BEA
Bureau d'Enquêtes et d'Analyses
pour la sécurité de l'aviation civile
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SAFETY INVESTIGATION REPORT

Accident to the Cameron - Z105 registered F-GMGE on Monday 24 July 2023 at Villecey-sur-Mad

Time	Around 20:55[1]
Operator	Pilâtre de Rozier Organisation
Type of flight	Air show
Persons on board	Pilot and four passengers
Consequences and damage	Pilot injured, one passenger slightly injured
This is a courtesy translation by the BEA of the Final Report on the Safety Investigation. As accurate as the translation may be, the original text in French is the work of reference.	

Hard landing, passenger ejected, during an air show

1 HISTORY OF THE FLIGHT

Note: the following information is principally based on statements.

The pilot was taking part in the balloon festival, Grand Est Mondial Air Ballons 2023 (GEMAB), organised every two years on Chambley aerodrome (Meurthe-et-Moselle). The balloon festival took place from Friday evening 21 July to Sunday evening 30 July.

On Monday 24 July, from 18:30, the pilot attended the flight briefing given by the balloon festival organisers for the ascent session that evening. The ascent was scheduled for around 20:00 and the landing limit was set at 21:15. The Flight Director held back the ascent due to showers and a strong wind (8 kt[2] according to the pilot). When the meteorological conditions had improved and the wind had dropped to 5 kt, the Flight Director finally authorized the ascent (green flag) at around 20:10. After preparing the balloon with his four passengers and carrying out a safety briefing, the pilot took off at 20:35 in a south-easterly direction. They flew at a height of around 300 m.

During the flight, the pilot detected that the wind was getting stronger, due notably to the topography of Rupt de Mad valley. At this point, the balloon was flying over areas not particularly suitable for landing (forests, river, railway line, power line, road). Finally, after flying for a further twenty minutes or so, the pilot identified an area for landing between two forests, at seven kilometres from the departure point. He estimated the wind speed at this time as being between 10 and 15 kt. He planned a rapid-descent landing and asked his passengers to adopt the safety position that they had reviewed a few minutes previously in cruise.

[1] Except where otherwise indicated, the times in this report are in local time.
[2] The glossary of acronyms and abbreviations frequently used by the BEA can be found on its website.

The pilot pulled on the rapid deflation line at a height of around 15 m. During the landing, the basket bounced several times, tipped over due to the wind and came to a stop on its side. During this sequence, one of the passengers jumped out of the basket, another hit his face against the basket side and was then ejected from the basket.

2 ADDITIONAL INFORMATION

2.1 F-GMGE information

F-GMGE is commercially operated by Pilâtre de Rozier organisation. The Région Grand-Est owns the balloon. The four passengers, who worked for the Région Grand-Est, were taken free of charge in the scope of a sightseeing flight (see paragraph 2.4).

The balloon flight manual specifies that a flight shall not be undertaken:

- if the surface wind at the site, at the time of take-off, is more than 15 kt;
- If the forecast for the site, at the time of the planned landing, indicates a significant probability of the wind exceeding the above limitation;
- If there is widespread thermal activity, a cumulonimbus activity close to the flight path or any turbulence causing gusts of more than 10 kt above the mean wind speed.

The balloon envelope has a volume of 3,000 m^3. The rectangular basket measuring 1.65 m x 1.22 m without compartments, can carry five people.

In the basket, the passengers were positioned with their backs to the direction of travel during the landing.

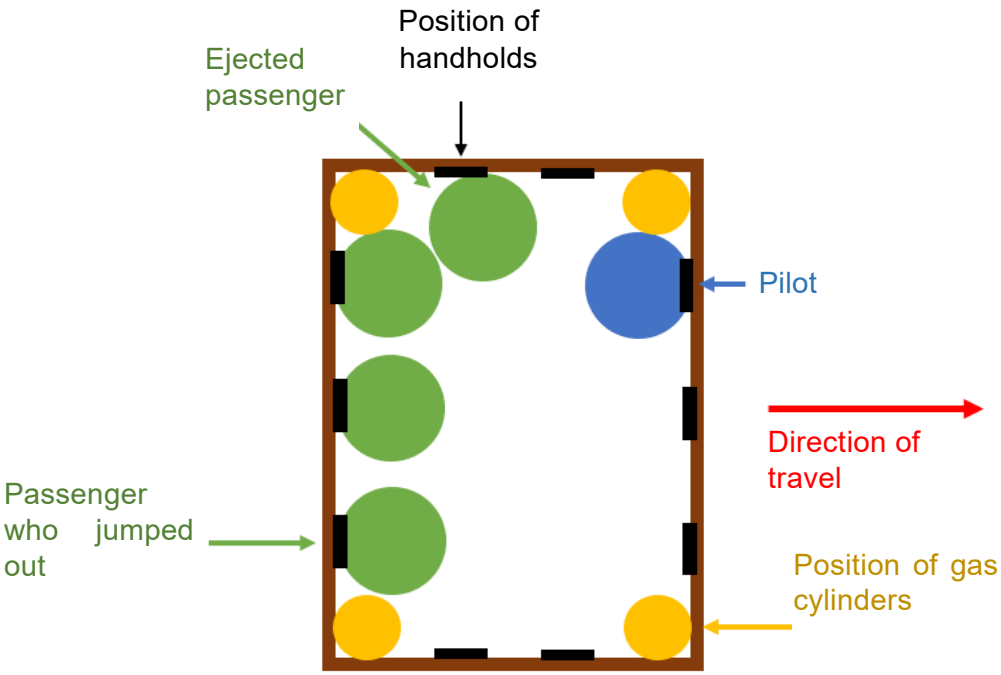

Figure 1: position of people in basket (source: BEA)

In the Safety instructions regarding the preparation and operation of hot-air balloons written by the DSAC in collaboration with Fédération Française d'Aérostation (FFAé)[3], it is recommended, in baskets without compartments, that passengers have their backs turned to the direction of travel if there is sufficient space as in a basket with compartments, and if not to stand sideways, facing the flight path.

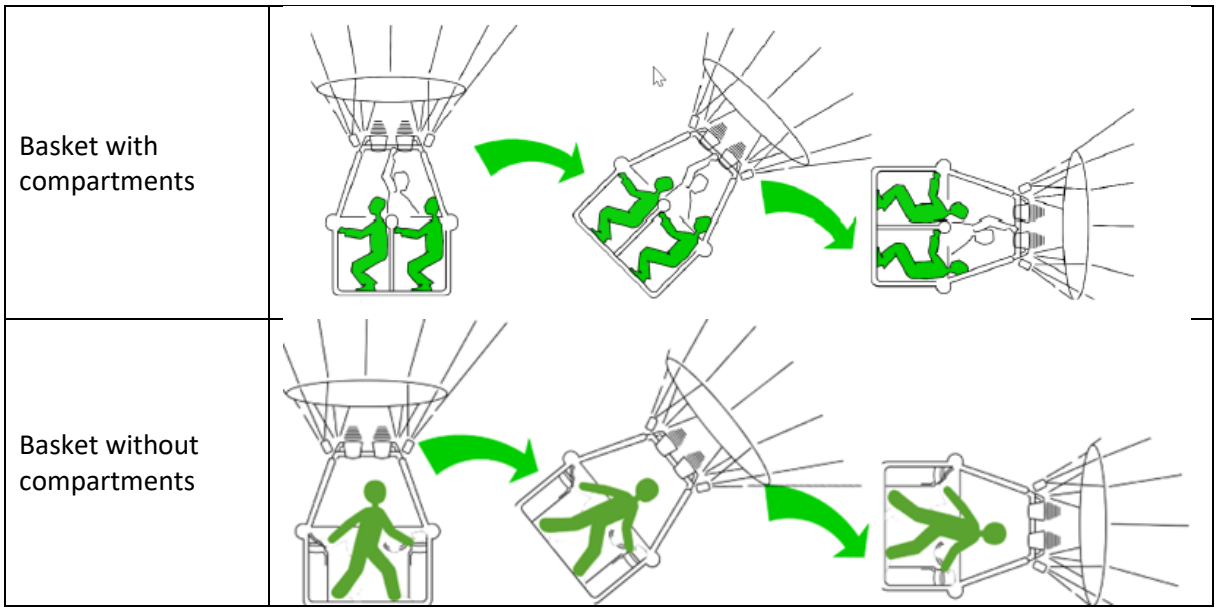

Figure 2: illustrations based on the safety instructions (source: DGAC)

2.2 Pilot's experience and statement

The 57-year-old pilot obtained his hot-air balloon pilot licence (BPL) in 1994. He had logged approximately 360 flight hours for around 340 ascents. In the 12 months prior to the GEMAB balloon festival, the pilot had totalled a flight time of 10 hours 40 minutes (15 ascents with 2,200 m^3 and 2,600 m^3 balloons). He had carried out two flights of approximately 30 minutes in the days preceding the accident in the scope of the GEMAB.

The pilot indicated that during the briefing, the weather forecaster indicated that the strength of the wind was going to drop in the evening. He added that in general, he did not completely rely on the weather forecaster's analysis, as the forecasts were not always accurate. Before taking off, he made a personal analysis based on observations, watching other balloons taking off (speed and direction) and discussions with other pilots, some of whom had released a test balloon. He decided to maintain the flight as the wind speed was compatible with his proficiency, especially as the wind was forecast to ease in the evening, a frequent phenomenon for evening flights. Furthermore, the wind direction initially forecast was to take the balloon towards large fields suitable for balloon landings.

The pilot indicated that during the passenger safety briefing, before the flight, he had specified that the basket could tip over on landing according to the wind and he repeated this information during the flight before landing. He added that he asked the passengers to firmly hold the handholds for the landing and to keep their knees flexible.

[3] In the *Safety Lessons General Aviation* section of its website, the BEA identified in 2022 the "Safety position during landing" risk.

He specified that he had also asked them not to exit the basket before being authorized to do so and not to put their hands or head outside the basket. He showed them the position to be adopted but did not ask them to practice taking this position[4].

When the pilot observed that the wind was strengthening, he decided to land quickly. Further on, he would have encountered difficulties again in finding a suitable site. He therefore carried out a descent with a high vertical speed. He explained that the first contact with the ground was rough. He did not know if his injury (fracture of the tibial bearing, upper part of the tibia) was due to a lack of flexibility in his knees or if it was the result of a passenger falling onto his leg.

The pilot indicated that he was surprised to see a passenger exit the basket on making contact with the ground and that this had contributed to the bounce. He had not envisaged this type of behaviour but he had detected that this passenger was relatively stressed by the flight.

The pilot added that the passenger who hit his face was ejected and passed under the basket which flew over him.

2.3 Passenger statements

The passenger who exited the basket on first contact with the ground explained that he was stressed as he suffered from vertigo and was afraid of heights. The introductory flight had been offered to him when he was at the balloon festival. He indicated that the descent for landing was very fast. He explained that he jumped out of the basket to slow down the fall when it bounced and then tipped onto its side. He added that the pilot had not mentioned that the basket could tip over. Lastly, he indicated that the wind was strong that evening.

The passenger who was ejected specified that the pilot pulled hard on the line and that the balloon descended vertically with a sharp jerk. On coming into contact with the ground, his nose hit the basket side and he was ejected. He indicated that he was not struck by the basket when it flew over him. The passenger specified that he did not know if the pilot had mentioned the possibility of the basket tipping over on landing.

2.4 Balloon festival information

The Grand Est Mondial Air Ballons (GEMAB) is a balloon festival. This is a simple public air show, within the meaning of the Order of 15 May 2023 modifying the Order of 10 November 2021 on air shows.

This balloon festival was authorized by the Meurthe-et-Moselle prefecture. It was organised by the association, Les Portes du Ciel. Project management was delegated to Pilâtre de Rozier organisation, as was the sightseeing flight activity of the festival. A number of accredited pilots, including the pilot of F-GMGE, took part in the sightseeing flight activity during the festival.

Nineteen displays were scheduled over the ten days of the air show. Two mass balloon ascents were scheduled each day, departing from Chambley aerodrome, subject to weather conditions, in the morning from 06:30 and in the evening from 19:00.

[4] Paragraph (e) of AMC1 BOP.BAS.115 *Passenger briefing* of regulation (EU) 2018/395 of 13 March 2018 laying down detailed rules for the operation of balloons indicates that, "*Before commencing the landing phase, passengers should be required to practise the correct landing position*."

The Order of 15 May 2023 (section SAP.OPS.205-Experience) requires participating pilots to provide proof of 50 ascents as a hot-air balloon pilot on their registration form for the festival. In addition, in order to be authorized to carry out sightseeing flights, participants must provide proof of ten flight hours as pilot-in-command, including at least three hours on a balloon of the same class and identical group or higher than the class and group of the balloon[5] used to take part in the public air show, within the last twelve months.

In accordance with the Order of 15 May 2023, in order to hold an air show, a flight director and a deputy flight director have to be appointed.

A weather forecaster also has to take part in the air show. Before each display, a briefing (given in French and English) for the pilots was organised by the flight director at around 06:00 in the morning and around 18:30 in the evening. The weather forecaster gave the weather information during this briefing. A "weather information" sheet was made available to the pilots.

The show organisers did not record the number of ascents for each display. However, they provided the BEA with the following data:

- the number of tickets left by the pilots at the end of the briefing to indicate their presence (in blue on the graph below);
- the number of sheets at the propane station, close to the number of flights carried out, corresponding to the number of pilots who refuelled after the flight (in purple).

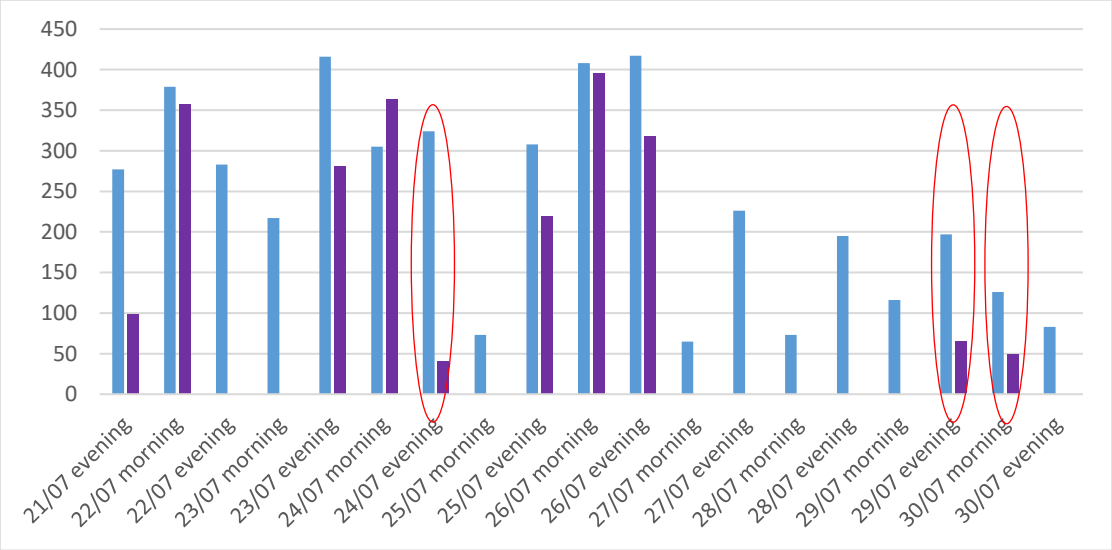

Figure 3: number of participants at the briefing and number of pilots who refuelled for the 19 displays

Nine of the nineteen planned displays were cancelled due to the weather conditions (no pilot refuelled, see **Figure 3**).

Other accidents and incidents involving balloons other than F-GMGE occurred during the balloon festival (see paragraph 2.5), during the displays in the evening of Saturday 29 July and the morning of Sunday 30 July (see **Figure 3**).

[5] The hot air balloon classes and groups are defined in section BFCL.010 of abovementioned regulation (EU) 2018/395.

Figure 3 shows that for the displays during which accidents and incidents occurred, a small proportion of the pilots present actually took part in the flights.

2.5 Other occurrences during the balloon festival

2.5.1 Accident to PH-NBR

The BEA opened a safety investigation into the accident to the hot air balloon registered PH-NBR in the evening of 29 July 2023.

In this accident, a passenger was injured. The investigation report mentioned that during the landing, at around 21:20, the basket bounced several times, tipped over and was dragged some way before coming to a stop. The pilot thought that the wind had accelerated from 7 to 12 kt at the time of the accident. The pilot reported that the weather conditions had been correct but not ideal for the whole of the week and that there had been difficult landings. He added that on the day of the accident, the clearance to start the ascent had been given as there was a moment of stability in the weather conditions. The pilot had totalled 110 flight hours.

2.5.2 Accident to G-BXCO

The BEA opened a safety investigation into the accident to the hot air balloon registered G-BXCO in the morning of 30 July 2023.

In this accident, the pilot was injured. The investigation report mentioned that during the landing, at around 07:30, the basket tipped over and was dragged some way before coming to a stop. The pilot indicated that the strength of the wind had increased more than forecast. He estimated a speed of at least 25 kt on landing. The pilot added that the briefing took place at 06:00 and that it would have been useful if the organisers had provided updated wind information. The pilot had totalled 253 flight hours. He carried out seven flights during this balloon festival between 21 and 30 July.

2.5.3 Incident to PH-PRL

The BEA was informed of the incident concerning the hot air balloon registered PH-PRL in the morning of 30 July (same ascent as G-BXCO, see paragraph 2.5.2). The BEA did not open an investigation into this incident, however, some information was collected.

The pilot indicated that in the briefing, the reported wind was 8 kt with gusts up to 12 kt. It was indicated that the weather was dry and stable. The pilot added that the briefing was very short and that no instructions were given with respect to possible rain or areas with more wind. Shortly after the take-off in a calm wind, the pilot indicated that the wind changed and became stronger. He therefore decided to land quickly, the wind being around 15 kt at this point. The basket was dragged over around 30 m very slightly injuring a passenger. The pilot added that the wind became even stronger and the sky darkened. The pilot had logged around 1,500 flight hours.

2.5.4 Incident to F-HJBG

The BEA was informed of the incident concerning the hot air balloon registered F-HJBG in the morning of 30 July (same ascent as G-BXCO, see paragraph 2.5.2). The BEA did not open an investigation into this incident, however, some information was collected.

The pilot explained that he was ready to take off and that there were strong gusts. When he decided to reject the ascent and deflate the envelope, a gust pushed the balloon, taking with it the vehicle to which it was attached until the mooring line gave way. The balloon was carried over a few dozen metres. The persons on board, in the safety position, were not injured. The pilot explained that he had not heard the message from the Flight Director who had stopped the ascents (red flag) due to the adverse weather conditions, he was in the middle of the take-off phase. He indicated that he never hurried to take off and that generally, he was one of the last to take off. He added that the gusts were of around 15 kt and that the sky was dark in the distance. The pilot had totalled 2,500 flight hours.

2.6 Meteorological information

2.6.1 Evening of Monday 24 July (accident to F-GMGE)

Météo-France specified that the general situation was one of a vast low-pressure area centred over Scandinavia, directing an unstable westerly flow over most of France. In the region of the accident, the sky was very cloudy to overcast (from 4,500 ft) with at times, isolated cumulus, stratocumulus, altocumulus and towering cumulus, and locally cumulonimbus and showers.

On the site, between 20:00 and 22:00, the wind was between 6 and 10 kt (maximum spot wind of 14 kt) from the west-north-west. It progressively decreased until becoming practically nil between 21:00 and 22:00. There was moderate turbulence locally linked to the convective clouds.

The METAR for Metz-Nancy-Lorraine airport around 30 km from Chambley aerodrome to the east, available before the 18:30 briefing mentioned a westerly wind of around 15 kt and temporarily gusts up to 25 kt associated with cumulonimbus and thunderstorms with moderate rain. The TAF published at 13:00, forecast at the usual time for the flights, temporarily moderate showers and gusts associated with a small probability of cumulonimbus and storms with moderate rain.

The METARs indicated a westerly wind of around 10 kt for the flight period with showers and few cumulonimbus. The TAF published at 19:00 forecast wind from 230° of 10 kt and moderate rain showers associated with scattered cumulonimbus with a small probability of gusts from 270° up to 25 kt.

The WINTEM chart (FL 020), valid at 20:00, forecast a west-south-west wind of between 10 and 15 kt.

The 17:00 “weather information” sheet provided by the balloon festival weather forecaster, included the following information (see

Appendix **1**):

- presence of cumulus;
- modelisation of wind (time not specified) between a height of 0 and 1,000 ft: westerly wind between 12 and 14 kt;
- test balloon at 16:30:
    - between 0 and 500 ft (height): south-westerly wind between 13 and 20 kt;
    - between 500 ft and 1,000 ft (height): west-south-westerly wind between 22 and 29 kt.

The sheet also specified the :

- "*Synoptic situation:*
  The low pressure over Scandinavia and the associated fronts determine the weather over France with unstable air masses."
- *"Weather:*
  Cloudy with sunny breaks becoming very cloudy then few clouds in the evening."

It was not possible to know the exact content of the information given by the weather forecaster during the 18:30 briefing (see paragraph 0).

2.6.2 Evening of Saturday 29 July (accident to PH-NBR)

Météo-France specified that the general situation was one of a vast low-pressure area centred over the north of the British Isles, directing an unstable westerly flow over most of France. In the region of the accident, the sky was very cloudy to overcast (from 2,600 ft), with cumulus, cumulonimbus, stratocumulus and altocumulus. A zone of heavy rain and thunderstorms crossed the region from west to east in the early evening.

On the site, between 20:00 and 22:00, the wind was between 4 and 10 kt (maximum spot wind of 15 kt) from the west-south-west. There was local moderate to strong turbulence linked to convective clouds.

2.6.3 Morning of Sunday 30 July (accident to G-BXCO and incidents to PH-PRL and F-HJBG)

Météo-France specified that the general situation was one of a vast low-pressure area over the north of Europe, directing an unstable westerly flow over most of France. In the region of the accident, the sky was very cloudy to overcast (from 1,000 ft), with cumulus, stratocumulus, altocumulus and towering cumulus temporarily. There were also a few scattered unstable showers.

On the accident site, between 06:00 and 08:00, the wind was between 4 and 11 kt strengthening to 24 kt (maximum spot wind) initially from the south-south-west and then the west.

2.6.4 Weather situation during balloon festival

Météo-France specified that for the ten days of the balloon festival, Lorraine was under the influence of a moderate, disturbed westerly flow: westerly winds often exceeding 10 kt, variable, often thick cloud cover, with occasional precipitation and unstable clouds (towering cumulus and cumulonimbus). The conditions were globally unstable (wind, precipitation, unstable clouds with turbulence, even storms). Periods of calm were rare.

Météo-France added that the synoptic wind is generally predictable (in this case the westerly wind speed), but that the development and movement of clouds, particularly convective clouds, and their consequences (precipitation, thunderstorms, turbulence) are more difficult to anticipate.

None of the weather forecaster's sheets analysed mentioned the presence of local unstable phenomenon, in particular the cumulonimbus.

2.7 Other statements

2.7.1 Flight Director

The Flight Director had totalled 3,200 balloon flight hours. It was the second time that he had had the role of Flight Director for this balloon festival.

He stated that he gave the clearance for the ascent, but that the pilots were not under any obligation, and that it was for them to decide whether to undertake the flight. He repeated this point several times in his briefings. To take the decision to authorize the ascent, he consulted the weather forecaster. On the whole, his decisions were based on common sense. He explained that in general, he first gave a clearance to enter the runway and that the authorization to take off was given later by radio. At this time, he was generally in the control tower at Chambley aerodrome where he had an overall view of the balloons and the point wind data. He raised the green flag from the tower to authorize the ascents, or the red flag to abort the display.

He considered that the role of Flight Director was a thankless one. He mainly had to deal with discontented pilots. He added that there was also the pressure due to the responsibility. He believed that you had to have a strong personality for this role. He accepted this role for a second time to help out the president of the Les Portes du Ciel association who was a close friend. If a new Flight Director had been designated, he would have had to follow training regarding the above mentioned order concerning air shows. He specified that the organisers did not put pressure on him to authorize the ascents.

He stated that he mentioned the accident to F-GMGE in the briefing which followed but that he did not dwell on it so as not to dampen the spirits of the other pilots as the weather conditions were difficult during the balloon festival.

The accident to PH-NBR was not mentioned in the briefing which followed which took place in the morning of Sunday 30 July. However, during this briefing, the Flight Director informed the pilots that the small, scattered showers forecast by the weather forecaster the day before had transformed into a heavy squall during the evening. The Flight Director specified that the job of weather forecaster was a difficult one. In this respect, the Flight Director had specified during a previous briefing that the weather conditions had to be monitored as a storm cell can develop very quickly.

2.7.2 Director of Pilâtre de Rozier Organisation

The director specified that each pilot was responsible for his decision to undertake a flight. The organisation team provided the pilots with all the relevant information to take this decision with full knowledge and without pressure. She added that there was a certain euphoria that inevitably accompanied such an event, which brings together up to 700 pilots. She specified that it was essential for pilots to attend the briefing however she did not know if all the pilots paid attention to the information given or if they understood the data provided.

She added that making pilots responsible was not sufficient. The organisers and instructors, as well as the authorities responsible for maintaining and supporting this type of event, must work to improve the recognition and assessment of risks and the adoption of a flight safety culture.

2.7.3 Weather forecaster

The weather forecaster worked for around 30 years at Luxembourg airport. He had been the weather forecaster for the GEMAB since 2015.

For his forecasts, he principally used the data available on internet, namely the Arome fine mesh model, the Aleman model, the GFS medium mesh model and the surface maps from the UKMO Europe model. He consulted the websites Météociel, Météoblue and DWD PCMET (German weather forecast site equivalent to the Météo-France Aéroweb), in particular for the forecasts and satellite photos.

The weather forecaster specified that the convective clouds developed in the morning and that their activity decreased in the evening and that they were therefore present during the day outside the flight hours. He added that he gave this information during the briefings and that he was available to answer any questions the pilots might have. He explained that it could be difficult to understand all of the presentation due to the quality of the sound system and the large number of participants. He also added that the level of expertise among the pilots varied.

He explained that based on the wind information (forecast model), it was possible to identify the evolution in the morning and that the test balloon was mainly used to check the model data and provide supplementary information for the pilots.

Lastly, he indicated that a pilot must check for himself that the weather conditions are compatible with his capabilities.

2.7.4 Pilot of F-HJBG (see paragraph 2.5.4)

The pilot indicated that he knew the Flight Director and that in his opinion, he was not under pressure from the balloon festival organisers. There was no interference between the organisation team and the flight management.

The pilot considered that the Flight Director made late decisions for a given ascent slot, in particular for pilots who take a lot of time to set up their balloon. He thought that the weather conditions given during the briefing were obsolete. He carried out his own weather briefing using the Luxembourg data. He added that sometimes the ascent authorizations were given for a relatively short slot and that this was the case on the morning of Sunday 30 July. He considered that the transmission of weather information in real time was lacking. He added that for the GEMAB 2023 balloon festival, the weather conditions had been particularly difficult.

He explained that the position of Flight Director was a difficult one. He indicated that he had never see a Flight Director being commended for having taken the decision to cancel a display.

He specified that the balloon festival brought together a large number of pilots with very different profiles, ages and experience and that each person must make his own decision to carry out the flight according to his proficiency.

2.8 Similar accidents

2.8.1 GEMAB 2021

In April 2022, the BEA published the investigation report into the accident to the Cameron Z-90 registered F-HSAV on 29 July 2021 at Saint-Privat-la-Montagne .

This investigation report underlined in a safety lesson, the significant recurrence of trauma during balloon landings and the vulnerability of passengers unfamiliar with this activity. It also reiterated the difficulties for passengers to position themselves inside a basket without compartments.

2.8.2 GEMAB 2017

In June 2019, the BEA published the investigation report into the accident to the Cameron C80 registered G-CGPV on 22 July 2017 at Magny.

The investigation report concluded that the pressure associated with the organisation of such a gathering and the presence of the public may have led to the Flight Director underestimating the evolution of the weather conditions and giving the ascent clearance despite weather forecasts indicating showers and thunderstorms. The report also mentioned that even though the pilot-in-command is responsible for deciding on whether or not to take off, the pressure connected to the organisation and the excitement of mass ascents, as well as excessive confidence in the authorization given by the Flight Director, contributed to the pilot's decision to take off.

3 CONCLUSIONS

The conclusions are solely based on the information which came to the knowledge of the BEA during the investigation.

Scenario

The pilot of F-GMGE took off following the ascent clearance given by the Flight Director of the GEMAB 2023 balloon festival, as the weather conditions had improved. The wind had notably decreased. The balloon, carried by a north-westerly wind, headed towards Rupt de Mad valley. The pilot had probably not anticipated this flight path which took him over an unfavourable area for landing. The information provided during the briefing mentioned a south-westerly wind. The wind subsequently increased slightly and was amplified by the topographical configuration of the area. The wind strengthened up to 15 kt, meaning a proven risk of the basket tipping over on landing. The pilot decided to land as soon as there was a suitable site. He asked his passengers to adopt the safety position for landing but the possibility of the basket tipping over on landing did not seem to be understood by all of the passengers.

After descending with a high vertical speed in order to land, the basket bounced. One passenger, who had been anxious during this flight, jumped out of the basket, destabilizing the balance of the balloon and the pilot’s manoeuvre. Another passenger hit his nose on the side of the basket. He probably let go of the handholds to touch his face and was then ejected from the basket. The pilot was also injured.

Contributing factors

The following factors may have contributed to the hard landing and the ejection of a passenger:

- a hurried landing due to the strengthening of the wind having carried the balloon to an area unfavourable for landing;
- the difficulty, for all the passengers, to adopt the recommended landing position when a basket without compartments is used. In these conditions, it is all the more important for the pilot to ensure before and during the flight, that the passengers have correctly understood and correctly comply with the landing safety instructions.

The investigation also revealed that insufficient account was probably taken of the meteorological conditions, which led the balloon to an unfavourable area for landing, with a local wind that was not conducive to a safe landing.

In addition to the accident to F-GMGE, two other accidents, for which the BEA opened safety investigations, and two incidents, brought to the BEA's attention, occurred during the air show. The information gathered about these events shows that they occurred in adverse wind conditions, linked to unstable towering cumulus or even cumulonimbus type clouds. The documents prepared by the weather forecaster and made available to the pilots contained information that was not very precise and could not be readily used to decide whether to maintain the planned flights. It was not possible to determine what the pilots understood and retained from the information shared by the forecaster during the briefings, or even what information was available to the Flight Director to decide whether or not to maintain the displays.

Safety lessons

Decision to undertake a flight in the context of an air show

The Flight Director is formally in charge of monitoring the execution of the programme. To this end, the Order of 15 May 2023 on air events gives him the authority, if he deems it necessary, to cancel all or part of the displays, particularly if the weather conditions are adverse and, more generally, if he considers that the safety conditions have not been met. The Flight Director himself may have difficulty in understanding the weather conditions which the pilots are likely to encounter and their ability to cope with them. A cancellation decision by the Flight Director, even if it may be unpopular with pilots or even the organisers, is a benchmark for all pilots, whatever their experience, level of skill, desire to make the flight or the pressures they may feel.

Although the pilot-in-command is ultimately responsible for the decision to undertake the flight, the group effect, as well as the desire to satisfy passengers and spectators, intrinsic to this type of air show, can influence this decision. Some pilots, with varying levels of experience and skills, may expose themselves to conditions that are potentially beyond their proficiency and which could jeopardise the safety of the flight. In a context where several displays had already been cancelled, the decision for each pilot to cancel a new flight when the Flight Director had authorized the display and other pilots were taking off was all the more difficult to take.

Appendix 1

"Weather information" sheet provided by air show weather forecaster for the accident flight concerning F-GMGE.

GRAND EST MONDIAL AIR BALLONS 2023

METEOROLOGICAL INFORMATION
MONDAY, 24 JULY 2023 1700 LOC

PLACE: CHAMBLEY
FREQ ZRT: 120.405 - NEW!

FORECAST PERIOD: 23/07/2023
FROM 1700 TO 2200 LOC

WEATHER FORECASTER: [redacted]

GREEN FLAG TIME / HEURE DRAPEAU VERT: .... LOC

LANDING TIME / HEURE D'ATTERISSAGE : 2115 LOC

Model Wind

Height	Direction	Speed kts	Trend	Temp °C
Surface	290	12	220 08	22
500ft	290	14	220 11	21
1000ft	290	14	230 12	20
2000ft	260	124	230 15	19
3000ft	260	15	23015	18
4000ft	260	16	23017	17
Surface visibility: +10km			Lightning risk: NIL	
Altitude inversion: subsidence 2500			Temp. change: 4°C	
End of convection: 1700 after			QNH: 1006 hPa	
Sunrise:(local) 05 59			Sunset:(local) 21 27	

Cloud type	Cloud cover	Base	Tops
Cu	Sct	5000	8000

PITBALL READING TIME AT 1630LOC

Piball reading at time:16 30

Hgt FT	Dir DEG	Spd KTS
170	211	13
290	222	20
400	231	18
520	234	16
630	250	22
750	243	26
860	244	29
980	251	26
1090	253	26
1210	249	30
1320	252	33
1440	258	22
1550	248	37
1670	246	28
1780	251	30
1900	252	38
2010	245	32
2130	249	42

The above Winds Aloft data is for:

General Synoptic situation /Situation synoptique:

La dépression centrée sur la Scandinavie et les fronts y associées déterminent le temps sur la France avec des masses d'air instable.
The low pressure over Scandinavia and the associated fronts determine the weather over France with unstable air masses.

Weather/ Le temps:

Nuageux avec éclaircies devenant très nuageux puis peu nuageux.
Cloudy with sunny breaks becoming very cloudy then few clouds in the evening.