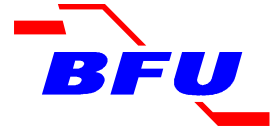


Bundesstelle für
Flugunfalluntersuchung



German Federal Bureau of
Aircraft Accident Investigation

Statistics 2018

Accidents and Incidents during Operation of Civil Aircraft

BFU – V183



German Federal Bureau of
Aircraft Accident Investigation

box@bfu-web.de
www.bfu-web.de

Hermann-Blenk-Str. 16
38108 Braunschweig 38108

Phone +49 531 35 48-0
Fax +49 531 48-246

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Introduction

In accordance with Regulation (EC) No. 996/2010¹ and the Federal German Law relating to the investigation of accidents and incidents associated with the operation of civil aircraft², the German Federal Bureau of Aircraft Accidents Investigation (BFU) conducts investigations of Accidents and Serious Incidents during operation of civil aircraft. According to the law the sole objective of the investigation shall be the prevention of future accidents and incidents. It is not the purpose of this activity to assign blame or liability or to establish claims.

In addition, the BFU publishes annually anonymised statistics of accidents and incidents. These statistics have the purpose to inform the interested public about the incidents which had been reported to the BFU during the reporting period. Covered are all national and international occurrences involving German registered aircraft and Foreign registered aircraft in Germany.

In accordance with ICAO Annex 13³ on multiple occasions the BFU assisted Foreign investigation authorities, e.g. read-out of flight data recorders and cockpit voice recorders. These events are not subject to these statistics.

The statistics represent the Accidents and Serious Incidents which had been reported to the BFU in 2018.

The International Civil Aviation Organization (ICAO) classifies the following incident categories as High Risk Categories:

- Loss of Control in flight (LOC-I)
- Controlled flight into or towards terrain (CFIT)
- Runway safety related events (Abnormal Runway Contact, Bird Strike, Ground Collision, Ground Handling, Runway Excursion, Runway Incursion, Loss of Control on Ground, Collision with Obstacle(s), Undershoot / Overshoot and Aerodrome)

In addition to the high risk category occurrences other key aspects are described.

¹Regulation (EU) No. 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation

² (Flugunfall-Untersuchungs-Gesetz - FIUUG) of 26 August 1998

³ Annex 13 to the Convention on International Civil Aviation, International Standards and Recommended Practices, Aircraft Accident and Incident Investigation

Until the time of compilation the aircraft movement data for 2018 was not available for referencing with the BFU accident figures. Therefore, the BFU is not able to conclude the accident rate.

Note:

This document is a translation. Although every effort was made for the translation to be accurate, in the event of any discrepancies the original German document is the authentic version.

Overview Accidents and Serious Incidents

In 2018 the BFU received 1,779 national and international occurrence reports. The BFU registered a total of 218 Accidents and 37 Serious Incidents involving civil aircraft in Germany and German registered aircraft abroad.

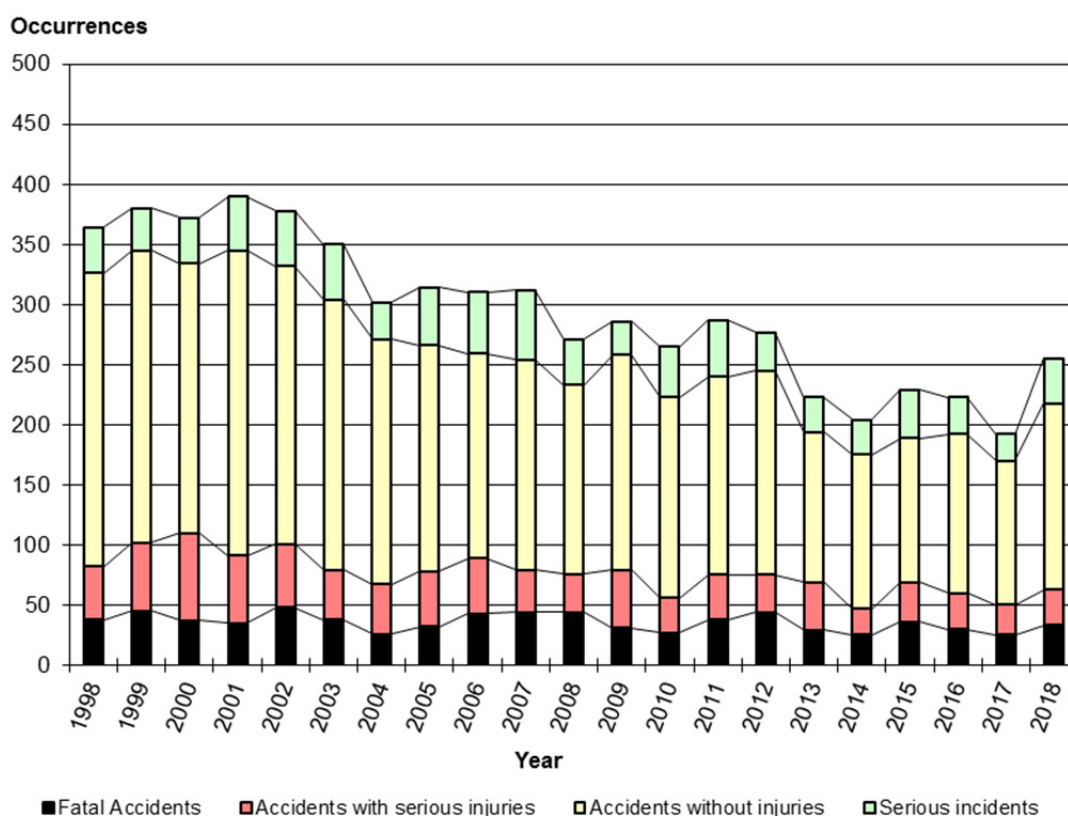


Fig. 1: Accidents according to degree of injury and Serious Incidents 1998-2018


Source: BFU

After five consecutive years with Accident numbers below 200 an increase had to be recorded. Compared with the average of 125 Accidents without serious injuries in the years 2013-2017 the number of 155 for 2018 was above average. Between 2013 and 2017 the average for fatal Accidents was 29 in 2018 there were 33. In 2018, a total of 49 people lost their lives. There were 30 Accidents with serious injuries.

Ubfälle und schwere Störungen in Deutschland und mit in Deutschland zugelassenen Luftfahrzeugen im Ausland

Zeitraum: 01.01.2018 bis 31.12.2018

(In Klammern: 01.01.2017 bis 31.12.2017)

	Schwere Störungen	Unfälle (gesamt)	Unfälle mit Schwerverletzten	Anzahl der Schwerverletzten	Unfälle mit tödlich Verletzten	Anzahl der tödlich Verletzten
	Spalte S1	Spalte S2	Spalte S3 aus S2	S4 aus S3 und S5	S5 aus S2	S6 aus S5
Flugzeuge > 5,7 t	22 (12)	4 (3)	1 (1)	1 (2)	0 (0)	0 (0)
Flugzeuge 2,0 - 5,7 t	4 (3)	6 (7)	2 (0)	3 (0)	1 (1)	2 (3)
Flugzeuge bis 2,0 t	5 (6)	77 (64)	5 (6)	11 (11)	13 (7)	22 (11)
Hubschrauber	2 (1)	6 (4)	0 (0)	0 (0)	1 (1)	4 (2)
Reisemotorsegler	0 (0)	18 (10)	1 (0)	1 (0)	1 (0)	1 (0)
Segelflugzeuge (auch mit Hilfsantrieb)	2 (0)	81 (66)	8 (9)	10 (11)	8 (12)	9 (12)
Sonstige LFZ-Arten	1 (0)	11 (8)	1 (3)	2 (3)	9 (4)	11 (5)
Freiballone	1 (0)	15 (8)	12 (6)	16 (7)	0 (0)	0 (0)
Summe	37 (22)	218 (170)	30 (25)	44 (34)	33 (25)	49 (33)

Tab. 1: Accidents and Serious Incidents in Germany and with German registered aircraft abroad Source: BFU

Analysis According to Aircraft Types and Take-off Mass

Airplanes with a Maximum Take-off Mass of more than 5.7 t

In 2018 the BFU registered a total of 4 Accidents (3 in 2017) and 22 Serious Incidents (12 in 2017) involving airplanes with a Maximum Take-Off Mass (MTOM) of more than 5.7 t.

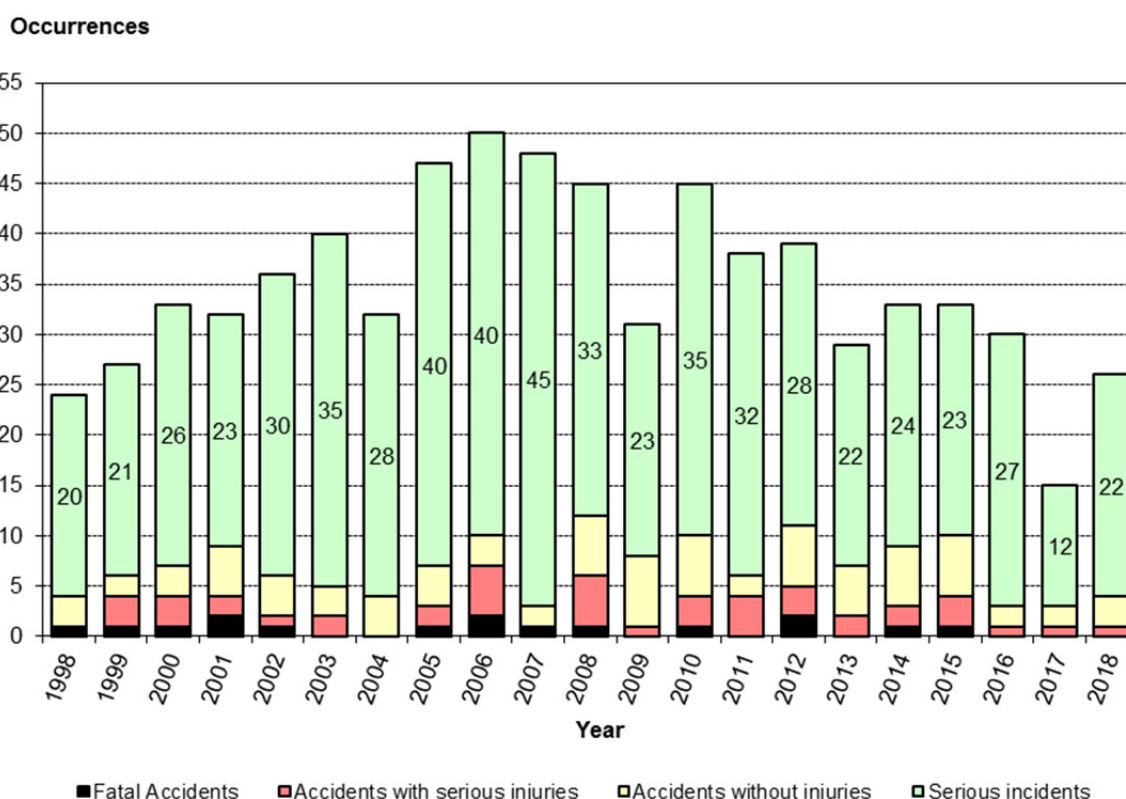


Fig. 2: Accidents and Serious Incidents involving airplanes with a MTOM of more than 5.7 t

Source: BFU

Compared with 2017, the number of Accidents and Serious Incidents increased in 2018. In regard to Accidents 6 is below the average of the years 2013-2017 and 22 Serious Incidents equals the average.

Three of the four accidents were Runway Safety Related Events (ICAO category). At Venice Airport, Italy, a ramp agent suffered severe injuries as during pre-flight preparations an Airbus A320 of a German operator began to move unnoticed. At Berlin Schönefeld Airport, during loading of an Airbus A320 of a Russian operator the conveyor belt was moved. The aircraft was damaged at the right side of the aft cargo

door. At Tel Aviv Airport, Israel, during push back a Boeing 737-700 of a German operator collided with a Boeing 767-300. The Boeing 737-700 was severely damaged.



Fig. 3: Damaged Boeing 747-400 with extended flaps

Source: BFU

The fourth accident of 2018 occurred during approach to Frankfurt/Main Airport. A Boeing 747-400LCF of a Turkish operator lost the upper inner flap of the right wing. The airplane was severely damaged at the fuselage and the tail section.

One of the Serious Incidents of 2018 was also a Runway Safety Related Event. During landing of a Bombardier BD-700-1A10 at Hamburg Airport the wing touched the ground shortly before touch-down. The occupants remained uninjured. The airplane's outboard slat was slightly damaged.

During cruise flight of an Airbus A340 of a South-African operator in Swiss Airspace temporary loss of control occurred (ICAO Category LOC-I). The aircraft later landed at Frankfurt/Main Airport. The Swiss safety investigation authority delegated the investigation of the Serious Incident to the BFU.

During 5 of the 22 Serious Incidents health impairments during flight resulted in incapacitation of one of the pilots.

One Serious Incident occurred during a ferry flight of a Learjet 31 A of a German operator. On Board were two pilots and two other persons. On the flight from London Biggin Hill, Great Britain, to Faro, Portugal, control inputs during descent resulted in a 360° roll. The Portuguese safety investigation authority delegated the investigation of the occurrence to the BFU.

The BFU classified 6 air proximity occurrences involving transport category aircraft and other aircraft as Serious Incidents.

During cruise flight of an Airbus A340-300 of a German operator above the Atlantic Ocean a rechargeable battery pack caught fire in the backpack of a passenger. The pilots temporarily donned their oxygen masks. Until the landing at Frankfurt/Main Airport, the flight was continued safely and without incident. Two passengers received medical or psychological care. During approach of an Airbus A320 to Frankfurt/Main Airport, a battery charger of a passenger developed great heat and smoke. In both cases extinguishing agents were used and the batteries cooled.

During cruise flight on board a Boeing 737-700 and a Boeing 737-800 loss of cabin rate occurred. The respective pilots conducted an emergency descent and subsequent diversion. In the first case no one suffered any injuries. In the second, 31 passengers and 2 crew members suffered minor injuries.

In 2018 the BFU received 175 reports where smoke or smell developed on board. This is again a reduction in reports compared with the numbers of 2017. One of the occurrences was classified as Incident, which the BFU investigated.

Airplanes with a Maximum Take-off Mass between 2 and 5.7 t

A total of 6 Accidents and 4 Serious Incidents were registered involving aircraft with a MTOM between 2 t and 5.7 t.

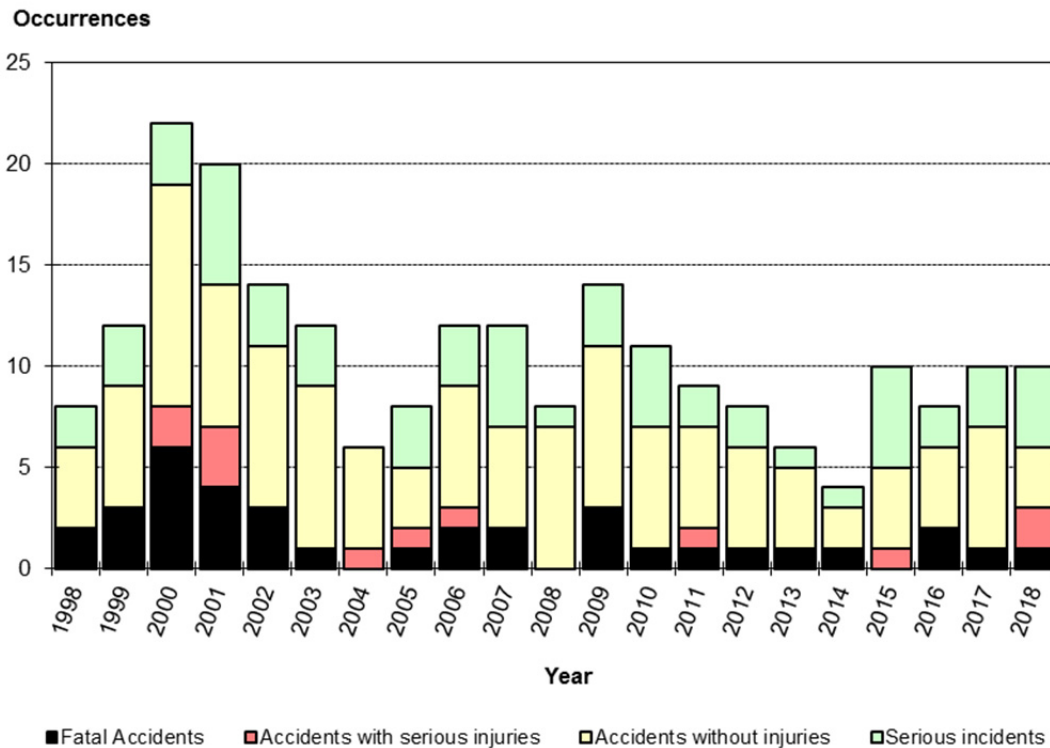


Fig. 4: Accidents and Serious Incidents involving airplanes with a MTOM between 2 and 5.7 t Source: BFU

During simulated single-engine go-around on a MEP(land) rating checkflight at Münster-Osnabrück Airport a twin-engine airplane Beech 58 got out of control and impacted the ground next to the runway in an inverted position. The two pilots suffered fatal injuries. The aircraft was destroyed.



Fig. 5: Accident site Beech 58

Source: BFU

An accident occurred at Le Tourquet Paris-Plage Airport, France, as a Cessna 525 with damaged main landing gear tire veered sideways off the runway during landing. The aircraft was seriously damaged.

During the landing of a Cessna 525 at St. Tropez Airport, France, an accident occurred as the airplane overshot the runway end area. Then the airplane crashed into an embankment. The two pilots suffered severe injuries. The aircraft was substantially damaged.

During a flight of a Cessna 208 dropping skydivers in the vicinity of Illertissen, one skydiver suffered severe injuries because he collided with the elevator. There was minor damage at the aircraft.

During engine start-up of an Antonov An-2 the fabric-covered right wings of the biplane caught fire. Eight skydivers and one pilot were on board. All occupants were able to leave the airplane uninjured.



Fig. 6: Fire damage on the Antonov An-2

Source: BFU

Helicopter

In 2018 the BFU registered a total of 6 Accidents and 2 Serious Incidents involving helicopters.

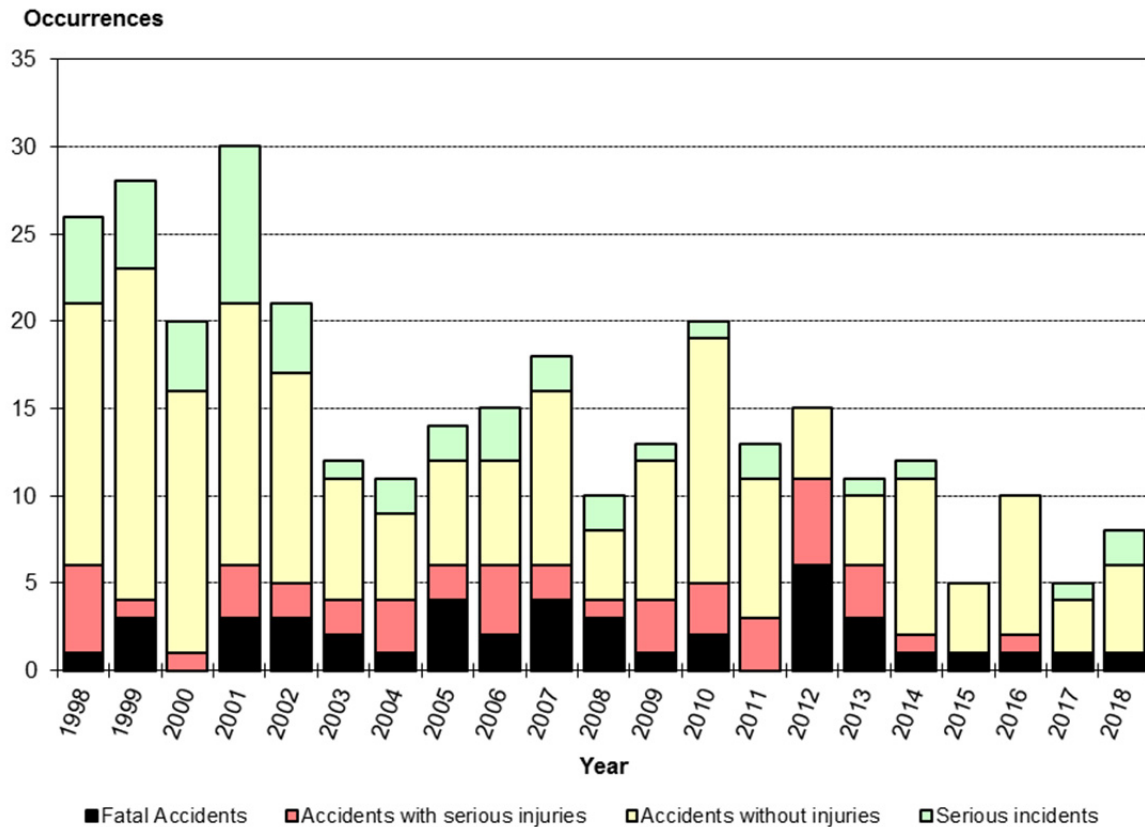


Fig. 7: Accidents and Serious Incidents involving helicopters

Source: BFU

Compared with the previous year (4) the number of Accidents (6) increased, but remains below the average of 8 in the time period 2013-2017.

During the collision of a helicopter EC 135P2+ with a Piper PA28 RT, two persons were fatally injured in each aircraft.

In the past year, 3 Accidents occurred where helicopters were damaged during landing due to engine failure. In the time period 2013-2017 on average one such Accident occurred.



Fig. 8: Accident after an autorotation of a Rotorway Exec 162F

Source: BFU

Airplanes with a Maximum Take-off Mass of up to 2 t

In the past year, the BFU received reports of 77 Accidents and 5 Serious Incidents involving airplanes with a MTOM of up to 2 t. In the time period 2013-2017 the average was 66. Therefore this year's value is above average.

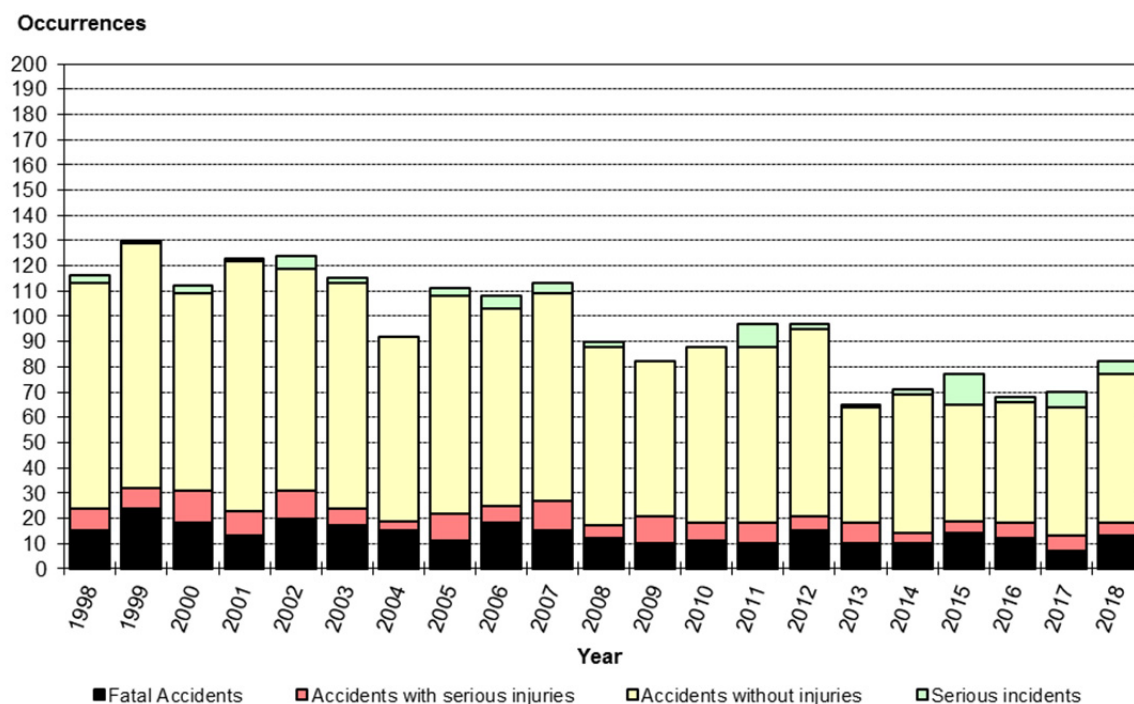


Fig. 9: Accidents and Serious Incidents involving airplanes with a MTOM of up to 2 t

Source: BFU

In 2018 the BFU registered 13 fatal Accidents involving airplanes of up to 2 t MTOM. This number is above the average of the time period 2013-2017 of 11 fatal Accidents.

During 4 of the 13 fatal Accidents a mid-air collision occurred. Five of them were connected with the occurrence category Controlled Flight Into or towards Terrain (CFIT) Another 4 Accidents were due to loss of control (LOC-I).

During a private flight in Brac, Croatia, the pilot of a DR 1050 died during taxiing after landing. This occurrence was classified as Serious Incident.

In the past year, several Accidents involving airplanes of up to 2 t MTOM also occurred during go-around procedures. At the Wasserkuppe one of them was a fatal Accident. Another Accident occurred at Stuttgart Airport as a DA 40 performed a go-around and then collided with the airport fence. On board were the pilot and 3 other persons. All 4 occupants could disembark without help.



Fig. 10: Accident of a DA 40 during go-around

Source: BFU

Touring Motor Gliders

In 2018 the BFU received 18 reports of Accidents involving Touring Motor Gliders (TMG). One of them was fatal.

The pilot of a HK-36R suffered fatal injuries as the TMG crashed to the ground during final approach and caught fire.

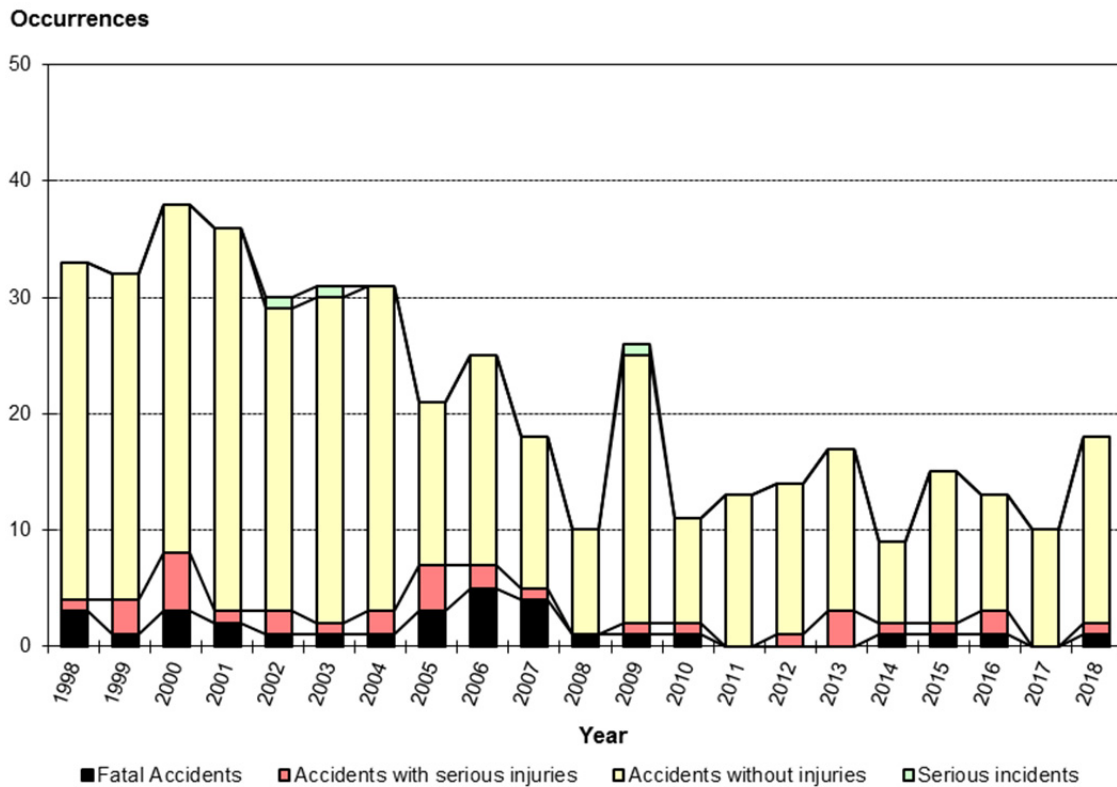


Fig. 11: Accidents and Serious Incidents involving TMG

Source: BFU

As in the previous years, in 2018 most of the Accidents (13) involving TMG occurred during the landing phase. The results were hard landings and fractured landing gears, among other things.

Glider and Powered Glider

A total of 81 Accidents occurred involving gliders and powered gliders. Two air proximity occurrences involving gliders were classified as Serious Incidents.

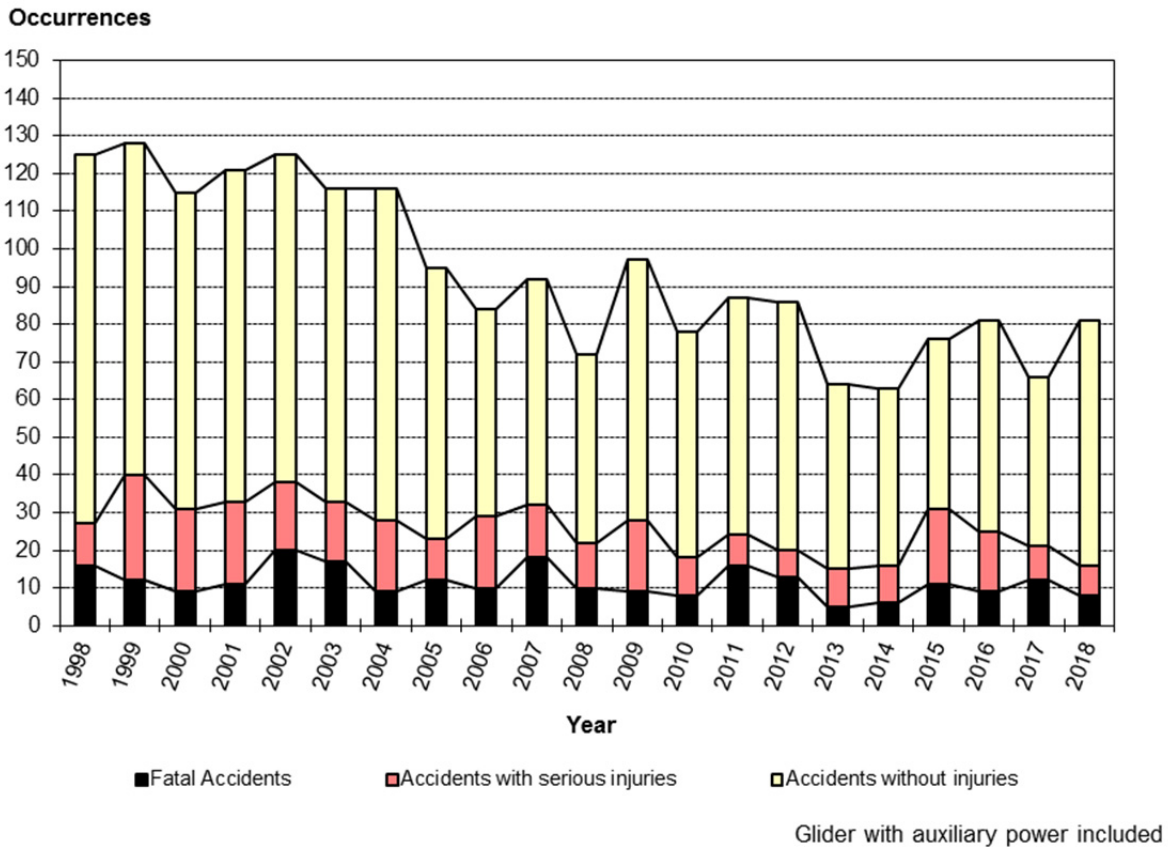


Fig. 12: Accidents involving gliders and powered gliders

Source: BFU

Compared with the average of the last 5 years (70 Accidents) the numbers increased.

In 2018, as in the past, most glider Accidents occurred during the landing phase. The 52 landing Accidents represent with 64% the largest part of the total number of accidents. Of these, 23 occurred during off-field landings and 29 during landing at airfields. A total of 17 Accidents occurred during the take-off phase, 16 of them during winch launching.

Fatal Accidents

Nine people lost their lives during 8 of the 81 Accidents involving gliders. The number of fatal Accidents was close to the average of 9 fatal accidents in the years 2013-2017. During 7 of the 8 fatal Accidents, the glider entered an uncontrolled flight attitude.

Training Accidents

In 2018 a total of 15 Accidents occurred during training. Nine of them occurred during solo flights and 6 during dual control flights.

Two of the solo flight Accidents resulted in fatal injuries of the student pilots. In one case the roll control of a KA 6 had failed in flight. The student pilot left the glider with the emergency parachute but suffered fatal injuries by impact forces. The second fatal accident occurred as an ASK13 entered an uncontrolled flight attitude during the landing. The 7 other Accidents were solo flights which ended as hard landings.

The glider ASK-13 impacted the ground after winch launching was disrupted. The flight instructor suffered fatal and the student pilot serious injuries during this dual control flight Accident. In 3 cases a hard landing occurred after rope break training. In one case the aircraft touched down hard on the runway, in the other during off-field landing.



Fig. 13: Accident site ASK-13

Source: BFU

Balloons

In the past year, the BFU investigated 15 Accidents and 1 Serious Incident involving balloons. This is a significant increase compared with the average (6) of the years 2013-2017. A total of 16 people suffered serious injuries during 12 Accidents.

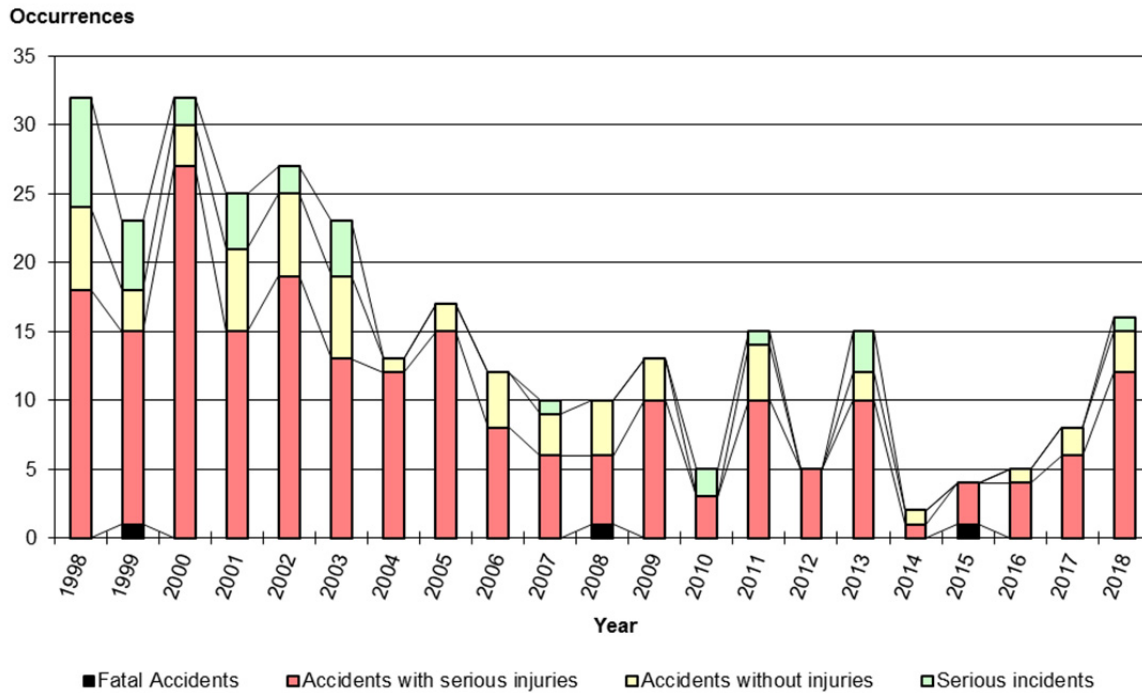


Fig. 14: Accidents and Serious Incidents involving balloons

Source: BFU

Ten of the Accidents with serious injuries occurred during the landing. In 2 cases the balloon collided either with a power line or a tree during the approach to land. The occupants remained uninjured. In each case the balloon was substantially damaged.

The Serious Incident occurred a few minutes after take-off as a hot air balloon collided with the span pole of a power line. The basket got jammed at the lightning protection; the envelope draped itself across the power lines. The 6 occupants remained uninjured.



Fig. 15: Serious Incident involving a hot air balloon

Source: BFU

Other Aircraft

Ultralight Aircraft

In 2018 the BFU investigated 11 Accidents and 1 Serious Incident involving ultralight aircraft⁴. Of the 11 Accidents, 9 were fatal and 11 people lost their lives.

During 6 of the Accidents the ultralight aircraft had entered an uncontrolled flight attitude. All of them were fatal.



Fig. 16: Accident site after uncontrolled flight attitude Murphy Aircraft / Renegade 472 912 ULS Source: BFU

Both pilots suffered fatal injuries during mid-air collision involving a Dallach D-4b and a Cirrus SR-20. One pilot was killed and the other suffered severe injuries during another collision involving an ultralight Remos G-3 and an ATEC Zephyr 2000. Three

⁴ Ultralight aircraft are air sports equipment. There is no reporting obligation to the BFU of Accidents and Incidents involving air sports equipment. These occurrences shall be reported to the authorised air sports association.

air proximities involving an ultralight and another aircraft were classified as Serious Incident and investigated by the BFU.

Unmanned Aircraft Systems



Fig. 17: BFU unmanned aircraft system in action

Source: BFU

The BFU received a total of 22 occurrence reports involving Unmanned Aircraft Systems (UAS). Four of these occurred abroad, 18 in Germany.

The remaining 20 occurrences were reports of air proximities involving UAS and aircraft.

Three cases reported crashes of UAS without any injuries to persons. The remaining 19 reported occurrences were airproxes involving manned aircraft and UAS.

BFU Safety Promotion Activities

In 2018 the BFU has conducted lectures and actively helped shape many Safety Promotion events.

In General Aviation there were more than 20 flight instructor recurrent training events in which more than 1,100 flight instructors participated. Over the past years, the BFU has send speakers to these events in order to report insights from investigations and, in addition, was hoping that the participants may serve as multipliers.



Fig. 18: BFU speeches in General and Commercial Aviation

Source: BFU

The BFU also participated in the AERO Friedrichshafen and answered to visitors to the fair.

In the area of commercial aviation the BFU was co-organiser for the annual two-day German Flight Safety Forum. More than 100 persons from operators, air navigation service providers, military aviation, and police participated and discussed current flight safety issues.

The BFU also participated in the annual European Business Aviation Safety Conference.

Definitions

Accident

Means 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 such persons have disembarked [...], in which:

1. a person is fatally or seriously injured
 - on board an aircraft, or,
 - as a direct contact with any part of the aircraft including parts which have become detached from the aircraft, or,
 - as a result of direct exposure to jet or propeller blast,

except when these injuries are from causes other than the accident, 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 members; or

2. the aircraft or the airframe sustains damage which:
 - 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 to the aircraft is limited to the engine concerned, its cowlings or accessories; or for damage limited to propellers, wing tips, radio antennas, tyres, brakes, fairings or to small dents or puncture holes in the aircraft skin; or

3. the aircraft is missing or is completely inaccessible.

Serious Incident

means an occurrence associated with the operation of an aircraft involving circumstances indicating that an accident nearly occurred.

Fatal Injury:

means an injury which is sustained by a person in an accident and which results in his/her death directly in the accident or within 30 days of the date of the accident.

Serious Injury:

means an injury which is sustained by a person in an accident and which:

1. requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received; or
2. results in a fracture of any bone (except simple fractures of fingers, toes or nose);
3. involves lacerations which cause severe haemorrhage or nerve, muscle or tendon damage; or
4. involves injury to any internal organ; or
5. involves second or third degree burns, or any burns affecting more than 5 per cent of the body surface; or
6. involves verified exposure to infectious substances or harmful radiation.