



Safety recommendation no. 519

Date of the publication	20.03.2017
Number of the final report	2294
Safety deficit	<p>On 3 June 2015, an airprox occurred between a commercial aircraft and a hot-air balloon within the terminal control area (TMA) of Zurich Airport. The commercial aircraft was approaching Zurich Airport using radar vectoring. The hot-air balloon had entered the terminal control area several times without clearance from an air traffic control centre because the balloon pilot was insufficiently aware of the risks he was posing even if only entering into such airspace by a short distance. Because the transponder was switched on, the hot-air balloon was in theory visible to air traffic control. However, the display on the air traffic controllers' monitors was so inconspicuous that the unauthorised entry went unnoticed until the airprox.</p> <p>Similar safety deficits were established as part of the investigations into the following near misses:</p> <ul style="list-style-type: none">– The investigation into a near miss involving a commercial aircraft and a glider in the TMA of Zurich Airport on 11 August 2012 identified the pilot's lack of risk awareness regarding unauthorised entry into class C airspace as the direct cause.– The same near miss revealed the following systemic risks: an airspace structure around Zurich Airport with a low fault tolerance and a limited obligation to use a transponder which makes it harder to detect unauthorised entry into the terminal control area.– The investigation into a near miss between a sport aircraft and a hot-air balloon in the TMA of Bern Airport on 15 September 2012 showed that it was primarily caused by the balloon pilot's lack of awareness regarding the balloon's spatial position relative to the airspace structure.– Another contributing factor to the same near miss was that the pilot was not carrying a transponder and was therefore undetectable by air traffic control. <p>All of these airproxes have the following elements in common: The respective pilots had sufficient knowledge of the airspace structure itself and, using the means available, would have been able to respect the boundaries of the terminal control area or to contact air traffic control to ask for permission to enter, if necessary. However, they were of the opinion that marginal entries into terminal control areas were not a problem, because there were sufficient safety margins. These were incorrect assumptions. Contrary to their beliefs, Swiss airspace is characterised by very small safety margins as – in order to restrict light and sport aviation as little as possible – the distances between areas where aircraft under visual flight rules (VFR) are allowed to move freely and areas where predominantly</p>

large aircraft are guided according to instrument flight rules are reduced as much as possible. To accommodate the needs of light and sport aviation however, the boundaries of airspace must consistently be adhered to, because otherwise considerably dangerous situations can arise instantly. Furthermore, even if airspace users are sufficiently aware and demonstrate great discipline, minor mistakes might still happen occasionally, and because even minor mistakes can have very serious consequences, a system should be sought that provides a certain resilience when mistakes happen. If unauthorised entry into a controlled airspace were detectable by air traffic control at an early stage, corrective action could be taken in good time.

In principle, a number of strategies are available to reduce this safety deficit:

a. Airspace remains as it is, but the crews' awareness regarding the low tolerance for mistakes is raised, and it is ensured that all aircraft are suitably displayed to the air traffic controllers, by the latest when an aircraft enters the controlled airspace. It should also be ensured that the systems, such as those which are fitted to large aircraft to warn of airproxes and to avoid collisions, can take over their role as the last safety net.

b. No operational or technical measures for decreasing the collision risk are taken but the airspace in which large aircraft in particular are guided according to instrument flight rules is enlarged to create bigger safety margins. These additional buffer zones must be designed big enough that large aircraft cannot be endangered, even if light aircraft and sport aircraft which cannot be detected by air traffic control make navigational mistakes.

As part of the investigations into the two near misses in 2012, the Swiss Transportation Safety Investigation Board consulted the public concerned as prescribed by law to be able to issue safety recommendations which are broadly supported and easy to implement. The majority of the public that were consulted back then were in favour of a technical-operational solution and the STSB subsequently issued safety recommendation no. 466, which would constitute a relatively easy and inexpensive possibility for improvement: "In cooperation with the supervisory authorities of neighbouring countries, the Federal Office of Civil Aviation should, where appropriate, define airspace surrounding Swiss airports in which only aircraft equipped with a functioning and activated transponder are allowed to fly (transponder mandatory zones – TMZ). These TMZ should include the control areas and terminal control areas and contain vertical or horizontal buffer zones with regard to this airspace." When contacting almost the same public involved as part of the investigation into the serious incident in question which happened around three years after the near misses in 2012, the STSB found out that hardly any concrete measures have yet been taken to decrease the abovementioned risk of collision between large aircraft and light and sport aircraft which mistakenly enter terminal control areas. The public involved blamed each other for the safety deficits still existing and the slow implementation of improvements. The Swiss Transportation Safety Investigation Board refrains from commenting on the actions of the public involved. However, the STSB urgently points out once again that the well-known risks of collision between large aircraft and light and sport aircraft still exist because the complex Swiss airspace is not very forgiving of mistakes and the safety nets of air traffic control and of commercial aircraft can become ineffective as it is not mandatory to carry a transponder. Therefore, the Swiss Transportation Safety Investigation Board once more recommends,

in line with safety recommendation no. 466, introducing transponder mandatory zones to protect control zones and terminal control zones. In line with the different strategies outlined above, which are possible to reduce the current safety deficit and thus support a holistic method of resolution, the STSB issues the two additional safety recommendations below.

Safety recommendation	The Federal Office of Civil Aviation should, where appropriate in collaboration with the supervisory authorities from neighbouring countries, specify simply designed and sufficiently large controlled class C and D airspaces in the areas surrounding Swiss airports, in order to prevent light aircraft and sport aircraft which enter this airspace without clearance from posing any danger to large aircraft in the future.
Addressees	BAZL Bundesamt für Zivilluftfahrt; BAZL Bundesamt für Zivilluftfahrt; BAZL Bundesamt für Zivilluftfahrt
Stage of the implementation	<p>Not implemented. In 2016, the FOCA was instructed by GS-DETEC to redesign the airspace structure and the associated aviation infrastructure in Switzerland by taking a 'clean sheet approach'. According to the FOCA, this assignment is being implemented with high priority as part of the new National Airspace and Aviation Infrastructure Strategy AVISTRAT-CH programme. The FOCA expected initial results by 2020, in the form of a vision for Swiss airspace and aviation infrastructure. In the FOCA's view, the planned programme would in principle be able to address the present safety recommendation. However, it takes the view that a risk to large aircraft can never be completely ruled out. The FOCA will not decide on the possible partial implementation of Safety Recommendation No 519 until the related strategic guidelines are available.</p> <p>In a letter dated 30 June 2022, the FOCA pointed out that it has been developing guidelines on airspace design criteria (ADP CH) since 2017, which are to be published in mid-2022. Among other things, this document sets out how instrument flight procedures are to be protected. This is a risk-based approach that has taken into account the volume of IFR (large aircraft) traffic. It also prescribes buffers for other airspace structures where activities that do not comply with air traffic rules take place. The key elements of these guidelines are already being taken into account in the redesign of the airspace around Zurich Airport (see statement on SE 484 of 30.06.2022) and it is planned to apply them to the entire Swiss airspace structure by the end of 2028. Currently, a concept for Sion Airport and for Bern Airport is being drawn up on the basis of the guidelines. These are due to be implemented in Sion in March 2024. Due to personnel changes, a delay in implementation is expected in Bern; here the guidelines will not be applied until March 2025 at the earliest.</p> <p>It should be noted that changes to airspace structure are only published once a year; this is always done in March by AIRAC, when the new chart material is published. The date is agreed with neighbouring countries so that there are no discrepancies in the various publications. As the implementation schedule for AVISTRAT is being drawn up from mid-2022, a detailed implementation schedule for other airports is not available at present. The ADP CH provides a methodology for airspace design in addition to the prescribed buffers for airspace structures; a new design should be risk-based and first consider airspace structures that are the least restrictive for all airspace users (from a mandatory transponder zone to segregation) and that are kept as simple as possible. Other measures (air traffic management measures such as technological, air traffic service sectorisation) are also planned under ADP CH in</p>

order to further develop the current Swiss airspace structure to create a simpler, more robust and less error-prone system overall. The FOCA plans to issue a follow-up statement on the progress made in implementing Safety Recommendation No 519 in due course.

**Investigation report concerning
the safety recommendation**

Schlussbericht
