TANDEM Pro-Course

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Supported by Albanian Airsport Federation

PARAGLIDING LEISURE PILOT

Introduction to paragliding
Tandem flight

APPI 1 DISCOVER → APPI 2 EXPLORE → APPI 3 PILOT → APPI 4 PROGRESS → APPI 5 ADVANCED

Conversion to **APPI PPG Pilot**

PARAGLIDING CERTIFICATIONS

- Dynamic soaring
- Thermalling
- Mini wing
- XC
- SIV
- Advanced SIV
- Performance
- Acro. → D-bag
- Handi-friend

PARAGLIDING PROFESSIONAL

NON COMMERCIAL TANDEM *Need First aid rescue* → PRO TANDEM → ASSISTANT INSTRUCTOR → INSTRUCTOR → MASTER INSTRUCTOR

PRO-PARAGLIDING CERTIFICATIONS

- Handifly tandem
- Advanced tandem *Need Perfo. & SIV tandem*
- Group leader
- SIV instructor
- Acro. & D-bag trainer
- XC instructor *Need Perfo.*
- Sky guide
- Handifly instructor *Need Handifly tandem*
- Handifly master
- S.I.V. & Acro. master

SPEED RIDE

Speed rider → Speed ride expert → Speed ride instructor → Speed ride master

TECHNICIAN

WINCH

Winch → Winch operator → Winch instructor → Winch Master

MAINTENANCE

- T1 Pro rescue packer → Expert T1
- T2 Lines check & adjust → Expert T2
- T3 Cloth check & repair → Expert T3
- T4 Harness & accessories check → Expert T4

Expert T1 / Expert T2 / Expert T3 / Expert T4 → Maintenance instructor → Maintenance Master

Unit n°1: *Gear*

1. GENERALITIES:

- ✓ Indicated total flying weight range
- ✓ The theory of flying at the top of the indicated flying range and the reality
- ✓ EN certification, flight and structure, what does it mean?

2. WING COMPONENTS

A. The cloth

- ✓ Manufacture and characteristics
- ✓ Ageing and consequences
  - Porosity
  - Stiffness
  - Breaking and tearing strength
- ✓ How long does the cloth last? typical alerts
- ✓ Conclusion
  - Ageing agents, how to limit cloth ageing

B. The lines

Generalities

- ✓ Materials and characteristics
- ✓ Where to find information about the lines of a glider (length, materials)
- ✓ Effect of a knot on the strength
- ✓ How to splice a line
- ✓ G load in flight, various manoeuvres
- ✓ Line load depending on glider's design

Line ageing control

a) Lines loosing breaking strength

- ✓ What materials are concerned
- ✓ How to proceed to control and “survival technique”
- ✓ Criteria for replacement

b) Glider getting out of trim

- ✓ What is the trim of a glider
- ✓ What happens, what materials are concerned
- ✓ Typical alerts

- ✓ Measurement and correction of line set up
  - Preliminaries: read a plan, identify a line
  - The differential method
  - Make a differential table
  - Measurement technique
  - Introduction to correction techniques
  - Permitted tolerances

Conclusion

- ✓ Control frequency and life of a line set, depending on material and glider's type
- ✓ Real life examples of ageing
- ✓ Controls after an intervention prior to fly

3. RESERVE

- ✓ Models
- ✓ Certification (shock resistance, sink rate, aperture time, oscillations)
- ✓ Types of mounting, benefits and disadvantages
- ✓ Problems that may occur: extraction, aperture, neutralisation
- ✓ Maintenance
- ✓ Conclusion:
  - How to find your handle
  - Five cases in which you should pull reserve immediately
  - The three types of situation when its time to throw, and the technique to use in each of those situations

4. HARNESS

- ✓ Geometries and position
- ✓ Adjustment
- ✓ Pod harness and glider certification
- ✓ Maintenance
- ✓ How long should a harness last?
- ✓ Conclusion

Table 29 — Classification of a paraglider's behaviour in the asymmetric collapse test

Measurement and ranges (according to Table 28)		Classification
Change of course until re-inflation	Maximum dive forward or roll angle	
Less than 90°	Dive or roll angle 0° to 15°	A
	Dive or roll angle 15° to 45°	A
	Dive or roll angle 45° to 60°	C
	Dive or roll angle 60° to 90°	D
	Dive or roll angle greater than 90°	F
90° to 180°	Dive or roll angle 0° to 15°	A
	Dive or roll angle 15° to 45°	B
	Dive or roll angle 45° to 60°	C
	Dive or roll angle 60° to 90°	D
	Dive or roll angle greater than 90°	F
180° to 360°	Dive or roll angle 0° to 15°	A
	Dive or roll angle 15° to 45°	C
	Dive or roll angle 45° to 60°	C
	Dive or roll angle 60° to 90°	D
	Dive or roll angle greater than 90°	F
Greater than 360°	Dive or roll angle 0° to 15°	C
	Dive or roll angle 15° to 45°	C
	Dive or roll angle 45° to 60°	D
	Dive or roll angle 60° to 90°	F
	Dive or roll angle greater than 90°	F
Re-inflation behaviour		
Spontaneous re-inflation		A
Inflates in less than 3 s from start of pilot action		C
Inflates in 3 s to 5 s from start of pilot action		D
No re-inflation within a further 5 s		F
Total change of course		
Less than 360°		A
Greater than 360° with tendency to recover (g force decreasing, rate of turn decreasing)		C
Greater than 360° without tendency to recover (g force not decreasing, rate of turn not decreasing)		F
Collapse on the opposite side occurs		
No (or only a small number of collapsed cells with a spontaneous re inflation)		A
Yes , no turn reversal		C
Yes, causing turn reversal		D
Twist occurs		
No		A
Yes		F
Cascade occurs		
No		A
Yes		F
Folding lines used		
No		A
Yes		D

5.5.18.14.2 Small asymmetric collapse

Stabilise the glider in straight flight at trim speed. Release the control handle on the side to be collapsed and attach it to the riser.

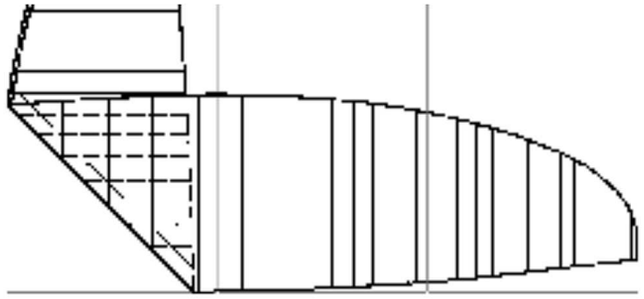
Pull down the appropriate lines on one side as fast as possible to collapse the canopy asymmetrically at approximately 50 % of the leading edge along the marked line.

As soon as the collapse is achieved, release the lines quickly.

The pilot shall take no further action and remains passive until the glider either recovers, or changes course by more than 360°, or 5 s elapses.

In the status of the maximum shape of the collapse, the bend line has to be completely (right through to the trailing edge) inside the marked tolerance field as shown in Figure 7.

As soon as the collapse is achieved, release the lines quickly. The pilot shall take no further action and remains passive until the glider either recovers, or changes course by more than 360°, or 5 s elapses.



Class	Description of flight characteristics	Description of pilot skills required
A	Paragliders with maximum passive safety and extremely forgiving flying characteristics. Gliders with good resistance to departures from normal flight.	Designed for all pilots including pilots under all levels of training.
B	Paragliders with good passive safety and forgiving flying characteristics. Gliders with some resistance to departures from normal flight.	Designed for all pilots and may be suitable for pilots under training if recommended by the manufacturer.
C	Paragliders with moderate passive safety and with potentially dynamic reactions to turbulence and pilot errors. Recovery to normal flight may require precise pilot input.	Designed for pilots familiar with recovery techniques, who fly "actively" and regularly, and understand the implications of flying a glider with reduced passive safety.
D	Paragliders with demanding flying characteristics and potentially violent reactions to turbulence and pilot errors. Recovery to normal flight requires precise pilot input.	Designed for pilots well practised in recovery techniques, who fly very actively, have significant experience of flying in turbulent conditions, and who accept the implications of flying such a wing.

Technical Data Sheet

Skytex 45
Hard

ZI des Vallons
38110 La Tour du Pin Cedex (France)
Tel : +33 (0)4.74.82.25.23
Fax : +33 (0)4.74.82.25.11

DESCRIPTION	
Fabric	9092
Finish	Side coated (polyurethane)
Yarn	PA 6.6 high tenacity - 33 dtex
Width	158 cm
Pattern	Rip Stop
Internal ref.	09092 - E29
Length of rolls	150 lm

Utilization / End-uses
Paragliding, Kite

Technical Specifications				
Characterictics		Test Method	Unit	Tolerance
Coated fabric's weight		ISO 2286-2	g/sqm	45 +/- 3
Tear Strength	warp	ISO 4674	DaN	1 mini
	weft			0.7 mini
Elongation	on bias 3 lbs	Internal Method	%	2 maxi
	on bias 5 lbs			3 maxi
	on bias 10 lbs			15 maxi
Break strength	warp	ISO 1421	DaN/5 cm	40 mini
	weft			33 mini
Air porosity		ISO 9237	l/sqm/mn under 1000 Pa surface 100cm²	100 maxi

Technical Data Sheet

Skytex 45
Classic

ZI des Vallons
38110 La Tour du Pin Cedex (France)
Tel : +33 (0)4.74.82.25.23
Fax : +33 (0)4.74.82.25.11

DESCRIPTION	
Fabric	9092
Finish	Side coated (polyurethane)
Yarn	PA 6.6 high tenacity - 33 dtex
Width	158 cm
Pattern	Rip Stop
Internal ref.	09092 - E38
Length of rolls	150 lm

Utilization / End-uses
Paragliding, Kite

Technical Specifications				
Characterictics		Test Method	Unit	Tolerance
Coated fabric's weight		ISO 2286-2	g/sqm	44 +/- 3
Tear Strength	warp	ISO 4674	DaN	2 mini
	weft			1,5 mini
Elongation	on bias 3 lbs	Internal Method	%	8 maxi
	on bias 5 lbs			16,5 maxi
	on bias 10 lbs			28 maxi
Break strength	warp	ISO 1421	DaN/5 cm	40 mini
	weft			33 mini
Air porosity		ISO 9237	l/sqm/mn under 1000 Pa surface 100cm²	10 maxi

Ageing performances			
Air porosity after Washing 1h at 30°	Internal Method	l/sqm/mn under 1000 Pa surface 100cm²	40 max
Air porosity after fluttering 15 mn	Internal Method		40 max

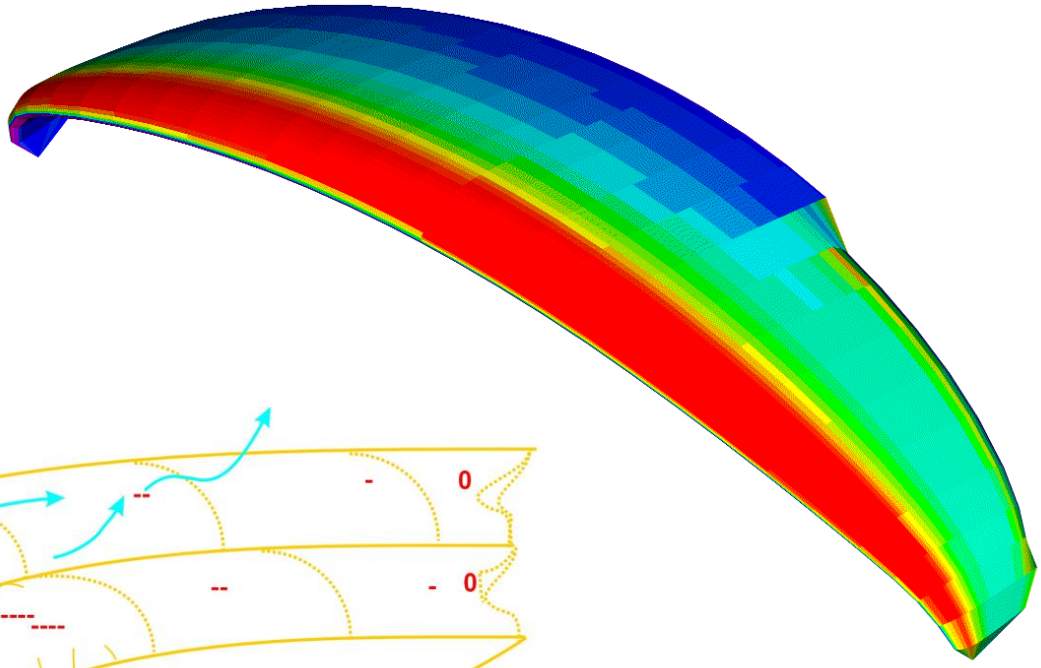
Technical Data Sheet

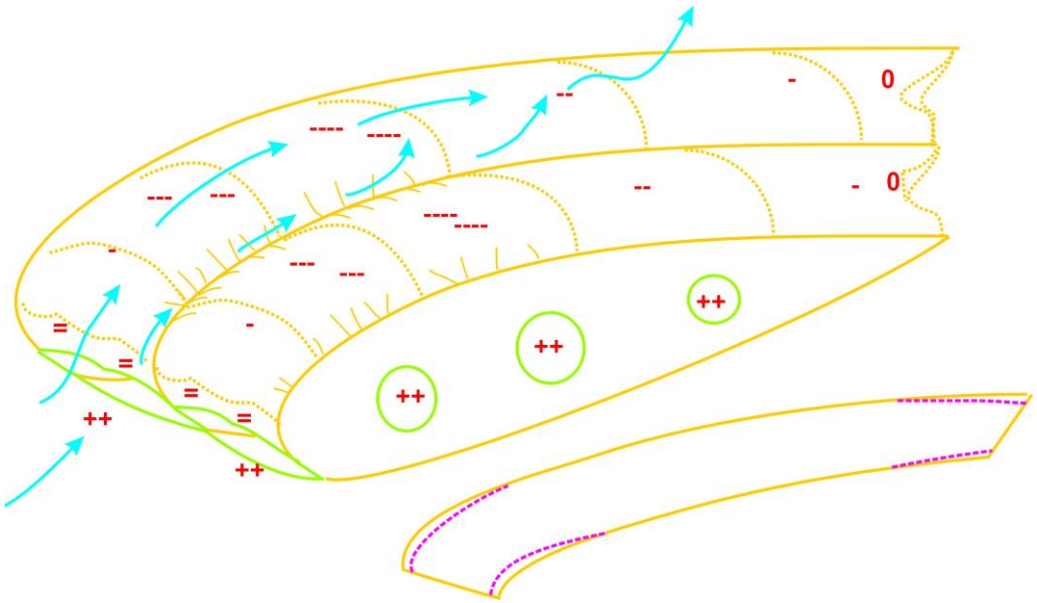
Skytex 27
Classic

DESCRIPTION	
Fabric	70000
Finish	Side coated (polyurethane)
Yarn	PA 6.6 high tenacity - 22 dtex
Width	158 cm
Pattern	Rip Stop
Internal ref.	70000 - E71
Length of rolls	150 lm

Utilization / End-uses
High performance paragliding, kites

Technical Specifications				
Characterictics		Test Method	Unit	Tolerance
Coated fabric's weight		ISO 2286-2	g/sqm	26 +/- 2
Tear Strength	warp	ISO 4674	DaN	1,5 min
	weft			
Elongation	on bias 3 lbs	Internal Method	%	10 maxi
	on bias 5 lbs			18 maxi
	on bias 10 lbs			30 maxi
Break strength	warp	ISO 1421	DaN/5 cm	25 mini
	weft			22 mini
Air porosity		ISO 9237	l/sqm/mn under 1000 Pa surface 100cm²	20 maxi

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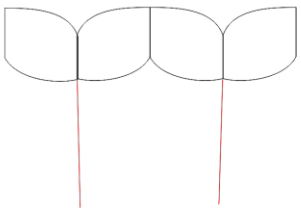
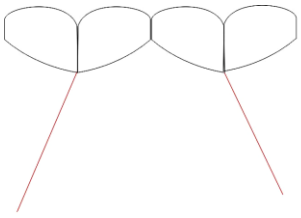
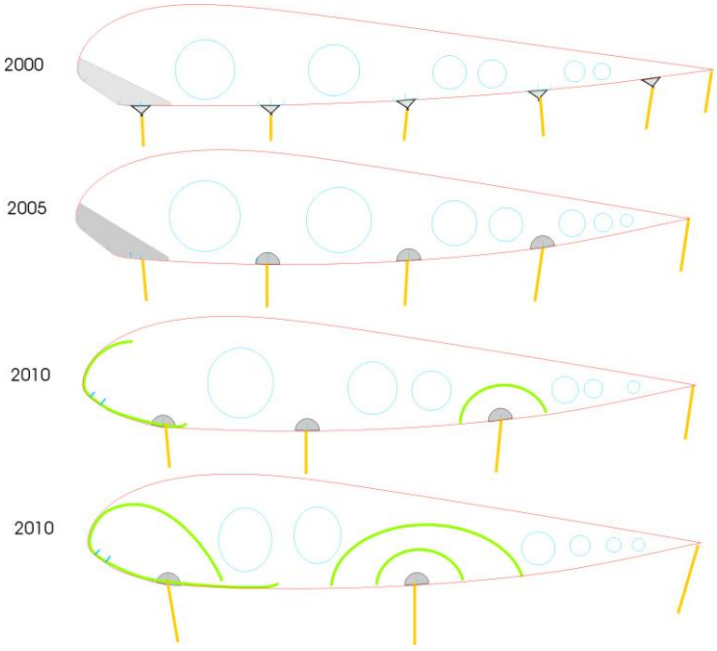
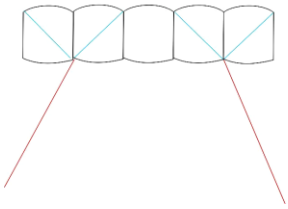
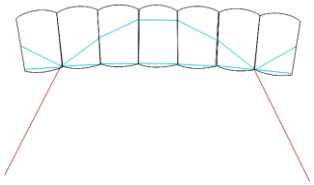





2000
2005
2010
2010

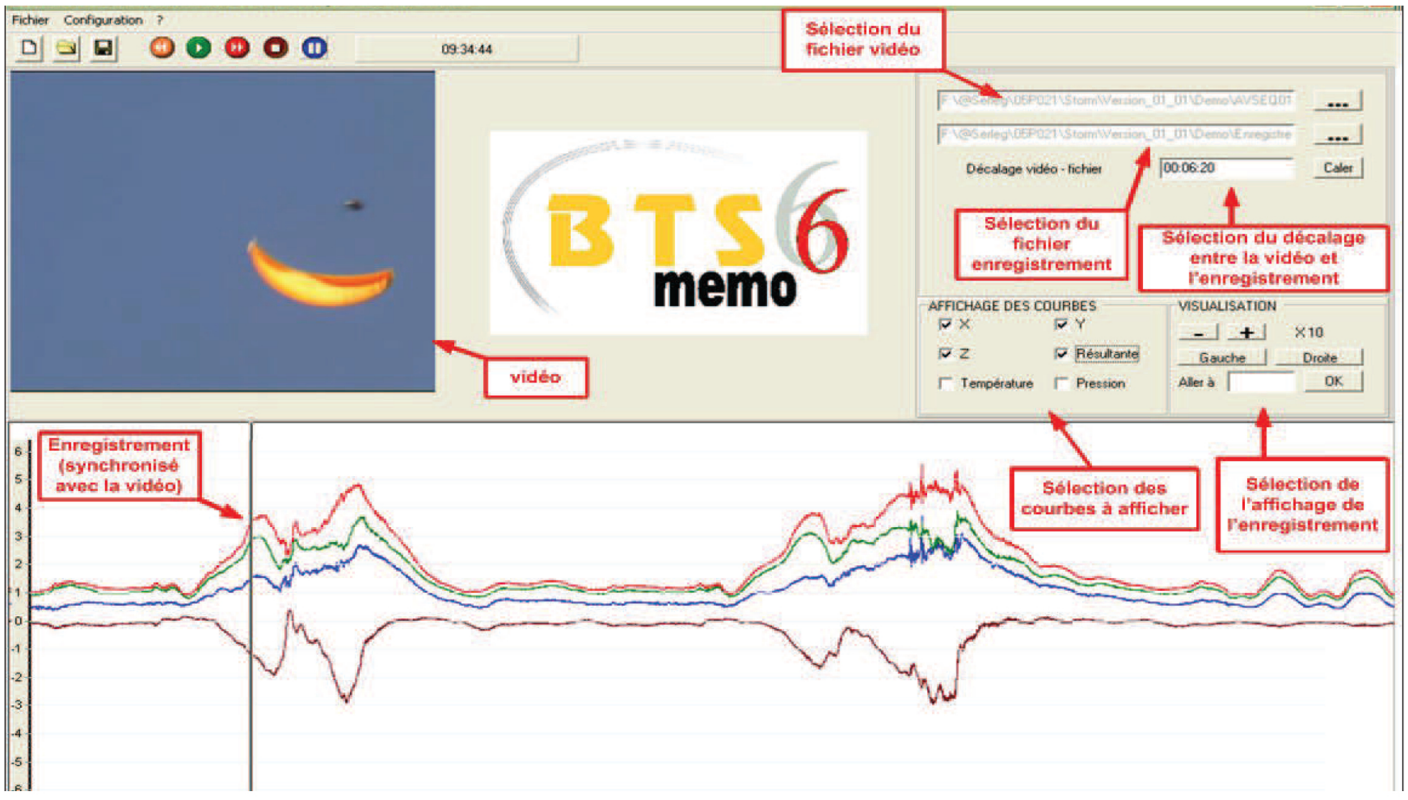


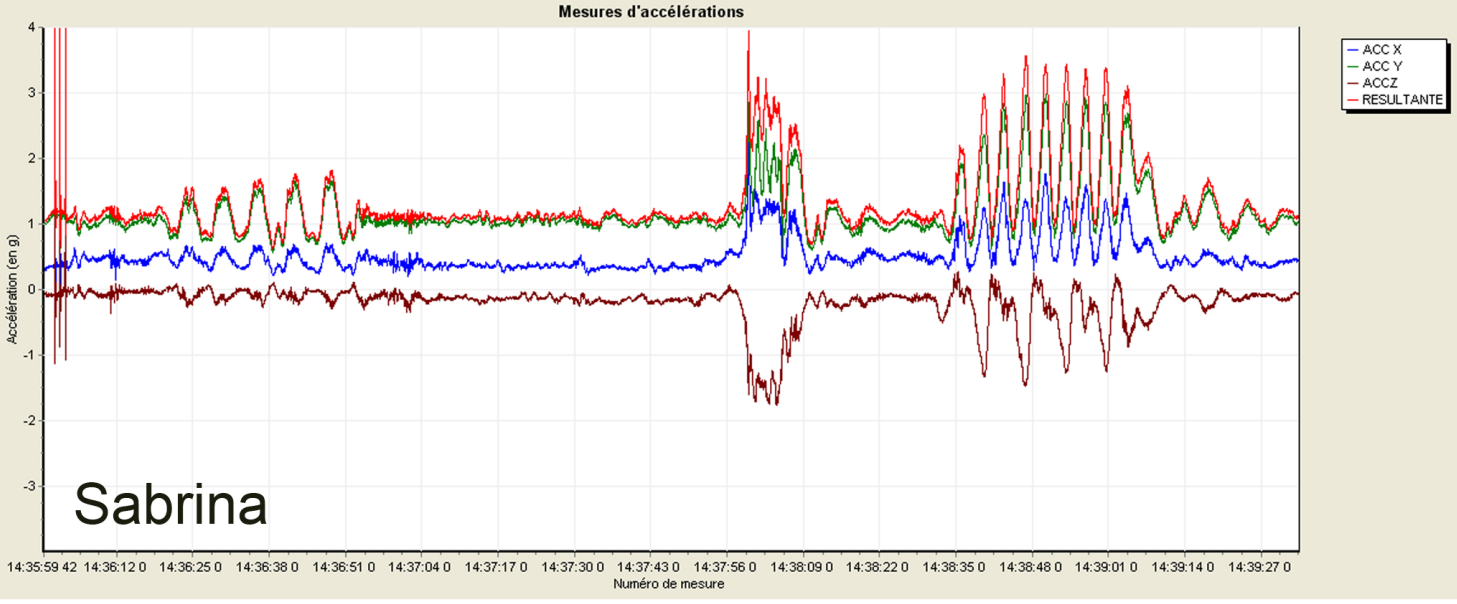


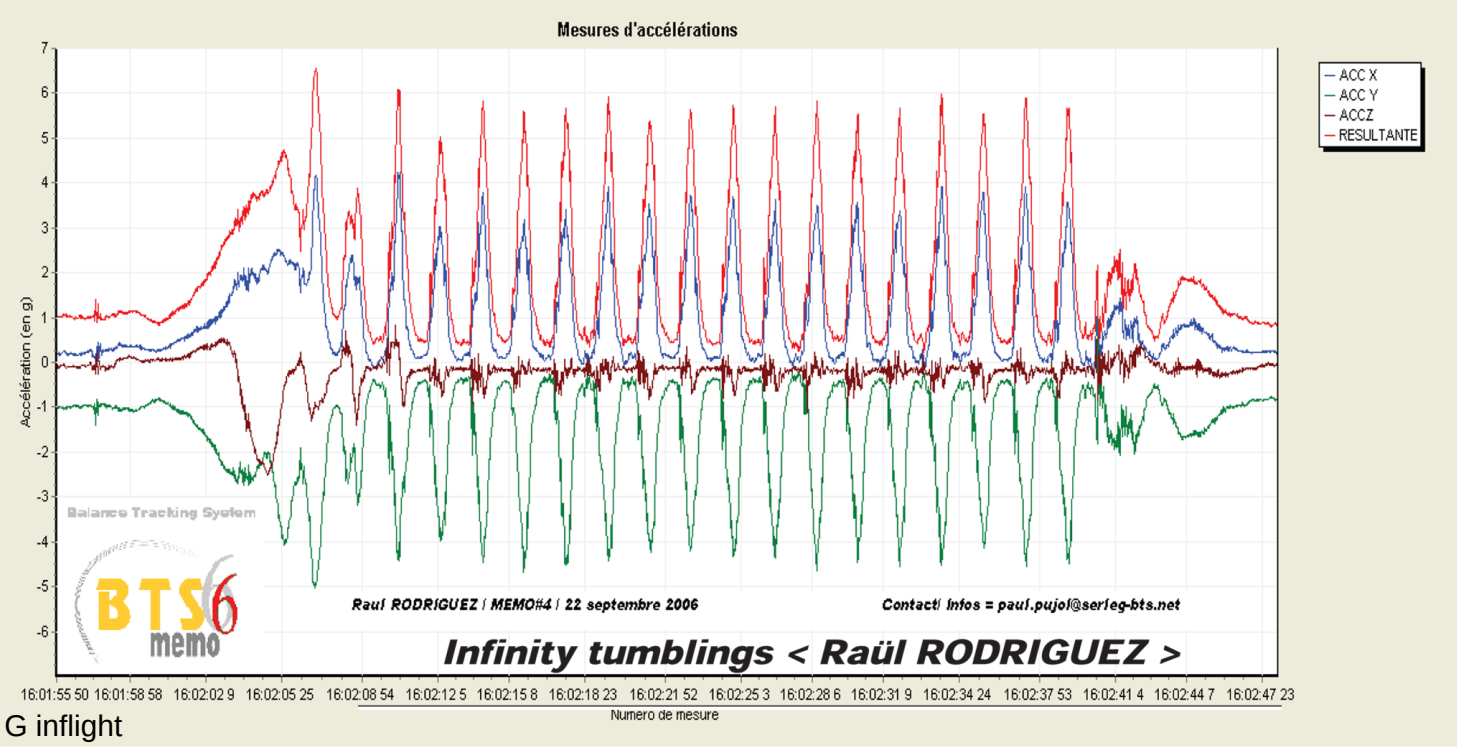
APPI WORKSHOP

Line characteristics

MATERIALS	Commercial name	Use	Coulor	Densi-ty	Deterio-ration	Melting point	Elasticity	Abrasion	UV resis-tance	Ageing : Sheathed line dimen-sional sta-bility	Ageing Un-sheathed line dimensional stability	Ageing : Breakage strength
Aramid	Kevlar	lines risers	yellow fiber, it can be coulored	1,44	500°C	500°C	little	poor	bad	very good	Good when protected, then it deteriorates	bad
Ultra-high molecular weight polyethylene	Dyneema	lines risers	white fiber, it can be tyied with a polyurethane coating	0,97	110°C	147°C	little	very good	good	average	average	excellent
Copolymer polyester	Vectran	lines	yellow fiber, it can be coulored	1,41	500°C	500°C	little	poor	very bad		Good when protected, then it deteriorates	bad
Polyester	Tergal, Dacron	lines sheaf, risers	It can be easily tyied, good coulor ageing	1,38	220°C	260°C	a lot	good	good			
Polyamide	Nylon	reserve lines	white	1,14	230°C	260°C	soft and elastic	good	average			

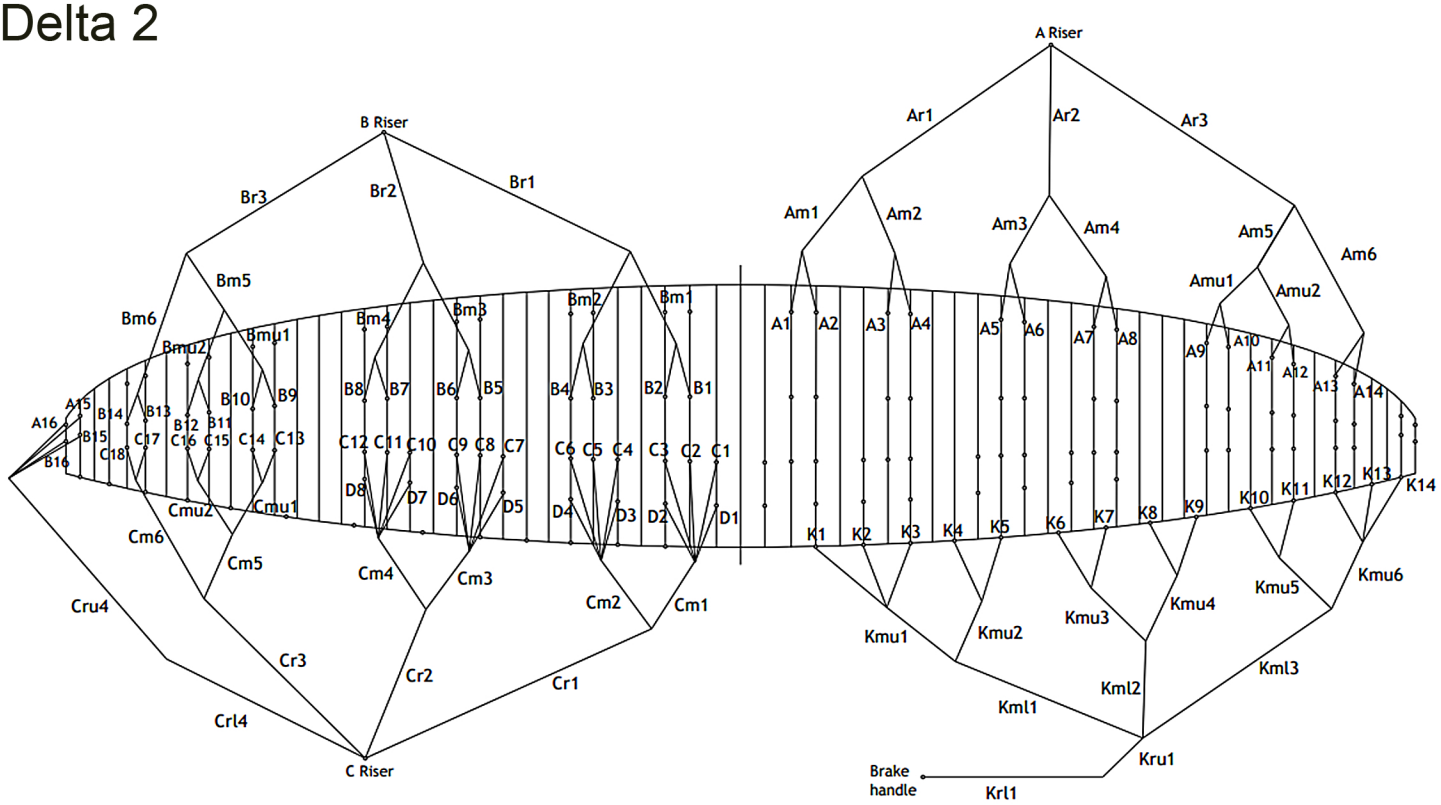

Fichier Configuration ?
09:34:44
Sélection du fichier vidéo
Décalage vidéo - fichier
00:06:20
Caler
Sélection du fichier enregistrement
Sélection du décalage entre la vidéo et l'enregistrement
AFFICHAGE DES COURBES
X
Y
Z
Résultante
Température
Pression
VISUALISATION
X10
Gauche
Droite
Aller à
OK
vidéo
Enregistrement (synchronisé avec la vidéo)
Sélection des courbes à afficher
Sélection de l'affichage de l'enregistrement


Mesures d'accélérations
ACC X
ACC Y
ACCZ
RESULTANTE
Accélération (en g)
Sabrina
Numéro de mesure


Mesures d'accélérations
ACC X
ACC Y
ACCZ
RESULTANTE
Accélération (en g)
Balance Tracking System
Raul RODRIGUEZ / MEMO#4 / 22 septembre 2006
Contact infos = paul.pujol@serleg-bts.net
Infinity tumblings < Raül RODRIGUEZ >
Numero de mesure

LINE DIAGRAM

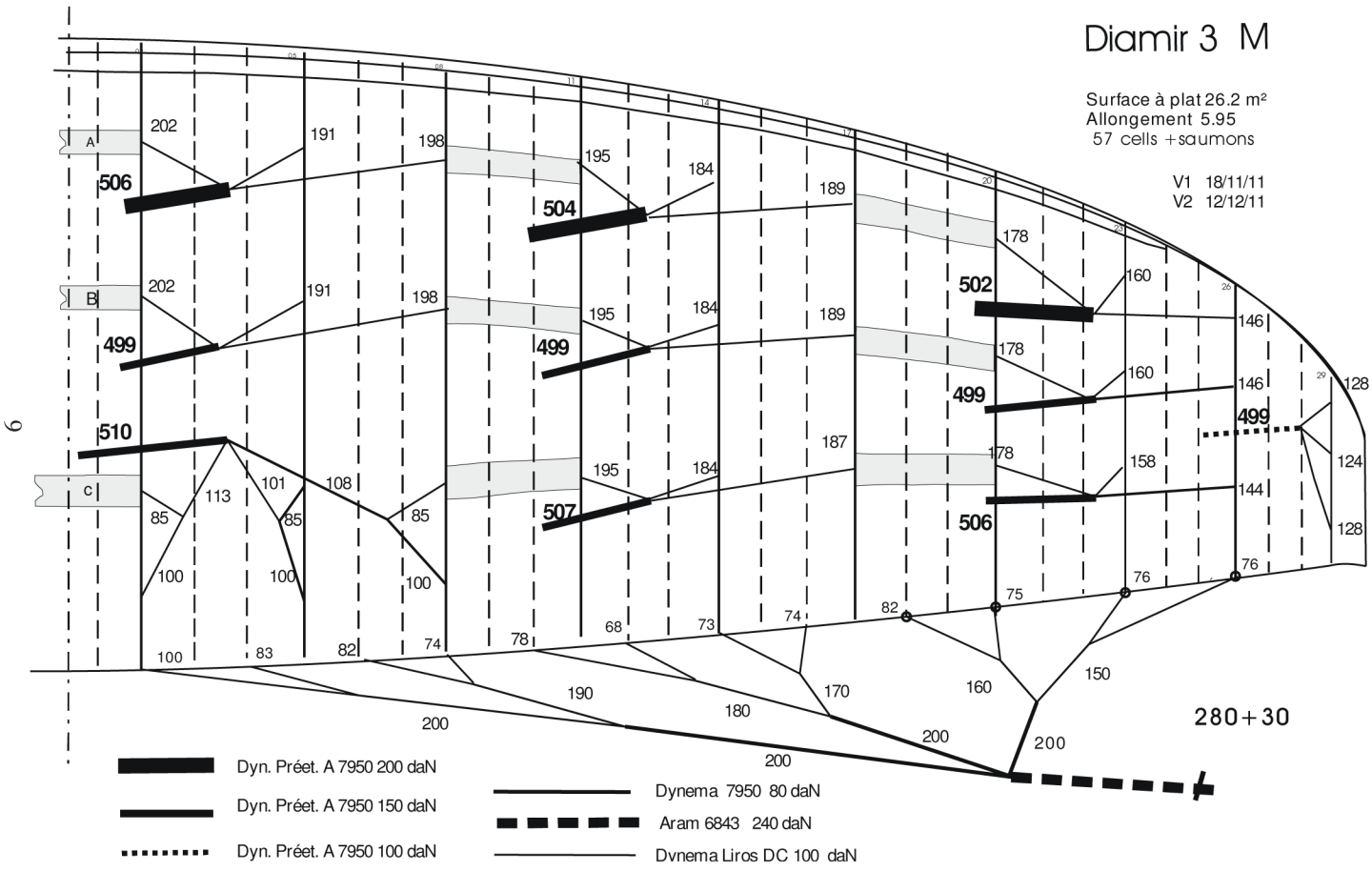
Delta 2



Diamir 3 M

Surface à plat 26.2 m²
Allongement 5.95
57 cells +saumons

V1 18/11/11
V2 12/12/11



glider	

Length Table

wing center	1	2	3	4	5	6	7	8	9	10	11	12
A												
B												
C												
D												
E												
F												

Differential Table

	1	2	3	4	5	6	7	8	9	10	11	12
arch control →	A1-An											
A-B												
A-C												
A-D												
A-E												
A-F												

Differential measurement

	1	2	3	4	5	6	7	8	9	10	11	12
arch control →	A1-An											
A-B												
A-C												
A-D												
A-E												
A-F												

negative values: x is too short compare to A

Differential error

	1	2	3	4	5	6	7	8	9	10	11	12
arch control →	A1-An											
A-B												
A-C												
A-D												
A-E												
A-F												

	Rescue fitted in a harness with connection points on the shoulder straps	Front mounted rescue with connection points on the shoulder straps	Front mounted rescue system connected on the main Karabiners
Harness and glider are permanently hooked	proper use	ok	not suitable, as the rescue is connected inside the risers you have to put on the harness, then the rescue is hiding the leg straps, there is a risk to forget them.
The harness is always disconnected from glider	proper use	ok	proper use
Installing/removing the rescue	complicated	A bit easyer but you need tools (for ex. pliers)	immediate
Harness transfer to another harness	very complicated, the rescue has to be fitted in a container... or install the reserve in the new harness	You need the other harness feature connection points on the shoulders otherwise you need to modify the way the risers exit the container	immediate
Practical to use on take off	Fine, the reserve and container are integrated in the harness	The rescue hangs on one side, the handling is not pleasant. Be careful not to catch the handle.	Perfect. Follow this procedure : 1 /connect the harness, check /2 connect the rescue /3 risers /4 speed bar
Interaction with speed bar	no problem	Be careful to put the speed bar inside of the rescue risers!	No problem
Pins'checking	You have to do it before putting on the harness, after it is more complicated	Possible at any time	Possible at any time
Special feature	no	no	Connect the karabiner, wire gate outside. Be aware of a bad installation to the container strap instead of the riser
Can you see the handle in flight?	complicated	obvious	obvious
Can you see if the handle is disconnected?	sometimes impossible	yes	yes
Can you throw the rescue with both hands?	no	yes	yes
Can you throw the rescue on both sides?	not recommended	not recommended	yes
In case of centrifugation, how can you reach the handle?	difficult	easy	easy
Impact of G forces on harness deformation and rescue deployment	important	no	no
Body position when the rescue is deployed	standing up, rescue behind, wing in the front	Standing up, rescue behind, wing in the front	sitting, rescue in the front, wing behind with a half twist
How to neutralize the glider?	If there is no twist, the rear risers are directly reachable	If there is no twist, the rear risers are directly reachable	It is recommended to neutralize the wing immediatly with the brakes
Body position when the glider is impossible to neutralize (mirror effect)	Lying on the back, standing up is virtually impossible	Lying on the back, standing up is virtually impossible	sitting, risers in front of the eyes, you can grab the risers to stand up and soften the impact
Body position when the rescue is twisted	The head is stucked downwards, reacting is impossible	The head is stucked downwards, reacting is impossible	Sitting, risers in front of the eyes, you can grab the risers to stand up and soften the impact
If main karabiners break	The rescue karabiners will take over	The rescue karabiners will take over	One broken karabiner: the rescue works but the position of the pilot is tricky. 2 broken karabiners: fatal accident. Installing a double karabiners system? The connection straps of the harness could come apart in case of mirror effect (resistance not tested)
position if hanged after landing (in the trees, cliff)	Body standing up. Might be unconfortable in case of long wait, also if reserve twisted and pushes head down, difficult to move	Body standing up. Might be unconfortable in case of long wait, also if reserve twisted and pushes head down, difficult to move	sitting in the harness, confortable to wait rescue, upper body free to work.
Installing the rescue	It stays in the harness, karabiners are tighten and installed once and for all; for the rescue steel Quick Link (Péguet) are recommended	It stays in the harness, karabiners are tighten and installed once and for all; for the rescue steel Quick Link (Péguet) are recommended	Karabiner, wire gate outside

5.5.6 Harness dimensions

The test pilot (and the passenger when testing in two-seater configuration) shall use a harness with a perpendicular distance from the harness attachment points (bottom of the carabiners as shown in Figure 3, measured from connector centrelines) to the seat board top surface as shown in figure 4 depending on the total weight in flight as shown in Table 48.

The horizontal distance between the harness attachment points (measured between connector centrelines) shall be set depending on the total weight in flight as shown in Figure 5 and Table 48.

When testing in two-seater configuration the horizontal dimension of the passenger's harness is set to the same width as the pilot's harness.

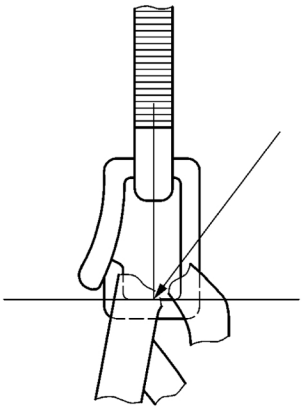


Figure 3 — Harness upper measuring point

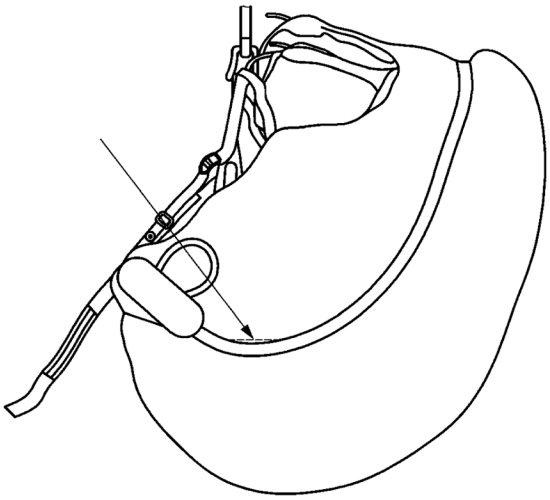


Figure 4 —Harness lower measuring point

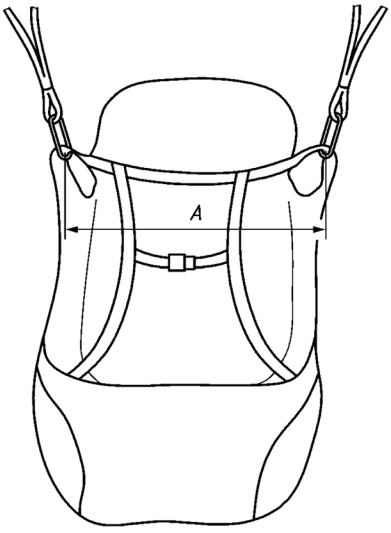


Figure 5 — Width of harness attachment points

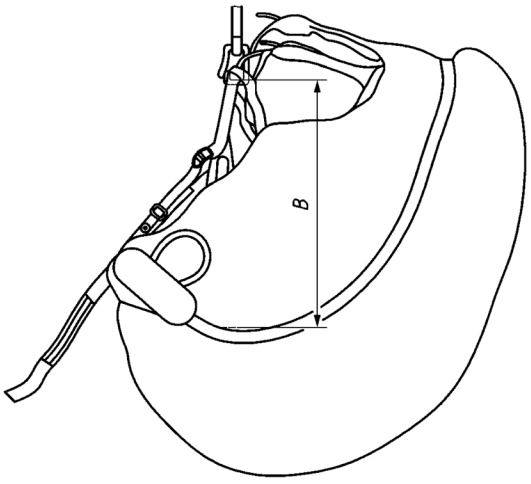


Figure 6 — Height of harness attachment points

Table 48 — Total weight in flight

TWF (total weight in flight)	< 80 kg	80 kg-100 kg	> 100 kg
Width (Measurement A on Figure 5)	(40 ±2) cm	(44 ±2) cm	(48 ±2) cm
Height (Measurement B on Figure 6)	(40 ±1) cm	(42 ±1) cm	(44 ±1) cm

5.5.8 Sitting position

Unless the test procedure states otherwise, the test pilot should adopt a normal upright sitting position with his feet perpendicularly below his knees.

Unit N°2
Aerodynamics, flight mechanics, piloting

Aerodynamics: effects of a fluid stream on an object
Flight mechanics: effects of the forces on a trajectory

1. PRELIMINARIES

- ✓ Vectors
- ✓ Pressure
- ✓ Stream on an object, Cx

2. AERODYNAMICS

How does a paraglider fly, common misconceptions.

A. The profile

- ✓ Forces and application point
  - Aerodynamic forces
  - Pressure point
  - Lift and drag
- ✓ Angle of attack variation and limits
  - Collapse
  - Stall

B. The wing

- ✓ Reality of air circulation around the wing, induced drag
- ✓ Total drag and glider polar

C. The complete paraglider

- ✓ When in equilibrium
  - Global balance pilot/wing
  - Attitude, glide angle
  - Balance: lift / drag
  - Numeric evaluation of drag
  - Load factor and consequences

- ✓ Transitory movements
  - Pendulum effect
  - Migration of pressure point
    - Profile stability and instability
    - What's happening when you «brake»: 2 cases
  - Inertia and damping

- ✓ Rain and profile

- ✓ Wind gradient

3. FLIGHT MECHANICS

- ✓ The pitch

- ✓ How does a paraglider turn?

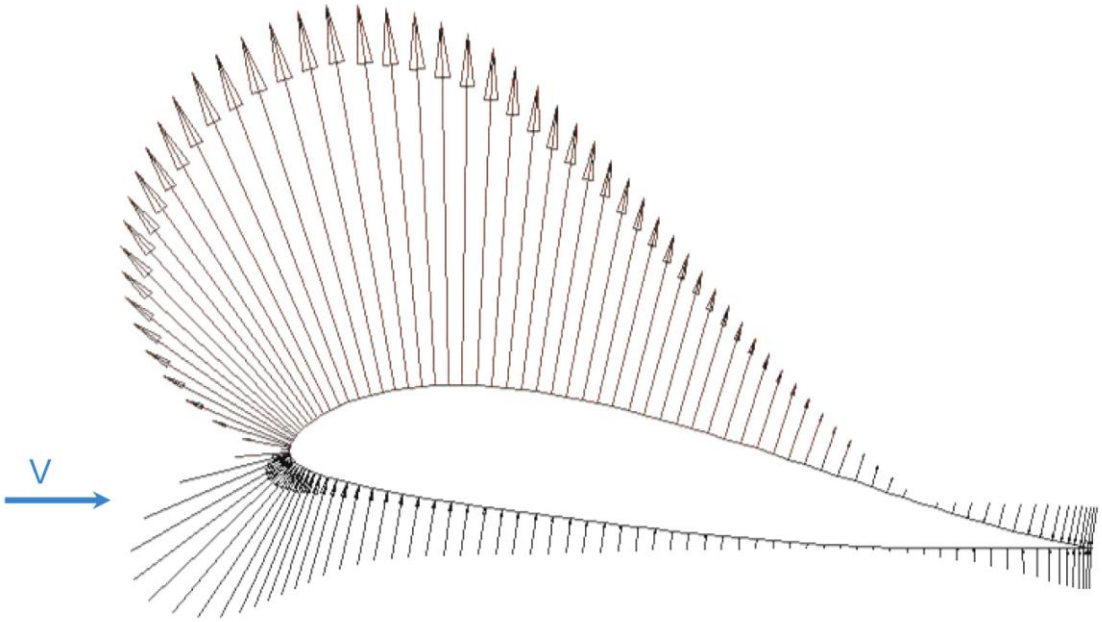
4. PILOTING

- ✓ What is piloting?
  - Aerodynamic and pendulum movements
  - Pitch piloting, generate, damp, stop
  - Roll movement, generate and damp
  - Piloting skills

- ✓ Piloting mistakes
  - Over piloting
  - Under piloting
  - Wrongly timed piloting

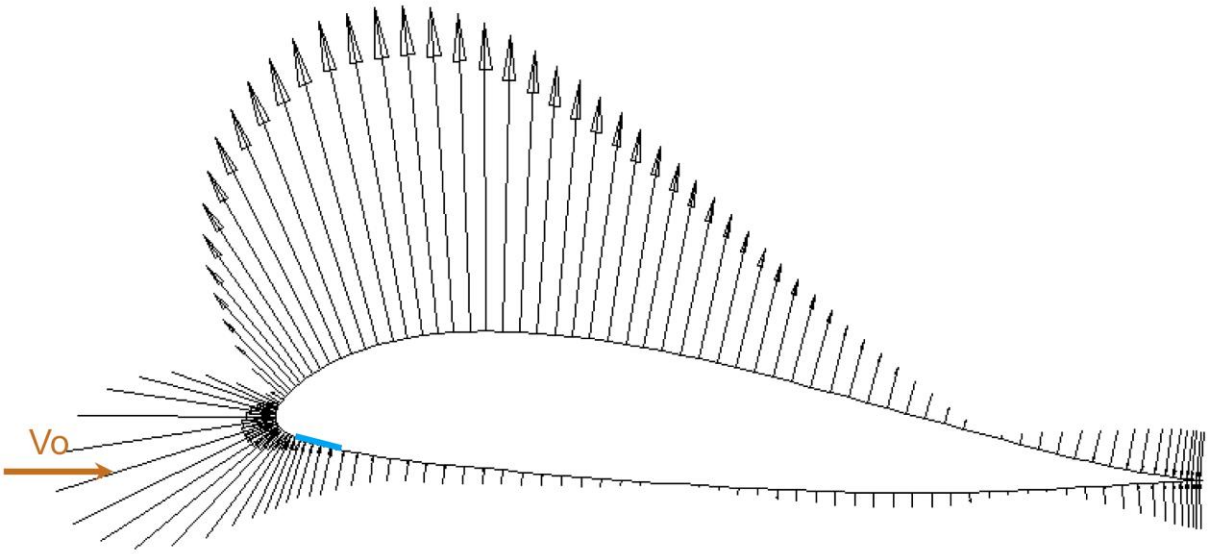
- ✓ S.I.V.
  - How to pilot classic incidents
  - Asymmetrical collapse
  - Cravate
  - Symmetrical collapse
  - Stall
  - Spin
  - Spiral
  - Cascade
  - Spiral neutrality

Incidence 7° • Typique de l'incidence du vol « bras haut »
Cz = 0.93
Cx = 0.013



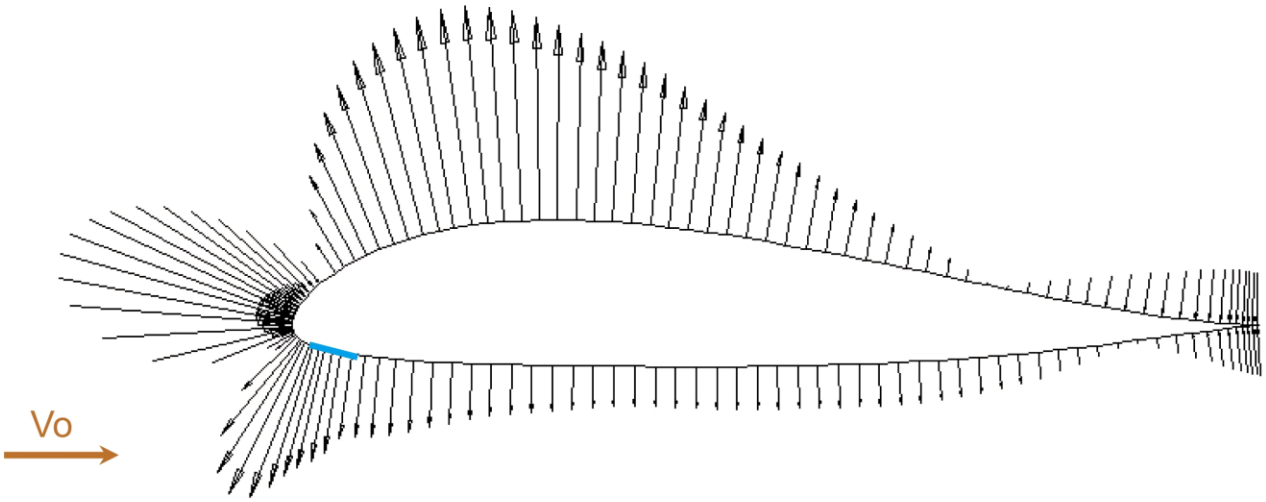
Représentation « soufflerie » : Vitesse horizontale **Xfoil**

Incidence 4° • Typique de l'incidence du vol accéléré
Cz = 0.59 • La pression du point d'arrêt remonte sur le BA
Cx = 0.011 • L'entrée d'air reste en légère surpression



Incidence 0°
Cz = 0.13
Cx = 0.008

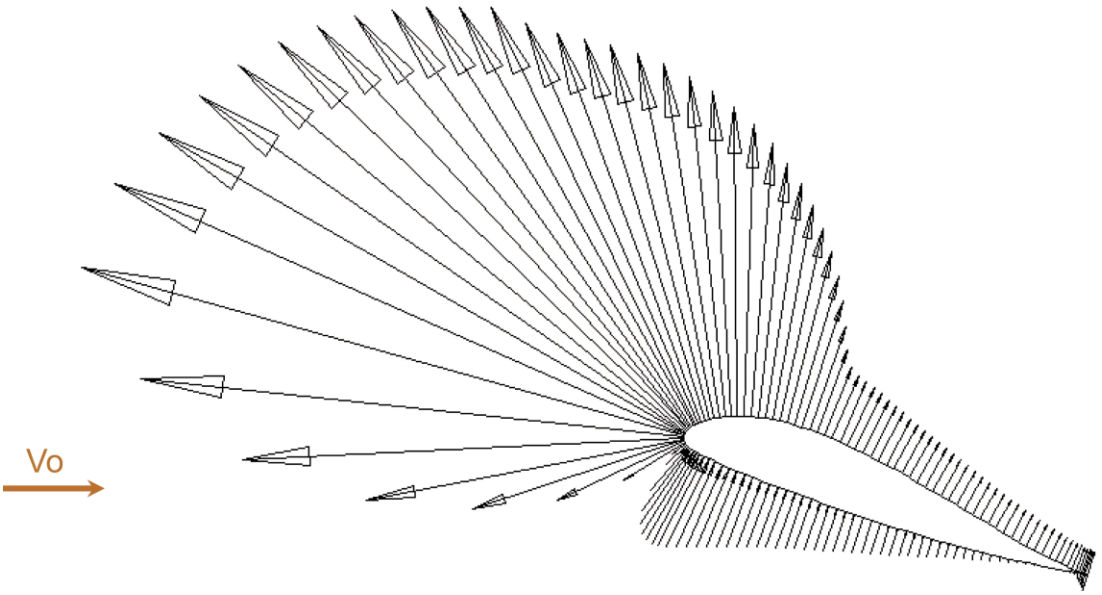
- Typique de l'incidence de fermeture (frontale, asym.)
- L'intrados du BA est en dépression : vidage

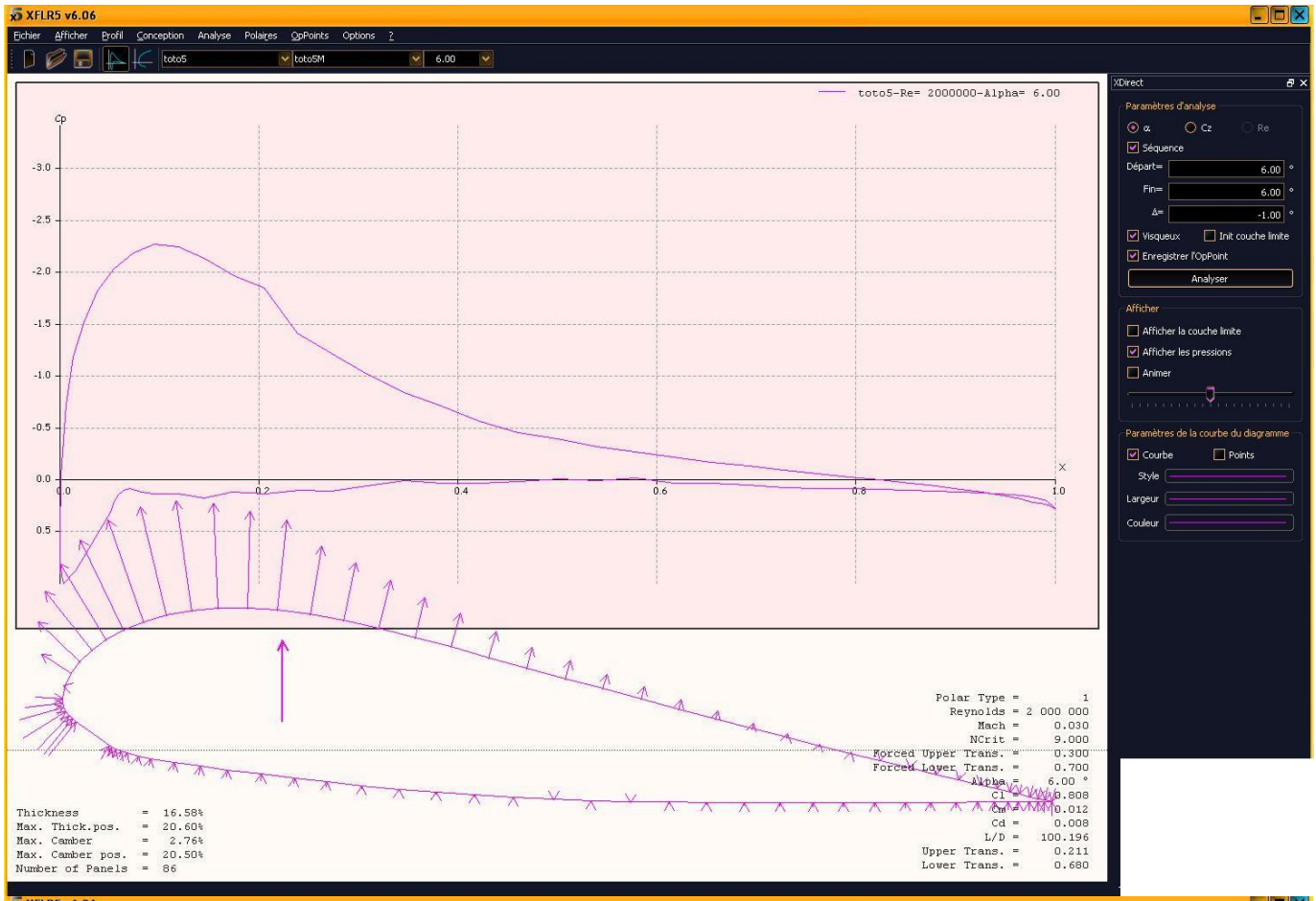


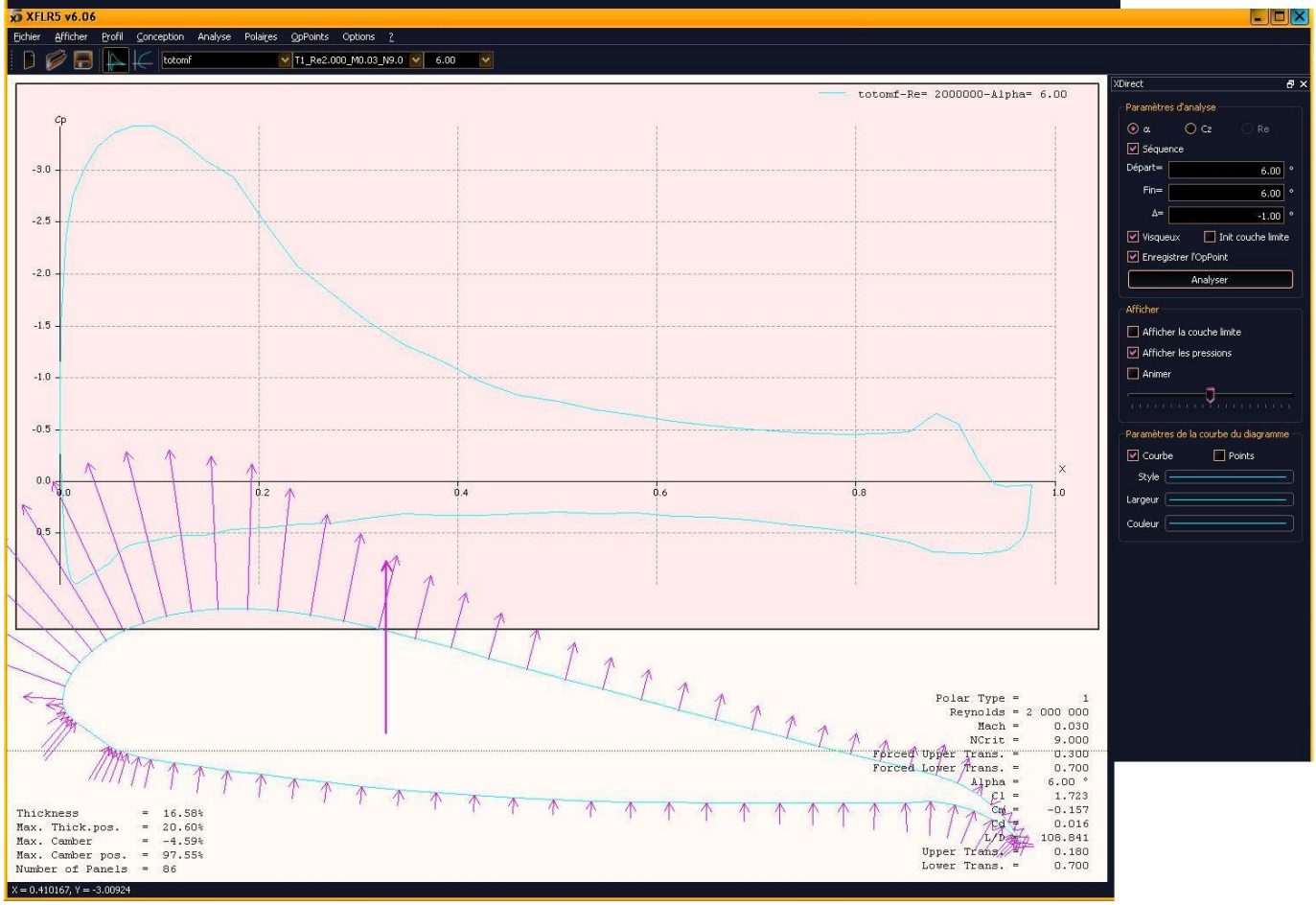
Incidence 19°
Cz = 1.46
Cx = 0.096

Typique de la sortie de phase parachutale

- Incidence importante, succion du BA
- Le Coefficient de portance diminue peu
- Le Coefficient de traînée double

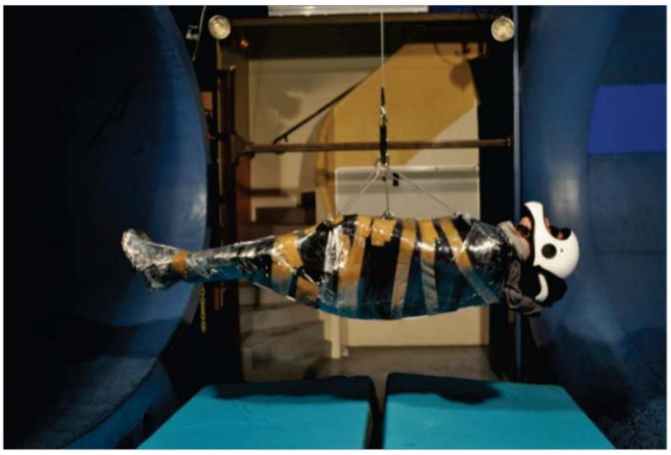



XFLR5 v6.06
toto5-Re= 2000000-Alpha= 6.00
Polar Type = 1
Reynolds = 2 000 000
Mach = 0.030
NCrit = 9.000
Forced Upper Trans. = 0.300
Forced Lower Trans. = 0.700
Alpha = 6.00 °
Cl = 0.808
Cm = 0.012
Cd = 0.008
L/D = 100.196
Upper Trans. = 0.211
Lower Trans. = 0.680
Thickness = 16.58%
Max. Thick.pos. = 20.60%
Max. Camber = 2.76%
Max. Camber pos. = 20.50%
Number of Panels = 86


XFLR5 v6.06
totomf-Re= 2000000-Alpha= 6.00
Polar Type = 1
Reynolds = 2 000 000
Mach = 0.030
NCrit = 9.000
Forced Upper Trans. = 0.300
Forced Lower Trans. = 0.700
Alpha = 6.00 °
Cl = 1.723
Cm = -0.157
Cd = 0.016
L/D = 108.841
Upper Trans. = 0.180
Lower Trans. = 0.700
Thickness = 16.58%
Max. Thick.pos. = 20.60%
Max. Camber = -4.59%
Max. Camber pos. = 97.55%
Number of Panels = 86

Fourchette de valeurs Scx

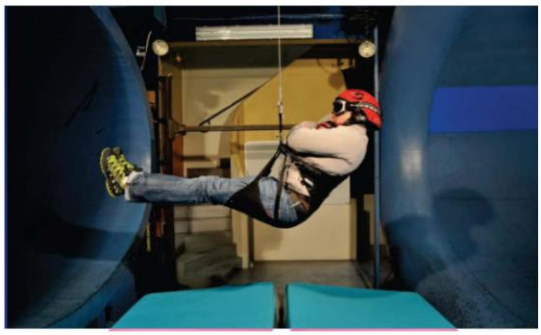
- Faible : SCx=0.08



- Importante : SCx=0.44

Sellette Simple / Elaborée

- SCx = 0.164 à 14 m/s



- SCx = 0.128 à 14 m/s

Bras croisés

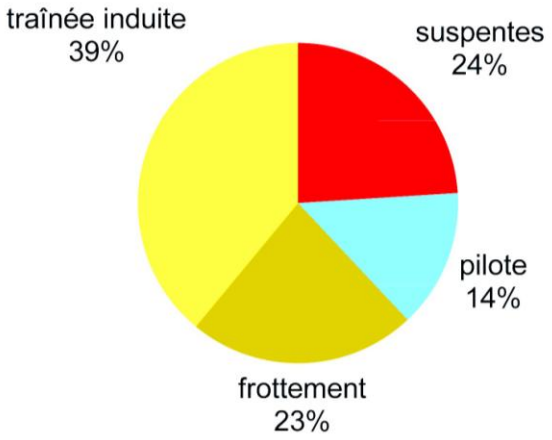
- SCx = 0.242 à 14 m/s

- SCx = 0.198 à 14 m/s

Mains aux élévateurs

Bilan de Traînée du Parapente Complet

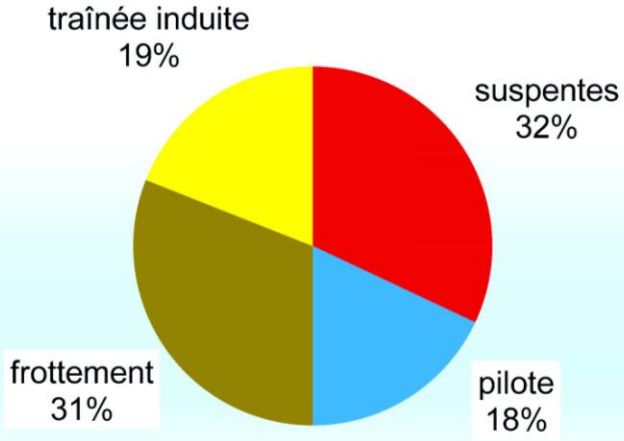
PTV : 90 kg
Finesse : 9
Vitesse : 10 m/s
Rx : 9,7 daN



Valable avec cocon et voile non accélérée

Bilan de Traînée du Parapente Complet

PTV : 90 kg
Finesse : 7.3
Vitesse : 13 m/s
Rx : 12 daN



Valable avec cocon et voile accélérée

Unit n°3:
Meteorology and aerology
Human factors
Performance
Airspace
Environment- free flight authority

1. METEOROLOGY AND AEROLOGY

A. Global scale: meteorology

- ✓ Global circulations, pressure systems

B. Local scale: aerology

- ✓ Breezes
- ✓ Obstacles effects
- ✓ Thermals
- ✓ Convergences

C. Weather forecasting

- ✓ Global forecasting tools, the models
- ✓ Local forecasting tools
- ✓ Stability and instability, the sounding
- ✓ Dangerous phenomenon

2. Human factors, security

A. Safety

- ✓ introduction, 3 simples rules
- ✓ Risk homeostasis
- ✓ what is the definition of the risk?
- ✓ Conclusion, the 3 levels

B. Psychological aspects of paragliding

- ✓ Three stages of stress
- ✓ Coping: four strategies
- ✓ Three times to deal with the stress
- ✓ Four stress factors
- ✓ Two tools

C. Risk management

- ✓ Accident causes
- ✓ Avoid accidents
  typical risky situations
- ✓ what to do in case of accident

3. PERFORMANCE FLYING

- ✓ Drift and strategy
- ✓ Wing polar best air glide, best ground glide
- ✓ Flying fast. Why, how.
- ✓ Transition strategy
  - Best glide strategy
  - MacCready strategy, what it is and how we can use it
  - Which one to use and in what situation

4. AIRSPACES

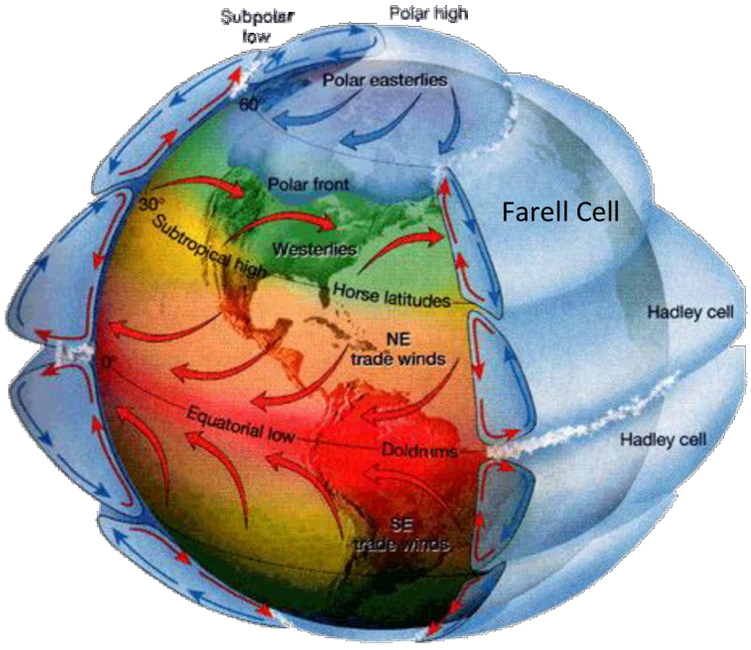
- ✓ Airspaces CTR TMA AWY..., NOTAM
- ✓ Rules

5. ENVIRONMENT

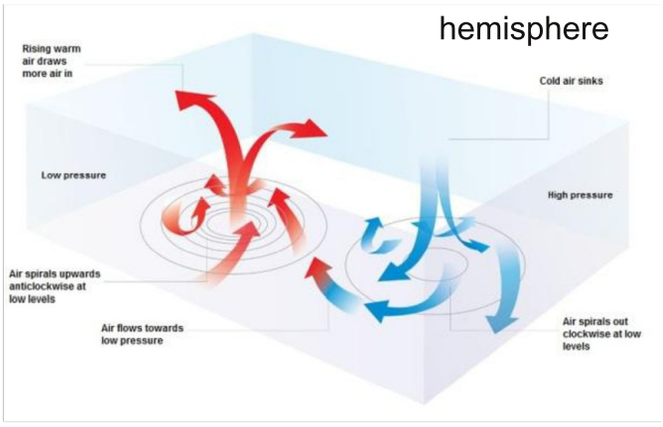
- ✓ Personal attitude, community

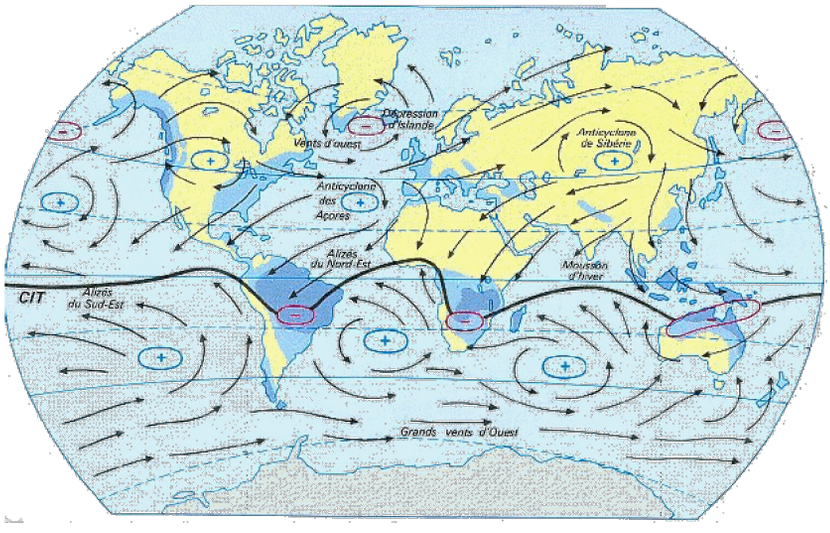
6. FREE FLYING AND AUTHORITIES

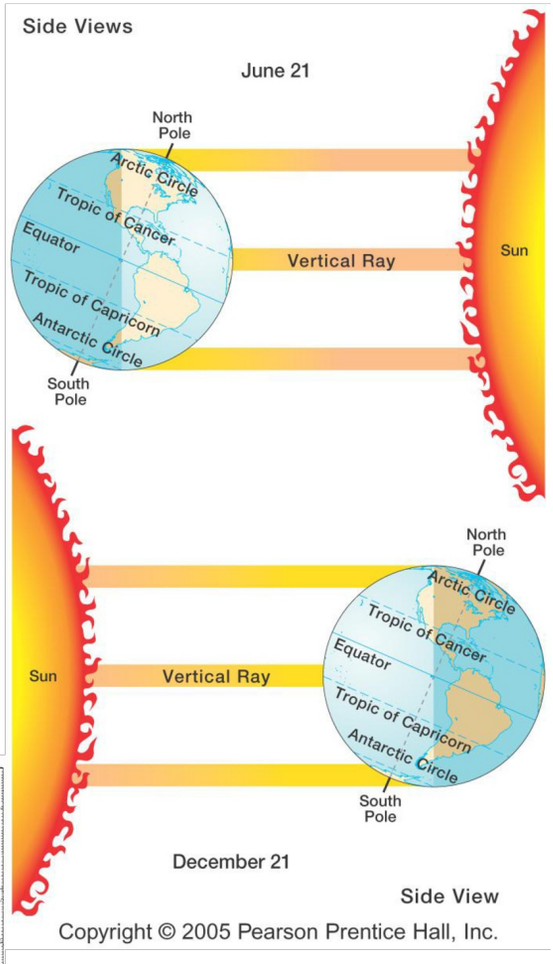
- ✓ Free flight history and philosophy
- ✓ Civil Aviation, FAI - CIVL, EHPU, Federation and club, APPI

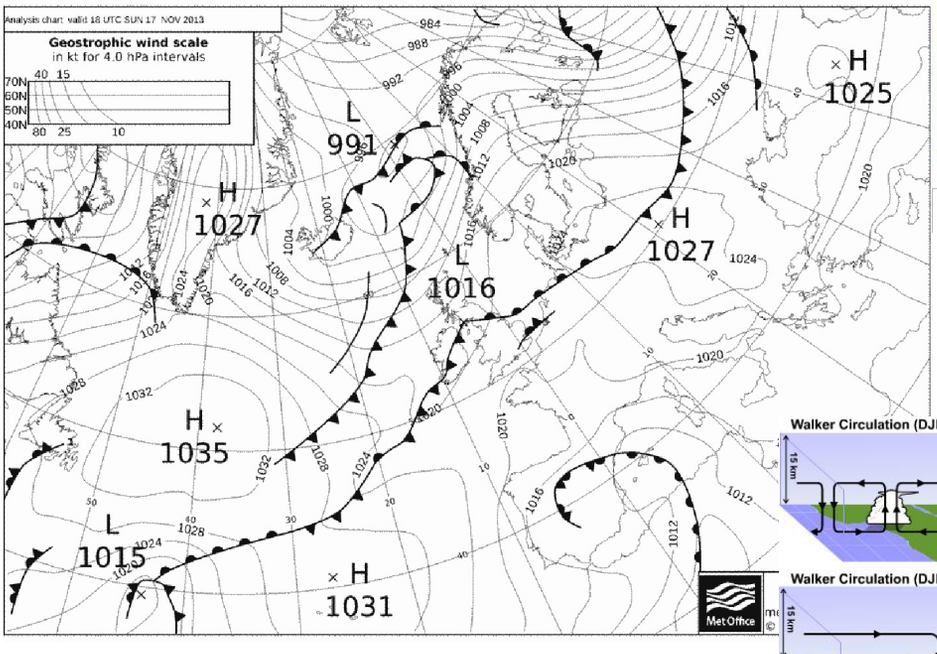


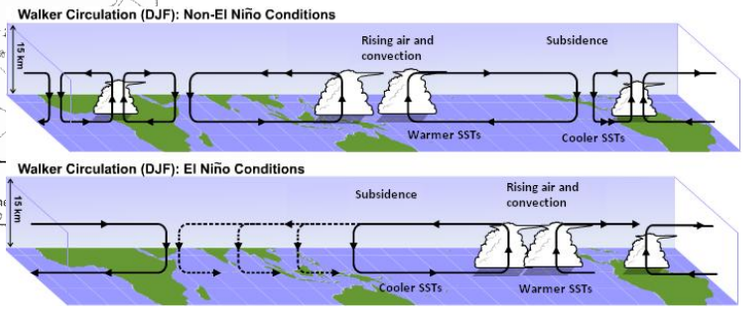
northern hemisphere





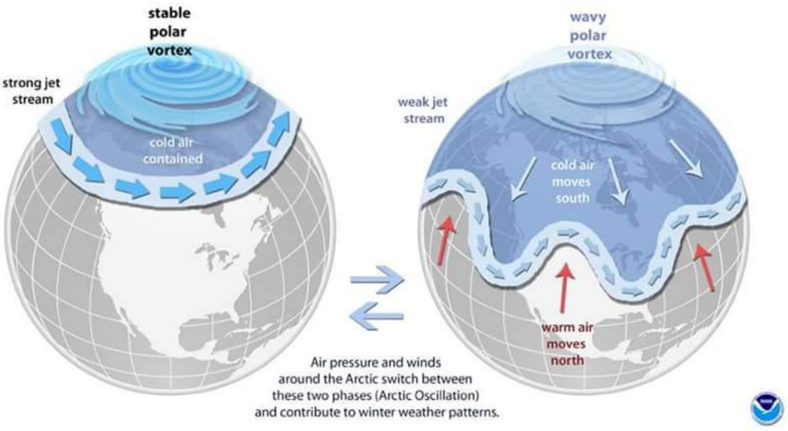




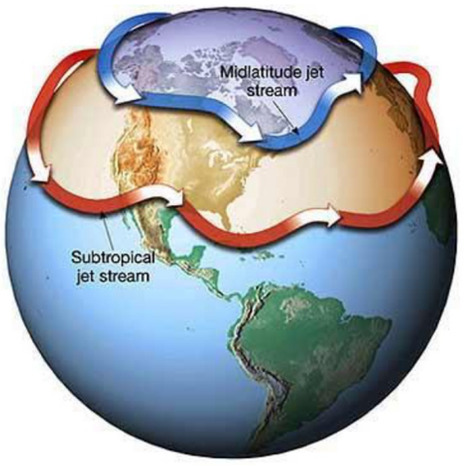


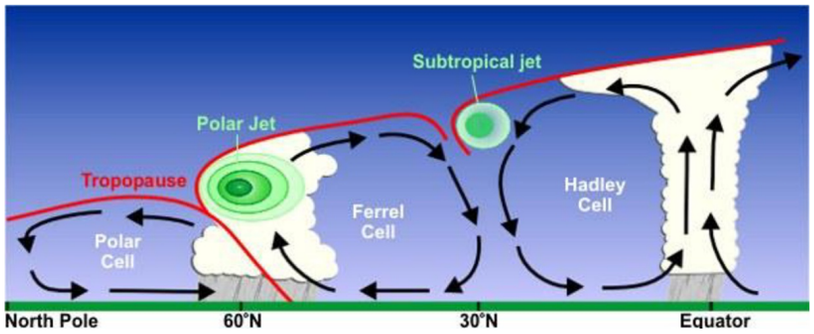
The Science Behind the Polar Vortex

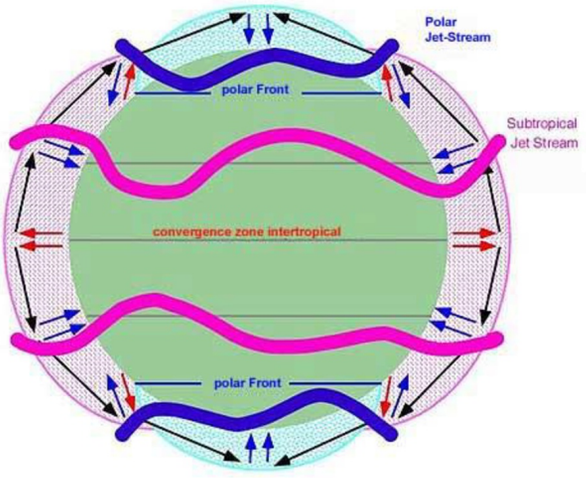
The polar vortex is a large area of low pressure and cold air surrounding the Earth's North and South poles. The term vortex refers to the counter-clockwise flow of air that helps keep the colder air close to the poles (left globe). Often during winter in the Northern Hemisphere, the polar vortex will become less stable and expand, sending cold Arctic air southward over the United States with the jet stream (right globe). The polar vortex is nothing new — in fact, it's thought that the term first appeared in an 1853 issue of E. Littell's *Living Age*.

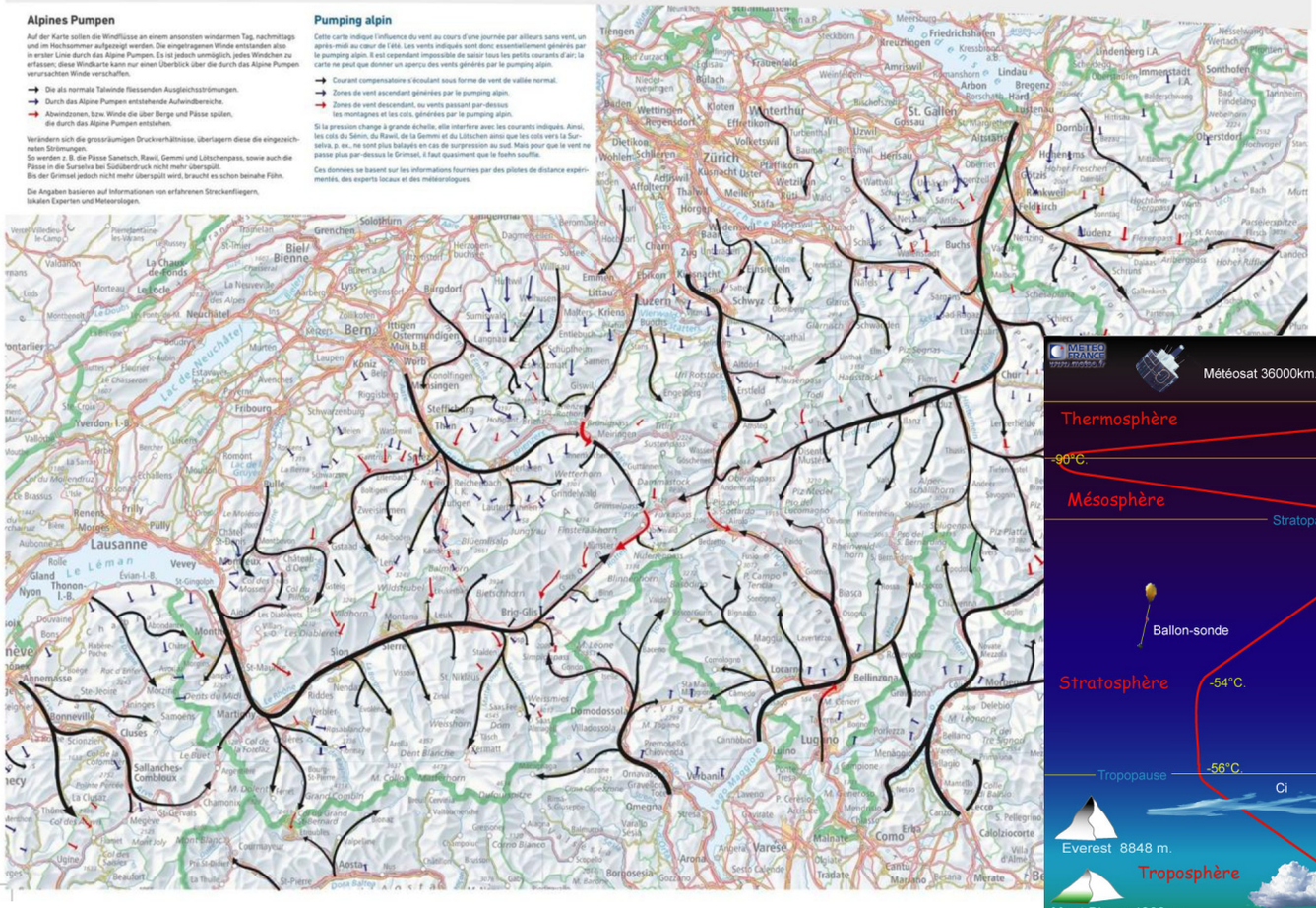


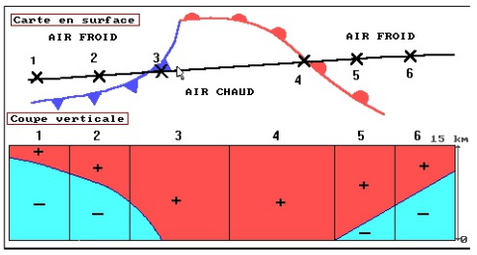
Air pressure and winds around the Arctic switch between these two phases (Arctic Oscillation) and contribute to winter weather patterns.

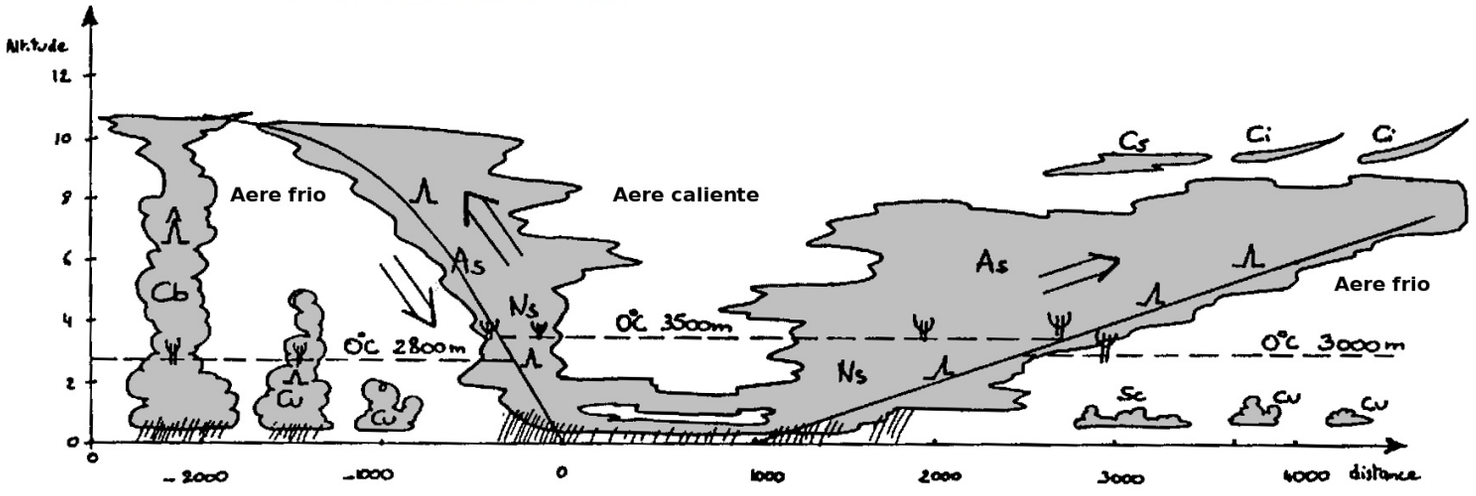






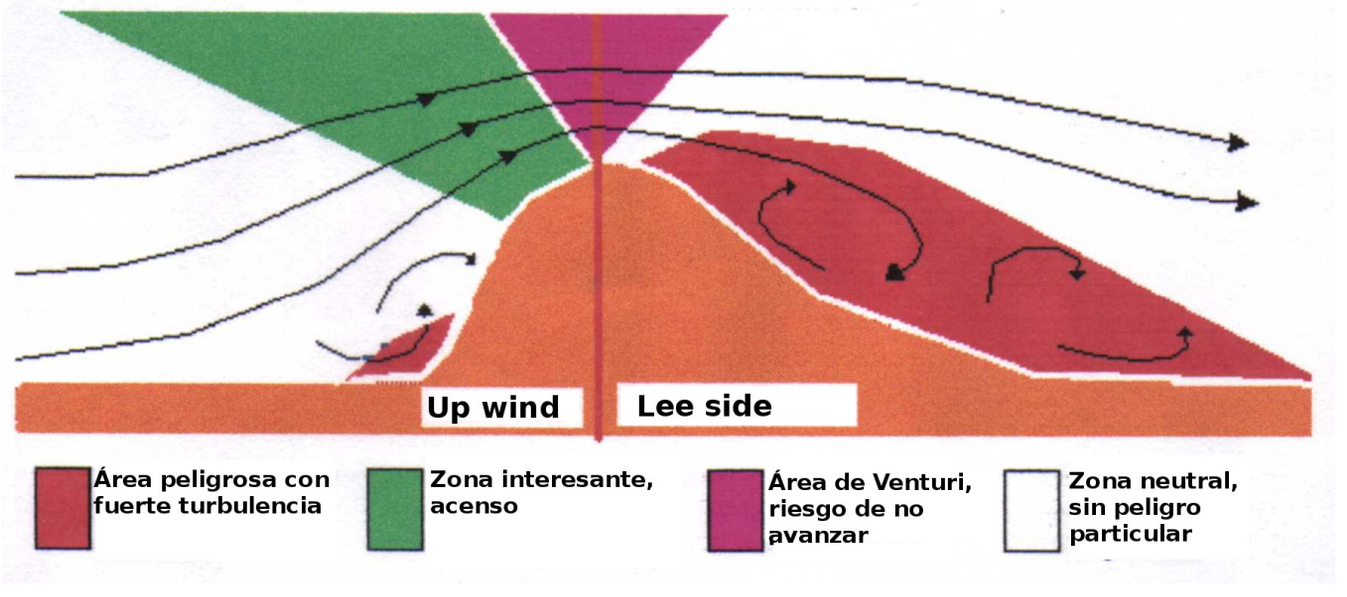


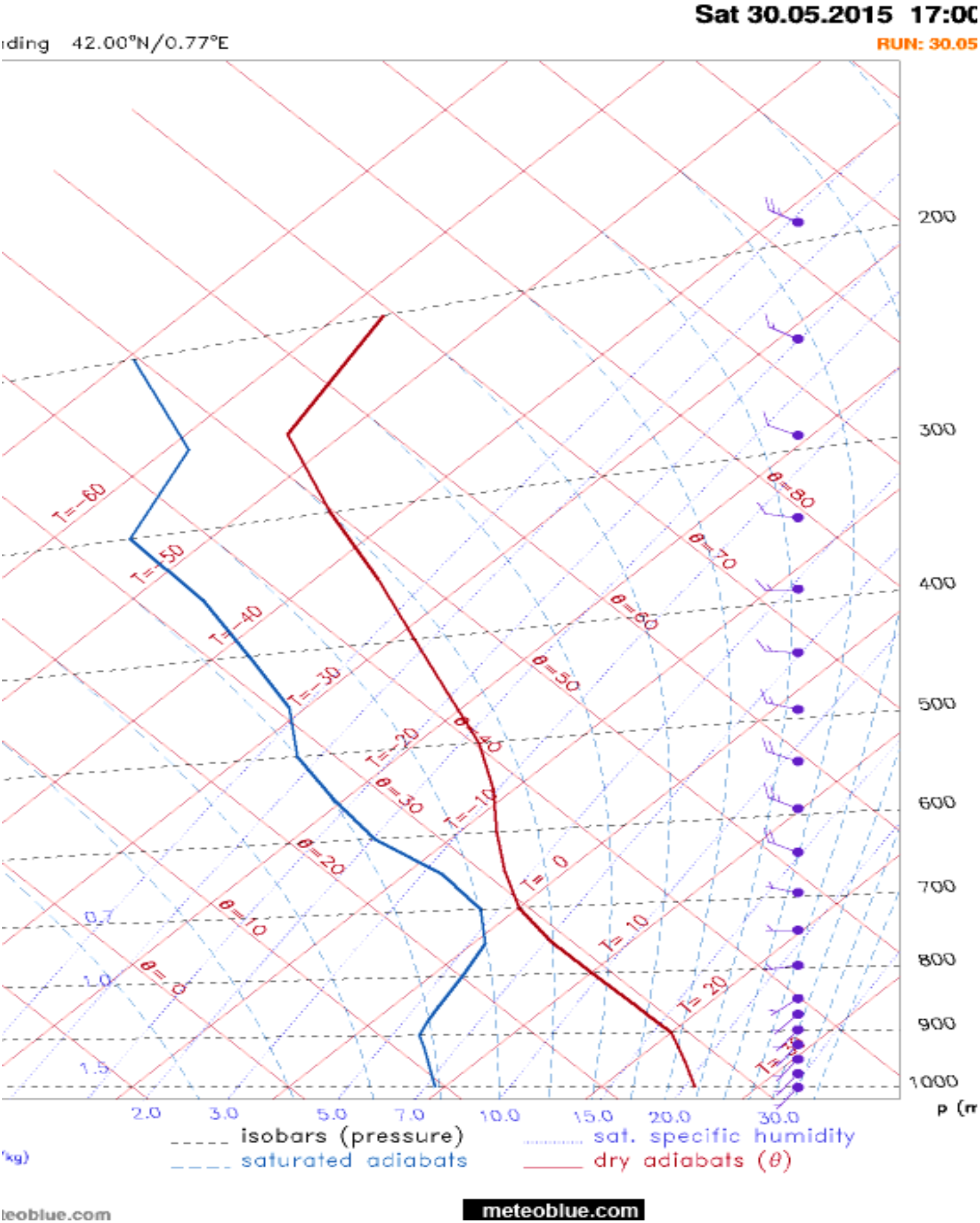


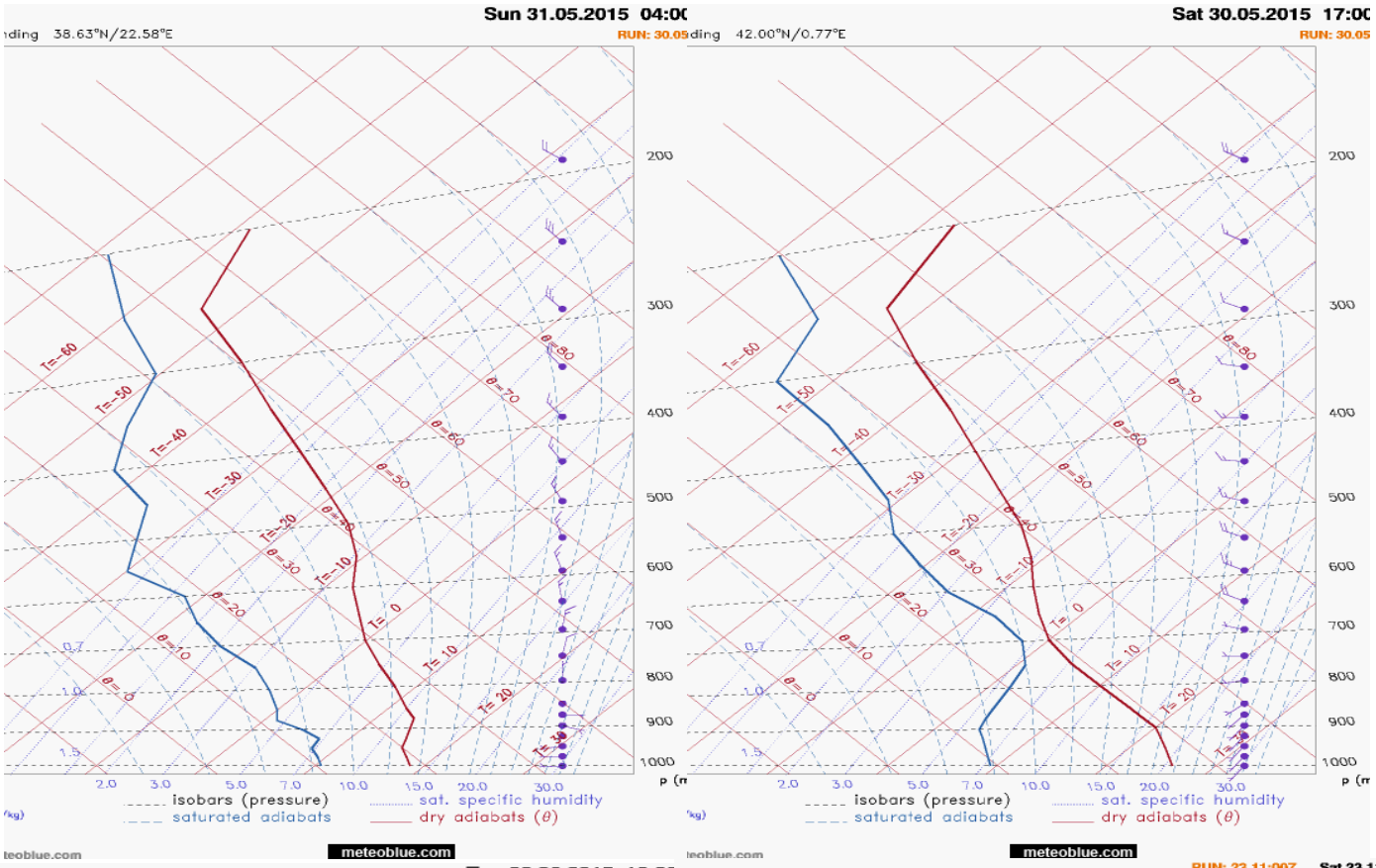


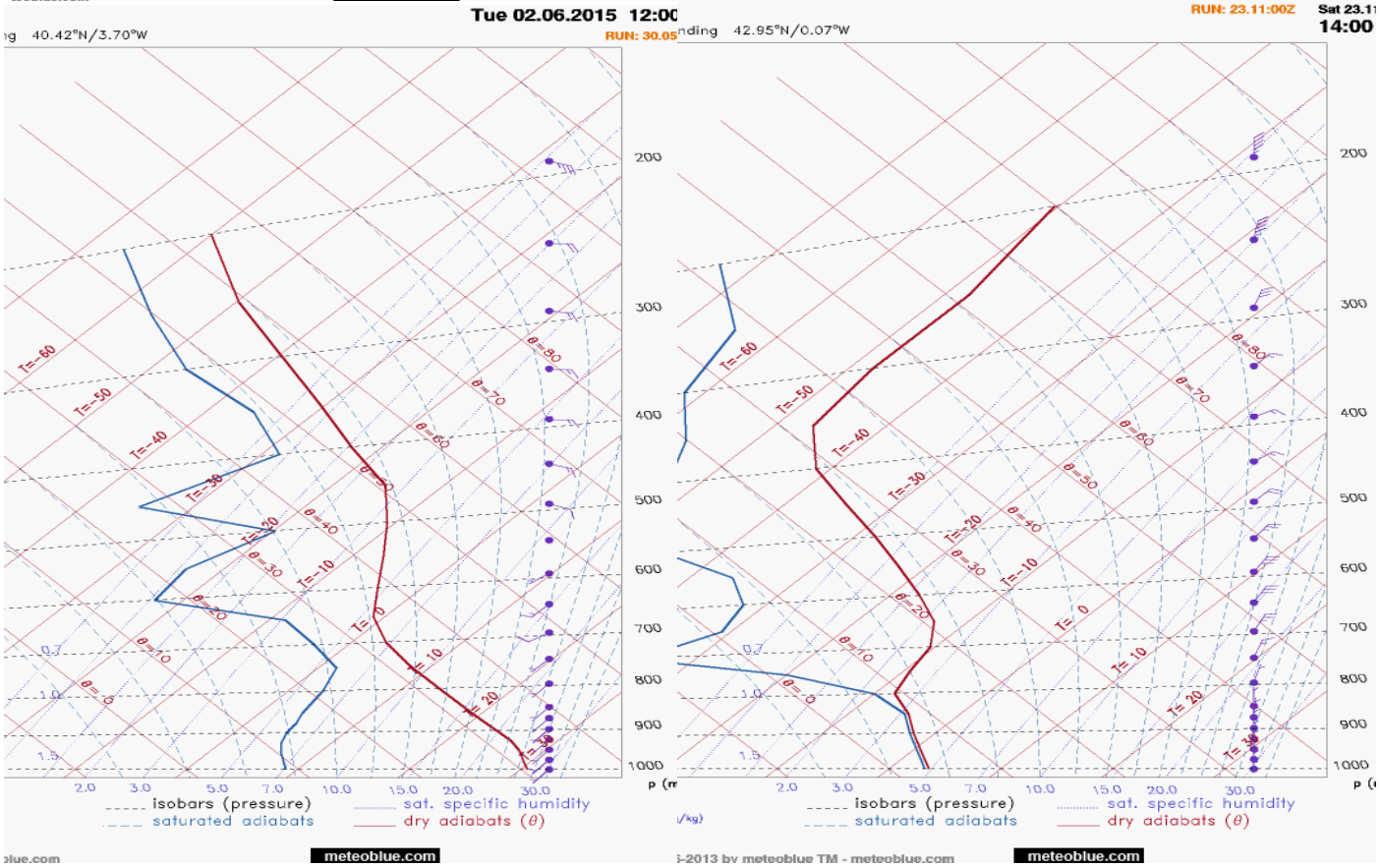
Las precipitaciones	aguacero	Lluvia Pesada	llovizna	Lluvia Pesada	Comenzando a llover	no Lluvia
Las nubes	Variando, tipo Cu o Cb	Bajo techo , cielo oscuro, NS and As	Cielo gris con estratos	Bajos y oscuros, nimbostratos	Cielo cubierto completamente, altoestratos and estratocúmulos	Nubes altas, cirrus más densos
Temperatura		bajando	estático	subiendo		
Viento	Norte Oeste	Cambio de Oeste a Norte Oeste enderezando	Oeste regular	Sur Oeste cambiando a Oeste	Sur Oeste	
Presión		sube	estático	Cae rápido	bajando	bajando
Visibilidad	Muy buena	Mala durante precipitación	Mala o pobre	Mala durante precipitación	Promedia	Promedia

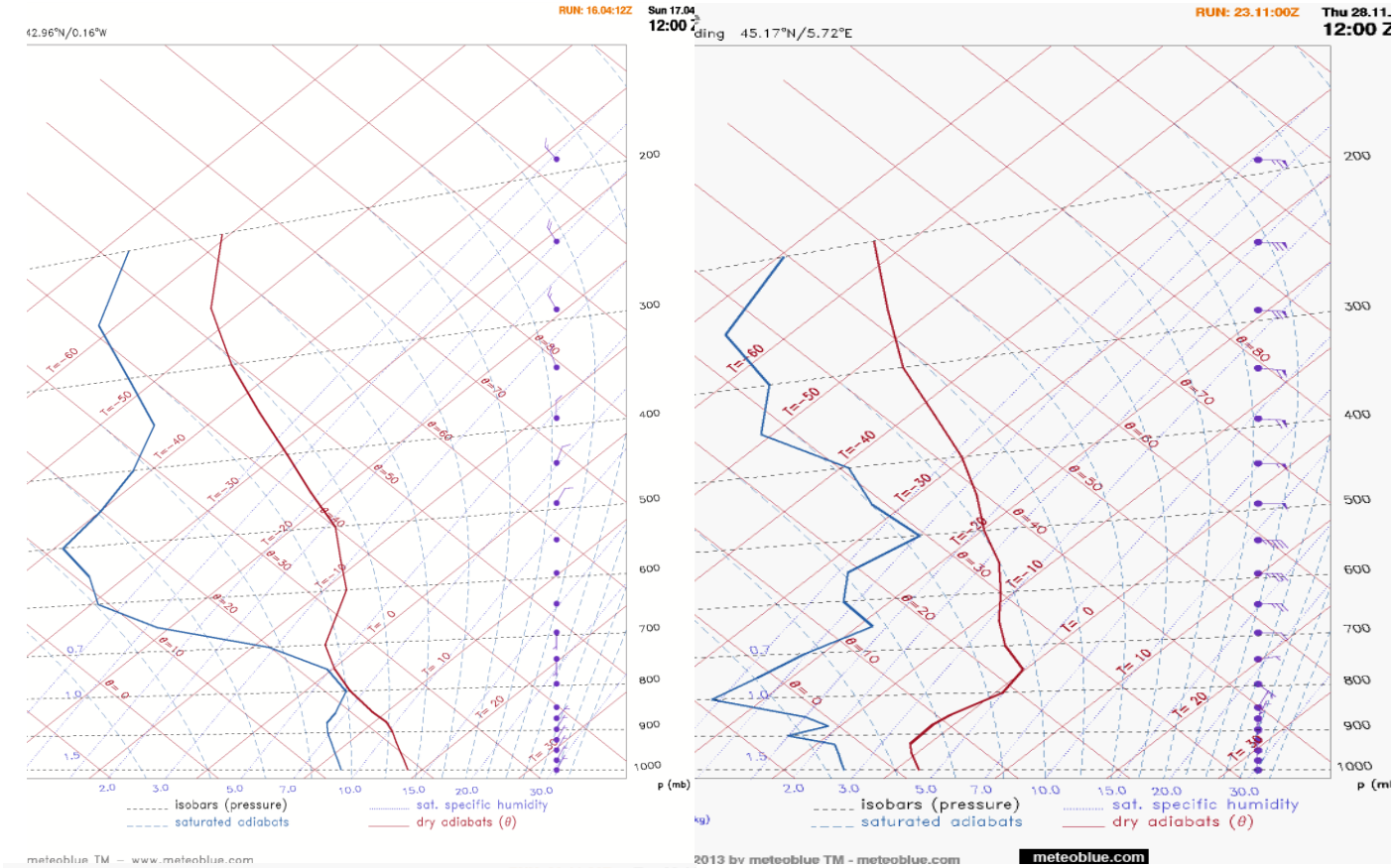
A medida que la perturbación se mueve de izquierda a derecha, en el punto de vista de un observador la tabla debe ser mirado de derecha a izquierda.



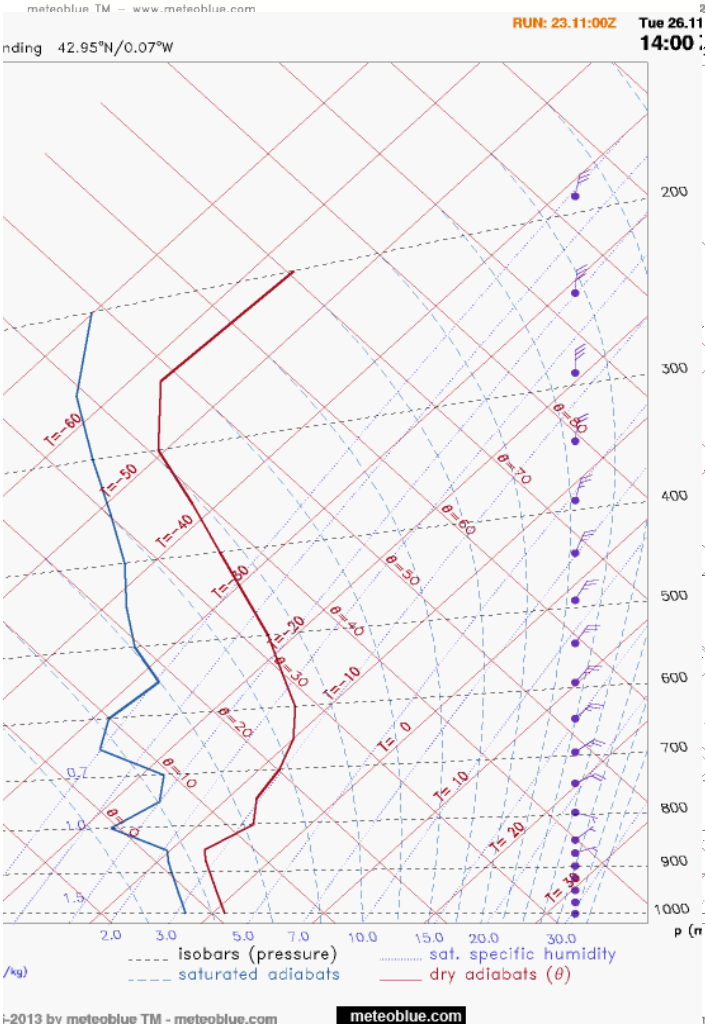

Sat 30.05.2015 17:00
ıding 42.00°N/0.77°E
RUN: 30.05
200
300
400
500
600
700
800
900
1000
p (m
T=-60
T=-50
T=-40
T=-30
T=-20
T=-10
T= 0
T= 10
T= 20
θ=80
θ=70
θ=60
θ=50
θ=40
θ=30
θ=20
θ=10
θ= 0
0.7
1.0
1.5
2.0
3.0
5.0
7.0
10.0
15.0
20.0
30.0
isobars (pressure)
saturated adiabats
sat. specific humidity
dry adiabats (θ)
'kg)
meteoblue.com
teoblue.com

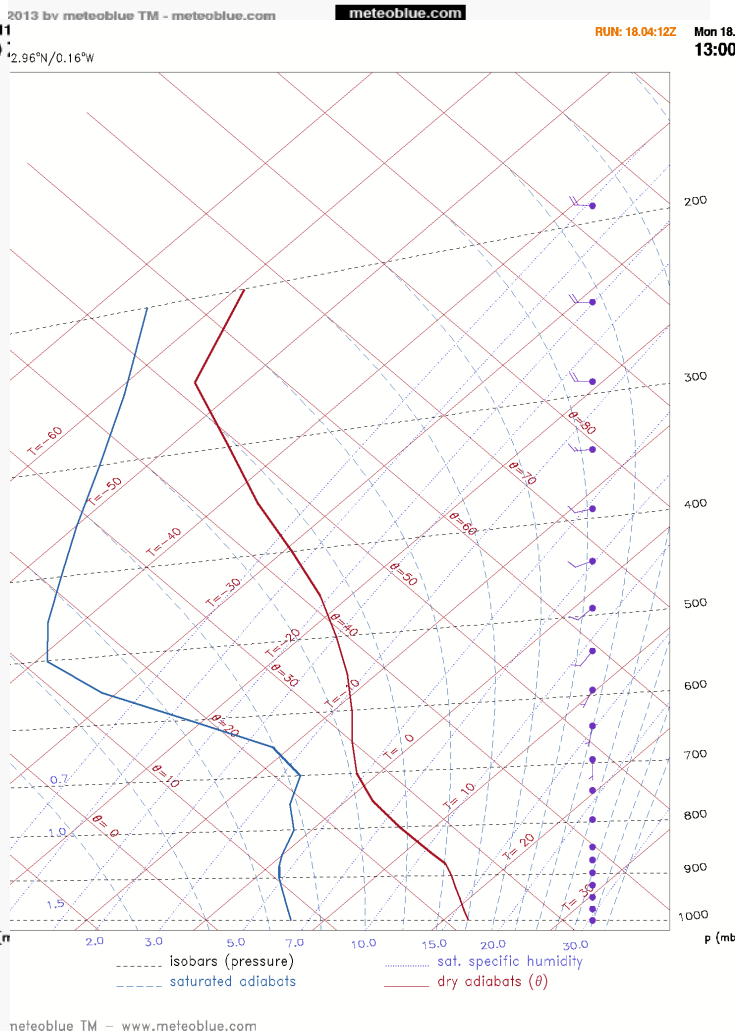

Sun 31.05.2015 04:0
RUN: 30.05
ding 38.63°N/22.58°E
Sat 30.05.2015 17:00
RUN: 30.05
ding 42.00°N/0.77°E
isobars (pressure)
saturated adiabats
sat. specific humidity
dry adiabats (θ)
meteoblue.com


Tue 02.06.2015 12:00
RUN: 30.05
g 40.42°N/3.70°W
RUN: 23.11:00Z
Sat 23.11
14:00
nding 42.95°N/0.07°W
isobars (pressure)
saturated adiabats
sat. specific humidity
dry adiabats (θ)
meteoblue.com

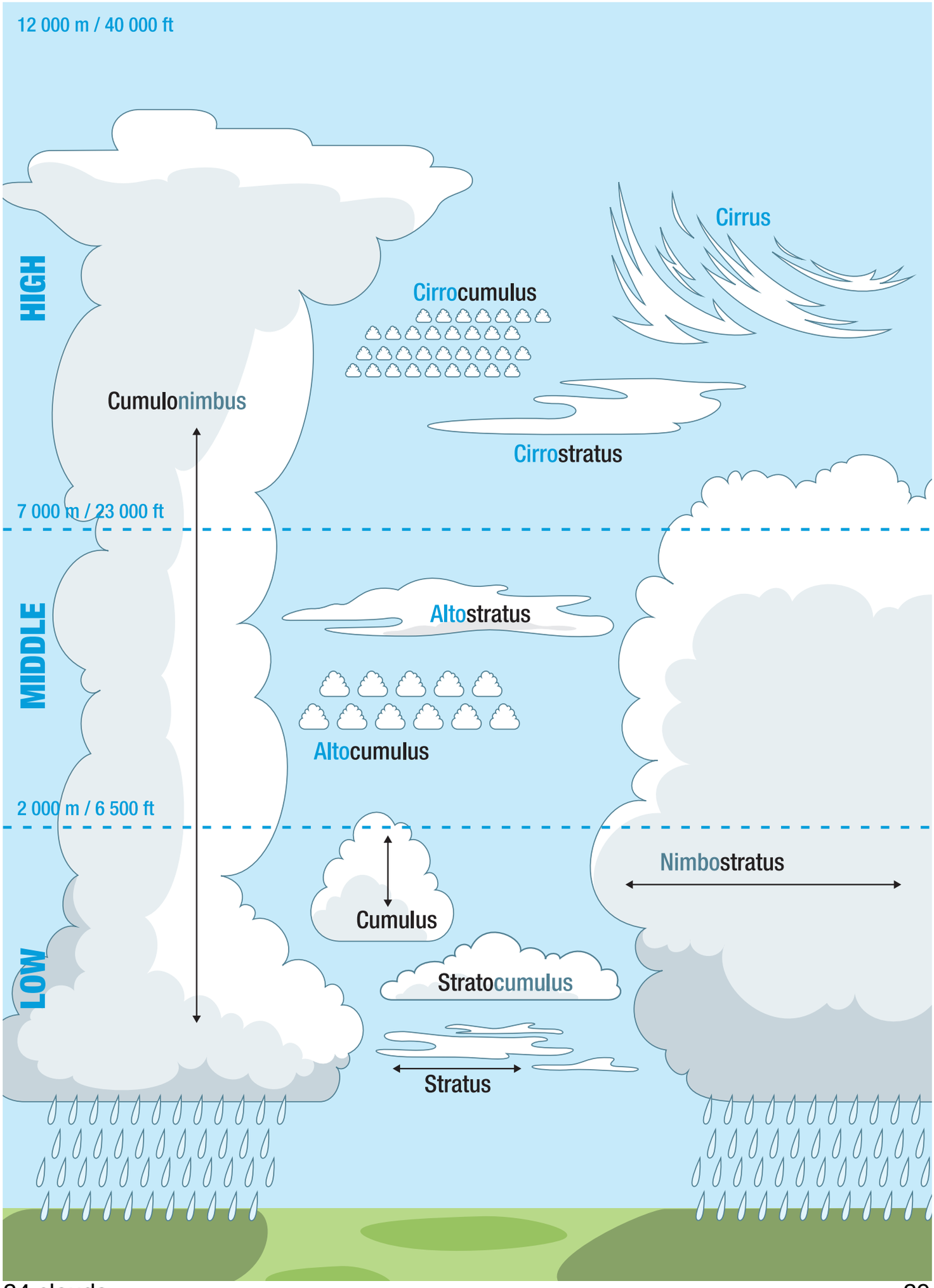

RUN: 16.04:12Z
Sun 17.04
12:00
42.96°N/0.16°W
isobars (pressure)
saturated adiabats
sat. specific humidity
dry adiabats (θ)
meteoblue TM – www.meteoblue.com

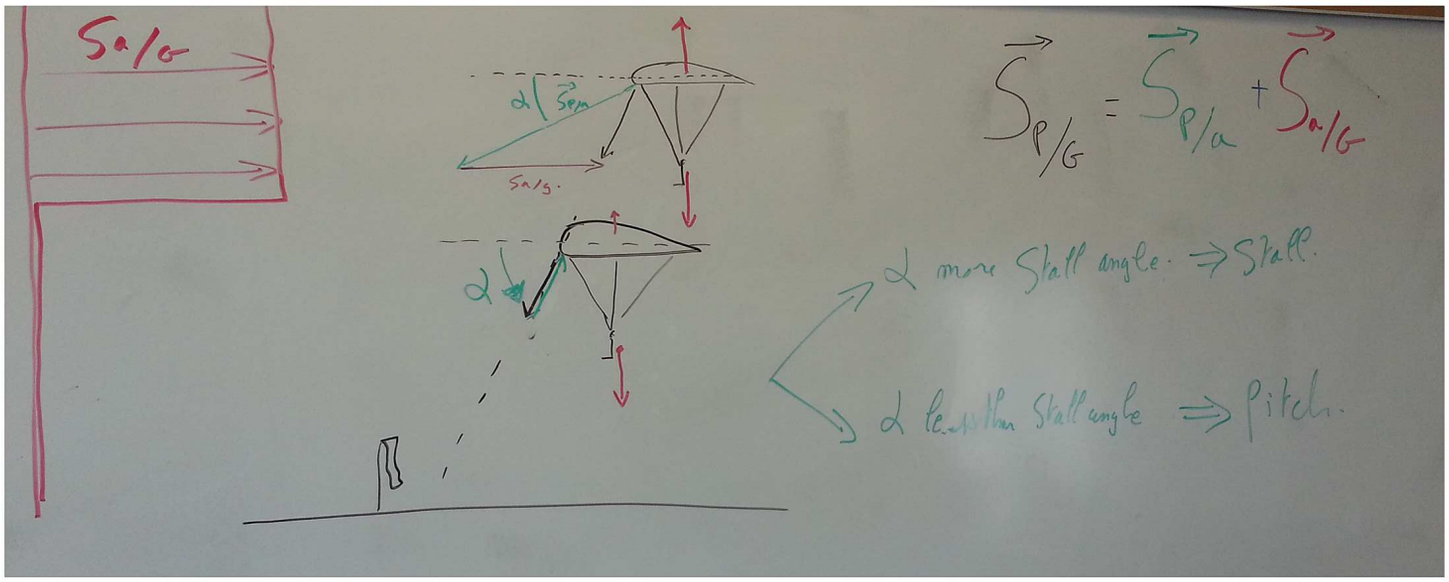
RUN: 23.11:00Z
Thu 28.11.
12:00
45.17°N/5.72°E
isobars (pressure)
saturated adiabats
sat. specific humidity
dry adiabats (θ)
2013 by meteoblue TM - meteoblue.com
meteoblue.com

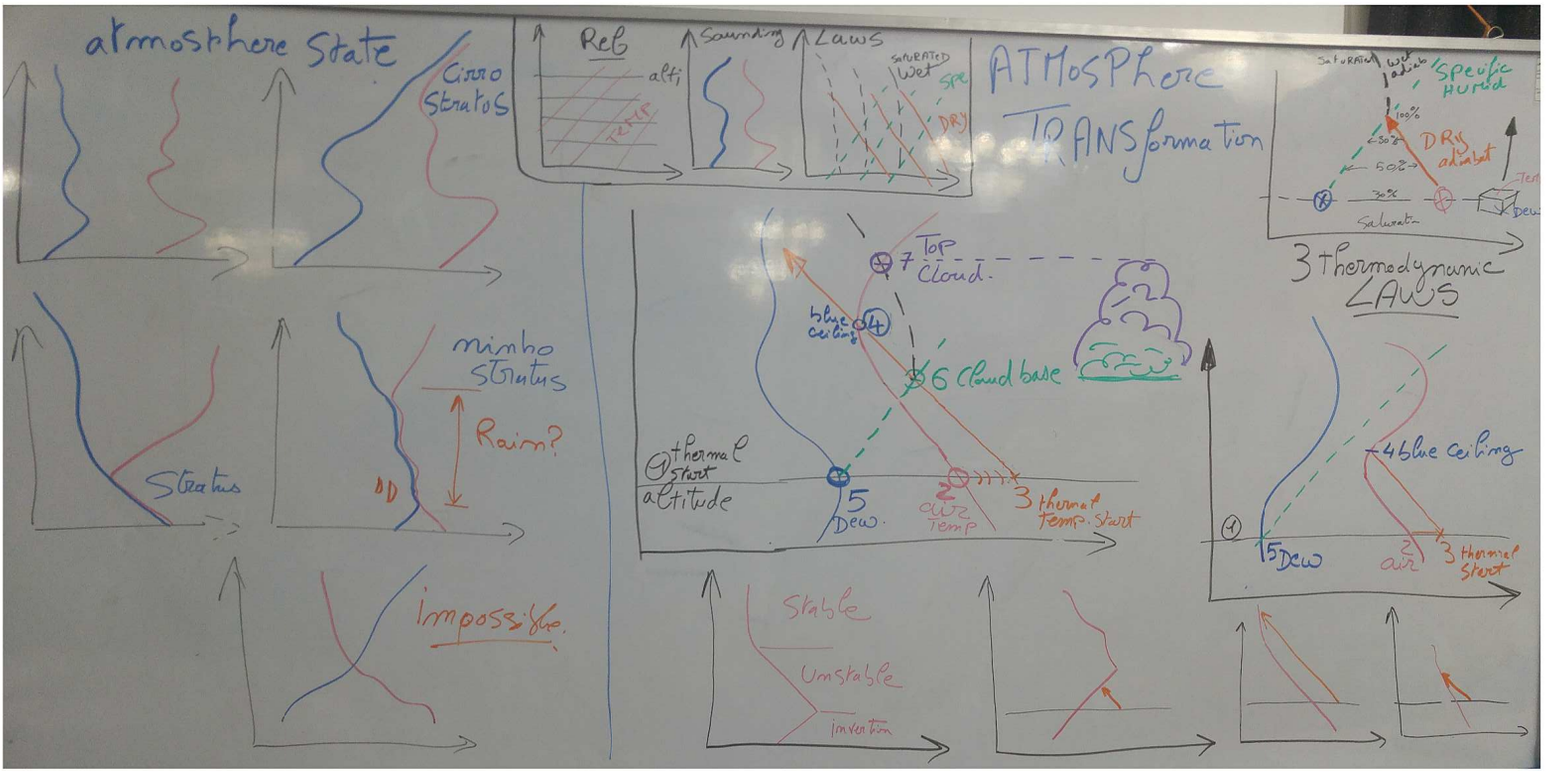

RUN: 23.11:00Z
Tue 26.11
14:00
42.95°N/0.07°W
isobars (pressure)
saturated adiabats
sat. specific humidity
dry adiabats (θ)
2013 by meteoblue TM - meteoblue.com
meteoblue.com

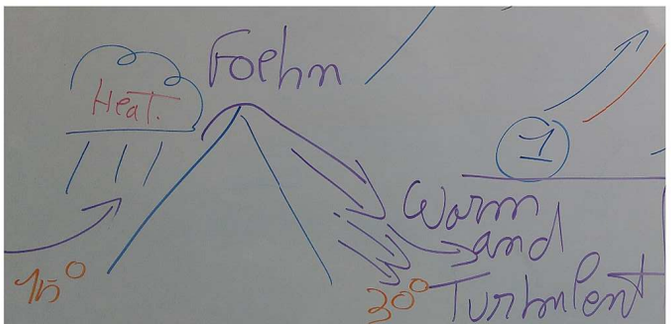

RUN: 18.04:12Z
Mon 18.
13:00
42.96°N/0.16°W
isobars (pressure)
saturated adiabats
sat. specific humidity
dry adiabats (θ)
meteoblue TM – www.meteoblue.com

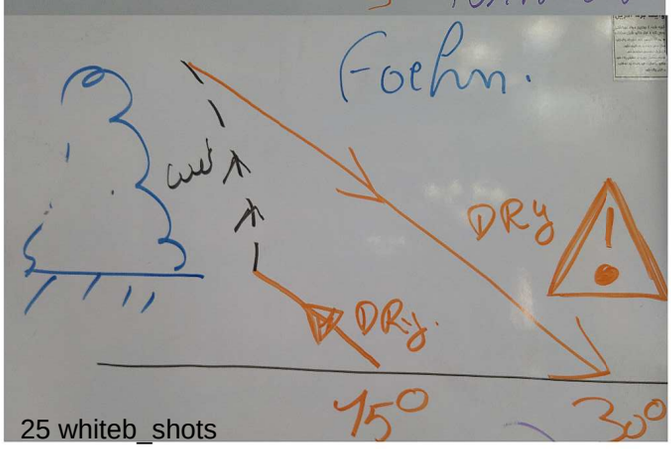
TYPES OF CLOUD

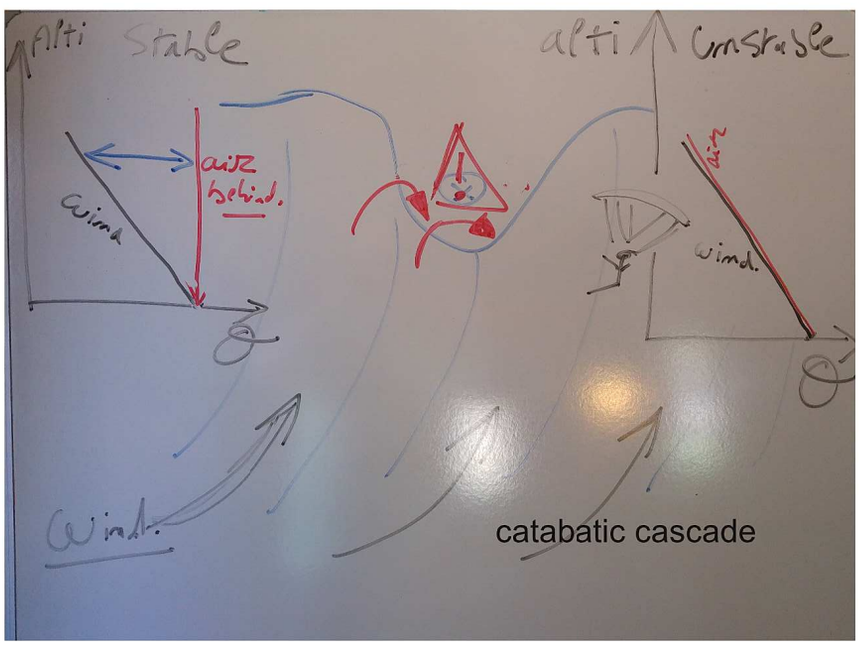



Sa/G
α
Sa/g.
α more Stall angle. ⇒ Stall.
α less than Stall angle ⇒ Pitch.


atmosphere State
Cirro Stratos
Strato Cumulus
Stratus
Rain?
impossible.
Refl
Sounding
Laws
ATMOSPHERE TRANSformation
3 thermodynamic LAWS
7 Top Cloud.
6 Cloud base
thermal start altitude
5 Dew.
2 air Temp
3 thermal Temp. start
4 blue ceiling
Stable
Unstable
inversion


Foehn
Heat.
Warm and Turbulent
15°
30°


Foehn.
DRy
DRy.
15°
30°


Alti
Stable
alti
Unstable
air behind.
Wind
air
wind.
Wind.
catabatic cascade

MENTAL STRENGTH SELF-**EVALUATION**

This tool is inspired by the mental strength evaluation made by Antoni Girod (2003). It helps to be able to know one's weaknesses and strengths and to define improvement guidelines.

21 mental abilities are proposed. Give a value to each of them. If it fits you completely, cross out 6; if it is the contrary cross out 1.

You may use the columns - - and ++ if you consider yourself excessive in one way or the other.

Mental qualities	**- -**	**1**	**2**	**3**	**4**	**5**	**6**	**+ +**	**Comment**
Passion									
Enthusiasm									
Pleasure of flying									
Taste for making an effort									
Discipline									
Respect									
Humility									
Constancy									
Willingness									
Ambition									
Determination									
Courage									
Boldness									
Autonomy									
Motivation									
Self-confidence									
Calm									
Concentration									
Fighting spirit									
Lucidity									
Adaptability									

Do some answers highlight a risk within the framework of your activity?

The values you will give to these abilities will change with time. Knowing your weaknesses makes it possible to work on your mental strength and optimize it. You should do this exercise on regular basis, date, archive and compare the results through time.

ERROR DETECTOR and POSITIVE MENTAL STRENGHTENING

Objective:
To encourage the pilot or instructor to develop its critical thinking skills. Improve their level of vigilance, safety and performance keeping his motivation up.

What mistakes did I make?
Each pilot or instructor should be able to identify at least 3 mistakes he made during a flight or a class. If the prestation was close to perfect, the identified errors will be minor, otherwise they will be grosser. An important point is being able to identify the real reasons of a fail.

Where was I successfull?
Also identify 2 points they were successfull. Being able to identify the progress allows to keep on progressing with a positive dynamic.

Date: **Place:** **Event description:** **Event duration:**

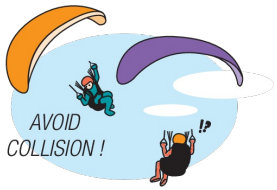
Error	Description	Cause	Remedy/solution
1			
2			
3			

Success	Description	What ressources did you use to succeed
1		
2		

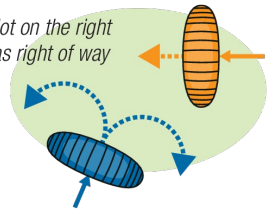
AIRLAW

AERIAL COLLISION AVOIDANCE

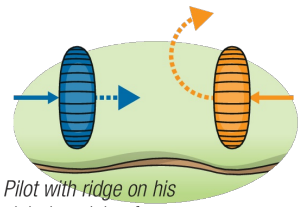
1st Rule



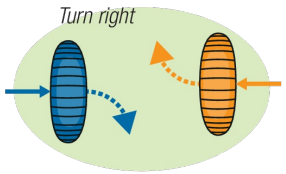
Converging



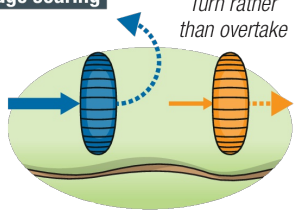
Head on (near ridge)



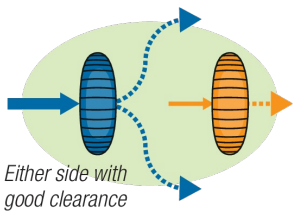
Head on



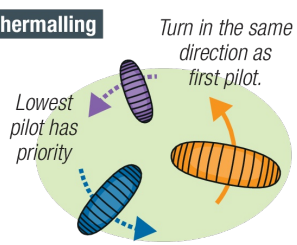
Ridge soaring



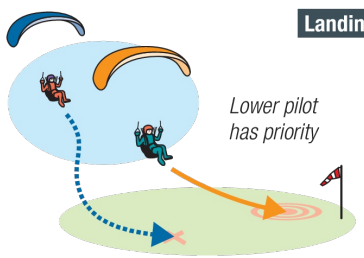
Overtaking



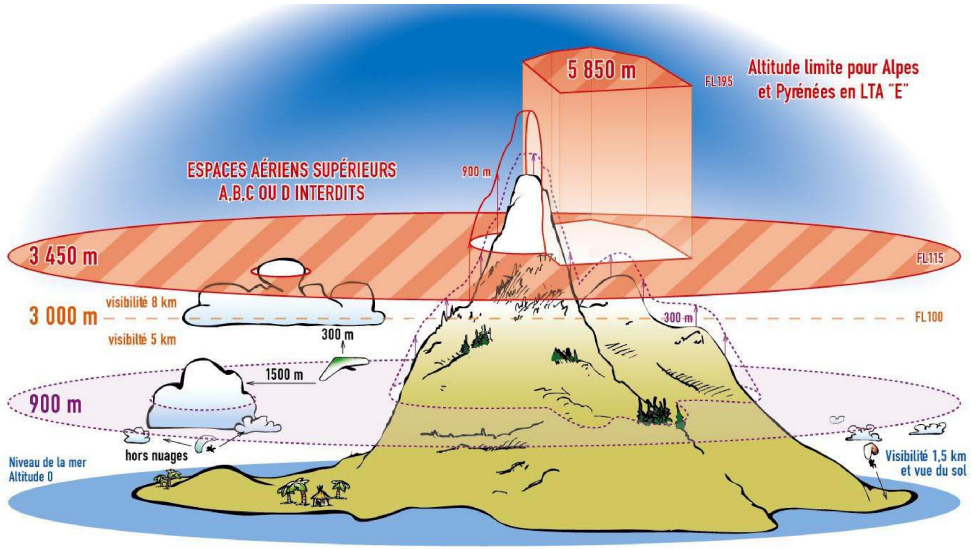
Thermalling

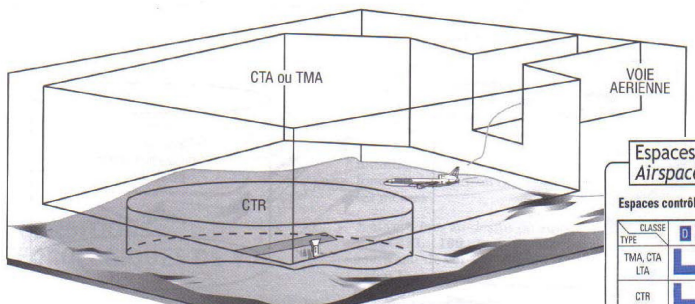


Landing

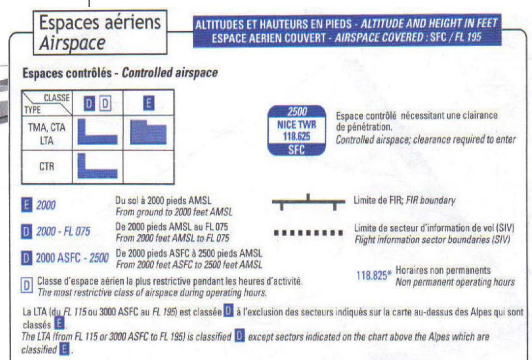


APPI International • Chemin Vieux 64, 1997 Sornard, SWITZERLAND

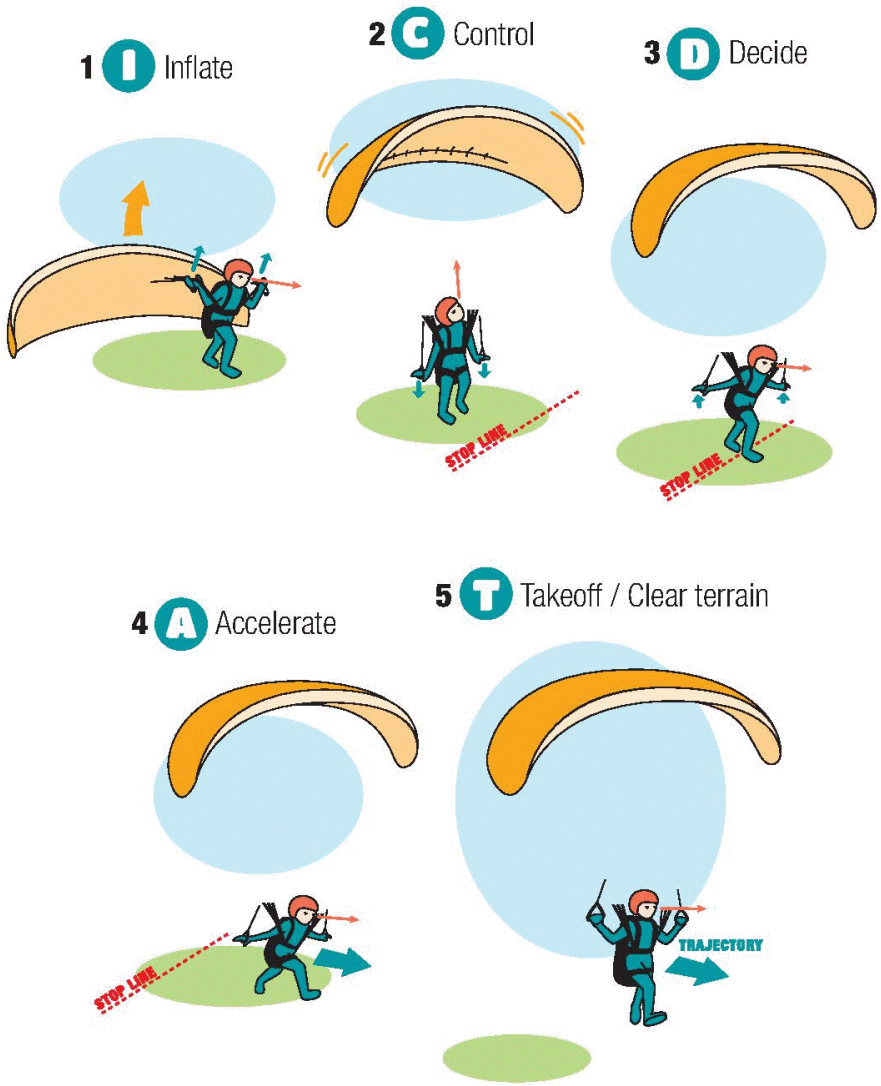




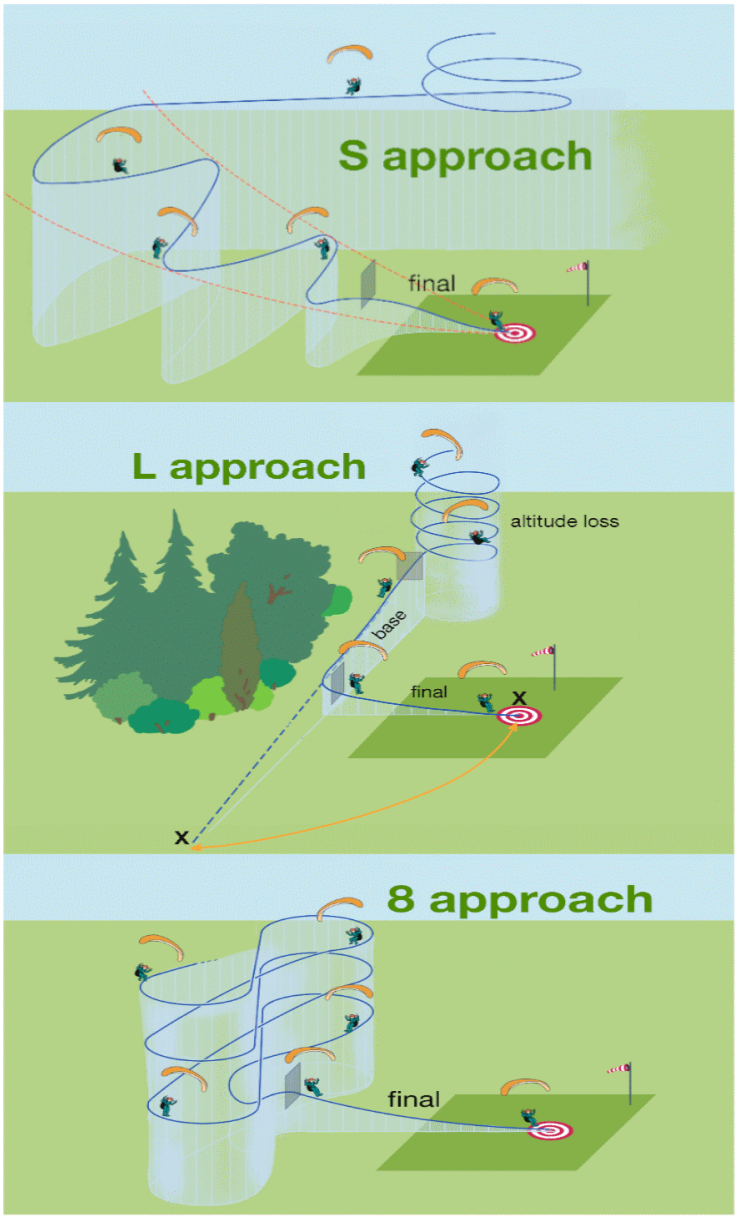
Classe d'espace aérien	Espace contrôlé					Espace non contrôlé	
VFR	Classe A	Classe B	Classe C	Classe D	Classe E	Classe F	Classe G
Conditions de pénétration et évolution	Interdit au VFR	Clairance			Non sauf pour VFR spécial	Non	
Ecoute radio obligatoire		Oui			Non sauf pour VFR spécial	Non	
Espacement assuré		Avec tous	Avec IFR		Non sauf pour VFR spécial avec IFR	Non	
Info de trafic systématique		Clairance			Non sauf pour VFR spécial	Non	
Minimum VMC (sup FL100)		Visi 8 km / hors nuage	Visi 8 km / nuage 1000 ft 1,5 km				
Minimum VMC (inf FL100)		Visi 5 km / hors nuage	Visi 5 km / nuage 1000 ft 1,5 km			Visi 5 km / nuage 1000 ft 1,5 km	
Minimum VMC (inf 3000 ft AMSL et 1000 ft AGL)						Visi 1,5 km ou 30 s / hors nuage en vue de la surf.	
Limitation de vitesse sous FL100		Non	250 KIAS sauf clair.		250 KIAS		
IFR	Classe A	Classe B	Classe C	Classe D	Classe E	Classe F	Classe G
Conditions de pénétration	Clairance					Non	
Espacement assuré	Avec tous			Avec IFR et VFR Spécial		Suivant poss.	Non
Info de trafic systématique	Sans objet			Sur VFR	Non	Suivant poss.	Non
Limitation de vitesse sous FL100	Non			250 KIAS sauf clair.		250 KIAS	

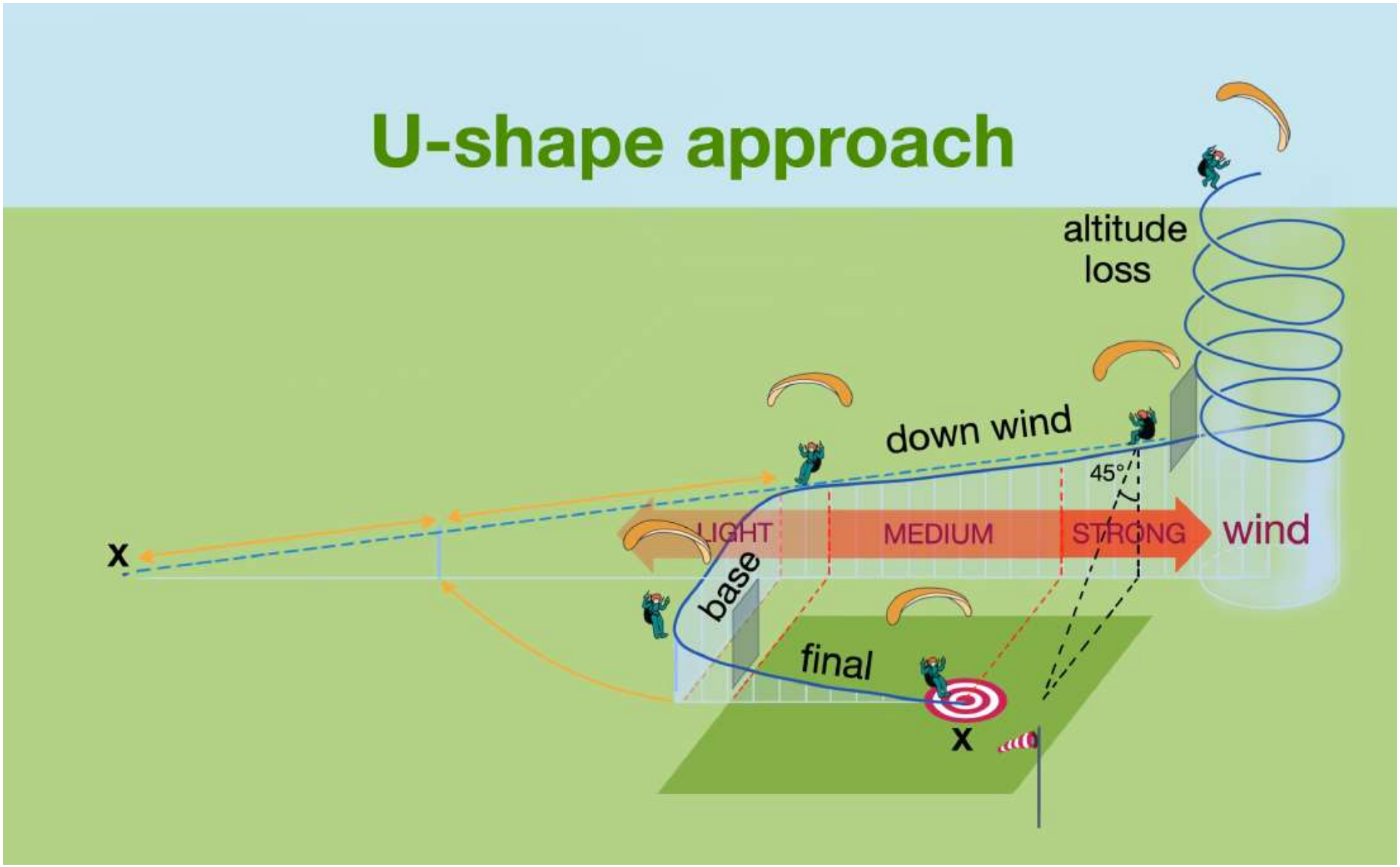


TAKEOFF PROCEDURE

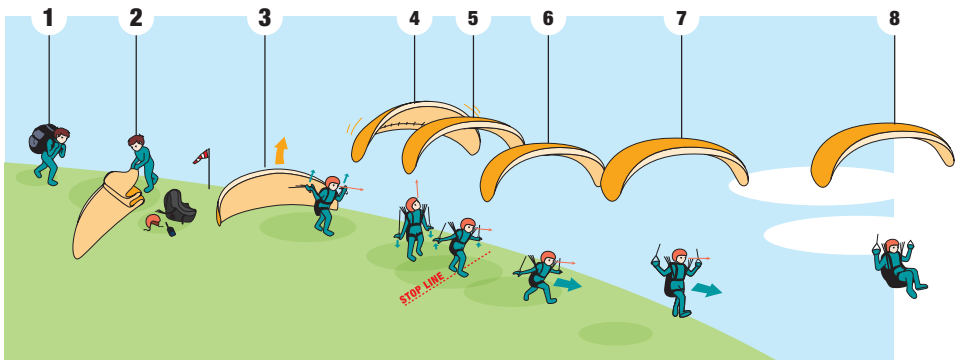


LANDING PROCESS




U-shape approach
altitude
loss
down wind
45°
LIGHT
MEDIUM
STRONG
wind
base
final
X
X

APPI GLOBAL FLIGHT PROCESS



I – TAKEOFF

① Preparation / Set-up
- Mental state awareness
- Choose place (wind, obstacle, slope)
- Set-up (glider in U shape, ⊥ wind)
- Clear the lines (1 by 1 or pre-inflation)
- Get into harness (check reserve first)

② Pre-flight check: B.E.S.A.F.E.
- **Buckles** (legs, waist & chest straps, helmet, carabiners)
- **Equipment** (reserve, glider, lines, brakes, speed bar, radio)
- **Stop line** (visualize limits and technique)
- **Airflow** (wind direction, strength, cycles)
- **Free airspace and runway**

+ Enjoy your flight

③ Inflation
- Choose the moment
- Quick look around
- Symmetric position of the hands
- Chest-strap pressure

④ Control
- Timing (release A > commands)
- Deep action on commands
- +/- look

⑤ Decision > Stop or Go

⑥ Acceleration
- Chest-strap pressure
- Hand position
- Balance pilot/glider
- Look ahead
- Trajectory

⑦ Takeoff
- Don't release commands
- Trajectory, **clear terrain**
- Speed range

⑧ End of takeoff procedure
- Traffic check
- Get in the harness, in-flight check

II – FLIGHT

Air speed ≠ Ground speed
Air trajectory ≠ Ground trajectory (Drift)

Speed range / Air (+/- 2 km/h)
- Best glide ratio ≈ 39 km/h
- Hands up speed ≈ 37 km/h
- Min sink speed ≈ 34 km/h
- Min speed ≈ 25 km/h (not for beginner)

Heading correction
- Visual marker 2 points
- Drift visualization and control
- Look, lean, +/- command

Turn control
- Take markers, 90°, 180°, 360°
- From trim speed:
  look, lean, pull inside command, release.
- From min sink speed:
  look, lean, release outside command, return to min sink speed.
- Leaning and command actions are progressive
- Traffic rules

Rescue procedure
- look-reach-pull, throw, control glider

Exercises
- Pitch control
- Roll control
- Big ears + speed bar
- Figure of 8
  (stay there, forward, backward)
- Min sink, turn

III – LANDING

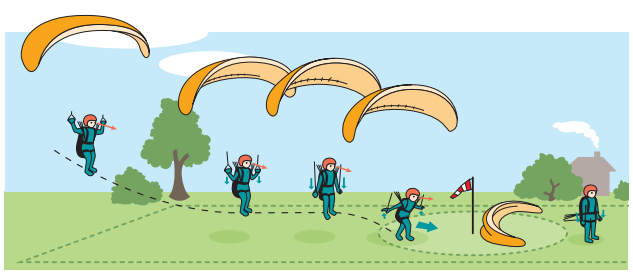
- 3 different approach-landing
- Target > get into final door at good height and good place

Arrive in landing area high enough and upwind to
- Anticipate
- Take information (landing size, obstacles, wind direction and velocity, other pilots)
- Imagine and build your approach

Final must be long enough to
- Stand up if not done before (recommended before)
- Take speed (wind gradient, final braking)
- Adjust trajectory using weight shift
- Adjust final braking (flare, timing)

Some basics
- When start approach:
  - Never fly over landing (keep 45° angle)
  - Never put landing in your back
- Place of the base part:
  - Windy conditions: make the base leg closer to the target
  - Light wind: base further
- No obstacle between you and landing
- Final must be into the wind
- See your fixed point

In case of radio failure
- Don't worry about accuracy
- Choose widest place free of obstacles
- Land into the wind



Unit n°4:
APPI Open Sky Tandem Pilot - APPI tandem pilot

Introduction
Organize tandem flights with maximum safety
Five preliminary important points

1. LEGAL ASPECTS OF TANDEM PRACTICE

A. Three levels of responsibility
Moral, civil, criminal

B. Obligations tandem pilot
Obligation of results
Obligation of means
Comply with national rules
APPI rules

C. Insurance
Third party liability insurance
Personal insurance of passengers
Personal insurance of pilot

2. TANDEM ACTIVITY
Tandem flying requires a professional attitude that is required at every stage of this activity

A. Choose and maintain the tools
- ✓ Flight equipment
  - Paragliding: certification, new designs ...
  - Harness: geometry, ageing, protection and agility
  - Spreaders, trimmers, karabiners, helmets
  - Reserve parachute: types, mounting, certification, ageing, limitations
  - Passenger equipment
- ✓ The flying site

B. The relationship with the passenger-client
- ✓ Reservations, information, attitude

C. Perform the flight

- ✓ Contact with the customer on the flying site
  - Attitude, psychology
- ✓ Access to the flight area, preparation, take-off
  - Security & installation
  - Briefings & checks
  - Last four steps before take-off (inc seven vital points check)
  - Take-off techniques
  - Assistance at take-off
- ✓ Flight
  - Passenger care
  - Attitude
  - Piloting techniques
    - Inertia
    - Descent techniques
    - Pictures and videos
    - Pedagogical Tandem
  - Landing briefing
  - Approach
  - Final
- ✓ End of the tandem flight, conclusion
- ✓ Most frequent problems

3. FLIGHT MECHANICS SPECIFIC TO TANDEM FLIGHT

- ✓ Wing loading
- ✓ Load factor, tandem structure compared to solo and conclusion
- ✓ Trimmers use at take-off, in flight, landing
- ✓ Inertia

4. APPI RULES

- ✓ APPI non comercial tandem pilot
  - Prerequisites, privileges and limitations
- ✓ APPI professional tandem pilot
  - Prerequisites, privileges and limitations
- ✓ Tandem flying rules
  - Specific APPI tandem certifications

5. CONCLUSION

EXAMPLE of Tandem Routine
7 steps
case : pilot's harness not connected to glider (no André Rose system)

Pilot	Interaction with client
weather, decision	
Step 1 Assess passenger stress level & physical aptitude	Hello I am your pro tandem pilot first time? Sport? Why? Expectation? jokes, touch, drink, reassure.. Patagonian tiger trick
Step 2	Present activity We enter take off zone, traffic, for safety stay close – present flight program – take a walk on take off (check exit axis)
Step 3 Gear up passenger (4 important points: 1 : the 2 legs, 2 : ventral, 3 : chest, 4 : helmet)) click-pull additional (shoes, smartphone…)	Briefing adapted to conditions, terrain, technique you may use, what to do and not to do « less is more »! word choice is important
Step 4 glider position, check quick-links, lines, trimmers gear up pilot ((5 points inc reserve check) click-pull	Let passenger focus
Step 5 Assistant briefing ıf applies hook pilot/ passenger on spreaders hook glider on spreaders, **Ready to go**	Give a « go » to measure energy, make feel & see « we are hooked together », Passenger arms position.
Step 6 <u>! once fully Ready to go!</u>, last **4 steps just** before take off : 1) **last check 7 vital points** 2) assess weather, wind direction & cycles (last words), Visualize stop line, stop procedure. 3) **look at glider**, lines away from body, moving obstacles (around, in front) 4) moment choice, **traffic check**, GO	1 passenger leg-straps, 2 passenger carabiners, 3 main carabiners, 4 pilot carabiners, 5 pilot leg-straps, 6 trims symmetrical, 7 commands free. **Last words**: **give direction** (far target), don't stop unless I tell you « Stop » , don't sit until I tell you **ask feedback** “Remind me what we will do”
Step 7 regulate passenger energy, **glider visual control**, decide, accelerate, trajectory control	**GO !** Communication with passenger
If take off fails, **<u>go to step 6</u>**	
Take off successfull: Trajectory control H&V, traffic, inboard check, clear terrain… Then install passenger into harness	« Knees to your chest »

Guidelines to develop your routine :
a-insure passenger safety (traffic on take off, top landing, traffic on LZ)
b-limit time when crew is partially or totally hooked to glider and not ready to take off
c-do the things at the right moment, briefing short but complete, use the right words, less is more.

Briefing Example light wind, alpine take off
there are 3 important things to know for take-off: 1 you need to run, 2 you need to run, 3 you need to...run

this looks like a joke but we will have 3 stages in our take off

-1: when I tell you go, you… (walk fast, run smoothly, run fast... depending on gear, conditions, passenger) and you will feel like a brake, this is glider's inflation
-2: keep going ahead with strength, then you may feel you are being lifted, we are not flying yet, stay standing up and keep on going even if your feet do not touch the ground for a moment
-3: Finally it gets easy to go forward and the wing is lifting you: accelerate, run fast, look far, huge steps

-never sit, until I say you can sit, even if your feet don't touch the ground,
-never stop unless I tell you « stop ».

so can you repeat what we will do ?

also
At what moment will you do the landing briefing?
-in flight as soon as you are sure to have enough flying time
-early enough and prepare your landing briefing to have it clear and concise

technique
-Forward launch technique is preferable until reverse launch technique is obviously safer
-Reverse launch: the pilot should have the controls in the correct hands before to inflate (crossed controls)
-U-shape approach is preferable

Operation guidelines

-Passenger never takes a risk consciously

-Passenger comes to have fun, just remember your first flight, your feet leaving the ground, lots of emotion. There is no need for crazy maneuvers to impress.

-Each time there is an accident, the passenger pays the price big time

-Each bad takeoff or bad landing, each passenger that vomits is a bad advertisement for your activity

-Are my passengers happy? Would they do it again?

Tandem flight evaluation grid

pilot/passenger
gear

on take off				
Assess weather? Decision				
Passenger care, presentation of flight, if necessary actions to lower passenger stress				
Glider attention : place choice, glider lay out-orientation, efficiency, choice of most adapted technique to untangle lines,				
Gear up passenger mini 4 points check Click-pull the buckles, if applies explain how to sit.				
Briefing adapted to terrain and conditions				
Gear up pilot mini 5 points check (reserve!) click-pull				
Position on spreaders, (make feel hooked together)				
If it applies, assistant care and briefing (normally no assistant for exam)	/		/	
Once ready for takeoff. 1)**Last check mini 7 vital points. (pull)**				
2)Check wind, visualize stopline and stop procedure **give far target, last words, feedback.**				
3)**Look glider & lines**, Assess Wind cycles, moment choice, 4) **traffic check**				
Choice of most appropriate take off technique				
Regulate passenger energy, **glider visual control**, **trajectory**, glider in balance, Communication during take off process				
Doesn't release brakes too early, trajectory control, get passenger into harness.				
Global efficiency : time between « contact with client glider in the bag » and « ready for take off » : less than **10 mn : pro**, less than **20mn: non commercial**, more than 20 mn : non commercial in progress		time ?		time ?
Eliminatory dangerous behavior? (crash on take off, dangerous trajectory on exit, close call or collision…)				

flight				
Confidence, natural				
Safety in flight (terrain and pilots distance, traffic rules)				
720° in less than 20 sec (pro), less than 25 sec (NCTP)		time ?		time ?
Figure 8 in less than 25 sec (pro), less than 30 sec (NCTP)		time ?		time ?
fast descent technique				
Pitch & roll control (optional)				

approach and landing				
Approach choice , altitude loss upwind of landing field				
Approach realization, use of glider speed range				
Briefing moment, **stand up moment**				
Final long and stable, with speed, facing the wind, **4 sec mini**				
Flare quality, final breaking efficiency				
Accuracy, land standing up, no fall (<15m from target : pro // <20m from target non commercial // >20m non commercial in progress)		distance ?		distance ?
Trim set up, explanations?				
Safety on landing zone, passenger care				
Eliminatory dangerous behavior? (crash landing, dangerous or uncontrolled maneuvers, close call or collision…)				

U1

- Cloth ageing: how to characterize it, what are the typical alerts, what is the life span of a paraglider, what are the main ageing agents, how do you care for your paraglider cloth.

- Lines aging: what are the two main line aging problems your glider may encounter, what materials are concerned in each of these cases. My glider lines are made of sheathed aramid, what should I do to control the aging, what are the criteria, what is the control frequency?

- My glider has 4 row (a, b, c, d), 5 bottom lines on each A riser, max total flying weight is 100kg. What is the max load per A bottom line in a stabilized straight line? What is the airworthiness criteria?
  Same question for a 2 liner with 3 A on each A riser

- Explain what is the trim of a glider, how can I change the trim in flight. Aging: what line material could cause the trim change, usually in what way does it move? What are the typical alerts of a wing out of trim? How do we proceed to control the trim, what are the criteria? What should I do prior to flying once the trim has been corrected?

- Reserve: 5 cases when you must throw your reserve directly. 3 family of situation you can encounter when it's time to throw, what throwing technique do you use in each case. How do you care for your reserve, what is the best technique to fold it?

- Should I fly my glider in the top, middle, or bottom of the weight range?
  My glider is B certified at the top of weight range and C certified at bottom of weight range, what could be the explanation? what is the connection with security in flight?
  My new tandem is 105-220kg certified, what should I pay attention to?
  My student has now 50 hours, he wants to buy a B glider (AR 6) "to progress", what should I explain him?

- How to set up a harness for a student? What are the benefits and disadvantages of pod harnesses?

U2

- How does a paraglider fly? Explain aerodynamic force, lift, different drags, pressure center, global equilibrium of paraglider + pilot. Explain angle of attack and its limits

- What characterizes a stable and an unstable profile? Draw and explain. In turbulent conditions, as safety position I pull the brakes "contact +20% of brake travel". Advantages, disadvantages, conclusion. What simple guideline can I give to explain what is "active piloting"

- Pitch: what is aerodynamic and pendulum movement, draw the 3 sequences of pitch, the two borders, explain how to stop a pitch movement. Explain how to create and increase a pitch movement

- Dow does the paraglider turn. Drawing and explanation.

- Fine piloting: explain the 3 parameter that characterize wing movement, the 4 parameter that characterize command action. When the goal is to damp the movements of the glider, how should be the command be released? What is spiral neutrality, what to do?

- What are the 3 families of piloting mistakes? What are the possible reasons, consequences, and remedies?

- Negative wind gradient on landing, using vectors explain what are the 2 situations that can happen, what to do to prevent? How to react in both situations

U3

- Explain the mechanism that creates wind on the globe scale. Explain breeze at the local scale
- Explain the birth of a thermal bubble and what happens when it rises in the atmosphere 1,2,3,4,5,6,7
- Analyzing a given skew-t, tell me about the situation, ceiling, cloudbase, development. What strategy would you adopt In flight, What can you say about that model?
- Explain the phenomenon of katabatik cascade, the Foehn phenomenon, the prisoner effect. Cases where they are dangerous?
- Explain what is the risk. What is the risk homeostatis? What actions can I take to lower the risk in my own practice? If I want to give a student or fellow 3 advices for safety what would they be? At the level of my flying community (club) what actions can I developp to improve safety.
- Stress: 3 stages, 4 strategy (coping), 3 times to deal with the stress
- Accident: main cause? Typical risky situations? Your Individual risk management strategy? . In flight I witness an accident, what should I do? I am about to land in the trees // in the water what should I do?
- Airspaces rules, visual flight rules?
- Using polar curve of the glider, explain the best air glide, best sinkrate. Explain best ground glide with face wind, with sink. How to figure out the best ground glide speed in flight?
- Transition strategy in XC, what defines the limits of the speed range I should use. What is the conclusion
- How can I evaluate my drift in flight? Using vectors explain what to do if I want to cross a valley with a good breeze, and arrive as high as possible on the other side no matter where I arrive?

U4

- tandem operating: Responsibilities, insurances, obligations
- Main points of your tandem procedure
- mime Gear up passenger and pilot, give briefing (no wind, or strong wind), the 4 last steps before take off
- Influence of load on speed range. trim use at take off, in flight, at landing
- APPI rules tandem. My pilot harness has no seatboard, what is the point I should particularly check

U 5 & 6

- Development, organizing and conducting courses, Pedagogy
- Takeoff guiding, landing guiding and instructor position
- Where does the instructor looks depending on the situation
- APPI system questionnary