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Büro für Flugunfalluntersuchungen  
Bureau d'enquête sur les accidents d'aviation  
Ufficio d'inchiesta sugli infortuni aeronautici  
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Aircraft accident investigation bureau

# **Final Report No. 1877 by the Aircraft Accident Investigation Bureau**

concerning the accident

to Cessna aircraft R182RG, N6412T

on 13 July 2003

in Pianello, municipality S. Antonio / TI

This report has been prepared solely for the purpose of accident/incident prevention. The legal assessment of accident/incident causes and circumstances is no concern of the investigation (art. 24 of the Air Navigation Law). The masculine form is used exclusively in this report regardless of gender for reasons of data protection.

## Ursachen

Der Absturz ist die Folge des Verlustes der Kontrolle über das Flugzeug mit anschliessender Kollision mit dem Gelände.

Zum Unfall haben beigetragen:

- die unzweckmässige Flugtaktik im Gebirgsflug
- die geringe Erfahrung des Piloten im Alpenflug
- die hohe Abflugmasse
- die schwachen Abwinde auf der nördlichen Talseite
- die optischen Irritationen des Piloten durch Morgendunst und tiefen Sonnenstand

## Final Report

Owner	Sixforty corp., Dover DE 19901-4912 (USA) in 30 Old Runick LN
Keeper	Sixforty corp., c/o via Francesca 3, 6596 Gordola
Aircraft type	Cessna 182 RG, S/N R182/02014
Nationality	U.S.A.
Registration	N6412T
Location	Pianello, municipality S. Antonio / TI Coordinates: 732 500 / 114 085 Elevation: 1870 m/AMSL National map of Switzerland 1:25,000 Sheet 1314 Passo San Jorio
Date and time	13 July 2003, 08:45 LT <sup>1</sup>

### General

#### Brief description

On Sunday 13 July 2003 the pilot, with three passengers on board, took off from the cantonal airport of Locarno-Magadino on a VFR flight to Bolzano. Fifteen minutes after take-off, the signal from an emergency transmitter was received and an eye witness informed REGA about the crash. The crew of the REGA helicopter which took off from the Locarno base at 08:56 ascertained that at the scene of the accident the aircraft was still burning and that the occupants were dead.

#### Investigation

The investigation was carried out immediately in cooperation with the Ticino cantonal police. All traces were secured at the site of the accident and it was possible to question several eye witnesses.

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<sup>1</sup> All times in this report follow the effective local time (LT) in Switzerland. At the time of the accident, Central European Time (CET) applied as local time (LT) in Switzerland. The relation between LT, CET and coordinated universal time UTC is: LT = CET = UTC + 2 h.

## 1 History

### 1.1 Pre-flight history and history of the flight

#### 1.1.1 Pre-flight history

From December 2002 to January 2003 the pilot undertook basic pilot training in the United States, which he concluded on 21 January 2003, obtaining an American private pilot's licence. After his return to Switzerland, he enrolled in a flying school in order to obtain a transcription of his FAA-license to a CH/JAR-license. He passed the corresponding examination on 19 April 2003.

On the day of the accident, it was envisaged to fly from Locarno to Trento and back, with an intermediate landing at the Italian customs aerodrome at Bolzano. On the day before, the pilot, who had been planning the flight for a week, went to the C Office of Locarno airport to prepare the flight.

In the early morning of 13 July, the pilot and his three friends met at the airport. In the C Office the pilot submitted the flight plan and completed the customs forms. He then went to the aircraft and asked the refuelling attendant to fill the tanks completely. The latter then filled the aircraft tanks with 233.72 litres of fuel. It could not be noticed whether and which pre-flight checks were carried out.

#### 1.1.2 History of the flight

The aircraft took off at 08:35 from runway 08 left at Locarno airport. At 08:40, the pilot reported that he was over Bellinzona passing 3000 ft (914 m/M) in a climb. An eye-witness was subsequently able to observe the aircraft flying past in front of his property, which is in Melirola at 1000 m/AMSL. The eye-witness estimated the altitude at 1100 to 1150 m/AMSL (3600 – 3700 ft). At about 08:45 two other eye-witnesses saw the aircraft flying over the Costa del Credé at an estimated altitude of 1800 m/AMSL. The eye-witnesses ascertained unanimously that the flight path passed along the northern side of the valley. Shortly afterwards, two explosions were heard. Shortly after that the alarm was raised by eye-witnesses.

The Passo del San Jorio is at an altitude of 2012 m/AMSL (6600 ft), 1.3 km from the point at which the aircraft was last seen (Appendix 1 and 2).

### 1.2 Injuries to persons

	Crew	Passengers	Third parties
Fatally injured	1	3	---
Seriously injured	---	---	---
Slightly injured or uninjured	---	---	---

**1.3 Damage to aircraft**

Destroyed

**1.4 Other damage**

Minor soil contamination

**1.5 Personnel information****1.5.1 Pilot**

Person	Swiss citizen, born 1970		
Licence	PPL (A) CH-47409 / JAR issued by the Federal Office for Civil Aviation on 08.05.2003		
Ratings	Radiotelephony RTI (VFR) Night flight NIT (A)		
Registered aircraft types	Single-engine piston SEP		
Last medical examination	18.10 2002, findings: fit		

**1.5.1.1 Flying experience**

Total experience	116:44 hrs	during the last 90 days	9:03 hrs
On the accident type	11:17 hrs	during the last 90 days	2:29 hrs

**1.5.2 Passengers**

Swiss citizen, born 1967, no flying experience  
Swiss citizen, born 1971, no flying experience  
Swiss citizen, born 1974, no flying experience

**1.6 Aircraft information**

Type	Cessna R182RG
Characteristics	Single-engined high-wing
Year / serial No.	1985 / S/N R18202014
Engine	Lycoming O-540-J3C5D - S/N L-23870-40A
Propeller	MacCauley B3D32C407-B – S/N 831277
Certification	Standard, normal
Operating hours	1460 hrs

Mass and centre of gravity	Maximum take-off mass 3100 lbs Estimated take-off mass 3100 – 3200 lbs Centre of gravity within the prescribed limits
Airworthiness certificate	USA; issued on 22 May 2002
Maintenance	Last 100 hour check carried out on 13.06.2003 at 1455:56 operating hours  On the occasion of the inspection work on 21 June 2001 at 1349:00 operating hours, the inspector made the following entry: <i>"The following items are due for overhaul or inspection: propeller, propeller governor, wheel bearings lubrication, power pack brushes wear, elevator trim tab lubrication, engine controls replacement, starter brushes check, fuel tanks interior check, Lycoming SB 388B valves inspection, vacuum air system filter replacement: NOT PERFORMED AS PER OWNER REQUEST."</i> There were no indications as to whether this work was performed subsequently.

## 1.7 Meteorological information

### 1.7.1 General weather situation

An area of high-pressure centred over the North Sea determined the weather in the Alpine area. The air mass settled over Switzerland was dry and strata were stable. There was a very slight tendency to cumulus cloud.

### 1.7.2 Weather at the time and location of the accident

Weather/cloud	1-3/8 cumuli, base approx. 6500 ft AMSL (1980 m/M)	
Visibility	over 30 km	
Wind	North to north-east wind at 4 kt, gusting to 8 kt	
Temperature/dewpoint	+18 °C / +10 °C	
Atmospheric pressure	QNH LSZA 1015 hPa	
Hazards	Slight turbulence possible	
Position of the sun	Azimuth: 74°	Elevation: 15°

### 1.7.3 Weather according to eye-witness statements

At the time of the accident, mist in the direction to the east.

## 1.8 Aids to navigation

Not affected.

## 1.9 Communications

The Locarno-Magadino control tower was not in service and the pilot made the standard reports.

At 08:29 he called Locarno Traffic: "*Locarno traffic, parking in front of Hangar 1, VFR to Bolzano, Information A, taxi to 08 concrete*".

The last message was five minutes after take-off: "*N12T, Bellinzona, 3000 ft climbing*".

## 1.10 Aerodrome information

Not affected.

## 1.11 Flight recorders

Not installed.

## 1.12 Wreckage and impact information

### 1.12.1 The site of the accident

The entrance of the Valle Morobbia is to the east of Giubiasco. The floor of the valley climbs over the first 5 kilometres from 250 m/AMSL to 650 m/AMSL and over the next 5 kilometres to 1500 m/AMSL.

Over the last 1500 metres the valley climbs, in the form of a steep rock face, by a further 500 metres (Appendix 1 + 2).

In a climb in an easterly direction, persons unacquainted with the locality might get the incorrect impression that it is possible to fly out of the valley to the left and right respectively (Appendix 3).

### 1.12.2 The wreck

The wreck was at the foot of the last rock face, just to the south of the valley with its nose to the west.

The aircraft was almost completely burned. Only the tail, with the elevators and rudder and the remains of the engine with the propeller, were still recognizable.

From the deformation of the remains it can be concluded that the aircraft impacted into the ground following a vertical trajectory, with a virtually horizontal attitude, inclined slightly to the left and forwards.

**1.13 Medical and pathological information**

Autopsies were carried out on the bodies of all the occupants.

The victims were identified by DNA analysis.

The deaths of all the occupants were the direct result of the accident.

The toxicological report states that the pilot was not under the influence of drugs or alcohol.

**1.14 Fire**

As a result of the impact, the fuel tanks were ruptured and exploded. The fire destroyed the aircraft completely. The rapid intervention of the fire brigade ensured that the fire did not spread to the surrounding vegetation.

**1.15 Survival aspects**

None.

**1.16 Tests and research**

The remains of the aircraft were examined.

The propeller deformations and the traces on the still recognizable mechanical parts imply that the engine was running at high power at the time of the impact.

The appearance of the impact fracture on the left half of the elevator indicates that the elevator was fully deflected at the time of impact.

The last annual check took place on 13 June 2003 and was designated in the documents and in the job reports as 100 hrs/annual inspection according to FAR 43 Appendix D, corresponding to the FAA regulations for civil aircraft in non-commercial use.

The memory stick of a digital camera was found at the scene of the accident. Despite the fire damage, it was possible to print the recorded photographs. Some photographs showed the Giubiasco region, which was flown over some six minutes after take-off.



## 2 Analysis

### 2.1 Technical aspects

According to the eye-witnesses the engine was running regularly and the aircraft was flying in a straight line with a normal attitude.

### 2.2 Operational aspects

The mass of the C182RG when empty, including oil and four gallons of residual petrol, was 1962 lbs. If one adds to this the mass of 88 gallons of petrol in the filled tanks, the mass of the pilot and the three passengers plus the baggage, one arrives at a total mass between 3100 and 3200 lbs. The maximum take-off mass of the aircraft is 3100 lbs. The actual mass of the aircraft was consequently equal to or slightly greater than the maximum take-off mass.

The San Jorio pass is at 2012 m/AMSL, approximately 11 km from Giubiasco. The recommended clearance for crossing a pass is at least 300 m (1000 ft). To cross the San Jorio pass, therefore, an initial altitude of 2312 m/AMSL would be appropriate (Appendix 2). In the prevailing north-easterly wind, downdraughts would be expected at the north face and in the centre of the valley. Under these conditions it would have been necessary to fly into the valley at an altitude of at least 1500 m/AMSL, in order to obtain the necessary altitude along the southern flank to clear the pass.

At an outside temperature of 18 °C, with a mass virtually equal to or above the maximum take-off mass and along the flight path chosen by the pilot, it would only have been possible to clear the pass by flying continuously at full power (2400 rpm, full throttle, mixture full rich, cowl flaps open) and at the maximum rate of climb (Appendix 2).

Because of the light morning mist, in connection with the opposing low sun the pilot was most probably not aware of the danger of his situation until the very last moment.

The gently rising valley deceptively changes the horizon reference. This effect frequently causes pilots to slowly change their attitude without being aware of this. The progressive increase in the angle of attack leads to a gradual drop in speed.

The stall speed of the C182RG with flaps retracted and approaching its maximum mass increases by 7% at a 30° bank angle, by 20% at a 45° bank angle and by 41% at a 60° bank angle. If the speed had already unwittingly been reduced during the climb, it would have been very easy to drop below the stall speed when the aircraft was in a turn.

### 3 Conclusions

#### 3.1 Findings

- The pilot was in possession of a CH/JAR-licence.
- His basic private pilot's training was completed in the United States and concluded with the acquisition of the American licence. The essential further training and the examinations to obtain a CH/JAR-licence were undertaken in Switzerland. The training programme for transcription of a foreign licence in Switzerland does not provide for any specific training in mountain flying. Nevertheless, the flying school had recommended a mountain training flight on the Gotthard-Furka-Grimsel-Nufenen route, with an intermediate landing in Ambri. The flight was performed, outside of the school run, with the aircraft N6412T and with a FAA-licensed flight instructor on the route Gotthard-Furka-Grimsel-Nufenen with an intermediate landing in Ambri.
- The aircraft was licensed for transport. The last annual check and 100 hr check was conducted on 13 June 2003.
- At the time of the accident the engine was providing high power.
- The pilot and three passengers were on board.
- The aircraft was fully refuelled before take-off.
- In addition to the pilot's case, additional items of equipment with a mass of about 50 lbs were found on board (4 life jackets, 2 Bottlang folders, tools, etc.).
- The maximum take-off mass was 3100 lbs.
- The estimated take-off mass was 3100 to 3200 lbs.
- Prior to take-off, the pilot confirmed receipt of "Information A" on the Locarno Traffic frequency. Among other things, the ATIS information includes the pressure value for Locarno, enabling the altimeter to be set. The last report on the Locarno airport frequency was: "N12T Bellinzona, 3000 ft, climbing".
- At the time of the accident the outside temperature was 18 °C.
- There was a light morning mist.
- The direction of flight was approximately 090°, the position of the sun was 74° with an elevation of 15°.
- The wind blew from the direction of north-north-east with a speed of 4 to 8 knots.

### 3.2 Causes

The crash was the result of a loss of control over the aircraft, followed by a collision with the terrain.

The following factors contributed to the accident:

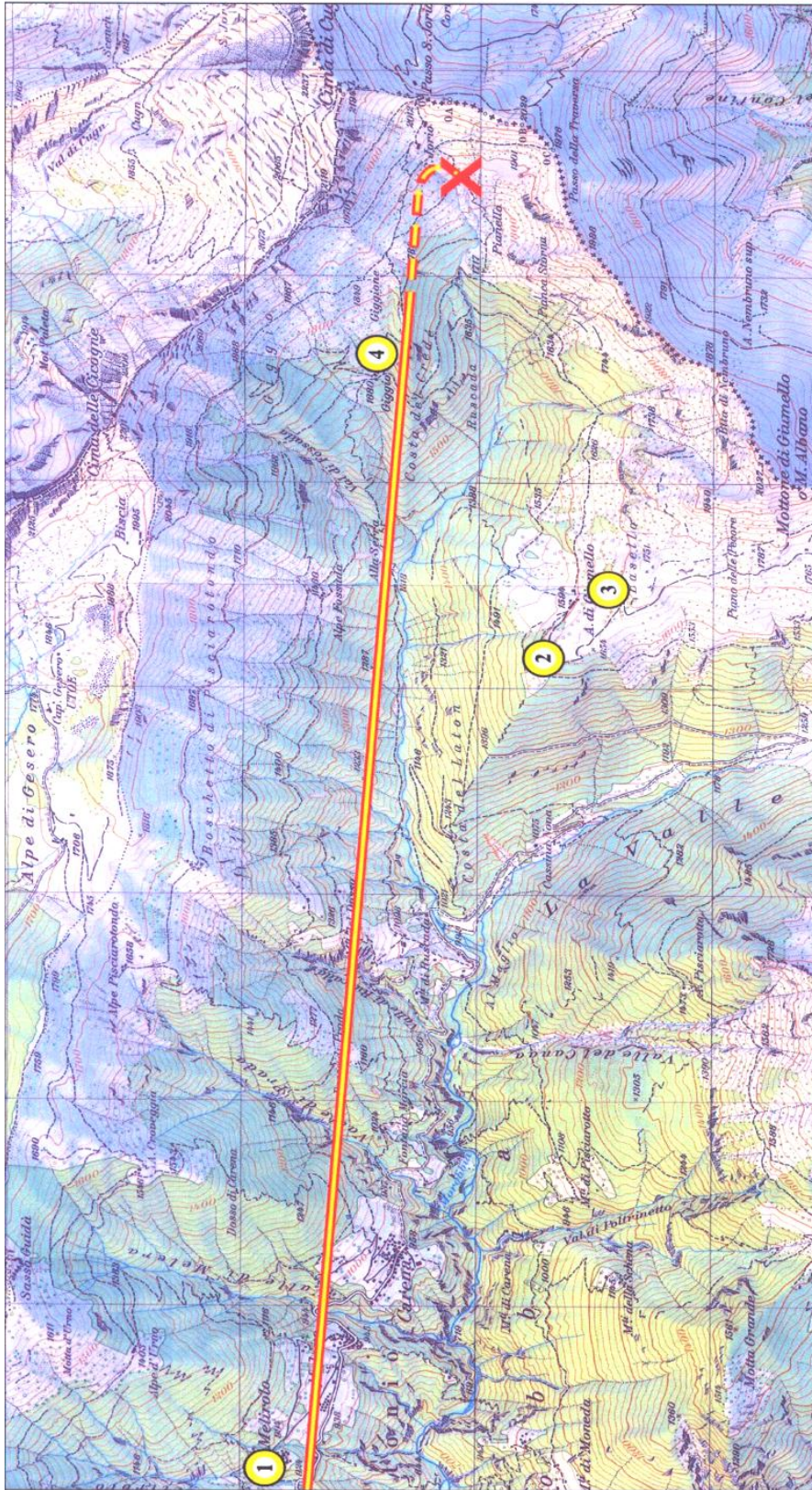
- The unsuitable tactics for flying in mountainous areas
- the pilot's limited experience of Alpine flying
- the high take-off mass
- the low downdraughts on the northern side of the valley
- the pilot's optical confusion due to the morning mist and the low sun





Berne, 14 December 2005

Aircraft Accident Investigation Bureau

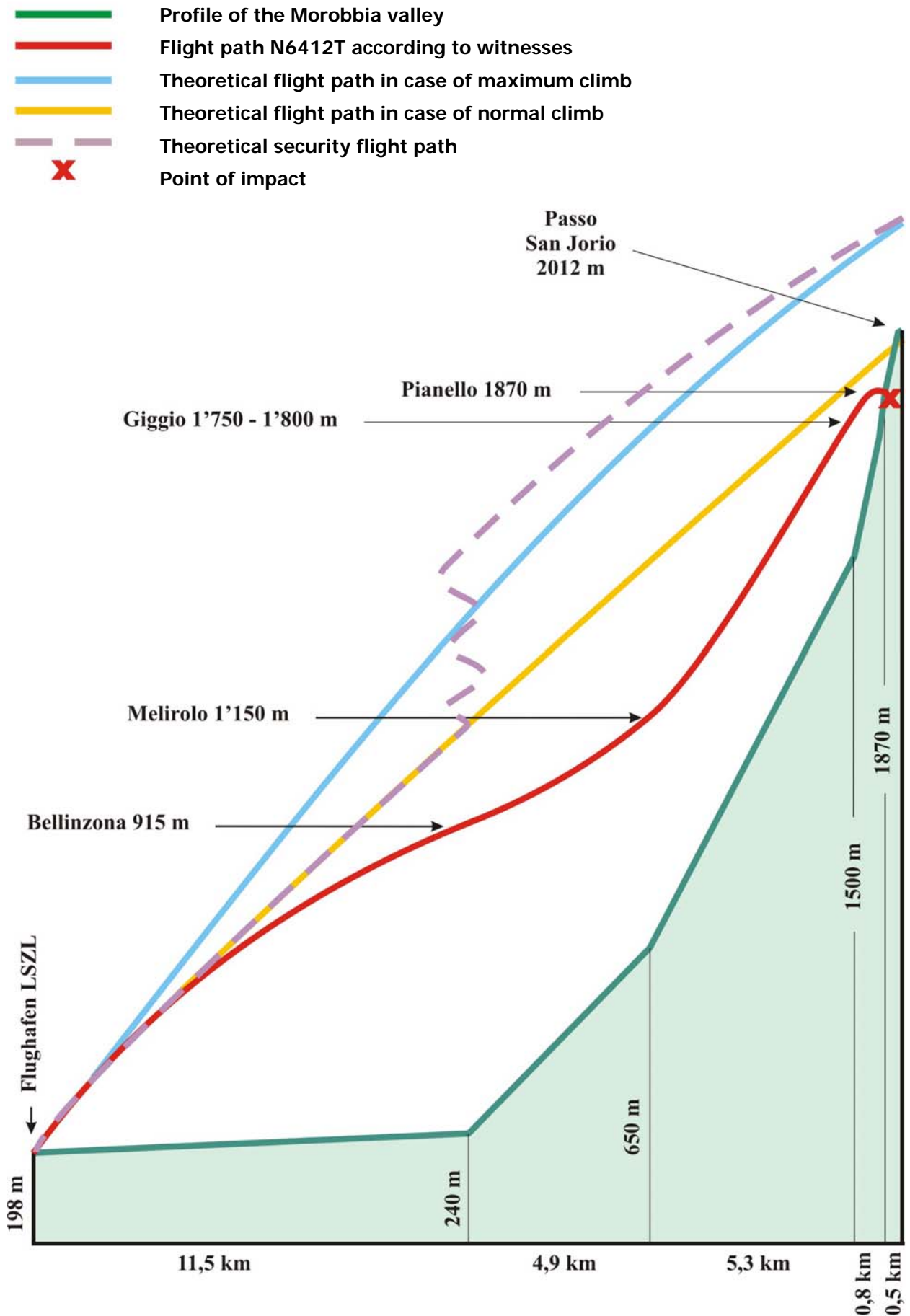
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Appendix 1



-  Flight path observed by witnesses
-  Probable flight path
-  Position of the witnesses
-  Point of impact

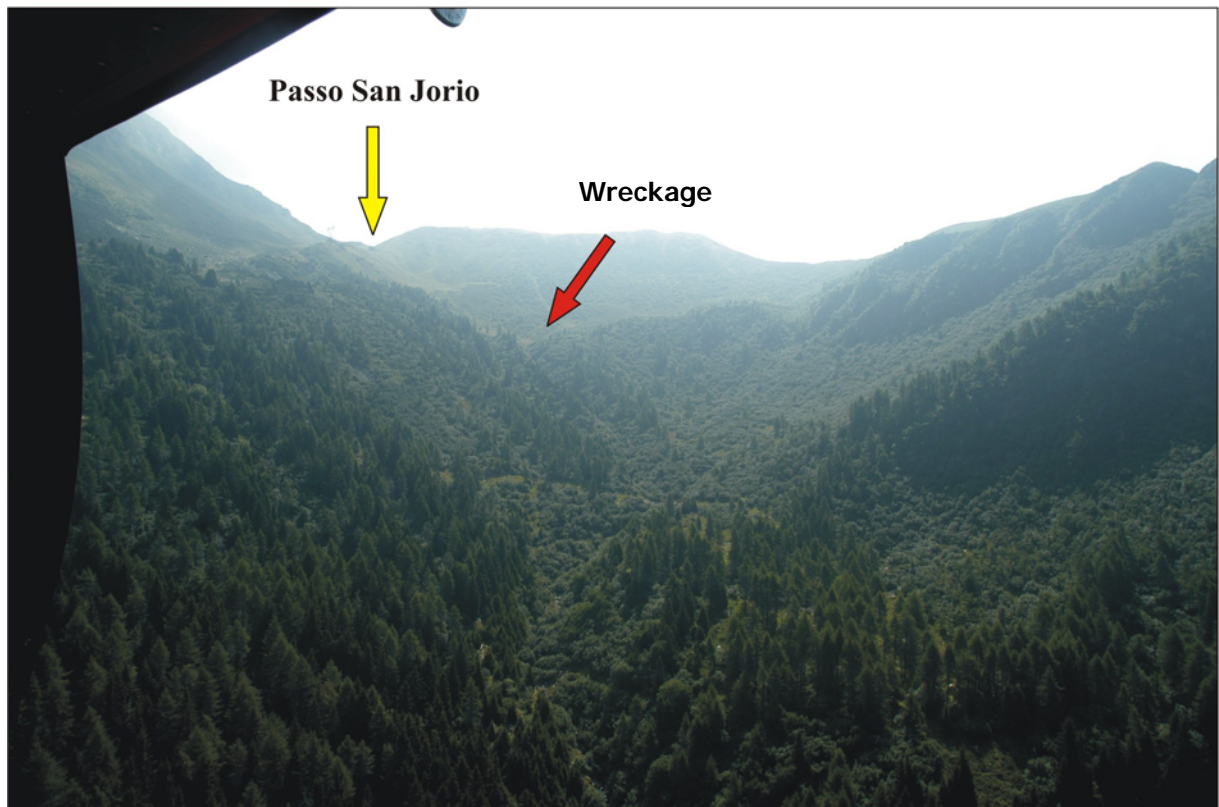
# Appendix 2



### Appendix 3



Site of impact and wreckage



Morobbia valley, sight in direction east