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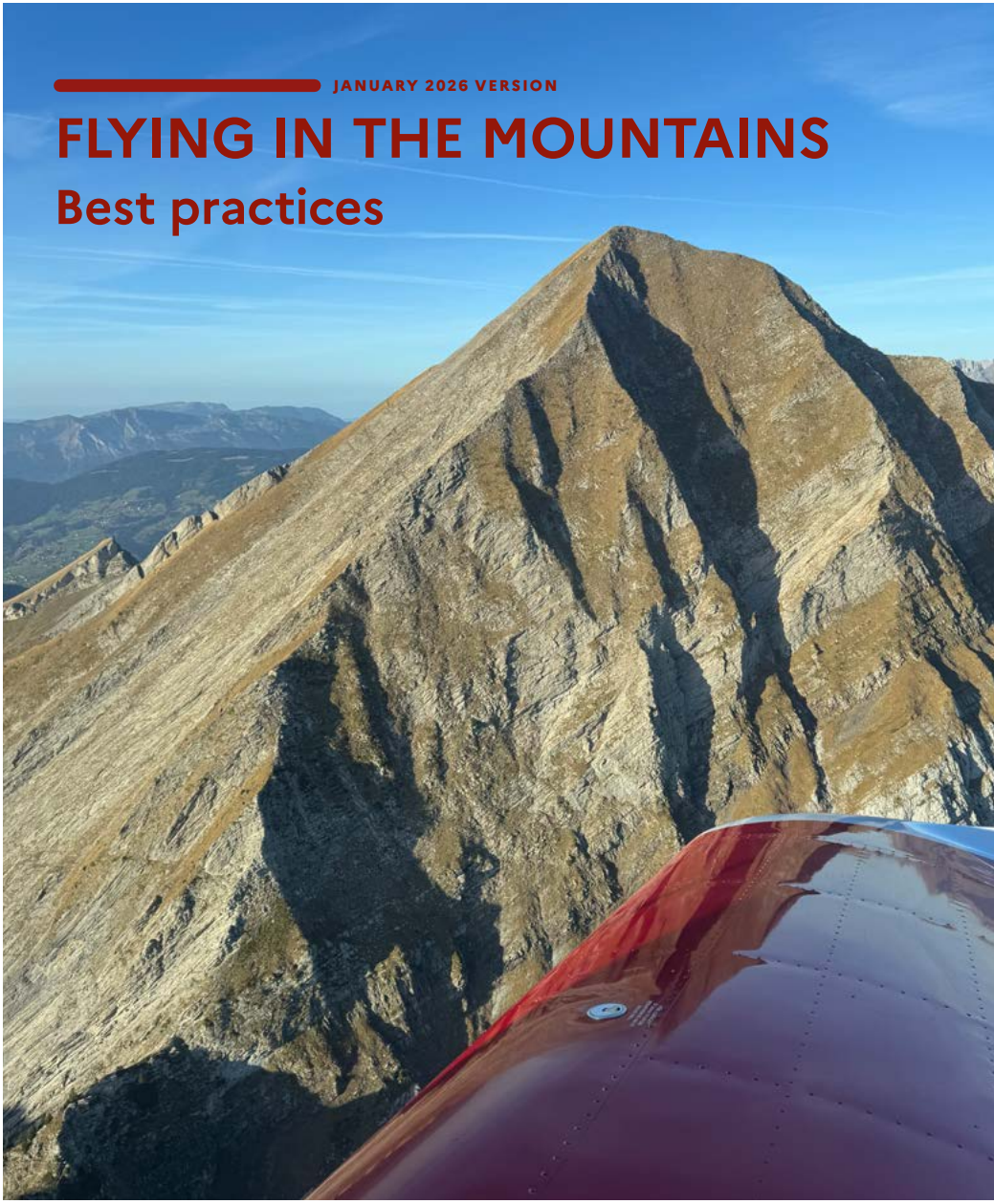
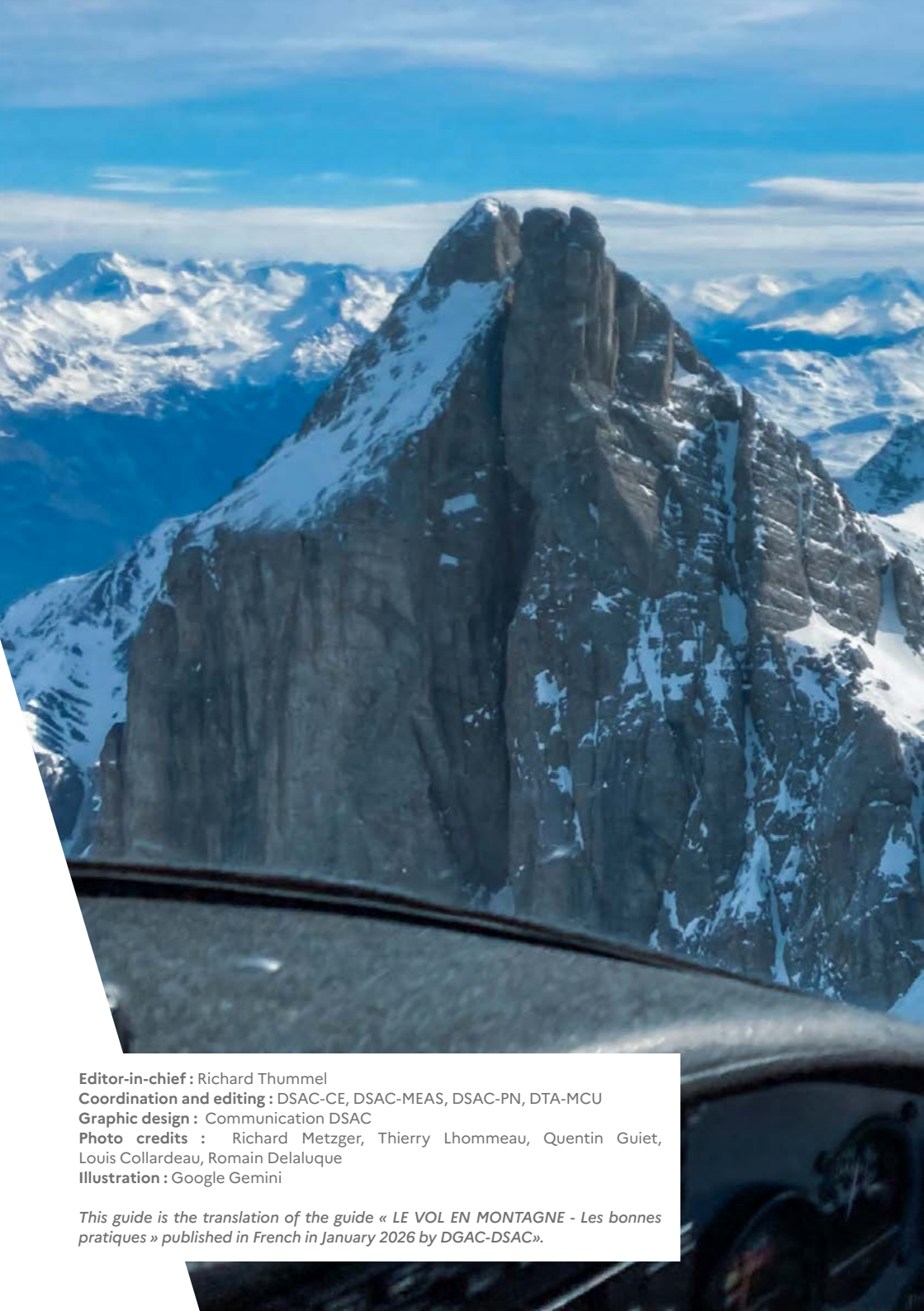
FLYING IN THE MOUNTAINS

Best practices





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This guide is the translation of the guide « LE VOL EN MONTAGNE - Les bonnes pratiques » published in French in January 2026 by DGAC-DSAC».

INTRODUCTION

Flying in the mountains is one of the most rewarding flying experiences. However, this environment presents specific threats and dangers that it is essential to be aware of them before venturing there. Flying in the mountains inherently carries a higher level of risk than flying in the lowlands and therefore requires additional skills and knowledge to ensure an acceptable level of safety.

Without additional training, a pilot is not fully prepared to deal with the specific challenges and hazards associated with flying in mountainous terrain.

This guide is primarily intended for pilots of aeroplanes, microlight aircraft or helicopters who have no experience flying in mountainous terrain in France. It sets out the key recommendations and best practices that pilots should be aware of before undertaking such flights.

Pilots qualified for mountain flying will nevertheless find useful reminders, clarifications and recommendations here. However, this guide does not cover landing on mountain airfields and altiports, and instead focusses solely on navigation in mountainous terrain.

This concise guide is not intended as a self-study resource. Pilots are encouraged to explore the various topics covered in greater depth with organisations specialising in mountain flying training.

It is not intended to replace the many reference books on mountain flying. Various French federations and associations, such as the French Aeronautical Federation (FFA), the French Microlight Federation (FFPLUM) through its National Mountain Flying Centre (PNVM), and the French Association of Mountain Pilots (AFPM), promote such publications on their respective websites. The Civil Aviation Safety Directorate (DSAC) thanks them for their contribution to the development of this guide.

RECOMMENDATIONS AND BEST PRACTICES

TRAINING

The mountains present a challenging environment that requires **specific knowledge and skills**. Various training organisations offer theoretical and practical training in mountain flying for aeroplanes, helicopters or microlight aircraft.

Training is strongly recommended before undertaking a flight in mountainous terrain without prior experience in such an environment. Furthermore, maintaining **regular practice** and **currency** is essential to fly safely.

FLIGHT PREPARATION

During flight preparation, several aspects require particular attention :

→ The terrain dictates **minimum flight altitudes**, taking into account regulatory minimum heights, particularly over national parks and national natural reserves, areas of major sensitivity, obstacles, as well as allowing for an adequate safety margin;

→ The **route** must be carefully planned, both horizontally and vertically, to determine the safest route through the terrain. A bad-weather alternative route must be systematically prepared for every flight;

→ A detailed analysis of **weather conditions** is essential. Weather conditions can change rapidly and can be severe in mountainous areas;

→ **NOTAMs** provide information on firing range activity, the presence of obstacles such as slacklines (or highlines), or areas where people or activities may gather temporarily (air shows, the Tour de France cycling race, etc.);

→ The **equipment carried by occupants** (clothing, footwear, PLB, etc.) must be suitable, as they may be faced with an emergency landing at high altitude.

If the planned flight crosses an **international border**, pilots must, in addition to filing the required flight plan, familiarise themselves with French regulations and those of the neighbouring country, which may require specific routes or landings at an aerodrome before entering mountain areas.

FLYING

The **absence of natural horizon** requires the pilot to adjust their flying technique, particularly with regards to maintaining speed and altitude. It may also contribute to a gradual transition into the region of reversed controls, which could lead to a loss of control. The pilot's visual scan must therefore be adjusted to detect any inconsistencies in instrument readings.

Perception of obstacles and the clearance available (both lateral and vertical) may also be impaired.

Flying in mountainous terrain also involves significant **variations in light levels**. Transitioning from a sunlit area into shade requires a few seconds for the eyes to adjust before the terrain becomes clearly visible again.

PERFORMANCES

Air density decreases as altitude and temperature increase. Less dense air reduces both the power output of a naturally aspirated piston engine and the aircraft's aerodynamic performance. It is important to take **density altitude** into account when calculating performance.

A general rule of thumb is a 10% reduction in engine power for every 3,000 ft of density altitude.

It is important to note the influence of air mass on performance. A **light aircraft** is more responsive to controls and climbs better, but is more sensitive to turbulence.

AEROLOGY

Local wind phenomena typically begin to develop by late morning, and a strong valley breeze can arise even when there is no prevailing wind. Strong winds can generate powerful **downslope flows**.

Strong solar radiation also intensifies convection, creating a **turbulent atmosphere** that makes flying more difficult and reduces comfort for pilots and passengers. For reference, these points are covered in DGAC Safety Information Leaflet No. 2022/03.

It is therefore advisable to **fly in the morning** before these conditions develop. In addition, there are usually more gliders and paragliders airborne in the afternoon.

TRAJECTORIES

When entering a valley, pilots must be prepared to **turn back** at any point during the flight and thus to adjust their flight path accordingly, bearing in mind that the turning radius increases with altitude.

Where no other constraints exist (wind, visibility, obstacles, etc.), it is good practice to fly on the right-hand side of valleys.

However, flights have traditionally been conducted on the left-hand side in the Chamonix valley and the Mont-Blanc massif, given the climb performance of the aircraft and the configuration of the valley.

Passes and ridges should not be approached head-on, but at an angle allowing a retreat if there is any doubt about safely crossing them.

When flying in the vicinity of an altiport or a mountain airfield, the **aerodrome traffic pattern** shall be avoided.

You should check your altitude **before** attempting a ridge or pass. If you are too low, you should turn back and adjust your route.

Temperature affects true altitude. When it is colder, you are lower than the altimeter indicates.

Aerology must be considered, as **air currents** (updrafts or downdrafts) can significantly affect aircraft performance and flight path.

Relying solely on a horizontal GPS track is not suitable for mountain flying. **Familiarity with the terrain** and distinctive mountain features is a key asset for safety. **Careful map reading** is essential throughout the flight to avoid navigation errors, which are more frequent in such an environment (e.g., entering the wrong valley).

TERRAIN AND MID-AIR COLLISION AVOIDANCE

Cables and pylons are numerous in the mountains. Some may be located above 10,000 ft, are not always visible depending on the lighting conditions, and may not always documented as they can be temporary.

Even if a cable appears to be identified, there may be one or more others nearby.

Awareness of these obstacles must be combined with vigilance regarding **other aircraft** operating in mountainous areas, particularly during slope soaring. High concentration of paragliders around launch sites, or their isolated presence, including near aerodrome patterns, pose a hazard in all seasons.
This vigilance should also include **large birds of prey**.

Under the **Rules of the Air** (SERA), non-powered aircraft have priority, but it is the responsibility of each pilot to maintain a safe distance from other aircraft and to give way when they are aware that avoidance of the other aircraft is impaired.

Blind spots in the cockpit can be significant, particularly in helicopters on steep climb routes, in high-wing aircraft during climb, and in low-wing aircraft during descent.

Passengers can help prevent mid-air collisions, if properly briefed.

Fitting aircraft with **electronic conspicuity (or visibility) devices** is strongly recommended. An active **transponder** can assist other aircraft in detecting your aircraft. However, system interoperability is not currently guaranteed, and such devices should only be used as an aid to the fundamental principle of 'see and avoid'.

ALTIMETER SETTING

In mountainous areas, it is preferable to set and report **altitude using QNH**, although it can **change rapidly** and needs to be updated frequently.

COMMUNICATION

To improve air traffic awareness among crews, the use of the **mountain frequency 123.065 MHz** is **mandatory** for aerodrome traffic at altiports and mountain airfields that do not have their own frequency. This enables aircraft operating nearby or overflying the area to identify the position of manoeuvring aircraft and thus minimises the risk of mid-air collision.

Use of this frequency is also **recommended** during other phases of flight in mountainous terrain when radio contact cannot be established with the Flight Information Service.

NB. This frequency replaced 130.0 MHz on 1 November 2025.

On aircraft equipped with two VHF sets, monitoring the mountain frequency is good practice.

To avoid overloading the frequency and to help identify the position of other aircraft, **concise and appropriate phraseology** should be used, including

the following information :

→ Type of aircraft (it may be helpful to preface this with 'helicopter' or 'microlight'),

→ Registration,

→ Origin/destination (not necessarily the origin/destination airfields but relevant landmarks that help to visualise the aircraft's track),

→ Altitude,

→ Position (preferably expressed in relation to known landmarks),

→ Track,

→ Intentions.

The initial call should enable other pilots to identify the area of operation without excessive detail. Familiarity with the names of mountain ranges, peaks and passes makes this easier.

E.g.: « *Mousquetaire F-PA, du Versoud vers Courchevel, 8000 ft QNH 1 0 1 4, approche du col de la Madeleine du Sud vers le Nord.*
Mousquetaire F-PA, from Versoud to Courchevel, 8000 ft QNH 1 0 1 4, approaching Madeleine pass, Northbound. »

If a pilot identifies a potential conflict, they should respond by clearly stating their position relative to other aircraft.
E.g. : « *Écureuil F-XM, en montée initiale de Courchevel, 6500 ft QNH 1 0 1 4 en montée vers 8500 ft, approche également le col de la Madeleine estimé dans deux minutes, je le franchirai côté Est.*
Écureuil F-XM, initial climb from Courchevel, 6500 ft QNH 1 0 1 4 climbing 8500 ft, also approaching la Madeleine pass estimated in two minutes, I will cross it East side. »
« *Mousquetaire F–PA, reçu, je le franchirai côté Ouest.*
Mousquetaire F-PA, roger, I will cross it West side.»

The mountain frequency may be used to broadcast information affecting the safety of other aircraft.
Ex : « *Mousquetaire F-PA, je signale de fortes turbulences au passage du col de la Madeleine.*
Mousquetaire F-PA, I report strong turbulences when crossing the Madeleine pass. »

Knowledge of, and ability to use, the French language can enhance safety when communicating with pilots who do not speak English.

PHYSIOLOGY

At high altitudes, reduced air density leads to **hypoxia**, which affects physical and mental performance. Oxygen use must comply with applicable operational regulations.

Visual performance is reduced.

In particular, '**whiteout**', which results from a combination of glare from snow-covered ground and a diffuse, milky sky, causes significant sensory illusions.

Fatigue can set in and judgement may become impaired.

Exposure to the sun in the cockpit can lead to **dehydration** or even heatstroke.

All these factors must be taken into account before every flight to ensure safety.

These factors also require continuous **self-monitoring** during flight, which may mean cutting it short if necessary.

NUISANCES

Whilst safety remains the top priority, it is important to take noise into account, as the mountains are an environment **highly sensitive to noise**.

Wildlife and people engaged in mountain activities must be respected through appropriate flight paths and altitudes, as well as careful use of engine power, particularly during descents.

As a reminder, powered aircraft must fly at a distance of at least 500 ft (150 m) from the terrain.

Flying too close to the terrain is unlikely to reassure occasional passengers

and does not enhance the flight experience.

Areas of major sensitivity for large birds of prey published in the AIP (ENR 5.6) must be taken into account when choosing a flight path, along with the minimum fly-over altitudes applicable to national parks and national nature reserves.

The high volume of visitors to the Mont Blanc Massif makes this area particularly sensitive to noise, and exemplary behaviour is required of every pilot.

DECISION

Every pilot must assess their ability to safely complete a flight, particularly in this mountainous environment, which presents many hazards.

With increasing experience, pilots may be tempted to extend their limits and thus take greater risks. They must therefore maintain situational awareness at all times and maintain an adequate **safety margin**.

Turning back must always remain an option.

Training enables pilots to be better prepared for this unique environment, while maintaining humility.

A NOTE ON MOUNTAIN LANDING SITES

Although this is not the focus of this guide, it is important to recall a few principles regarding landing options in mountainous terrain in France :

→ **Aerodromes** located in valleys within mountainous areas require specific skills and are often classified as 'restricted use' with the VAC chart specifying their conditions of use. Some, however, are open to public air traffic (CAP), and pilots are advised to become familiar with them beforehand with an instructor.

→ **Mountain airfields** (altisurfaces) are platforms authorised by the Departmental Prefect. To use them, aeroplane pilots must hold a mountain rating. Microlight pilots are strongly recommended to complete the mountain training course provided by the French Microlight Federation (FFPLUM).

→ **Altiports** are a type of aerodrome. Their use requires the same qualifications as altisurfaces, with the alternate for aeroplane pilots to hold a specific access authorisation for each altiport.

→ The French Environment Code (Mountain Act) **prohibits motorized aircraft from landing for recreational purposes in mountain areas** outside aerodromes and sites authorised by the administrative authority (altisurfaces, helisurfaces, microlight bases). Furthermore, the embarkation and disembarkation of passengers by motorised aircraft for recreational purposes is permitted only at aerodromes, including altiports and heliports.

APPENDIX – List of the most recent BEA reports relating to mountain flights

This appendix provides a non-exhaustive list of reports, in French, from the French Bureau of Enquiry and Analysis (BEA) published since 2017, concerning accidents related to topics addressed in this guide.

Piper PA28 F-GHBA – July 2017 – Plaine de Saint Nicolas (73)
Stall while attempting to turn in a valley in mountainous terrain; collision with trees and post-impact fire.

Airbus EC135 F-GOPG – February 2018 – Sainte-Foy-Tarentaise (73)
Collision with a cable during take-off from a ski slope during a mountain rescue operation.

Van's RV7 D-EIOI – August 2018 – Bourg-Saint Maurice (73)
Flight continued in high mountains in stormy weather; fuel system icing, loss of control, collision with terrain.

Cirrus SR22 N918SE – September 2020 – La Chevillotte (25)
Unstabilised approach; loss of control during aborted approach; collision with terrain followed by fire.

DR400 F-GSBS – September 2020 – Pas de la Coche (38)
Transition to the region of reversed command; collision with terrain; post-impact fire during a BIA flight in mountainous terrain.

Schweizer 269C-1 F-HAGO – January 2021 – Bastelica (2A)
Decrease in main rotor speed; loss of altitude while crossing a mountain pass; forced landing on snow-covered surface; helicopter rollover.

Bell 206 F-HUBA – February 2021 – Courchevel (73)
Collision with terrain during low-altitude flight in mountainous terrain.

DR400-140B F-GHYQ – March 2021 – Fort de Montgilbert (73)
Collision with treetops while crossing a mountain pass.

Flight Design CTLS F-HVAT – June 2021 – Col des Prés, Thoiry (73)
Attempt to turn before reaching the top of a pass; collision with trees and terrain; post-impact fire; during training.

DR500 F-HMYY – August 2021 – Col du Glandon (73)
Collision with trees and terrain, followed by fire during a valley flight.

R44 F-HARY – January 2022 – Pas de la Croix (63)
Collision with terrain in adverse weather conditions for VFR flight during cruise; post-impact fire.

Jodel D140C F-HJLB – May 2022 – Les Adrets (38)
Collision with a row of trees resulting in post-impact fire during an introductory flight.

Jodel D113 F-PLUM – June 2022 – Glacier d'Argentière (74)
Collision with terrain in mountainous area; post-impact fire.

EC155B1 F-HEGT and Nord 1203 F-AYVV – February 2024 – Cozy (73)
Mid-air collision.

Piper PA18 F-BAYP and a paraglider – January 2025 – Les Allues (73)
Collision with a paraglider during approach to an altiport; loss of control; collision with a house.

Additional :
AS350 B3 I-EDIC and Jodel D140E F-PMGV – January 2019 – La Thuile (Aosta, Italy)
Mid-air collision; report in English available on the ANSV site.

THE 11 COMMANDMENTS OF MOUNTAIN FLYING

1 – I am trained to fly in mountainous terrain.

2 – I prepare my flight with care (altitudes, routes, performance, NOTAMs, weather, atmospheric conditions, fuel, survival equipment, etc.).

3 – I take density altitude into account when calculating my aircraft's performance and remain below the calculated maximum take-off weight, maintaining an adequate safety margin.

4 – I avoid flying in the afternoon, in strong winds, or in extreme heat.

5 – I am aware that my perception of the horizon may be impaired and that I am subject to optical illusions.

6 – I use routes suitable for mountainous terrain.

7 – I adjust my flight path and power to minimise disturbance to people or animals below.

8 – I am vigilant regarding power lines, pylons, other aircraft, and birds of prey.

9 – I communicate my position and altitude clearly and ensure my transponder is switched on.

10 – I am aware that high altitude reduces my physical abilities (dehydration, heatstroke, hypoxia, etc.).

11 – I don't hesitate to postpone my flight if I have any doubts about my ability to complete it.

And above all, I always allow a safety margin!

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