Mountain Flying

- A Great Joy to Fly – See – and even land in the Mountains.
- Mountain Flying is VERY Unforgiving
- Mountain Flying is safe and very challenging to do as long as we obey some long taught rules.
- Why are you flying down in the Mountains and not above them ?

Terrain Flying

Where is my out?

My Out is…

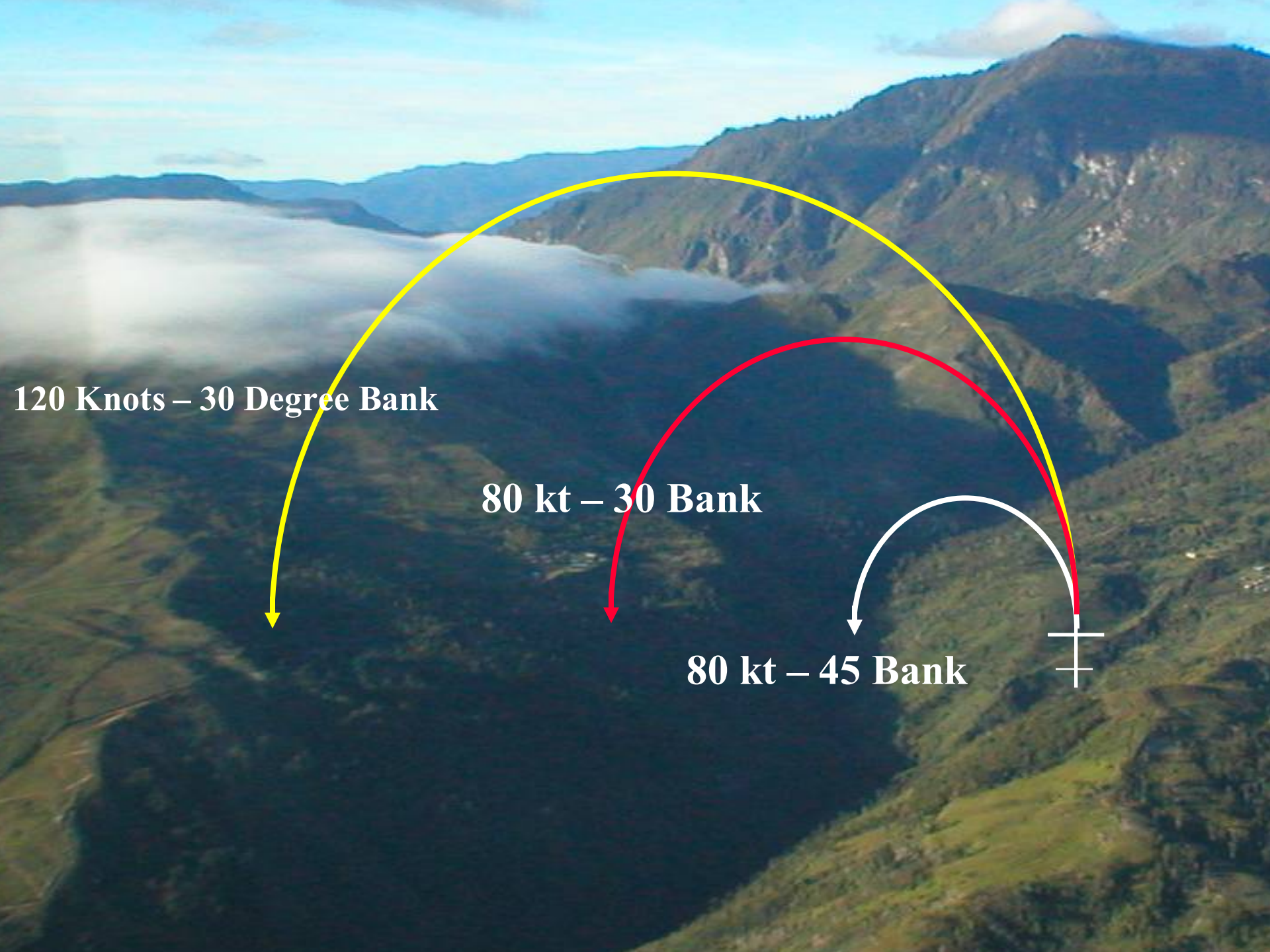
Always keep an Out!!!

What Constitutes being "In Terrain"

- Whenever we enter an area where turn radius is an issue
- Generally, any time we get within 500 ft. of terrain with varying topography.
- When evaluating a potential pass or ridge crossing ahead
- Anytime we are working in terrain and visibility is limited
- Other variables include, flying toward the rising terrain

TURN RADIUS

- The airplane's turn radius is related to the ground speed and the angle of bank used
- Facts:
  - Cutting speed by 1/3 will reduce turn radius by 1/2
  - Increasing the angle of bank increases the rate of the turn, reducing the turn radius


120 Knots – 30 Degree Bank
80 kt – 30 Bank
80 kt – 45 Bank

A Story

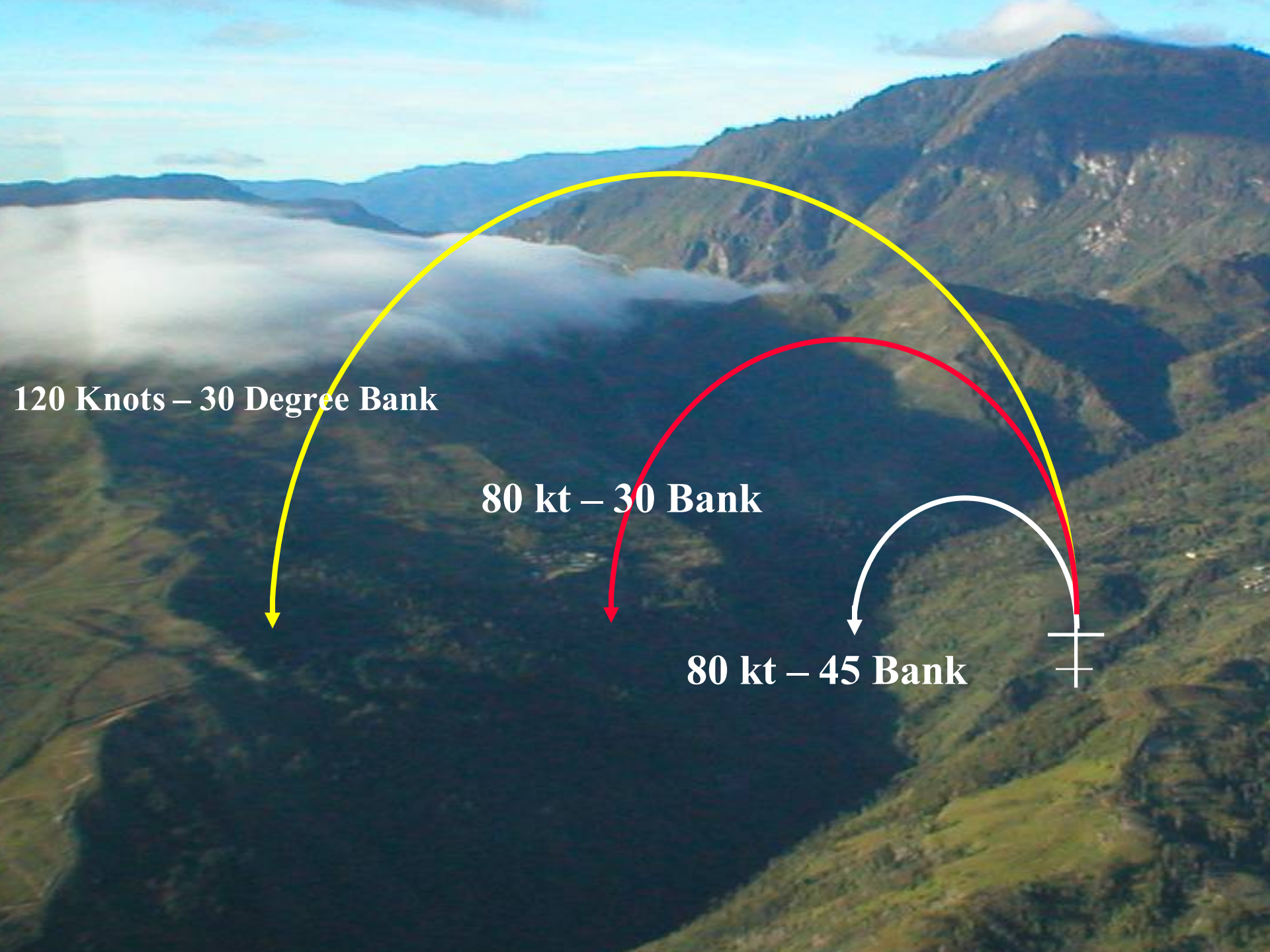
- Why Turn Radius is Important in everyday flying as well as in the mountains

SOME RULES TO LIVE BY

?? Which side of the canyon do you fly on ??

When flying in a valley, plan to use no more than 50% of the valley to turn around in.

- This means that we have 100% margin when flying in terrain
- This margin may save your “bacon” one day


120 Knots – 30 Degree Bank
80 kt – 30 Bank
80 kt – 45 Bank

Maneuvering in Terrain

Tendency to pitch up in rising terrain to follow the slope.

Why?

Illusions

The pilot attempts to project what he sees on a square and flat horizon. In the mountains there are many different angles. Trying to project a flat horizon in sloping terrain can fool a pilot into following the terrain.

Maneuvering in Terrain

Tendency to pitch up in rising terrain to follow the slope.

Raising Nose- airspeed slows, can cause a stall.

Tendency to pitch down in lowering terrain to follow the slope

Lowering Nose – increases ground speed and the turn radius - eating into our margin

How does a pilot overcome illusions while flying in the terrain?

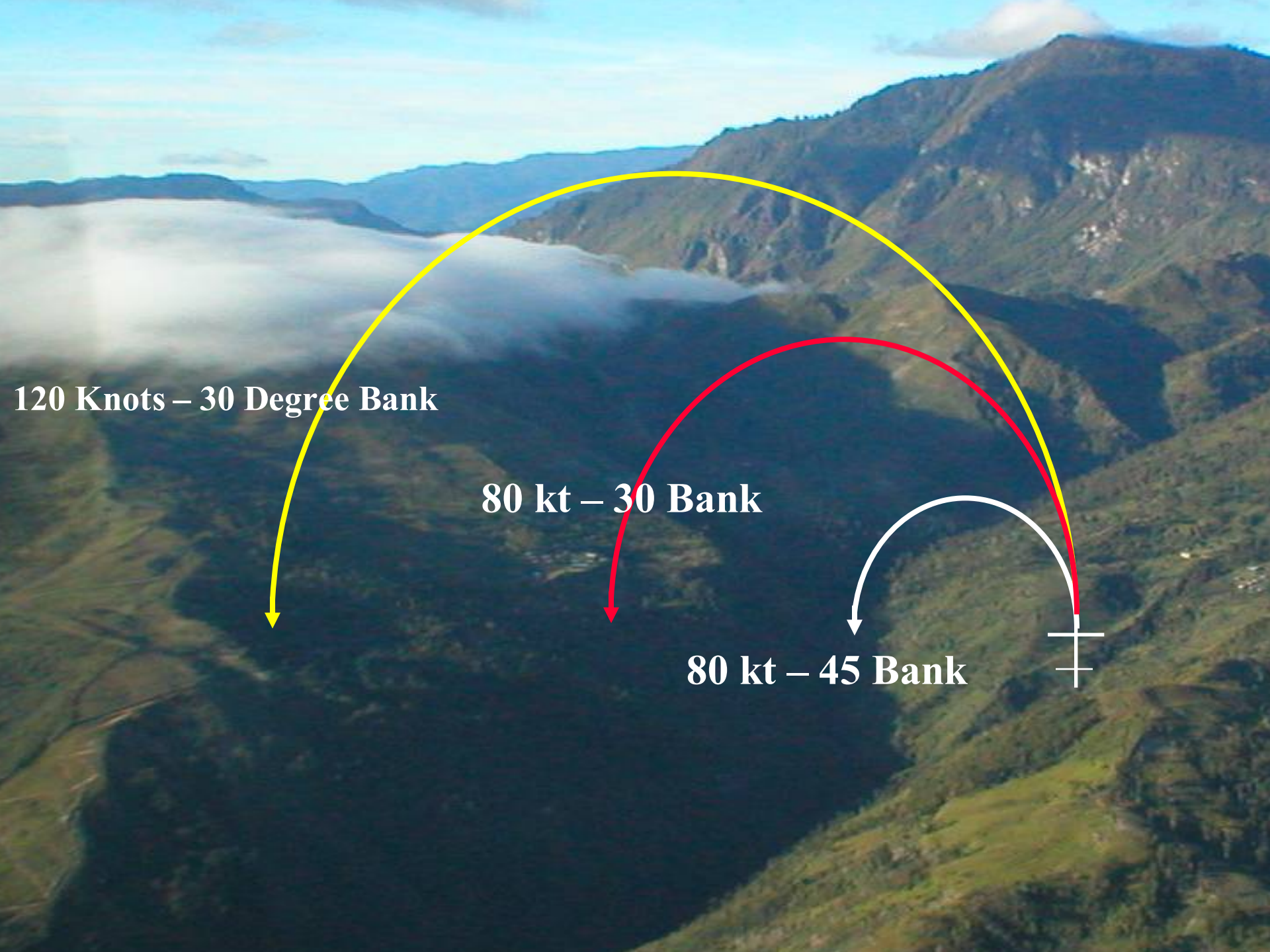
- Use Performance Instruments
  VSI – Altimeter – Airspeed
  Check your MAP
- Use a Composite Style of Flying, mainly looking outside with quick glances inside at the performance instruments and the manifold pressure
- Use the Flick Method to Check Instruments

AIRCRAFT SET-UP

- **Definition - 80 knots with 20 degrees of flaps - Checklist complete. Also referred to as 80/20**

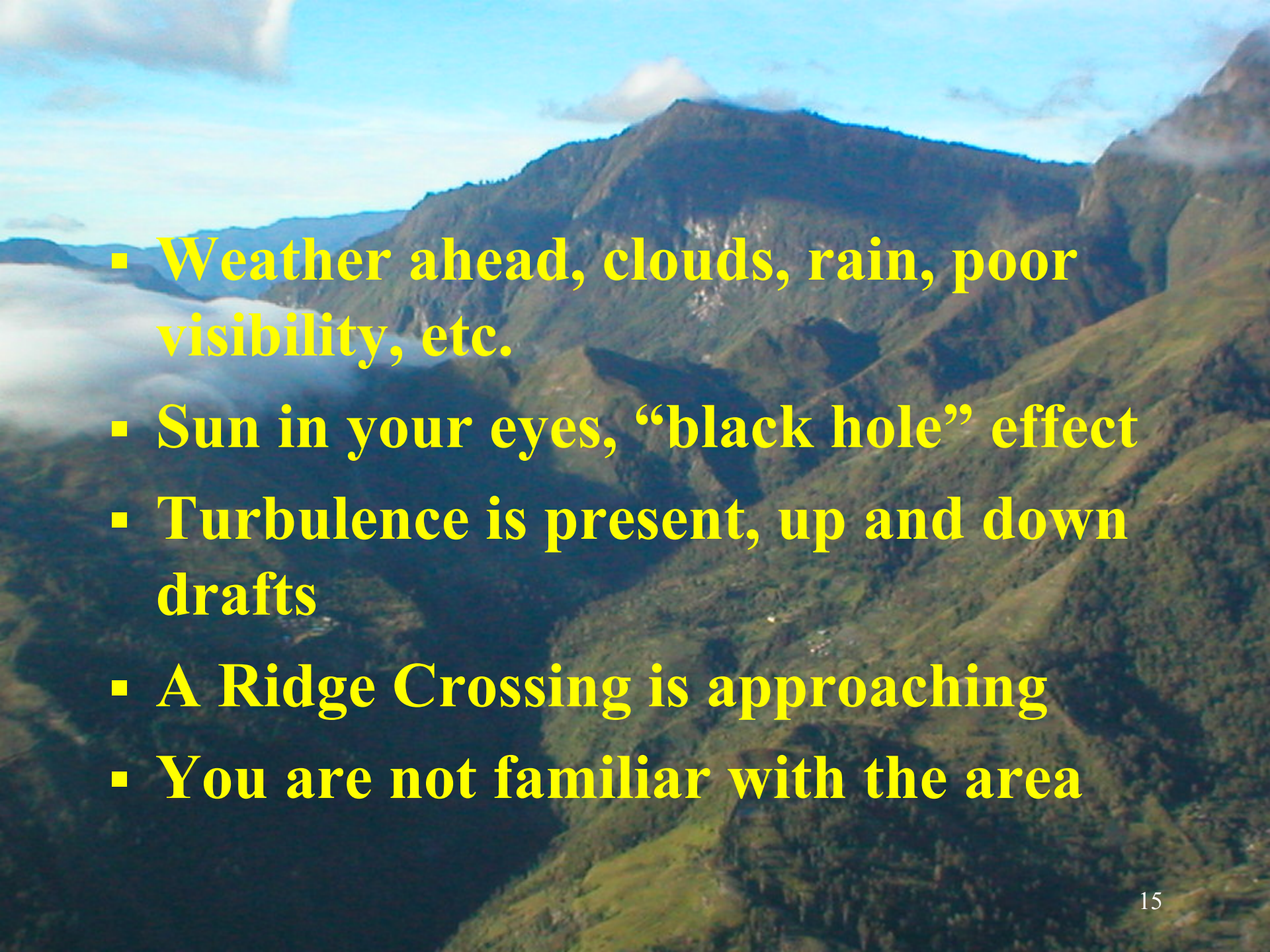
Why?

- **Reduces turn radius**

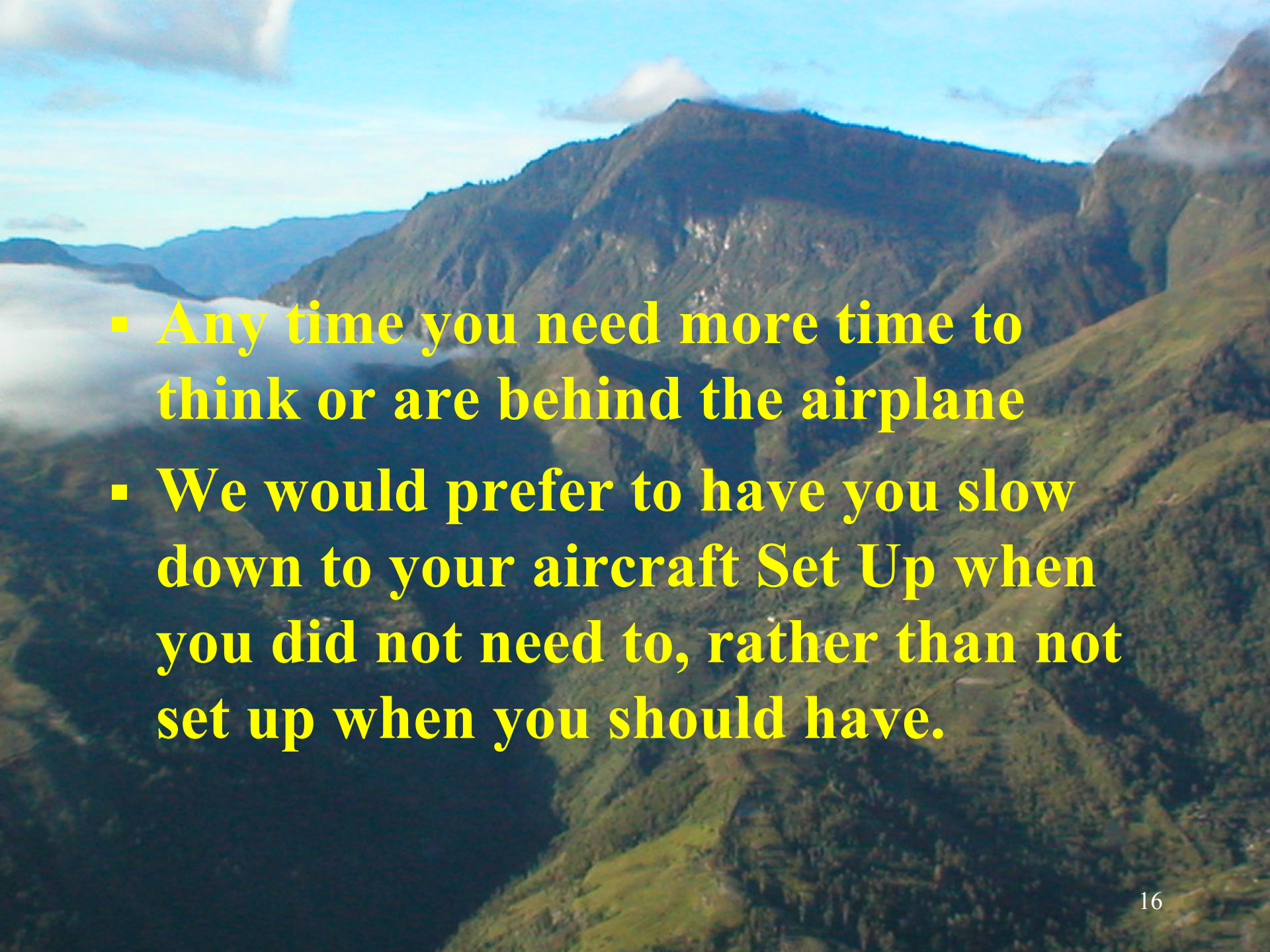

120 Knots – 30 Degree Bank
80 kt – 30 Bank
80 kt – 45 Bank

AIRCRAFT Setup
When?

- Whenever turn radius is an issue.
- Consider where your out is. If your out is behind you, narrowing or rising terrain is approaching, and turn raduis is a consideration, go to your aircraft Set Up.
- While flying in terrain and your out is in front of you (down the valley) continue or return to cruise. Caution: other factors may determine that you may want to go to your aircraft Set Up even when your out is ahead of you.
- They include:



- Weather ahead, clouds, rain, poor visibility, etc.
- Sun in your eyes, “black hole” effect
- Turbulence is present, up and down drafts
- A Ridge Crossing is approaching
- You are not familiar with the area



- Any time you need more time to think or are behind the airplane
- We would prefer to have you slow down to your aircraft Set Up when you did not need to, rather than not set up when you should have.

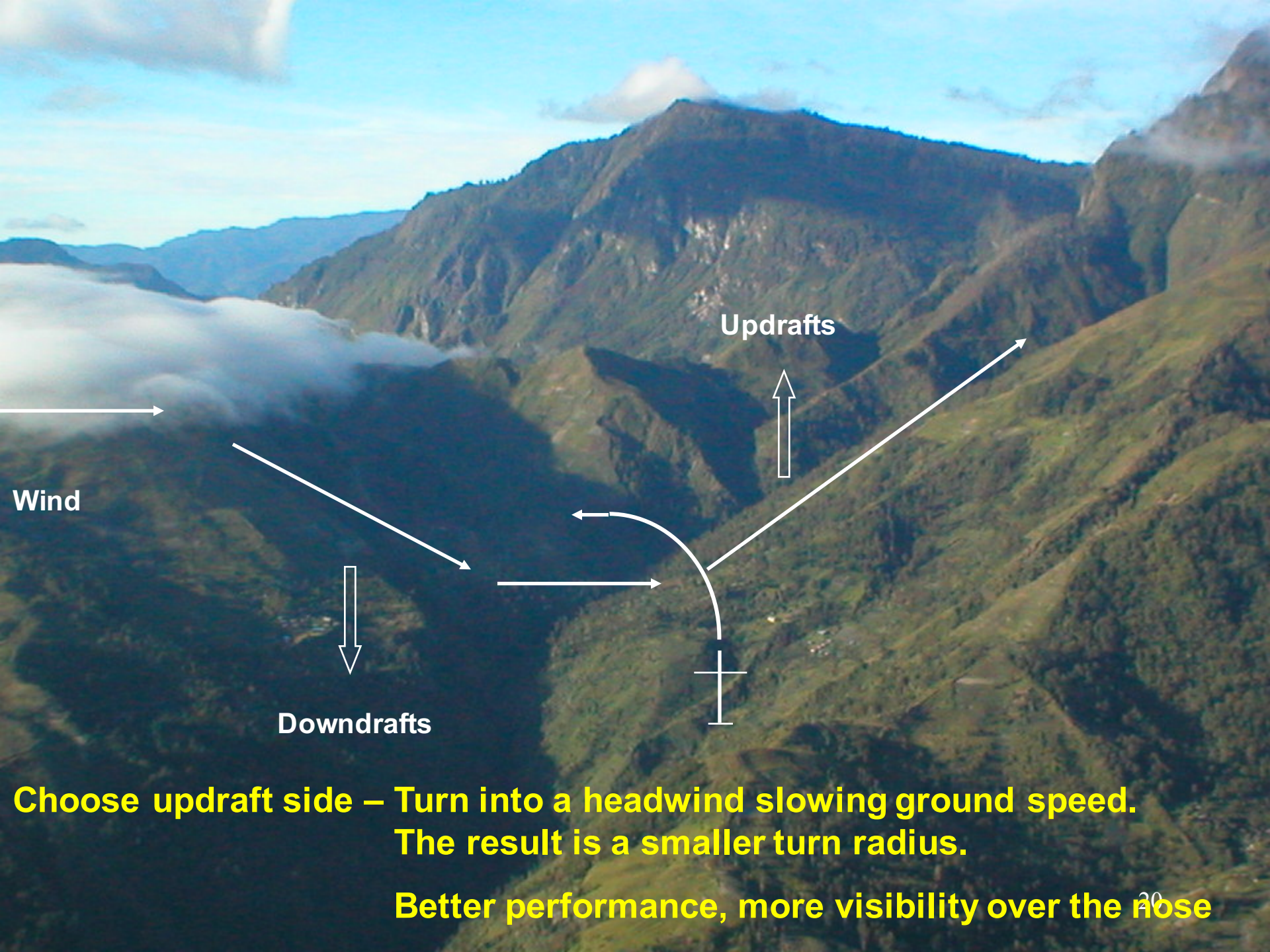
Flying up a Valley

- Slow down with plenty of time before entering a valley
- Question – What is the main reason to slow down when entering a valley?

  Turn Radius
- Pick one side of the valley to fly up. Remember at all times where your out is
- Which side of the valley to choose?
- Wind is one deciding factor

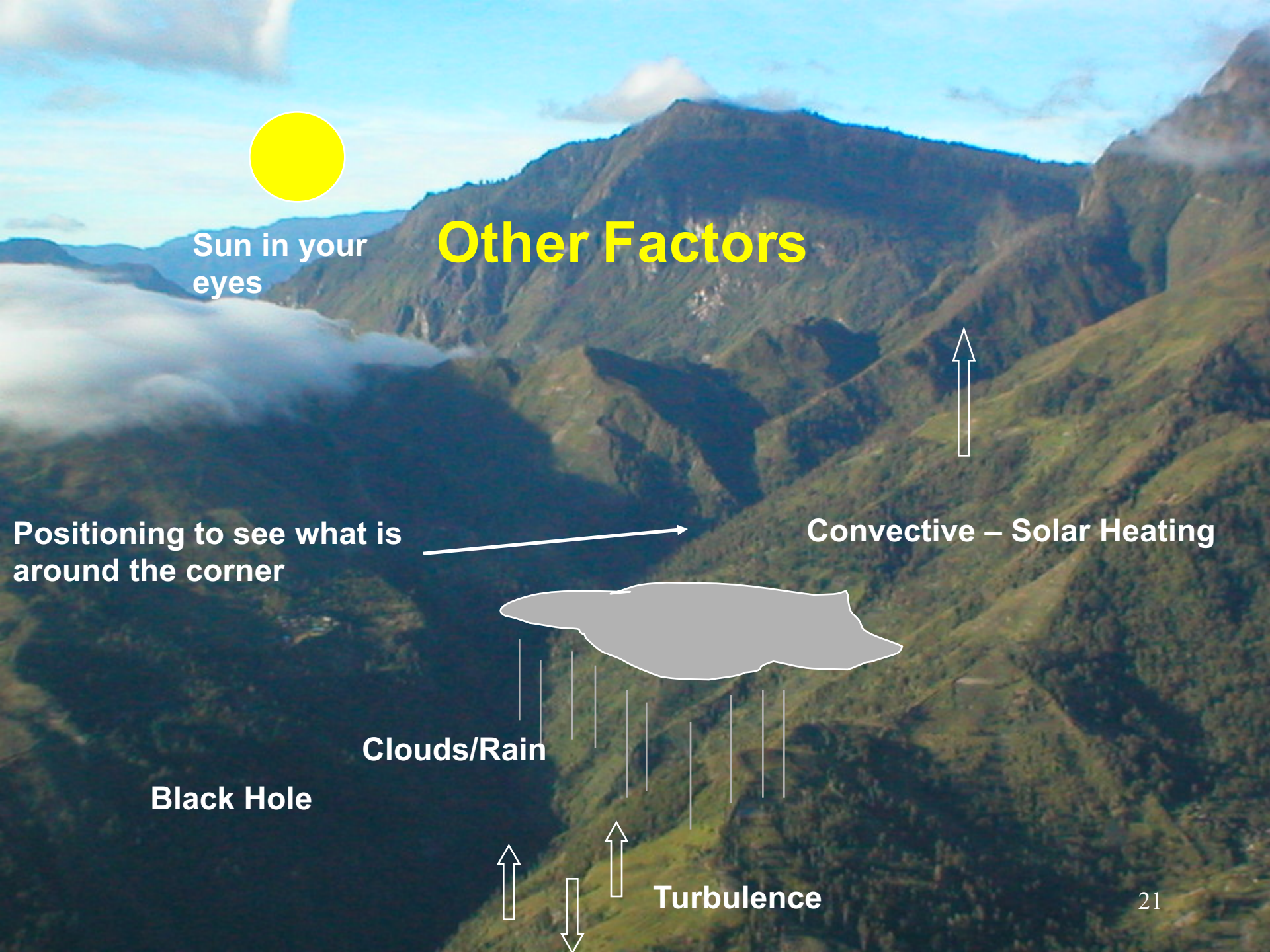

Where is my out?

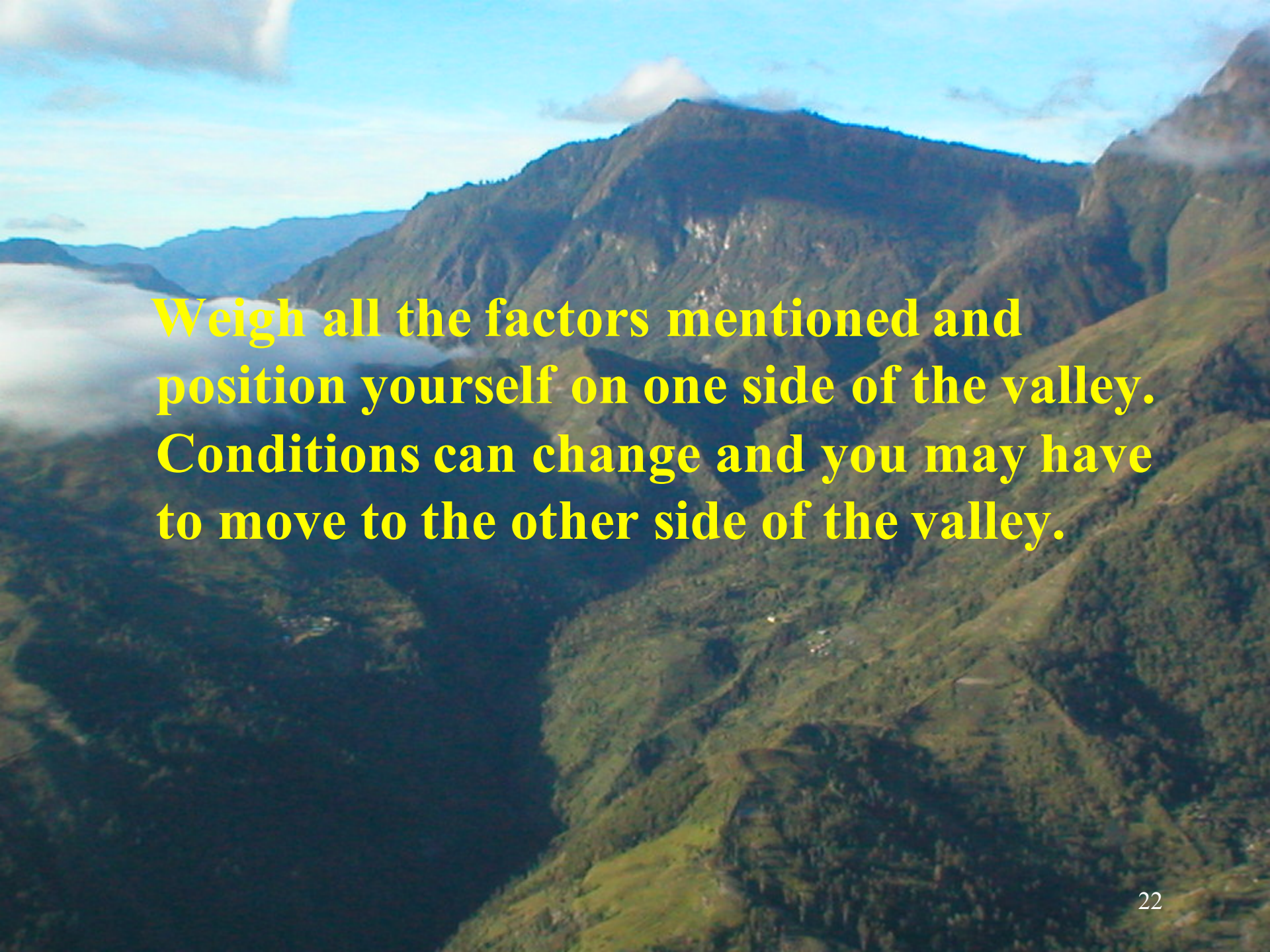
Where is my out?



Choose updraft side – Turn into a headwind slowing ground speed.
The result is a smaller turn radius.

Better performance, more visibility over the nose


Other Factors
Sun in your eyes
Positioning to see what is around the corner
Convective – Solar Heating
Clouds/Rain
Black Hole
Turbulence


Weigh all the factors mentioned and position yourself on one side of the valley. Conditions can change and you may have to move to the other side of the valley.

Maneuvering in a Valley

- Maintain a chosen altitude going up the canyon
- Try a trial turnout early
- Stay ahead of the airplane
- Give yourself a goal for turn-outs
- If need to climb go to a climb configuration (flaps 0 degrees)

Trial Turn-Outs in Terrain

- **Used to determine turn radius for that particular day and present conditions, which include:**
- **Density Altitude**
- **Wind**
- **Turbulence**

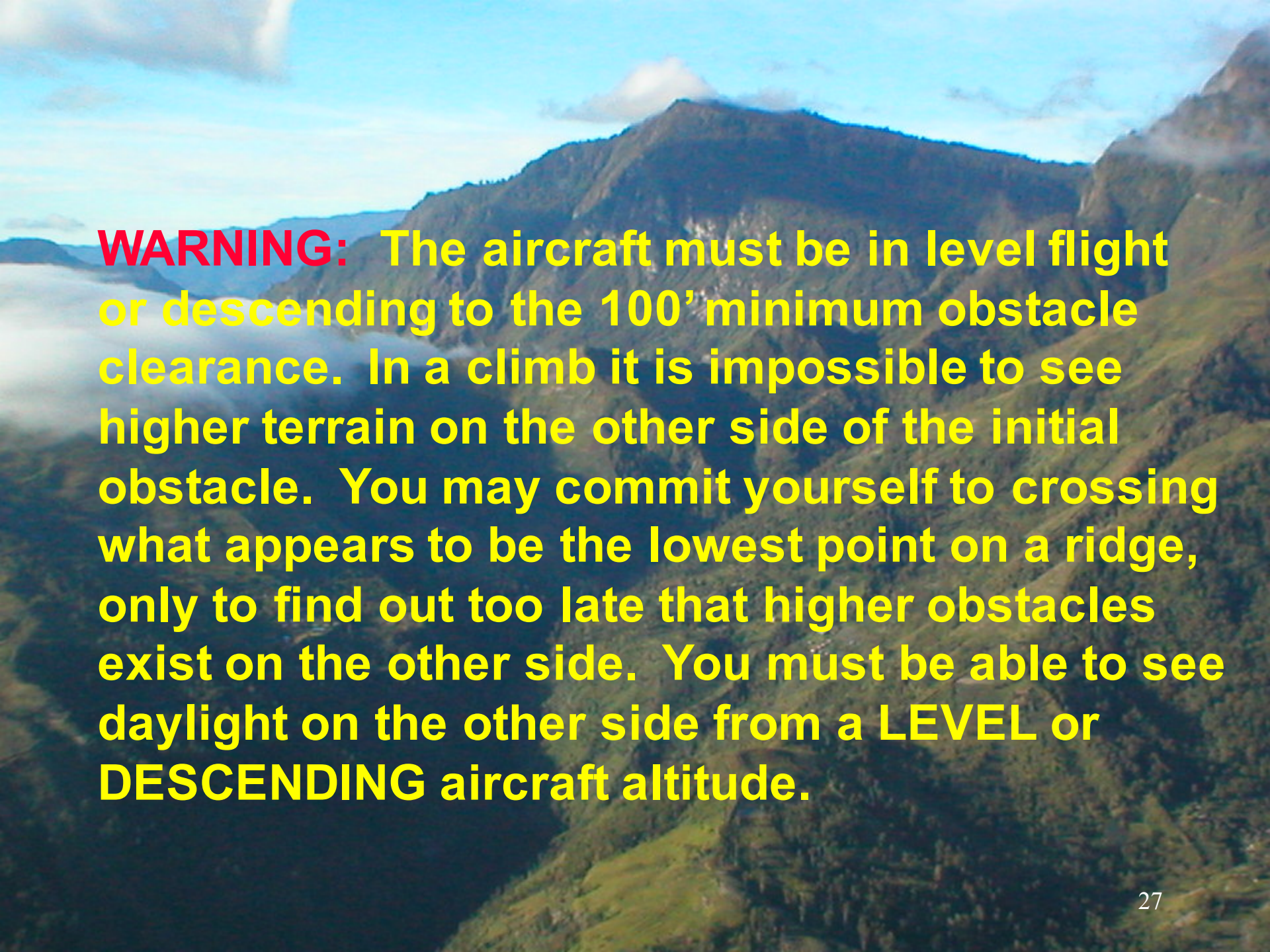
Turn-Outs in Terrain

- Turn must be completed within 50% of the canyon. The rest is margin.
- Initial Turn always a 45 degree bank:
- Always add power in the turn
- Maintain 45 degree bank throughout the turn. (If the turn can easily be completed in 50 % of the valley, using less then 45 degree bank, you may reduce the bank angle when half way through the turn)
- Maintain 80 Kts, Altitude, Coordination

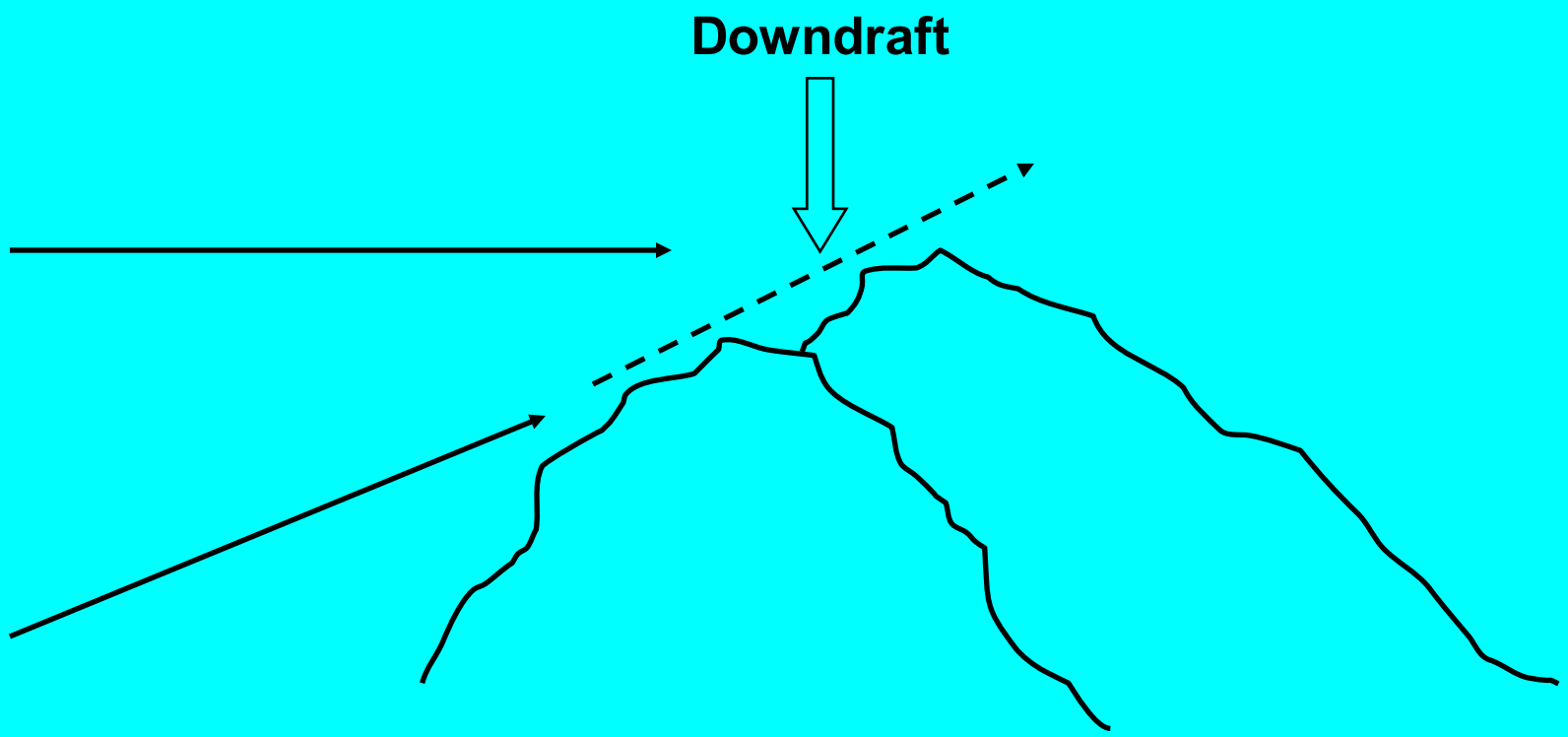
Pass and Ridge Crossing

Crossing ridges under low clouds should not be attempted unless:

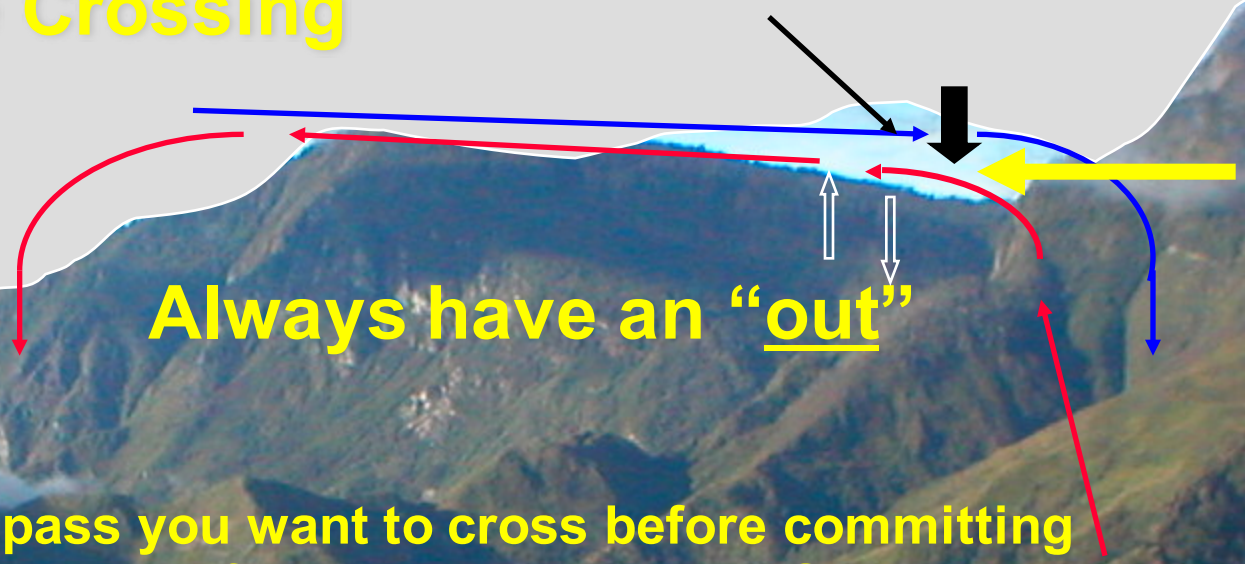
1. The pilot is very familiar with the area
2. Weather on the opposite side permits adequate maneuvering
3. It is possible to remain clear of clouds with 100’ minimum obstacle clearance
4. Normally, more than 100’ margins shall be maintained for ridge crossings



WARNING: The aircraft must be in level flight or descending to the 100' minimum obstacle clearance. In a climb it is impossible to see higher terrain on the other side of the initial obstacle. You may commit yourself to crossing what appears to be the lowest point on a ridge, only to find out too late that higher obstacles exist on the other side. You must be able to see daylight on the other side from a LEVEL or DESCENDING aircraft altitude.


Downdraft

Pass and Ridge Crossing



Check out the ridge or pass you want to cross before committing yourself. Fly close to the wall of the canyon. Use the Set - UP

Use a rectangular pattern, fly straight and level as much as possible

Fly "High to Low" Where is my out? My out is….

Check the weather and terrain on the other side of the pass

Check for wind and downdrafts

Check the pass out in more than one direction

Maximum 45 degree angle of crossing

Maintain level flight after crossing the ridge

Engine Out Procedures in Terrain

- Turn toward lower terrain (your OUT!)
- Pitch for best glide
- Reduce drag as soon as possible after turn (if flaps at 20 degrees in turn, reduce to 0)
- Trim for hands off best glide
- 6 Gs
- If no restart is possible, choose a survivable area and go with it. DO NOT try to stretch the glide in hope of reaching something better around the next corner

RISK - BENEFIT

- Why am I even doing this type of flight??
- Better have a very good reason!!!
- Weather and Terrain – DO NOT MIX well. Keep your "back door open" <u>My out is….</u>
- Most of the fatal accidents have resulted from a combination of mixing terrain and weather
- Cost of just one accident is VERY HIGH!!

BOOK

- Look For - MOUNTAIN FLYING
- By Sparky Imeson
- Wariness must be an ever present condition amoung pilots who make mountain flights. This trait is usually an acquired characteristic that is always found in the best pilots.