Federal Public Service
Mobility and Transport
Air Accident Investigation Unit

Air Accident Investigation Unit
- (Belgium)
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FINAL REPORT ON THE ACCIDENT TO THE HOT AIR BALLOON KUBICEK SPOL. S.R.O. – BB37N REGISTERED OO-BHA IN OUDENBURG ON 22 APRIL 2011

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FOREWORD

This report is a technical document that reflects the views of the investigation team on the circumstances that led to the accident.

In accordance with Annex 13 of the Convention on International Civil Aviation, it is not the purpose of aircraft accident investigation to apportion blame or liability. The sole objective of the investigation and the Final Report is the determination of the causes, and define recommendations in order to prevent future accidents and incidents.

In particular, Art. 17.3 of EU Regulation 996/2010 stipulates that a safety recommendation shall in no case create a presumption of blame or liability for an accident, serious incident or incident.

Unless otherwise indicated, recommendations in this report are addressed to the Regulatory Authorities of the State having responsibility for the matters with which the recommendation is concerned. It is for those Authorities to decide what action is taken.

The investigation was conducted by L. Blendeman, H. Metillon and S. Laureys.
The report was compiled by L. Blendeman

NOTE:
For the purpose of this report, time will be indicated in UTC, unless otherwise specified.

Synopsis

Date and hour of the accident

22 April 2011 at 18:21 UTC

Aircraft

Kubicek SPOL. S.R.O. – BB 37 N, registered OO-BHA

Accident location

In a ditch, alongside the Brugge-Oostende waterway.
N 51°12.077' E 003°2.870'

Aircraft owner

Garage Raes

Type of flight

Aerial Work – First Flight

Persons on board

6

Abstract

The hot air balloon was scheduled for a flight on Friday 22 April 2011, from the South of Brugge, in Oostkamp.

After flight preparation, the balloon took off, around 17:13 UTC with 6 persons on board; 4 passengers, the pilot and a flight attendant.

The first part of the flight was uneventful. The balloon initially flew North, then in a North – Westerly direction, at a speed of 9 km/h.

Around 18:00, the wind direction and speed changed suddenly. The balloon went West, and reached a maximum speed of 51 – 57 km/h.

The pilot decided to land, as soon as possible, and eventually selected a suitable field, between the highway and the water waterway Brugge – Oostende.

The balloon came in for landing, at a speed of 37 – 43 km/h. Upon touchdown, the basket rotated violently 180°.

The pilot lost his balance and his head was violently hurt, making him unconscious.

One passenger fell out of the basket mount, seriously injured.

The balloon went up somewhat, due to the loss of weight, and flew a further 200m, before touching down again.

A passenger and the flight attendant were ejected from the basket and the basket was further being dragged on the ground towards the tree line bordering the Brugge-Oostende waterway.

The basket came to a stop in a ditch alongside the waterway, where the two remaining passengers climbed out. The balloon ground crew member and a passer-by went to the rescue of the pilot who remained still attached in the basket. The pilot was found dead.

1. Factual information.

1.1 History of flight.

The flight of the balloon OO-BHA was planned for the Friday 22 April 2011.

As usual, the pilot contacted the passengers during the morning. After reviewing the latest meteorological information around 14.00 UTC, the pilot phoned the passengers to confirm that the flight will take place in the evening.

They first gathered in Loppem around 16:00 UTC, then owing to the wind direction, they decided to start from a field in Nieuwenhove (Oostkamp).

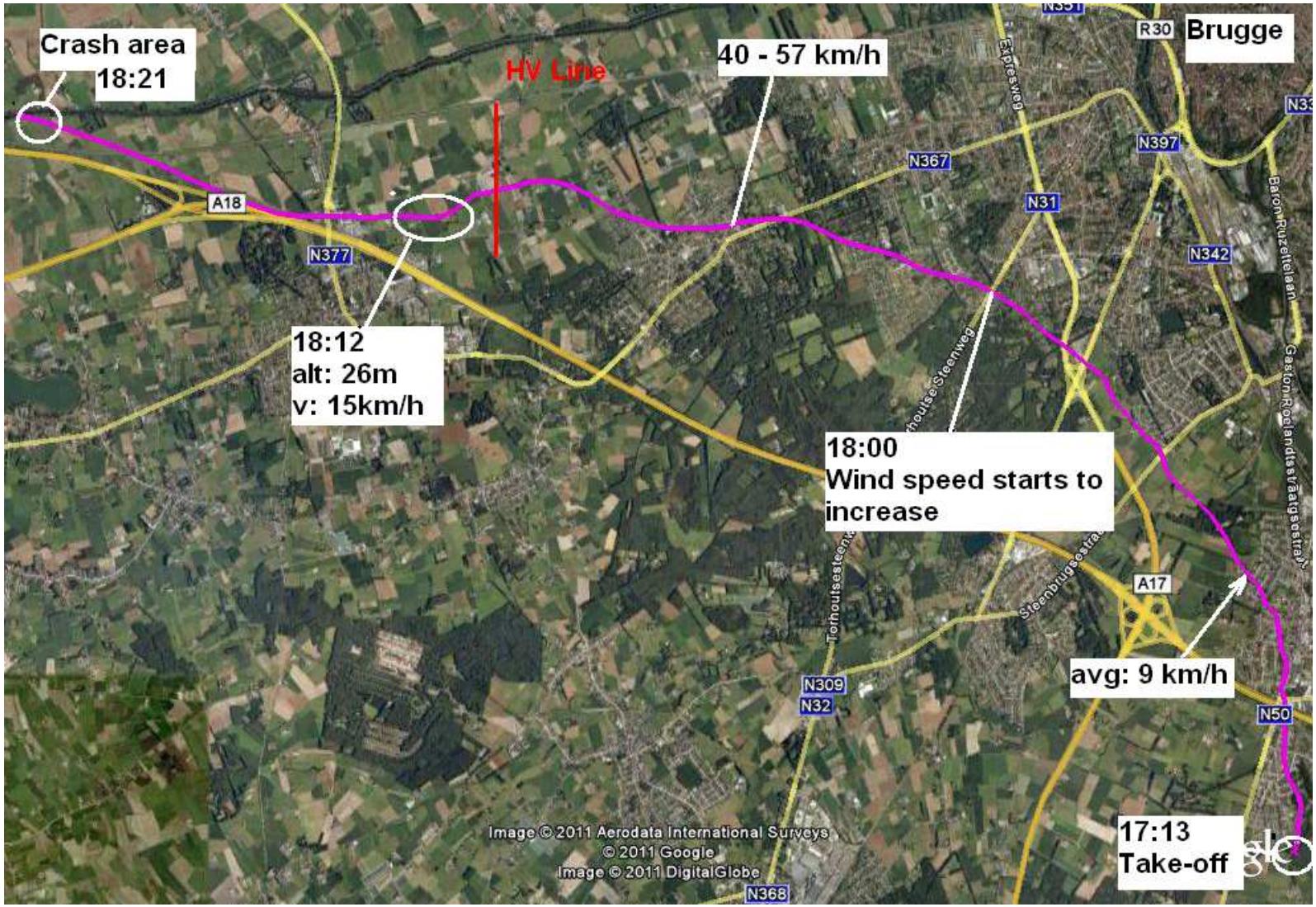
The pilot, helped by a flight attendant and the ground crew member, prepared the balloon for the flight. The passengers stated they did not receive a safety briefing prior to the flight.

The passengers climbed in the basket, and the balloon took off at 17:13 UTC.

The balloon initially flew North, with a speed of 9 km/h on average, then, when climbing to an altitude of 170m, the balloon flew North-West, leaving the city of Brugge on the Right hand side.

The passengers reported the pilot was often busy on the telephone, enquiring about the meteo situation.
A passenger recalled overhearing a conversation about a thunderstorm in Ronse, about 55 km to the South East.

During that period, the sky around the balloon was clear.
.


Crash area
18:21
HV Line
40 - 57 km/h
Brugge
R30
N397
N367
A18
N31
N377
N342
18:12
alt: 26m
v: 15km/h
18:00
Wind speed starts to
increase
A17
avg: 9 km/h
N309
N32
N50
17:13
Take-off
Image © 2011 Aerodata International Surveys
© 2011 Google
Image © 2011 DigitalGlobe
N368

Flight path

Upon reaching the St Michiels suburb of Brugge, a passenger saw the ambient light above Brugge turning yellow, and another passenger saw dust flying on the ground, and trees starting to shake.

Around 18:00, the wind speed increased rapidly, the balloon ground speed increased from 12km/h to 41 km/h in 5 min time.

A passenger took a picture of the sky. The weather was becoming increasingly menacing.

The pilot assessed the situation, and decided to land as soon as possible. He asked the flight attendant to read him continuously the ground speed. The pilot phoned the ground crew, and asked him to remain as close as possible.

Passengers noticed the pilot, from that time on, was focusing on the flight. A passenger recalled hearing the flight attendant reading the speed of 57 km/h.

The pilot lowered the altitude, but saw a High Voltage line, so he climbed again. After passing the HV line, the pilot brought the balloon to a lower altitude, down to 26m, the ground speed was around 15 km/h.

The pilot and flight attendant told the passengers to prepare for landing, which they announced to be rough. Three passengers wrapped their arms around the burner support rods, while the fourth passenger held on to the rope handle inside the basket.

At that moment, the wind changed direction to the East; the balloon flew then in the direction of a series of buildings, and the highway. The pilot climbed somewhat, to pass the obstacle. The balloon entered the CTR of Ostend Airport.

The balloon continued to fly west, in the direction of the city of Oostende, and eventually the sea. The pilot spotted a suitable location for landing and brought the balloon down. The ground speed was around 33 km/h. Just before impact, a passenger heard the flight attendant reading a speed of 43 km/h.

All passengers and the flight attendant braced for impact. A corner of the basket touched ground first; the violent impact forced the basket to swing and rotate 180°.

The balloon envelope fell on the ground, and the ground team witnessing the scene thought the vent panel was being opened (rapid deflation system).

During impact and rotation of the basket, the pilot lost balance, and was violently hit on the face. He fell unconscious.

The basket was dragged on the ground by the balloon. A passenger, clenching on one mount of the burner, was ejected outside the basket, and was hanging between basket and ground, and eventually fell out, seriously injured.

The balloon, being lighter, took off again, and continued to fly at very low height; 30-40cm from the ground in direction of the tree line bordering the waterway Brugge-Oostende. It landed some 200m further. The flight attendant, seriously injured, and another passenger were ejected from the basket.

The ground team and a passer-by rushed to the rescue of the pilot, who was under water, still attached to the basket. The pilot was found dead.

1.2 Injuries to persons.

Injuries	Pilot	Crew	Passenger	Others		Total
Fatal	1		0	0		1
Serious	0	1	2	0		3
Minor	0	0	2	0		2
None	0	0	0	0		0
Total	1	1	4	0		6

The serious injuries included:
- 1 broken hip
- 1 broken wrist
- Injuries to the backbone.

1.3 Damage to aircraft.

The balloon sustained only limited damage to the envelope and basket.

1.4 Other damage.

None.

1.5 Personnel information.

Pilot
Sex: male
Age: 69 years old
Nationality: Belgian
Free Balloon Pilot Licence, first issued 23 April 1979, valid until 23 December 2011.

Rating: Hot Air Balloon.

Medical Certificate: Class 4, valid until 23 December 2011.

Total Flight Experience: more than 4600 flights

The pilot was holder of the Authorization for Aerial Work and First Flights N°479, issued on 07 April 2011, and valid until 09 April 2013.
This authorization concerns the performance of the following activities with OO-BHA;

- First flights,
- Aerial photography (portable),
- Publicity (removable)
- Publicity (permanent)
- Banner towing
- Parachuting (free)

Flight attendant
Sex: male
Age: 56 years old
Nationality: Belgian

The pilot had the custom to fly with a flight attendant being a person from the ballooning team, not qualified as pilot. The precise role of the flight attendant is unclear, but is believed to provide a general support to the pilot.

1.6 Aircraft information.

The OO-BHA is a N-Type Kubicek SPOL s.r.o. hot air balloon, featuring a BB37 envelope and a K18 basket.

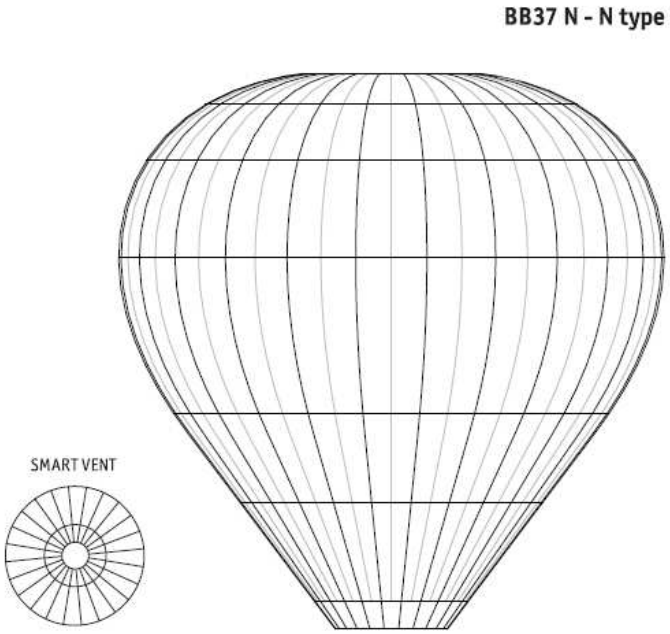
The balloon is defined by the EASA Type Certificate Data Sheet BA.003. The certification base is FAR Part 31 AMdt 31-4.

The BB37 – N free hot air balloon has a natural-shaped envelope of 3700 m3 volume with 24 vertical gores.

The parachute, Smart Vent or also called Life Vent is used for sealing of the vent aperture. As an option, the envelope can be equipped with a rotation vent. A double burner is the heat source for the envelope. The basket is a cane-work connected to the envelope by means of stainless steel or Kevlar wires and karabiners with a screw gate.
The BB37-N envelope is able to carry up to 6 persons,

Balloon (envelope) data

- **Manufacturer:** Balony Kubicek SRO
- **Type:** BB37N
- **Serial Number:** 112.
- **Built:** 06/2000
- **Rebuilt:** 03/2007
- **Maximum Take-off Weight:** 1150kg
- **Minimum Landing Weight:** 500kg
- **Volume:** 3700 m3
- **Height:** 20m
- **Equator Diameter:** 19.7m
- **Mouth Diameter:** 4m
- **Vent Aperture Diameter** 6m
- **Weight:** 145kg

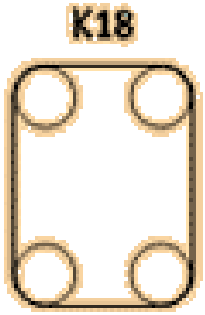


- **Certificate of Registration:** N°4863, issued on June 24, 1999 by the BCAA
- **Certificate of Airworthiness:** N°4863, issued July 23, 2007 by the BCAA
- **Airworthiness Review Certificate:** issued June 11, 2010 by BCAA, valid until June 10, 2011.

OO-BHA was equipped with a Smart vent and a rotation vent (installed during rebuild in 2007).

Basket General characteristics

- **Manufacturer:** Balony Kubicek SRO
- **Type:** K18
- **Capacity:** 5 persons (7 max)
- **Dimensions:** 1.16m x 1.55m (base of the basket)
  1.10m (height)
- **Typical weight:** 100kg (average weight of standard equipped basket. It means incl the bag, fire extinguisher, handling rope etc)
- **Serial Number:** 81.
- **The K18 with a BB 37 envelope is the manufacturer - recommended combination.**



Burner General characteristics

- **Manufacturer:** Balony Kubicek SRO
- **Model:** Komet Plus
- **Serial Number:** 115

Owner

- Garage – Carrosserie Raes Patrick BVBA

Flight Manual

The flight manual applicable to OO-BHA is the publication reference B.0102, issue 25.10.2004 / Change N°6, approved by EASA under Approval Nr: EASA.BA.C.01171.

Note: Flight Manual reference B.2102 is applicable to the same type of balloon, but bearing serial Nr 640 and above.

Extracts from the flight manual.

2. OPERATIONAL LIMITATIONS

2.2. Meteorological Conditions

The maximum surface wind speed for take-off: 14 kt (7.5 m/s = 27 km/h)
(….)
The balloon should not be flown in meteorological conditions that give rise to erratic and gusty winds or in thermic conditions.
(…)

2.4. Rate of Climb and Descent
(…)
The maximum rate of climb: **4,0 m/s**
The maximum rate of descent: **6,5 m/s**
(..)

2.8. Operation of the Deflation System (DS)
(…)
Opening of the Smart Vent (…) by means of the red activation rope with basket higher than 2m above ground is prohibited.

Section 3.

3. Emergency Procedures

3.3. Emergency Landing

3.3.1. <u>Fast Landing</u>

The wind speed is higher than 14 knots (7.5 m/s = 27 km/h)

Passengers ..... back to the direction to travel, hold the internal rope handles, fix objects
Basket ..... by means of the rotation vent (if fitted), turn the balloon so that the longer basket side is perpendicular to the flight direction.
Field ..... a large sort of landing field or area protected behind a slope.
Descent ..... gently
Venting ..... open the parachute close to the ground
Passengers ..... keep passengers not to leave the basket till it comes to the absolute stop.

Note on Flight Manual:

Flight Manual ref B.2102 is applicable to the same type of balloon with serials above 640 (and therefore not applicable to OO-BHA). However, among the differences between the manuals we note that several chapters were added, including one on Safety Briefings.

(extract from Flight Manual ref. B.2102)

4.4. BRIEFINGS AND INFLATION

(…)

4.4.2. Passenger Briefing

Passengers may be briefed in the basket whilst it is upright before the envelope is connected or they may be briefed in the basket when the envelope is inflated and before the balloon takes off.

Passengers in Open Baskets

Passengers Must	At all time listen to the pilot and obey his instructions. Before landing: Stow all loose items such as cameras. On landing: Stand sideways to the direction of travel. Hold on to rope handles to maintain this position. Stand with legs together and with their knees slightly bent. Keep feet flat on the basket floor. Keep hands and arms within the basket. Watch the progress of the landing and brace for the touch-down. Be aware that the basket may, on landing, tip over and drag along the ground. Remain in the basket until instructed to leave by the pilot.
Passengers must not	Hold onto the fuel hoses or touch the control lines or burner controls. Use a mobile telephone in flight. Smoke in the balloon or within 50m of the basket. On landing: Wrap their arms around the burner support rods. Leave the basket before instructed to do so by the pilot.

Flight controls.

The balloon is equipped with three control systems, operated by the pilot in flight;

- the burner heating up the air, allowing the balloon to climb,
- a Venting system creates an opening in the envelope, allowing hot air to escape and therefore the balloon to descend.
- A rotation vent allowing a rotation of the balloon around its vertical axis.

During landing, the envelope is largely opened in order to evacuate all the hot air as rapidly as possible. This is called the “parachute”, or the “rapid deflation system”.

Smart Vent.

The Smart Vent combines the in-flight venting system and the rapid deflation system.
Two activation lines are fitted;

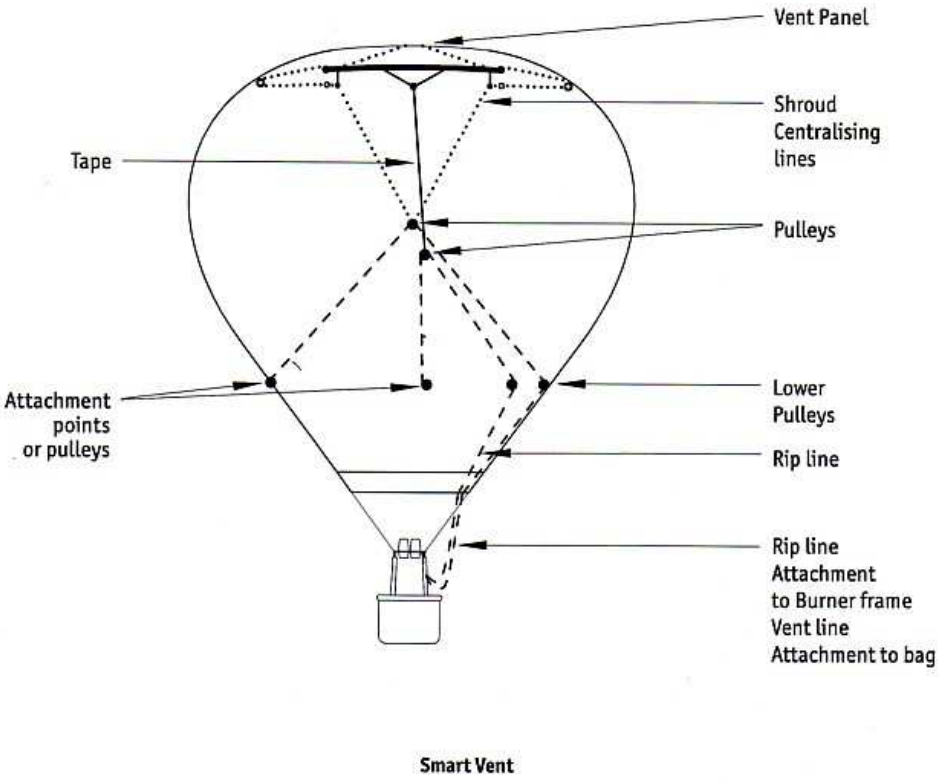
- one coloured red/white for in-flight venting and for resetting the system during intermediate landings and,
- the rip line, coloured red for final deflation.

The lines, through pulleys, are acting on a circular vent panel at the top of the envelope. The panel is normally held in place by internal pressure.

In-flight Venting

Pulling on the red/white vent line will apply a pulling force on the edge of the circular vent panel, and the vent panel will move down, creating an opening through which hot air will escape. When the pulling action on the red/white vent line is released, internal pressure will move the vent panel back in the close position.

For in-flight venting, the circular vent panel is opened for a few seconds, until the adequate descent rate is reached, then released.



Smart Vent

Rapid deflation system

Pulling the rip line will apply a downward force at the centre of the circular vent panel. The vent panel is pulled down into the envelope until it forms a vertical plume in the centre of the vent hole allowing a clear path for air to escape quickly out of the envelope.

The action on the rip line is normally not reversible in flight; it can only reversed by pulling the red/white vent line, actually resetting the internal lines to their original position.

Maintenance:
The maintenance program for the balloon is referenced AMP/OO-BHA/Rev-01, issued 09/02/2011, and approved by the BCAA on 25/02/2011.

The last BCAA inspection for the renewal of the airworthiness review certificate occurred on 11 August 2010. At that time, the balloon had accumulated 1003 FH in 799 fares. There was no remark formulated.

The next maintenance (yearly inspection) was to be performed before the 19 May 2011.

1.7 Meteorological conditions.

The general forecast, as well as the ballooning bulletin (see appendices) identifies a risk for degrading weather, including thundery showers and Cumulonimbus.

The bulletins are forecasting a surface wind of:

- 3 to 6 kts (5 to 11 km/h) during normal conditions inland,
- 5 to 8 kts (9 to 15 km/h) along the coast
- 10 to 15 kts (18.5 to 28 km/h) in vicinity of CBs, and
- Gusts to 20 – 25 kts (37 – 46 km/h)

The wind direction is E-NE (meaning a balloon would travel W – SW).

The witnesses on the crash site reported a thundery shower after the landing of the balloon, including hail and heavy wind gusts.

The Meteorological observations (METAR) taken at the Ostend airport at the time of the crash is as follows;

METAR EBOS 221820Z 01005KT 9999 FEW050TCU 19/10 Q1008 NOSIG=

In other words,

EBOS – 18:20 UTC

Wind:
Direction: 010 degrees
Speed: 5 kts

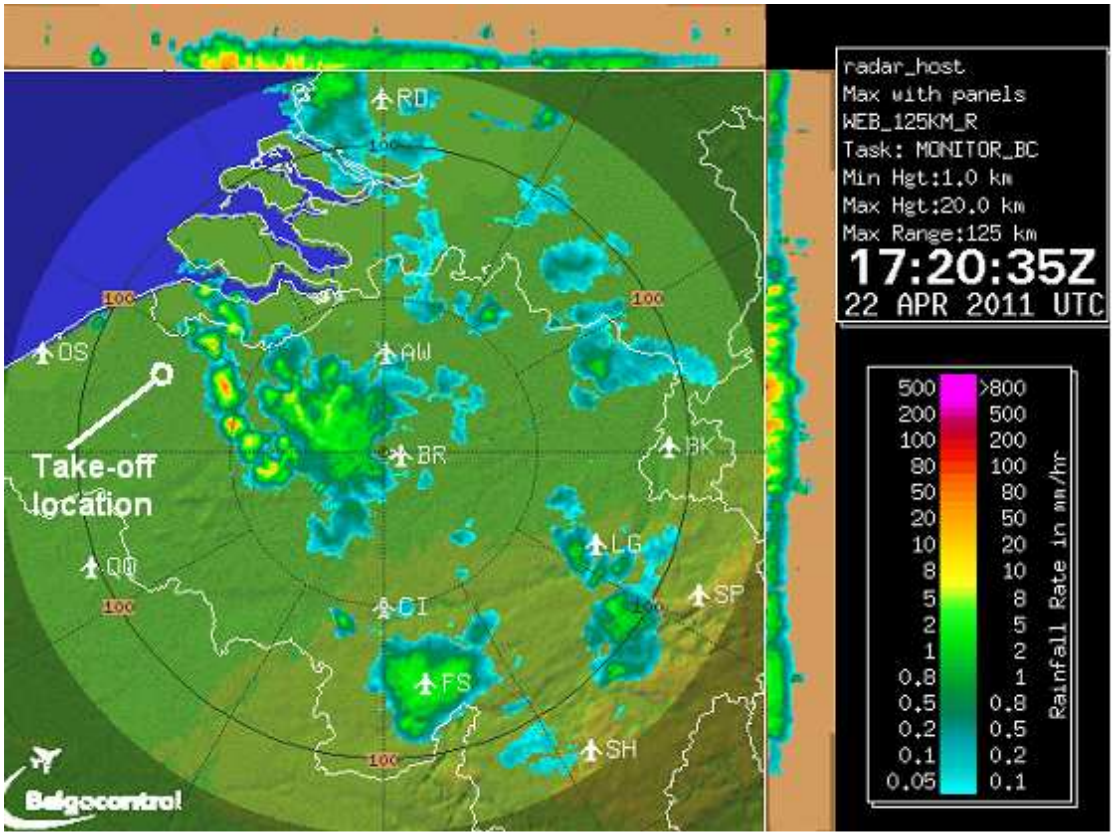
Visibility: +10km

Clouds:
Few at 5000 ft
Towering Cumulus

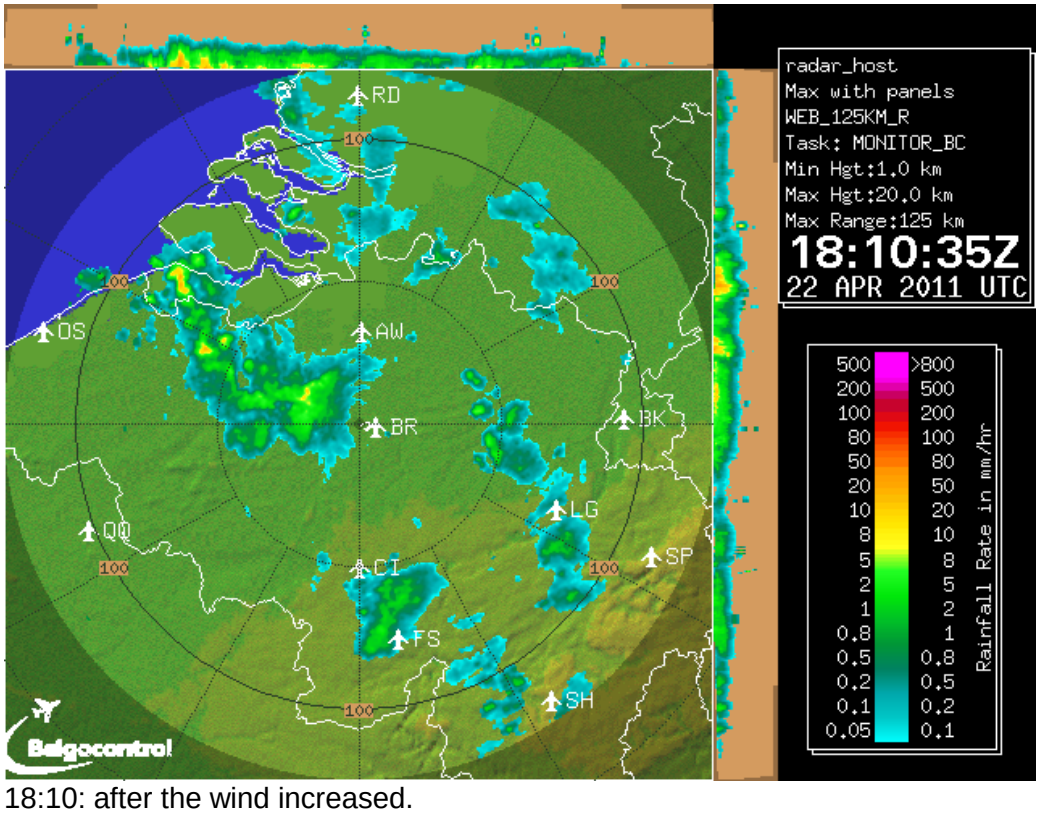
QNH: 1008 hPa

Temperature:
Dry bulb: 19°C
Wet bulb: 10°C

1.7.1. Weather Radar (Belgocontrol)



At take-off



18:10: after the wind increased.

Upon landing

1.8 Aids to navigation.

On-board equipment

The balloon was equipped with a hand-held GPS Garmin e-Trex Legend. And a variometer Bräunigger (sn 0506-5255B)

1.9 Communication.

The pilot was in mobile phone communication with the ground team, and several other persons, but the communication were not recorded.

Although he entered the CTR of EBOS, the pilot did not contact the EBOS tower.

1.10 Aerodrome information.

Not Applicable

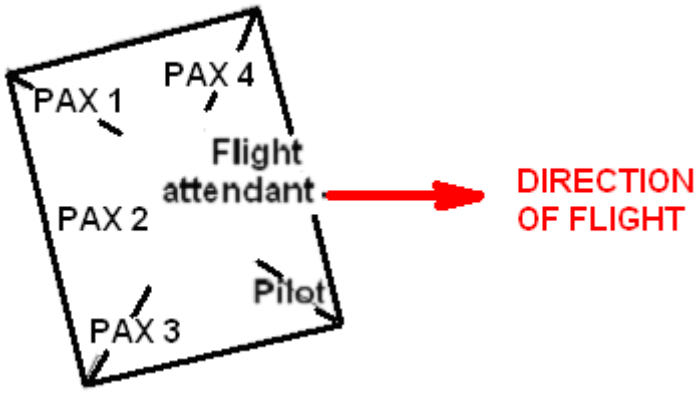
1.11 Flight recorders.

The GPS recordings were downloaded, and provide the following information;
- Time
- Location (WGS84)
- Elevation

1.12 Wreckage and impact information.

The pilot and flight attendant told the passengers to prepare for the landing; to stow all loose items, and to take position for a rough landing. They instructed passengers next to a burner support rod to hold onto it, with their arms. One passenger was told to hold one of the handles inside the basket.

Passengers reported that the standing configuration inside the basket was as follows:



The ground crew member reported seeing the balloon coming low, in a controlled descend, although the wind condition would have made the landing a rough one. He saw the basket touching down.

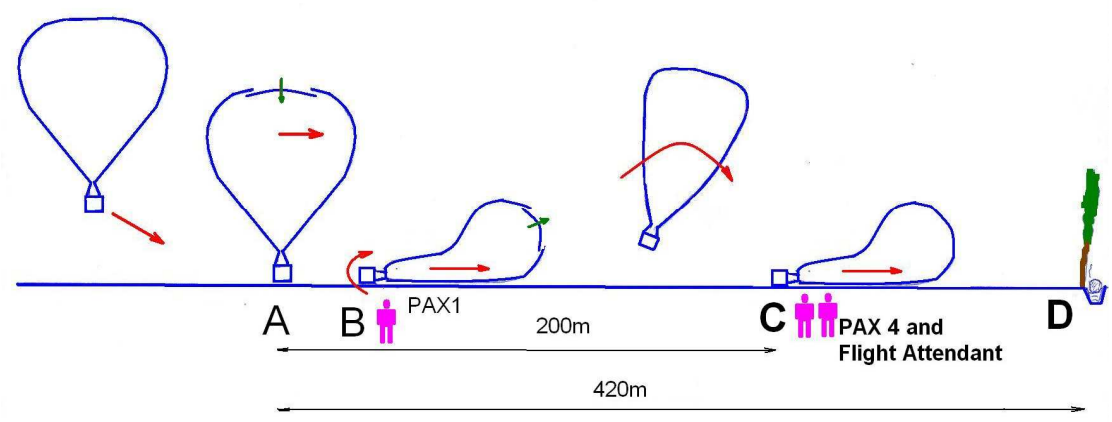


Fig 1. Impact sequences

First Impact (A)
The ground crew member stated also that the pilot stopped using the burner upon landing, as in a normal landing

A passenger recalled the last speed reading by the flight attendant just before impact was 43 km/h.

The ground crew member saw the basket impacting the ground, followed by a commotion inside. The balloon laid down on the ground, and the ground crew member reported seeing the vent panel open.

After First Impact (B)
The impact was violent, the passengers recalled. The basket pivoted brutally; PAX 4 recalled that he was above PAX 1 after the initial shock. PAX 3, who was next to the pilot, saw him unconscious with blood on his face. The flight attendant, standing next to the pilot was projected forward, his face hitting the ground.

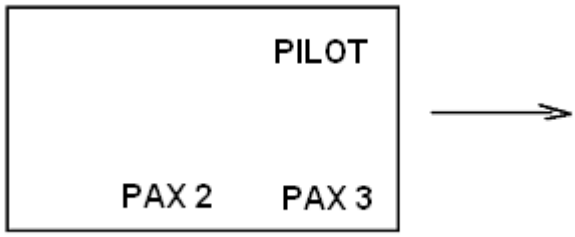
The basket was dragged on the ground for 50m.
PAX 1 was still hanging on the basket, caught between ground and the basket skidding on the ground. She asked to PAX 4 what to do, and he said her to let go. She did it, and escaped the basket breaking her hip in the process.

Ground trace between A and B

Second Impact (C)
The balloon took off somewhat due to the loss of weight, and flew at a height of 30 – 40 cm from the ground (very low); then touched ground violently again, at which point PAX 4 and the flight attendant were ejected from the basket.

The balloon went further in the direction of the tree line, dragging along the basket on the ground for another 150m until the balloon reached the tree line and the basket went into the water ditch.

During this time, PAX 3, standing next to the pilot was still clenching one mount of the basket, but got her arms dragged under the basket. She got one wrist (LH) broken, with the flesh of the arms burned due to the friction. The other remaining passenger, PAX 2, still holding the rope handle, recalled shouting to the other passenger to keep her head up, and both recalled seeing the pilot laying face down, the arms also caught between basket and the ground, his head banging violently to the ground each time the basket bounced.

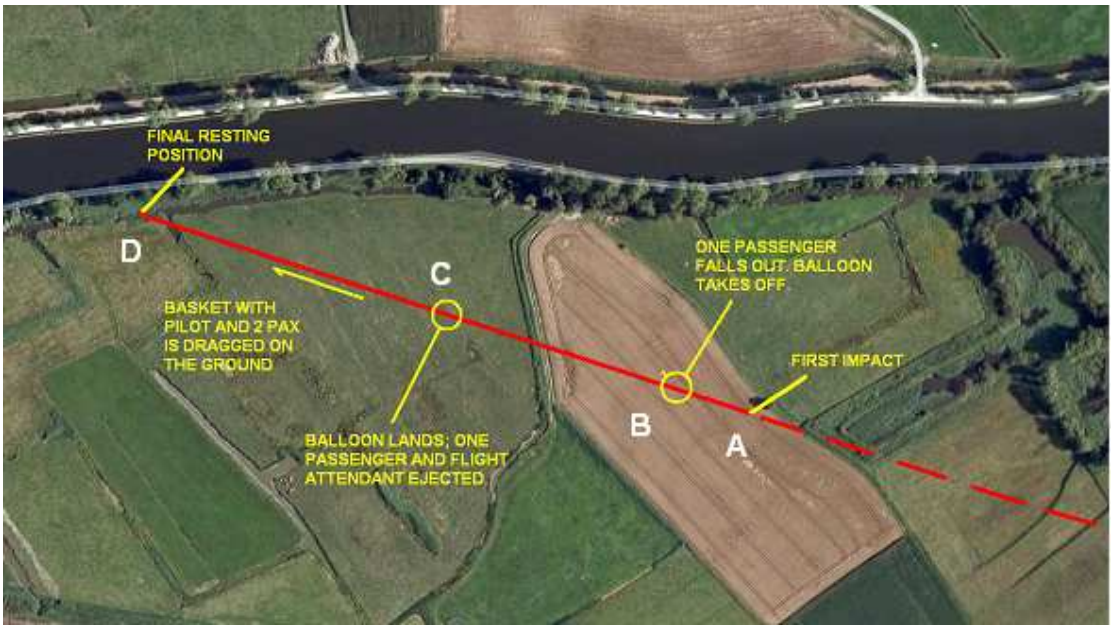


Final Resting place (D)

The balloon reached the tree line, and the basket went into the ditch, before stopping.

One passenger had her leg blocked by a gas bottle, but managed to climb out of the water-filled basket, along with the other passenger.

The ground crew member dashed to the rescue of the passengers, and finally came to the final resting place of the balloon. The pilot was still trapped under water, inside the basket, still held by the safety belt. The ground crew member released the pilot with the help of a passer-by, and brought him to firm ground. They applied Cardio-Pulmonary Resuscitation (CPR), without success.



Impact

The landing zone is located 10km E of the EBOS airport, 20min flight at the average speed of 30km/h (last 5min of flights). It would have been one of the last landing zone possible, before the urban zone of Oostende / Bredene, the CTR of EBOS and eventually the sea.

Findings on the wreckage:

The condition of the basket and its components was assessed from the pictures taken at the accident site, and by an inspection of the elements and the envelope by the investigation team, and the help of a balloon expert of BCAA.

The basket was found intact, without apparent damages.

The 3 gas bottles were weighed and showed the following:

- Bottle 1; 38 kg.
- Bottle 2; 21 kg.
- Bottle 3; 25 kg.

The empty weight of each bottle is 19kg.

The envelope showed burning damage at the underside; it was later determined that these damage were existing prior to the flight.

The envelope was torn open.

The rip chord was found in the flight position.

1.13 Medical and pathological information.

The pilot fell unconscious due to a blow to the head. A passenger saw blood oozing from his head immediately after first impact. The investigation team could not determine against what the pilot banged his head.

According to the Medical Examiner, the pilot died shortly after impact from a violent shock and traumatisms, believed to be due to the pilot being crushed.

1.14 Fire.

There was no fire.

1.15 Survival aspects.

The pilot was using a safety belt; a loop was passed on a waist belt on one side, and was fastened to a basket's handle with a D-Ring. The waist belt was cut when extracting the pilot.

The other passengers did not wear any restraint system, nor were they supposed to.

The flight manual B.0102. describes the system:

7. Balloon and Systems description

7.5. Seats and Safety harness

(…)
Pilot restraint harness (if fitted) is designed to secure the pilot inside the basket during landing. The harness consists of the waist belt secured with the seat belt type buckle and a strap of adjustable length with the clips on both ends. One clip is to be fixed to a D ring on the waist belt, the other to a D ring on the basket floor.

The pilot should wear and adjust the waist belt before landing and adjust the strap length during approach. The length of the strap must allow the pilot to reach all controls while preventing him from falling over the basket rim. In emergency the waist belt can be released by the "press" button.

1.16 Tests and research.

Not applicable.

1.17 Organizational and management information.

Flights with passengers in a hot air balloon is considered as aerial work in the Belgian Regulation. The applicable legal requirements are to be found in:

- Article 50 and 51 of the Royal Decree of 15 March 1954 define the basic general requirements for aerial works.
- The Ministerial Decree of 27 October 1982 defines the requirements for the issue of Free Balloon pilot's licences with the following class ratings:
  - Hot air balloon
  - Gas balloon

and the following ratings
  - Authorized Commercial flights
  - Instructor.

The pilot's licence is submitted to 2 examinations ;

- a theoretical examination, including general knowledge of legislation, meteo, navigation and specific technical and operational knowledge of balloon, as well as the flight procedures.
- a practical examination with an examinator including 2 flights for the purpose of demonstrating the flying abilities of the candidate.

The rating "authorized commercial flights" is granted upon fulfilling the following conditions:

- minimum age of 18 years,
- valid licence of free balloon pilot

- holder of a restricted radiotelephony certificate,
- minimum experience of 50 flights, among which 20 must have been performed during the last 24 months.
- A practical examination;
  - Precision flight. « During a solo flight of at least one hour, the candidate must follow a barographic flight profile defined beforehand by an examinator".
    At the completion of the flight, the barogram must be dated and signed by the examinator, before submittal to the BCAA.

1.18 Additional information.

Not Applicable

1.19 Useful or effective investigation techniques.

Not Applicable.

2. Analysis.

2.1. The Flight.

Prior to initiating the flight, the pilot was obviously concerned by the meteorological conditions. The passengers recalled seeing him using a lot of small balloons, and making a series of telephone calls, on ground and during the flight.

The pilot contacted the meteo service of the Ostend airport to assess the weather evolution.
The weather condition before take-off was favourable, as also the weather radar image :
METAR EBOS 221650Z 01007KT CAVOK 22/09 Q1008 NOSIG= (see appendices)

Using the small balloons, he determined that the wind direction was clearly S. with a low speed. He said to the passengers that he expected to fly N to Brugge, taking off from Oostkamp. He revised his statement in flight, when the wind direction changed to SE.

It was only after 45 minutes of flight that the situation dramatically changed, with wind direction and speed that would match the worst figures stated in the weather forecast.

From that point on, the only solution was to land the balloon, as soon as possible.

2.2. The landing

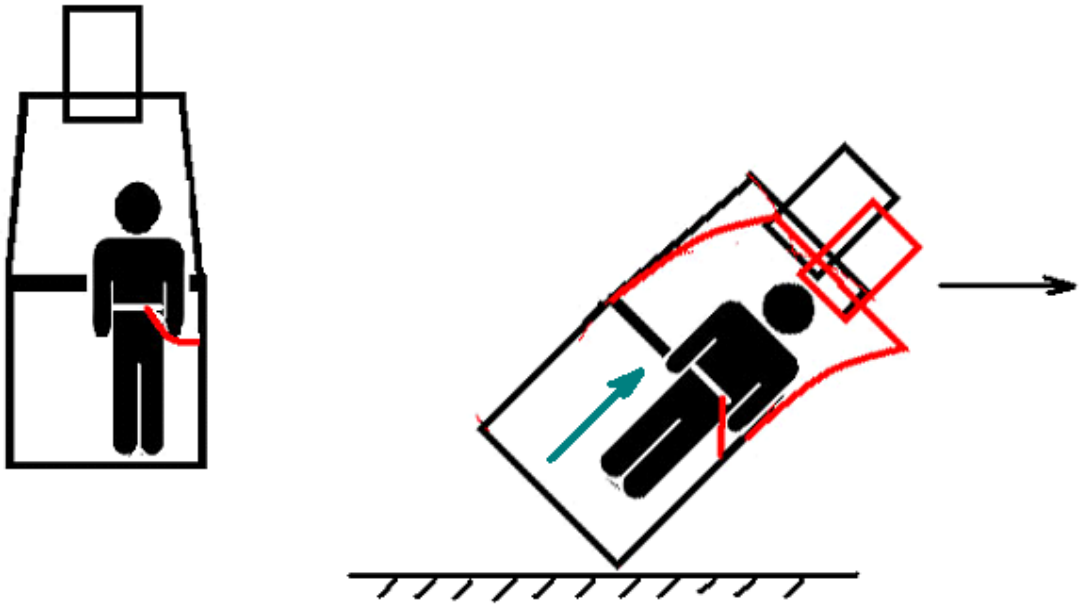
The dramatic outcome of the flight originates from the conditions encountered during landing.

The selection of the landing place, and the approach itself were quite adequate. With reason, the pilot expected a ‘sporty’ landing, but not dramatic.

A wind gust close to the ground increased the ground speed to 43 km/h, increasing the impact forces upon touch down. As the basket could not be positioned perfectly with respect to the ground, the touchdown caused the basket to swivel round one of the corner.

How the pilot got incapacitated during touchdown was not determined, but we can formulate two hypothesises:

1. **Collision with the burner structure.**
   Since he was standing, he took the full blow of the impact, and it reasonable to think he banged his head to the burner frame during the rebound; the safety belt allowing a (limited) vertical movement.



2. **Collision with the ground.**

   Considering that the flight attendant was projected forward, and that his head hit the ground with force during the first impact, a similar situation might have occurred to the pilot.

Due to the pilot being unconscious at that moment, the rapid deflation system was not activated – or not completely activated -, and therefore the balloon moved a further 420m until it stopped.

2.3. Safety Harness.

The safety harness system used by the pilot was not the one described by the balloon manufacturer.

Although both system were not designed to restrain the pilot in the vertical axis, the system used by the pilot allowed him to remain inside the basket, but would provide limited efficiency in the vertical axis, with the potential risk of hitting the burner structure with the head.

2.4. Safety Briefing.

The safety briefing for balloon fares is not formally required per regulation, and the Flight Manual applicable to OO-BHA does not provide an extensive instruction on the subject.

A safety briefing is nevertheless requested by Insurance companies.

The passengers do not recall having received a safety briefing on ground, but they recalled having received instructions in flight, just before the landing. Passengers standing in the corners of the basket got the instruction to hold onto the burner support rods, while the passenger standing behind was told to hold onto a basket handle.

Passenger holding onto the burner support rods tend to have their center of gravity higher than those holding onto the handle; This would have contributed to one passenger to be drawn outside the basket, when the basket swivelled upon impact.

Also, holding onto the burner support rod implies that passengers have their arms outside the basket, and when the basket skidded on the ground, one passenger got her arms caught between basket and ground.

3. Conclusions.

3.1 Findings.

- The balloon was airworthy.
- The pilot was duly qualified and experienced.
- The pilot wore a restraint system.
- The crew included a flight attendant.
- The meteorological forecast bulletin issued prior to the flight indicated the risk to encounter the type of weather the balloon actually experienced.
- The passengers do not recall having received a safety briefing before take-off.
- There are no records made for the performance of a pre-flight safety briefing.
- The safety briefing performed in flight encouraged passengers to hold onto the burner support rods.
- The current Regulation does not require the performance of safety briefings for commercial flights with hot air balloons.
- The pilot became incapacitated during ground impact.
- The rapid deflation system was not activated after touchdown.
- Some passengers were ejected outside the basket during landing.

3.2 Causes.

The cause of the accident is the incapacitation of the pilot during the landing of the balloon under unfavorable weather condition, and inadequate positioning of passengers for a hard landing.

4. Safety recommendations.

4.1. Safety Recommendation 2011-15 to BCAA

AAIU(Be) recommends BCAA to introduce the requirement to perform a safety briefing to the passengers of hot air balloon prior to the flight.

4.2. Safety Recommendation 2011-16 to Kubicek Balloons

AAIU(Be) recommend to revise the flight Manual B.0102 to incorporate the instructions regarding the safety briefing to passengers in the Flight Manual B.2102.

Appendices.

General Forecast

FABX56 EBBR 221608
GENERAL FORECAST
ISSUED: 22/04/11 AT 1608 UTC

VALID FOR PERIOD: 22/04/11 - 1800 UTC TO 23/04/11 - 0600 UTC

SUNRISE: 230431 UTC
SUNSET: 221848 UTC

1. SYNOPTIC SITUATION
WEATHER IS STILL DOMINATED BY A WEAK S-SE'LY UPPER FLOW BETWEEN A QUASI STATIONARY HIGH OVER SCANDINAVIA AND EASTERN-EUROPE AND A COMPLEX LOW FROM ICELAND TOWARDS SPAIN/ PORTUGAL. IN THIS AIRFLOW WARM AND POTENTIALLY UNSTABLE AIR IS ADVECTED ACROSS OUR COUNTRY BUT
AS UPPER PATTERN BECOMES ANTICYCLONIC AGAIN THE MID LEVEL INSTABILITY IS EXPECTED TO DIE OUT RAPIDLY AT BEGINNING OF PERIOD.

2. WEATHER
PARTLY CLOUDY TO CLOUDY WITH STILL RISK FOR A LOCAL THUNDERY SHOWER AT BEGINNING OF PERIOD RAPIDLY DYING OUT BECMG CLEAR TO PARTLY CLOUDY WITH ENLARGING BREAKS FROM E-SE.IN MORNING HOURS AROUND SR RISK FOR LOCAL MIST AND/ OR SHALLOW FOG.

3. WINDS

SURFACE :
E-NE 060-090 DEG 03-07KT. AT BEGINNING OF PERIOD IN ANY LOC TS RISK FOR GUSTS 20-25KT.

AT 1000FT / 300M :
E-SE 090-110 DEG 05-10KT BECMG E-NE 060-090 DEG 10-15KT

AT 2000FT / 600M :
E-SE 100-120 DEG 05-10KT BECMG E-NE 070-100 DEG10-15KTKT

AT 3000FT / 1000M :
E-SE 100-120 DEG 05-10KT BECMG E-NE 070-090 DEG10-15KT

AT 4000FT / 1300M :
E-SE 090-120 DEG 10-15KT

AT 5000FT / 1600M :
E-SE 090-120 DEG 10-15KT

AT 6000FT / 2000M :
E-SE 090-120 DEG 10-15KT

AT 10000FT / 3000M :
S-SW 180-200 DEG 05-10KT BECMG E-SE 090-120 DEG
05-10KT

4. VISIBILITY

MORE THAN 10KM, IN ANY THUNDERY SHOWER AT BEGINNING OF PERIOD TEMPO 3-6KM. IN MORNING HOURS AROUND SR LOCALLY FORMATION OF MIST/ GROUND FOG WITH VISIBILITY TEMPO 4-7KM.

5. CLOUDINESS:

AT BEGINNING OF PERIOD TEMPO FEW CU 5-6000FT TOPS 10-12000FT WITH SCT-BKN AC 8-9000FT TOPS 15-16000FT WITH RISK FOR A LOCAL EMBD CB 4-5000FT TOPS FL250-300 ISOL300-350 BECMG OVER MAIN REGIONS FEW-SCT AC 10-15000FT AND FEW-SCT CI FL250-300;

6. ISOTHERM

0'C: AROUND 9000FT
-10'C: AROUND 13000FT

7. TEMPERATURE

MIN 6-12C

8. MINIMUM QNH: 1009 HPA

9. WARNING:
-RISK FOR LOC TSRA AT BEGINNING OF PERIOD

10. SOARING CAPABILITIES

SOARING CAPABILITIES: FILLED IN ONLY BETWEEN 01 MARCH AND 31 OCTOBER FOR THE GENERAL FORECAST ISSUED AT 05.30 UTC.

11. OUTLOOK NEXT 24HRS

AFTER RAPID CLEARANCE OF MORNING MIST BECMG CLEAR TO PARTLY CLOUDY WITH ESP IN AFTERNOON FORMATION OF FEW CU. IN AFTERNOON/ EVENING INCREASING RISK FOR AN ISOL TSRA OVER S-SE; PERSISTING WARM WITH MAXIMA 21-27C; WEAK, IN AFTERNOON TEMPO MOD E-NELIES, ALONG COASTAL AREAS TEMPO N-NELIES.
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Ballooning Bulletin

FABX58 EBBR 221417
ANNEX: BALLOONING BULLETIN
ISSUED: 22/04/11 AT 14:30 UTC
PLEASE REFER TO THE GENERAL FORECAST ISSUED ON 22/04/11 AT 0425 UTC

PERIOD: 2 HOURS BEFORE AND 1 HOUR AFTER SUNSET

1. WINDS

SURFACE: 080-100 03-06KT.
IN VICINITY OF CB TEMPO VRB 10-15KT GUSTS UP TO 20-25KT.

COAST 030-060 05-08KT
IN E LOC VRB 02KT

250 FT: 090 05-10KT (COAST 10-15KT). IN E LOC VRB 02-05KT.
500 FT: 090 05-10KT (COAST 10-15KT). IN E LOC VRB 02-05KT.
1000 FT: 100 05-10KT (COAST 10-15KT). IN E LOC 040 05KT.
1500 FT: 110 05-10KT (COAST 10-15KT). IN E LOC 050 05KT.
2000 FT: 110 05-10KT (COAST 10-15KT). IN E LOC 050 05KT.
3000 FT: 130 05-10KT (COAST 10KT). IN E LOC 060 05KT.

2. WEATHER
PARTLY CLOUDY WITH SOME THUNDERY RAINSHOWERS.

3. INVERSIONS: HEIGHT IN FEET [+ WINDSPEED ABOVE INVERSION]
NIL

4. OUTLOOK FOR NEXT BALLOONING FORECAST PERIOD
PARTLY CLOUDY DRY WEATHER. TEMPORARY FORMATION OF MIST (3-5KM).
GROUNDINVERSION FROM SFC TO 2000FT ABOVE SEA LEVEL.
(TEMP. AT 2000FT ASL +/- PS18C).
WINDS:
N OF SAMBRE-MEUSE: 050-080 02-05KT.
S OF SAMBRE-MEUSE: VRB 03KT TO 050-080 02-05KT.

NEXT UPDATE OF BALLOONING BULLETIN: 02:30 UTC:

METAR EBOS

METAR EBOS 221650Z 01007KT CAVOK 22/09 Q1008 NOSIG=
METAR EBOS 221720Z 01005KT 9999 FEW050TCU 21/10 Q1008 NOSIG=
METAR EBOS 221750Z 02005KT 9999 FEW050TCU 20/09 Q1008 NOSIG=
METAR EBOS 221820Z 01005KT 9999 FEW050TCU 19/10 Q1008 NOSIG=
METAR EBOS 221850Z 07009KT 030V100 9999 FEW050CB 21/10 Q1009 NOSIG=
METAR EBOS 221920Z 11007KT 9999 FEW050CB 20/08 Q1009 NOSIG=

TAF

TAF EBOS 221100Z 2212/2318 12008KT CAVOK
PROB30 TEMPO 2212/2218 4000 SHRA TSRA=
TAF EBOS 221700Z 2218/2324 04008KT CAVOK=