Safe, Effective Cross Country Techniques and Decision Making

Panelists		~ 15 mins each
Pete Alexander	-	Fundamentals and Guidelines
John Cochrane	-	Safety Decision Mindset
John Cochrane	-	Tactics for Going Faster
John Cochrane /Peter Deane	-	The Head Stuff
Q&A		~(30mins)
All topics –		including Safe, Fast Racing

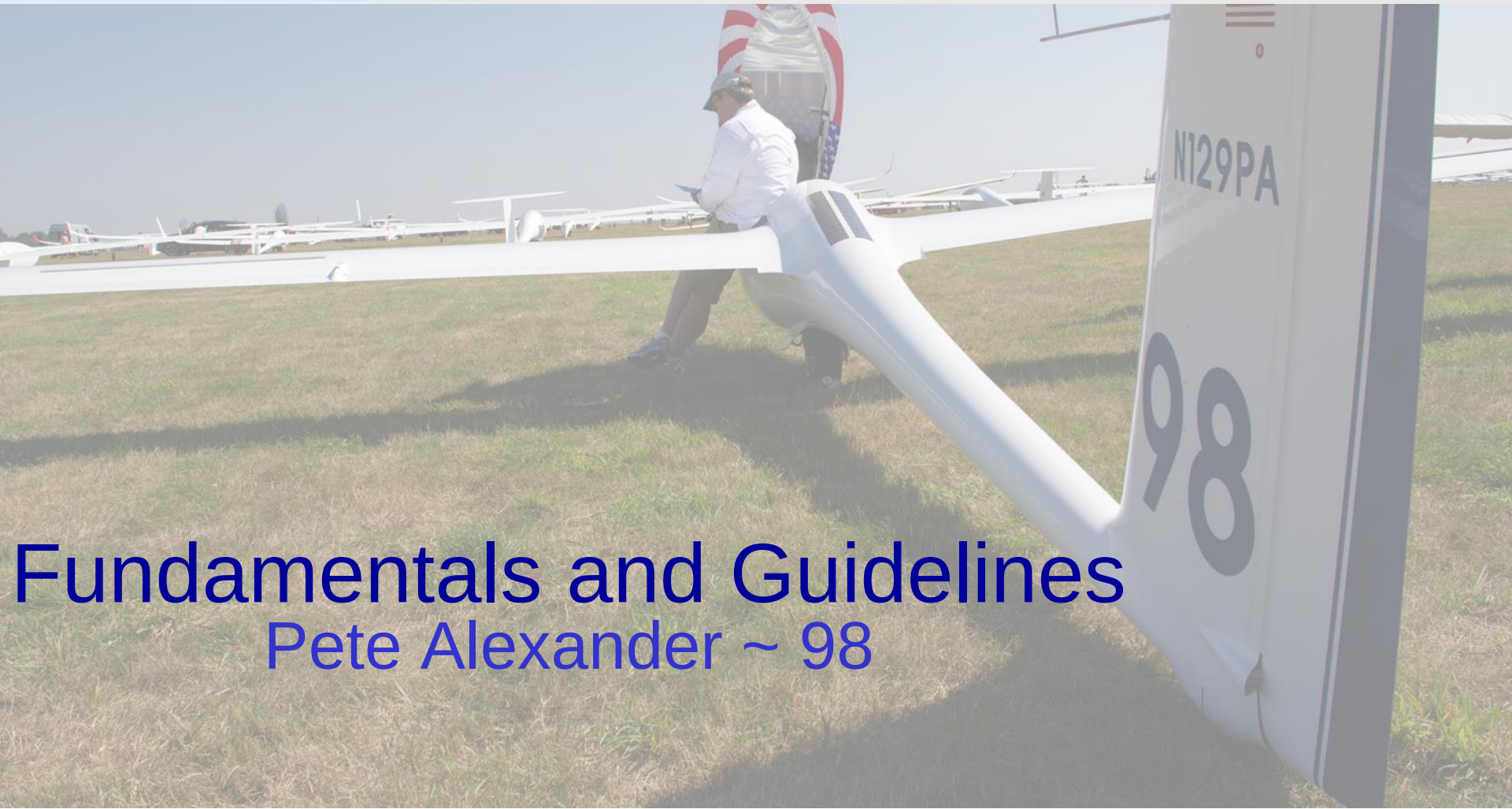
PASCO

PASCO

SOARING

Pacific Soaring Council, Inc.

A non-profit volunteer organization serving glider pilots in Northern California and Nevada



Fundamentals and Guidelines

Pete Alexander ~ 98

Agenda

- Thermaling Tips
- Reading The Sky
- You Need A Plan Before You Can Change It
- Seeking Additional Knowledge?
- Questions?

Thermaling Tips

- Coordinated Turns
- Smooth Movements
- Speed Control +/- 2 kts
  - Radius of the circle varies with square of the airspeed
  - Examples:
    - 50 mph = 2500’ Radius
    - 55 mph = 3025’ Radius

Thermaling Tips

- Fly Minimum Sink for the Bank Angle
  - Refer to the circling polar of your ship
  - Or: 42 kt (Minimum Sink) x √**1.41 (45º Bank Angle) = 50.4 kts**
- "Super Secret" Thermal Detector?
- Develop a mental image of the thermal's structure

Reading The Sky

- Flying with your eyes WIDE open!
- Looking for lift indicators:
  - Spinners (circling sailplanes),
  - Dust Devils, Haze Domes
  - Flying Junk (i.e. balloons, corn husks, plastic bags, etc)
  - Soaring Birds
- Look UP!
- Changing “fabric” of the cloud
- Wind direction


30 W
Area Tatum
24
3907
2.0

You Need A Plan Before You Can Change It?

Seeking Additional Knowledge?

Available From
Wings & Wheels
(http://wingsandwheels.com)

Cross Country Decisions for Speed and Safety.

Part 2: Safety

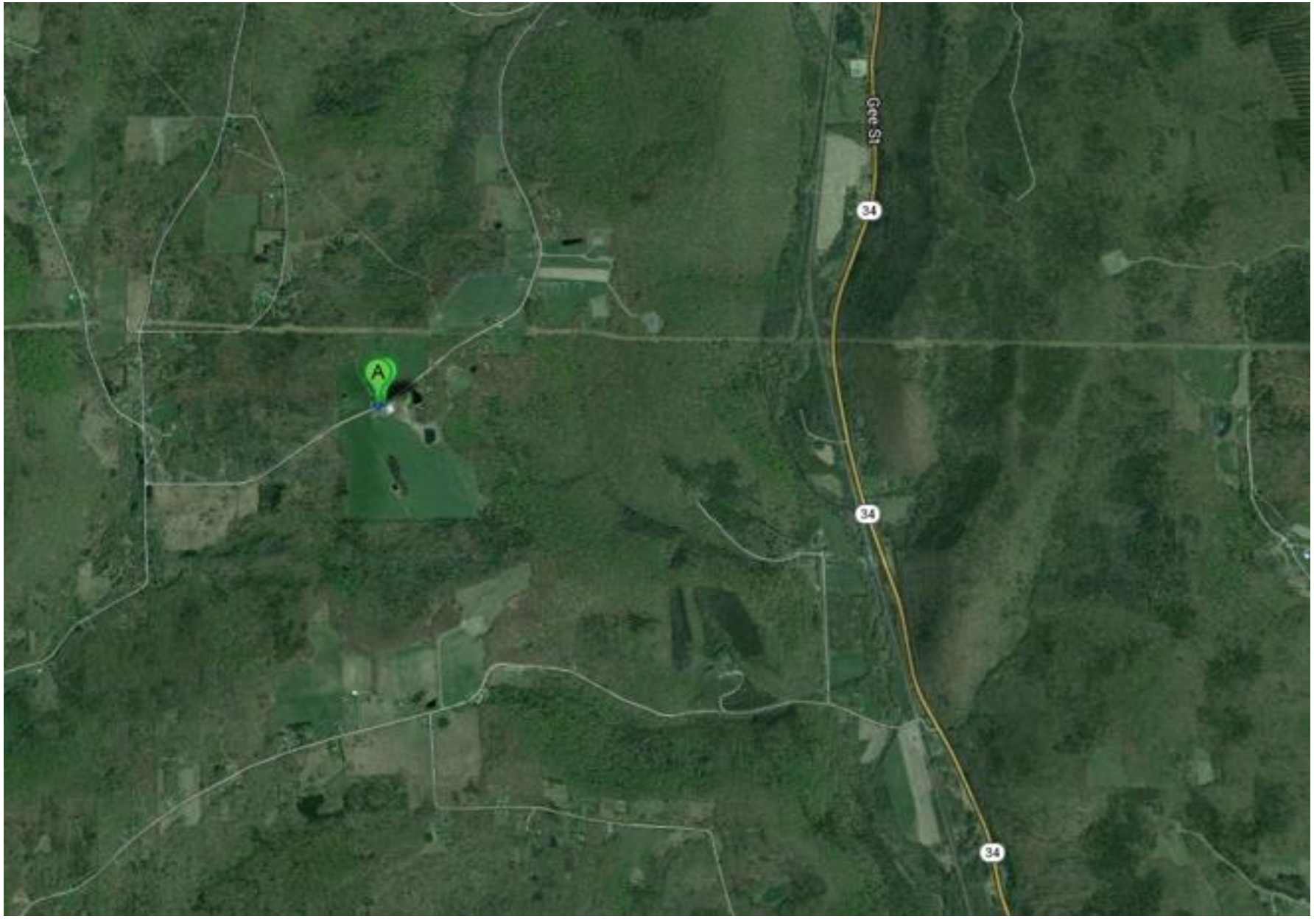
Pete Alexander (98)

and John Cochrane (BB)

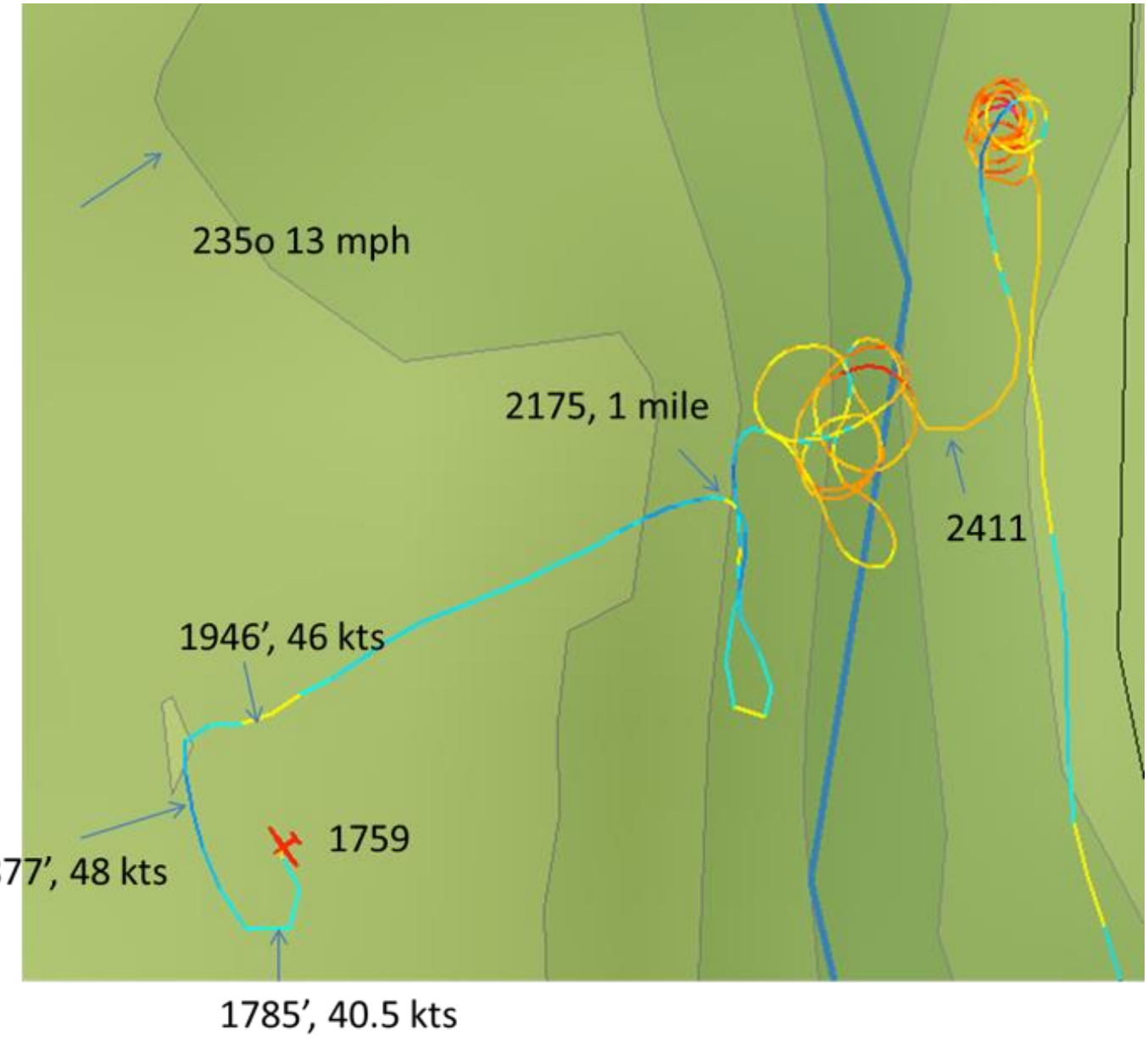
An Off-field Landing Gone Bad

The Field

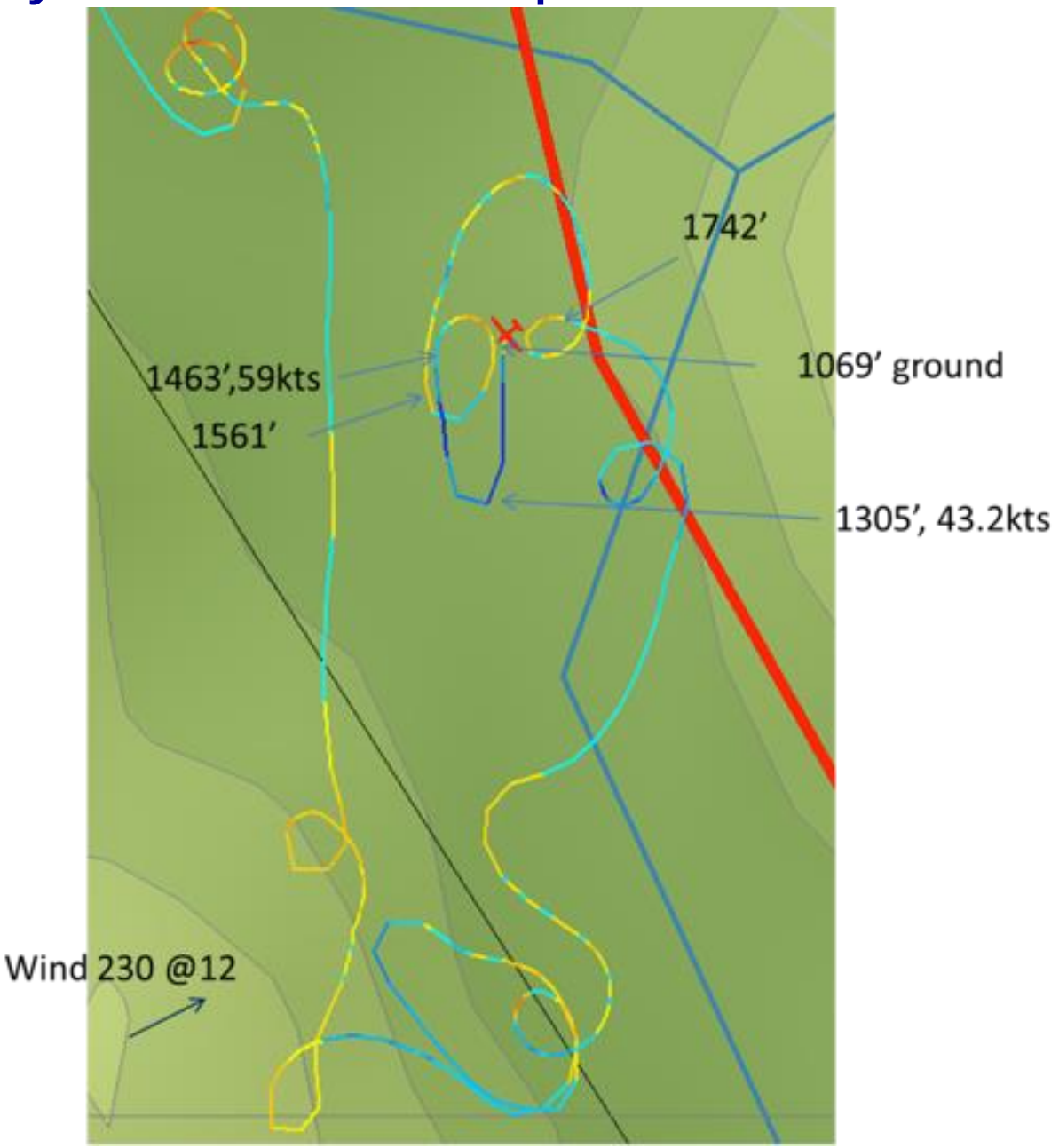
The Surroundings



The Trace

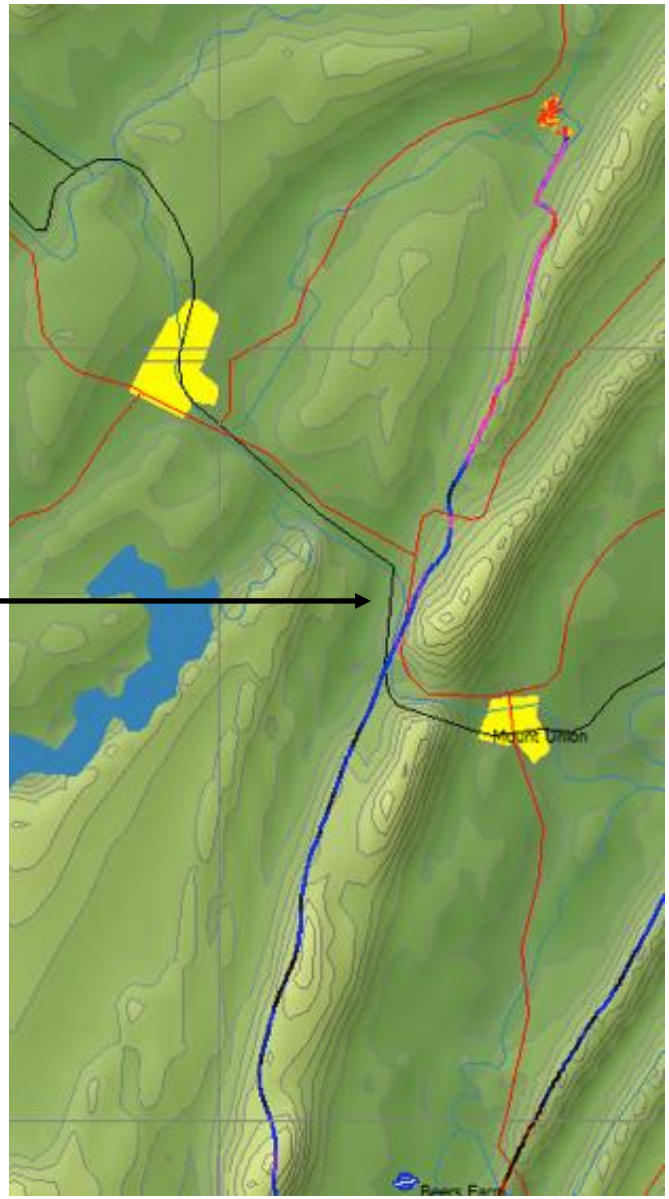

235o 13 mph
2175, 1 mile
2411
1946', 46 kts
1759
1877', 48 kts
1785', 40.5 kts

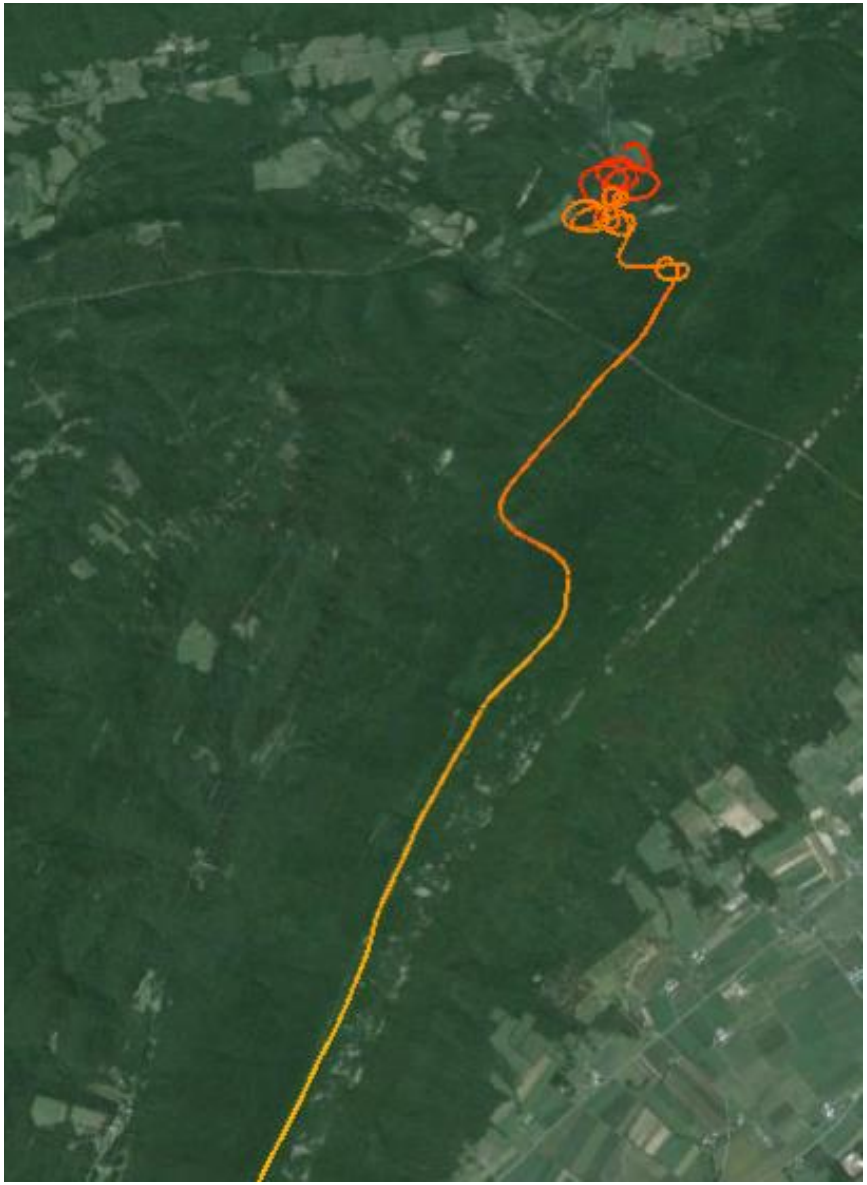
The Nearly Irresistible Temptation to Thermal Low

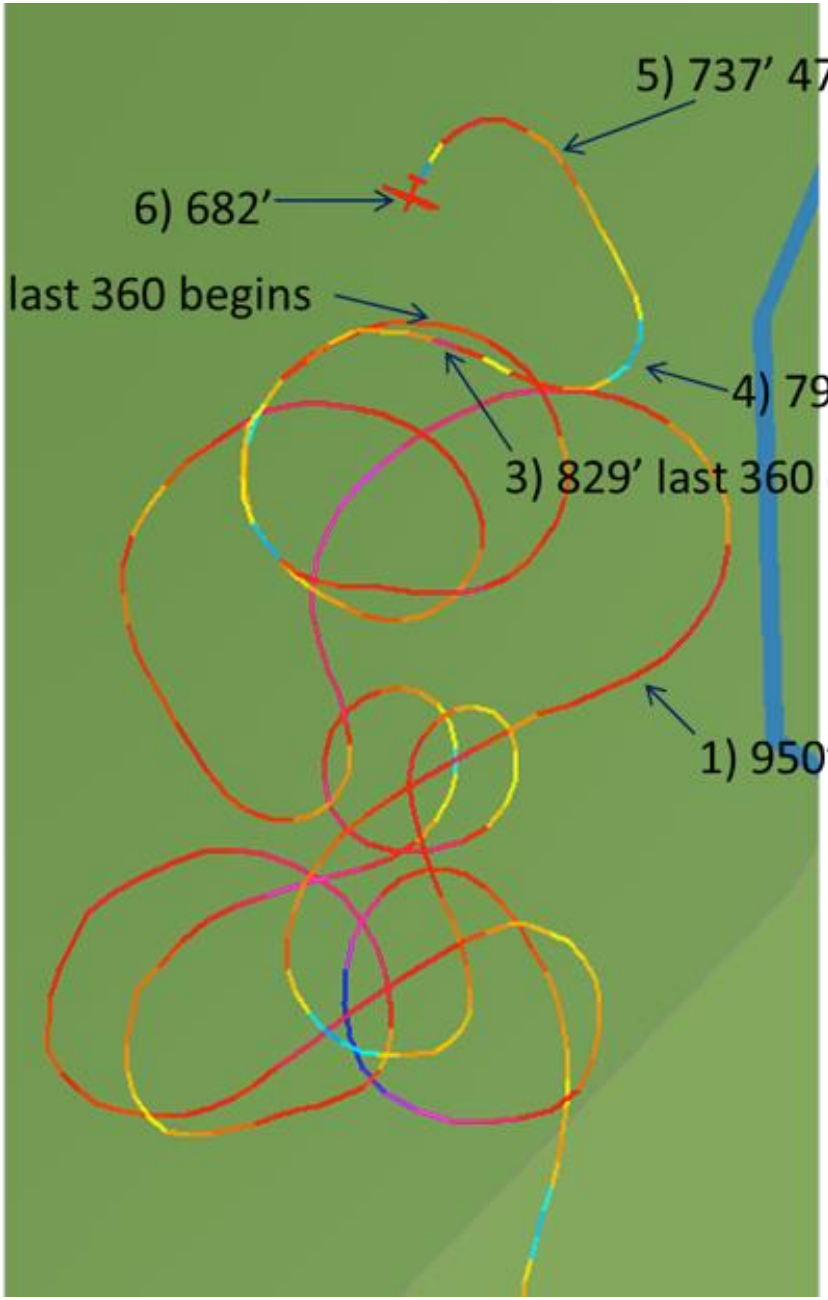


The Nearly Irresistible Temptation to Thermal Low

Fields







1) 950’ = 268
2) 941’= 259
3) 829’ =147
4) 793’ =111
5) 737’ = 55

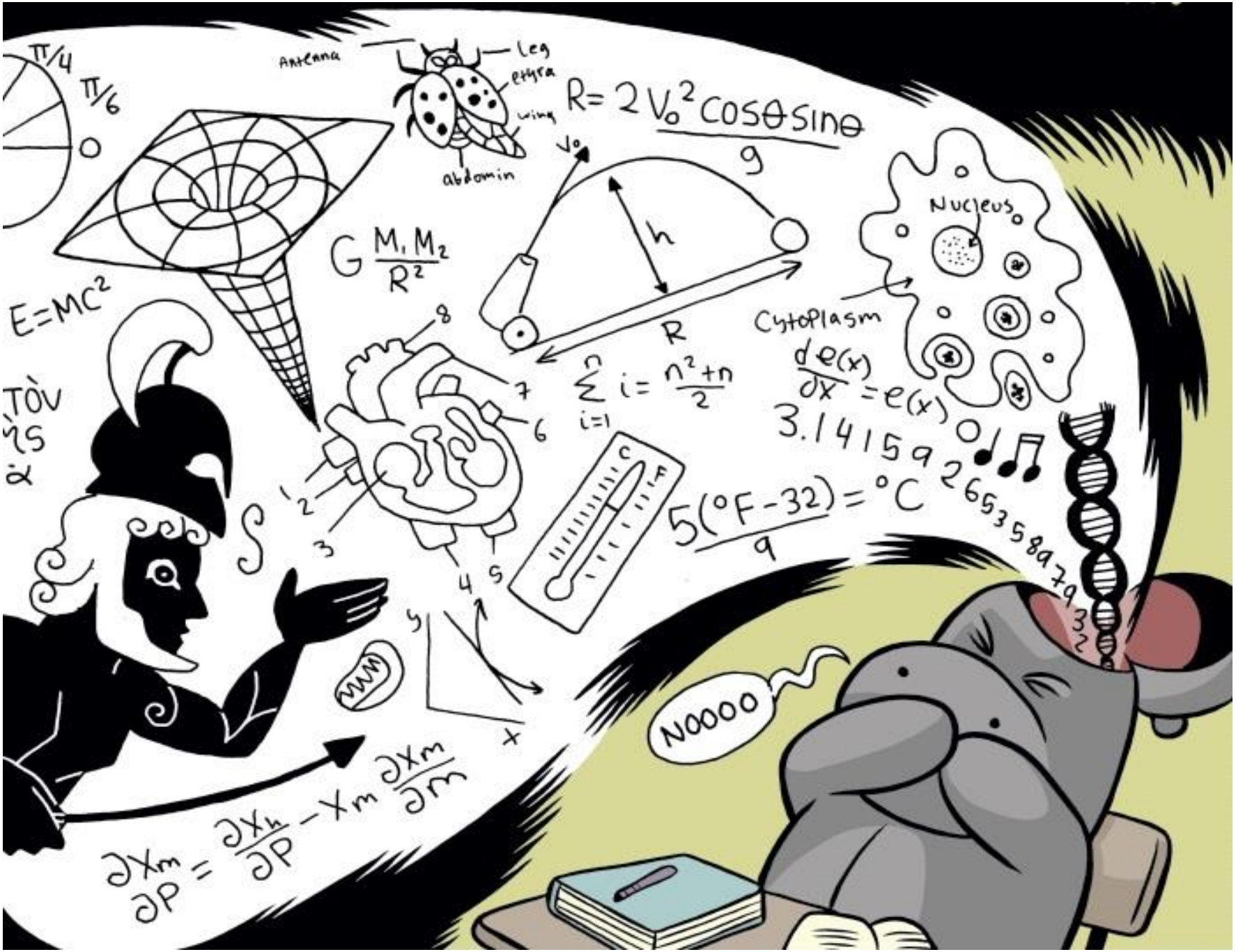
How to do things in the air that we understand perfectly on the ground?

- Like PTT: Rehearse, preplan decisions; mental state
- Prepare for misperceptions/temptations
- Check mental state
- You *will* be tempted
- Remember low thermal issues / use quantitative guidelines
- Choose a good patter/feelings
- Exercise: slip to landing.

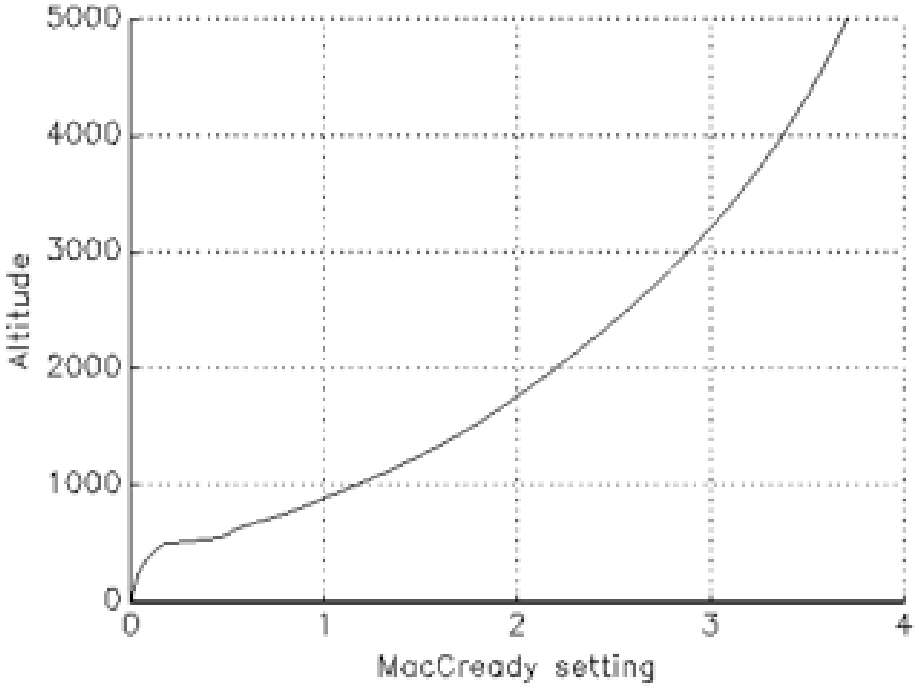
Cross Country Decisions for Speed and Safety.

Part 3: Speed — Technical

Pete Alexander (98)
and John Cochrane (BB)


π/4
π/6
Antenna
Leg
Elytra
wing
abdomin
$R = \frac{2V_0^2 \cos\theta \sin\theta}{g}$
$G\frac{M_1 M_2}{R^2}$
$E=MC^2$
V_0
h
R
Nucleus
Cytoplasm
$\sum_{i=1}^{n} i = \frac{n^2+n}{2}$
$\frac{de(x)}{dx} = e(x)$
3.14159265358979...
$\frac{5(°F-32)}{9} = °C$
C
F
1
2
3
4
5
6
7
8
y
x
$\frac{\partial X_m}{\partial P} = \frac{\partial X_h}{\partial P} - X_m \frac{\partial X_m}{\partial m}$
NOOOO

What is the weakest thermal you'd take right now?



Thermal strength	Miles 1	5	10
1	20	90	99
2	10	61	84
4	5	30	52
6	2	10	18

Probability of finding a thermal at least this strong in the indicated number of miles.

Height band. “Long glide?” “Stay high?”

Height			Thermal	
gain	1	2	4	6
500	0.7	1.1	1.5	1.8
1000	0.8	1.4	2.2	2.7
2000	0.9	1.7	2.9	3.8
5000	1.0	1.9	3.4	4.8

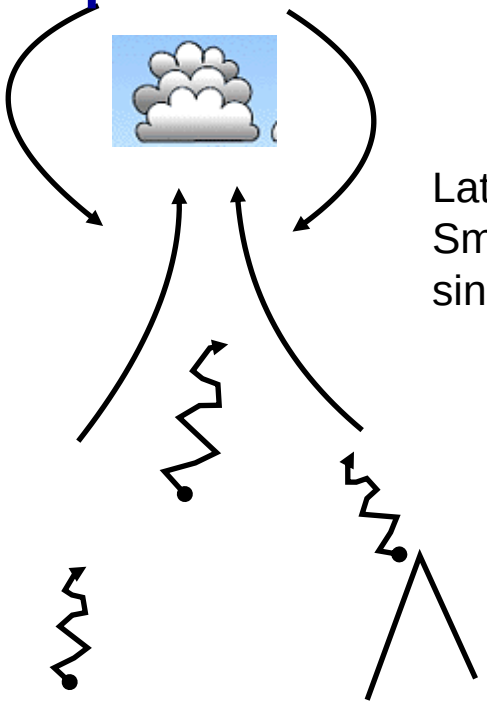
Achieved climb if it takes 2 minutes to center

>Total bottom to top matters, not the best gust!

Avoid weak lift!

- Minutes per foot, not feet per minute
- 2 kts + 10 kts = 3.33 kts not 6 knots!
- 5 min/1000’ + 1 min/1000’ = 6min/2000’ = 3 min/1000

Understand the Vertical Structure of the Atmosphere. Today.



Latent heat, circulation.
Smooth weak lift, less sink, a few strong cores

Strong cores, but sink too.
Climb&glide

Superadiabatic.
Punchy, ratty, strong.
Strong sink, lift quits

Often worth stopping for smooth 4-5 knots to stay high.
With many (slow) options to save the flight

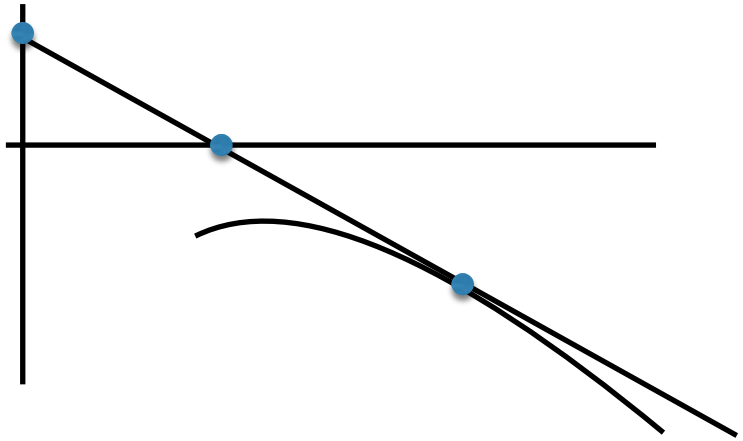
Many considerations!

- Blue vs. isolated cu vs. well developed vs. streets vs. OD
- Mountains vs flats vs ridges
- Wind and wind profile
- Bubbles vs columns? Easy to center or need work?
- Sun and terrain. (Lift and sink!)
- Circulation / convergence patterns.

Climbing better

- Leave bad lift.
- If not climbing at mc value, leave.
- Searching is costly. Going back is a huge cost.
- Sniffing and fishing.
- Don’t go past 90 if not increasing, smooth.
- Look! birds, gliders, convergence, wisps
- Gs and entries.
- Roll out slowly and sniff.

MacCready Speeds



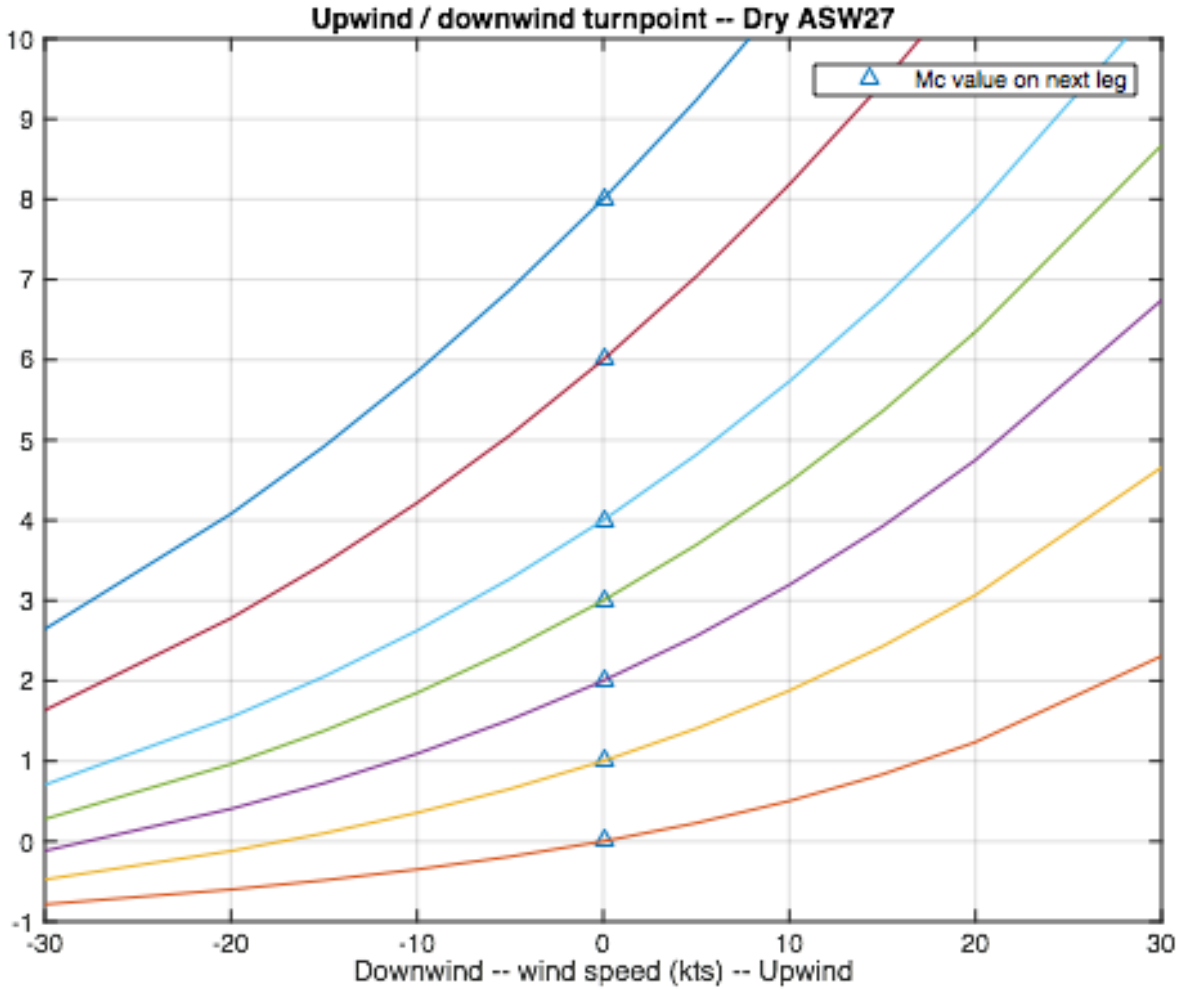
WET ASW 27

Mc (kts)	Speed (kt)	L/D	ft/mi	Avg Speed (mph)
0	67	47	112	0
1	79	45	117	33
2	89	41	128	49
3	97	37	141	60
4	105	34	156	68
6	120	28	186	81
8	133	24	216	91

DRY ASW27

Mc (kts)	Speed (kt)	L/D	f/mi	Avg Speed (mph)
0	55	48	110	0
1	65	46	116	31
2	73	41	129	44
3	80	36	146	53
4	87	32	163	60
6	99	26	200	70
8	109	22	236	78

All Decisions are MacCready Values



(Much) More theory
Google “cochrane soaring”

John H. Cochrane

Home | Research | News, opeds | Blog | Teaching | Soaring |

Navigation

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  - Articles etc.
  - Contest Corner

Links

- Official Booth Page
- Family Webpage
- elizabethfama.com

Soaring

Me, polishing the tail before takeoff. Photo by Chris Strong for the Booth alumni magazine

MacCready and other theory of how to fly contests

- Safety glides. (Later published in Soaring) February 27 2012 How to use your glide computer for safety glides. Don't use Mc 0 and expect to get home. The square root rule, and more. Slightly expanded version with metric units: (pdf) or (doc) (August 2012)
- Deviations Part I Sept 2011. (Later published in Soaring) How far off course should you go to chase that juicy cloud? The MacCready theory of course deviations. (Part I is the case with no wind. Part II with wind on the way.) This version includes the algebra appendix for masochists.
- Just a little Faster Please Jan 2007. Condensed and rewrote the article for publication in Germany. This version is better, except the numbers are all m/s and km. Slovenian translation. German version.
- Just a Little Faster Please July 2000. Article for Soaring Magazine on applying new MacCready theory.
- Upwind and downwind The theory of upwind and downwind turnpoints. Oct 2006 (Also a "contest corner"
- "MacCready Theory with Uncertain Lift and Limited Altitude" *Technical Soaring* 23 (3) (July 1999) 88-96. This version cleans up some typos that crept into the published version. Acrobat 3.0 pdf file Programs contains matlab and gauss programs for making the calculations.
- NOTE: Robert Almgren wrote this very nice and mathematically much better version of the theory. Even if you don't like equations, skip to Figure 4.1 and 4.2 which are full of insights.
- "The start time game in competition soaring" *Technical Soaring* 22 (2) (April 1998) 56-64 . This article analyzes when to start early, when to start late, when a big gaggle will form, and so on. Acrobat 3.0 pdf file.
- Notes for talk given at the Midwest mini-convention, Feb 2000 MS-Word doc file. Same general stuff as in "Just a little faster please"

Safety and rules

- 2013 Contest safety review. Reviews 2013 contest accidents. Another bad year for absurdly low-altitude thermaling.
- A radio revolution? *Soaring* 77 (2) February 2013 24-25. Pilot to pilot communication will be allowed at regionals this year. Some thoughts on how to use this innovation productively.
- 2012 US contest safety review. Reviews 2012 contest accidents, and recommends changes to try to address them. It's been a bad year for low-altitude maneuvering.
- You Will Be Tempted. A Safety Talk at Uvalde 2011 turned into a short article for Gliding Australia 2012. A little safety psychology for contest pilots. Old issues, new package. Thanks to Bruce and Anita Taylor for getting me to write it up, publishing it, and sending me a scan.
- 2011 US contest safety review.
- Safer Finishes Soaring Magazine article, arguing for a high finish gate or "hard deck" and no rolling finishes to reduce accidents on and near the home airport. Draft if you have problems with the published version.
- Contest Safety Feb 2002 Power point slides for presentation at 2002 convention. Where are the accidents, what can you do to avoid them, and what can rules do to make contests safer.
- Plea for the 500 foot rule. Message to r.a.s. Sept 2003 on the high finish

Cross Country Decisions for Speed and Safety.

Part 4: Speed — Head Stuff

John Cochrane (BB) and Peter Deane (2T)

“Head Stuff”

- Make in the air decisions you understand perfectly on the ground. Hard!

- Preplan, visualize, rehearse, choose emotional state and patter.

Emotions and patter:
- Self-pity, ego defenses.
- Stress
- Fear
- Impulsivity

Techniques:
- Short term goals
- Advance planning, but decisions when you have to

Exercises:
- Low save / landout?
- Day after landout?
- Competitor passing?

Practice!
- Monitoring, choosing emotional state, patter.
- Practice executing in the air emotional control you've preplanned on the ground

Soaring is a Mental Sport

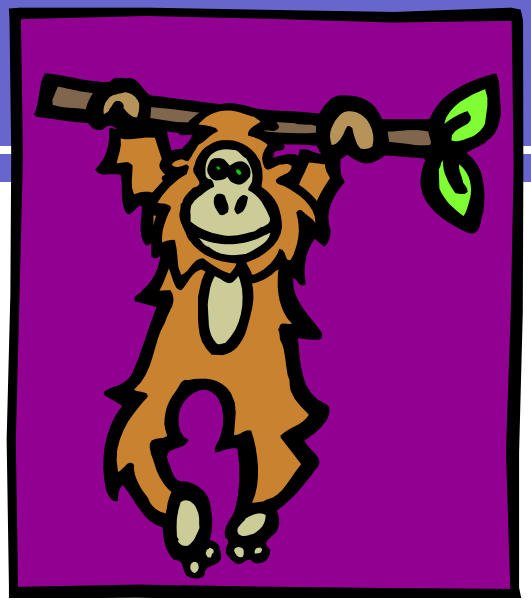
In Soaring, our speed, distance and safety are dictated by our ability to;

- Absorb information,
- Interpret it correctly and
- Act on it appropriately.

Tools to help us understand what happens in our heads

can help us be more aware of our decision making biases and help us more effective pilots without sacrificing safety.

The Automatic Pilot



Under very high stress or work load we revert to primacy.

- Automatic pilot comes into play in high pressure decisions as well as high risk situations.
- **We must address why our automatic pilot behaves as it does…..**
- To do this, we start out with some basics, then we look at some models to help us make sense of ourselves..

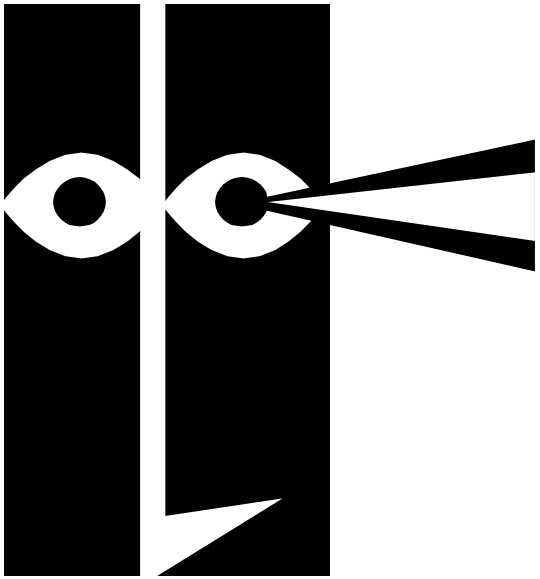
Pressure or Risk means Stress

- A condition that comprises 4 interrelated stages.

1. Environmental demand
2. Perception of demand
3. Stress response (automatic pilot..)
4. Behavioural consequences

Perception can Differ from Reality

- Individual View of Situation …



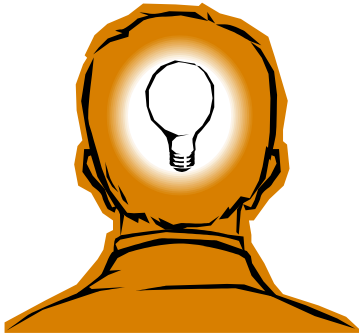
Incoming information

Expectations & Biases

Expectation Colours Perception
Perception Colours Interpretation
Interpretation Colours Decisions

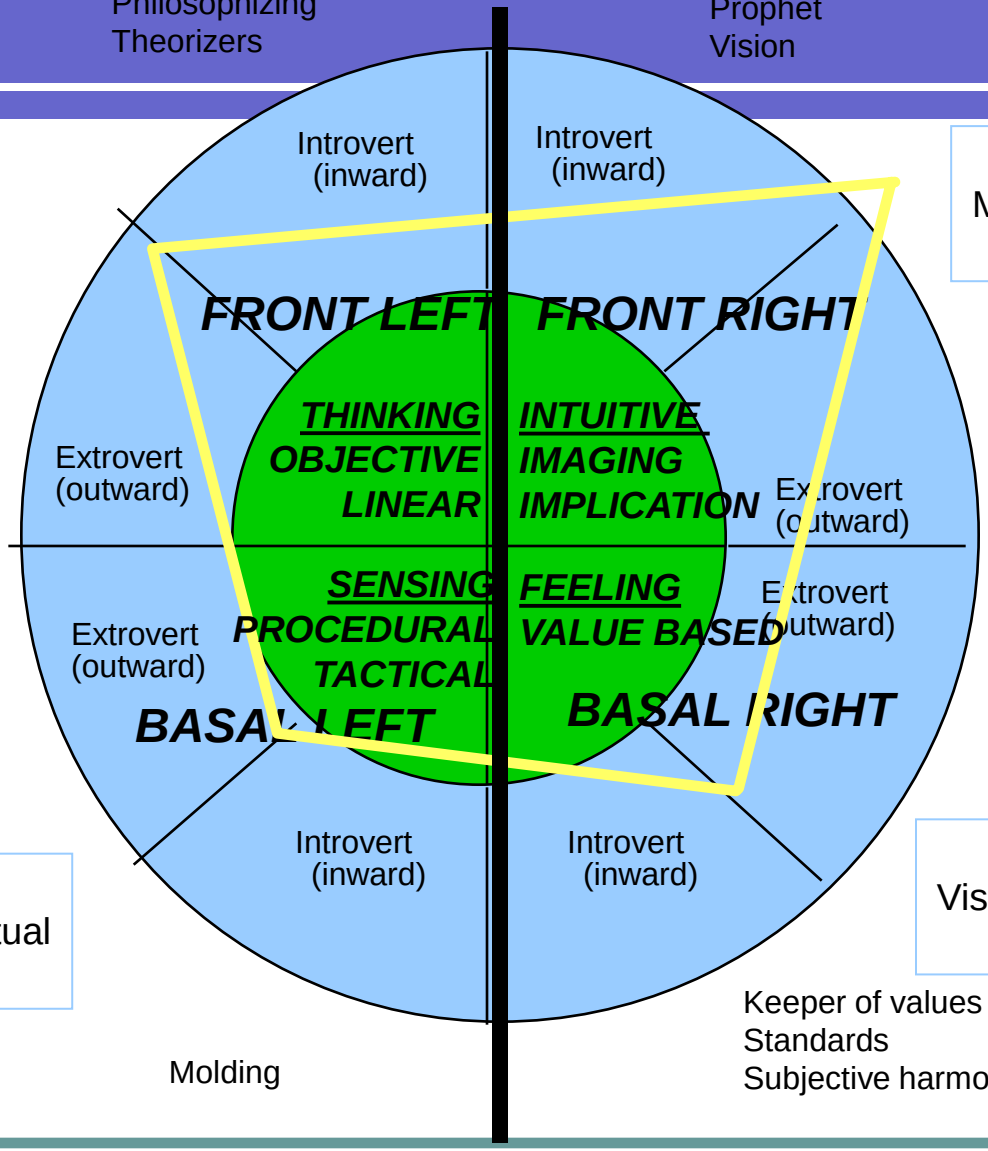
Individual Mental Traits

Mental Trait
A Predisposition to ‘Think’ in a Certain Way.



- Individual, Characteristic ***Thinking Preferences.***
- ***How we Perceive Data*** about our Environment.
  - Our Individual ***Decision Making Criteria***.
  - Our ***Attitude Toward Our Environment***.
    (ourselves & others included)

A Model for Mental Preferences



Thought pattern;
Conceptual
Decisive

Structuring
Command
Detached

LEFT BRAIN

Detailed
Factual
Procedural
Foundation

Thought pattern;
Visceral vs Conceptual
Things & ideas

Molding

Thought pattern;
Metaphoric & Pictorial
Very conceptual

Connections
Relational
Changeable
Creative

RIGHT BRAIN

Objective Harmony
Relational
Gregarious
Charismatic

Thought pattern;
Visceral vs. Conceptual
People oriented

Keeper of values
Standards
Subjective harmony

Diagonally opposing trends ; one tends to dominate

The Overlay of Temperament

- Novelty seeking
- Harm avoidance
- Reward dependence
- Persistence

- Relative combination of these strengths is a guide to our temperament

Some Resultant Decision Maker Types

- The ‘Sure Thing’ (predictability)
  - Low Risk Speculation
  - High Risk Speculation
- Gambling (prospect of wild success)

<u>Risk the flight not the glider.</u>
Where do YOU fit in this spectrum?

Can you use self awareness to recognise when any of these ‘urges’ takes over?

Awareness is the first step to fixing it.

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Invitation To Your First Contest

Pete Alexander ~ 98

John Cochrane ~ BB

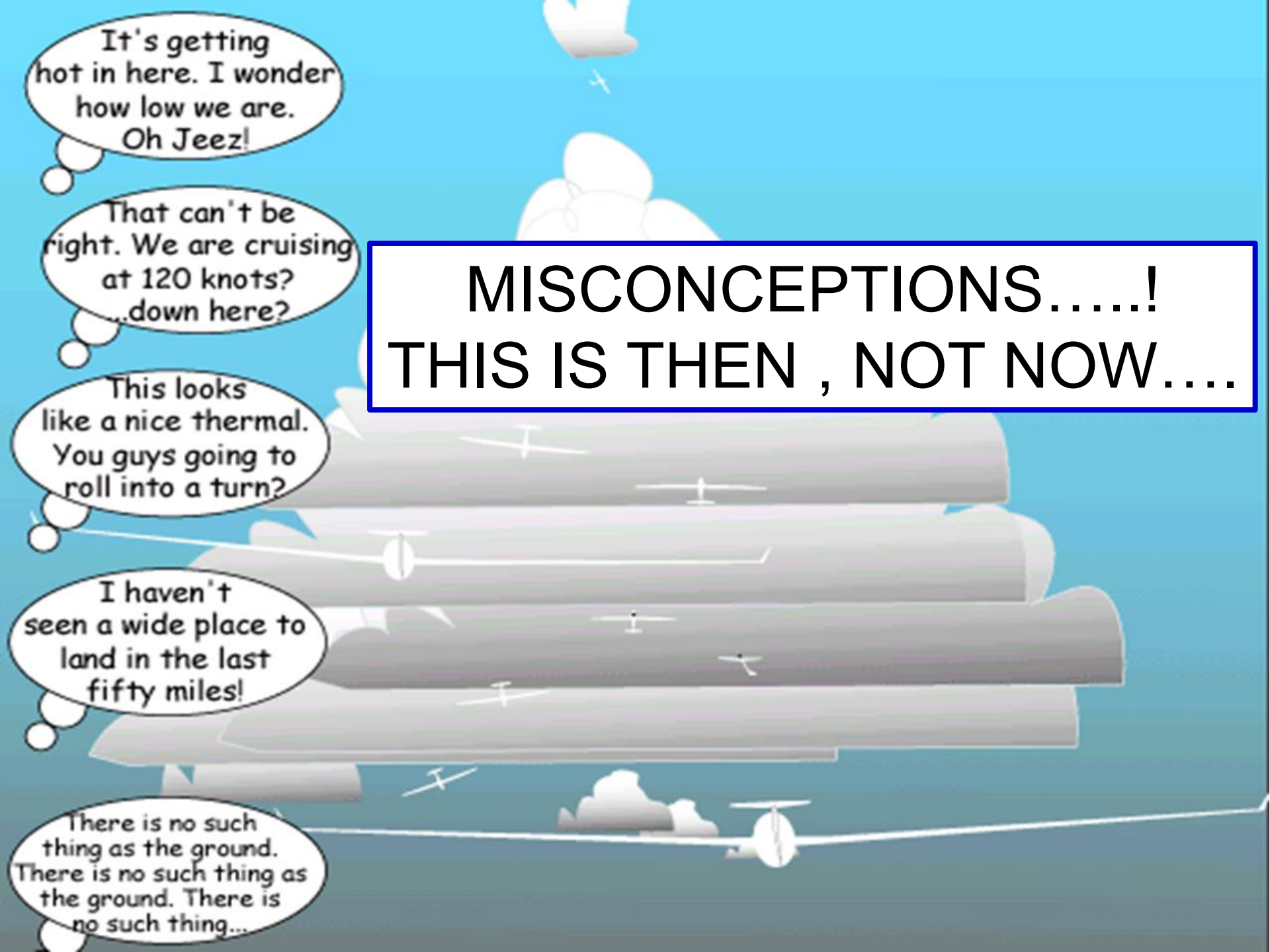
Peter Deane ~ 2T

Contest Flying Is…

Flying with your Buddies!

What Will Happen At A Regionals Contest: Truths & Misconceptions

Tasks At Sports Regionals Will Be Reasonable.
3 Hours With Large Turn Areas
The Start Is A Low Key Affair
Gaggles Will Be Reasonable Sized (like your club)
You Fly The Task Just Like Your OLC Flights


It's getting hot in here. I wonder how low we are. Oh Jeez!
That can't be right. We are cruising at 120 knots? ..down here?
This looks like a nice thermal. You guys going to roll into a turn?
I haven't seen a wide place to land in the last fifty miles!
There is no such thing as the ground. There is no such thing as the ground. There is no such thing...
MISCONCEPTIONS…..!
THIS IS THEN , NOT NOW….

Things You Really Do Need

- A Logger That Produces An IGC File. If It Works For OLC Good Enough.
- Load The Contest Turn Points And Airspace
- Put Your Contest ID Not Your N Number In The Logger.
- Drinking Water
- SSA Membership And Proof Of Insurance

What You Will Receive?

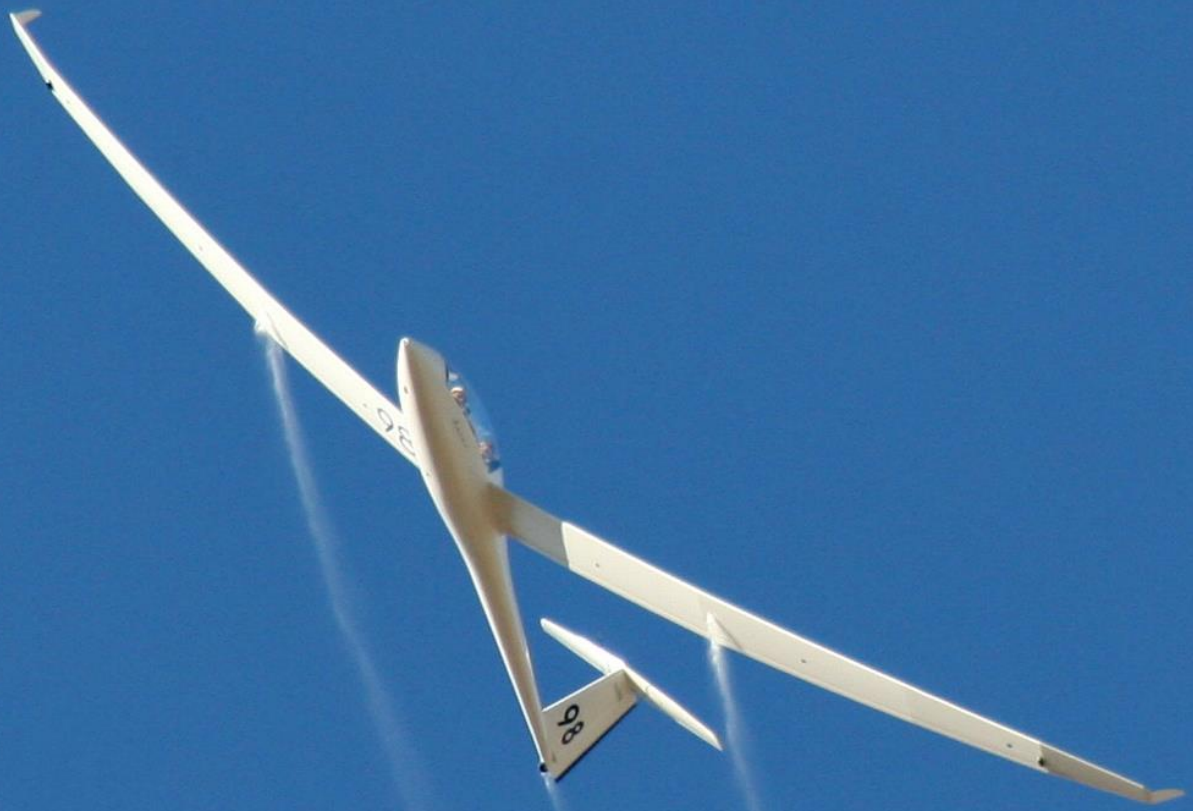
- Great Daily Weather Forecast
- Have A Fun And Reasonable Task To Fly
- Have Lot's Of Friends And Advice
- Have A Good Social Scene
- Lots Of Experienced Pilots To Help With Rules, Task, Strategies

Daily Schedule

- Sailplane Ready To Fly Before Daily Briefing
- Daily Briefing:
  - Winner's Stories
  - Wx Briefing
  - Tasks For The Day?
- Huddle With Your Mentor or Buddy
- Grid
- Final Huddle With Your Mentor or Buddy

Go Fly!

Good Finish!



Questions?

Fundamentals
Safe Decision Making
Going Faster
The Head Stuff
Racing (OLC and Contests)

APPENDIX

Agenda

- What Will Happen At A Regionals Contest: Truths & Misconceptions
- Things You Really Do Need
- What You Will Receive?
- 5 Rules You Need To Know
- Daily Schedule
- Questions?

5 Rules You Need To Know

- You Get 3 Tows Per Day
- You Need A Valid Start
- Do Not Bust Any Airspace And You Cannot Fly Above 17,500’ MSL
- You Need A Valid Finish
- Turn In You IGC File After Your Flight

Gaggle Flying


photo by Jacek Lewinski