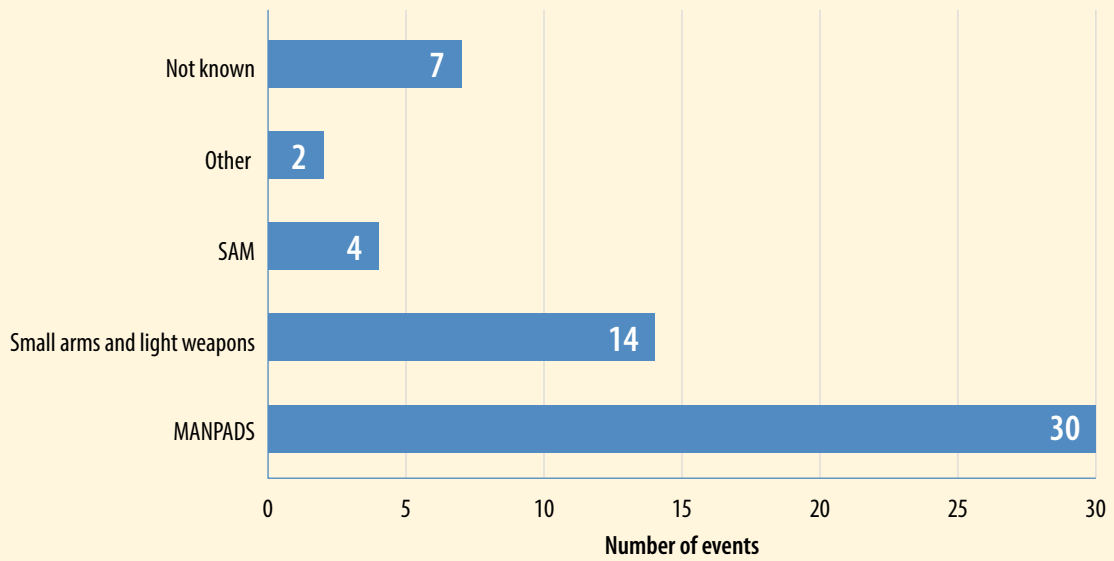
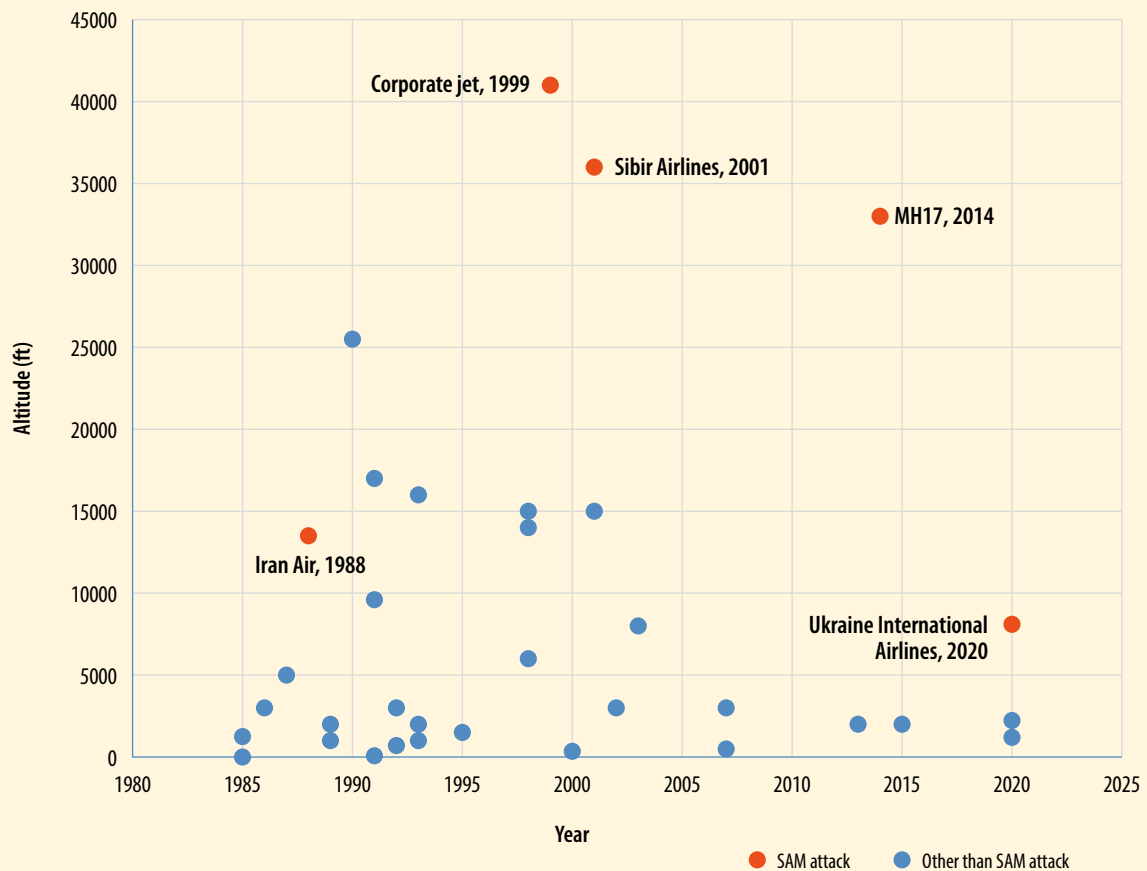


Figure 6
Altitude Distribution



occurred within the limits of MANPADS engagement altitude. The occurrences depicted in blue involved capability to attack other than a SAM.

From the analysis, it appears that MANPADS range can be greater than sometimes assumed. A U.S. government assessment, published in July 2011, stated that MANPADS could “strike aircraft flying at altitudes up to approximately 15,000 feet at a range of up to 3.2 miles [5.9 km].” However, data associated with a 1990 attack on an IL-76 in Afghanistan recorded its altitude when hit by a U.S.-manufactured Raytheon FIM-92 Stinger MANPADS missile as FL 255. In this case, the missile was fired from high terrain. Therefore, the launch altitude for MANPADS can have a significant effect on their range and maximum engagement altitude.

It can be concluded that a reliable initial assessment of risk to airspace users demands an accurate up-to-date assessment of any effective capability in the hands of potential non-state aggressors and state actors.

The analysis of the engagement altitude, the associated phase of flight and the typical cruising altitude for an involved type of aircraft reveals that FL 250 is well selected for studying the security risk for aircraft at a cruising level that does not include the risk of MANPADS.

3.7. Intentional vs. Unintentional Attack

The two origins of risk to airspace users are “intentional act” and “unintentional act.” State perpetrators’ acts are generally associated with the latter explanation. And while irregular perpetrators also make targeting errors, in some regional conflict zones, an intent to bring down civil transport aircraft has featured prominently in their actions.

In terms of consequences, the most difficult to predict risk with the most serious consequences is error by those controlling the offensive capability of well-armed states. Recent history shows that this capability can sometimes be inadequately controlled both during training exercises and when applying the “offensive engagement approval” process in the general context of growing political instability.

Table 2 presents information about unintentional attack occurrences extracted from the Foundation database. There are eight such events identified and all but one involved military misidentification of the target identity and/or intentions. The remaining 49 events involved either an intentional attack or events for which the Foundation did not find information regarding intent.

The capability of “irregular perpetrators” is likely to be less than that of states unless states are pursuing an aggressive

Table 2

Unintentional Acts and Their Context

Date	State	Unintentional Act	Aircraft Operator	Perpetrator	Altitude	Killed/Injured/Uninjured
11-Jun-87	Afghanistan	Misidentified as a Russian IL14.	Bakhtar Afghan	Hezb-i-Islami	n/k	53/2/0
03-Jul-88	Iran	Military misidentified target as a descending Iranian F-14.	Iran Air	U.S. Navy	13,500 ft	290/0/0
29-Aug-99	Ethiopia	Military targeting error after proceeding into NOTAM closed airspace.	Corporate Jets	Ethiopian Army	FL 410	2/0/0
04-Oct-01	Black Sea	Military exercise missile overshoot intended target at 18 nm (33 km) by 140 nm (259 km) after locking onto it.	Sibir Airlines	Ukraine Armed Forces	FL 360	78/0/0
26-Jan-15	Iraq	Probably accidental, rounds from nearby social event.	FlyDubai	n/k	<2,000 ft	0/2/X
08-Jan-20	Iran	Military misidentified aircraft as a hostile target.	Ukraine International	Iranian Armed Forces	8,100 ft	176/0/0
04-May-20	Somalia	Military misidentified going-around aircraft as a suicide plane.		Ethiopian troops as part of AMISOM	2,230 ft	6/0/0
25-May-20	Somalia	Military misidentified aircraft and opened fire.	Aeronav/Kenya School of Flying	Ethiopian troops as part of AMISOM	<1,200 ft	0/0/X

AMISOM = African Union Mission to Somalia; n/k = not known; NOTAM = notice to airmen

policy objective by equipping irregulars with offensive capability much greater than they normally would possess (older versions of MANPADS with less than current frontline capability, for example).

3.8. Hostile Events and Conflict Zone Flights

The analysis of the Foundation database sample suggests that the primary risk of overflying conflict zones at high cruising altitudes is the mis-targeting of long-range air-burst missiles. Based on our sample, these long-range missiles are unlikely to be in the possession of non-state actors.

Information about the risk of flight within a conflict zone is usually disseminated with a NOTAM.

The hostile events analysis identified several conflict zones where either an obvious intent to attack or factors for an unintentional attack existed. These zones, listed below, were

considered candidates for further conflict zone analysis as part of the study.

- Afghanistan;
- Georgia during civil war, 1991–1993;
- Iraq;
- Libya;
- Democratic Republic of the Congo; and,
- Nagorno-Karabakh war.

Angola, where a number of attacks occurred, including the TransAfrik event noted above, was reviewed for inclusion, but is not included in the final list because the parties involved did not have a capability to attack aircraft flying at cruise altitude.

4. Conflict Zones Analysis: 1990–2014

4.1. Purpose of the Conflict Zones Analysis

Within the context of this study, the purpose of the conflict zones analysis was to provide an overview of state practices regarding airspace restrictions above and/or around conflict zones. Among other things, the Foundation focussed on determining the presence of air defence equipment (both air-to-air and surface-to-air) during a conflict and the restrictions that were applicable to the use of the airspace.

4.2. Conflict Zones Sample

Conflict zones were selected in the following manner:

- Based on publicly available information for the major conflict zones in the world.
- Conflict zones were active during the period 1990–2014.
- There was a reasonable expectation, prior to commencing the analysis, of the existence of capability to attack at altitudes above FL 250. In this respect, the study scope is restricted to the airspace management state practices for cruising altitudes that are more than 25 000 ft above ground level. FL 250 is also the altitude limit that is often used in state advisories or restrictions for operations in particular airspace with regard to risk associated with MANPADS.

Following the above-outlined study-specific requirements, and including the results of the hostile events analysis, the conflict zones selected for analysis are:

- Bosnian war, 1992–1997.
- Croatian war, 1991–1995.
- Democratic Republic of the Congo — it is to be noted that this conflict zone is the only one from the sample for which the analysis concluded that there was low likelihood of the presence of capability to attack above FL 250. However, the analysis is kept in the sample to provide context and perspective.
- Egypt (Sinai).
- Georgia-Russia, 2008.
- Iraq war, 1991.
- Iraq war, 2003–2011.
- Kosovo, Allied Force 1999.
- Libya, 2011.
- Slovenia, 1991.

- Afghanistan, 2001–present.
- Armenia Azerbaijan.
- Ivory Coast, 2002–2004.
- Indonesia (Aceh), 1990–1998.
- Mali, 2012–2015.

4.3. Conflict Zone Indicators

The situation in each conflict zone was reviewed (Appendix A) relative to a set of 10 predetermined “indicators of likelihood of attack,” such as the presence of SAMs capable of reaching a target in flight above FL 250.

Each of the indicators is considered as a question with possible answers numbered from 1 to 3. The number of the answer is an indication of likelihood, with 1 indicating, in general and with all other conditions being equal, the lowest likelihood of attack. The higher the number of the answer, the greater is the indication of the likelihood of attack.

The indicators are defined as follows:

A. Parties:

1. Conflict between states.
2. Conflict between non-state armed groups and state(s) or civil wars.
3. Conflict between non-state armed groups.

B. Armed conflict scale and/or tensions:

1. Terrorism and/or international political tension.
2. Insurgency (small-scale military activities) and/or medium increasing political tension.
3. Large-scale military activities and/or heightened international political tension.

C. Military air transport activities - Use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be difficult to distinguish from civil aircraft, particularly when they operate near airways and close to civil aircraft cruising altitudes):

1. Military air transport activities not reported.
2. Occasional use of aircraft to transport ground troops or military equipment.
3. More than occasional use of aircraft to transport ground troops or military equipment (by at least one party).

- D. Military air combat activities - Use of military aircraft in a combat role or for hostile reconnaissance by at least one party in the conflict. This could include remotely piloted (unmanned) aircraft:
1. No military air combat activities.
 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250.
 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250.
- E. Known attacks:
1. Conflict area without any publicly reported security incidents involving military and civil aviation.
 2. Conflict area with a single security-related reported incident/accident involving military (or civil) aviation.
 3. Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.
- F. Capability to attack by at least one party:
1. No information about capability to attack with range above FL 250.
 2. Air-to-air missiles (AAMs) launched from fighter aircraft (and no SAMs) and/or some indication (but not full certainty) of long-range SAMs that can hit an aircraft at cruising level.
 3. Long-range SAMs that can hit an aircraft at cruising level.
- G. Capability to differentiate between civil and military aircraft:
1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques.
 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF); or secondary surveillance radar (SSR).
 3. Differentiation supported only by radar tracks.
- H. SAM/AAM operators' experience and chain of command:
1. Regular forces.
 2. SAMs in the possession of irregular military forces *or* an absence of robust SAM/AAM command and control procedures for authorizing launch.
 3. SAMs in the possession of irregular military forces *and* an absence of robust SAM/AAM command and control procedures for authorizing launch.
- I. Known intent to attack:
1. Known intent to attack military aircraft.
 2. Known intent to attack civil aircraft.
 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.
- J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions, if any):
1. No air traffic or only occasional traffic.
 2. Small to moderate traffic volume (for example, traffic restricted to arrivals and departures to airports).
 3. Considerable traffic volume, including international overflights

The 10 indicators belong to groups of indicators defined in Section 2 that characterise the security threat. Each of the 10 indicators can belong to more than one group as follows:

- Capability to attack: indicators D, F and G.
- Intent to attack: indicators E and I.
- Possibility for an unintentional attack: indicators B, C, D, G, H and J.
- Conflict parties' command and control: indicators A, B and H.

One of the indicators, "The capability to attack by at least one party," is used as the primary filter, because the presence of an air defence system (surface-to-air or air-to-air) that can reach aircraft above FL 250 is an enabling risk factor at that altitude. The only possible exception would be an aircraft emergency such as an engine failure requiring a drift-down or an aircraft pressurisation failure leading to an emergency descent within the range of lower altitude capability to attack.

Other indicators of likelihood of attack were considered. Within them are some indirect indicators that are based on others' risk analyses. Examples of such indicators are the behaviour of large airlines and/or airlines with better access to risk information and the information from underwriting companies.

Detailed information about conflict zones is now generated globally by the insurance industry and is used to determine underwriting risk for so-called "war risk insurance" on an hour-by-hour basis. The risk assessments are used to set premiums for a given route, whether for overflight or landing, and underwriters may even refuse to insure an operator if the risk is considered to be unacceptably high. Sudden increases, sustained high premiums or refusals of coverage may

therefore provide a useful indicator of overflight risk before formal airspace closures or NOTAM warnings are issued. Operators will balance insurance costs against the cost of flying a less efficient avoidance route as part of their own risk assessment for a given flight; however, state authorities can lawfully direct their certificated operators to avoid a given area regardless of any efficiency penalties.

The indicators based on the behaviour of airlines and underwriters, although considered important in general, were not retained for the conflict zone risk analysis because of the lack of access to such historical information for the studied conflict zones.

Apart from the conflict zone likelihood of attack, and within the context of this study, there is another important indicator — the indicator of airspace restrictions. This indicator describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:

- Restrictions by the sovereign authority (state) responsible for the airspace.
- Restrictions by others — third parties (for example, introducing a no-fly zone) and/or neighbouring states.

4.4. Overview of the Conflict Zone Analysis

Table 3 (p. 18) provides an overview of the analysed conflict zones.

The individual indicators of likelihood of attack (A to J) are coloured to illustrate how each contributes to the overall likelihood of attack. Green boxes indicate a low contribution to the likelihood, red boxes indicate a high contribution to the likelihood and yellow means a medium contribution to the likelihood.

The overall likelihood of attack is defined qualitatively as follows:

- *High* means a very plausible scenario that includes the presence of civil aircraft operations and evidence of capability and intent to attack or high indication of likelihood of unintentional attack.
- *Low* means a scenario with no information about capability to attack or without civil aircraft operations or low indication of unintentional attack.
- *Medium* means a scenario that is not covered by the either the *high* or *low* likelihood to attack definitions.

The overall likelihood of attack is not just a simple aggregation of the 10 indications of likelihood of attack provided by the 10 individual indicators. For example, the indicator “capability to attack by at least one party,” apart from influencing the risk factors for an unintentional attack, is also a

key filtering factor that, in the beginning of the risk analysis, defines with its indication the subsequent course of the risk analysis. Indeed, if in a given conflict zone there is (certainty of) no capability to attack above FL 250, then there is no need to analyse the other indicators, and the likelihood of attack there can be considered to be low.

Another example of the complex interactions of the indicators and their influence on the likelihood of attack can be illustrated by discussing the “intent to attack” and “capability to attack” indicators. High likelihood of attack is determined not simply by the intent of one of the conflict parties to attack, but also by their capability to attack at that altitude.

Similarly, fusing the information from the six indicators related to the likelihood of unintentional attack only makes sense when military aviation assets are in possession of the enemies of the parties that possess capability.

With the aim of providing an overall assessment of the likelihood of attack in a conflict zone while at the same time addressing all the complexities related to the interactions of the individual indicators in their influence the likelihood of attack, the Foundation used proprietary risk analysis algorithms. The algorithms were parametrised to assess the overall likelihood of attack above FL 250, and the results are provided in Table 3.

Using the algorithms, two sets of assessment were performed — one factoring the civil aviation traffic volume for the situation after introducing the airspace restrictions (if any), and the other for assessing the situation as if airspace restrictions were not in effect. The latter assessment is hypothetical and is not the same as the assessment of the likelihood before the introduction of the airspace restrictions. The reason for that is because before the introduction of airspace restrictions, many of the other indicators were often also different — the military combat activities have not commenced, the armed conflict scale was still to be seen and the attacks on military aircraft were still to be performed.

For each set of assessments, separate “algorithm runs” were performed for each credible capability to attack. Here are some examples of risk scenarios that determine separate runs of the algorithm:

- Long-range SAM capability of one conflict party that could result in intentional or unintentional attack against civil aircraft;
- AAM capability of a party that could result in intentional or unintentional attack against civil aircraft; and,
- A scenario (specific to the mountainous terrain in places like Afghanistan) where MANPADS can reach above FL 250.

Table 3
Overview of the Conflict Zone Analysis

	Airspace Restrictions above FL 250	No information		Command and control factors									
		High likelihood indication		Risk factors for an unintentional attack									
		Medium likelihood indication		Capability to attack									
		Low likelihood indication		Intent to attack									
		Overall indication of likelihood of attack above FL 250		A. Parties	B. Armed conflict scale and/or tensions	H. SAM operators' experience and chain of command	C. Military air transport activities	J. Civil aircraft operations (with airspace restrictions)	D. Military air combat activities	G. Capability to differentiate between civil and military aircraft	F. Capability to attack by at least one party	E. Known attacks	I. Known intent to attack (civil a/c)
With actual airspace restrictions	Without airspace restrictions												
Bosnian war 1992-1997	Others' restrictions												
Croatian war 1991-1995	Partially restricted												
Democratic Republic of the Congo	No restriction												
Egypt (Sinai)	No restrictions												
Georgia-Russia 2008	No restriction												
Iraq war 1991	Others' restrictions												
Iraq war 2003-2011	Others' restrictions												
Kosovo, Allied Force 1999	Others' restrictions												
Libya 2011	Others' restrictions												
Slovenia 1991	Restricted												
Afghanistan 2001- present	No restrictions												
Armenia Azerbaijan	Restricted												
Ivory Coast 2002-2004	No restriction												
Indonesia (Aceh) 1990-1998	No restriction												
Mali 2012-2015	No restriction												
Georgian civil wars 1991-93	No restriction												

The overall likelihood for a given set of algorithm runs is determined by the highest risk assessed for the scenarios within the set. For example, in a given set (with or without airspace restrictions), if the likelihood of attack associated with air-to-air unintentional attack is assessed as medium and the likelihood of attack with long range SAMs is assessed as high, then the likelihood of attack for the set is considered high. This is intuitively logical because for an aircraft operator and the general public, what is important is not how the attack will be performed but the likelihood of attack when flying in a given airspace.

4.5. Discussion of the Conflict Zone Analysis

In this section, we analyse the data in Table 3 and draw conclusions based on the historical evidence and our expert analysis.

In analysing these conflict zones, sometimes the evidence and expert interpretations led to clear conclusions, and in other cases, due to lack of information, a conclusion could not be definitively established.

The overview of the conflict zones analysis provided in Table 3 reveals (see the two columns under the common title “Overall indication of likelihood of attack above FL 250”) that in the studied sample there are only two conflict zones where a state completely closed its own airspace. These are the conflict zones of “Slovenia, 1991” and “Armenia-Azerbaijan.”

In one conflict zone, “Croatian war, 1991-1995,” the airspace was partially closed. In five of the analysed conflict zones, the airspace was closed by other states or organisations and not the sovereign state — for example by a U.N. Security Council resolution, as in the case of “Libya, 2011,” or by the neighbouring states, as in the case of “Kosovo, Allied Force, 1999.”

For eight conflict zones, either there were no airspace restrictions or no information about airspace restrictions could be found.

The analysis of airspace restrictions for the studied sample of 16 conflict zones is illustrated in Figure 7.

Overall, there are 11 conflict zones with medium or high indication of likelihood of attack without airspace restrictions. Of these 11 conflict zones, there was only one instance in which the sovereign state responsible for that airspace introduced airspace restrictions — see Figure 8.

Finding 3: The analysis of selected conflict zones over the period of 1990–2014 did not identify a uniform practice of states closing their own airspace when there were indications of a likelihood of attack against civil aircraft in the context of an armed conflict on the territory of that state.

Figure 7

Sample of 16 Conflict Zones

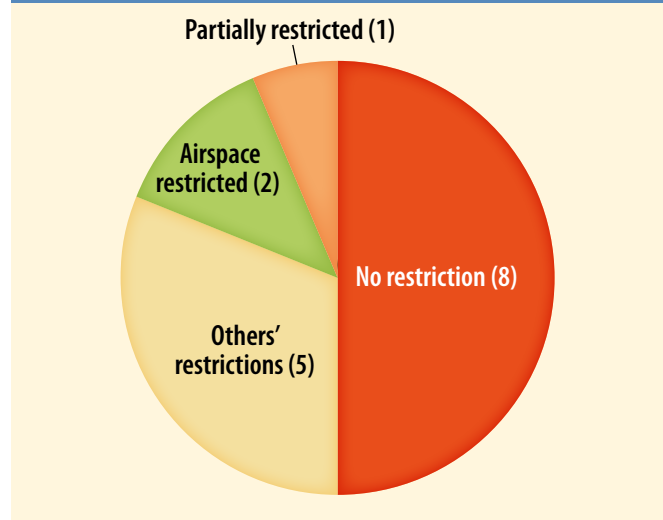
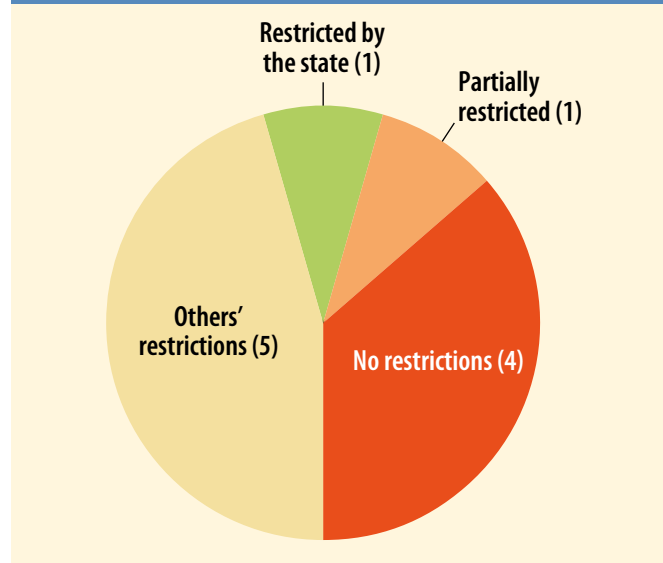


Figure 8

11 Conflict Zones With Medium or High Indications of Likelihood of Attack Without Airspace Restrictions



In the few cases in the sample where states partially or completely closed their airspace, this was often associated with the loss of effective control over the relevant airspace by the state — Yugoslavia with the “Croatian war, 1991-1995” and with “Slovenia, 1991” and the conflict zone “Armenia-Azerbaijan.”

Finding 4: The analysis of selected conflict zones over the period of 1990–2014 identified that, on the rare occasions

when a state restricted its own airspace above FL 250, it was associated with the loss of effective control over the relevant airspace by the state.

Whenever a state closes or restricts its own airspace above FL 250, or such a restriction is imposed by a third party (such as in the introduction of a “no fly zone” by an entity like the North Atlantic Treaty Organization), the predominant concerns historically have related to the security of military operations, military aircraft traversing airspace, and the protection of ground infrastructure and of the population rather than the security of the civil aviation. Indeed, looking at the publicly available sources, U.N. Security Council resolutions and/or the introduction of no-fly zones, no information was found referring to the protection of civil aviation whenever airspace was restricted or closed.

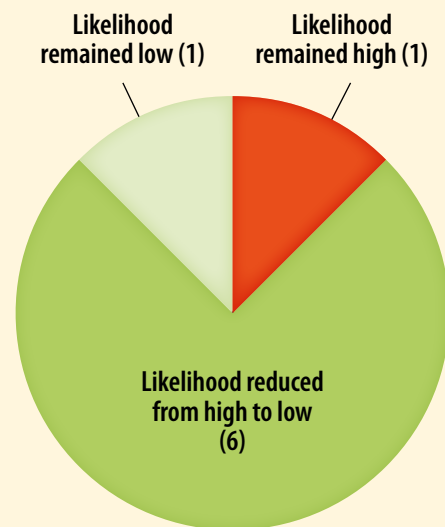
Finding 5: The analysis of selected conflict zones over the period of 1990–2014 identified that whenever a state closed or restricted its own airspace above FL 250, or such a restriction was imposed by a third party, the predominant concerns were the security of military operations and of the population rather than the security of civil aviation.

In the studied sample, there were eight cases in which an entity (the sovereign state or a third party) introduced partial or full airspace restrictions. These restrictions were for the conflict zones “Bosnian war, 1992–1997,” “Croatian war, 1991–1995,” “Iraq war, 1991,” “Iraq war, 2003–2011,” “Kosovo, Allied Force, 1999,” “Libya, 2011,” “Slovenia, 1991” and “Armenia-Azerbaijan.”

Two sets of overall indication of likelihood of attack above FL 250 for these conflict zones were compared. These two sets of assessment include one that factors in the civil

Figure 9

Eight Cases of Airspace Restrictions



aviation traffic volume for the situation after introducing the airspace restrictions (if any), and the other that assesses the situation as if airspace restrictions were not in effect.

This comparison reveals that in six of the eight cases in which airspace restrictions were introduced, the assessed likelihood of attack against civil aviation was reduced considerably. (See Figure 9)

The likelihood of attack for the conflict zone “Slovenia, 1991” without airspace restrictions was assessed as low, and because of that, it can be argued that the restrictions were not necessary for the purpose of protecting civil aircraft at cruising altitudes above FL 250.

5. Discussion

5.1. Flight Safety Foundation Integrated Standard for Airspace Security Risk Assessment

The study of States' decision-making processes reveals that there is significant benefit to be gained in promoting a standard that defines a State-wide process for airspace security risk management that is distributed around different authorities and organisations, yet functional from end to end.

In this way, the organisational scope of the process is not restricted to the more traditional perspective of civil-military aviation coordination (e.g., some State intelligence functions may not be attributed to military authorities).

Namely, the Foundation's integrated standard for airspace security risk assessment, as illustrated in Figure 10, addresses the five main functions to be assigned to one or more different authorities, organised as an integrated process and performed within a given sovereign state:

- A. Threat watch — roles, responsibilities, procedures and processes for monitoring for potential threats to civil aviation.
- B. Threat analysis — roles, responsibilities, procedures and processes for threat analysis, including capability of attack, intent to attack, risk factors for unintentional attack, and for validating the information.

- C. Risk analysis — roles, responsibilities, procedures and processes for analysing the security risk including potential consequences.
- D. Decision-making — roles, responsibilities, procedures and processes for airspace management in relation to security threats to civil aviation, including deciding airspace restrictions and closure of airspace.
- E. Promulgation — roles, responsibilities, procedures and processes for communicating airspace management decision-making, including decisions on the communication tools (e.g., NOTAMs) used, composition of the communication message and verification of adherence to international standards and procedures for aeronautical information.

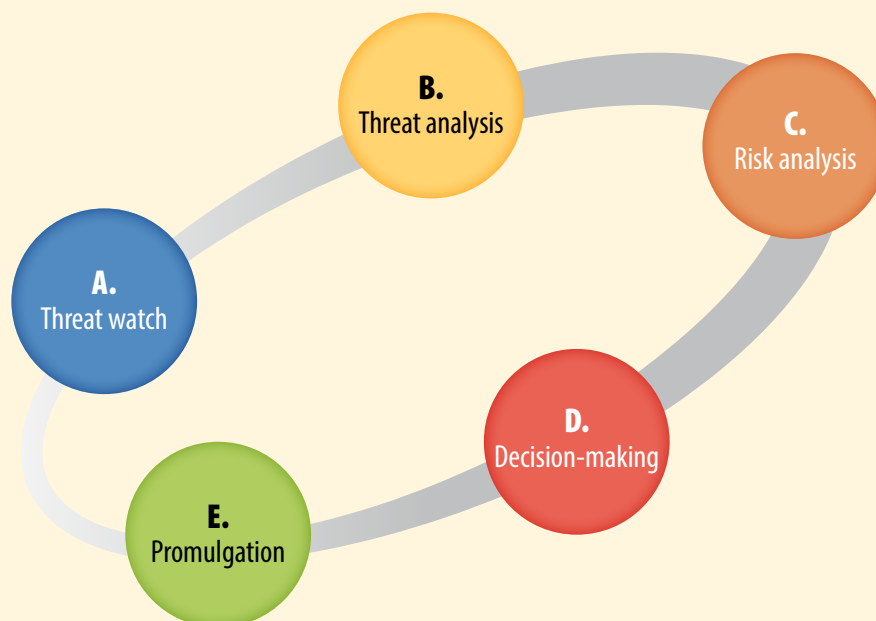
Each of the five functions of the integrated standard for airspace security risk assessment targets a particular step from the risk assessment process and contains three or four specific sub-functions that are formulated as questions:

A. Threat watch:

- Q1 — **Social media:** Is information in social media including information about capability of attack and/or intent to attack civil aircraft, used as a trigger for security threat analysis for civil aviation?

Figure 10

Flight Safety Foundation Integrated Standard for Airspace Security Risk Assessment



- **Q2 — Public and private sources:** What are the sources of public and private threat information and what are the processes for gathering information relative to civil aviation security (including in a conflict zone)?

- **Q3 — Other actors' information:** What is the level of involvement of airlines, air navigation service providers (ANSPs), the military, adjacent states and/or other states publishing advisories in gathering information about aviation security (including information for conflict zones)?

B. Threat analysis:

- **Q4 — Adjacent airspace:** What are the procedures for routine review and analysis of NOTAMs, security warnings and airspace restrictions for adjacent FIRs to ensure civil aircraft security?

- **Q5 — Verifying the information:** What is the process for deciding on source credibility and for verifying information, including information on capability of attack and intent to attack, relative to an active armed conflict that could impact civil aviation?

- **Q6 — Unintentional attack factors:** What are the determining risk factors for unintentional attack that may result in civil aviation not being allowed to fly over a conflict zone? For example, scale of the conflict, military air transport or air combat activities, previous attacks against aircraft, level of training and experience of SAM operators, level of robustness of command and control mechanism for authorising launch, civil aviation flight proximity to strategic assets, technical capability of SAMs to distinguish between civil and military aircraft.

C. Risk analysis:

- **Q7 — Coordination and analysis:** What organizations are involved, how do they coordinate, and what is the process for determining acceptable security risk levels in civil aviation airspace over a conflict zone?

Note: These are general security level targets to be met, if specified, that are not specific to an event or situation.

- **Q8 — Potential consequences:** What is the process of determining how civil aviation can be affected based on threat information in a conflict zone? For example, what part of the airspace, what altitudes or types of aircraft?
- **Q9 — Risk methodology:** What analysis methodology or risk matrix is used to assess the likelihood of a threat presenting itself and the potential consequences for civil aircraft flying over the conflict zone?

- **Q10 — Risk mitigations:** What is the process to determine security mitigations that would permit civil aviation to overfly a conflict zone?

D. Decision-making:

- **Q11 — Normal times decision-making:** What are your normal (not during conflict) criteria for establishing restriction or segregation of airspace and what are the coordination procedures both internally and externally?

- **Q12 — Conflict zone decision-making:** What are the decision processes for security of airspace, including establishing restriction or segregation of airspace in a conflict zone? What are the ANSP and military coordination procedures for active civil flights and their safety?

- **Q13 — Adjacent FIR coordination:** What organisations are involved and what are the procedures for coordinating airspace restrictions in the conflict zone among adjacent FIRs?

E. Promulgation:

- **Q14 — Publish or not, and how:** What is the process to decide if there is a need for aeronautical information publication and to choose the communication tool for it (e.g., NOTAMs, AIC)?

- **Q15 — Verify and validate:** What organisations are involved in and what are the processes used to prepare, verify if ICAO Aeronautical Information Service procedures and terminology are used, validate for correctness and transmit aeronautical information to its users (e.g., airlines and ANSPs)?

- **Q16 — Special advisories and threat information:** What are the procedures for disseminating civil aviation security threat information to operators within and outside the conflict zone FIR?

In total, 16 question groups (as listed above) were formulated. In addition, four detailed questions were formulated for each of the 16 question groups:

- **Answer:** Provide a brief overall answer to the question.
- **Responsible:** Describe which authorities/organisations are responsible for the activities associated with the respective question.
- **References:** Provide specific references to legislation, requirements and other provisions that define the responsibilities and the process.
- **Process and timeline:** Describe the process (including its inputs/outputs) to perform the associated activities, including the processing time.

5.2. Risk Assessment Methodology

As highlighted by the analysis, there is significant risk reduction potential for States in adopting robust security risk assessment methodologies within the context of their airspace security management process that are systemic and integrating considerations of factors for unintentional attack on civil aircraft.

The analysis of selected conflict zones and the referenced inquiry identified the need to include in the scope of the airspace security risk management process the risk associated to threats originating from other States that can affect the airspace of a State. In this context, the States to be considered are determined by the potential range of the capability to attack civil aircraft and include, but are not restricted to, the adjacent States.

The study and the referenced inquiry identified instances in which States acknowledged the source of the threat in the neighbouring territory and, in general, the need to consider all risk factors, and subsequently did not acknowledge the responsibility to determine the risk factors for an unintentional attack in their airspace originating from the close proximity to the conflict zone in the other (e.g., adjacent) States.

5.3. Recommendations

Within the defined scope FSF elaborated some recommendations. It is important to note that the recommendations are within the scope of state security management of the airspace. In this way, the recommendations do not address other prospects for security risk management like aircraft operators' actions or ICAO provisions.

The recommendations are as follows:

Recommendation 1: States should introduce and continuously oversee a state-wide process for airspace security risk management that is distributed around different authorities and organisations yet functional from end-to-end.

Recommendation 2: States should adopt robust security risk assessment methodologies within the context of their airspace security management process that are systemic and integrating considerations of factors for unintentional attack on civil aircraft.

Recommendation 3: States should include in the scope of the airspace security risk management process the risk associated with threats originating from other (often adjacent) states that can affect the airspace.

Appendix A

Conflict zones case studies

Bosnian war 1992–1997	
Likelihood of attack indicators	
<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p>Conflict between states.</p> <p><i>The conflicting parties in the Bosnian war were: Croatia, Bosnia and Herzegovina, Herzeg-Bosnia, Republika Srpska, Serbian Krajina, Western Bosnia, FR Yugoslavia. NATO Operation Deny Flight and Operation Deliberate Force.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large-scale military activities and/or heightened international political tension.</p> <p><i>There were more than 20 large military operations or battles during the war, including the siege of Sarajevo.</i></p> <p><i>On 29 August 1995 Operation Deliberate Force was launched by NATO involving 400 aircraft and over 3,515 sorties. It continued until 20 September 1995.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party. 	<p>More than occasional use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near airways and close to civil aircraft cruising altitudes).</p> <p><i>In 1992 the United States recognized the independence of Bosnia and Herzegovina and soon after began airlifting food and supplies from Italy.</i></p> <p><i>United Nations forces took control of the Sarajevo airport and authorized an international airlift of humanitarian supplies.</i></p> <p><i>United States launched Operation Provide Promise on 3 July 1992 to provide airlift.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Large- to medium-scale military air combat activities.</p> <p><i>Military combat activities involving multiple regional parties and NATO.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.</p> <p><i>On 3 September 1992 an Italian Air Force (Aeronautica Militare Italiana) G.222 was shot down when approaching Sarajevo airfield while conducting a United Nations relief mission. It crashed 18 miles (29 km) from the airfield.</i></p> <p><i>On 28 February 1994, six Republika Srpska Air Force J-21 Jastreb jets were engaged, and four of them shot down, by NATO warplanes from the U.S. Air Force</i></p> <p><i>On 16 April 1994 a Sea Harrier of the UK Royal Navy 801 Naval Air Squadron, operating from the aircraft carrier HMS Ark Royal, was brought down by a Igla-1 surface-to-air missile fired by the Army of Republika Srpska while attempting to bomb two Bosnian Serb tanks over Gorazde.</i></p> <p><i>On 28 May 1995 a Mi-17 was shot down by a missile from an 2K12 Kub mobile SAM launcher. The attack killed the Bosnian Minister Irfan Ljubijankić, a few other politicians, and the helicopter's Ukrainian crew.</i></p> <p><i>On 2 June 1995 a US Air Force F-16C was shot down at 6000 meters altitude by a missile launch from an 2K12 Kub mobile SAM launcher.</i></p> <p><i>On 30 August 1995 a French Air Force Dassault Mirage 2000N was shot down by SAM-14 or DCA after bomb release on munition storage — Deny Flight mission.</i></p>

Bosnian war 1992–1997 (continued)	
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.</p> <p><i>2K12 Kub mobile SAM. The 2K12 “Kub” (NATO reporting name: SA-6 “Gainful”) mobile surface-to-air missile system is a Soviet low to medium-level air defence system designed to protect ground forces from air attack.</i></p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported only by radar tracks — for some of the armed forces.</p>
<p>H. SAM/AAM operators’ experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>SAMs in the possession of poorly trained, inexperienced personnel OR an absence of robust command and control procedures for authorizing launch.</p> <p><i>The SAMs (2K12 Kub mobile SAM) were in possession of the Army of Republika Srpska forces.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p> <p><i>See the incidents and accidents reported in section E.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>No or occasional traffic after the restrictions.</p> <p><i>Before the airspace closure the airspace of Bosnia and Herzegovina was characterized by considerable overflight traffic volume, with overflights from Turkey, Greece, Middle East and Asia Pacific to Central and Western Europe.</i></p>
Airspace Closure	
<p>Airspace restrictions</p> <p>Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<ol style="list-style-type: none"> 1. Restrictions by the responsible for the airspace sovereign authority (the state) <p><i>None</i></p> <ol style="list-style-type: none"> 2. Others <p><i>Note:</i></p> <p><i>Closure of the whole airspace for civil flights occurred in 1992.</i></p> <p><i>Airspace below FL285 was closed from 1997.</i></p>

Bosnian war 1992–1997 *(continued)*

<p>Reasons for airspace restrictions</p> <p>Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	<p><i>Reason for airspace closure of Bosnia and Herzegovina was the war, which started in Bosnia and Herzegovina 6 April 1992. Bosnia and Herzegovina independence was proclaimed in March 1992. There were no aviation authorities in Bosnia and Herzegovina who would issue any official document.</i></p> <p><i>The former Yugoslavia had SAMs and there was threat of their use. In addition, NATO was in the air.</i></p> <p><i>Signing of the Dayton peace accord in November 1995 enabled negotiation on limited opening of Bosnia and Herzegovina airspace — upper airspace above FL 285 in 1997. Lower airspace was closed at NATO's request. NATO used this airspace for their operations.</i></p>
<p>Decision-making</p> <p>Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p><i>The first step in the closure of airspace was done indirectly. Namely, the two neighboring states, the former Federal Republic of Yugoslavia (FRY) (successor Serbia), and Croatian aviation authorities stopped the traffic to/from Bosnia and Herzegovina. This essentially closed the airspace for international traffic.</i></p> <p><i>In March 1993, the United Nations passed Resolution 816, which banned all flights over Bosnia-Herzegovina not authorized by the United Nations. It also authorized NATO to enforce the ban on military flights by shooting down violators. At the request of UN Security Council, NATO declared 'Operation Deny Flight' and a 'no fly zone.'</i></p> <p><i>In 1997 FRY, Croatia, Bosnia and Herzegovina and NATO signed agreement on the opening of the airspace above FL285 for commercial air traffic. It was agreed that ATM would be provided by Belgrade and Zagreb ACCs, while Search and Rescue was provided by Bosnia and Herzegovina. Operational boundary for the traffic above FL285 was on the old FIR boundary between Belgrade and Zagreb FIR. It was 40NM west of Sarajevo and Mostar. The whole airspace below FL 285 was controlled by NATO Stabilization Forces (SFOR).</i></p>
<p>Promulgation</p> <p>Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	<p><i>FRY and Croatia published NOTAMs (references not available).</i></p> <p><i>NATO published information as well (references not available).</i></p> <p><i>Opening of the airspace above FL285 was done by the NOTAM coordinated between FRY, Croatia and supported by the assistance of EUROCONTROL (references not available).</i></p>
<p>Notes</p> <p>Other relevant information</p>	<p><i>LOAs were signed between all actors in the opening of Bosnia and Herzegovina airspace for civilian traffic.</i></p> <p>References:</p> <p><i>U.S. Central Intelligence Agency, Yugoslavia: Military Dynamics of a Potential Civil War, March 1991</i></p> <p><i>U.S. Central Intelligence Agency, Combat forces in former Yugoslavia, July 1993</i></p> <p><i>Daniel L. Haulman, Air Force historical Research Agency, MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994–1999, October 2009</i></p> <p><i>Jaffe S., Airspace Closure and Civil Aviation, 2015</i></p>

Croatian war 1991–1995

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>The conflicting parties in the Croatian war from 1991 until 1995 were Croatia, Federal Republic of Yugoslavia, Serbian Autonomous Oblast of Krjina, Serbian Autonomous Oblast of Eastern Slavonia, Baranja and Western Sylvania, Republika Srpska, Serbian Autonomous Oblast of Western Slavonia.</i></p> <p><i>The war lasted from 31 March 1991 until 12 November 1995.</i></p> <p><i>This conflict was fought by the defence forces of the Croatian government initially against the Yugoslav Army (JNA) until 1992 and local Serbian forces formed as the self-declared Republic of Serbian Krajina (RSK) until 1995.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency or small-scale military activities.</p> <p><i>The Yugoslav People's Army tried to keep Croatia within Yugoslavia by occupying all of Croatia.</i></p> <p><i>After this was unsuccessful self-proclaimed proto-state Republic of Serbian Krajina (RSK) was established within Croatia.</i></p> <p><i>After the ceasefire of January 1992 and international recognition of the Republic of Croatia as a sovereign state the United Nations Protection Force (UNPROFOR) was deployed.</i></p> <p><i>The military activities became largely intermittent in the following three years.</i></p> <p><i>In 1995, Croatia launched two major offensives known as Operation Flash and Operation Storm, and effectively the war was ended.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>Occasional use of aircraft to transport ground troops or military equipment.</p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Small-scale (occasional) military air combat activities.</p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.</p> <p><i>On 23 August 1991 Croatian forces shot down two Yugoslav G-2 Galeb fighter aircraft using shoulder-launched anti-aircraft missiles.</i></p> <p><i>On 27 December 1991, the Croatian An-2 was shot down during a bombing mission by a SA-6 SAM missile by Republika Srpska.</i></p> <p><i>On 7 January 1992, an Italian Army Agusta-Bell AB-206L LongRanger helicopter, operating as a European Community Monitor Mission and carrying five European Community observers was downed by a Yugoslav Air Force Mikoyan-Gurevich MiG-21,</i></p> <p><i>On 31 July 1994 Air Ukraine An-26 was shot down and crashed.</i></p>

Croatian war 1991–1995 (continued)	
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.</p> <p>Federal Republic of Yugoslavia:</p> <p><i>At the start of the war, the Yugoslav national air defence force possessed more than 100 search radars, eight battalions of SA-2s, six battalions of SA-3s, one battalion of SA-5s, four battalions of SA-6/11s, and 15 regiments of anticraft guns. For support of army, there were also SA-9, SA-13 mobile IR-guided SAMs, and thousands of SA-7 and SA-16 shoulder-fired SAMs.</i></p> <p><i>S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000ft.</i></p> <p><i>S-125 Neva/Pechora (NATO reporting name SA3) mobile surface-to-air missile system is a Soviet-made SAM system with engagement altitude of 59,000 ft.</i></p> <p><i>S-200 (NATO reporting name SA-5) is a very long range, medium-to-high altitude SAM system to defend large areas from bomber attack or other strategic aircraft. It has an engagement altitude of 130,000 ft.</i></p> <p><i>2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") low- to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000ft.</i></p> <p><i>Other capabilities for lower altitudes: 9K32 Strela-2 (SA-7), 9K31 Strela-1 (SA-9), 9K35 Strela-10 (SA-13), 9K34 Strela-3 (SA-14), 9K310 Igla-1 (SA-16) and mobile AAA batteries (multiple types).</i></p> <p>Republika Srpska</p> <p><i>2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") mobile surface-to-air missile system is a Soviet low to medium-level air defence system designed to protect ground forces from air attack.</i></p> <p>Croatian Army:</p> <p><i>The Croatian Army was developed and equipped during the war.</i></p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported only by radar tracks.</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>SAMs in the possession of poorly trained, inexperienced personnel OR an absence of robust command and control procedures for authorizing launch.</p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p> <p><i>See the incidents and accidents reported in section E.</i></p>

Croatian war 1991–1995 (continued)	
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Small to moderate traffic volume. <i>Considerable traffic volume before the restrictions.</i></p>
Airspace Closure	
<p>Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state) None</p> <p>2. Others <i>Partial restriction.</i> <i>Croatian airspace was closed for eight months, starting from August 1991 preceded on 25 June 1991 by a declaration of independence by Croatia.</i></p>
<p>Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	<i>References not found.</i>
<p>Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<i>References not found.</i>
<p>Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	<i>References not found.</i>
<p>Notes Other relevant information</p>	<p>References: <i>U.S. Central Intelligence Agency, Yugoslavia: Military Dynamics of a Potential Civil War, March 1991</i> <i>Adria Airways Kronika 1991</i> <i>U.S. Central Intelligence Agency, Combat forces in former Yugoslavia, July 1993</i> <i>Daniel L. Haulman, Air Force historical Research Agency, MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994–1999, October 2009</i></p>

Democratic Republic of the Congo (DRC)

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups.</p> <p><i>Second Congo War, pitting Congolese forces against rebels and soldiers backed by Uganda and Rwanda, ended in 2002/2003. In 2013, a UN offensive force and Congolese army defeated rebel group M23 Movement. However, more than 100 armed groups, such as the Allied Democratic Forces (ADF), which was driven out of Uganda in the late 1990s, are believed to operate in the eastern region of the DRC. ADF has pledged allegiance to ISIL (ISIS) but researchers say there is no evidence of close collaboration. More than 16,000 UN peacekeepers are stationed in the country as part of what is described as a stabilization mission. There also is tension with neighbouring Rwanda.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency or small-scale military activities.</p> <p><i>DRC military is primarily ground-based. DRC military and UN Peacekeepers are battling insurgent groups in eastern DRC.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>Occasional use of aircraft to transport ground troops or military equipment.</p> <p><i>DRC military currently has about a dozen transport aircraft. UN peacekeeping force has 11 fixed wing and 30 rotary wing aircraft.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>No military air combat activities.</p> <p><i>Insurgents not known to have aircraft. DRC forces have six fixed wing and eight rotary wing attack aircraft, but most combat activities seem restricted to ground operations.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with single reported security-related incident/accident involving military (or civil) aviation.</p> <p><i>In Oct. 1998, a 727 crashed after reportedly being struck by a MANPADS while in-flight. Various accounts put death toll at 40 or 41. (In a 1999 incident, a Fokker F27 was struck by gunfire and a possible RPG while parked at an airport.)</i></p>
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>No information about capability to attack with range above FL 250</p> <p><i>DRC military has 53 "rocket projectors," which are most likely RPGs.</i></p>

Democratic Republic of the Congo (DRC) (continued)

<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>NA</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces, primarily ground forces, and no evidence of SAMs.</p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Know intent to attack military aircraft. <i>Assume that insurgents/rebels would attack DRC military aircraft if opportunity presented itself.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Moderate traffic volume, mainly restricted to arrivals and departures. <i>Most traffic seems to be internal or with other countries in the region.</i></p>

Airspace Closure

<p>Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state) None.</p> <p>2. Others <i>None.</i></p> <p>Note: <i>DRC has not issued any NOTAMs referring to the conflict.</i> <i>FAA previously has issued warnings to U.S. operators advising them to make sure they are informed about the current situation before flying in that area, but there are no current (June 2020) warnings active.</i> <i>EASA does not currently have any Conflict Zone Information Bulletins active regarding the DRC.</i></p>
<p>Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	<p><i>References not found.</i></p>

Democratic Republic of the Congo (DRC) *(continued)*

<p>Decision-making Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p><i>References not found.</i></p>
<p>Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	<p><i>References not found.</i></p>
<p>Notes Other relevant information</p>	<p><i>In 2015, DRC signed an agreement with Harris Corp. to upgrade the country's ATC system.</i></p>

Egypt (Sinai)	
Likelihood of attack indicators	
A. Parties: <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>Ongoing conflict pitting Egyptian armed forces, including army, air force and police, against IS of Iraq and Levant (ISIL) and Wilayah Sinai. Wilayah Sinai emerged as a terrorist organization in the Sinai Peninsula following a popular uprising and subsequent overthrow of President Hosni Mubarak in 2011.</i></p> <p><i>In November 2014, Wilayah Sinai declared its allegiance to the Islamic State and has since claimed responsibility for numerous attacks, including an attack on a mosque that killed more than 300 people, the April 2017 attack on Coptic churches that killed at least 44 people, the December 2016 attack on a Coptic chapel in Cairo that killed at least 25 people, and the October 2015 downing (with a planted IED) of a Russian A321 that killed all 224 people aboard.</i></p>
B. Armed conflict scale and/or tensions: <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency (small-scale military activities) and/or medium increasing political tension.</p> <p><i>In addition to attacks referenced in A., two coordinated attacks in one day in Oct. 2014 killed 33 Egyptian security personnel in the Sinai Peninsula. Rocket propelled grenades were used in one of the attacks.</i></p> <p><i>Scale and pace of operations increased in 2018 during government offensive prior to presidential election.</i></p> <p><i>Scale of conflict has been influenced by pressure from other States, including the U.S. and Israel.</i></p>
C. Military air transport activities: <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment</p> <p><i>Egypt has a more than 40 C-130Hs and C-295 cargo transports, as well as smaller utility aircraft. Use likely dictated by launching of govt. offensives and/or in response to attacks by insurgents.</i></p>
D. Military air combat activities: <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Large- to medium-scale military air combat activities and/or regular activities above FL 250</p> <p><i>Egyptian AF has a range of fighters (including F-16s, Mirages, Rafales and MiG-29s) and attack helicopters and has been accused of using air launched cluster bombs in Sinai.</i></p> <p><i>Media reports include a number of references to air attacks, including one that killed eight Mexican tourists.</i></p> <p><i>There also have been reports of Israeli warplanes attacking ISIL in Sinai with the secret approval of Egypt; Egypt has denied the reports.</i></p>
E. Known attacks: <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.</p> <p><i>In addition to claimed IED attack on a Russian airliner in 2015, current FAA background information says in June 2015 ISIS fired rockets toward El Gora Airport (HEGR) in northern Sinai, fired at Egyptian military aircraft with small arms and used MANPADS to shoot down a military helicopter flying at low altitude.</i></p> <p><i>In late 2013, the Dutch government informed Dutch carriers about a threat specifically targeting civil aviation.</i></p> <p><i>Although MANPADS have not been used to target civil aircraft in the Sinai, extremists/militants could potentially do so at any time with little or no warning, says FAA.</i></p>
F. Capability to attack by at least one party: <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.</p> <p><i>Egyptian navy has ships equipped with French-made VL (vertically launched)-MICA SAMs that can reach 30,000 ft</i></p> <p><i>Egyptian military also has long-range, Russian-made SAMs and a large fleet of a fighter aircraft, including F-16s, Mirages, Rafales and MiG-29s.</i></p>

Egypt (Sinai) (continued)

<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques.</p> <p><i>Egyptian military has differential capability. Unknown for ISIL.</i></p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces</p> <p><i>Egypt has a modern, well-equipped military. Scattered media reports allege that ISIS/ISIL may possess a few SAMs, but that has not been confirmed.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft.</p> <p><i>ISIL laid claim to the Oct. 2015 downing of a Russian airliner with an IED planted on board, which, if true, demonstrates an intent to attack civil aircraft.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>No information available</p>

Airspace Closure

<p>Airspace restrictions</p> <p>Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state)</p> <p><i>None</i></p> <p>2. Others</p> <p><i>None</i></p> <p>Note:</p> <p><i>Airspace restrictions and warnings regarding the Cairo FIR (bellow FL 250/260), particularly involving the northern Sinai region, have been issued since 2014 by Egypt, EASA, Germany the U.S. and U.K.</i></p> <p><i>EASA Conflict Zone Information Bulletin current in effect (June 2020)</i></p> <p><i>FAA KICZ NOTAM A0040/20 in effect until March 2021</i></p>
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Egypt (Sinai) (continued)**Reasons for airspace restrictions**

Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.

A since cancelled EASA SIB advised against operating lower than 25,000 ft AGL because of a threat from “dedicated aircraft weaponry.” Germany advised operators not to plan and conduct flights below FL260 “due to potentially hazardous situation within FIR Cairo; also warned of potential risk during takeoff/landing at all north Sinai airports within FIR Cairo.

Current FAA NOTAM says: “plan to exercise extreme caution during flight operations due to ongoing fighting between military forces and extremist/militant elements and the continuing extremist threat to civil aviation, which involves a variety of anti-aircraft-capable weapons, including MANPADS, anti-tank missiles, small-arms fire, and indirect fire weapons, such as mortars and rockets targeting aircraft and Sinai airports.”

Decision-making

Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.

Promulgation

Describes how the restrictions were published, number of the NOTAMs if available, AIS.

FAA KICZ NOTAM A0040/20

EASA CZIB-2017-09R5

Georgia-Russia 2008

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>The conflicting parties in the Georgia-Russia war in 2008 were Georgia, Russia and the Russian-backed self-proclaimed republics of South Ossetia and Abkhazia.</i></p> <p><i>The war lasted from 7 until 12 of August 2008.</i></p> <p><i>This conflict took place in the Transcaucasia region.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large scale military activities.</p> <p><i>In July and August 2008 there was growing tension between Georgian and South Ossetian Forces. On 8 August Georgia launched an air and land assault on Tskhinvali. The Russians responded with air attacks on Georgian forces and Russian forces entered South Ossetia.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>Occasional use of aircraft to transport ground troops or military equipment.</p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Large- to medium-scale military air combat activities and/or regular activities above FL 250.</p> <p><i>After initial use Georgian forces almost completely withdrew their aircraft.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.</p> <p><i>Russia lost six planes in Georgia. Friendly forces likely shot down three or four of the six aircraft Russia lost in the war. "Identify Friend or Foe" (IFF) systems didn't work.</i></p> <p><i>On 8 August 2008 Russian Su-25 was shot down after it came under friendly fire from a MANPADS as it was overflying the positions of Russian troops in South Ossetia.</i></p> <p><i>On 9 August 2008 Russian Tu-22M3 heavy bomber was shot down by Georgian Air Defenses (possibly by Buk-M1 SAM).</i></p> <p><i>On 9 August 2008 Russian Su-24M frontline bomber was shot down from a Georgian Air Defenses.</i></p> <p><i>On 9 August 2008 Russian Su-25 was hit by a Georgian MANPADS that hit the left engine; subsequently, while returning to base at an altitude of 1000 meters, a second MANPADS missile struck the right engine, leaving the plane without thrust and the aircraft crashed.</i></p> <p><i>On 9 August 2008 Russian Su-25 attack aircraft was shot down by friendly fire. It was hit from a Russian ZSU-23-4 Shilka self-propelled air defense artillery system covering the Gufti bridge.</i></p> <p><i>On 9 August 2008 Russian Su-24M frontline bomber aircraft was shot down by friendly fire.</i></p> <p><i>On 11 August 2008 Russian Su-25 attack aircraft was shot by friendly fire. SU-25 attacked by mistake Russian forces and Russian soldiers returned fire from man-portable SAM systems. One of the missiles damaged the plane's right engine, which burst into flames. The aircraft was barely able to return to its base.</i></p>

Georgia-Russia 2008 (continued)

<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.</p> <p><i>Russian Federation possess multiple types of surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude. However, there were reports that Russian military forces in the war did not have long-range surface-to-air missiles that could be fired beyond the air-defence zones of an adversary.</i></p> <p><i>At least one 9K37 Buk was captured by Russian and Russian backed forces during the war.</i></p> <p>Georgia:</p> <p><i>9K37 Buk (NATO reporting name SA-11 Gadfly, SA-17 Grizzly) is a Soviet medium-range SAM designed to counter cruise missiles, smart bombs, fixed- and rotary-wing aircraft, and unmanned aerial vehicles. It has an engagement altitude of 20,000ft.</i></p> <p><i>9K330 Tor (NATO reporting name SA-15 "Gauntlet") is a Soviet all-weather low to medium altitude, short-range surface-to-air missile system designed for destroying airplanes, helicopters, cruise missiles, precision guided munitions, unmanned aerial vehicles and short-range ballistic threats. It has an engagement altitude of 46,000ft.</i></p> <p><i>SPYDER (Surface-to-air PYthon and DERby) is an Israeli short and medium range mobile air defence system. It has an engagement altitude of 30,000 ft or 52,000 ft depending on the modification.</i></p> <p><i>S-125 Neva/Pechora (NATO reporting name SA3) is Soviet-made a mobile SAM system with engagement altitude of 59,000 ft.</i></p> <p><i>Other capabilities include up to three Osa-AK/AKM SAM system batteries, a large number of man-portable SAM systems, as well as a few C-60 57-mm anti-aircraft guns, ZU-23-2 twin 23-mm anti-aircraft guns, and ZSU-23-4 Shilka quad 23-mm self-propelled anti-aircraft gun systems.</i></p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar and electronic identification (e.g. identification, friend or foe (IFF), SSR).</p> <p><i>The Georgian air-defence early-warning and command-control tactical system was linked via Turkey to a NATO Air Situation Data Exchange (ASDE), which provided Georgia with intelligence during the conflict.</i></p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>SAMs in the possession of irregular military forces OR an absence of robust command and control procedures for authorizing launch.</p> <p><i>At least one 9K37 Buk was captured by Russian and Russian-backed forces during the war.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p> <p><i>See the incidents and accidents reported in section E.</i></p>

Georgia-Russia 2008 (continued)

<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Moderate traffic volume, mainly restricted to arrivals and departures.</p>
<p>Airspace Closure</p>	
<p>Airspace restrictions</p> <p>Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state)</p> <p><i>None</i></p> <p>2. Others</p> <p><i>No information found</i></p> <p><i>No NOTAMs issued by Georgia regarding the conflict were identified. It is assumed that airspace above FL 250 was not restricted to civil aviation.</i></p>
<p>Reasons for airspace restrictions</p> <p>Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	<p><i>n/a</i></p>
<p>Decision-making</p> <p>Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p><i>n/a</i></p>
<p>Promulgation</p> <p>Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	<p><i>n/a</i></p>
<p>Notes</p> <p>Other relevant information</p>	<p>References:</p> <p><i>“Air power in Russia’s Georgian campaign August 2008,” Pathfinder, Air power development centre bulletin, October 2008</i></p> <p><i>Pukhov R., The Tanks of August, Centre for Analysis of Strategies and Technologies Moscow, Russia, 2010</i></p> <p><i>Cohen A., Hamilton R., The Russian military and the Georgian war: lessons and implications, Strategic Studies Institute, US Army War College, June 2011</i></p>

Iraq war 1991

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>The Persian Gulf War, also known as “The Gulf War,” was a conflict between Iraq and 34 other countries, led by the United States. The conflicting parties were: The Allied Coalition Forces consisting of 34 nations and the Iraqi Armed Forces (Army, Air Force, Navy, Iraqi Republican Guard).</i></p> <p><i>The conflict started with the invasion of Kuwait by Iraq on August 2, 1990, with the Allied Coalition military offensive beginning January 16, 1991. The official ceasefire was declared February 28, 1991.⁶</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large-scale military activities.</p> <p><i>The Allied Coalition’s Operation Desert Storm involved approximately 750,000 troops. The coalition aerial strike-force comprised over 2,250 combat aircraft (including 1,800 US aircraft). By contrast, the Iraqi Forces were estimated to be 1,000,000 personnel, having 934 combat-capable aircraft (including trainers) of which 550 were operational.</i></p> <p><i>The air campaign of the Gulf War was an extensive aerial bombing campaign. The Coalition of the Gulf War flew over 100,000 sorties, dropping 88,500 tons of bombs, widely destroying military and civilian infrastructure.⁷</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>Use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near airways and close to civil aircraft cruising altitudes).</p> <p><i>More than 145 C-130 aircraft deployed in support of Desert Shield/Desert Storm. The C-130s flew 46,500 sorties and moved more than 209,000 people and 300,000 tons of supplies within the theater. C-141 aircraft operated 8,536 strategic airlift missions, followed by the C-5 with 3,770; the KC-10 with 379 and the C-9 with 209. UK C-130, VC10 and L1011 Tristar also operated across the operational area.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Military air combat activities.</p> <p><i>Military combat activities involving the Allied Coalition and the Iraqi Air Force.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported incidents/accidents involving military (or civil) aviation.</p> <p><i>Military armed conflict existed throughout the airspace. UNSCR 678 authorised use of all necessary means to force Iraqi forces out of Kuwait after 15 Jan 1991. Widely reported by international media.</i></p>
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.</p> <p><i>Both parties in this conflict had the capability to hit civilian aircraft in the region with SAM and air-to-air missiles.⁸</i></p>

⁶ Mockaitis, Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2013

⁷ https://en.wikipedia.org/wiki/Gulf_War_air_campaign

⁸ Mockaitis, Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2015, pg.18

Iraq war 1991 (continued)

<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar and electronic identification (e.g. identification, friend or foe (IFF), SSR).</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces. <i>While the actual war lasted a brief time, there was evidence of command and control breakdown of the Iraqi military in the latter stages of the conflict.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft. <i>An effective state of war existed through the period.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Small to moderate traffic volume. <i>Several factors greatly reduced the amount of traffic in Iraqi airspace during the wartime months. The combination of restrictions and, among other things, large increases in insurance rates encouraged many operators to route around the region.⁹</i></p>

Airspace Closure

<p>Airspace restrictions</p> <p>Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state) <i>No information found</i></p> <p>2. Others <i>The Iraqi airspace had been severely restricted by a combination of sanctions into/out of Iraq, as well as restrictions imposed by the UN regarding overflights. In September of 1990, UN resolution 670 established restrictions of operations into and out of Iraq, allowing only UN humanitarian operations.¹⁰</i> <i>During the conflict, the Allied Command limited overflights to those above FL200 and restricted certain airways.</i> <i>The two no-fly zones, one in the north and another in the south of Iraq, were unilaterally created by the US, Britain and France soon after the 1991 Gulf War. Iraq was banned from using all aircraft, including helicopters, in the air exclusion zones.</i></p>
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⁹ Jafe, Steven D.: Airspace Closure and Civil Aviation, Routledge, 2015, pg. 177

¹⁰ <https://digitallibrary.un.org/record/97522?ln=en>

Iraq war 1991 *(continued)***Reasons for airspace restrictions**

Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.

Military wartime operations area.

Decision-making

Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.

No documentation of decisions by Iraqi government can be found. The airspace limitations were driven by UN, Allied, US and European authorities. Certain restrictions existed limiting traffic above FL200, with numerous sectors prohibited.

Promulgation

Describes how the restrictions were published, number of the NOTAMs if available, AIS.

NOTAM and EUROCONTROL AIM.

Notes

Other relevant information

Iraq war 2003–2011

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>The Iraq War, also known as the Second Gulf War or Operation Freedom, began on 20 March 2003 when the U.S., joined by the U.K. and several coalition allies, launched a “shock and awe” bombing campaign. In December of 2011, the US announced “official withdrawal” of troops from Iraq.¹¹</i></p> <p><i>Conflict related to a destabilization of the nation and region continues to this day.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large-scale military activities.</p> <p><i>At the time of invasion, the Allied forces were comprised of 1801 aircraft and approximately 767,000 troops. The overall number of sorties flown in the decade of war is not available. However, there were a 20, 228 sorties flown during the initial phases of the war between March 19 and April 18, 2003.</i></p> <p><i>The status of the Iraqi Air Force was poorly documented in the open literature. The capabilities of the Iraqi Forces were greatly impacted by the Gulf War and a total of 390 aircraft were believed to be operational at the end of 2002.¹²</i></p> <p><i>The International Institute for Strategic Studies estimated the Iraqi troops prior to the 2003 invasion to number 538,000 (Iraqi Army 375,000, Iraqi Navy 2,000, Iraqi Air Force 20,000 and air defense 17,000, the paramilitary Fedayeen Saddam 44,000, and Republican Guard 80,000.¹³</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>Use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near airways and close to civil aircraft cruising altitudes).</p> <p><i>A wide array of allied military transport aircraft numbering more than 800 were deployed to support the invasion in 2003.</i></p> <p><i>The Iraqi Air Force was not a factor in the conflict.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Military air combat activities.</p> <p><i>Large scale military air combat activities across Iraq and in neighbouring countries and sea areas (not Syria or Iran).</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported incident/accident for military (or civil) aviation.</p> <p><i>Military conflict existed throughout the airspace, widely reported by international media.</i></p>
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.</p> <p><i>Both parties in this conflict had the capability to hit civilian aircraft in the region.</i></p> <p><i>Coalition forces deployed multiple fighters with a capability to attack air targets at all altitudes.</i></p>

¹¹ Mockaitis, Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2013

¹² <https://www.airforcemag.com/PDF/MagazineArchive/Magazine%20Documents/2003/July%202003/0703Numbers.pdf>

¹³ https://en.wikipedia.org/wiki/2003_invasion_of_Iraq#Preparations_for_war

Iraq war 2003–2011 (continued)	
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques.</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces. <i>Capability existed on both sides.¹⁴</i> <i>Extensive use of SAMs by the Iraqi military. Iraq fired approximately 1,600 radar guided SAMs during the invasion, failing to down a single allied aircraft.</i> <i>US Patriot batteries mistakenly shot down a UK Tornado GR4 and a USN FA-18 in separate friendly fire incidents.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft. <i>Iraqi military forces were openly motivated to attack allied aircraft. Reports indicate that Saddam Hussein personally encouraged the shooting of allied aircraft, offering \$5000 to any unit that shot down a US aircraft and \$2500 to any soldier capturing a pilot.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Small to minimal traffic volume. <i>Iraq airspace was closed to civilian traffic at the beginning of the war. Coalition forces, in collaboration with ICAO and other stakeholders, opened the airspace to civil overflights in August 2003, leading to overflight traffic increasing. However, the development of optional routes around the airspace limited the number.</i></p>
Airspace Closure	
<p>Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state) <i>No information found</i></p> <p>2. Others <i>Several national aviation authorities and third-party organisations closed Iraq airspace to civilian traffic at the beginning of the war. Coalition forces, in collaboration with ICAO and other stakeholders opened the airspace to civil overflights in August 2003.</i></p>
<p>Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	<p><i>Military operations area.</i></p>

¹⁴Mockaitis' Thomas R.: Iraq War Encyclopedia ABC-CLIO, 2015, pg.18

Iraq war 2003–2011 *(continued)*

<p>Decision-making</p> <p>Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p><i>No documentation of decisions by Iraqi government can be found. The airspace limitations were driven by national organisations outside Iraq and by international coalition forces.</i></p>
<p>Promulgation</p> <p>Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	<p><i>NOTAM and EUROCONTROL AIM.</i></p> <p><i>ICAO</i></p>
<p>Notes</p> <p>Other relevant information</p>	

Kosovo–Allied Force 1999

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p>Conflict between states.</p> <p><i>The conflicting parties in the Kosovo war were: Kosovo Liberation Army, Republic of Kosovo, Federal Republic of Yugoslavia and NATO (since 24 March 1999). It started in late February 1998 and lasted until 11 June 1999.</i></p> <p><i>In early 1998, violence erupted within Kosovo between Yugoslavian (Serb) forces and the Kosovo Liberation Army (KLA). United Nations Security Council Resolution 1199, passed on 23 September 1998, demanded a ceasefire in Kosovo. On 13 October 1998, NATO's North Atlantic Council authorized activation orders for air strikes. The crisis intensified in November and December 1998. NATO launched Operation Allied Force on 24 March 1999.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large-scale military activities.</p> <p><i>Operation Allied Force involved close to 1000 NATO aircraft in an air campaign that lasted 78 days. NATO flew more than 38,000 sorties, of which 10,484 were strike sorties.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near airways and close to civil aircraft cruising altitudes).</p> <p><i>3 x AWACS overland orbits manned 24-hrs.</i></p> <p><i>EC-130s served as Airborne Battlefield Command and Control Center (ABCCC).</i></p> <p><i>C-17, C-5 Galaxy and C-130 were used to transport cargo into certain airfields.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Large- to medium-scale military air combat activities.</p> <p><i>Military combat activities involving multiple regional parties and NATO.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported incident/accident for military (or civil) aviation.</p> <p><i>On 24 March 1999 two Yugoslav Air Force MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles. Different sources claim one of the MiG-29s was downed by friendly ground fire.</i></p> <p><i>On 24 March 1999, during Operation Allied Force, a Dutch F-16AM J-063 shot down a Yugoslavian MiG-29 with an AMRAAM missile. The pilot of the stricken jet ejected safely.</i></p> <p><i>On 26 March 1999 two Yugoslavian MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles.</i></p> <p><i>On 27 March 1999 an American F-117A Nighthawk stealth bomber was shot down over Belgrade by a Soviet-made S-125E SAM. The pilot ejected safely and the plane's wreckage was recovered by Serbian special forces.</i></p> <p><i>On 2 May 1999 a USAF F-16CG was shot down over Serbia. It was downed by an S-125 Neva SAM (NATO: SA-3) near Nakucani. The pilot ejected and was later rescued by a combat search-and-rescue mission.</i></p> <p><i>On 4 May 1999 a lone Yugoslav MiG-29 attempted to intercept a large NATO formation that was returning to base. It was engaged by a pair of USAF F-16CJs from the 78th Fighter Squadron and shot down with an AIM-120, killing the pilot. The falling wreckage was hit by a Strela 2M fired by the Yugoslav army in error.</i></p> <p><i>On 4 May 1999 a Yugoslav Mi-8T was shot down by a French Super Etendard.</i></p>

Kosovo–Allied Force 1999 (continued)	
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.</p> <p><i>Both parties in this conflict had the capability to hit civilian aircraft in the region.</i></p> <p>Federal Republic of Yugoslavia:</p> <p><i>S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000 ft.</i></p> <p><i>S-125 Neva/Pechora (NATO reporting name SA3), that shot down American F-117A Nighthawk stealth bomber, F-16 and possibly some UAVs, mobile surface-to-air missile system is a Soviet surface to air missile system with engagement altitude of 59,000 ft.</i></p> <p><i>2K12 Kub mobile SAM. The 2K12 “Kub” (NATO reporting name: SA-6 “Gainful”) low to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000ft.</i></p> <p><i>Other capabilities for lower altitudes: 9K32 Strela-2 (SA-7), 9K31 Strela-1 (SA-9), 9K35 Strela-10 (SA-13), 9K34 Strela-3 (SA-14), 9K310 Igla-1 (SA-16) and mobile AAA batteries (multiple types)</i></p> <p><i>Air-to-air missiles launched from fighter aircraft.</i></p> <p><i>Multiple NATO fighters with radar and IR AAMs.</i></p> <p><i>SAM capability for warships in the region — DDGs (guided missile destroyers) protecting the carrier group.</i></p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar and electronic identification (e.g. identification, friend or foe (IFF), SSR).</p>
<p>H. SAM/AAM operators’ experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces.</p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p> <p><i>See the incidents and accidents reported in section E.</i></p>

Kosovo–Allied Force 1999 *(continued)***J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):**

1. No or occasional traffic.
2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports).
3. Considerable traffic volume, including international overflights.

No civil aircraft operations during the airspace restrictions.

Considerable traffic volume, including international overflights prior the restrictions. The airspace of Federal Republic of Yugoslavia was characterized by considerable overflight traffic volume, with overflights from Turkey, Greece, Middle East and Asia Pacific to Central and Western Europe.

Airspace Closure**Airspace restrictions**

Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:

- Restrictions by the responsible for the airspace sovereign authority (the state).
- Restrictions by others — third parties and/or neighboring states.

1. Restrictions by the responsible for the airspace sovereign authority (the state)

No information found

2. Others

24 Mar 1999–10 June 1999

The entire airspace of Federal Republic of Yugoslavia, Slovenia, Croatia, Bosnia and Herzegovina, FYROM, parts of southern Hungary, western Romania and Bulgaria, northern Greece, entire airspace over Albania and almost entire airspace over Adriatic Sea was closed.

The airspace closure was immediately associated with Operation Allied Force and there were no prior airspace restrictions for the period of escalation starting in 1998.

The airspace of Federal Republic of Yugoslavia was opened for civilian traffic in Sep 1999.

An air security zone, including the airspace of Kosovo, remained closed for civil aircraft until 3 April 2014.

Reasons for airspace restrictions

Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.

NATO air strikes.

NATO aircraft and Tomahawk missiles from the air and Federal Republic of Yugoslavia air defence systems from the ground.

US Navy Carrier Air Group in Adriatic Sea.

Decision-making

Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.

Decision to close the described airspace came from all neighbouring states in order to stop the traffic to/from/over Federal Republic of Yugoslavia.

Technical support provided by EUROCONTROL. All flight plans to/from and over Federal Republic of Yugoslavia were rejected.

Promulgation

Describes how the restrictions were published, number of the NOTAMs if available, AIS.

NOTAM and EUROCONTROL AIM.

A substantial preparation with the inclusion of all states whose airspace was used by NATO air forces.

EUROCONTROL participated in coordination and provided technical support.

Notes

Other relevant information

References:

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Daniel L. Haulman, Air Power History, "The U.S. Air Force in the Air War Over Serbia 1999," Summer 2015

Daniel L. Haulman, Air Force historical Research Agency, MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994–1999, October 2009

Libya 2011

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p>Conflict between states.</p> <p><i>The conflicting parties in the Kosovo war were: Kosovo Liberation Army, Republic of Kosovo, Federal Republic of Yugoslavia and NATO (since 24 March 1999). It started in late February 1998 and lasted until 11 June 1999.</i></p> <p><i>In early 1998, violence erupted within Kosovo between Yugoslavian (Serb) forces and the Kosovo Liberation Army (KLA). United Nations Security Council Resolution 1199, passed on 23 September 1998, demanded a ceasefire in Kosovo. On 13 October 1998, NATO's North Atlantic Council authorized activation orders for air strikes. The crisis intensified in November and December 1998. NATO launched Operation Allied Force on 24 March 1999.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large-scale military activities.</p> <p><i>Operation Allied Force involved close to 1000 NATO aircraft in an air campaign that lasted 78 days. NATO flew more than 38,000 sorties, of which 10,484 were strike sorties.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near airways and close to civil aircraft cruising altitudes).</p> <p><i>3 x AWACS overland orbits manned 24-hrs.</i></p> <p><i>EC-130s served as Airborne Battlefield Command and Control Center (ABCCC).</i></p> <p><i>C-17, C-5 Galaxy and C-130 were used to transport cargo into certain airfields.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Large- to medium-scale military air combat activities.</p> <p><i>Military combat activities involving multiple regional parties and NATO.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported incident/accident for military (or civil) aviation.</p> <p><i>On 24 March 1999 two Yugoslav Air Force MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles. Different sources claim one of the MiG-29s was downed by friendly ground fire.</i></p> <p><i>On 24 March 1999, during Operation Allied Force, a Dutch F-16AM J-063 shot down a Yugoslavian MiG-29 with an AMRAAM missile. The pilot of the stricken jet ejected safely.</i></p> <p><i>On 26 March 1999 two Yugoslavian MiG-29s were shot down by two USAF F-15Cs with AMRAAM missiles.</i></p> <p><i>On 27 March 1999 an American F-117A Nighthawk stealth bomber was shot down over Belgrade by a Soviet-made S-125E SAM. The pilot ejected safely and the plane's wreckage was recovered by Serbian special forces.</i></p> <p><i>On 2 May 1999 a USAF F-16CG was shot down over Serbia. It was downed by an S-125 Neva SAM (NATO: SA-3) near Nakucani. The pilot ejected and was later rescued by a combat search-and-rescue mission.</i></p> <p><i>On 4 May 1999 a lone Yugoslav MiG-29 attempted to intercept a large NATO formation that was returning to base. It was engaged by a pair of USAF F-16CJs from the 78th Fighter Squadron and shot down with an AIM-120, killing the pilot. The falling wreckage was hit by a Strela 2M fired by the Yugoslav army in error.</i></p> <p><i>On 4 May 1999 a Yugoslav Mi-8T was shot down by a French Super Etendard.</i></p>

Libya 2011 (continued)

F. Capability to attack by at least one party:

1. No information for capability to attack with range above FL 250.
2. Air-to-air missiles launched from fighter aircraft (and no SAMs).
3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.

Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.

Both parties in this conflict had the capability to hit civilian aircraft in the region.

Armed Forces of the Libyan Arab Jamahiriya:

Crotale, SA-7 Grail, SA-9/SA-13 SAMs, and AA guns in Army service. A separate Air Defence Command had SA-2 Guideline, SA-3 Goa, SA-5 Gammon, and SA-8b Gecko, plus guns.

S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000 ft. S-75 — 6 Brigades with 18 launchers each;

S-125 Neva/Pechora (NATO reporting name SA3) mobile surface-to-air missile system is a Soviet SAM system with engagement altitude of 59,000 ft. S125 — 9 Brigades with 12 launchers each;

S-200 (NATO reporting name SA-5) is a very long range, medium-to-high altitude SAM system to defend large areas from bomber attack or other strategic aircraft with engagement altitude of 130,000 ft. S-200— 8 battalions of six launchers each at four sites and an estimated 380 missiles.

The Crotale EDIR (“InfraRed Differential Ecartometry”) is an all-weather short-range anti-air missile, originally developed by France, which can be used to intercept low-flight anti-ship missiles and aircraft with engagement altitude of up to 30,000 ft. Crotale — nine acquisition and 27 firing units.

The 9K33 Osa (NATO reporting name SA-8 Gecko) is a mobile, low-altitude, short-range tactical surface-to-air missile system designed in the Soviet Union with engagement altitude of 39,000 ft. 9K33 Osa/ SA-8 Gecko — 50

9K38 Igla (NATO reporting name SA-18 Grouse) is a Russian/Soviet man-portable infrared homing surface-to-air missile with and engagement altitude of 11,000 ft. 9K38 Igla — 380;

50 2K12 Kub mobile SAM. The 2K12 “Kub” (NATO reporting name: SA-6 “Gainful”) low to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000 ft.

Other capabilities for lower altitudes: 200 9K34 Strela-3 (SA-14) — 278;

The National Transitional Council of Libya — The National Liberation Army:

9K32 Strela-2 (SA-7)

NATO:

NATO had the capability to hit civilian aircraft in the region.

G. Capability to differentiate between civil and military aircraft:

1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques.
2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR).
3. Differentiation supported only by radar tracks.

Differentiation supported only by radar tracks.

NATO had more sophisticated capabilities to differentiate.

Libya 2011 (continued)	
H. SAM/AAM operators' experience and chain of command: <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	Regular forces.
I. Known intent to attack: <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	Known intent to attack military aircraft. <i>See the incidents and accidents reported in section E.</i>
J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any): <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	No or occasional traffic after the restrictions. Moderate traffic volume, including international overflights prior the restrictions. <i>The infrastructure of Libya's air traffic control has largely been destroyed and only sporadic military air activities are conducted. On 18 March the Libyan airspace was closed from some neighbours.</i>
Airspace Closure	
Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including: <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<ol style="list-style-type: none"> 1. Restrictions by the responsible for the airspace sovereign authority (the state) <i>No information found</i> 2. Others <i>On 18 March the Libyan airspace was closed, supported by countries with neighbouring airspace, to all traffic, reacting to a U.N. resolution.</i> <i>Beginning in early November 2011, a step-by-step approach has been followed for a safe transition of airspace, owing to the coordination between ICAO, EUROCONTROL, and the respective civil aviation authorities concerned (Malta, Tunisia, Egypt and Libya) and air traffic services over the central Mediterranean high seas and Libyan territory, as follows:</i> <i>Phase 1. The current situation, following the end of the no-fly zone in November, allowed the reopening of the main airports of Tripoli International, Tripoli Mitiga, Sabha, Benghazi and Misratah to civilian traffic.</i> <i>Phase 2. On 1 February 2012, two contingency north/south overflight routes were opened, allowing gradually increasing traffic as deemed necessary. The remaining routes will be released by the Libyan Civil Aviation Authority as soon as the operational conditions are fulfilled.</i> <i>Phase 3. From 1 April to 3 May 2012, aviation authorities added more routes to the overflight system, and reopened new airports on a regular basis with their associated contingency routes.</i>
Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.	<i>UN Security Council Resolution 1973 was adopted on 17 March 2011. The resolution authorised member states to establish and enforce a no-fly zone over Libya, and to use "all necessary measures" to prevent attacks on civilians. The resolution was the legal basis for military intervention by the forces of NATO.</i>

Libya 2011 *(continued)*

<p>Decision-making</p> <p>Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p><i>Decision to close the described airspace came from all neighbouring states.</i></p> <p><i>Technical support provided by EUROCONTROL.</i></p>
<p>Promulgation</p> <p>Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	<p><i>NOTAM and EUROCONTROL actions.</i></p>
<p>Notes</p> <p>Other relevant information</p>	<p><i>References:</i></p> <p><i>UN Security Council, Resolution 1973 (2011), 17 March 2011</i></p> <p><i>UN Security Council, Resolution 2009 (2011), 16 September 2011</i></p> <p><i>Jaffe S., Airspace Closure and Civil Aviation, 2015</i></p>

Slovenia 1991

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>The conflicting parties in the Slovenian war in 1991 were Slovenia and Yugoslavia. The belligerents Slovenian Territorial Defence and Slovenian police on one side and the Yugoslav People's Army on the other side.</i></p> <p><i>The war lasted from 27 June 1991 until 7 July 1991, when the Brioni Accords were signed.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency or small-scale military activities.</p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>Occasional use of aircraft to transport ground troops or military equipment.</p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Small-scale military air combat activities.</p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with single reported incident/accident involving military (or civil) aviation.</p> <p><i>On 27 June 1991, the Slovenian Territorial Defence shot down two Yugoslav People's Army helicopters with SA-7 missiles.</i></p>

Slovenia 1991 (continued)

<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.</p> <p>Federal Republic of Yugoslavia:</p> <p><i>At the start of the war, the Yugoslav national air defence force possessed more than 100 search radars, eight battalions of SA-2s, six battalions of SA-3s, one battalion of SA-5s, four battalions of SA-6/11s, and 15 regiments of anticraft guns. For support of the army, there were also SA-9, SA-13 mobile IR-guided SAMs, and thousands of SA-7 and SA-16 MANPADS.</i></p> <p><i>S-75 Dvina (NATO reporting name SA2) is a Soviet-designed, high-altitude air defence system with engagement altitude of 82,000 ft.</i></p> <p><i>S-125 Neva/Pechora (NATO reporting name SA3) mobile surface-to-air missile system is a Soviet-made SAM system with engagement altitude of 59,000ft.</i></p> <p><i>S-200 (NATO reporting name SA-5) is a very long range, medium-to-high altitude SAM system to defend large areas from bomber attack or other strategic aircraft. It has an engagement altitude of 130,000ft.</i></p> <p><i>2K12 Kub mobile SAM. The 2K12 "Kub" (NATO reporting name: SA-6 "Gainful") low- to medium-level air defence system designed to protect ground forces from air attack with engagement altitude, depending on the modification, of up to 46,000 ft.</i></p> <p><i>Other capabilities for lower altitudes: 9K32 Strela-2 (SA-7), 9K31 Strela-1 (SA-9), 9K35 Strela-10 (SA-13), 9K34 Strela-3 (SA-14), 9K310 Igla-1 (SA-16) and mobile AAA batteries (multiple types).</i></p> <p>Slovenian Territorial Defence:</p> <p><i>9K31 Strela-1 (SA-9) is a mobile, short-range, low altitude infra-red guided surface-to-air missile system and shoulder-fired 9K32 Strela-2 (SA-7).</i></p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR).</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces.</p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p> <p><i>See the incidents and accidents reported in section E.</i></p>

Slovenia 1991 (continued)

J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):

1. No or occasional traffic.
2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports).
3. Considerable traffic volume, including international overflights.

No or occasional traffic.

Moderate traffic volume, including international overflights prior the restrictions.

Airspace Closure**Airspace restrictions**

Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:

- Restrictions by the responsible for the airspace sovereign authority (the state).
- Restrictions by others — third parties and/or neighboring states.

1. Restrictions by the responsible for the airspace sovereign authority (the state)

On 26 June, at 1330, the Ljubljana airport and the airspace above Slovenia was closed by the federal air traffic control.

The federal air traffic control closed FIR Zagreb on 31 August at 15:00.

On 1 September at 0930 FIR Zagreb was opened.

On 15 September FIR Zagreb was again closed at 14:52.

After the airports in Ljubljana and Zagreb were closed, and because of the serious threat of further attacks in Slovenia by the federal army, high increases in insurance premiums for individual flights in Croatia and because of all the general uncertainties, the management of Adria Airways decided to transfer its operations abroad after 8 July 1991. Adria aircraft landed at airports in Klagenfurt, Frankfurt and Vienna.

On 15 January 1992 an agreement was reached with Austria for provision of air traffic control in Slovenian airspace. At midnight on 22 January 1992 Slovenian airspace was opened when an agreement between Slovenian and Austrian aviation authorities came into force.

The Ljubljana airport was shutdown, with rare exceptions, until February 1992.

Reasons for airspace restrictions

Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.

The reason for the initial restrictions was “technical shortcomings.”

The closure of airspace followed immediately after 25 June when Slovenia passed its act of independence and coincided with a plan the Slovenian government had already put into action to seize control of the republic’s border posts and the international airport.

Decision-making

Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.

The Brioni Declaration stated in the paragraph on air transport that there is only one air traffic control for the whole of Yugoslavia and that all domestic and international air traffic through Yugoslavia would be supervised and provided by the competent federal authority.

Subsequently, in January 1992 Slovenia agreed with Austria for the provision of air traffic control.

Promulgation

Describes how the restrictions were published, number of the NOTAMs if available, AIS.

References not found.

Notes

Other relevant information

References:

U.S. Central Intelligence Agency, Yugoslavia: Military Dynamics of a Potential Civil War, March 1991

Adria Airways Kronika 1991

U.S. Central Intelligence Agency, Combat forces in former Yugoslavia, July 1993

Daniel L. Haulman, Air Force historical Research Agency, MANNED AIRCRAFT LOSSES OVER THE FORMER YUGOSLAVIA, 1994–1999, October 2009

Afghanistan 2001–present

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency (small-scale military activities) and/or medium increasing political tension.</p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment by at least one party).</p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Small-scale (occasional) military air combat activities and/or some activities above FL 250.</p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.</p>
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Air-to-air missiles launched from fighter aircraft (and no SAMs).</p> <p><i>Afghan fighter presence 1989-2001, anti-aircraft artillery (AAA) capable of reaching cruising levels and MANPADS that, because of the specific high terrain, could reach cruising altitudes as well.</i></p> <p><i>2001 — Coalition fighter presence.</i></p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio. (Applicable only to coalition forces)</p> <p>CAUTION: Use of MANPADS and AAA by insurgent or irregular forces limited to visual differentiation</p>

Afghanistan 2001–present (continued)	
<p>H. SAM/AAM operators’ experience and chain of command:</p> <ol style="list-style-type: none"> Regular forces. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch</p> <p><i>Residual Strela and Stinger MANPADS, plus possible AAA.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> Known intent to attack military aircraft. Known intent to attack civil aircraft. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p> <p>Known intent to attack civil aircraft.</p> <p><i>Multiple engagements by Pakistan forces of Afghan aircraft straying into northern Pakistan airspace during late 1980s.</i></p> <p>https://www.nytimes.com/1988/11/22/world/afghanistan-reports-30-dead-on-plane-downed-by-pakistan.html</p> <p><i>Multiple engagements of military traffic by irregular forces within Afghanistan during Russian occupation up to 1989.</i></p> <p><i>Multiple low-altitude engagements by irregular forces since 2001.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> No or occasional traffic. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). Considerable traffic volume, including international overflights. 	<p>Considerable traffic volume, including international overflights.</p>
Airspace Closure	
<p>Airspace restrictions</p> <p>Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> Restrictions by the responsible for the airspace sovereign authority (the state). Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state)</p> <p><i>No information found</i></p> <p>2. Others</p> <p><i>No information found</i></p> <p>Note:</p> <p><i>No formal airspace closures. Area was voluntarily avoided by civil traffic during Soviet occupation. Coalition air ops from 2001</i></p> <p><i>India permanent NOTAM dated 3 Apr 2001, overflight of Taliban-held territory prohibited, traffic would be denied future access to Indian airspace. Still valid. (VI G0047/01)</i></p> <p><i>Extant overflight warnings by NOTAM from USA,UK, France, Germany, advising min altitude 25,000 AGL, (FL330 for USA and Germany) https://www.easa.europa.eu/domains/air-operations/czibs/czib-2017-08r5</i></p>
<p>Reasons for airspace restrictions</p> <p>Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	<p><i>Presence of anti-aviation weapons within Kabul FIR. USA NOTAM references potential for engagement by certain MANPADS below FL 330.</i></p>
<p>Decision-making</p> <p>Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p>National advisories only. Standard decision-making from appropriate national authorities.</p> <p><i>No warnings issued by Afghan government.</i></p>

Afghanistan 2001–present *(continued)***Promulgation**

Describes how the restrictions were published, number of the NOTAMs if available, AIS.

NOTAM, AIS. Germany NOTAM: B0437/20. USA A0038/20. UK AIP ENR 1.4.5 valid from 8 Oct 2015 <https://www.aurora.nats.co.uk/htmlAIP/Publications/2018-11-08-AIRAC/html/eAIP/EG-ENR-1.1-en-GB.html>

Notes

Other relevant information

References:

Jaffe S., Airspace Closure and Civil Aviation, 2015

Armenia Azerbaijan	
Likelihood of attack indicators	
<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between states.</p> <p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>After the 2016 Armenian–Azerbaijani clashes, in which an estimated 350 troops and civilians from both sides were killed, Azerbaijan declared a unilateral cease fire (the clashes started when Azerbaijani forces launched strikes to regain control of territory controlled by the Armenia-backed breakaway Nagorno-Karabakh.)</i></p> <p><i>The two countries are still technically at war and the Azerbaijani government regularly threatens to retake Nagorno-Karabakh by military force</i></p> <p><i>The Four-Day War, or April War, began along the Nagorno-Karabakh line of contact on 1 April 2016 with the Nagorno-Karabakh Defense Army, backed by the Armenian Armed Forces, on one side and the Azerbaijani Armed Forces on the other.</i></p> <p><i>The clashes have been defined as “the worst” since the 1994 ceasefire agreement signed by Nagorno-Karabakh, Azerbaijan and Armenia.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large-scale military activities and/or heightened international political tension.</p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near airways and close to civil aircraft cruising altitudes).</p> <p><i>The scale of the military actions, the number of forces and combat equipment involved, such as heavy artillery, including use of cluster munition, tanks, air forces and suicide drones, as well as the statements of Azerbaijani officials clearly indicate that the events of 2–5 April were not a spontaneous escalation, but a carefully planned and prepared military operation, aimed at resolving the Karabakh conflict by the use of force.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Small-scale military air combat activities.</p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation.</p> <p><i>February 2017 — Fighting flares up in Nagorno-Karabakh between the Azerbaijani army and ethnic Armenian troops along the line separating them.</i></p> <p><i>Azerbaijan’s air force was composed of 45 combat aircraft which were often piloted by experienced Russian and Ukrainian mercenaries from the former Soviet military. They flew mission sorties over Karabakh with such sophisticated jets as the MiG-25 and Sukhoi Su-24 and with older-generation Soviet fighter bombers, such as the MiG-21.</i></p> <p><i>Several were shot down over the city by Armenian forces and according to one of the pilots’ commanders, with assistance provided by the Russians. Many of these pilots risked the threat of execution by Armenian forces if they were shot down. The setup of the defense system severely hampered Azerbaijan’s ability to carry out and launch more air strikes.</i></p> <p><i>Azerbaijani fighter jets attacked civilian airplanes too. An Armenian civil aviation Yak-40 plane traveling from Stepanakert airport to Yerevan with total of 34 passengers and crew was attacked by an Azerbaijani SU-25. Though suffering engine failure and a fire in rear of the plane, it eventually made a safe landing in Armenian territory</i></p>

Armenia Azerbaijan (continued)

<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising altitude.</p> <p><i>Azerbaijani MiG-25 was shot down near Cherban on 20 August 1992 by an SA-7A MANPADS.</i></p> <p><i>Azerbaijani Su-22 was shot down on 19 February 1994 over Verdenisskiy by an SA-14 MANPADS.</i></p> <p><i>Azerbaijani Su-25 flown by Kurbanov was shot down over Mkhrdag on 13 June 1992 by a MANPADS.</i></p> <p><i>Azerbaijani Su-25 shot down near Malibeili on 10 October 1992 using MANPADS.</i></p> <p>Azerbaijan: BUK SAM, S-300PMU2, Perchora-T 2M SAM</p> <p>Armenia: BUK, OSA, Pechora-T2M, 2K11Krug, SA-13 Gopher, KUB-M-3, S-300PS, S-300PT-1</p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR).</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces.</p> <p><i>Azerbaijan's Defense Ministry said its forces on May 15, 2017 "destroyed an Osa air defense system along with its crew." The ministry added that the system's deployment near the line of control was a "provocation" and a threat to Azerbaijani aircraft.</i></p> <p><i>All versions of the 9K33 feature all-in-one 9A33 transporter erector launcher and radar (TELAR) vehicles which can detect, track and engage aircraft independently or with the aid of regimental surveillance radars. The six-wheeled transport vehicles BAZ-5937 are fully amphibious and air transportable. The road range is about 500 km.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft — reference 1991 hostile events sample.</p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>No traffic after the restrictions.</p> <p>Moderate traffic volume, mainly restricted to arrivals and departures to airports prior to the restrictions.</p>

Armenia Azerbaijan (continued)

Airspace Closure

Airspace restrictions

Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:

- Restrictions by the responsible for the airspace sovereign authority (the state).
- Restrictions by others — third parties and/or neighboring states.

1. Restrictions by the responsible for the airspace sovereign authority (the state)*Restricted*

A0024/11 NOTAMN Q) UBBA/QRPXX/IV/NBO/W /000/999/3936N04642E045 A) UBBA B) 1102111240 C) PERM E) ACCORDING TO AIP OF AZERBAIJAN REPUBLIC REF.ENR 5.1 DUE TO CONFLICT SITUATION THE PROHIBITED AREA UB3 GND/ UNL IS ESTABLISHED OVER THE TERRITORY OF THE NAGORNY KARABAKH AND CONTROLLED BY THE MINISTRY OF DEFENSE OF THE REPUBLIC OF AZERBAIJAN. INTERCEPTION OF OFFENDERS BY THE AIR FORSE IS MANDATORY ACTION F) GND G) UNL

Reasons for airspace restrictions

Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.

*Conflict***Decision-making**

Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.

Promulgation

Describes how the restrictions were published, number of the NOTAMs if available, AIS.

ICAO NOTAM A0024/11 NOTAMN Q) UBBA/QRPXX/IV/NBO/W /000/999/3936N04642E045

Notes

Other relevant information

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Wordpress.com Russian supplied defense systems

Hoge, James F. (2010). The Clash of Civilizations: The Debate. Council on Foreign Relations,

Eastern Europe, Russia and Central Asia. London: Europa Publications. 2002. p. 77., cfr.org

Ivory Coast 2002–2004

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars. <i>Official government forces, the National Army (FANCI), also called loyalists, formed and equipped essentially since 2003.</i> <i>Mercenaries recruited by president Gbagbo:</i></p> <ul style="list-style-type: none"> • Belarusian pilots; • Former combatants of Liberia, including under-17 youths, forming the so-called “Lima militia”; • New Forces (Forces Nouvelles, FN), ex-northern rebels; • Liberian government forces; • French military forces: troops sent within the framework of Operation Unicorn and under UN mandate (UNOCI); • Soldiers of the Economic Community of West African States (ECOWAS), White helmets, also under the UN; • NATO forces.
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency or small-scale military activities. <i>Mutiny in Abidjan by soldiers unhappy at being demobilized grows into full-scale rebellion, with Ivory Coast Patriotic Movement rebels seizing control of the north. They launched attacks in many cities, including Abidjan. Attacks were launched almost simultaneously in most major cities; the government forces maintained control of Abidjan and the south, but the new rebel forces had taken the north and based themselves in Bouake. Particular importance for the case study is the 2004 French–Ivorian clashes that represent air-to-air capability to attack.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment by at least one party (such aircraft may be more difficult to distinguish from civil aircraft, particularly where operating near airways and close to civil aircraft cruising altitudes). <i>Evidence of NATO and French mobilized and airborne force movement and deployments.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Small-scale (occasional) military air combat activities. <i>Military combat activities involving multiple regional parties and NATO.</i> <i>French forces conducted attacks on airports destroying SU25s and helicopters are shot down.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation. <i>On 4 November 2004, Gbagbo ordered the counter-offensive to the rebel town of Bouaké to be backed by air strikes. France does not react but on 5 November put three Dassault Mirage F.1 jet fighters based in nearby Gabon on standby.</i> <i>On 6 November, two Ivorian Sukhoi Su-25 bombers, crewed by two Belarusian mercenaries and two Ivorian pilots, fired on the Ivorian rebels led by Issiaka Ouattara. One of the bombers attacked the French peacekeeping position in the town at 1 pm, killing nine French soldiers and wounding 31. The Ivorian government claimed the attack on the French was unintentional, but the French insisted that the attack had been deliberate.</i></p>

Ivory Coast 2002–2004 (continued)	
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Air-to-air missiles launched from fighter aircraft (and no SAMs).</p>
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR).</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces.</p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Moderate traffic volume, mainly restricted to arrivals and departures to airports prior to the restrictions.</p>
Airspace Closure	
<p>Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<ol style="list-style-type: none"> 1. Restrictions by the responsible for the airspace sovereign authority (the state) <i>No information found</i> 2. Others <i>No information found</i> <p>Note: <i>Airport closures likely during raids</i></p>

Ivory Coast 2002–2004 *(continued)***Reasons for airspace restrictions**

Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.

Decision-making

Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.

State authorities and on-site commanders had the authority to make assessments and decisions regarding military threats.

Promulgation

Describes how the restrictions were published, number of the NOTAMs if available, AIS.

No evidence of airspace closures or restrictions other than those cited for Port Bouët Airport.

Notes

Other relevant information

References:

"Cote d'Ivoire, since 2002." Acig.org.

"Civil War in Côte d'Ivoire (Ivory Coast Civil War)." The Polynational War Memorial, www.war-memorial.net. Retrieved 5 June 2017.

Asante, Molefi Kete (2014). *The History of Africa: The Quest for Eternal Harmony*. New York and London: Routledge.

State.gov

Indonesia (Aceh) 1990–1998

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>Conflict was between the separatist Free Aceh Movement (GAM), which wanted autonomy, and the Indonesian state, which wanted centralized control.</i></p> <p><i>Separatist struggle waged for more than 30 years. After a period of dormancy, GAM re-emerged in the late 1980s, after sending combatants to Libya for training, by attacking police stations and military installations.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency or small-scale military activities.</p> <p><i>In 1989, Jakarta responded to the expansion of GAM (some of the guerrillas were trained in Lybia) by launching a large-scale counter insurgency campaign. Aceh was officially transformed into a 'Military Operations Area' (Daerah Operasi Militer, DOM), widely understood as the imposition of martial law, for the next decade. Some scholars, however, question whether the DOM designation is correct. Unclear how many Indonesian troops were stationed in Aceh during DOM, but most sources estimate that about 12,000 security forces personnel were involved. DOM formally lifted in 1998.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>Occasional use of aircraft to transport ground troops or military equipment.</p> <p><i>Indonesian Air Force, as of 2002, contained two squadrons of C-130s, a number of small transport and rotary-wing aircraft; and three Boeing 737s used for sea surveillance.</i></p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Small-scale (occasional) military air combat activities and/or some activities above FL 250.</p> <p><i>Indonesian Air Force operated a mix of Western- and Russian-built aircraft, including F-5s, F-16s and Su-30s.</i></p> <p><i>No information could be found on extent to which these and other combat aircraft were used.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area without publicly reported security incidents involving military and civil aviation.</p> <p><i>Low-flying Indonesian military helicopters and fixed-wing observation planes likely would have been GAM targets, but no incidents uncovered during research. Military or civil aircraft operating at cruise altitude would have been out of the reach of insurgent weapons.</i></p>
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Air-to-air missiles launched from fighter aircraft (and no SAMs).</p> <p><i>Heaviest weapons GAM rebels possessed were grenade launches and MANPADS</i></p> <p><i>Indonesian military has a mix of Western- and Soviet/Russian-made weapons systems, including naval vessels with SAMs and combat aircraft with air-to-air and air-to-ground attack capability.</i></p>

Indonesia (Aceh) 1990–1998 (continued)	
<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>No sufficient information</p> <p><i>Indonesian military and civil authorities have ability to differentiate. No indication that GAM could differentiate.</i></p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces.</p> <p><i>Indonesia has traditional military command structure. GAM rebels were irregular forces with some training from Libya.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p> <p><i>In 2000, which is two years after the period in review, two chartered aircraft carrying oil field workers were hit by small arms fire, including one aircraft that was hit while it was taxiing, resulting in two injuries.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Considerable traffic volume, including international overflights.</p> <p><i>Because of the number of islands in the Indonesian archipelago, the country has a well-developed and busy air transport system. Its proximity to Singapore and Malaysia, both of which have a lot of aviation traffic, and its location in a fast-growing region of the world result in a great deal of traffic. Indonesia tightly controls overflights.</i></p>
Airspace Closure	
<p>Airspace restrictions</p> <p>Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<p>1. Restrictions by the responsible for the airspace sovereign authority (the state)</p> <p><i>No information found</i></p> <p>2. Others</p> <p><i>No information found</i></p>
<p>Reasons for airspace restrictions</p> <p>Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	

Indonesia (Aceh) 1990–1998 <i>(continued)</i>	
<p>Decision-making</p> <p>Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p><i>Information on decision-making during this period was not available, but generally speaking it is a process complicated by the proximity of Singapore and Malaysia and the high level of air traffic in the region. According to at least one document, Indonesia's military pilots must seek clearance from ATC at Singapore's Changi Airport before taking off on training flights. There is tension between Singapore and Indonesia over FIRs and control of sovereign airspace.</i></p>
<p>Promulgation</p> <p>Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	
<p>Notes</p> <p>Other relevant information</p>	<p>References:</p> <p><i>Miller, Michelle Ann. "The Conflict in Aceh: context precursors and catalysts," Accord 20, p. 12–15.</i></p> <p><i>Pan, Esther, Backgrounder, "Indonesia: The Aceh Peace Agreement," last updated 15 Sept. 2005.</i></p> <p><i>Rabasa, Angel and Haseman, John, The Military and Democracy in Indonesia: Challenges, Politics and Power, Rand National Security Research Division, 2002.</i></p> <p><i>Schulze, Kirsten E., The Free Aceh Movement: Anatomy of a Separatist Organization, Policy Studies 2, East-West Center, ISBN 1-932728-03-1 (online version), 2004.</i></p> <p><i>Developing Countries Studies Center, "Singapore FIR Takeover Plan: Avoid the 1995 Experience," accessed 12 June 2020.</i></p>

Mali 2012–2015

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>In January 2012 the Northern Mali Conflict or Mali Civil War started when several insurgent groups (mainly MNLA [National Movement for the Liberation of Azawad] and Ansar Dine) began fighting against the Malian government for independence for north Mali. On 5 April the MNLA proclaimed the independence of northern Mali from the rest of the country. However, by 17 July 2012, the MNLA had lost control of most of northern Mali's cities. The government of Mali asked for foreign military help to re-take the north. On 11 January 2013, the French military began operations against the Islamists. Forces from other African Union states were deployed shortly after. By 8 February, the Islamist-held territory had been re-taken by the Malian military, with help from the international coalition. However, attacks against the Malian military continued until a peace deal between the government and Tuareg rebels was signed on 18 June 2013. On 26 September 2013 the rebels pulled out of the peace agreement and fighting continued. Despite a peace accord was signed on 15 April 2015, low-level fighting continues.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Insurgency (small-scale military activities) and/or medium increasing political tension.</p> <p><i>French military intervention: Operation Serval from 11 January 2013 till 15 July 2014. US forces arrived in Niger in early 2013 to support the French military intervention in Mali; 150 US personnel set up a surveillance drone operation over Mali that was conducted out of Niamey. As of 2017, there are about 800 US troops in Niger, the majority of whom are construction crews working to build up a second drone base in northern Niger.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment</p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Small-scale (occasional) military air combat activities and/or some activities above FL 250.</p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.</p> <p><i>In January one Malian Air Force MIG-21 jet was shot down by the Tuareg. On 11 January 2013, a French Army Gazelle helicopter was shot down by small arms fire.</i></p>
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Air-to-air missiles launched from fighter aircraft (and no SAMs).</p>

Mali 2012–2015 *(continued)*

<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	<p>Differentiation — fighter jets.</p>
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces.</p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Known intent to attack military aircraft.</p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Small to moderate traffic volume (for example restricted to arrivals and departures to airports).</p>

Mali 2012–2015 (continued)

Airspace Closure

Airspace restrictions

Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:

- Restrictions by the responsible for the airspace sovereign authority (the state).
- Restrictions by others — third parties and/or neighboring states.

1. Restrictions by the responsible for the airspace sovereign authority (the state)

No information found

2. Others

No information found

Note:

27/02/2017 The Algerian CAA has published in 2012 airspace closures along their southern border due to the conflict.

FAA (27/02/2017)

Feb 27th, 2017: The FAA issued warnings for Kenyan and Malian airspace, warning US operators of the potential dangers in operating through both the Nairobi and Malian FIR's.

Published on Feb 26th, the new advice also adds new language with clarification of the type of weapons and phases of flight that the FAA is concerned about, specifically:

- *fire from small arms,*
- *indirect fire weapons (such as mortars and rockets), and*
- *anti-aircraft weapons such as MANPADS.*

The scenarios considered highest risk include:

- *landings and takeoffs,*
- *low altitudes, and*
- *aircraft on the ground.*

The FAA uses the same wording for both Kenya and Mali.

The updated guidance is intended for US operators and FAA License holder.

Warnings are addressing flights below FL300/2607250

2017 (referring to EASA CZIB No 2017-01R1 and FAA warning

EASA 29/04/2020–31/1072020

This CZIB was issued on the basis of information available to EU Member States and EU institutions.

The presence of terrorist groups with access to anti-aviation weaponry is assessed to pose a HIGH risk to operations within the portion of the Niamey FIR, which is situated above Mali territory, at altitudes below FL 250. Terrorist groups continue attacks on the country with the risk of mortar shelling on airstrips and airports.

Additionally, the Agency draws the attention of the aviation community to the above referenced information, copies of which are attached to this CZIB.

France (AIC 08/20) 09/04/2020–ongoing

From 09/04/2020 and until further notice, French air carriers and aircraft owners registered in France are requested to ensure that their aircraft maintain at all times a flight level above or equal to FL320 in the part of the Niamey FIR (DRRR) located above the Malian territory.

Reasons for airspace restrictions

Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.

Rebels were expected to possess MANPADS

With instability in the Sahel-Saharan region, fears were growing al-Qaeda in the Islamic Maghreb's (AQIM) could have acquired portable surface-to-missiles from Libya.

Decision-making

Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.

Mali 2012–2015 <i>(continued)</i>	
Promulgation Describes how the restrictions were published, number of the NOTAMs if available, AIS.	AIC, warnings by FAA, EASA CZIB
Notes Other relevant information	References: https://www.eurasiareview.com/31012012-loose-libyan-missiles-threaten-air-traffic/ https://safeairspace.net/mali/ https://www.easa.europa.eu/domains/air-operations/czibs/czib-2017-01r7 https://ops.group/blog/fresh-warnings-as-faa-clarifies-weapons-risk-in-kenya-mali-airspace/ https://www.reuters.com/article/us-libya-arms-un/libya-arms-fueling-conflicts-in-syria-mali-and-beyond-u-n-experts-idUSBRE93814Y20130409

Georgian Civil Wars 1991–1993

Likelihood of attack indicators

<p>A. Parties:</p> <ol style="list-style-type: none"> 1. Conflict between states. 2. Conflict between non-state armed groups and state(s) or civil wars. 3. Conflict between non-state armed groups. 	<p>Conflict between non-state armed groups and state(s) or civil wars.</p> <p><i>Conflict involved multiple players during the period in question; first it involved the newly independent state of Georgia against separatists from South Ossetia, which had previously declared itself an autonomous Soviet Republic. A three-way power struggle involving Georgian, Ossetian and Soviet military forces broke out. The first democratically elected president of Georgia lost power in a coup; his armed attempts to regain power were later defeated. Also during this time, separatists from the Abkhazia region, with help from Russian troops, fought against Georgia.</i></p>
<p>B. Armed conflict scale and/or tensions:</p> <ol style="list-style-type: none"> 1. Terrorism and/or international political tension. 2. Insurgency (small-scale military activities) and/or medium increasing political tension. 3. Large-scale military activities and/or heightened international political tension. 	<p>Large-scale military activities and/or heightened international political tension.</p> <p><i>Armed conflict involved multiple players, including Russia, and military equipment left over from the Soviet military.</i></p>
<p>C. Military air transport activities:</p> <ol style="list-style-type: none"> 1. Military air transport activities not reported. 2. Occasional use of aircraft to transport ground troops or military equipment. 3. More than occasional use of aircraft to transport ground troops or military equipment by at least one party). 	<p>More than occasional use of aircraft to transport ground troops or military equipment by at least one party.</p>
<p>D. Military air combat activities:</p> <ol style="list-style-type: none"> 1. No military air combat activities. 2. Small-scale (occasional) military air combat activities and/or some activities above FL 250. 3. Large- to medium-scale military air combat activities and/or regular activities above FL 250 	<p>Large- to medium-scale military air combat activities and/or regular activities above FL 250</p> <p><i>Georgian Su-25s flew more than 200 sorties during conflict in Abkhazia region. Helicopters also were used extensively.</i></p>
<p>E. Known attacks:</p> <ol style="list-style-type: none"> 1. Conflict area without publicly reported security incidents involving military and civil aviation. 2. Conflict area with single security-related reported incident/accident involving military (or civil) aviation. 3. Conflict area with multiple reported security-related incident/accident involving military (or civil) aviation. 	<p>Conflict area with multiple reported security-related incidents/accidents involving military (or civil) aviation.</p> <p><i>A number of military aircraft, including both fighters and helicopters, were shot down during the conflicts.</i></p> <p><i>Two civil type aircraft, a Tu-134 and a Tu-154, also were attacked on consecutive days in Sept. 1993, resulting in 135 fatalities.</i></p>
<p>F. Capability to attack by at least one party:</p> <ol style="list-style-type: none"> 1. No information for capability to attack with range above FL 250. 2. Air-to-air missiles launched from fighter aircraft (and no SAMs). 3. Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level. 	<p>Long-range surface-to-air missiles (SAMs) that can hit an aircraft at cruising level.</p> <p><i>Long-range SAMs were in the Georgian arsenal and Georgian military aircraft were brought down by what are believed to have been SAMs, leading to speculation that Russian military units were supporting separatists.</i></p>

Georgian civil wars 1991–1993 (continued)

<p>G. Capability to differentiate between civil and military aircraft:</p> <ol style="list-style-type: none"> 1. Differentiation supported by radar, electronic identification and non-cooperative target recognition systems measuring signature using acoustic and thermal radiation, radio emissions, radar techniques. 2. Differentiation supported by radar and electronic identification (e.g., identification, friend or foe (IFF), secondary surveillance radar (SSR). 3. Differentiation supported only by radar tracks. 	
<p>H. SAM/AAM operators' experience and chain of command:</p> <ol style="list-style-type: none"> 1. Regular forces. 2. SAMs in the possession of irregular military forces OR an absence of robust SAM/AAM command and control procedures for authorizing launch. 3. SAMs in the possession of irregular military forces AND an absence of robust SAM/AAM command and control procedures for authorizing launch. 	<p>Regular forces <i>SAMs also possibly in the possession of irregular forces and/or irregular forces supported by regular forces.</i></p>
<p>I. Known intent to attack:</p> <ol style="list-style-type: none"> 1. Known intent to attack military aircraft. 2. Known intent to attack civil aircraft. 3. Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. 	<p>Communication of intent and a plan to attack civil aircraft or actual attack against civil aircraft. <i>A Tu-134 and a Tu-154 in flight were attacked by separatists in Sept. 1993 resulting in 135 fatalities.</i></p>
<p>J. Civil aircraft operations over or close to conflict zone (with and without the airspace restrictions if any):</p> <ol style="list-style-type: none"> 1. No or occasional traffic. 2. Small to moderate traffic volume (for example restricted to arrivals and departures to airports). 3. Considerable traffic volume, including international overflights. 	<p>Small to moderate traffic volume (for example restricted to arrivals and departures to airports).</p>
Airspace Closure	
<p>Airspace restrictions Describes when airspace restrictions were introduced, what airspace they affected and how they evolved over time including:</p> <ul style="list-style-type: none"> • Restrictions by the responsible for the airspace sovereign authority (the state). • Restrictions by others — third parties and/or neighboring states. 	<ol style="list-style-type: none"> 1. Restrictions by the responsible for the airspace sovereign authority (the state) <i>No information found</i> 2. Others Note: <i>During the period there were civil aircraft shot down in the airspace over Abkhazia.</i>
<p>Reasons for airspace restrictions Describes the reasons for airspace restrictions, weapons known to be in the area and their range/capabilities, what traffic was vulnerable, known or suspected intent to attack civil aviation and whether there was concern about unintentional attack.</p>	<p><i>No information available.</i></p>

Georgian civil wars 1991–1993 *(continued)*

<p>Decision-making</p> <p>Describes the source(s) of the threat information; who made the decision regarding the restrictions and with whom was the decision coordinated; was the decision-making process different from the normal or standard airspace decision-making process.</p>	<p><i>No information available.</i></p>
<p>Promulgation</p> <p>Describes how the restrictions were published, number of the NOTAMs if available, AIS.</p>	<p><i>No information available.</i></p>
<p>Notes</p> <p>Other relevant information</p>	<p>References:</p> <p>Web.archive.org</p> <p><i>U.S. Institute of Peace, The Intra-Georgian civil war and The Georgian-Abkhas conflict, accessed June 2020.</i></p>

References

- [1] ICAO, 2018, Doc 10084 “Risk Assessment Manual for Civil Aircraft Operations Over or Near Conflict Zones,” Second Edition, INTERNATIONAL CIVIL AVIATION ORGANIZATION, Quebec, Canada

