MOUNTAIN FLYING

As compared to flatland soaring

The purpose of this seminar is to emphasise the differences between these two flight styles and environments

The seminar is especially directed to the Junior Pilots, coming to Rieti for the J-WGC of 2007

Main differences

- The influence of the territory
- Typical mountain soaring conditions
- Turbulence, and strong sink
- Better lookout - improving airspace scanning techniques

The influence of the territory

The pilot must:

- Maintain the ridge well in sight
- Constantly re-assess its distance from the ridge
- Safely assess the intensity of turbulence
- Scan the airspace effectively for other (glider) traffic and fixed obstacles (wires, cables)
- Specifically plan your flight
- Be well-rested, trained and current

The influence of the territory

General Rules - The pilot must:

- Have flown with a mountain-flying instructor
- Maintain higher flight speeds
- Keep excellent look-out
- Always prepare himself with a good pre-flight briefing (or self-briefing), not only in contests
- Gradually explore the territory
- Study every landable area and fields, before the flight
- Plan the following phases of the flight during every climb
- Have the necessary and correct equipment/accessories

Typical mountain soaring conditions

- Ridge lift
- Thermal ridge lift
- Thermodynamic lift
- Convergence, cloud streets in alpine territory
- Valley breezes
- Sea breezes and the influence of mountain ranges
- Lee-side thermals
- Thermal-wave inside the valleys
- Wave flying

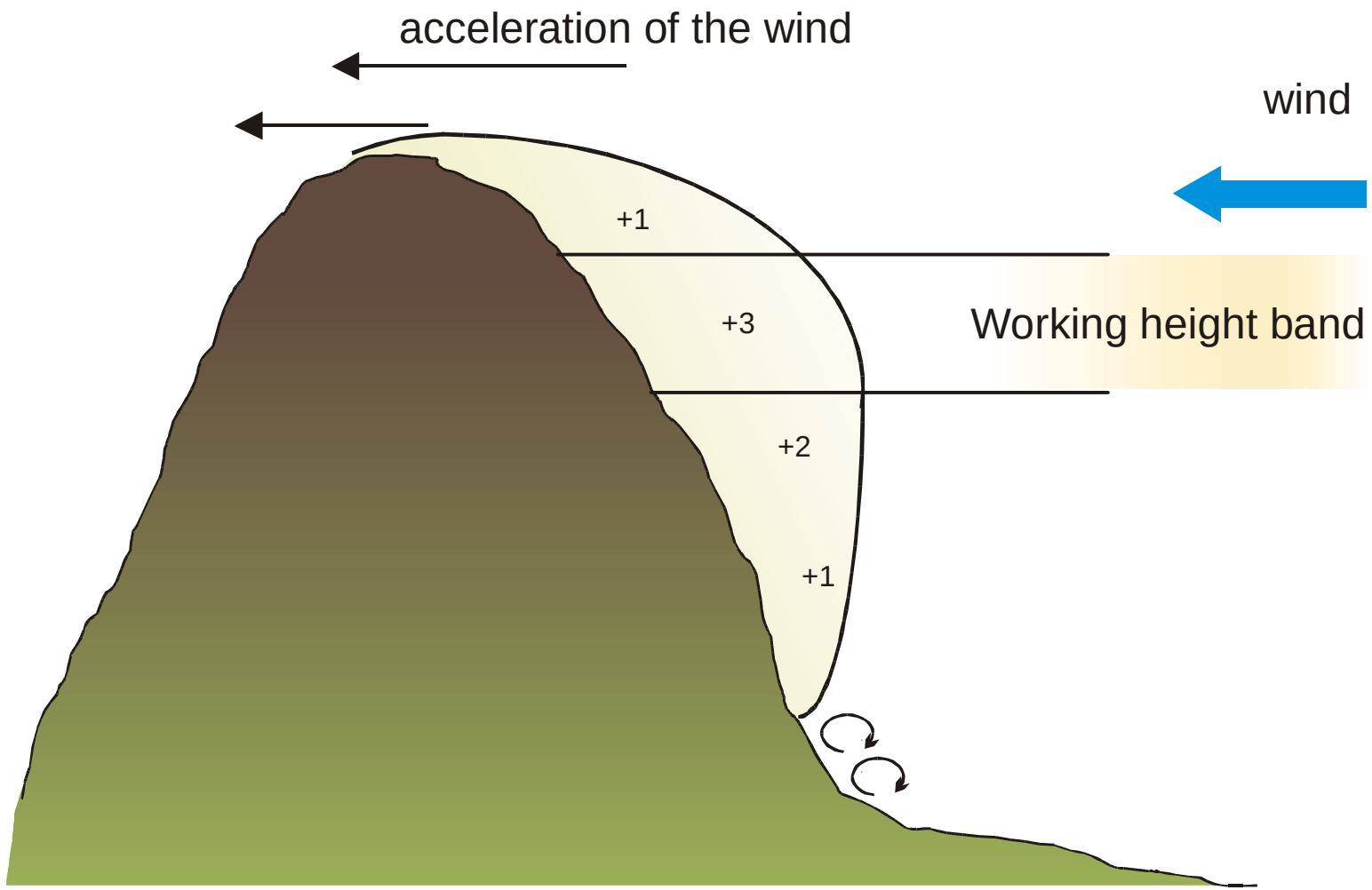
Ridge Lift

Requirement: wind

Flying technique

- Speed higher than E-max (Best Glide Speed)
- Correct “figure 8” turns
- Exploiting the most energetic height-band
- Adjust distance from the ridge accordingly to steepness of the ridge
- Placing the glider in the correct position over the ridge line

Ridge Lift



Ridge Lift

Warnings

- Wind gets stronger at the top of the ridge
- Look-out for cables and other obstacles
- Other gliders do fly on the same or opposite heading
- Always remember the basic rules for ridge flying:

  a) right of way

  b) overtaking

  c) turns: always turn away from the ridge

  d) safe distance from the ridge

Thermal Ridge Lift

Features:

Super-adiabatic gradient

Where to look for thermals

The tephigram and the thermal trigger points

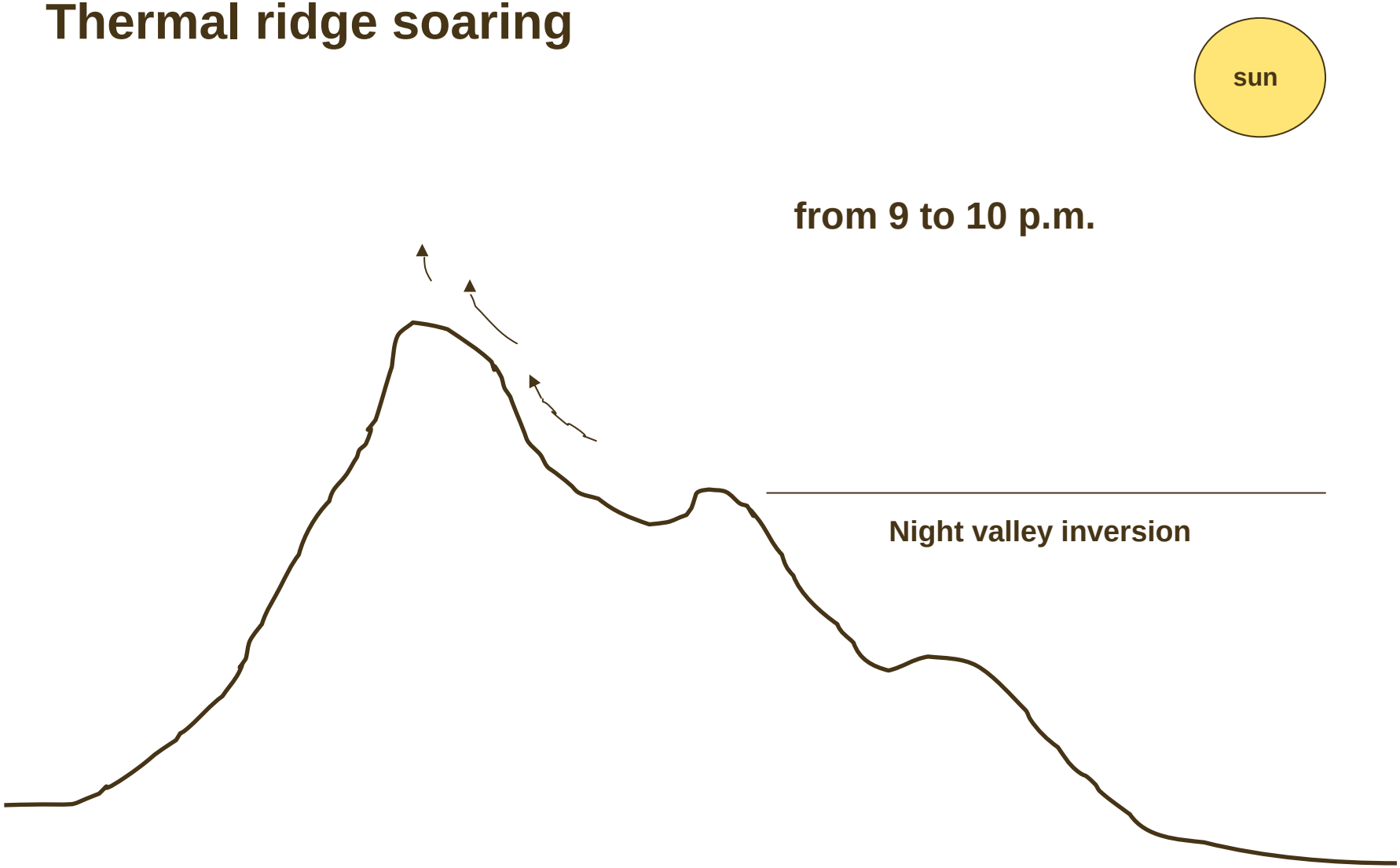
Thermals start from different places during different times of the day (position of the sun)

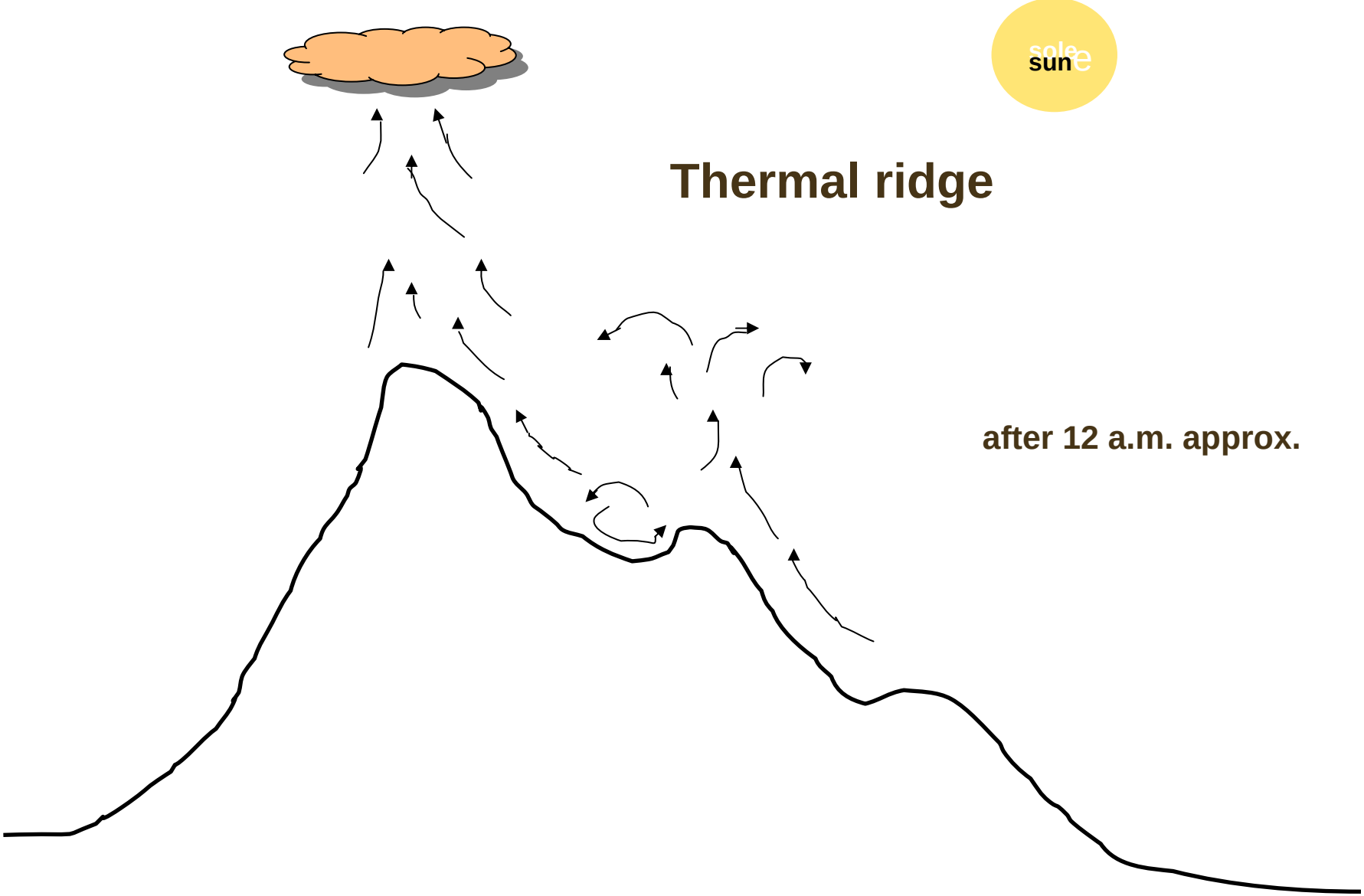
Thermal Ridge Lift

Warnings

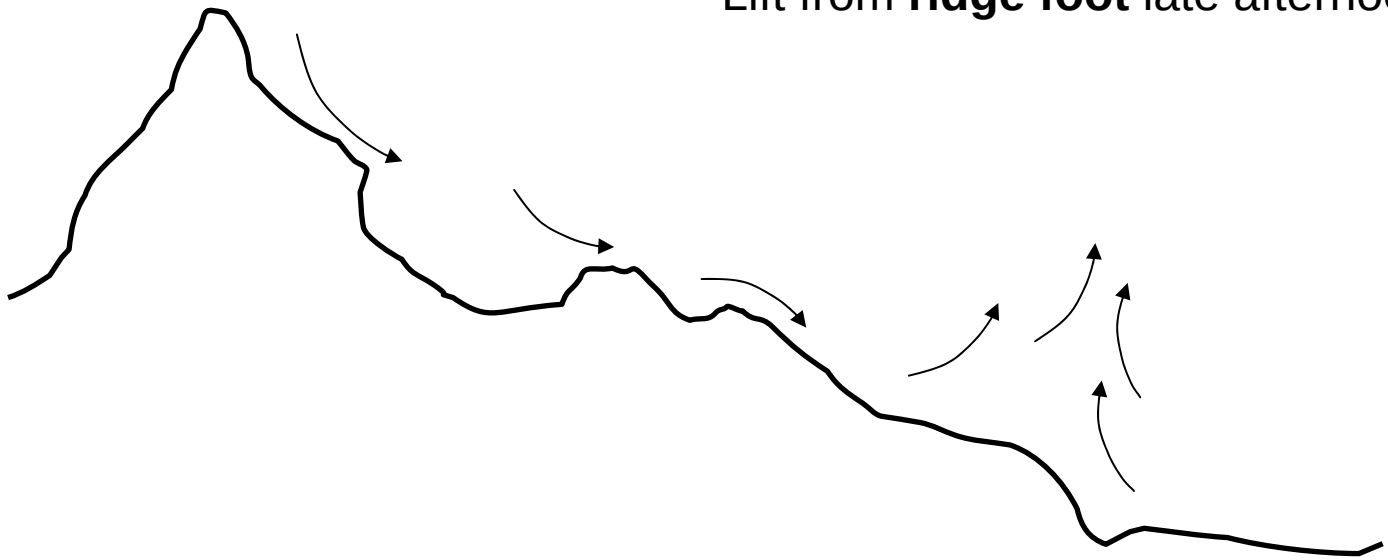
- Turbulence and strong sink; even worse when the inversion is close or below the top of the ridge
- Don’t progress into unknown, or dead-end valleys; avoid high plateaux
- Stalls can happen suddenly, much more frequently than over flatland. Keep safe flying speeds
- “Figure 8” turns until over the ridge top
- Keep excellent rudder/stick co-ordination

Thermal ridge soaring

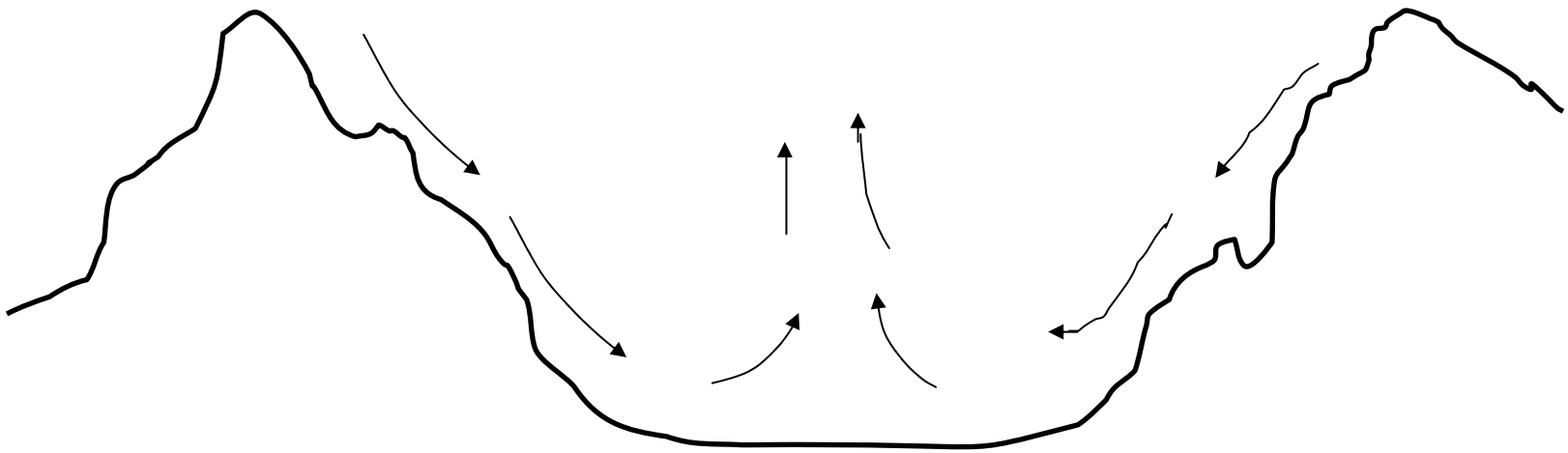



sole
sun
Thermal ridge
after 12 a.m. approx.

Lift from **ridge foot** late afternoon



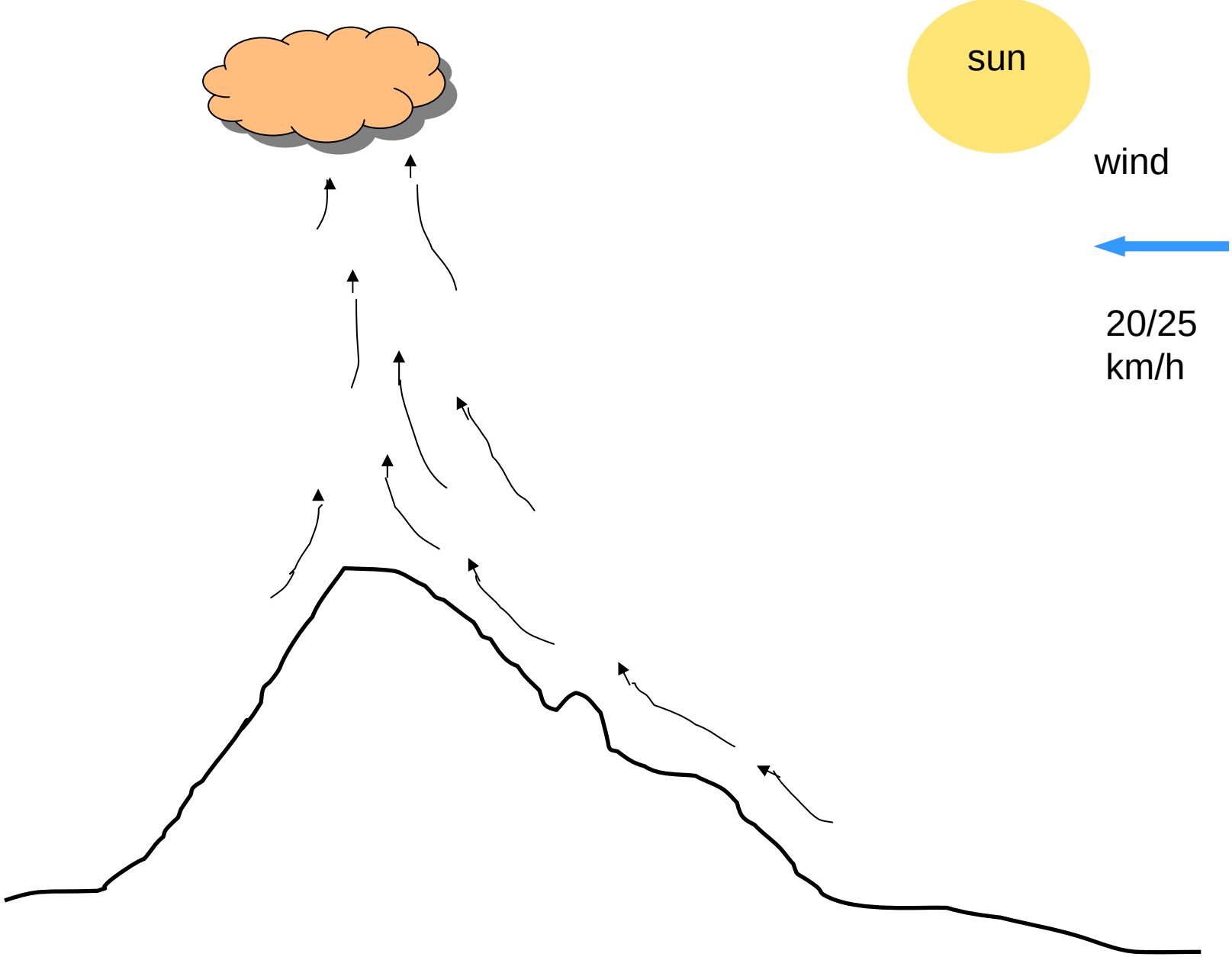
Lift from the **valley** late afternoon



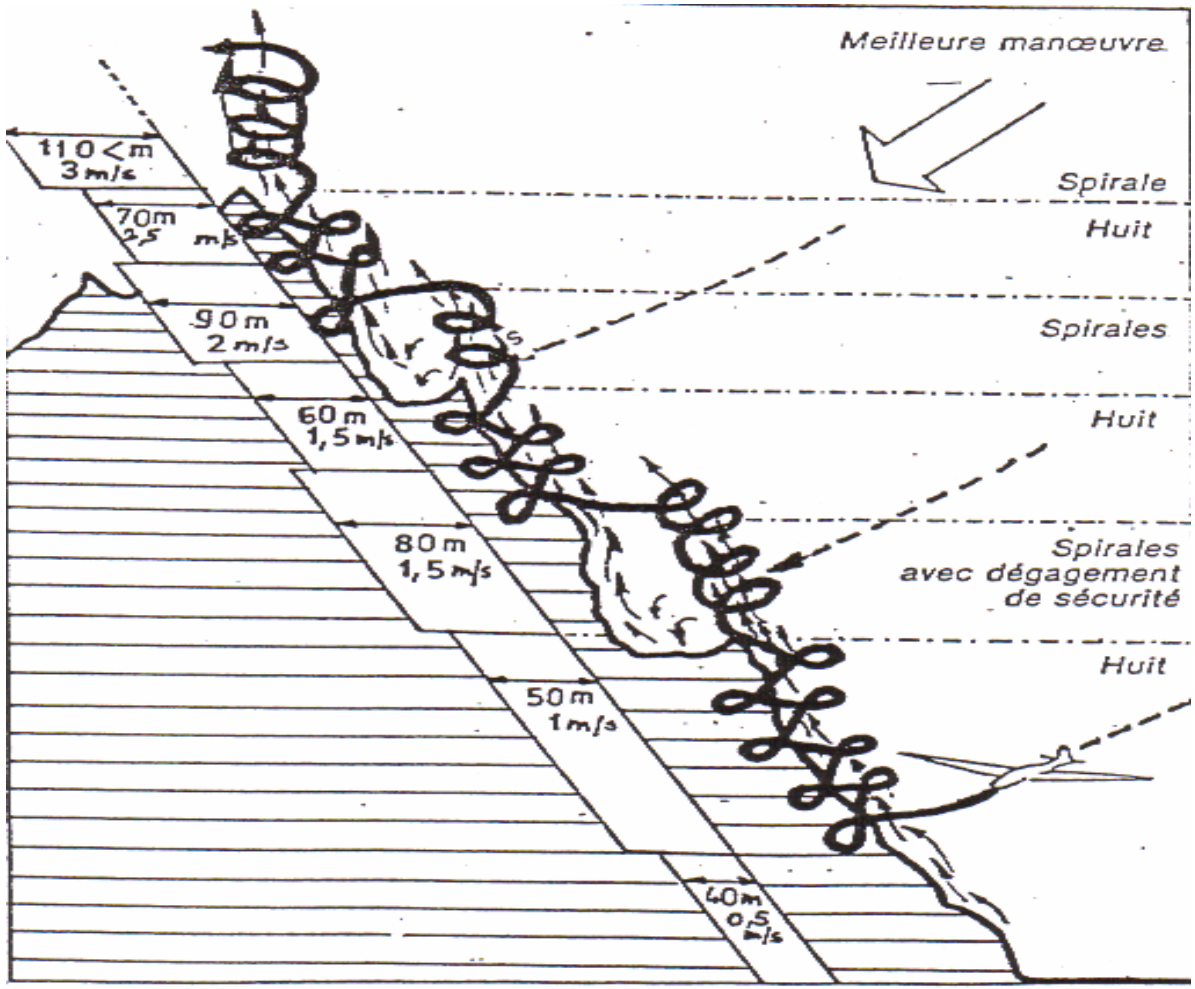
Thermodynamic lift

Requirements and features:

- The ridge surface must be exposed to the wind and sun at the same time
- The stronger the wind, the more ridge-flying techniques apply
- The weaker the wind, the more thermal-flying techniques apply


sun
wind
20/25
km/h

When and where make 8 turns or spirals



Thermodynamic lift

Warnings

- Climb to a higher level before crossing a gap
- Beware of wave resonance phenomena
- Same rules as per Thermal mountain-flying, even higher importance for flying “8” instead of circles

Cloud Streets

How and where:

- Thermodynamic lift, good gradient up to condensation altitude, an inversion just above
- Convergence of air masses
- In the mountains, cloud streets are rectangular to the wind direction (in the flatland, parallel to wind)
- Cloud streets are stationary in alpine territory (in the flatland, they drift along with the wind)

Sea-breezes

How and where:

- Synoptic wind and the breeze: opposite directions
- High surface temperatures in the continental side
- Mountain ranges allow for easier soaring exploitation

Sea-breezes

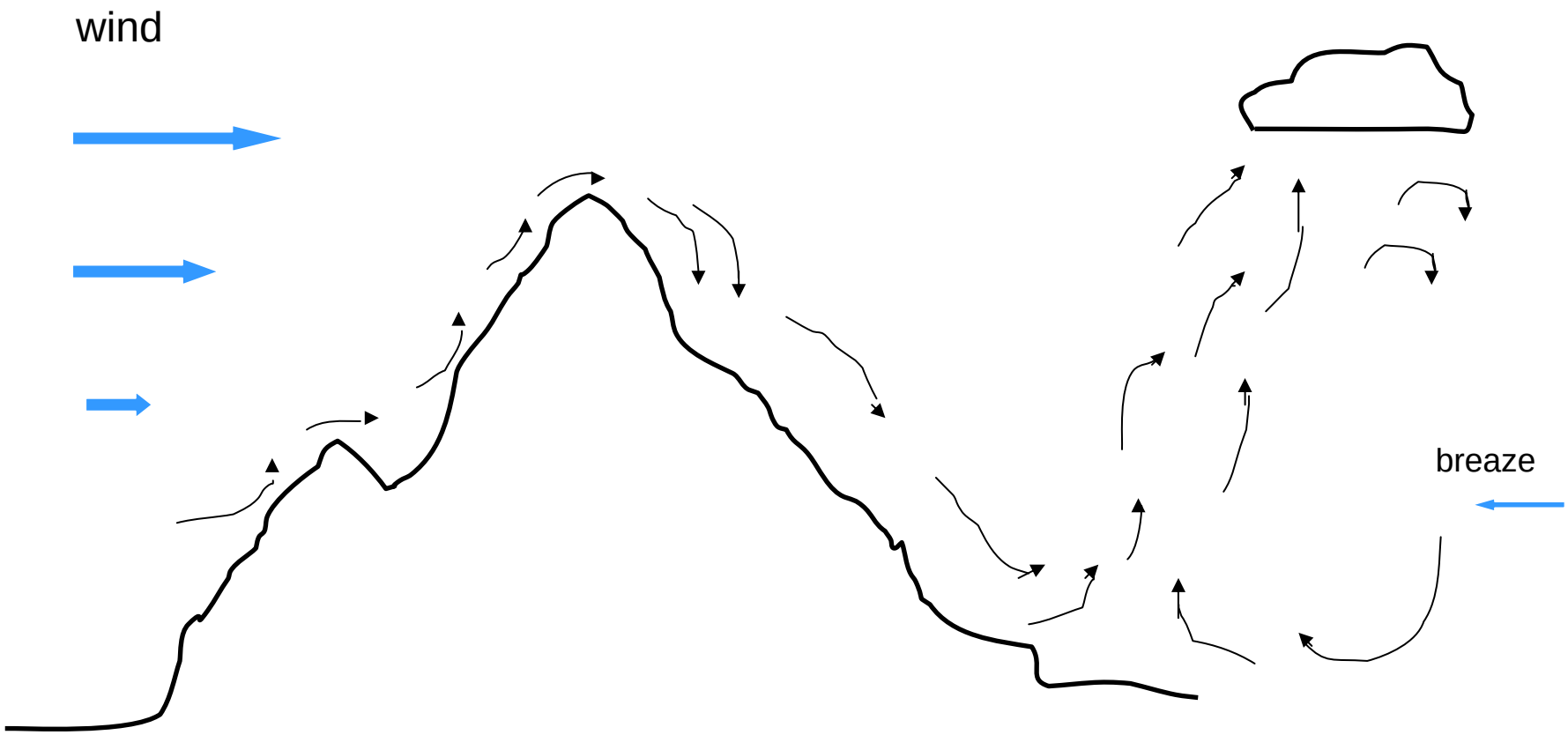
Exploiting Sea-breeze fronts

- Easy to see and recognise
- Using the optimum height-band
- Turbulence can be challenging at lower altitudes; dangerous when in close proximity to other gliders

Lee-side Thermals

- The Lee-side face is exposed to the sun
- The thin boundary layer is overheated
- Rotors, in the lee-side, are a different thing from thermals
- Sun-heated ridge faces generate a breeze which opposes the synoptic wind
- Lee thermals can drift with the wind, after a while; seldom they are linked to a feature on the ground
- The need for an outlanding may arise very quickly; plan and be aware of landing opportunities

Lee-side thermals



Thermal-Wave

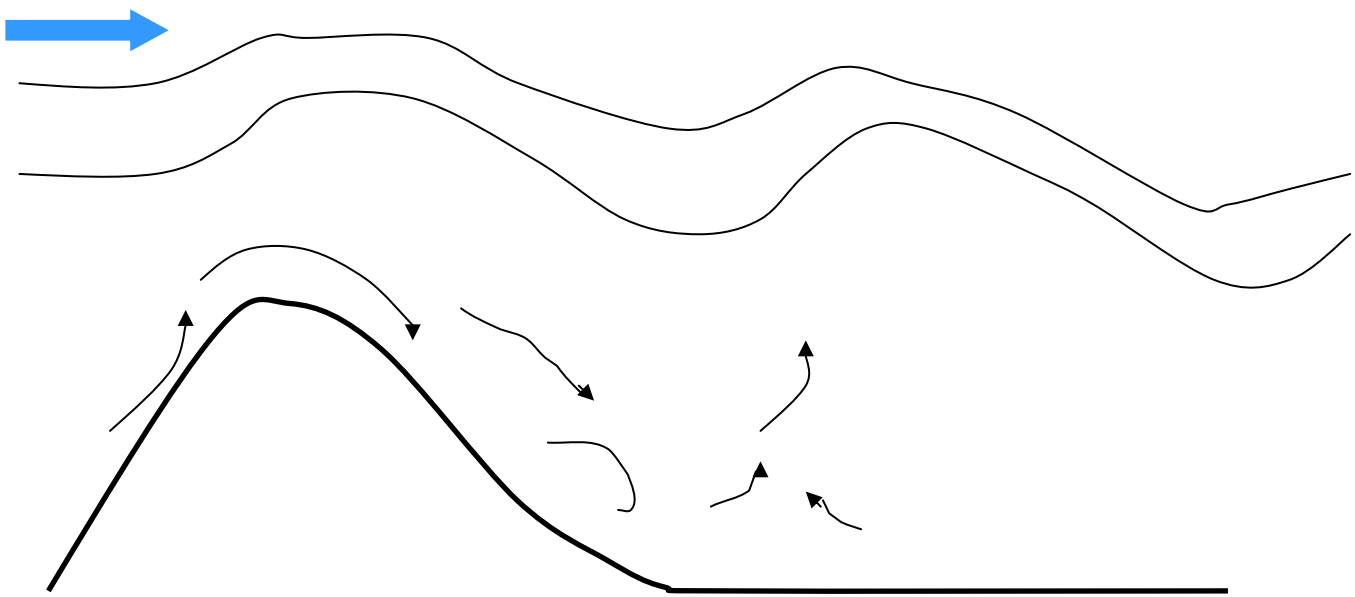
Lee Thermal-Wave

Often get their origin from Lee-side Thermals, together with weak waves in the upper layers

- Identifying the optimum distance from the ridge
- Not good for huge height gains, but excellent for long runs without height-loss
- Generally turbulence-free

Thermal-Wave

Wind 20/25 km/h

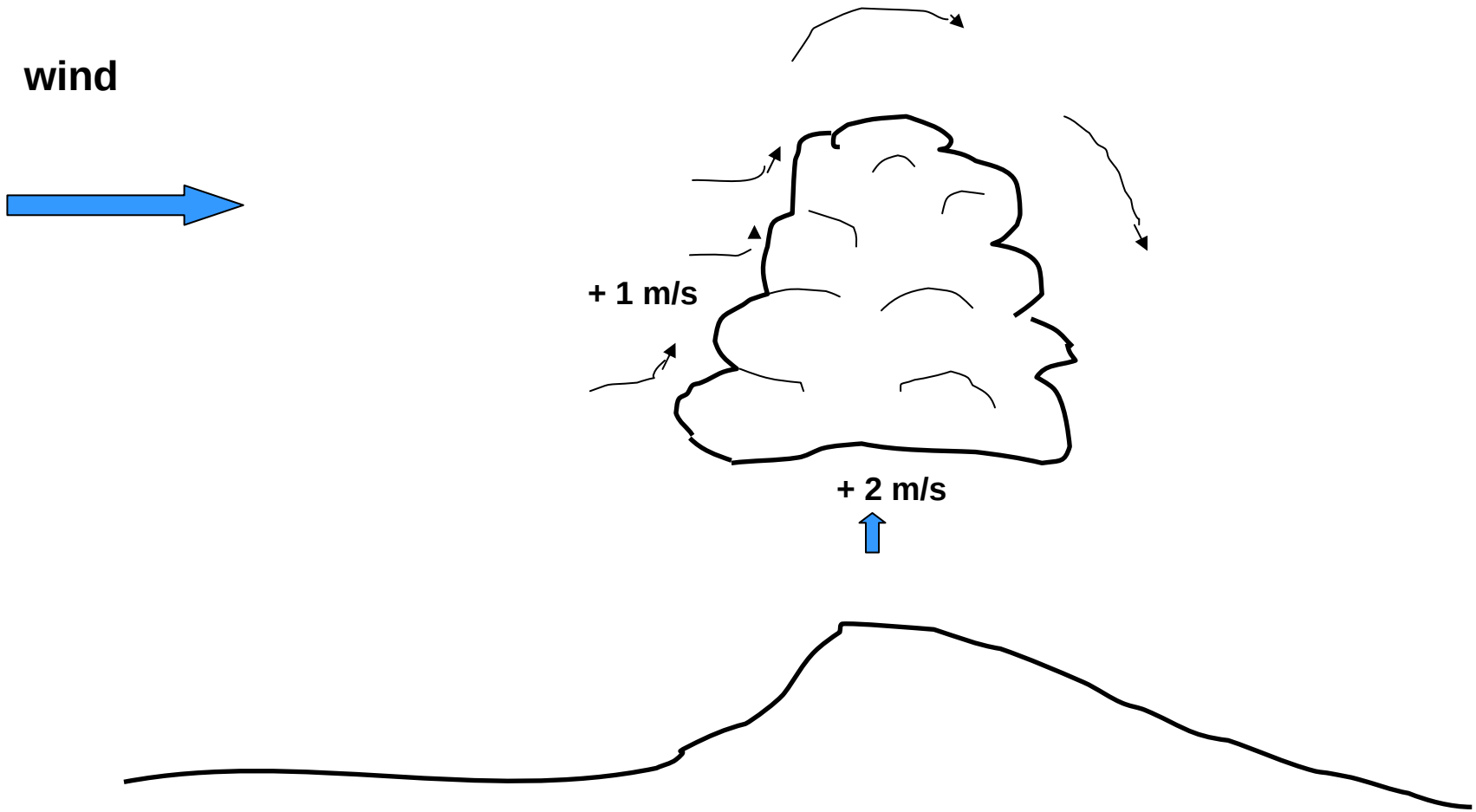


Thermal-Wave

(Windward Thermal-Wave)

- On the face of cumuli exposed to the wind, and to the sun
- Transition from thermal below cloud-base, to wave, is tricky
- The correct technique

Windword thermal wave

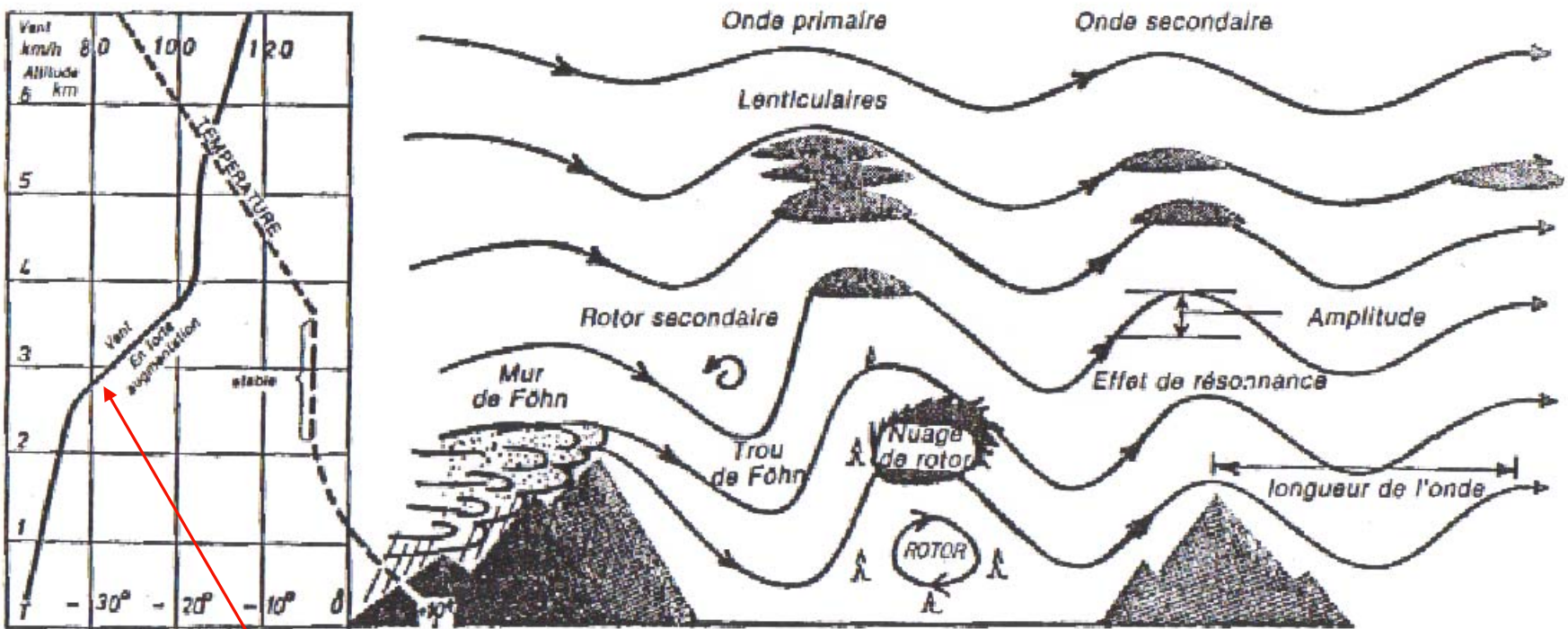


Wave Flying

Prerequisites for the generation of waves

- Wind direction relative to the mountain range/ridge
- Wind speed gradient
- Tephigram

Rotors and lenticulars clouds



Increase of wind speed

Wave Flying

Warnings

a) the pilot can suffer from:

- **Hypoxia and its effects**
- **Low temperatures**
- **Reduction of his judgement/abilities**
- **Effects of the strong winds**
- **Setting of the sun**

b) the glider can be damaged:

- **Overspeeding (Vne, Va, Vra, altitude)**
- **Cracks in the gelcoat**

THE END