Buckminster Gliding Club

XC2020

Developing soaring skills and extending local soaring.

Chris Davison

XC2020

Buckminster Gliding Club

What is it?

Coaching and training for cross country, extended local soaring and developing soaring skills.

Mixture of workshop, simulator training, dual and solo flights

Limited number of keen pilots. Progress card structure.

Aim to increase the XC flying from Saltby in 2020, measured by number of pilots with a flight on the BGA ladder.

XC2020 Workshops

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Date	Topic	Lead	Support
Feb-08	Extended local soaring and developing your soaring skills	Chris	Roy
Feb-15	Elements of a cross country task - Part one	Chris	Phil
Feb-22	Elements of a cross country task - Part two	Chris	Phil
Feb-29	General Radio Usage	Neil	Roy
Mar-07	Elements of a cross country task - Part three	Chris	Phil
Mar-14	Elements of a cross country task - Part four	Chris	
Mar-21	Simulator training	Chris	
TBA	Advanced topics (inc more radio)	Chris	Phil, Neil

XC2020 Workshops

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Extended local soaring and developing your soaring skills
Thermals, finding them and centering
Blue thermals
Effects of the wind on thermal location and structure
Cloud streets and dolphin flying
Rules of Thumb to remain safely local
Using a PDA or GPS to extend your local soaring
Elements of a cross country task - Part one
The elements of a cross country task
Planning a successful task to fit you, your glider and the day
Pre-flight preparation for you, your glider and crew
Assessing the day from the ground, when to launch and pre-start flying
Elements of a cross country task - Part two
Making a valid start and the decision making in the first 10K
Navigation using a PDA and turning a turn point
Final gliding, finishing a task and landing safely

Elements of a cross country task - Part three
Routing, finding and using lift and following the energy
How fast to fly and when to stop and turn.
Human factors during the flight
Planning and making a radio call
Elements of a cross country task - Part four
Landing area assessment, field selection and out-landing
Putting it all together for your big flight!
Post flight analysis, the ladder and learning from your flight
An introduction to competitions, flying in groups and racing tasks
Advanced topics
Bigger tasks and how to fit them in a day
Turbo gliders for cross country flying
More radio usage

Terminology

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Gliding = Flying a glider

Soaring = *Gliding* in rising air to extend flight times

Cross-country = *Soaring* over the countryside, to extend distance

Racing = Flying a *Cross-country* faster than other people. Speed.

XC2020 focus is flatland thermal, soaring and cross-country flying.

Developing soaring skills and extending local soaring.

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This Workshop:

1) Finding Lift (thermals)

2) Climbing in the lift you just found

3) Using that climb to extend your local flying!

1. Finding a thermal

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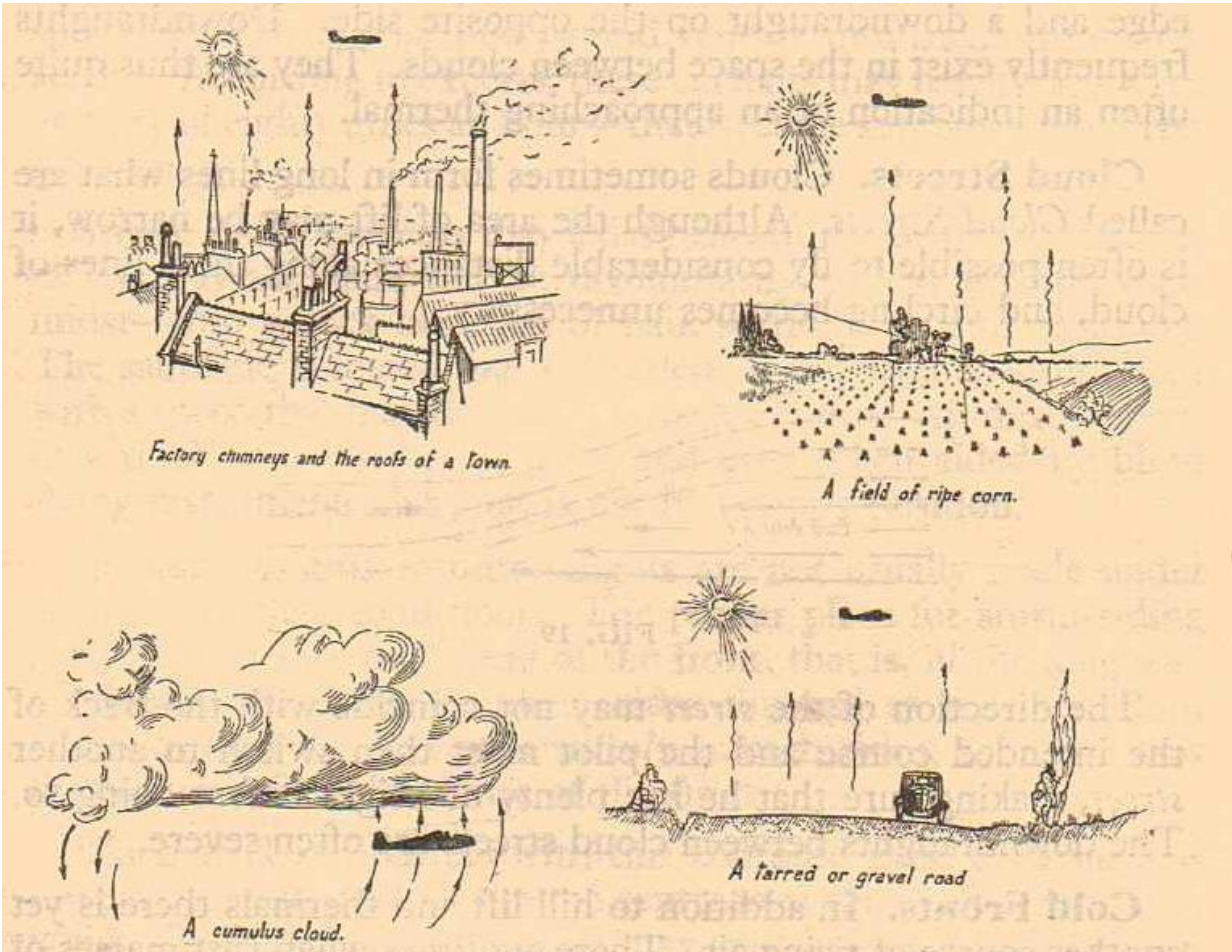

FIG. 18.—SOURCES OF THERMAL LIFT

What is a thermal?

How is it formed?

How do you find one?

What to practice.

Finding a thermal….

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Thermals, a few questions:

What is a thermal?

How big is a thermal?

How much does on weigh?

How does a thermal form??

How is a thermal formed?

Basics…but REALLY important…the sequence is

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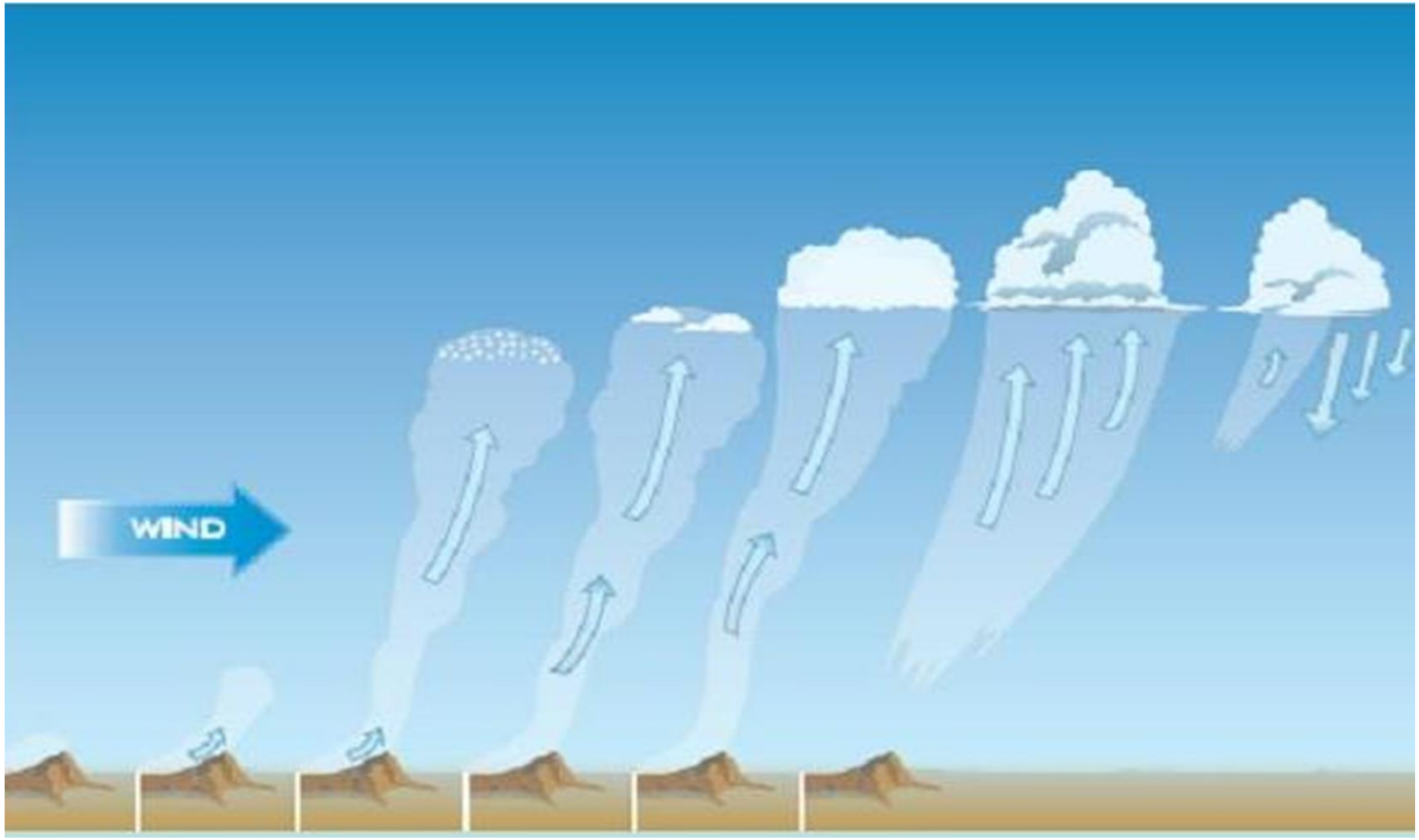
1. Sun heats the ground
2. Warm ground heats a bubble of air touching the ground
3. Bubble of warm air is released by a trigger (mostly)
4. Warm air rises (vs colder air) and becomes a column (or bubble)
5. Column of warm air cools as it gets higher and condenses into cloud
6. Column becomes detached, so loses its heating source
7. Eventually air is no longer warmer, so does not rise
8. Finally cloud dissolves as nothing to keep it growing, starts to sink

Thermal Life Cycle



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Thermal Sources

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Thermal sources, a few questions:

What makes a good thermal source?

What makes a bad one??

What might trigger the release of the warm air?

How do you find a thermal?

How do you find a thermal?

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Ground clues

Sun on the ground?

Area likely to heat up?

Trigger to release warm air?

Air clues

Evidence of rising air?

Clouds?

How do you find a thermal?

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Ground clues

Sun on the ground?

Is there any?? Slopes?

Area likely to heat up?

"Dry, Dark and Discrete"

Trigger to release warm air?

Edge of "change in scenery" (lakes, towns, etc)

Tractors and Combine Harvesters

Air clues

Evidence of rising air?

Soaring birds – REALLY good

Gliders turning (tightly)

Gliders going up relative to you

Smoke (smell or sight)

Your backside / vario

Clouds?

Cloud with a firm, dark base

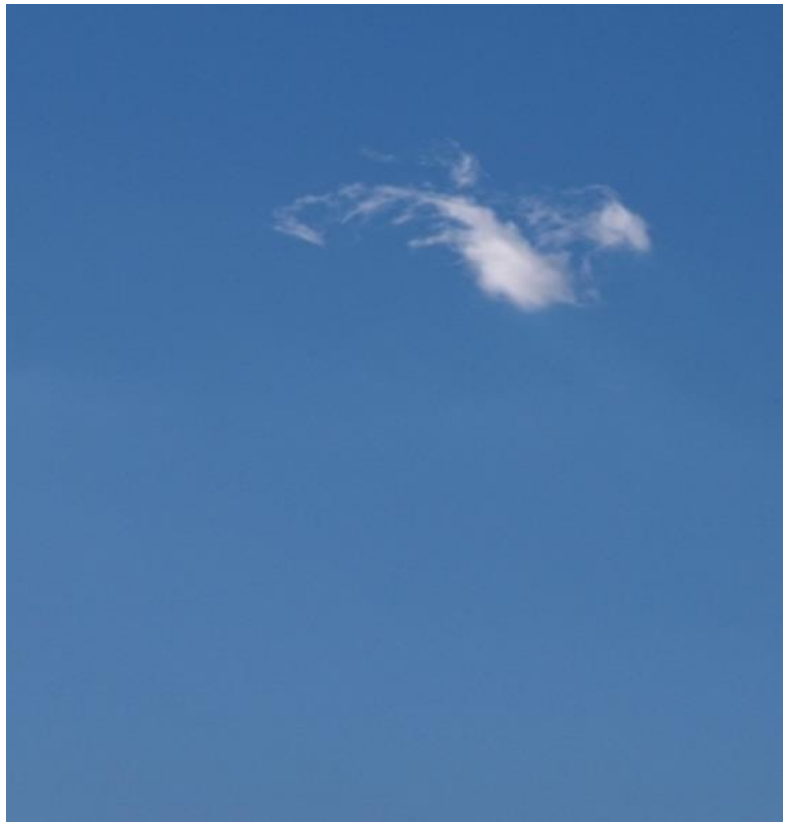
Wisp of cloud that is growing

Cloud Clues

"What is the best climb I can take?"

Dark bases?
Steps?
Tendrils?
Sun? Wind?
Birds?
Gliders?
Growing?
Streets?

Cloud clues



"What is the best climb I can take?"

Small but growing?

Twenty second snapshot whilst turning!

Possibly narrow?

How do you find a thermal in the **blue**?

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Ground clues

Sun on the ground?

Is there any?? Slopes?

Area likely to heat up?

"Dry, Dark and Discrete"

Trigger to release warm air?

Edge of "change in scenery" (lakes, towns, etc)

Tractors and Combines

Air clues

Evidence of rising air?

Soaring birds – REALLY good

Gliders turning (tightly)

Gliders going up relative to you

Smoke (smell or sight)

Your backside / vario

Clouds?

~~Cloud with a firm, dark base~~

Wisp of cloud that is growing

How do you find a thermal in the **blue**?

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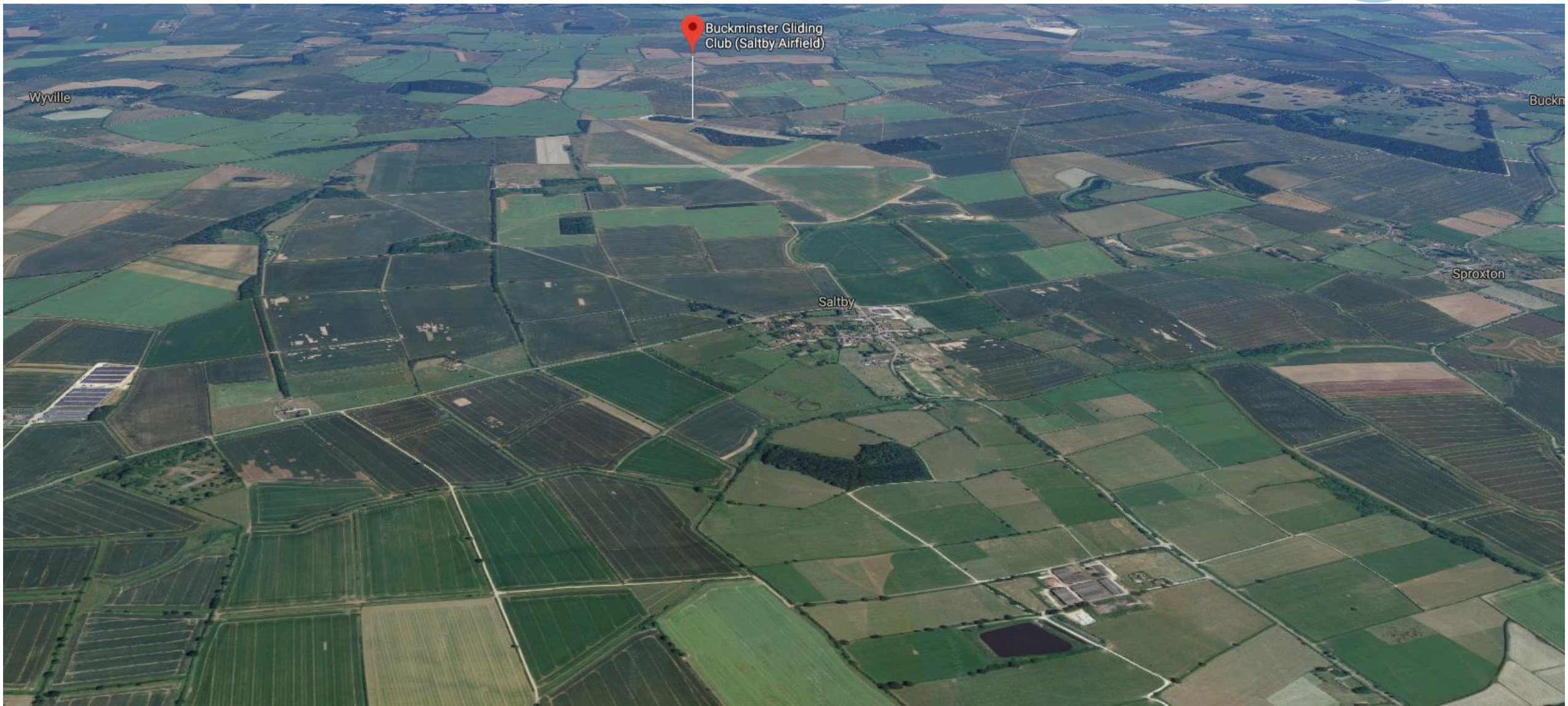
Blue does not always mean no cloud clues.

Ground sources and trigger points?



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Water!

Clouds – Discuss!

Clouds – Discuss!

Clouds – Discuss!

Clouds – Discuss!

Summary

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Sun heats the ground -> ground heats the air -> trigger release thermal

On the ground – “Dark, dry and discrete” – where would be warm to walk?

In the air – Dark, firm bases? Steps or tendrils? Growing wisps?

Blue days or low – downwind of “Dark, dry and discrete” areas. Triggers.

Things to practice

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Predicting and then assessing every climb

Lower down, looking at ground sources

- Dark, Discrete and Dry?
- Identify trigger points

Higher up, flat dark bases

- Birds? Gliders?
- Steps or wisps?

2. Climbing in a thermal

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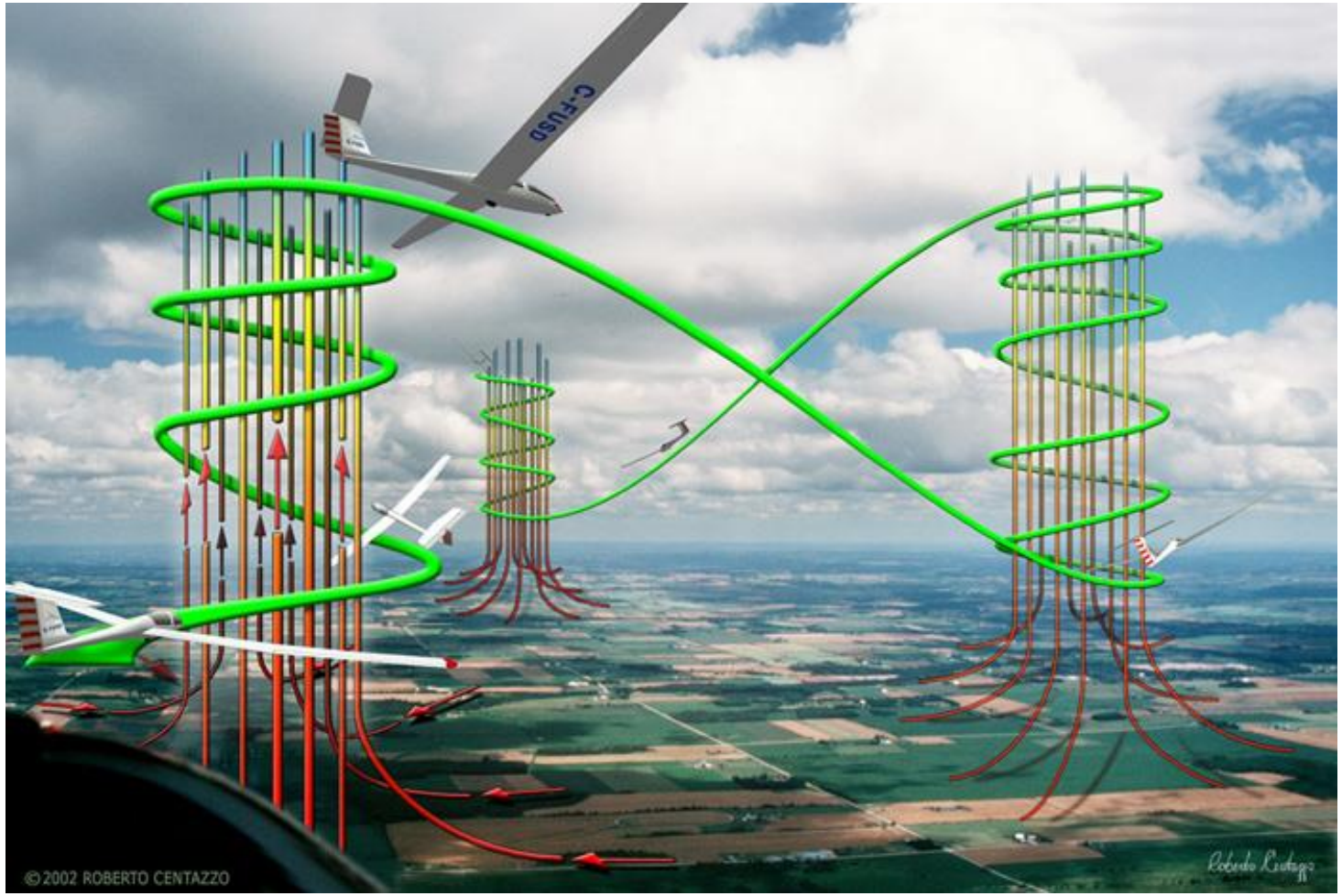

How tight to turn?

Entering

Centring (two methods)

Exiting

Climbing in a thermal….

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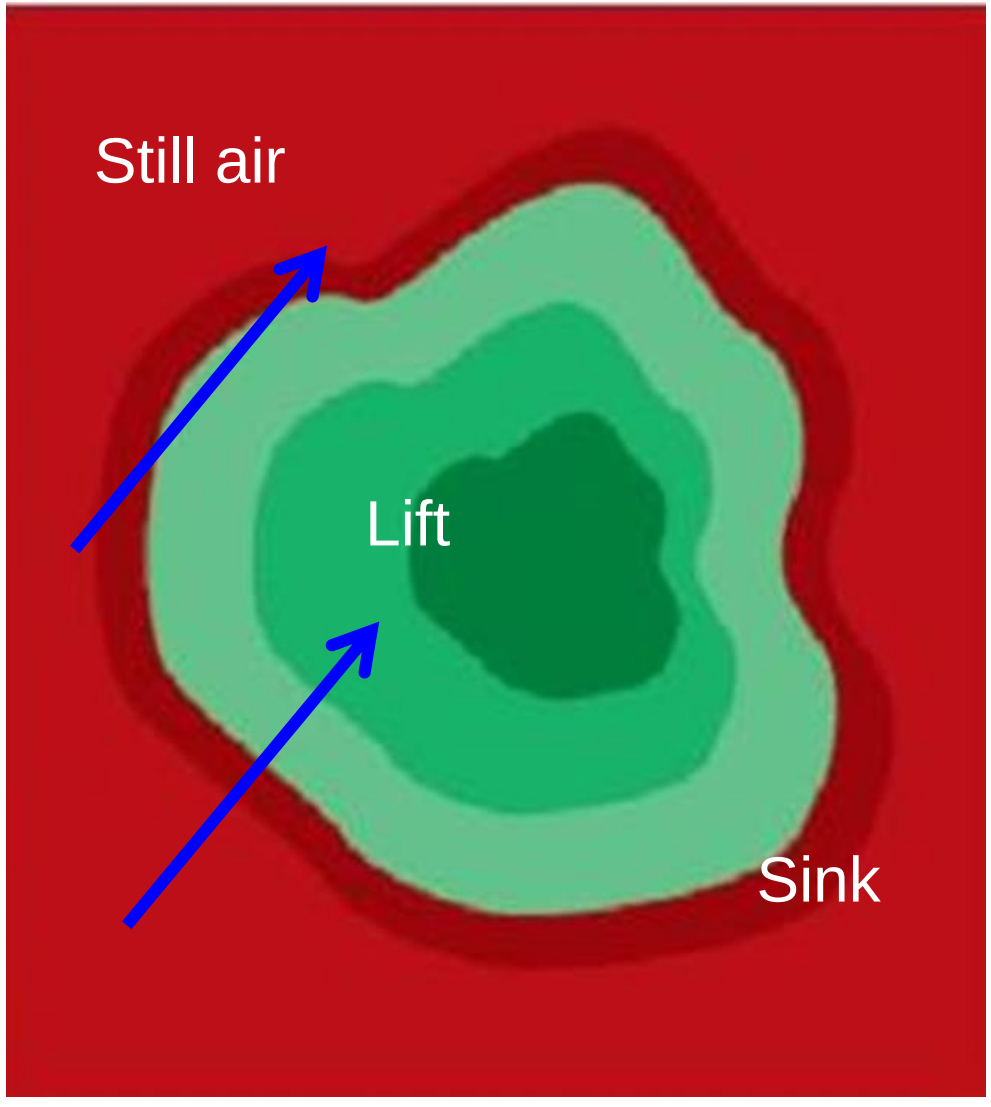
Climbing in thermals, a few questions:

Why do we want to climb in a thermal?

Why do want to climb efficiently in a thermal?

What are the dangers (TEM) of thermalling?

Our thermal…



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Assumptions:

5 seconds @ 60 knots = 500 ft across

Flying a K21

Questions: What is the radius of turn in a K21?

How tightly should we turn?

Our thermal…how tightly to turn?

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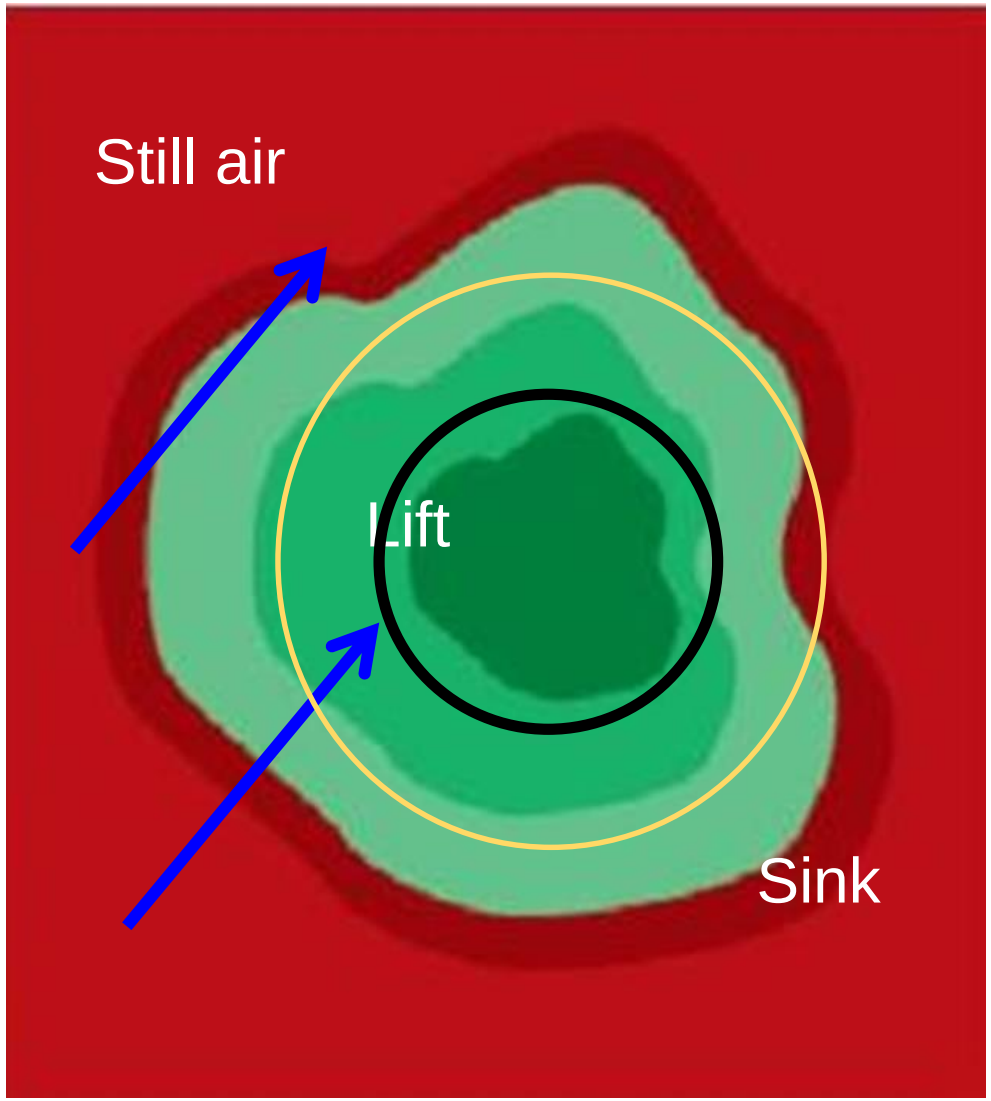
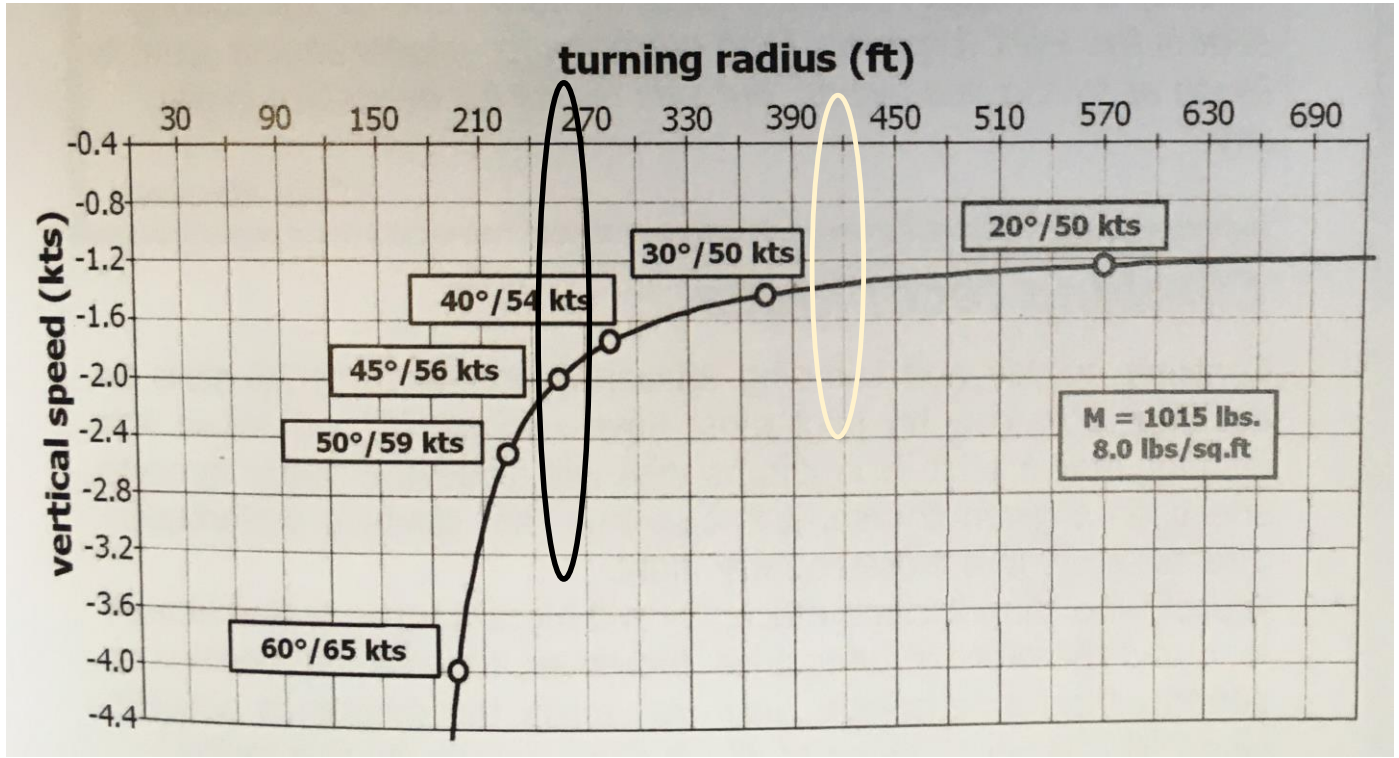
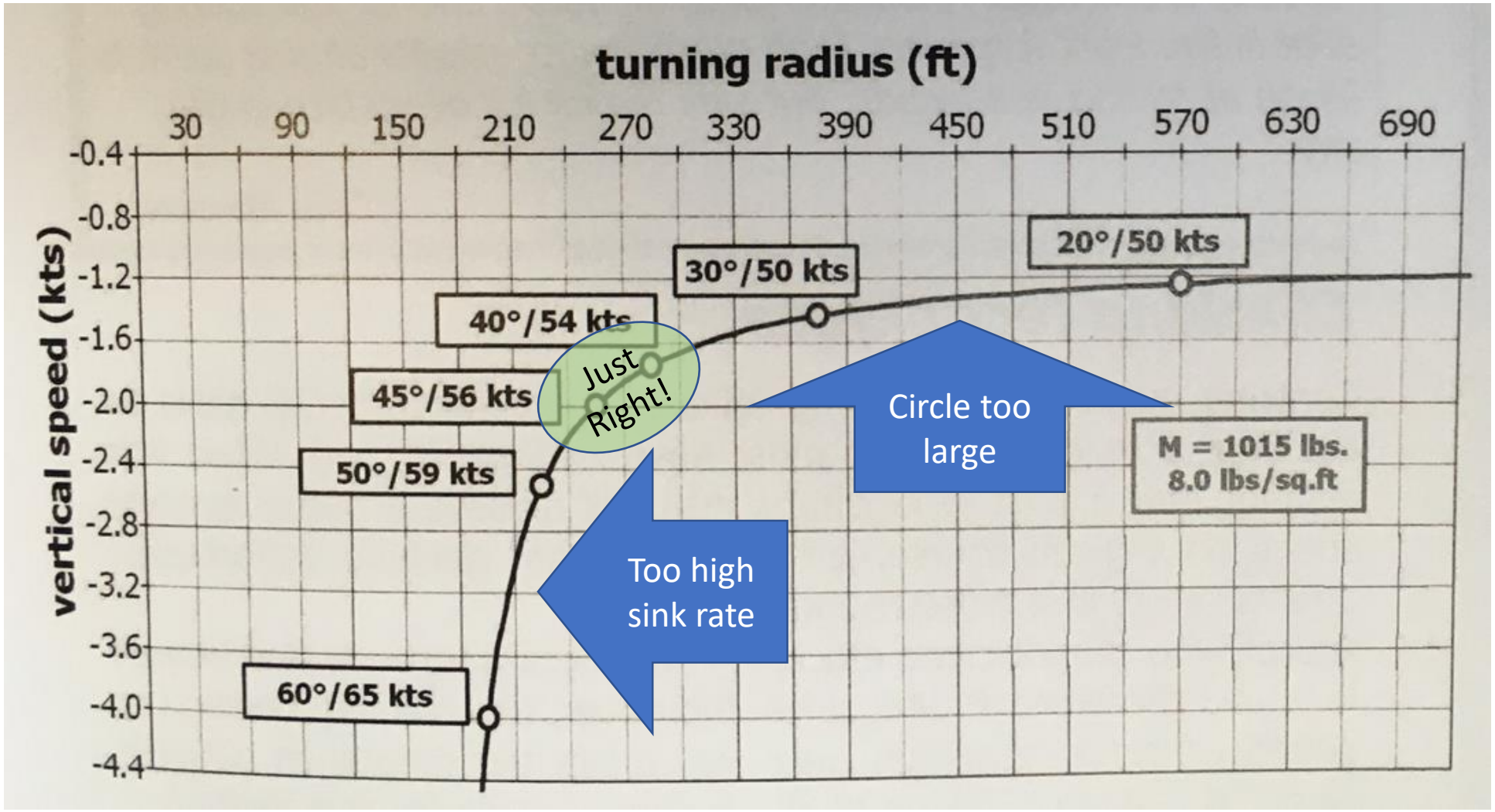


Assumptions:

5 seconds @ 60 knots = 500 ft across



How tightly to turn?



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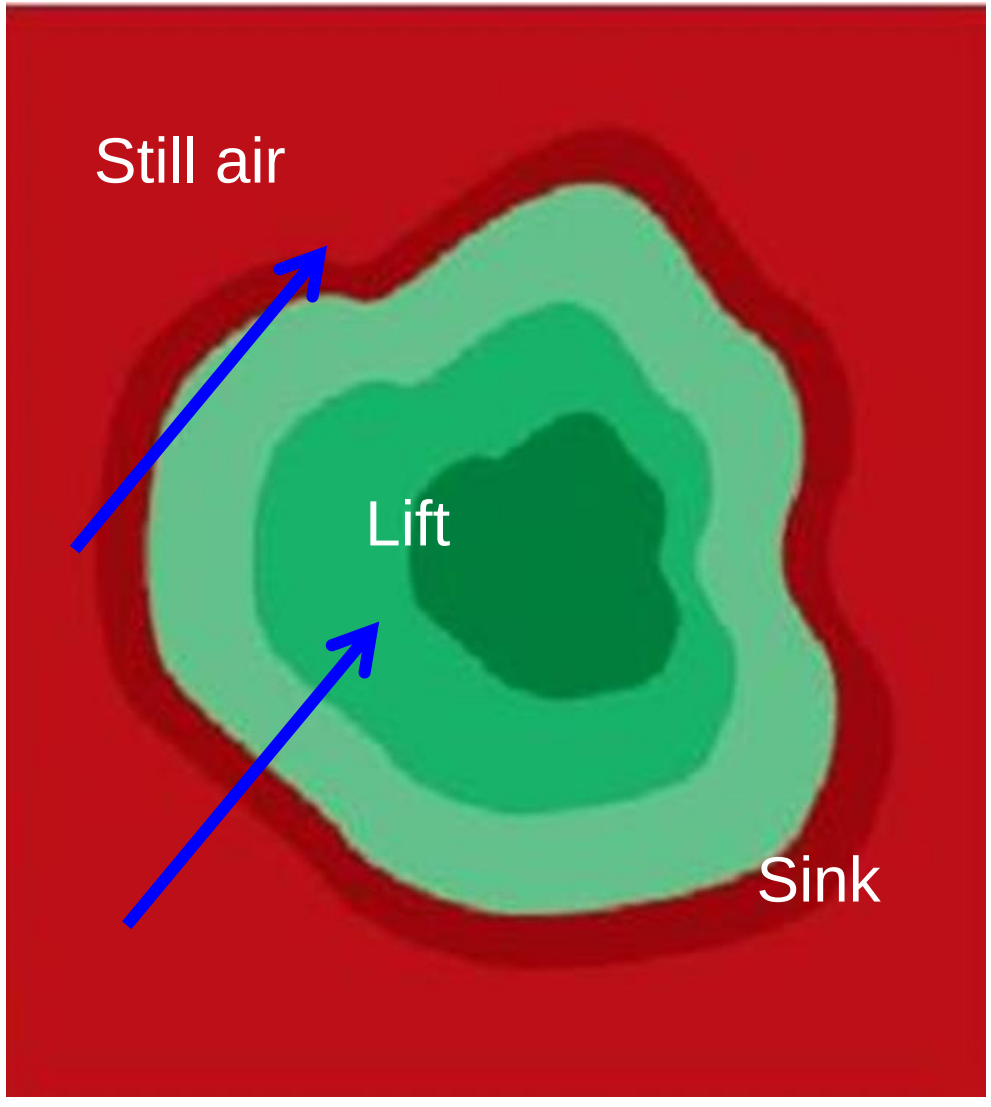
35 to 45 degrees of bank - great balance of sink rate and turning circle!

Enter – Centre - Exit



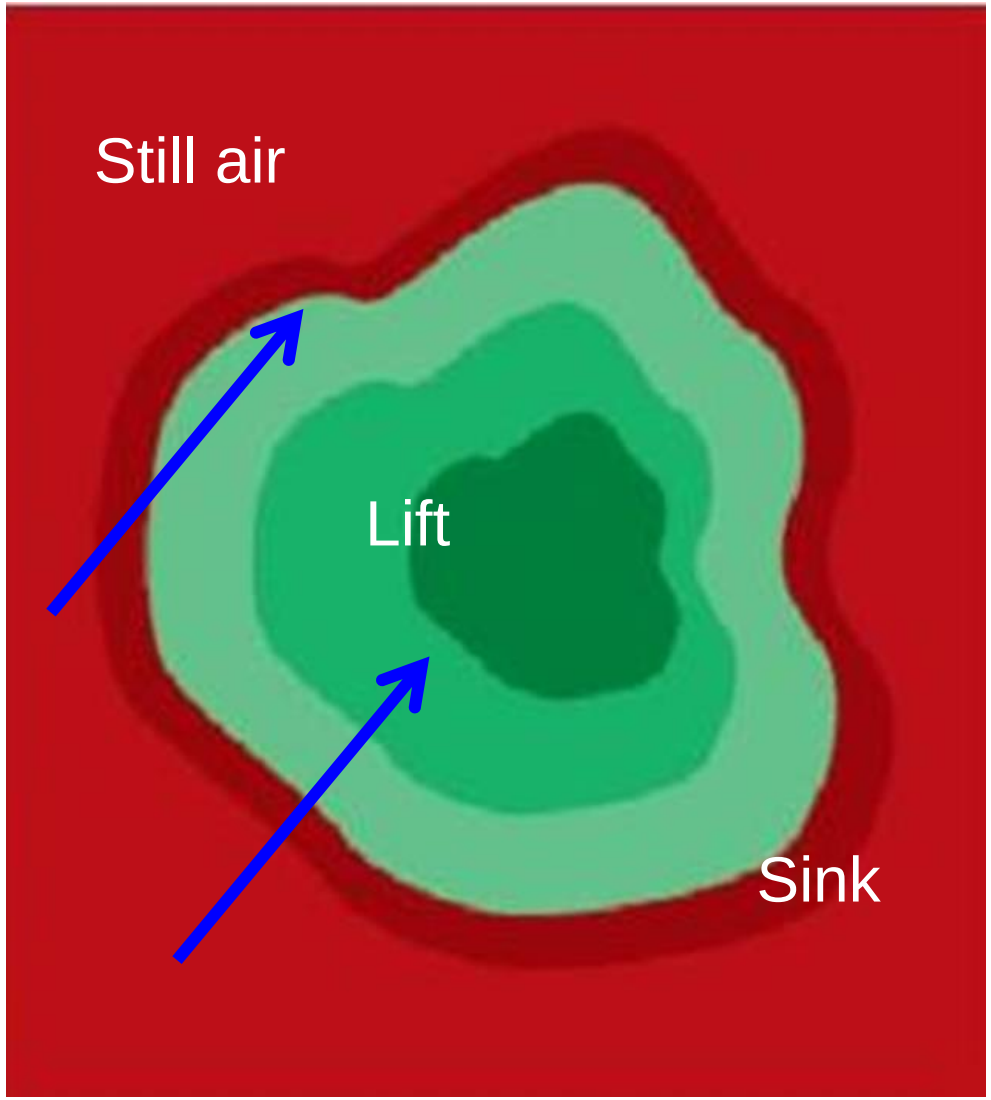
Where to enter? - Middle? Side?

What speed to enter?

Which way to turn?

Should I stay or should I go??

Enter – Centre - Exit



Where to enter? - Middle? Side?

Side usually better

Other gliders already established?

What speed to enter?

Don’t slow down in the sink

Don’t fly through the thermal!

Which way to turn?

Same direction as other gliders

Towards the rising wing

Should I stay or should I go??

Depends on height / options

S turn rather then full circle if you need to leave

Many methods to **centre**…

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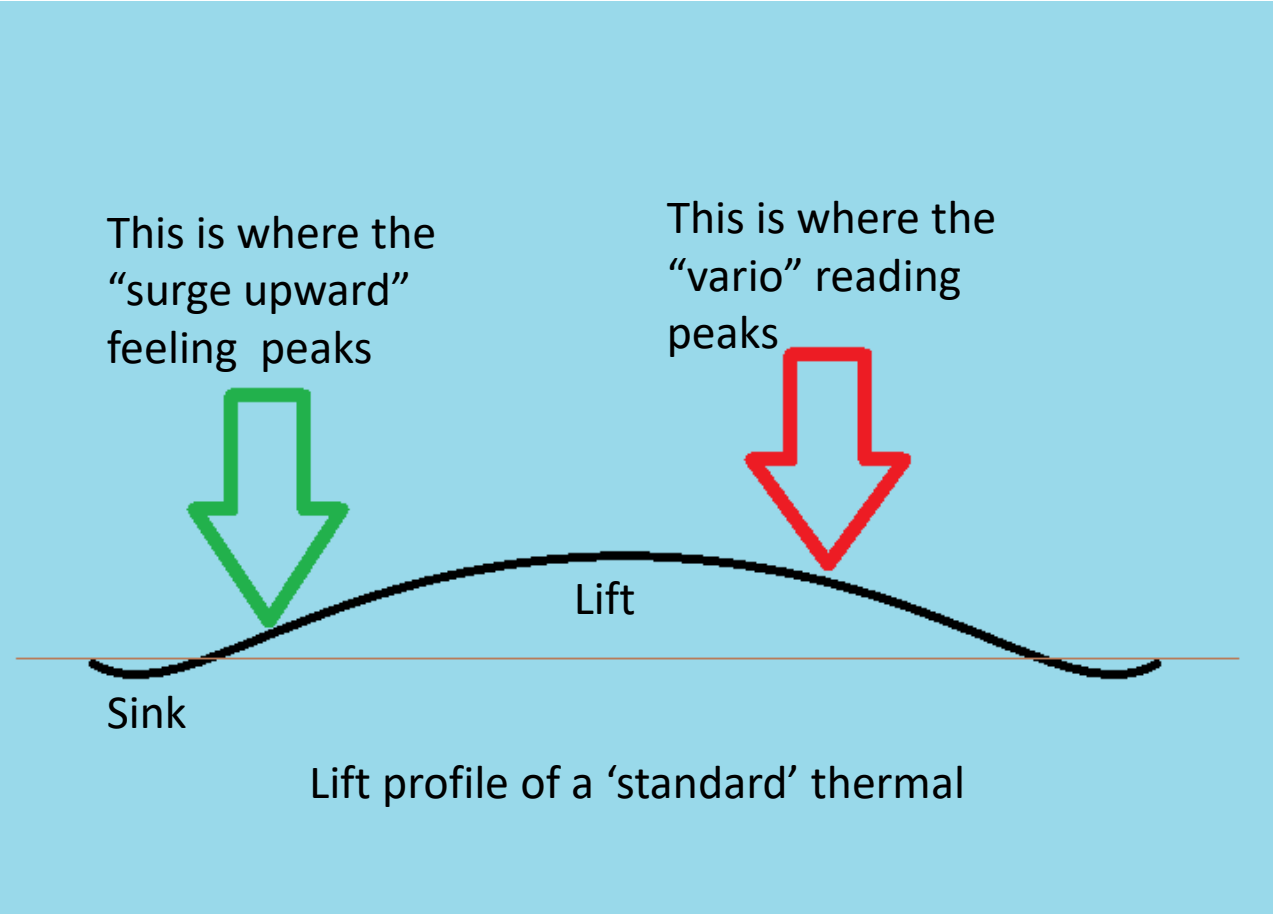
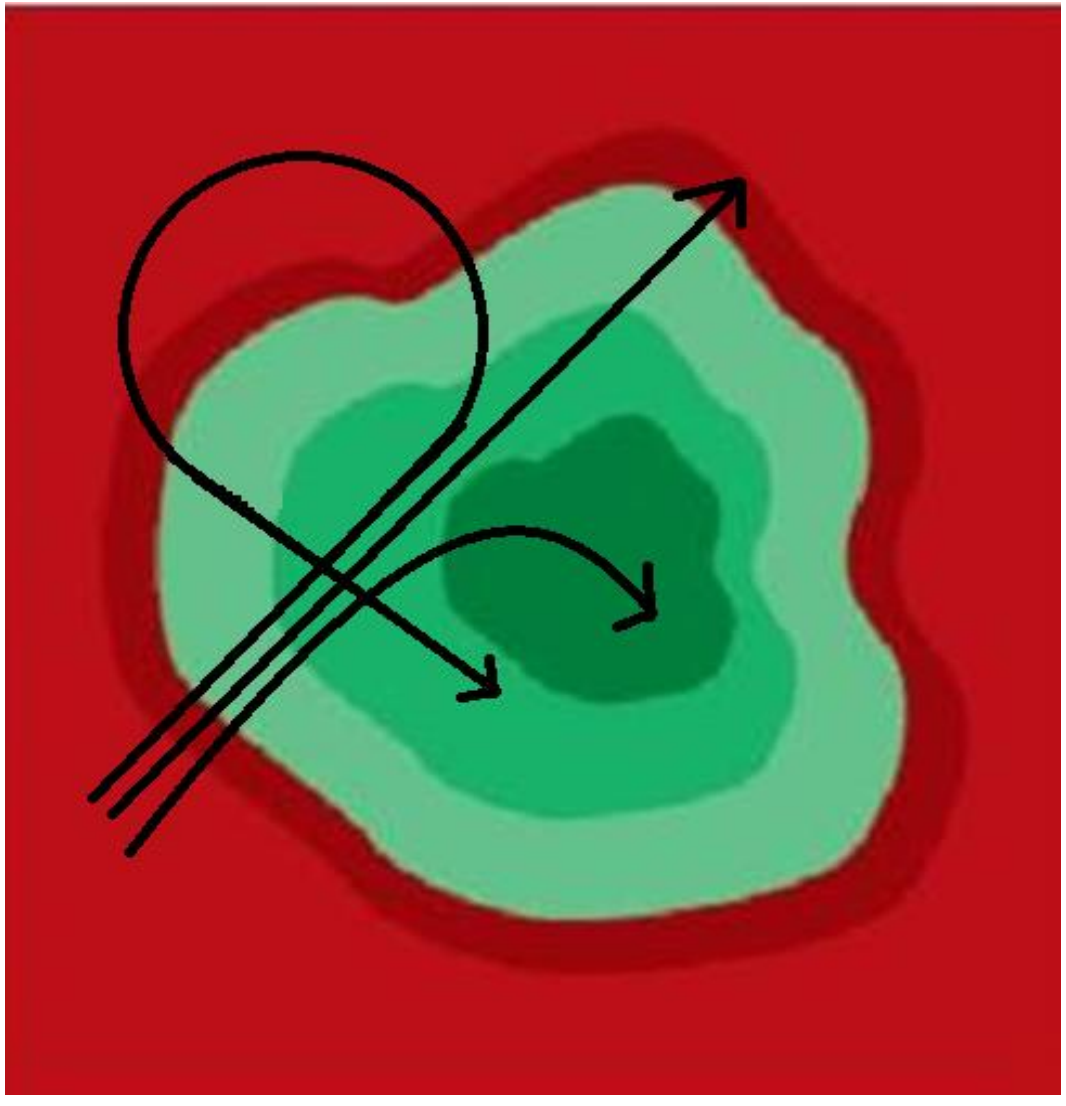


Variometer measures climb rate and lags by about two seconds due to inertia and TE issues.

You feel acceleration almost instantly but can't detect absolute climb rate!

Aim of the all methods: shift your circle away from sink, towards the strongest lift!

Centre - The initial turn:



Wait until through sink, plus a couple of seconds in lift (“seat of pants” not vario)

Choose you direction – wing lift / visual clue / other gliders

LOOK OUT! - Start your turn, 40 degree bank

If resistance on the down wing and lift - ☺

If sink - turn 270 degrees and try again.

All methods:

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LOOK OUT and keep LOOKING OUT!!!! USE THE AUDIO

Build a model of the lift in your head, relative to heading or ground features.

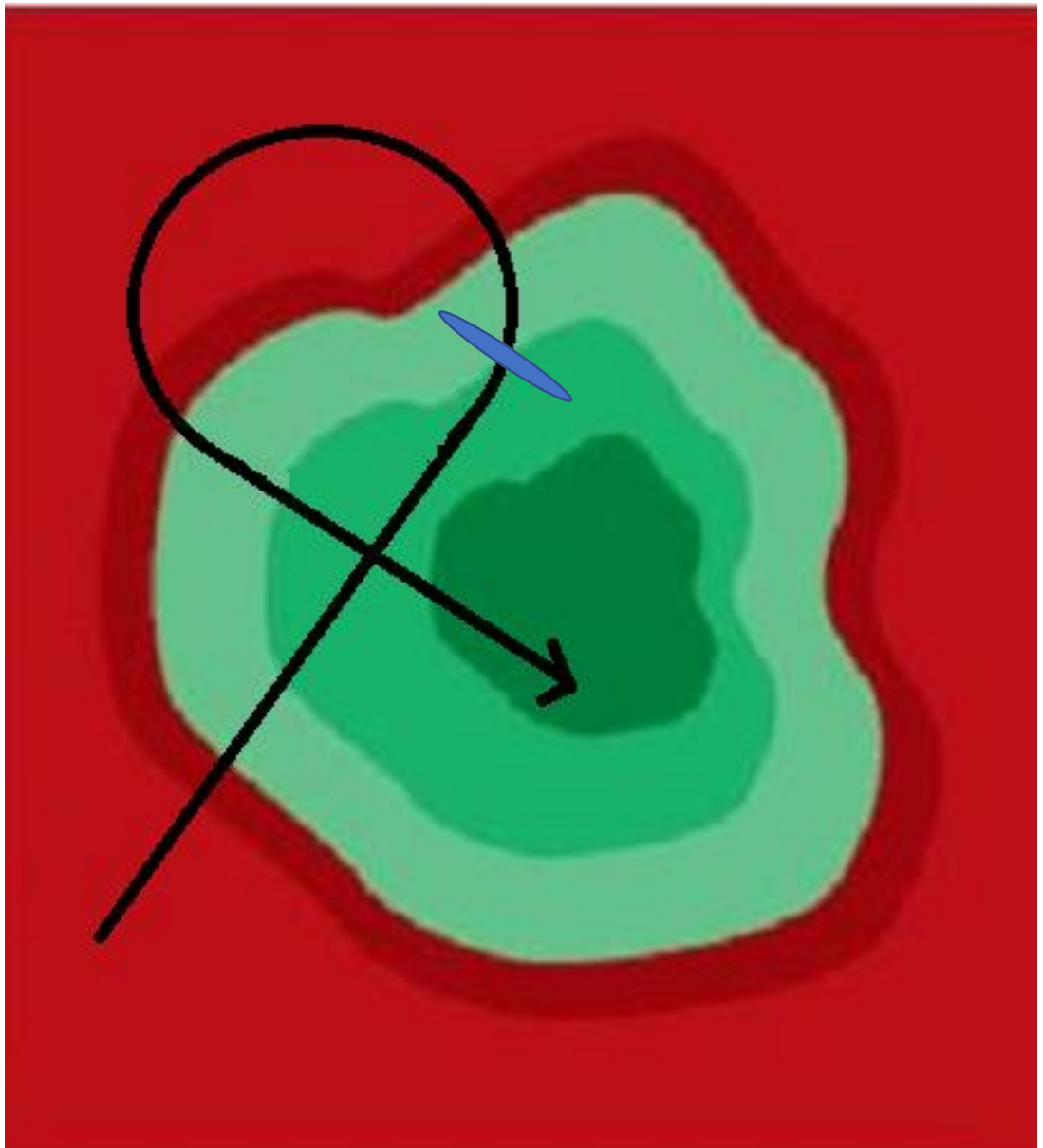
Shift away from sink and towards lift

If other gliders in thermal and close, just focus on maintaining a good separation.

Vario tells you what the thermal is doing where you were two seconds ago!

NEVER fly in the same sink twice!

Vario method



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Simple method ☺

Peak vario happens <u>after</u> peak lift

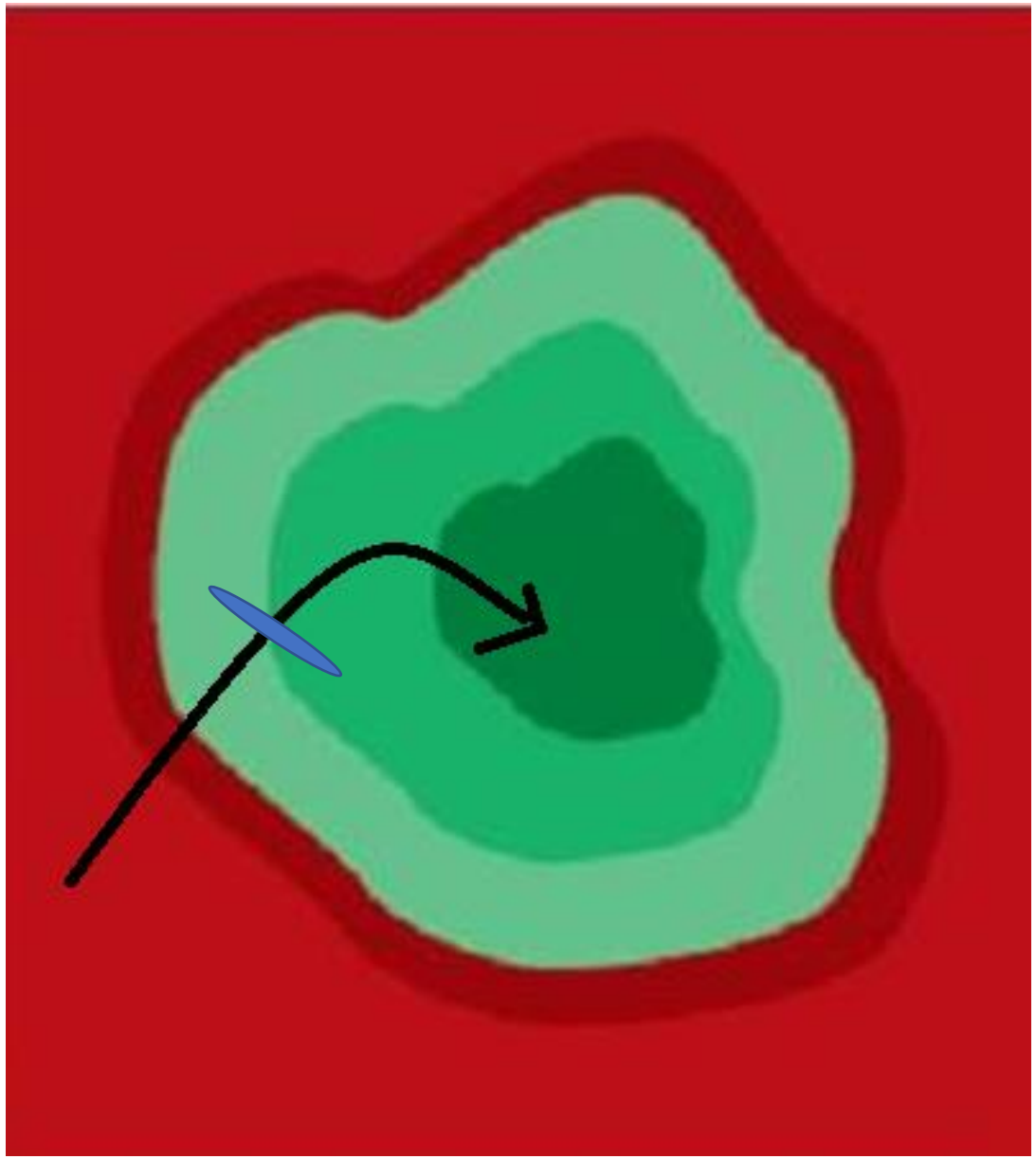
Use opposite wing to line up 270 turn

Keep shifting 270 until in stable climb

Can involve flying through sink ☹

USE THE AUDIO!!!

Surge method



Also a simple method ☺

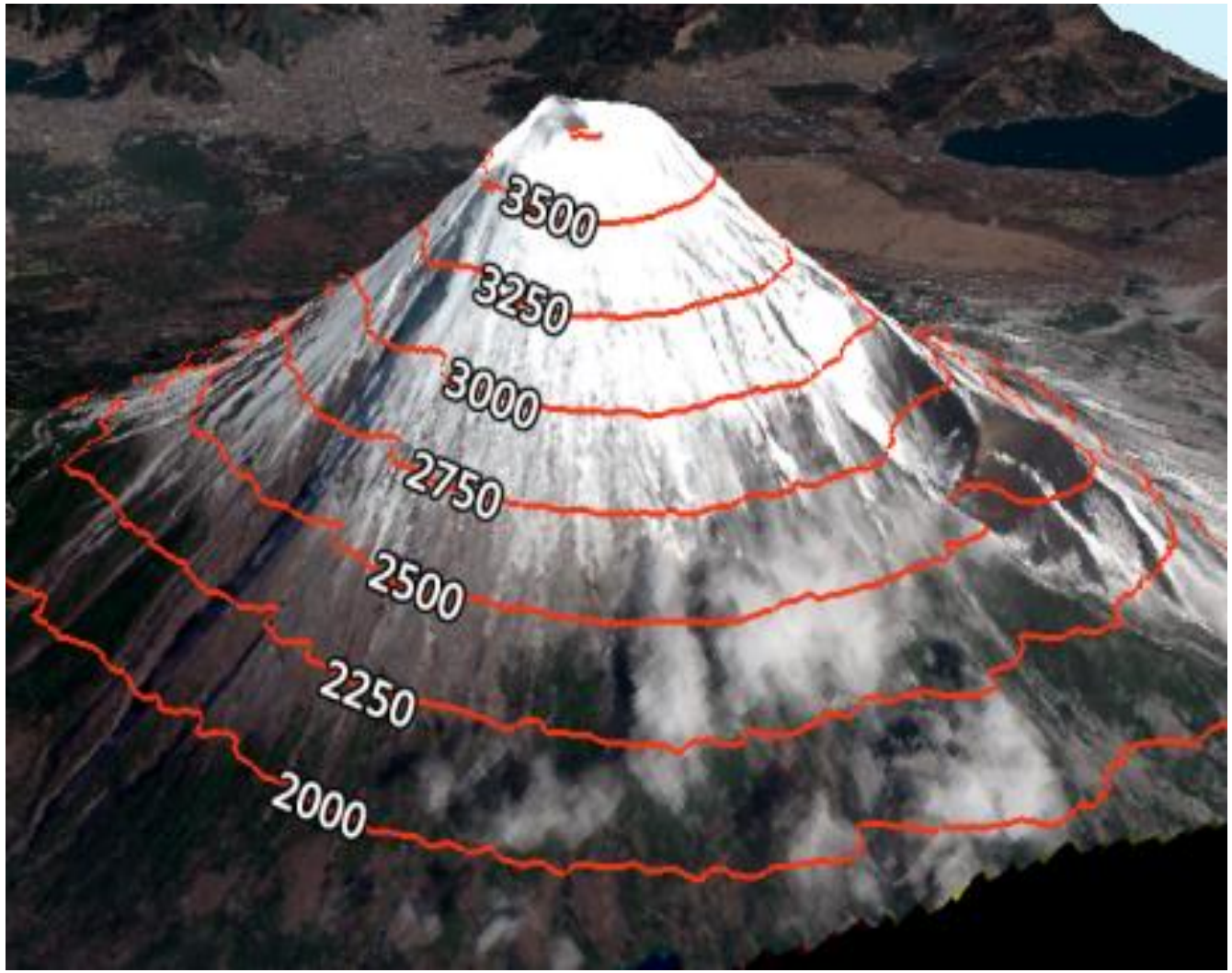
Pilot detected acceleration

Surge happens <u>before</u> peak lift!

Not as good with large, weak thermal ☹

Use 270 method to shift circle once established

Surge method



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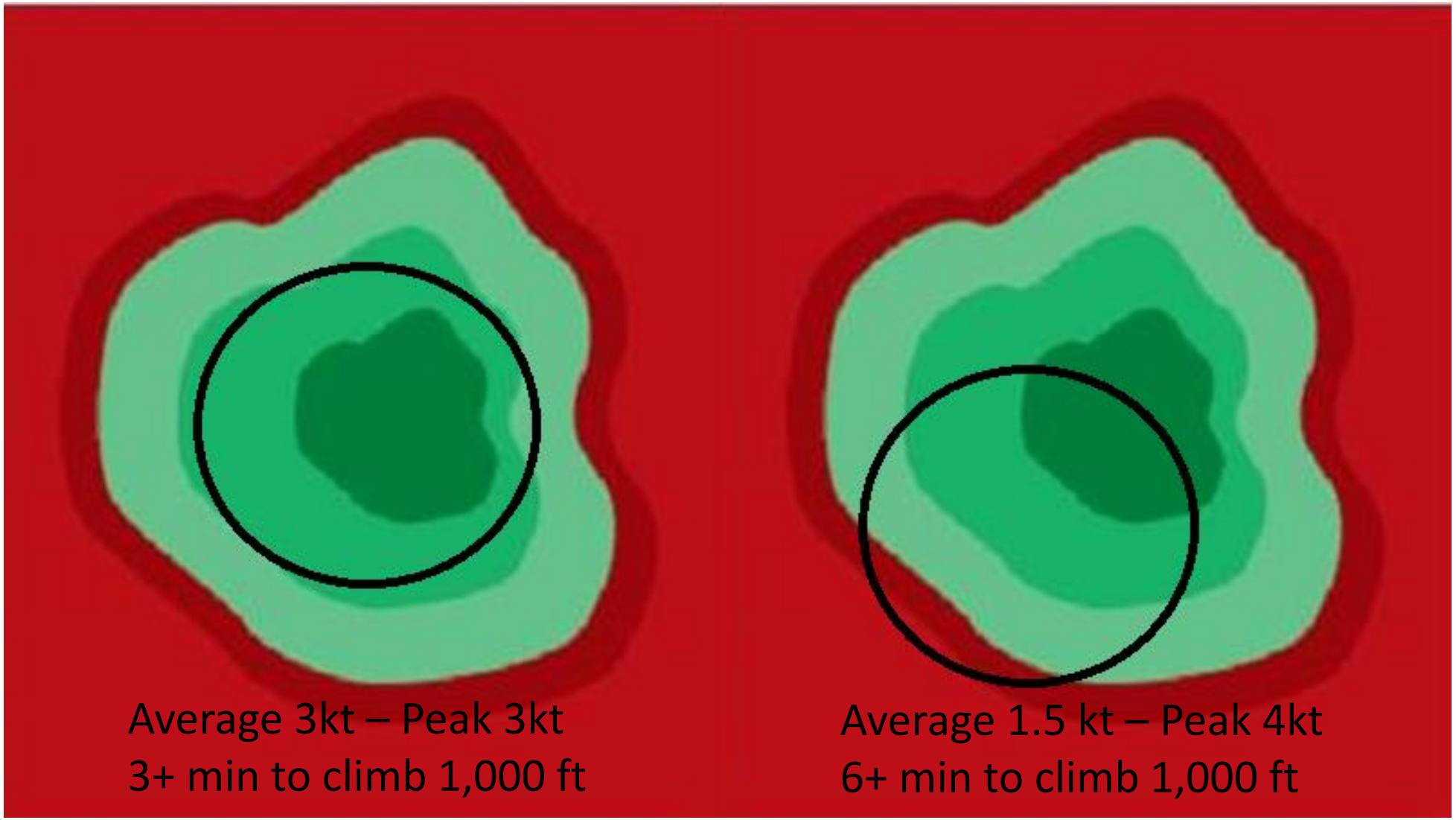
Based on acceleration felt, <u>not</u> vario.

Reduce bank ("open" or "straighten") on the <u>surge</u> - You are heading towards better lift!

Increase bank ("tighten") as that <u>surge ends</u> - You are now in that better lift!

Maintain attitude to avoid 'stick G'

Average vs **peak** climb rate



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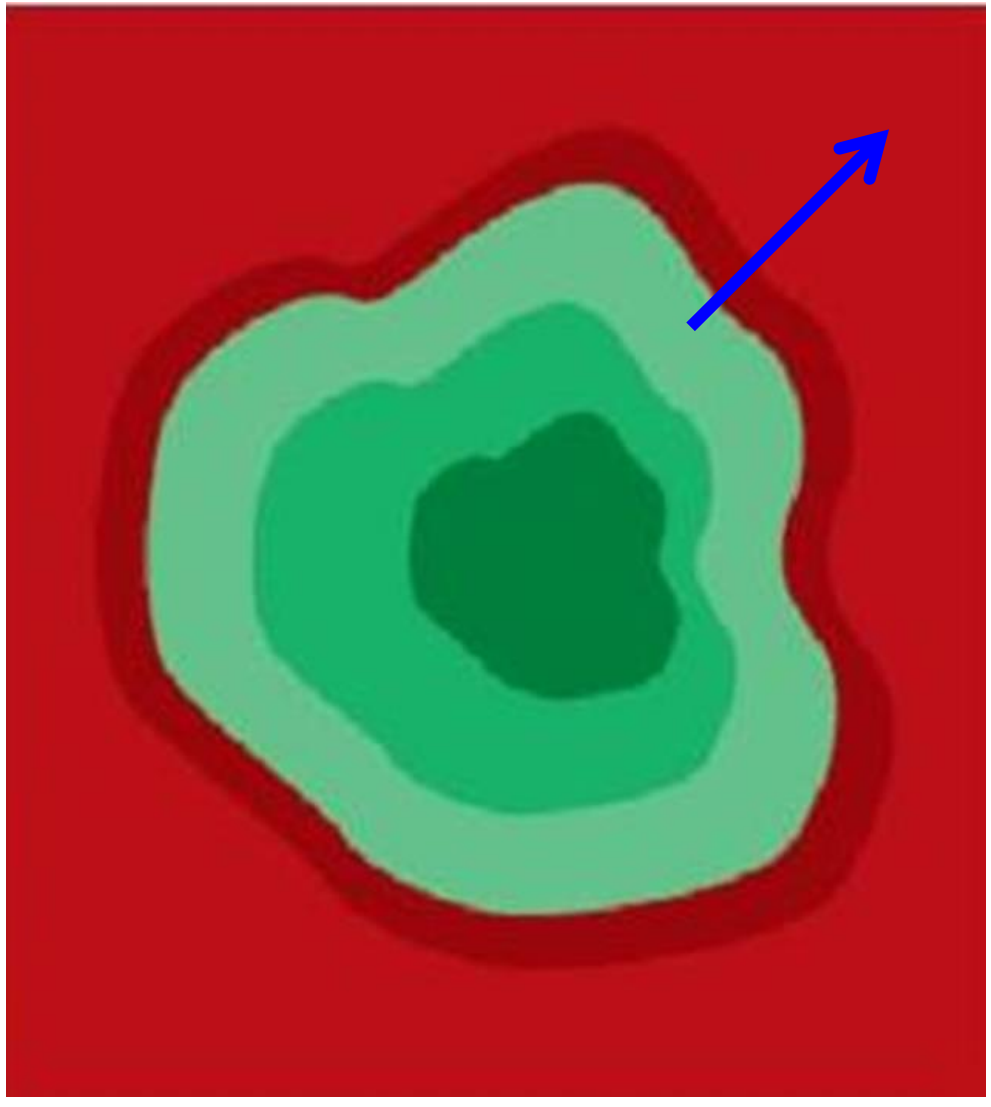
270 or surge method would help centre the thermal!

Enter – Centre - **Exit**



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Questions:

When do we exit a thermal?

How do we exit a thermal?

Enter – Centre - **Exit**

Leave because:

- Better lift elsewhere?
- Lift not as strong?
- Easier to see route ahead?
- Comfortably on final glide!

Use last of lift to accelerate – not to pull up!

(aim to minimise time in sink!)

Climbing with other gliders

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Question - How do you join, climb and leave a thermal with another glider?

Climbing with other gliders

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Assume that there **will be another glider** in your thermal!

KEEP LOOKING OUTSIDE!!

Join from the outside

Join at thermaling speed,

Think horizontal and vertical separation

Turn in the same direction

Match angle of bank to control and maintain separation

If in doubt, leave.

Climbing with other gliders

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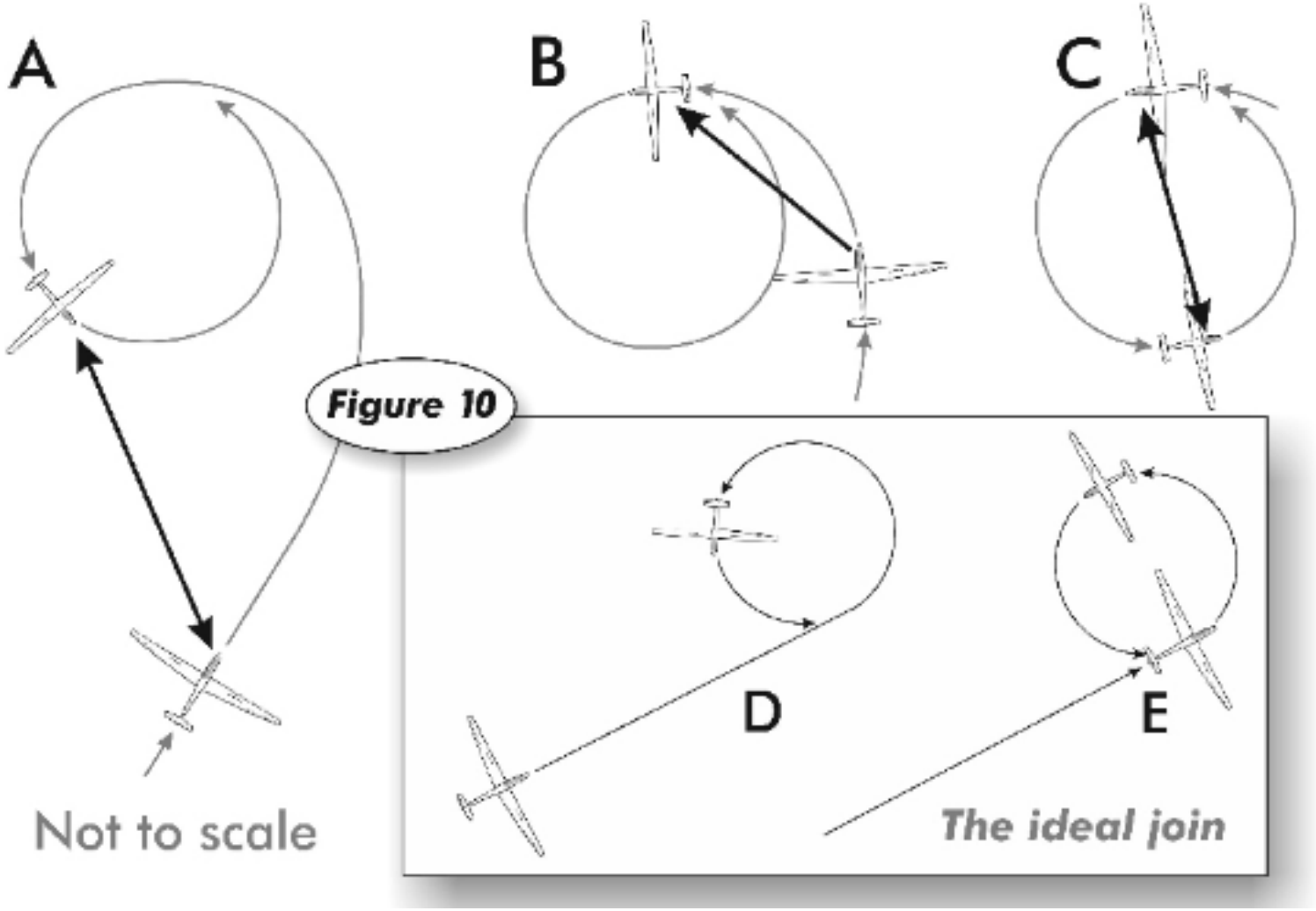

Climbing with other gliders

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Summary

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Turn at 35-45 degrees to balance rate of sink and turning circle

Maintain constant attitude (vs constant speed)

Surge method based on early pilot felt acceleration
Vario method based on delayed maximum reading

LOOK OUT! for clues and gliders!

Never fly in the same sink twice

Things to practice

LOOKING OUT!!!!! - Gliders, birds, tendrils, wisps, **CLUES….**

Feeling lifting wing and turning the correct way (first time)
Feeling surges and ‘straighten to climb the hill’
Never fly in the same sink twice

Looking out of the cockpit, 95% of the time – **<u>Listen</u>** to airspeed and audio vario
Maintaining a constant attitude in turns
40 degree turns - use tape?

LOOKING OUT!!!