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Autoriteti i Aviacionit Civil i Kosovës
Autoritet Civilnog Vazduhoplovstva Kosova
Civil Aviation Authority of Kosovo

Occurrence Reporting Overview



Introduction

The objective of Occurrence Reporting System is to contribute to the improvement of air safety by ensuring that relevant information on safety is reported, collected, analysed, stored, protected and disseminated. The ultimate goal of occurrence reporting is the prevention of incidents and accidents and not to attribute blame or liability.

Pursuant to Regulation 01/2009 on Occurrence Reporting in Civil Aviation, which transposes into Kosovo's national legal order the Directive 2003/42/EC, all relevant persons shall report aviation occurrences to the Civil Aviation Authority of the Republic of Kosovo (CAA). Such reporting contributes to the improvement of the safety of civil aviation through better knowledge of these occurrences to facilitate analysis and trend monitoring for initiating corrective actions.

Occurrence Reporting System in Kosovo has been in place since 2006. Despite the slow start, the occurrence reporting rate has substantially improved in the last years. Furthermore, the operators have their own Safety Management Systems (SMS), which have advanced significantly in the recent years. The SMS usually integrates a component for treating and addressing reported occurrences, enabling the industry to contribute directly to the collection and analysis of safety-related occurrences.

The CAA has set up and uses the 5th version of ECCAIRS (European Co-ordination Centre for Aviation Incident Reporting Systems) system. The CAA will subsequently integrate its safety data into the EU ECCAIRS central database to facilitate effective analysis and monitoring of safety critical information, in accordance with Regulation 8/2010, which transposes into our national legal order the Commission Regulation (EC) No.1321/2007. Accidents and serious incidents shall also be stored in the CAA ECCAIRS database, subject to the agreed terms and conditions with the Aircraft Accident Incident Investigation Commission of the Republic of Kosovo (AAIIC).

This report contains Occurrence Report (OR) statistics for 2013, a short explanation of each category and a short description of few occurrences.

ECCAIRS Occurrence Classes

The ECCAIRS occurrence classes are based on ICAO's ADREP 2000 taxonomy.

Accident

An occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, in which:

- a) a person is fatally or seriously injured as a result of:
 - being in the aircraft, or
 - direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or
 - direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or

- b) the aircraft sustains damage or structural failure which:
 - adversely affects the structural strength, performance or flight characteristics of the aircraft, and
 - would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to the engine, its cowlings or accessories; or for damage limited to propellers, wing tips, antennas, tires, brakes, fairings, small dents or puncture holes in the aircraft skin; or

- c) the aircraft is missing or is completely inaccessible.

Serious incident

An incident involving circumstances indicating that an accident nearly occurred.
N.B.

Examples of serious incidents can be found in Attachment D of ICAO Annex 13 and in the ICAO Accident/Incident Reporting Manual (ICAO Doc 9156).

Incident

An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation. *N.B.*

The type of incidents which are of main interest to the International Civil Aviation Organization for accident prevention studies are listed in the ICAO Accident/Incident Reporting Manual (ICAO Doc 9156) and ICAO Annex 13.

Major incident

Eurocontrol: An incident associated with the operation of an aircraft, which safety of aircraft may have been compromised, having led to a near collision between aircraft with ground or obstacles (i.e. safety margins not respected which is not the result of an ATC instruction).

Significant incident

Eurocontrol: An incident involving circumstances indicating that an accident, a serious or major incident could have occurred, if the risk had not been managed within safety margins, or if another aircraft had been in the vicinity.

Occurrence without safety effect

An incident which has no safety significance.

Occurrence Categories

For the purpose of this publication, occurrences are categorised based on ICAO's ADREP 2000/ECCAIRS taxonomy.

ADRM	Aerodrome (Aerodrome design, service, or functionality issues are evident)
AMAN	Abrupt manoeuvre (The intentional abrupt manoeuvring of the aircraft by the flight crew)
ARC	Abnormal runway contact (Any landing or take-off involving abnormal runway or landing surface contact)
ATM	ATM/CNS (Air traffic management (ATM) or communications/navigation/surveillance (CNS) service issues are evident)
BIRD	Birdstrike (Occurrences involving collisions / near collisions with bird(s)/wildlife)
CABIN	Cabin safety events (Miscellaneous occurrences in the passenger cabin of transport category aircraft)
CFIT	Controlled flight into or toward terrain (Inflight collision or near collision with terrain, water, or obstacle without indication of loss of control)
CTOL	Collision with obstacle(s) during take-off and landing (Collision with obstacle(s), during take-off or landing whilst airborne)
EVAC	Evacuation (An air carrier occurrence where either (a) person(s) are seriously or fatally injured during an evacuation, or (b) an unnecessary evacuation was performed)
EXTL	External load related occurrences (Occurrences during or as a result of external load or external cargo operations)
F-NI	Fire/smoke (non-impact) (Fire or smoke in or on the aircraft, in flight or on the ground, which is not the result of impact)
F-POST	Fire/smoke (post-impact) (Fire/Smoke resulting from impact)
FUEL	Fuel related (One or more powerplants experienced reduced or no poweroutput due to fuel exhaustion, fuel starvation/mismanagement, fuel contamination/wrong fuel, or carburettor and/or induction icing)
GCOL	Ground Collision (Collision while taxiing to or from a runway in use)
GTOW	Glider towing related events (Premature release, inadvertent release or non-release during towing, entangling with towing, cable, loss of control, or impact into towing aircraft / winch)
ICE	Icing (Accumulation of snow, ice, freezing rain, or frost on aircraft surfaces that adversely affects aircraft control or performance)
LA	Laser attack
LALT	Low altitude operations (Collision or near collision with obstacles/objects/terrain while intentionally operating near the surface (excludes take-off or landing phases))
LOC-G	Loss of control - ground (Loss of aircraft control while the aircraft is on the ground)

LOC-I	Loss of control - inflight (Loss of aircraft control while inflight)
LOLI	Loss of lifting conditions en-route (Landing en-route due to loss of lifting conditions)
MAC	AIRPROX/near miss/mid-air collision (AIRPROX/loss of separation/near miss/mid-air collision)
RAMP	Ground Handling (Occurrences during (or as a result of) ground handling operations.)
RE	Runway excursion (A veer off or overrun off the runway surface)
RI-A	Runway incursion - animal (Collision with, risk of collision, or evasive action taken by an aircraft to avoid an animal on a runway in use)
RI-VAP	Runway incursion - vehicle, a/c or person (Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft.
SCF-NP	System/component failure or malfunction [non-powerplant] (Failure or malfunction of an aircraft system or component - other than the powerplant)
SCF-PP	Powerplant failure or malfunction (Failure or malfunction of an aircraft system or component - related to the powerplant)
SEC	Security related (Criminal/Security acts which result in accidents or incidents (per the International Civil Aviation Organization [ICAO] Annex 13)
TURB	Turbulence encounter (In-flight turbulence encounter)
UIMC	Unintended flight in IMC (Unintended flight in Instrument Meteorological Conditions (IMC))
USOS	Undershoot/overshoot (A touchdown off the runway surface)
WSTRW	Windshear or thunderstorm. (Flight into windshear or thunderstorm)
OTHR	Other (Any occurrence not covered under another category)
UNK	Unknown or undetermined (Insufficient information exists to categorize the 99 occurrence)

Statistics

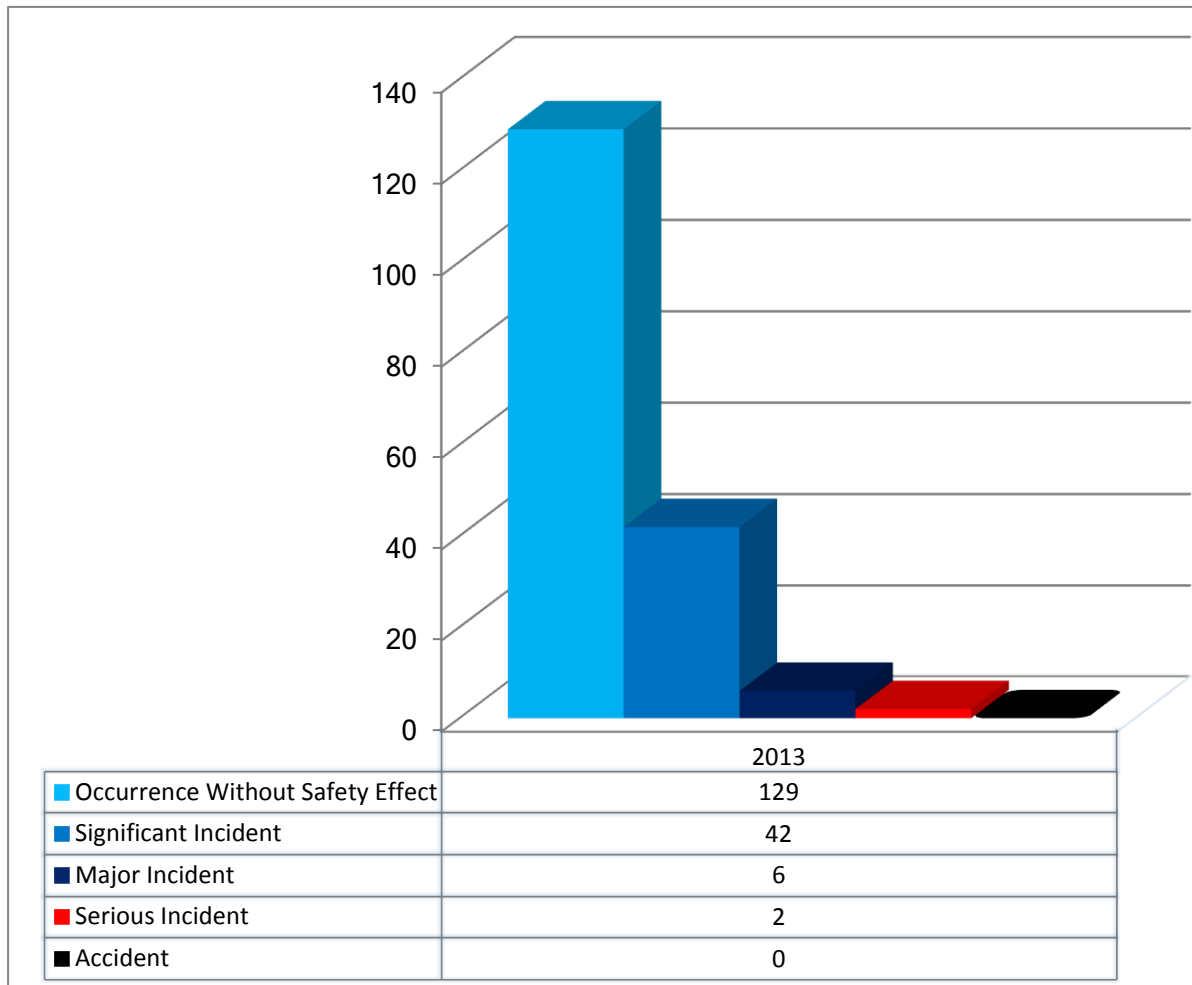


Figure 1.Number of ORs received in 2013 according to occurrence class

Observing the trend of received ORs in 2013 in Figure 1, it can be noticed that a contributing factor to the overall high number of reports is the number of reported occurrences without safety effect. Out of the 179 reported occurrences, 129 were classified as occurrences without safety effect, 42 were classified as significant incidents, 6 were classified as major incidents and 2 were classified as serious incidents.

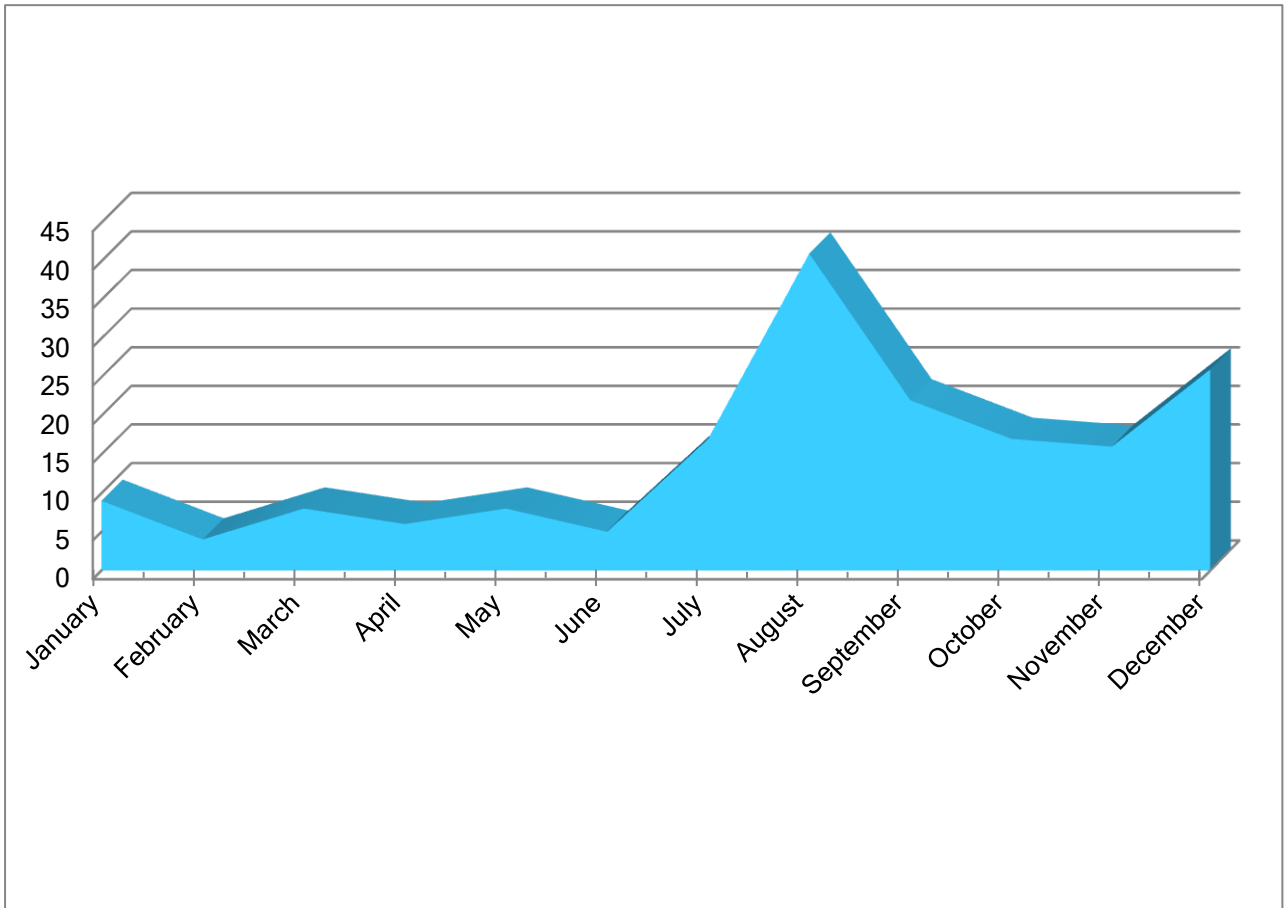


Figure 2.ORs received during 2013

Figure 2, shows the number of occurrence reports received by CAA per each month of the year 2013. During the first six months of the year, the curve of the received reports shows a relatively low and a uniform number of reports. While, in July the curve experiences a steady increase, and in August it reaches its maximum. This increase is consistent with the increase of aircraft activities during the summer months and can be attributed mainly to the increase of laser and bird activities around PIA "Adem Jashari". During those two months CAA received 14 Laser Attack and 8 Bird Strike reports. In September the curve drops down, but remains slightly higher than in July. In the coming months it remains relatively high, and in December it increases again, reaching the second highest point.

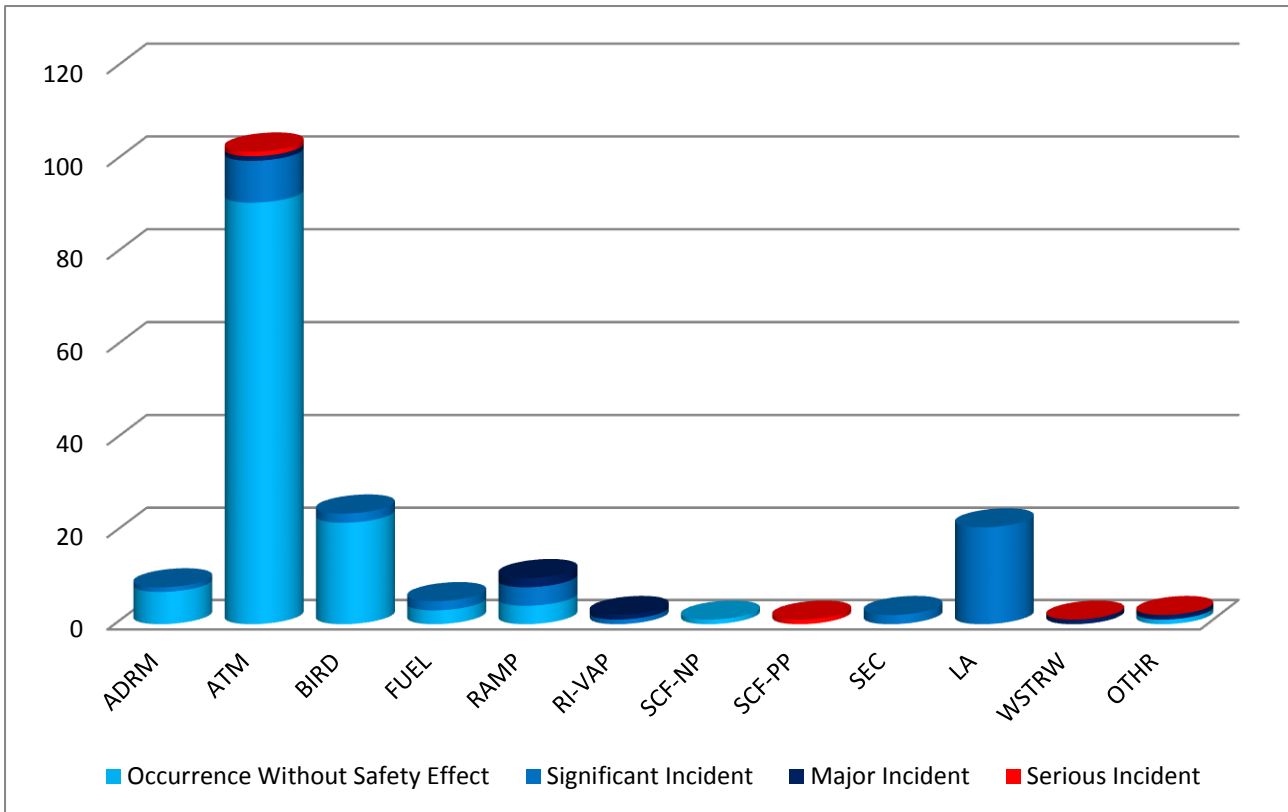


Figure 3. Breakdown of reported occurrences in 2013 by category and severity classification

	Occurrence Without Safety Effect	Significant Incident	Major Incident	Serious Incident	Total
ADRM	7	1	0	0	8
ATM	91	9	1	1	102
BIRD	22	2	0	0	24
FUEL	3	2	0	0	5
LA	0	21	0	0	21
RAMP	4	4	2	0	10
RI-VAP	0	1	1	0	2
SCF-NP	1	0	0	0	1
SCF-PP	0	0	0	1	1
SEC	0	2	0	0	2
WSTRW	0	0	1	0	1
OTHR	1	0	1	0	2
Total	129	42	6	2	179

Table 1. ORs received during 2013 according to categories and classes

Observing the trend of received reports in 2013 in Figure 3 and Table 1, it can be noted that a significant portion of the reported occurrences (around 57%) are

related to the ATM system and procedures, including Aeronautical Information and Meteorological services. Out of these occurrences, around 90% were classified as occurrences without safety effect, and the rest 10% were classified as incidents (significant or major) and only one as a serious incident. This trend once again highlights the positive attitude and readiness of the relevant operational staff, especially at the ANSP, to report also events that do not have outright detrimental effects on the safety of operations, but which help in observing long-term negative tendencies and preventing more serious incidents.

The second and third most reported categories are Birdstrikes and Laser Attacks, respectively, which combined comprise around 25% of the overall number of reported occurrences. The significant increase in the number of reported laser attacks raises concerns, since laser attacks are considered to be very sensitive events due to the severe effects they can have on the safety of aircraft operations. The issue was also highlighted in previous editions of this report. Detailed summaries for each of the individual categories are provided below.

ADRM (*Aerodrome*). In this category are included occurrences associated with runways, taxiways, ramp area, parking areas, buildings and structures, Crash/Fire/Rescue (CFR) services, obstacles on the Aerodrome property, power supply, lighting, markings, signage, procedures, policies, and standards. Occurrences from this category do not necessarily involve an aircraft. There were 8 reported occurrences during 2013, out of which 7 were classified as occurrences without safety effect and one as significant incident.

The incident is related to several power failures on TWR and MET premises and facilities. During that time, all equipment was working in UPS. After one hour it was reported that all power problems were resolved.

ATM (*Air traffic management (ATM) and communications/navigation/surveillance (CNS)*). Table 1 and Figure 3 show that during 2013 occurrences of concerning ATM systems and procedures (including Aeronautical Information and Meteorological Services) account for a significant portion of the occurrences reported during 2013.

Occurrences covering technical failures or defects, mainly related to communication, navigation, surveillance, meteorological equipment, AIS systems etc., are included here, as well as any other occurrence pertaining to or involving ATM procedures and systems. During 2013, around 48% of ATM Occurrences (see Figure 4) were related to the ATM communications systems (Radio Communications, VCSS, AFTN and Internet). The majority of these reported occurrences were short-term problems mainly with the Voice Communication Switching System (VCSS) and Internet, with no safety consequences.

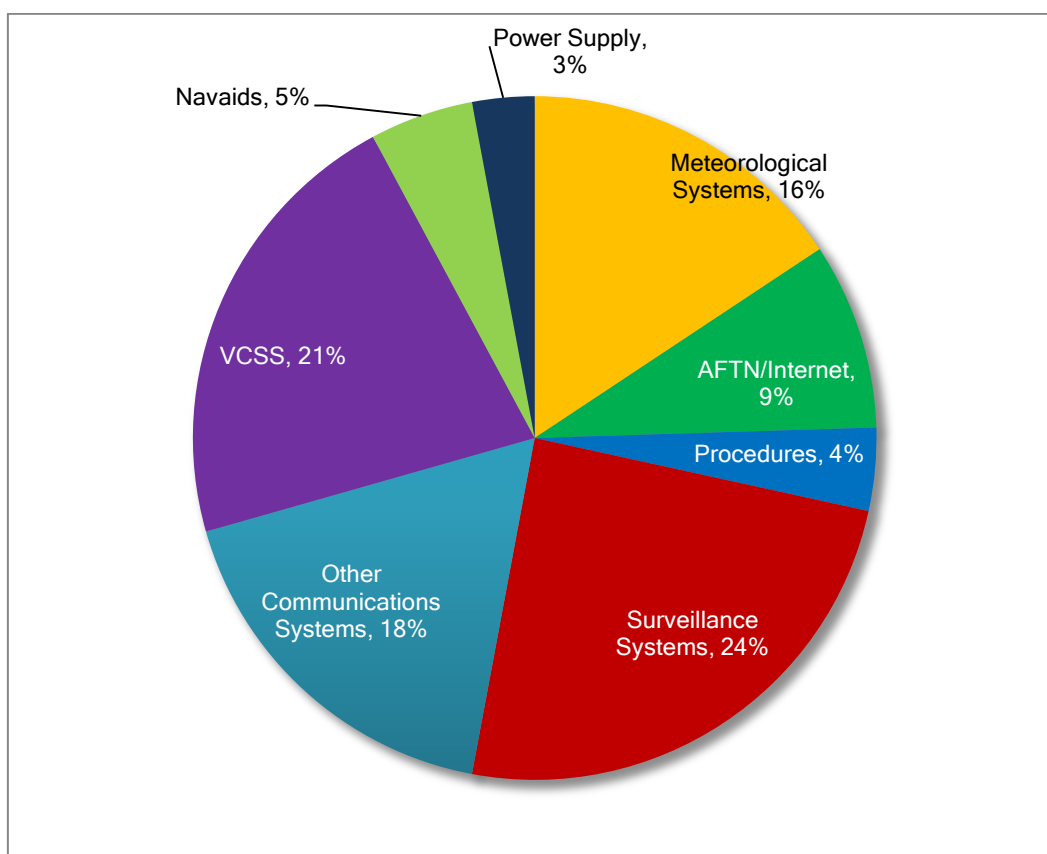


Figure 4. A breakdown of the reported ATM occurrences per sub-category

CAA together with the ANSP have taken necessary steps to ensure that safety is kept at an appropriate level. In particular, regarding the frequent problems with the VCSS system, the ANSP was asked to perform a safety assessment to ensure that all necessary measures are taken and appropriate back-ups are available to maintain the safety level of the provided services. One occurrence related to communication systems was classified as a serious incident, and two others as incidents, one major and one significant. The serious incident, related to radio communication systems and other ATM related systems, occurred due to heavy interference. The matter was immediately investigated and resolved with help of Kosovo Regulatory Authority of Electronic and Postal Communication.

The major incident was related to a radio frequency failure which lasted for around 2 hours and affected the primary radio communication systems. Although the back-up systems and procedures were utilised, efficiency suffered as traffic within Kosovo airspace had to be reduced. Safety levels were successfully maintained.

The occurrence classified as a significant incident was related to a failure of landline communications with the neighbouring centres, which caused delays

during the traffic coordination. As it can be seen from Figure 4, these types of problems have increased significantly since last year; therefore the CAA will be closely monitoring the implementation of recommendations that were produced as a result of the investigation of these occurrences.

Another sub-category of occurrences, which has experienced a significant increase in reports compared to the previous year, is the sub-category related to Surveillance Systems. During 2013 there were 25 occurrences that were reported related to radar systems and the surveillance function. The majority of these occurrences, reported mostly in the latter part of the year, were caused by short-term problems or malfunctions and were classified as occurrences without safety effect.

In several instances, such failures occurred while there was traffic within Kosovo airspace under ATC control. Under such circumstances, events of this nature can increase the workload of the ATCOs and in general can lead to more safety sensitive situations. In all the latter cases safety levels were maintained by activating back-up procedures, nevertheless they are classified as significant incidents. These occurrences are currently under investigation.

A smaller number of occurrences reported this year were related to Meteorological systems (around 16%), Navigational Aids (5%), Procedures (4%) and Power supply (3%). It is worth highlighting that occurrences related to meteorological systems have decreased by 24% since last year.

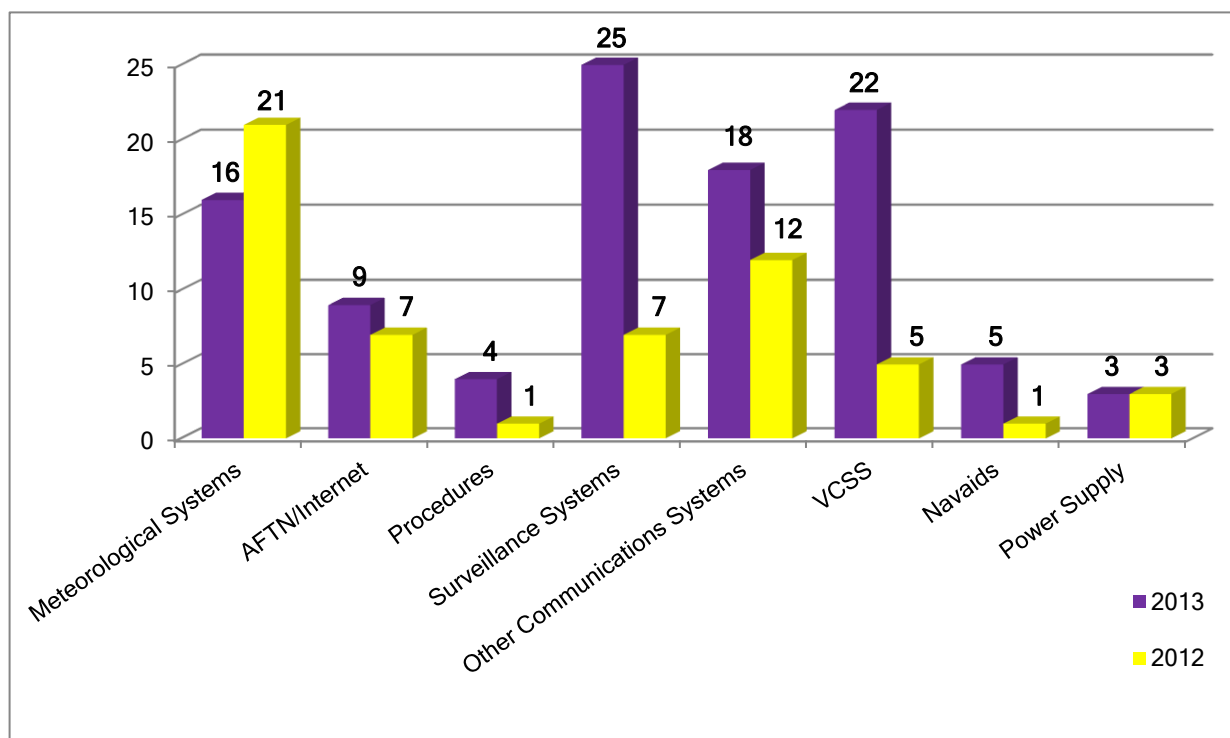


Figure 5. A comparison of the reported ATM occurrences between 2012 and 2013

The significant number of reports was helpful in identifying trends regarding equipment and other aspects of air navigation services and systems, both by the Air Navigation Service Provider (ANSP) and the CAA, enabling the ANSP to address these issues more carefully and ensure that proper measures are taken to mitigate the problems.

It is worth noting that there is a consistency in the number of reported occurrences in this category compared to the previous years, which is an indication that reporting continues to be widespread in the industry, especially the ANSP, due to raised awareness regarding benefits from occurrence reporting and its clear contribution to the improvement of safety.

BIRD (*Birdstrike*). There were 22 reported birdstrikes during 2013, out of which 20 were classified as occurrences without safety effect and 2 as significant incidents. Two birdstrike incidents caused minor damages to aircraft; the safety of flights wasn't jeopardised.

Due to increased number of reported bird strikes, CAA conducted several inspections at Prishtina International Airport "Adem Jashari" LKIA. The airport operator did implement some immediate corrective measures.

FUEL. There were five reported fuel related occurrences during 2013; two were classified as significant incidents and three were classified as occurrences without safety effect. In the two reported incidents, the fuel leaks were noticed by the ramp personnel and were reported to the pilots, who in turn, called maintenance for further assessment and repair. Ramp personnel also reported three occurrences without safety effect related to fuel. All the fuel related occurrences happened while the aircraft were on the ground, appropriate measures were taken and safety was not compromised.

LA (*Laser Attack*). There were 21 laser attack reports submitted to CAA in 2013 and they were all classified as significant incidents. Some of the reports contain two or three aircraft reporting a laser attack. All of the events occurred during the approach or departure phase of flight when aircraft were operating at low altitude. There was one report from helicopter pilots and twenty from aircraft pilots. All aircraft involved landed safely at Prishtina International Airport or transitioned safely to their destination.

Occurrences with laser attacks have significantly increased all over the world. These kinds of attacks are carried out deliberately by individuals and pose great hazard to the safe operation of aircraft when exposed to laser light in flight. Laser lights that hit at a particular angle can illuminate the whole cockpit with a

bright green or red light, and blind the pilots as they're trying to land. The lasers have never caused a crash, but they can disorient pilots at crucial moments.



Photo 1: A still from an instructional video simulating the effects of a laser pointer in a cockpit. ©FAA

In an attempt to crack down on the seemingly innocuous but potentially hazardous trend, Memorandum of Understanding was signed between CAA, Kosovo Police and Air Navigation Service Provider in order to coordinate the actions when an aircraft is exposed to laser attack. Civil Aviation Authority of Kosovo has also published an Advisory Circular and has communicated a Press Release (see Appendix A) regarding Laser Attacks in the Republic of Kosovo. CAA is urging citizens to report any and all "laser incidents" as soon as possible.

RAMP (*Ground Handling*) Occurrences related to ground handling (during or as a result of ground handling) include collisions that occur while servicing, boarding, loading, and deplaning the aircraft, propeller/rotor/fan blade strikes, pushback/powerback/towing events, jet blast and prop/rotor wash, aircraft external preflight configuration errors and all parking areas (ramp, gate, tiedowns).

There were 10 RAMP occurrences reported during 2013; 4 were classified as occurrences without safety effect, 4 were significant incidents and other 2 were classified as major incidents.

One major incident occurred during aircraft baggage offloading. Due to the windy conditions, a set of towable passenger stairs moved uncontrolled from the apron service road and struck the right wing of the parked aircraft, damaging

the wing slat. After technician's inspection, the aircraft was grounded due to the damage.

After analysing available documentation (procedures, reports, statements etc.), and considering other contributory factors, it was concluded that the incident occurred because of the human factor.

The second major incident was associated with transport of dangerous goods by air, specifically with transport of a wheelchair without protection against unintentional activation. During the aircraft offloading it was noted that the wheelchair loaded in the forward compartment of aircraft was secured, but power cable connectors were not separated and the lights were on. Captain was informed immediately.

Two reported significant incidents were related to static discharger damage, which occurred during aircraft loading/offloading. Apart from broken static dischargers, no effects on safety of operations were reported.

In order to prevent reoccurrence of the similar incidents in the future, CAA is closely monitoring implementation of safety recommendations deriving from occurrence investigation reports.

RI-VAP (*Runway incursion - vehicle, a/c or person*). This category includes occurrences at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for the landing and take-off of aircraft. There were two reported occurrences; one classified as significant incident and the other as major incident.

The reported major incident involved an aircraft taxiing from the parking platform to the runway. The pilot did not follow its clearance limit to stop short of the runway and entered the runway without authorization from ATC, while there was another aircraft on final for landing. ATC took action immediately and resolved the situation by having the landing aircraft go-around for another approach, while the traffic that entered the runway without clearance was given instructions to exit the runway. Situation was resolved with no harm to aircraft or person.

SEC (*Security related*). There were two reported occurrences related to security and they were both classified as significant incidents. One occurrence involved vehicle entering manoeuvring area of the LKIA without authorization from ATC and the other occurrence involved transport of undeclared Dangerous Goods. Both incidents were safely resolved and steps were taken to minimise the risk of such incidents reoccurring.

SCF-NP (*System/component failure or malfunction*). There was only one component related occurrence reported. The occurrence was related to a nose taxi light damage that was discovered by aircraft supervisor at LKIA and it was classified as occurrence without safety effect.

SCF-PP (*Powerplant failure or malfunction*). One occurrence was reported due to powerplant failure and it was classified as serious incident involving military aircraft. The crew after take-off from LKIA reported that they were turning back to land at LKIA due to intentional engine shutdown because of oil problems. The flight landed safely at LKIA.

WSTRW (*Windshear or thunderstorm*). One occurrence was reported due to thunderstorm and lightning strike that was classified as major incident. Lightning struck the passenger stairs that were attached to the aircraft. No person was injured; however, the aircraft sustained minor damage.

OTHR (*Other*). Reported occurrences which do not strictly fall in any of the categories listed above, are categorized in this category. In 2013, there were two such reports, one of which is classified as a major incident.

The major incident was an airspace infringement caused by powered paragliders flying without ATC clearance or coordination, and who were spotted by a nearby flying helicopter. The occurrence is currently under investigation.

APPENDIX A

Laser Attack - Press Release

Interference with aircraft operations is considered a crime under Article 99.2, 99.6 and 99.9 of the Law Nr. 03/L-051 on Civil Aviation and Article 165 of the Republic of Kosovo Criminal Code (Nr. 04/L-082).

To highlight and warn the general public regarding the hazardous effects of laser illumination of aircraft, the Civil Aviation Authority issued the following press release on 21st January 2014:

“During last year and this year a significant number of occurrences related to illumination of civilian aircraft by lasers were reported.

Pointing of laser light towards an aircraft, respectively towards its cockpit, during the preparation phase for landing, landing, or during climb phase, when the aircraft is on a low altitude, in addition to other things, can cause a flash blindness of pilots and could potentially jeopardize the flight safety. Such interferences, that are considered to endanger civil aviation operations, constitute offences under the Criminal Code of the Republic of Kosovo.



Kosovo Police, Civil Aviation Authority and PIA "Adem Jashari" - Air Traffic Control have established a response procedure, which enables police patrols to be within few minutes at the identified place of the source of the laser beam that is directed towards the aircraft.

Even though for somebody this may look like a game, this game threatens the lives of people and the offender could end up in jail.

Never illuminate aircraft with laser beam!”

APPENDIX B

Flying in bad weather

The Civil Aviation Authority of Kosovo, International Civil Aviation Organisation (ICAO), European Aviation Safety Agency (EASA), Federal Aviation Administration (FAA), etc. have a long list of flight requirements for commercial aircraft, which manufacturers (Boeing, Airbus, Bombardier, etc.) generally exceed. Many of the rules are designed to ensure that an aeroplane can operate in bad weather (fog, wind, thunderstorms, frosty weather, snow, etc.). Of all things which influence the safety of flight, the weather is without doubt the most influential.

The following can have a direct and indirect influence on flight safety:

- **Turbulence** associated with convective activity (for example, thunderstorms), terrain (for example, the movement of air masses over mountains), jet streams and the interaction between air masses, can cause structural damage to aircraft.

- **Icing.** Ice formation on aircraft can alter the aerodynamic characteristics of an aircraft and cause damage to or loss of function of the engines and seriously affect the performance of an aircraft. Ice may form on aircraft whilst they are on the ground prior to flight and this must be removed and any further accretion on the airframe prevented by the Aircraft Ground De/Anti Icing so that any aircraft is free of ice deposits at the point at which it gets airborne. This de-icing operation may take between 10 to 20 minutes per aircraft. At peak moments this may lead to minor delays for departing flights.

- **Reduced visibility,** associated with cloud, mist, fog, or sand storms, can make safe flight difficult or even impossible, even with the help of technology (ILS, weather radar, synthetic vision systems, etc.). Although a good visibility is essential for flying a small aircraft or helicopter, commercial aviation is far less affected by bad weather such as heavy fog. Aircraft and airports are equipped with the most modern technology which allows safe landing in poor or even zero visibility conditions. This is what we refer to as IFR operations (Instrument Flight Rules). Still, mist and fog do affect air traffic, even at the most modern airports. Whereas in normal visibility conditions aircraft have to observe normal horizontal separation between two aircraft, where in heavy fog the horizontal separation has to increase and when traffic is very busy or when the poor weather conditions persist, this may lead to small delays. Modern airports are equipped with the best instrument landing systems allowing aircraft to land when visibility is as low as 150 m. For aircraft and airports that are not equipped with this technology, landing in foggy conditions is not possible. If this is the case,

arriving aircraft are diverted to airports which do have the required landing systems or where there is no fog.

Prishtina International Airport "Adem Jashari" is currently equipped with ILS and CAT II operations for Runway 17 are published, which allow the safe landing of aircraft even when Runway Visual Range is as low as 300m.



Photo 1: Thick fog on south-east England (Photograph: Steve Parsons/PA)

- **Wind Velocity;** near the ground, the influence of wind on directional control and Cross Wind Landings or take-offs can, if not dealt effectively, lead to Runway Excursion. If conditions are windless, the direction a plane takes off or lands in is of no importance, but usually this will be against the wind. However, modern aircraft are also able to land - within certain limits - with a crosswind or tailwind. If the wind speed is high such as 35 knots (65 km/h), it is imperative to fly into the wind. That is why the wind direction may dictate which runway is to be used at a given time. However, if the winds are blowing across, not down, the runway, it may cause some problems for aeroplanes, but modern commercial aeroplanes can take off and land in a crosswind of 25 knots or more.

- **Surface contamination,** associated with standing water, ice, or snow on take-off, landing and manoeuvring surfaces, affects braking capabilities of aircraft.

- **Precipitation;** for example rain, freezing rain, hail, and snow affect aerodynamics and visibility. Light or moderate snow will not stop operations, but a heavy snowfall can cause flight cancellations. Pilots could face difficulties

generating flying speed in slush or standing water over a half-inch (1.3 cm) deep, or when there's too much snow accumulation. In such conditions, the drag on the aircraft tires can be so great that a plane is unable to take off before the runway ends. Visibility can also be a factor, created from the blowing snow.

Depending on the temperature, the intensity and the duration of the snowfall, snow may be the cause of many delays and cancelled flights. As some Airports have more than one runway, they can be cleared alternately so the airport hardly ever has to be closed because of snow.

In the other hand freezing rain is one of the weather phenomena that cause most difficulties for airline operations. The sparkle of shimmering ice coating almost any surface makes freezing rain one of the most deadly types of winter storms. With accumulations of several centimetres, runways, taxiways and roads can be dangerously slick while trees and power lines cannot withstand the heavy weight of the extra added ice.

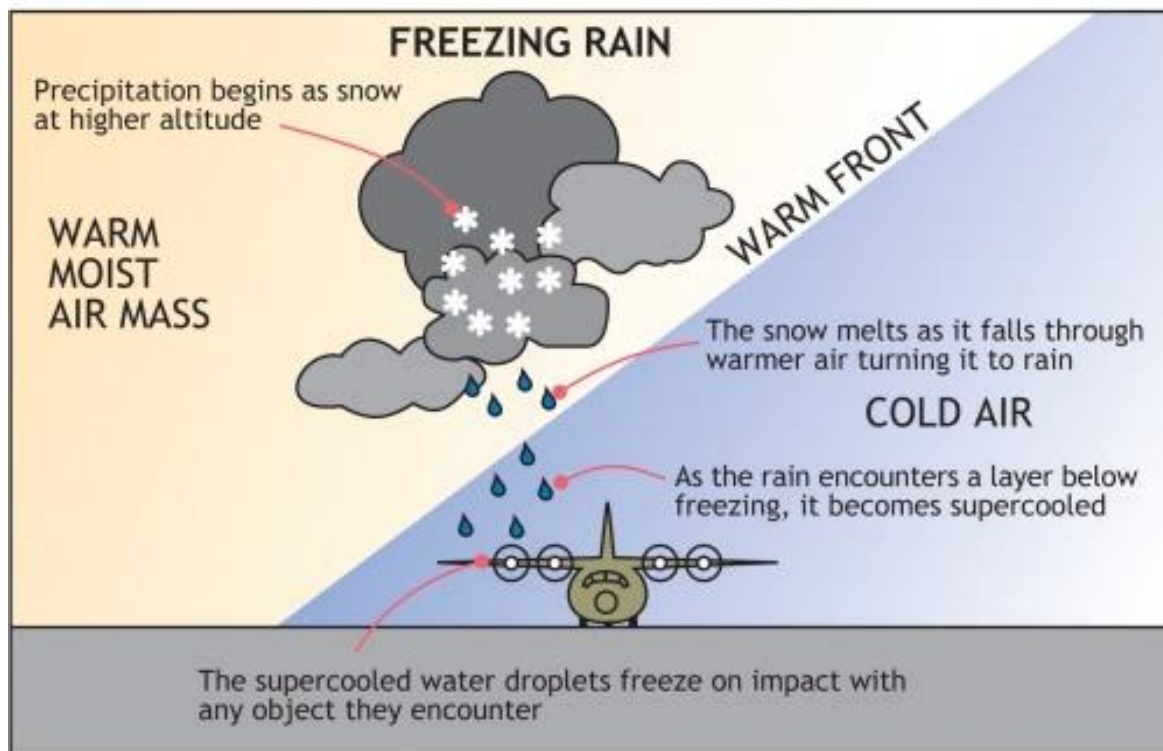


Photo 2: Freezing rain (skybrary.com)

- **Lightning;** a lightning strike can be very distressing to passengers (and crew) but very rarely threatens the safety of an aircraft. Once you're on board lightning is harmless (Faraday cage effect). As soon as the aircraft is airborne, pilots make use of special equipment (radar) to avoid the centre of the thunderstorm or they can rely on air traffic control to assist them. Of greater concern is the effect a lightning strike can have on aircraft avionics, particularly

compass and air data systems. However, aircraft are equipped with many backup systems and usually a damaged radio or system does not affect the safety of flight.

As for an airport, only a heavy thunderstorm right above the airport may lead to delays: after all an airport is a large, open area where lightning constitutes a minimal risk to passengers and staff.

Many of the operational safety issues can be affected by weather:

- **Runway Excursion:** The indirect contribution of weather to runway surface state and the direct effect of crosswind component on directional control.
- **CFIT:** Controlled Flight Into Terrain (CFIT) accidents often occur when an aircraft is in cloud or in reduced forward visibility, when the crew may be subject to extra workload, be distracted, or have reduced situational awareness associated with the weather conditions.
- **Loss of Control:** as a direct or indirect result of turbulence or windshear such as might be experienced in an unintentional excursion into active Cumulonimbus clouds, or an encounter with a Microburst or because of exposure to In-Flight Icing which exceeds the capacity of the available or selected Ice Protection Systems.

There are numerous specific mitigation strategies to maintain the safety of flight in certain types of weather. These may be technical, procedural, or navigation based, or all three, and it may be appropriate to re-route, delay or cancel a flight if no satisfactory mitigation is available. A common requirement is that all those associated with the safety of flight should have an understanding of meteorology appropriate to their operational role.


Sources:

<http://www.skybrary.aero/>

<http://www.brusselsairport.be/>

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<http://weather.about.com/od/winterweather/f/FreezingRain.htm>



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