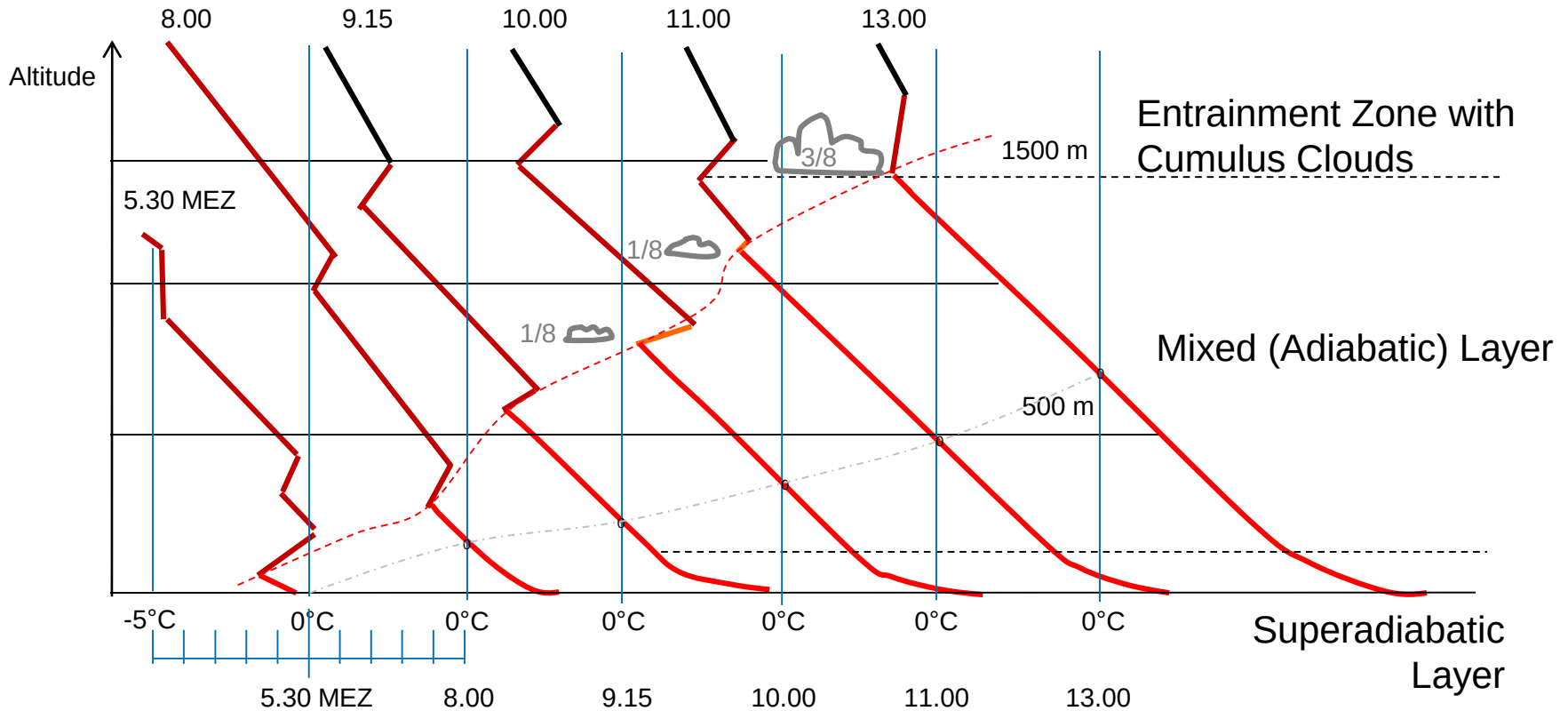


Svaeeflyvekonference 2015

Ejby



The Boundary Layer during the Day



Änderung des Temperaturverlaufs in den untersten 2000m der Atmosphäre am 26.04.74 in Meppen von 5.30 bis 13.00 Uhr. (Daten aus Beyer, Roth, 1977 – gefunden bei Müller, Kottmeier, 1984).

Content –

1. Thermals, that's warm air - or not?
2. Humid air has less weight
3. Practical consequences for everyday flying
4. Differences in climb rates on the same day
5. Taking off early or late, with weak or strong lift to be expected
6. The influence of the air mass
7. Consequences for flying competitively





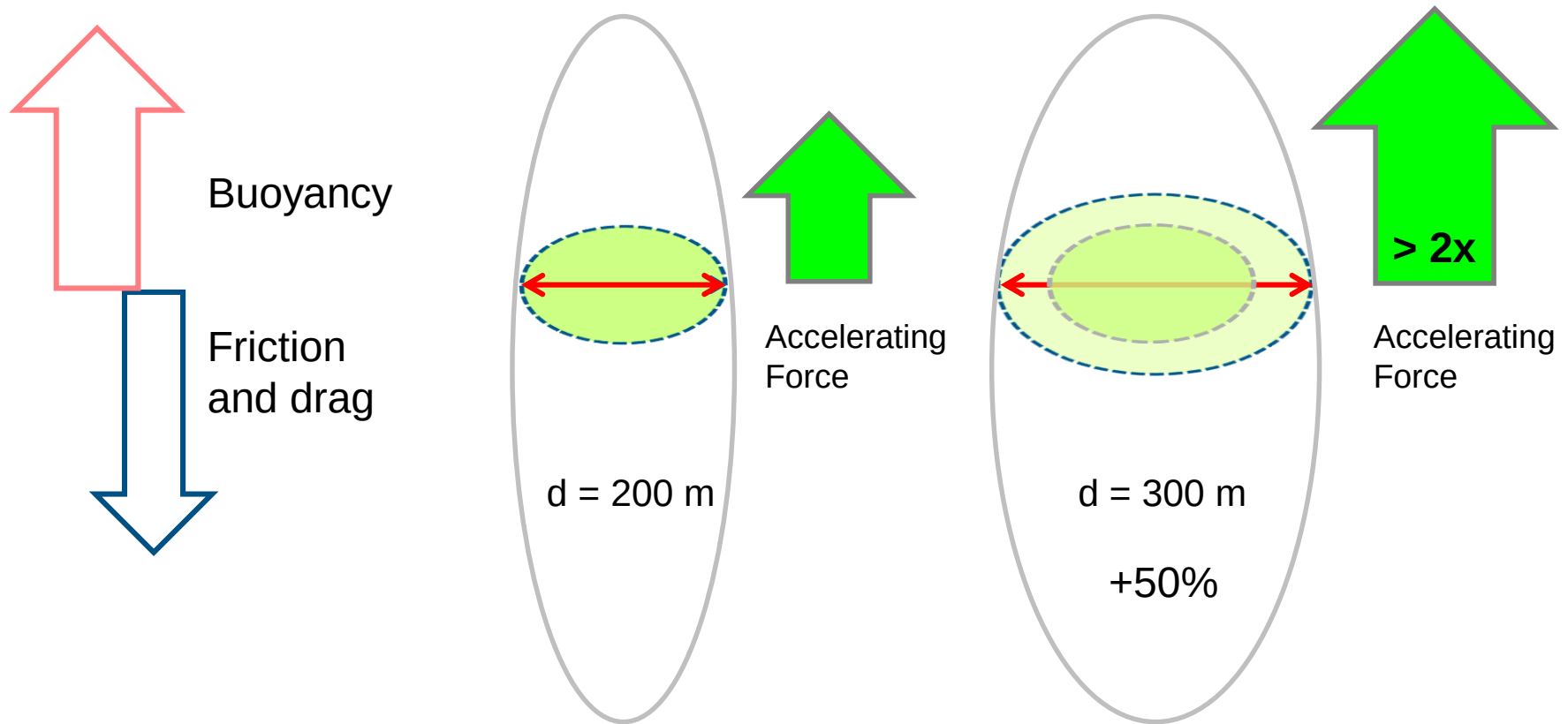


← Big bubbles
climb faster

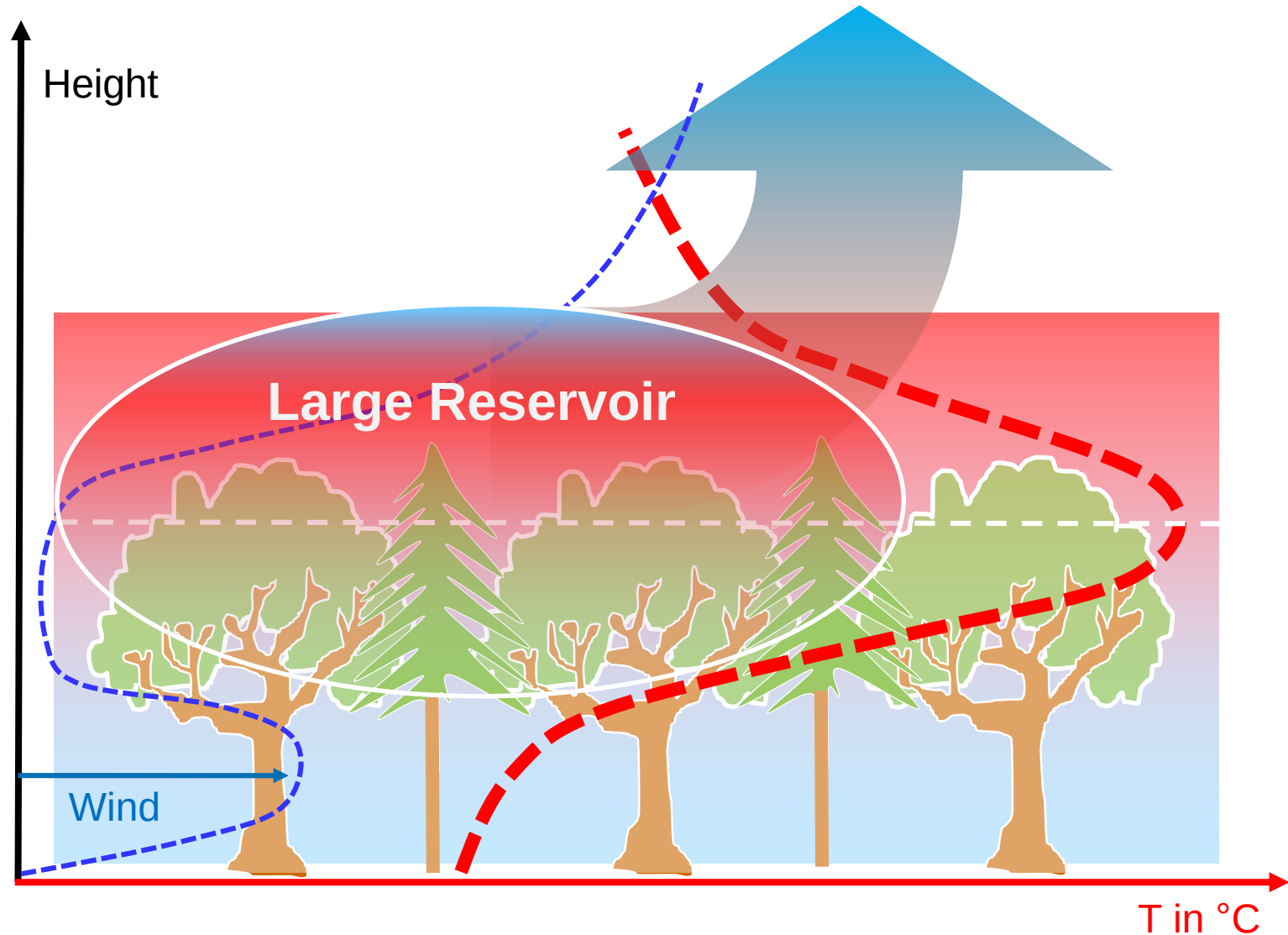
↑
Bubbles
increase in size
while climbing

← Small bubbles
climb slowly

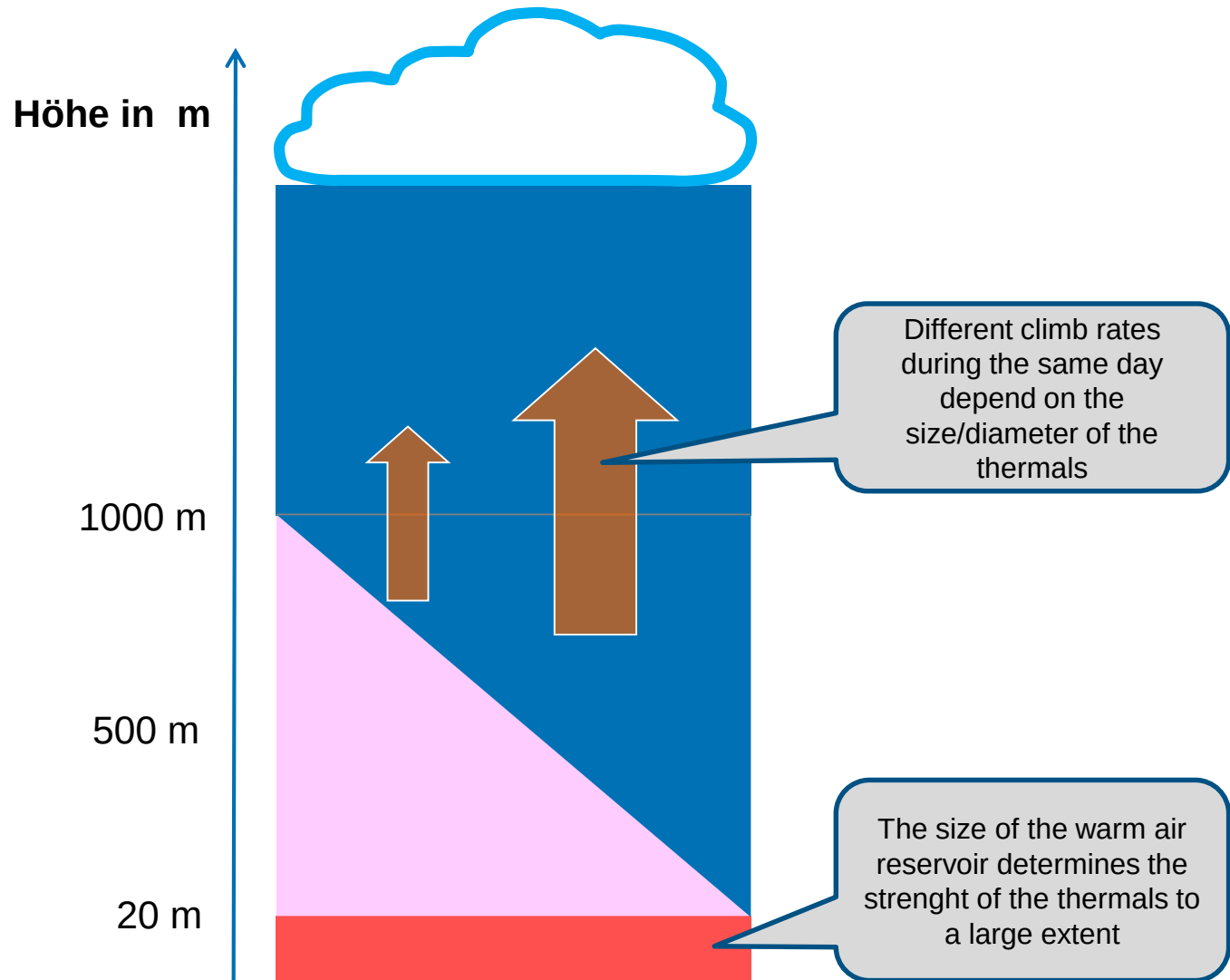
Different Lift on the same day depends on the size of the thermals



Forests release warm, humid air ...



Strenght of Thermals

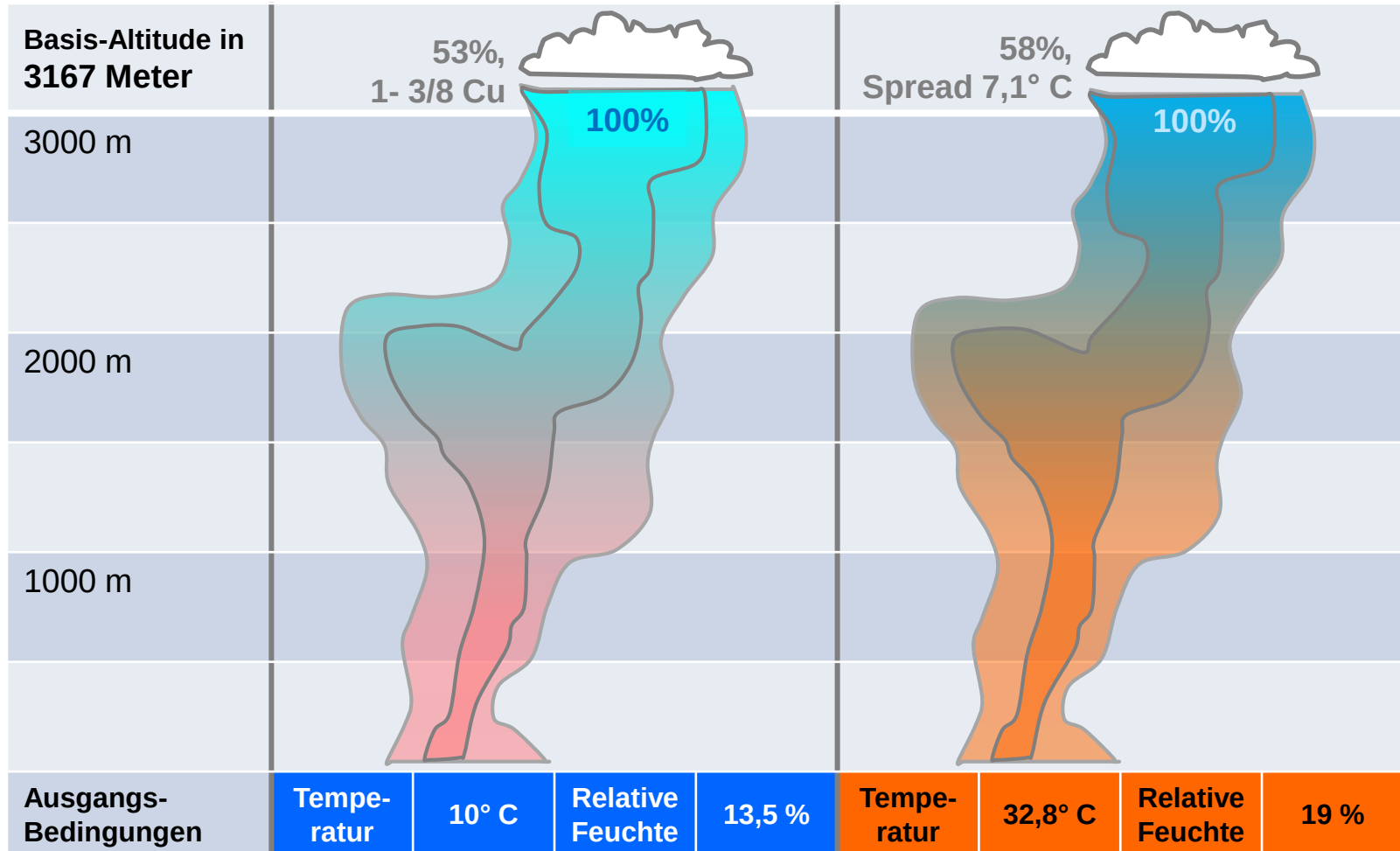


Early or late ... ?

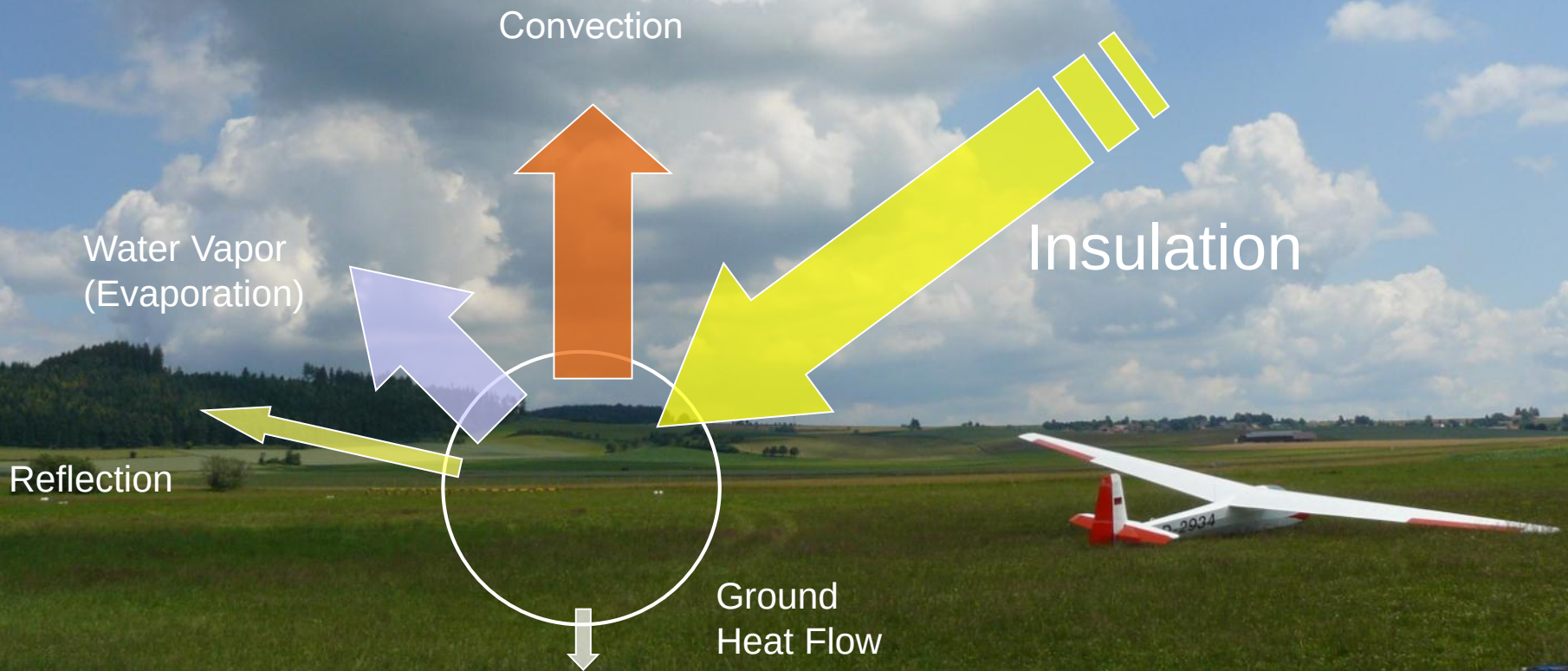
Strong or weak ... ?



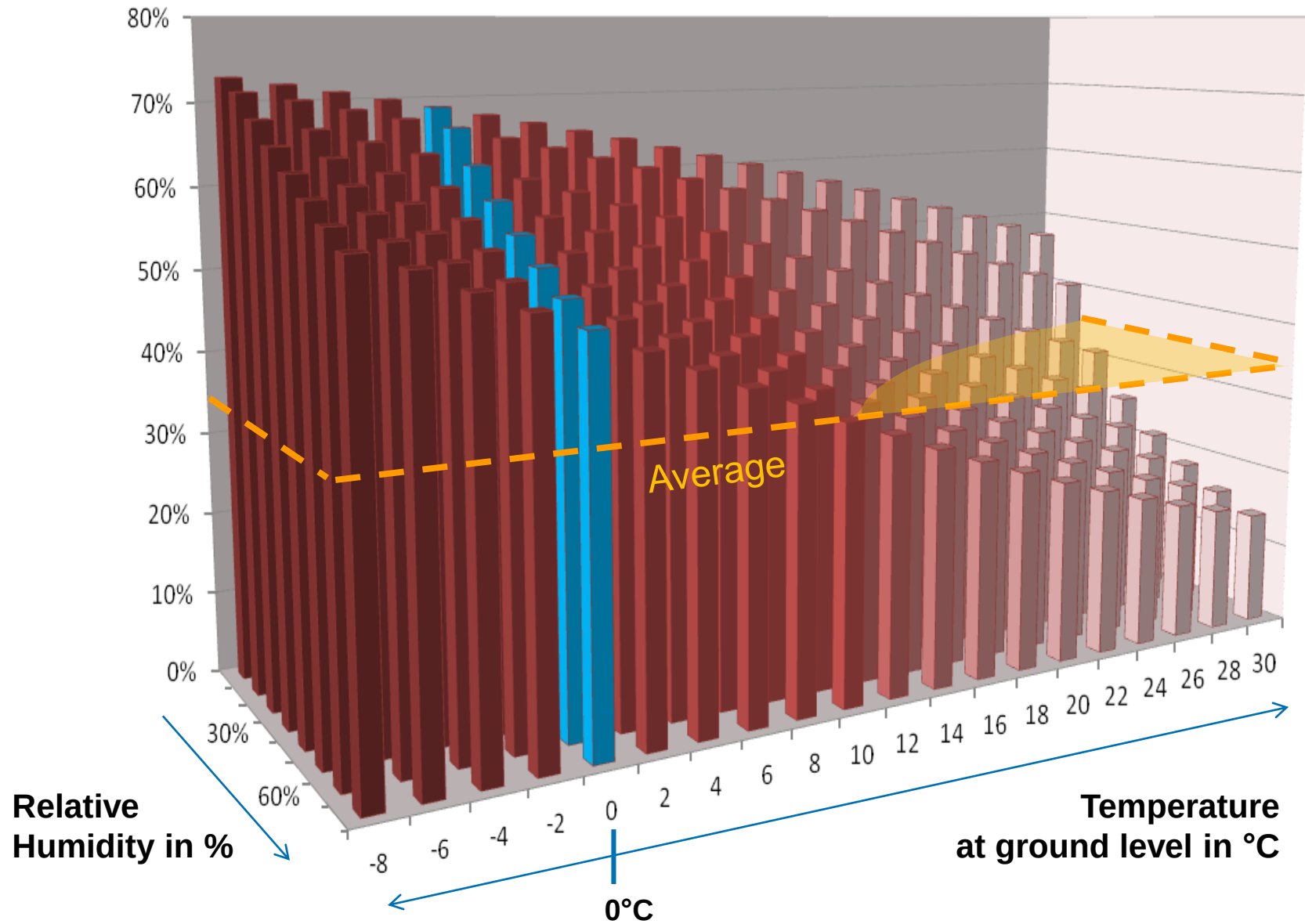
Thermals in different air masses



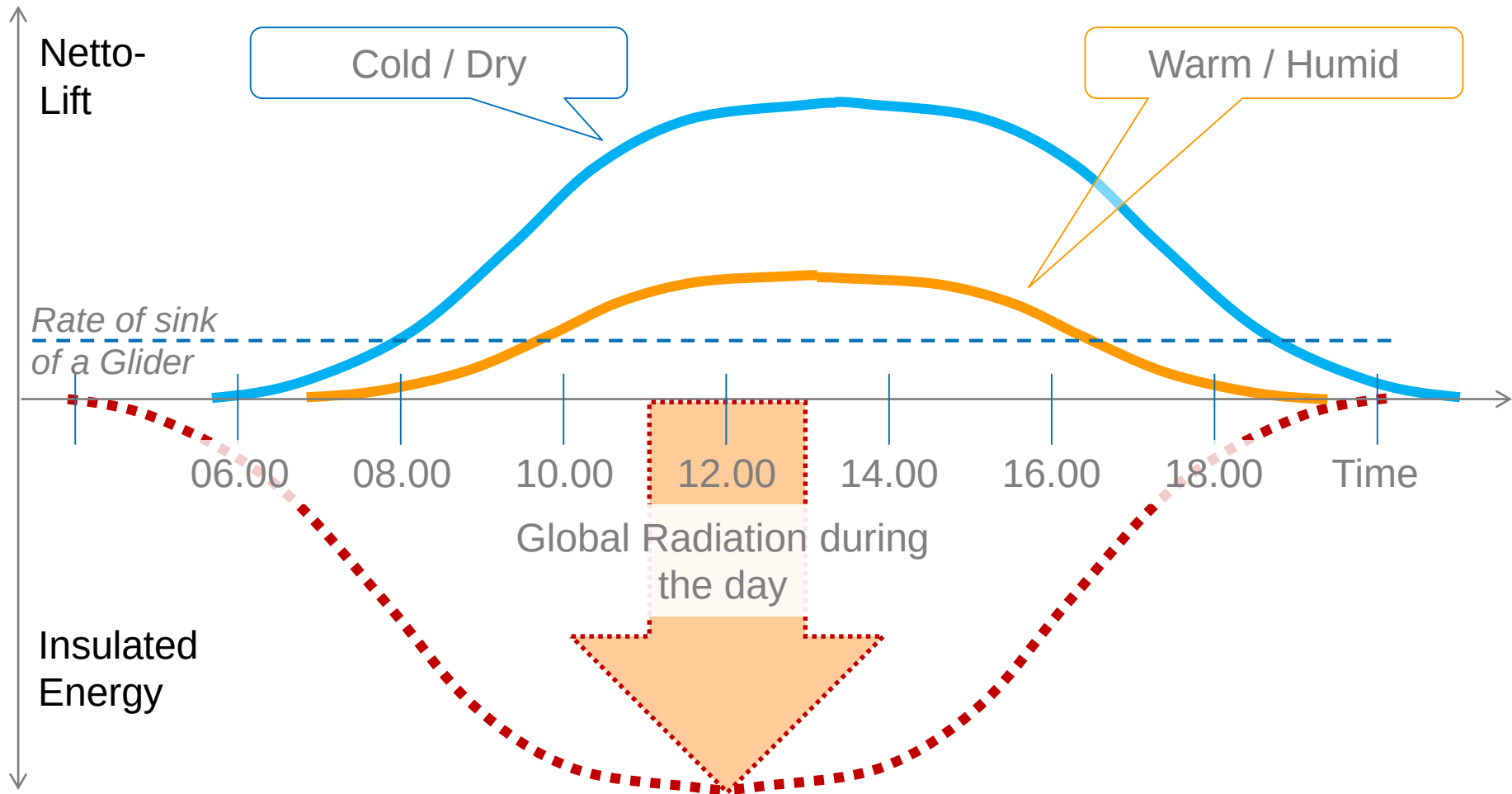
The Radiation Balance



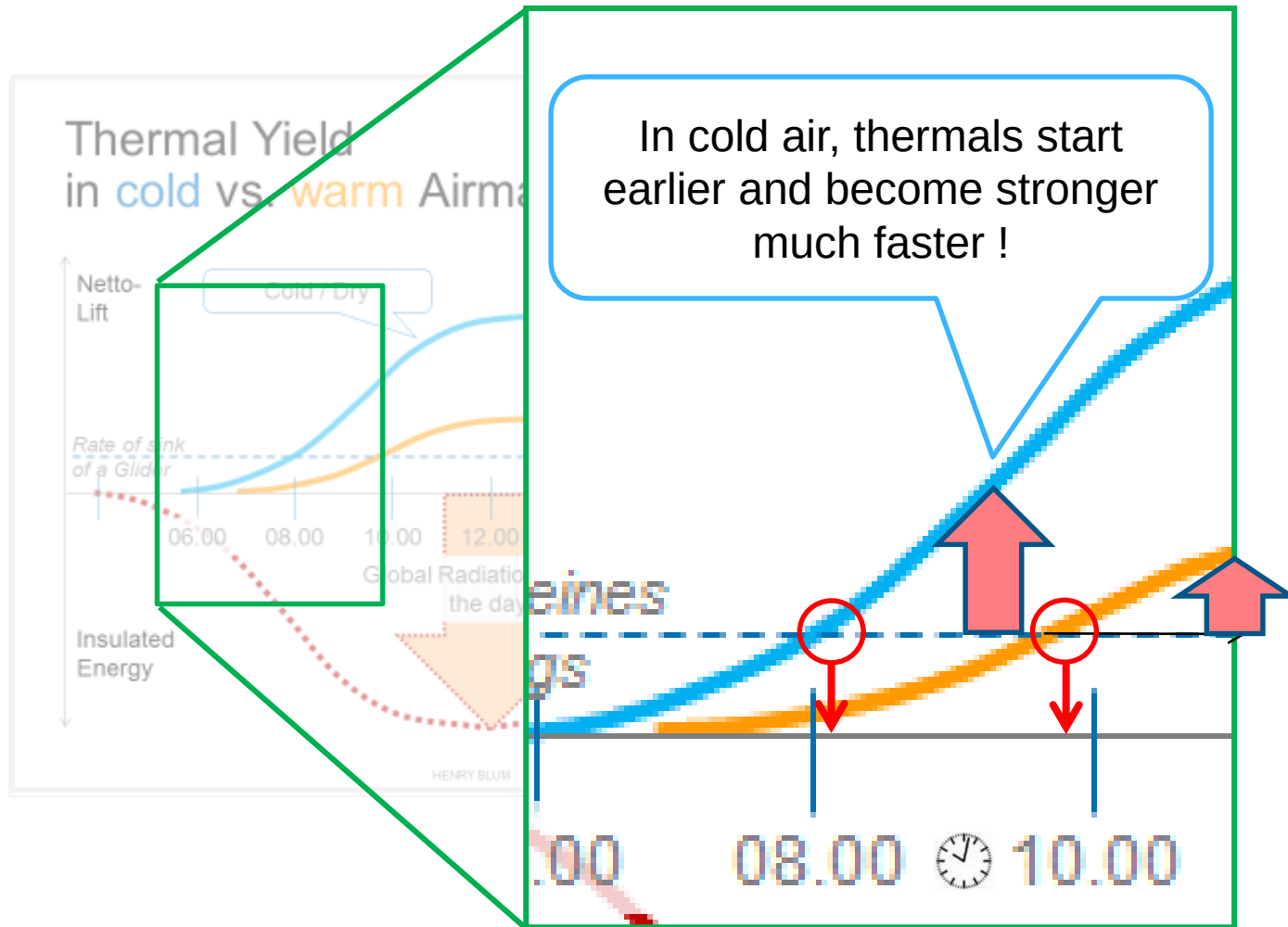
Thermal Yield close to the ground in percent of the insulated energy



Thermal Yield in cold vs. warm Airmass



Thermal Development in the Morning

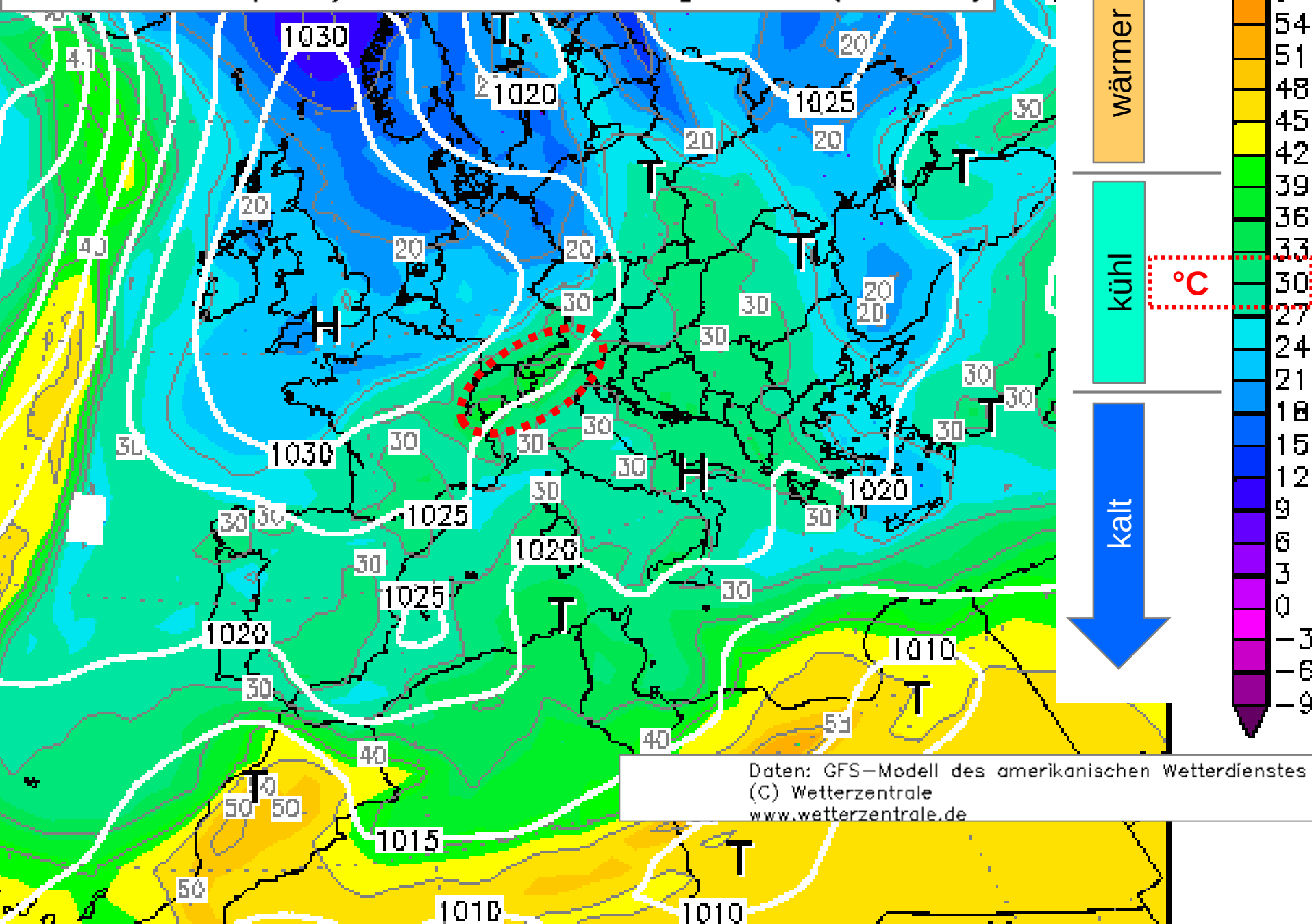




Init : Fri,09APR2010 12Z

Valid: Fri,09APR2010 12Z

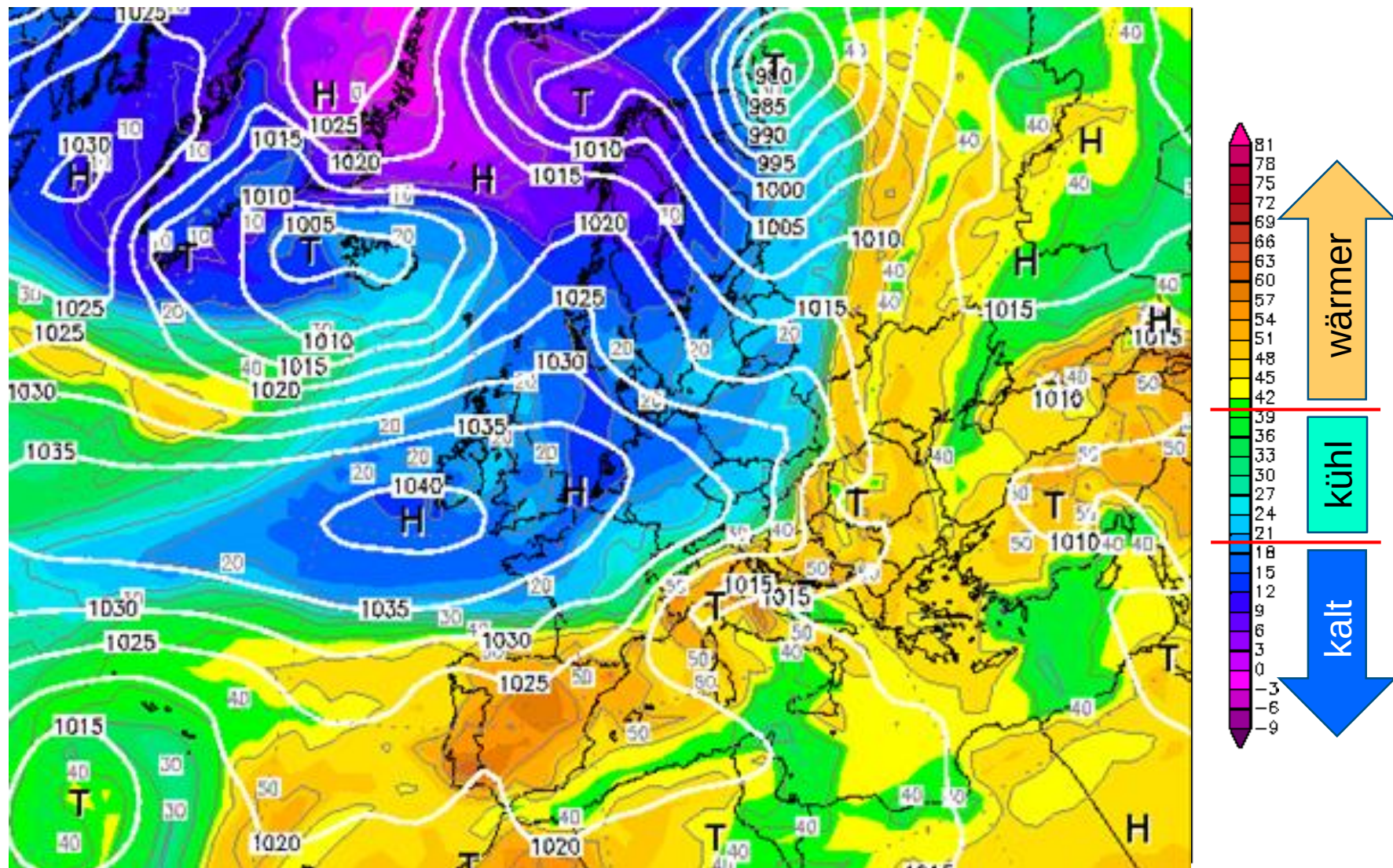
Bodendruck (hPa) und 850 hPa Aeq.Pot.T. (Grad C)



Init : Fri,11MAY2012 06Z

Valid: Sat,12MAY2012 18Z

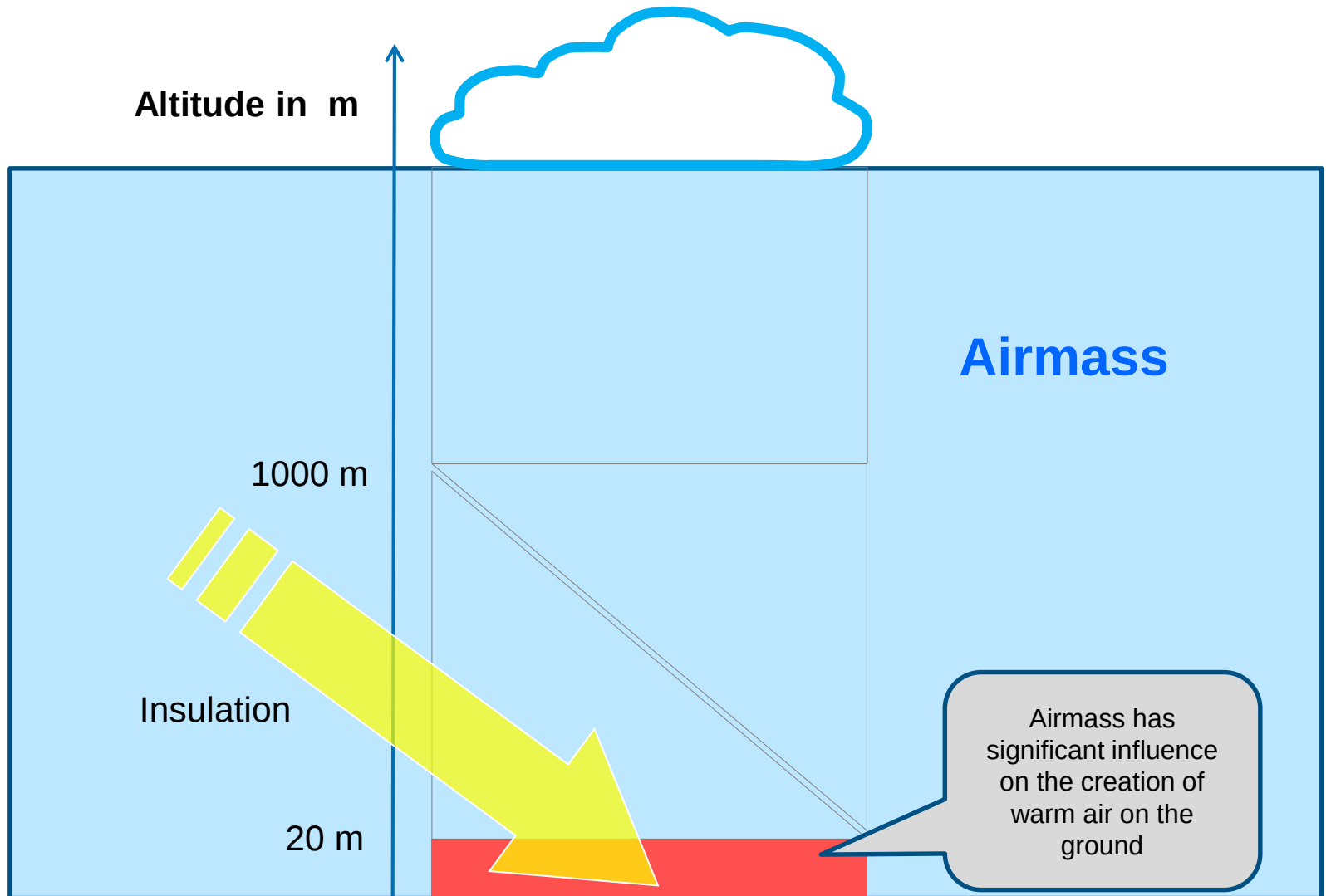
Bodendruck (hPa) und 850 hPa Aeq.Pot.T. (Grad C)



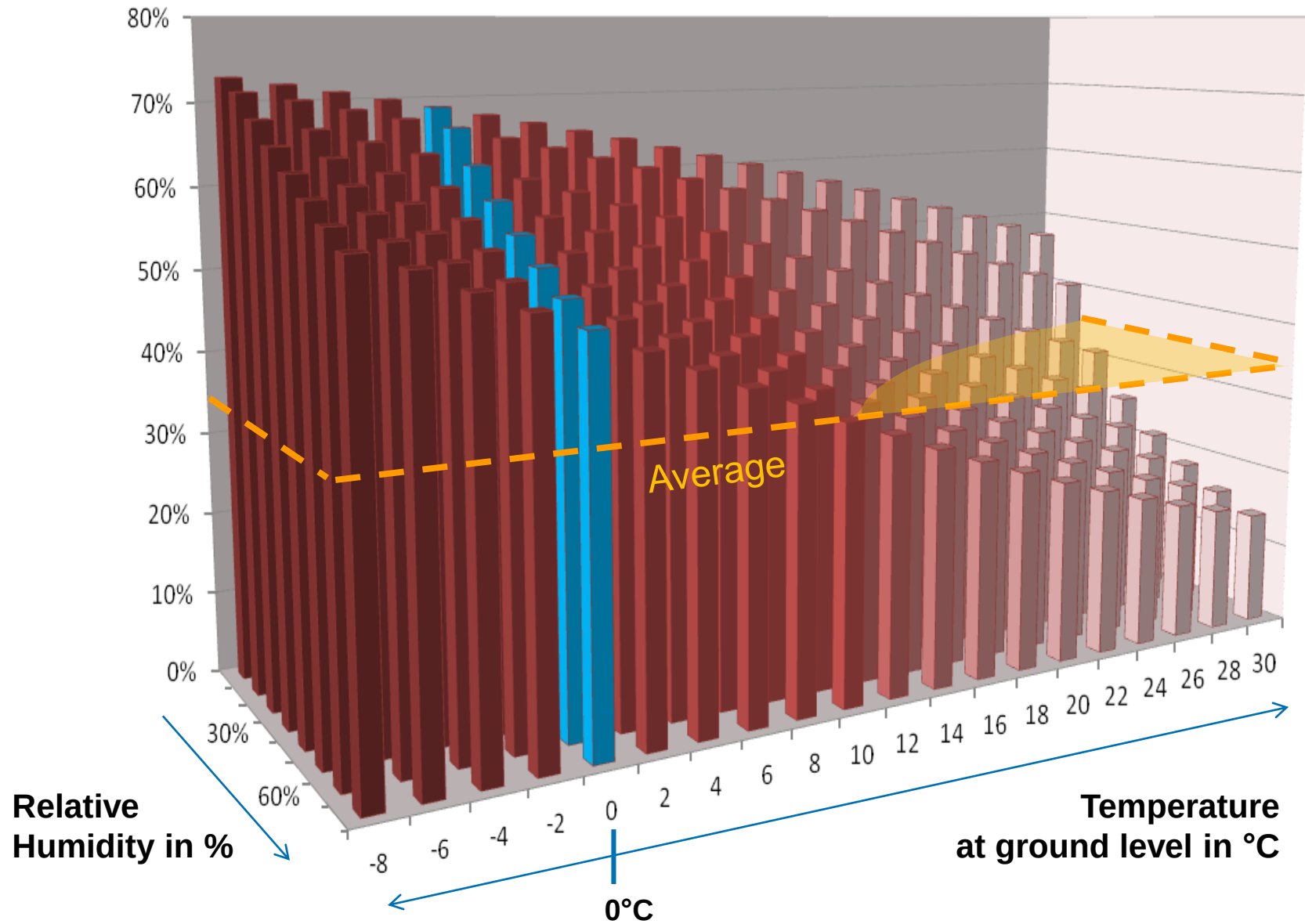
Daten: GFS-Modell des amerikanischen Wetterdienstes
(C) Wetterzentrale
www.wetterzentrale.de



The influence of Airmasses on Thermals



Thermal Yield close to the ground in percent of the insulated energy



Average Lift* in different airmasses and with varying insulation

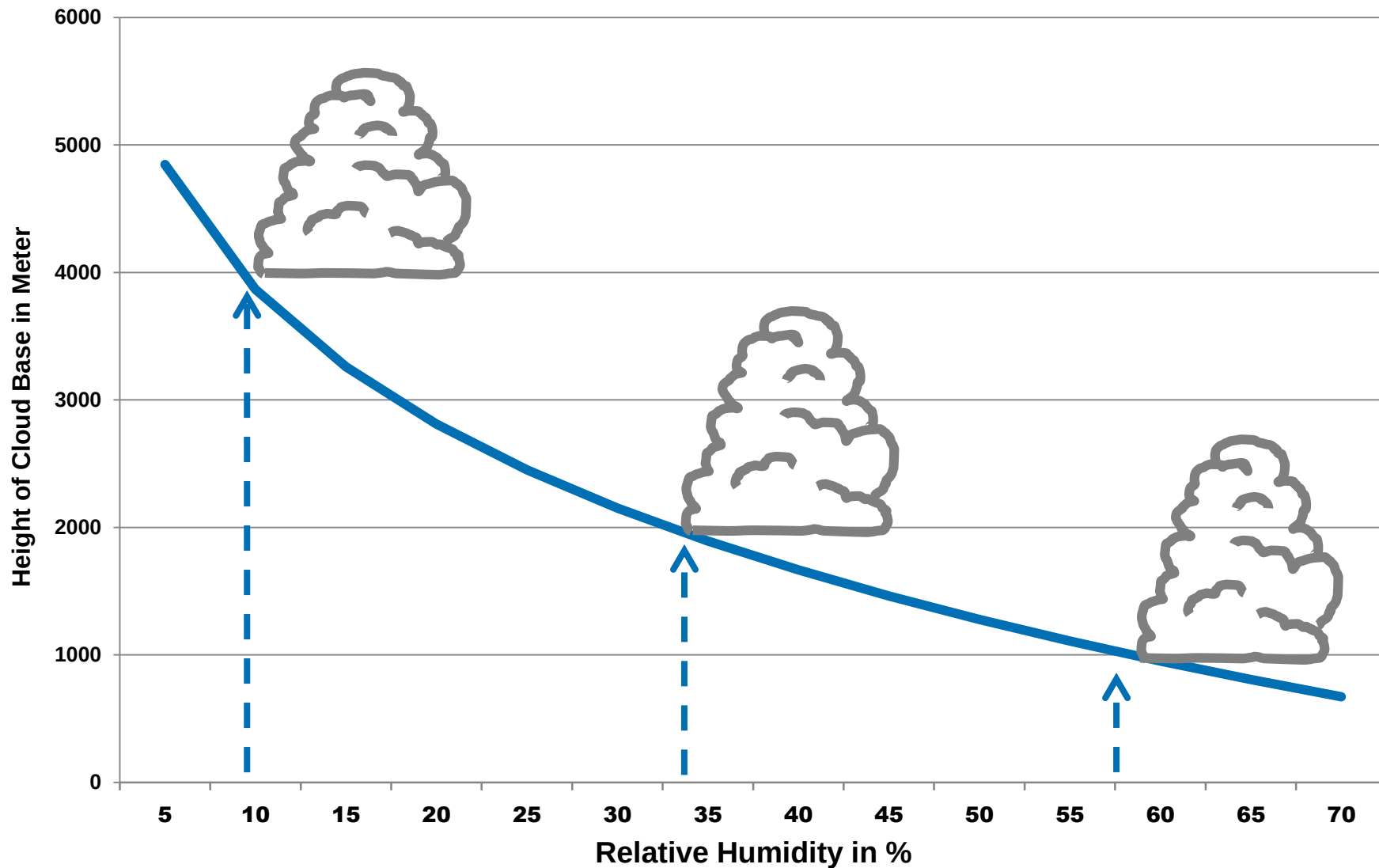
<i>Type of inhibition</i>	<i>Average Reflexion in %</i>	Cold Airmass	Cool Airmass	Warm Airmass
None	0%	2,0	1,5	1,0
<i>Cirrus</i>	12,5%	1,7	1,2	0,8
<i>Cirrostratus</i>	22,5%	1,3	1,0	0,6
<i>Altostratus</i>	45%	0,7	0,4	0,2
<i>Altostratus</i>	50%	0,5	0,3	0,1
<i>Stratocumulus</i>	60%	0,3	0,1	0

*All lift rates are averages in m/sec pro 1000 Meter ceiling. –
They can increase with altitude ...



Height of the Cloud Base

depends on relative humidity of air close to the ground





FEUER-
WARUNG

TEST-
KNOPF



SOLLF
AUTO
VARIO

D-KAIX 4Y



UIC
WARN

TE
STAT
PITOT
PWR OFF
PITOT
PWR ON



AVIONIC
BATT 1
BATT 2
LAPD





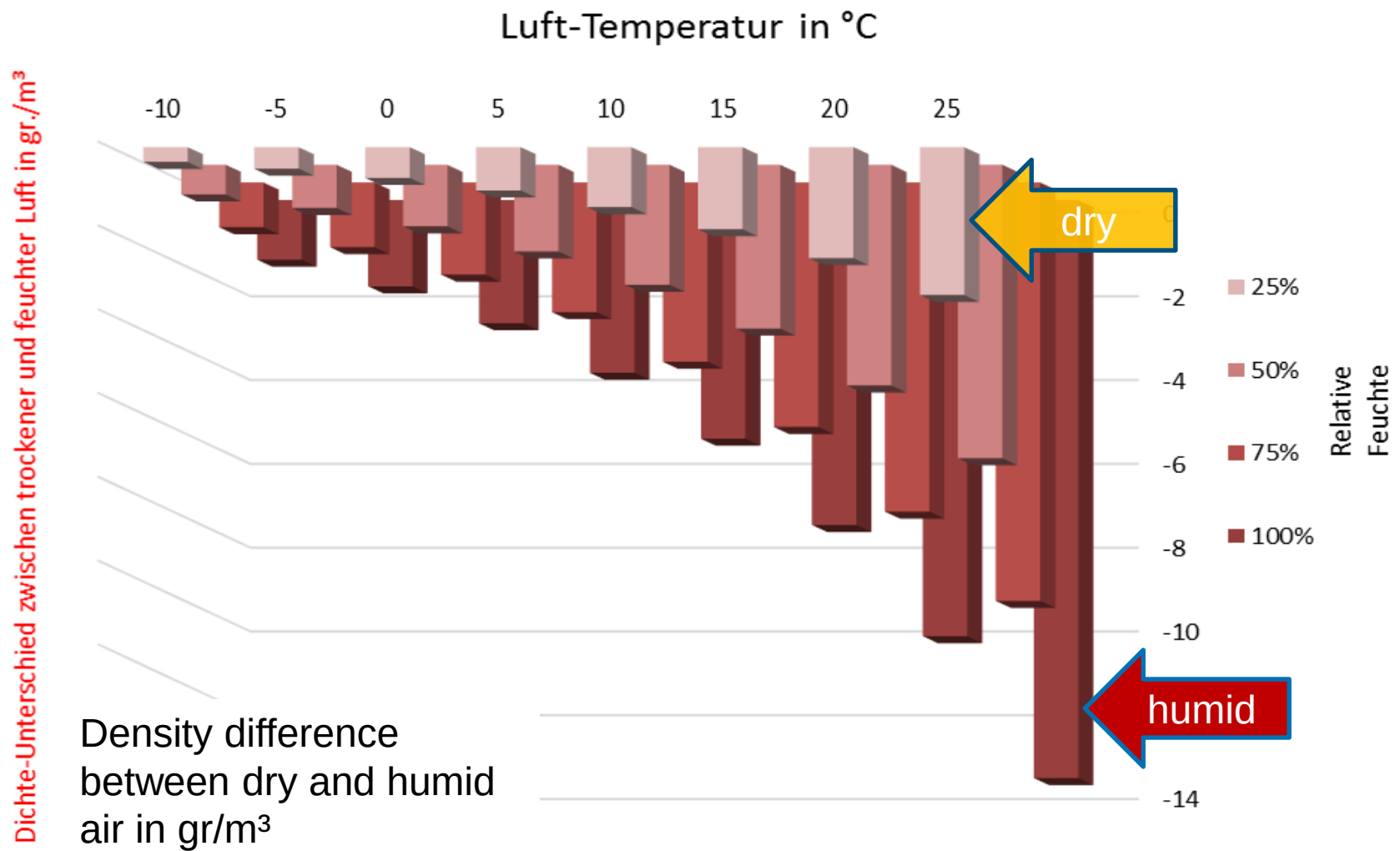


26 15:57

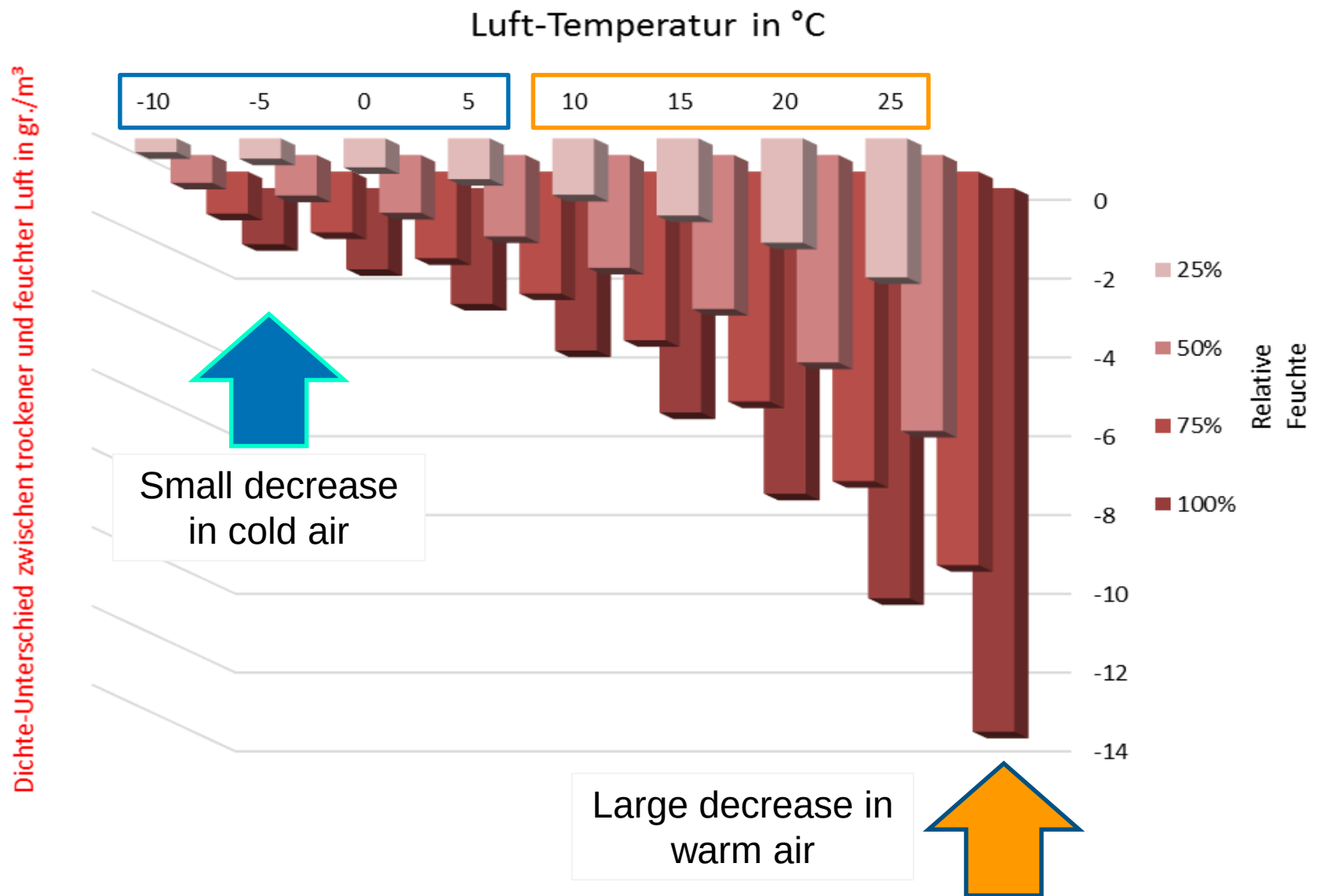
Remember ?



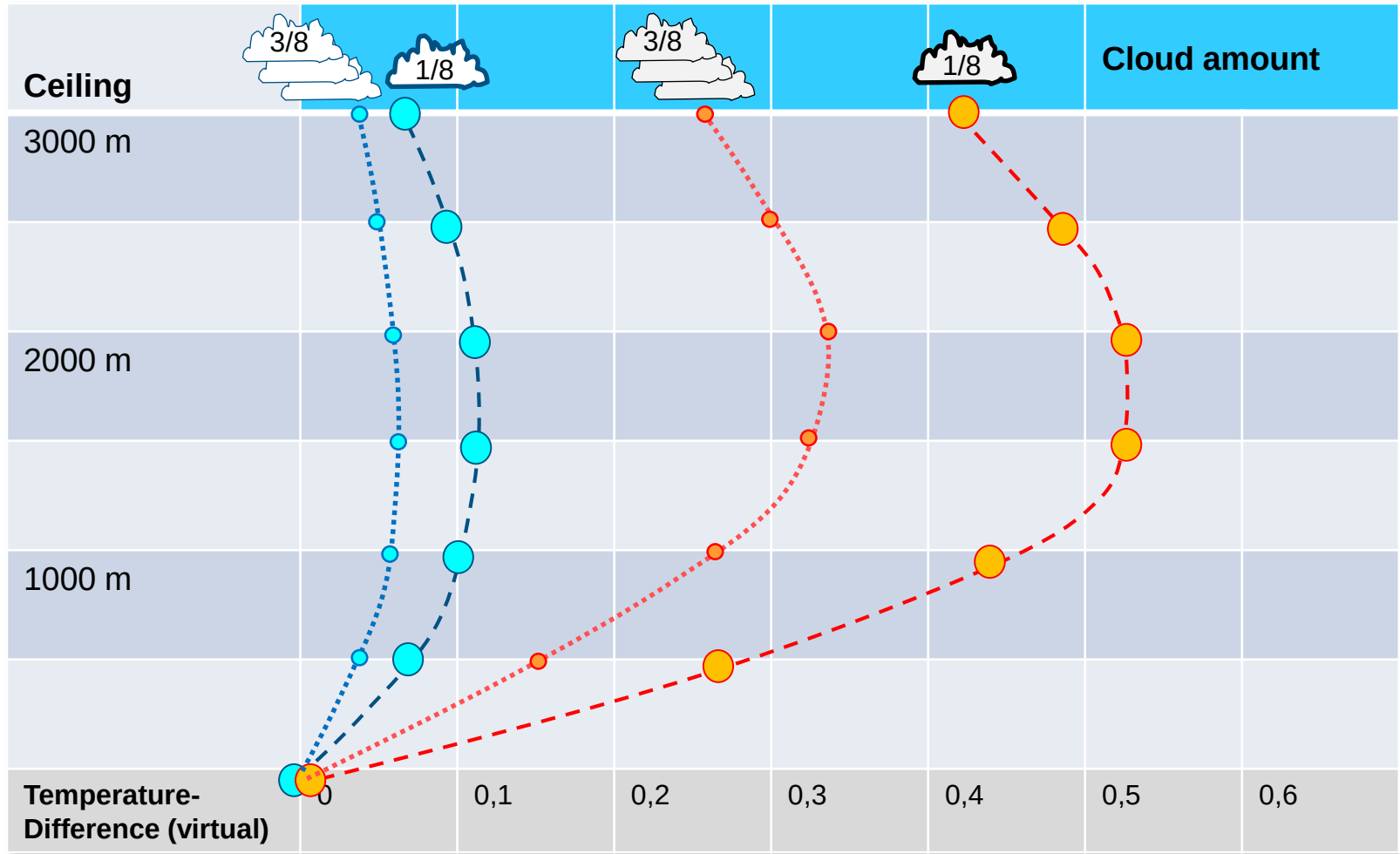
Humid air has less weight than dry air... !



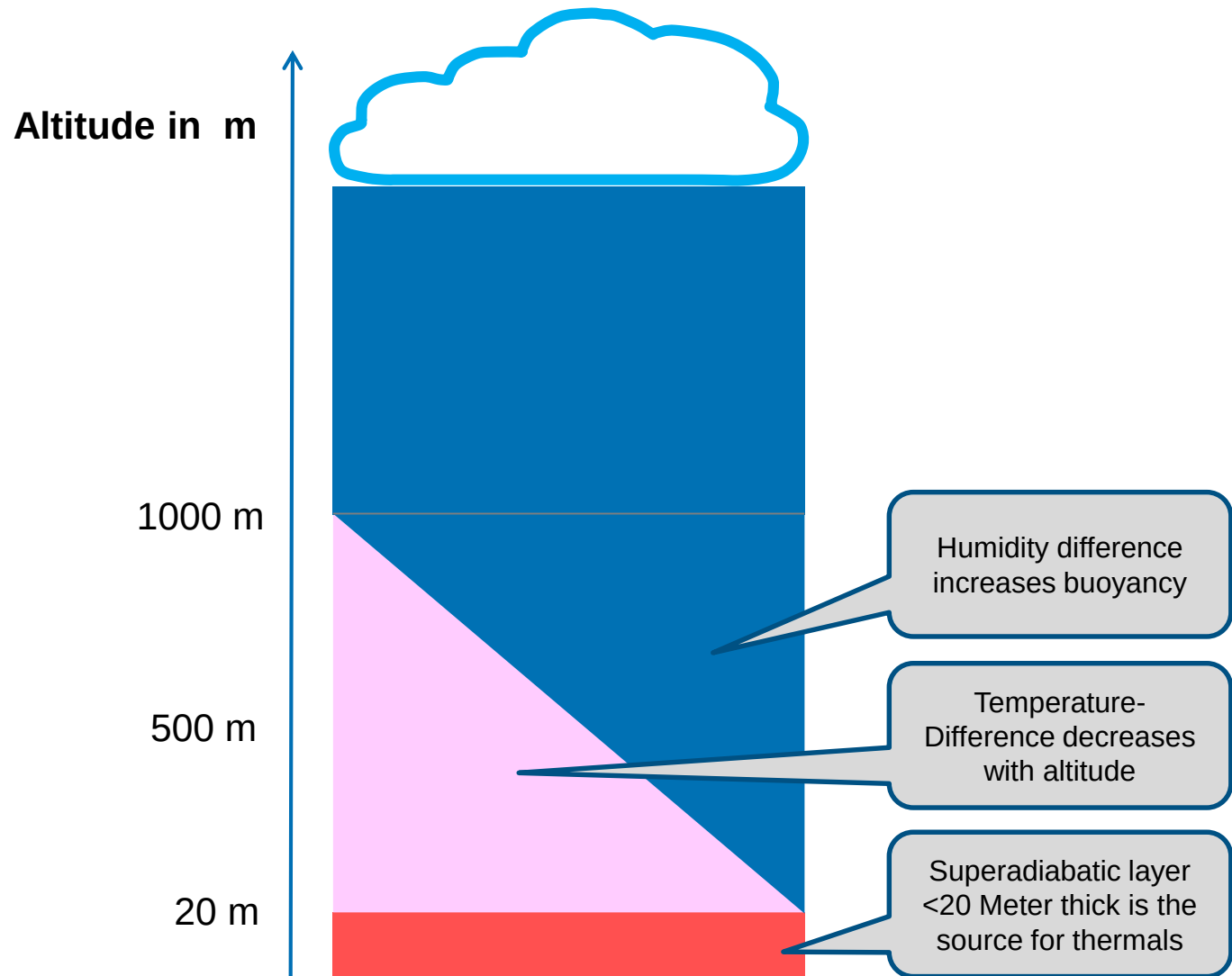
Humid air has less weight than dry air... !



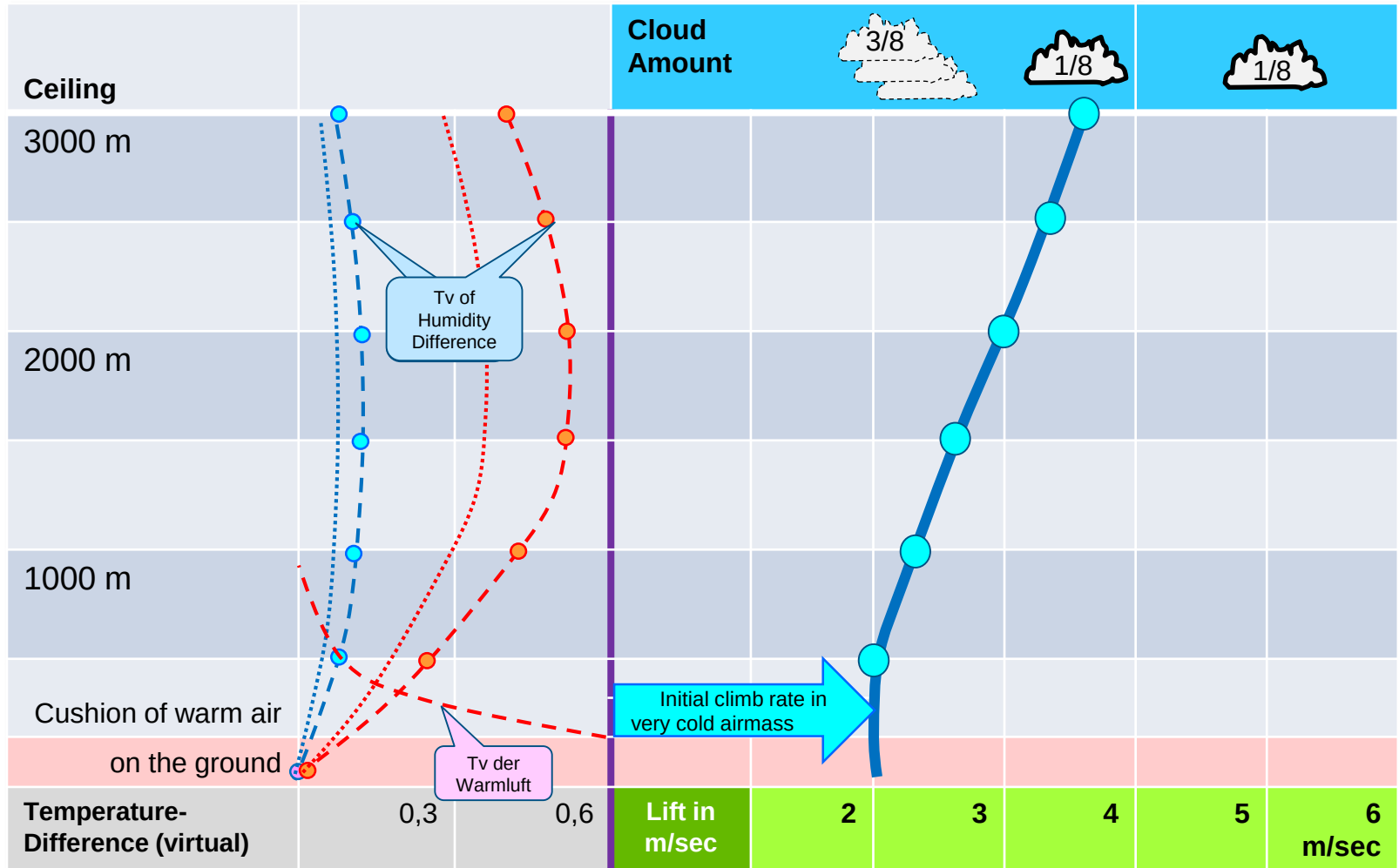
Humidity based buoyancy of thermals in cold and warm airmasses



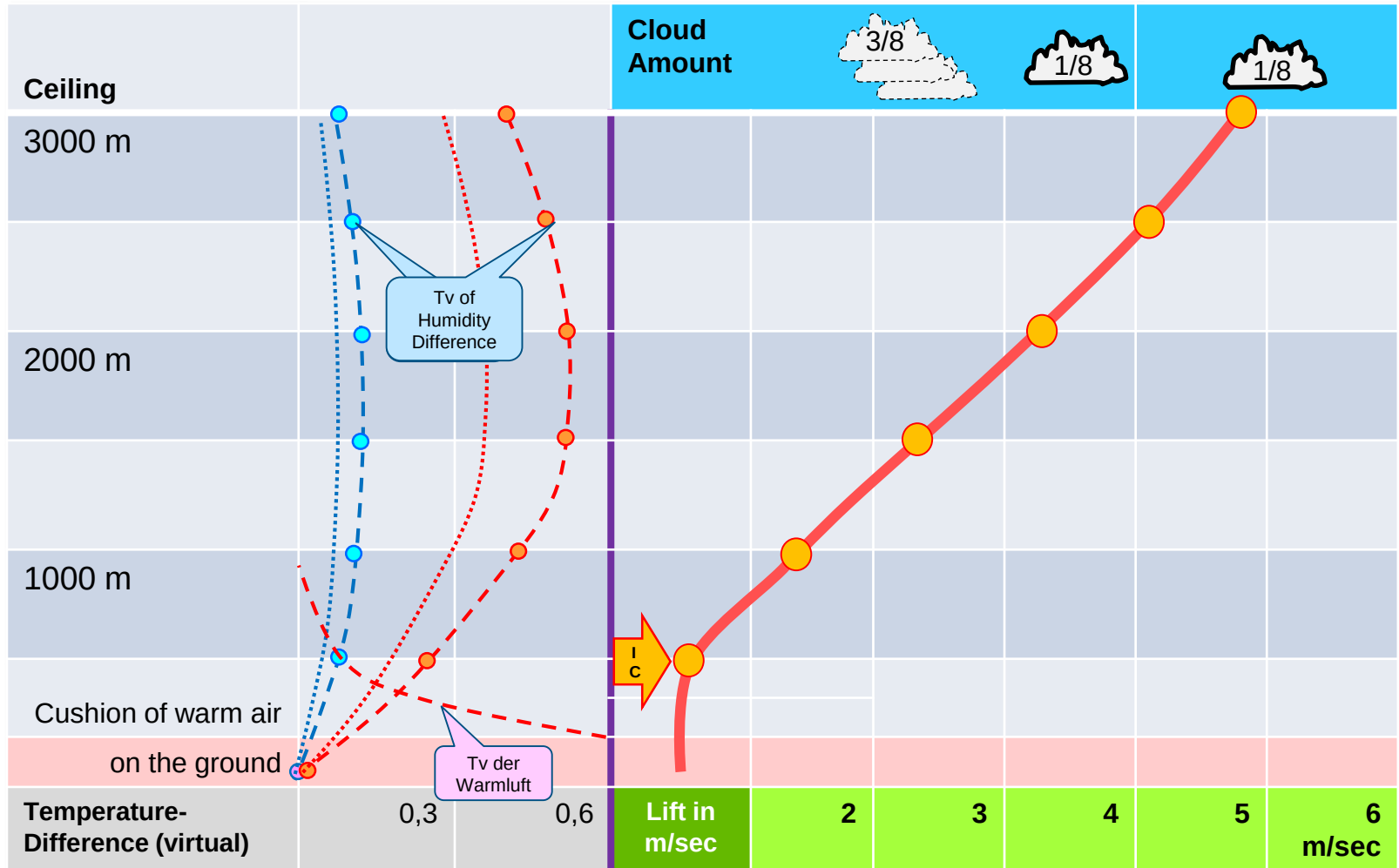
The Standard-Thermal-Model



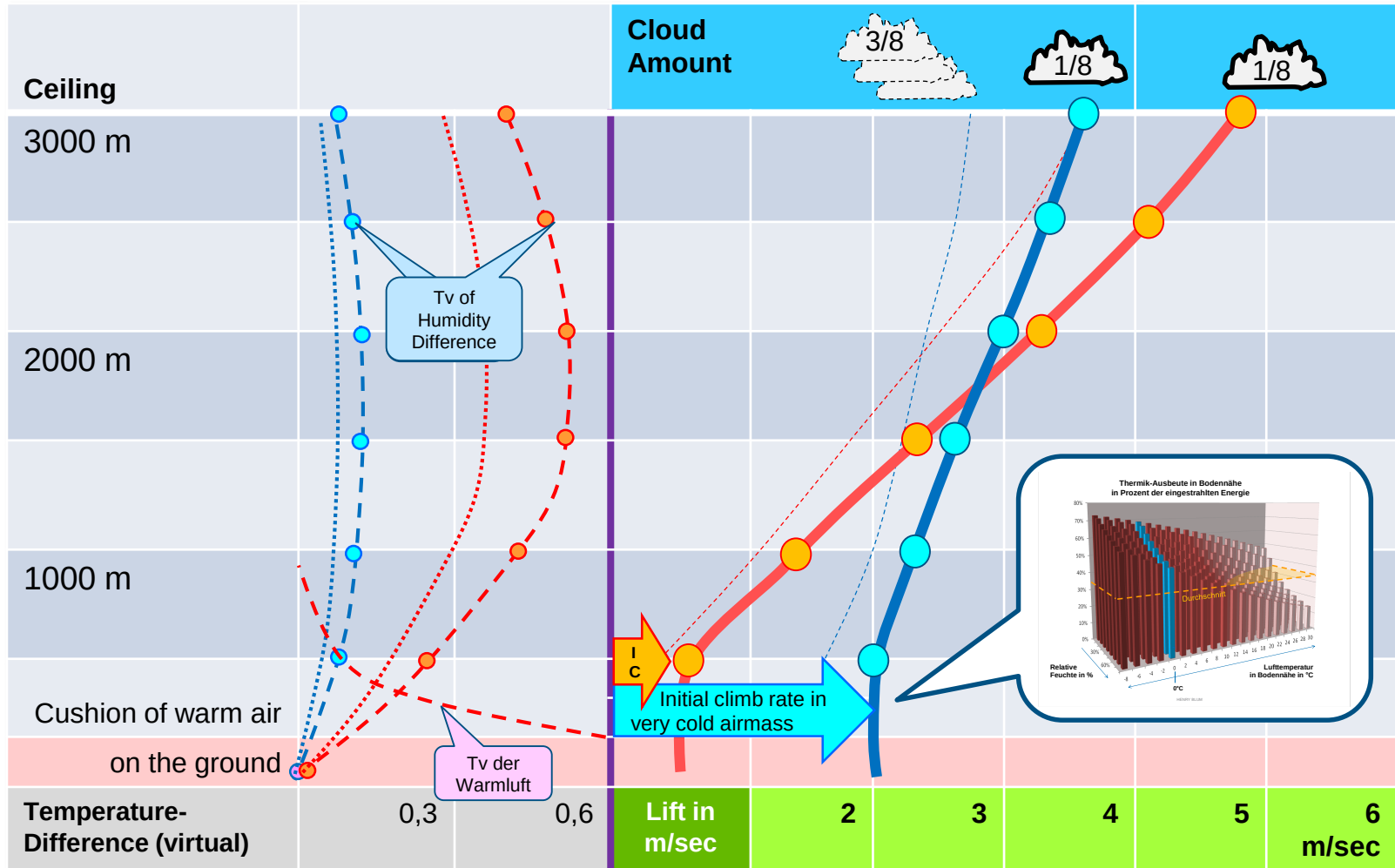
Real climb rates in cold and warm air masses



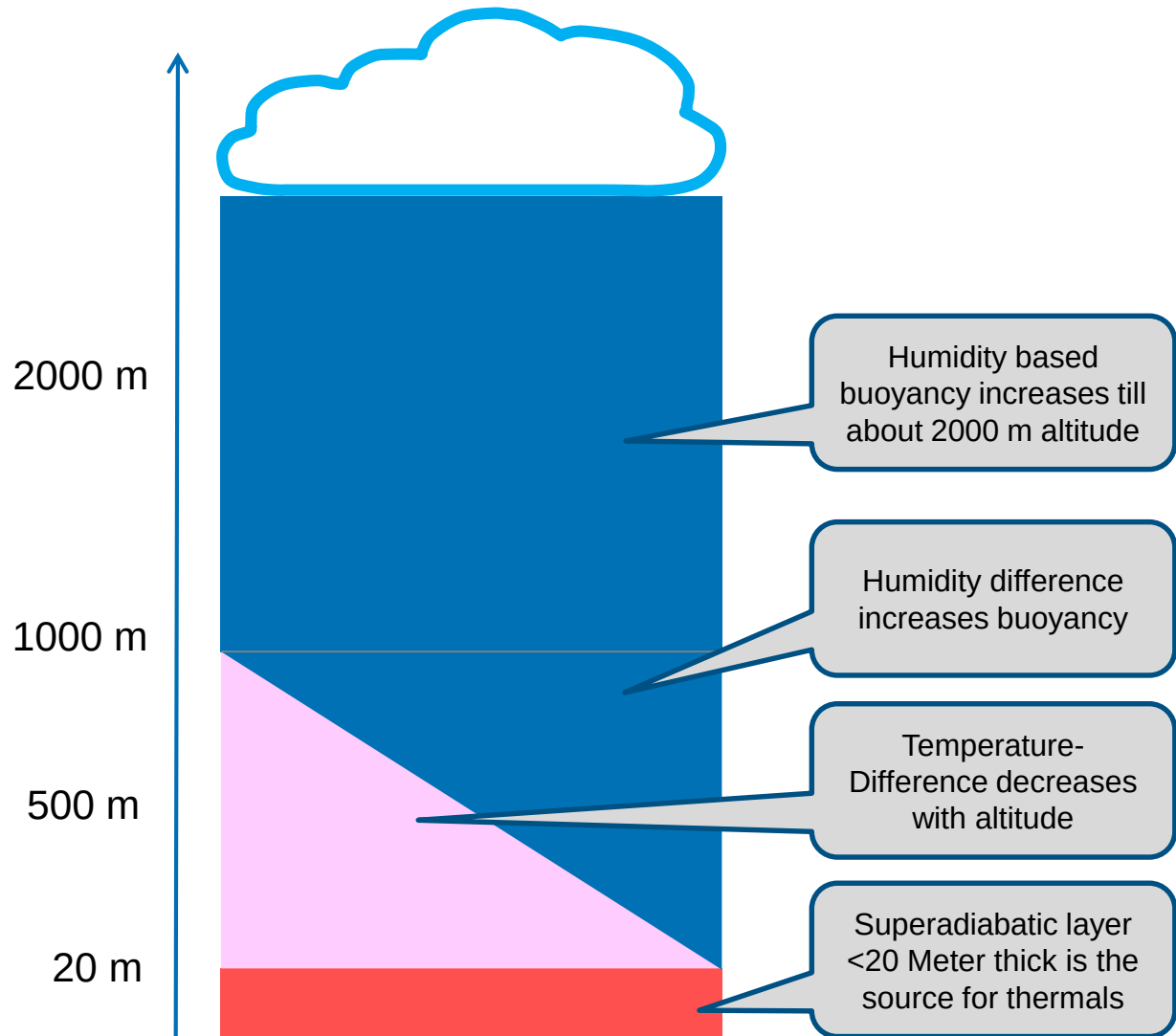
Real climb rates in cold and warm air masses



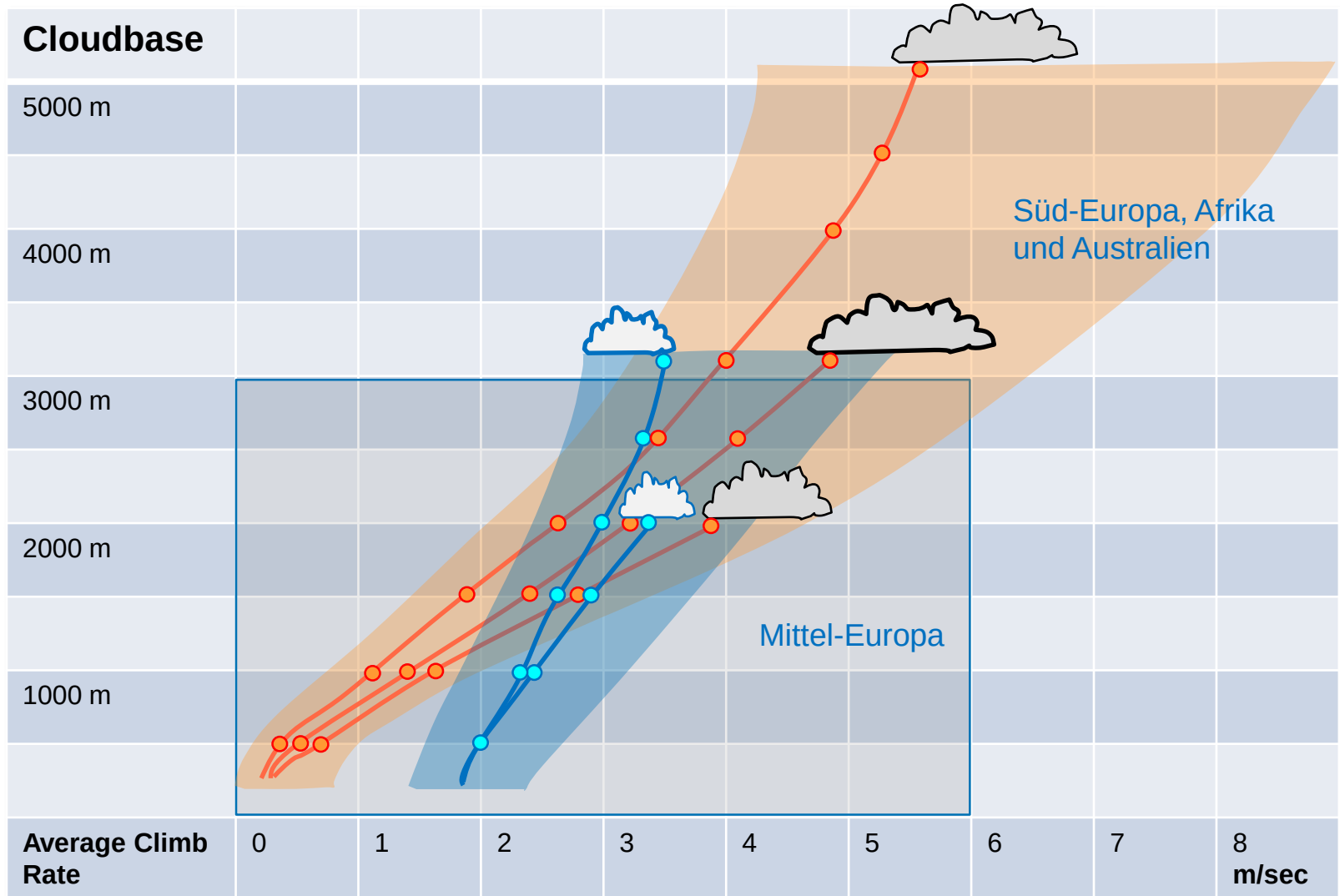
Real climb rates in cold and warm air masses



The Standard-Thermal-Model



Rates of lift in different air masses and high cloud bases



Examples of flights in different air masses

- Ewald Bombelka am 13.07.2013



- Klippeneck-Wettbewerb 2015

- Austin Texas, WM 2012

Flugzeugtyp: **Nimbus 4M**, Startplatz: **Klippeneck (DE / BW)**

OLC-Plus

OLC-League

DMSt

Destination

☒ Standard ☐ Google-Maps

Flugdetails

Punkte des Fluges:	1115.4	<i>Strecke</i>	878,69	<i>Dreieck</i>	236,71
Wertungsdistanz:			1.089,6 km		978,4 km
Speed:			103,2 km/h		94,4 km/h
Wertungsdauer:			10:33:11		10:22:07
Wertungsklasse:	open				
Index:	124,0				
Club:	<u>CDS Stuttgart</u>				
Tag der Meldung:	13.07.2013 20:05:25				

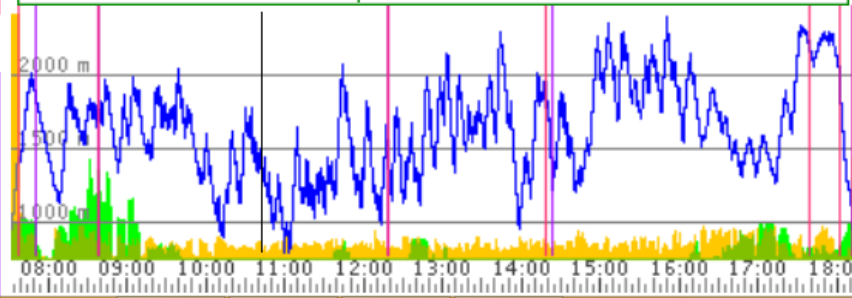
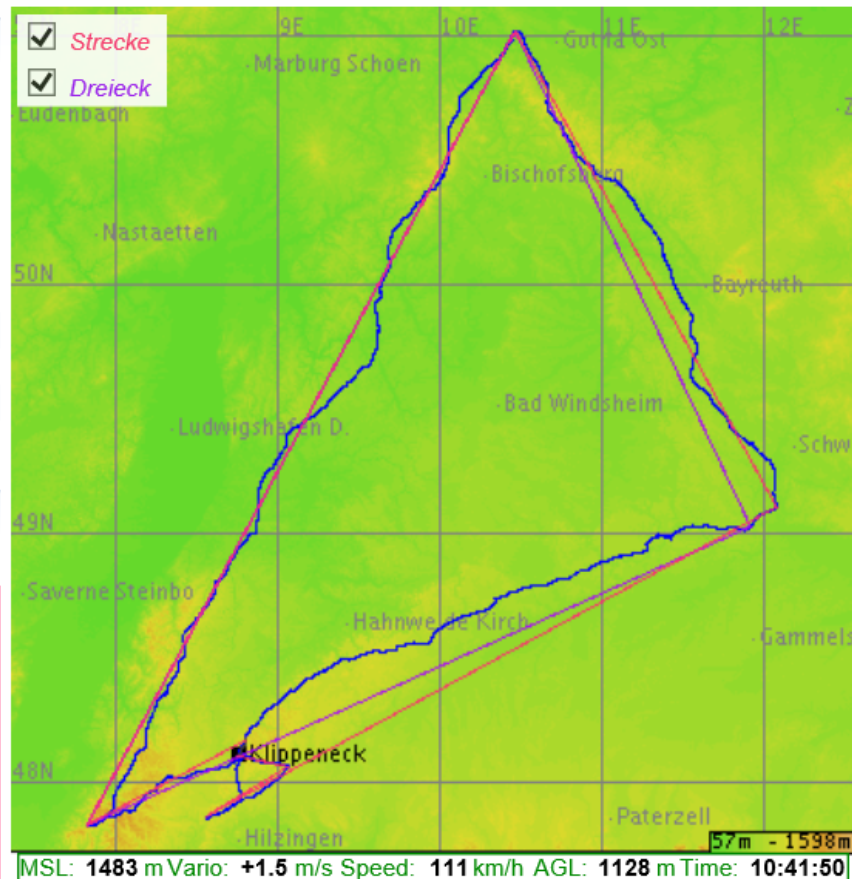
Ewald Bombelka am
13.07.2013

1089,6 Kilometer

			Time [UTC]
t			07:38:30
m			08:38:52
m			12:19:01
m			14:18:29
m			17:39:26
WP4	008°03.858E	48°03.678N	1998m
WP5	009°03.858E	48°03.678N	18:01:24
Finish	008°45.064E	48°06.070N	983m
			18:11:41

Dreieck (FAI-OLC):

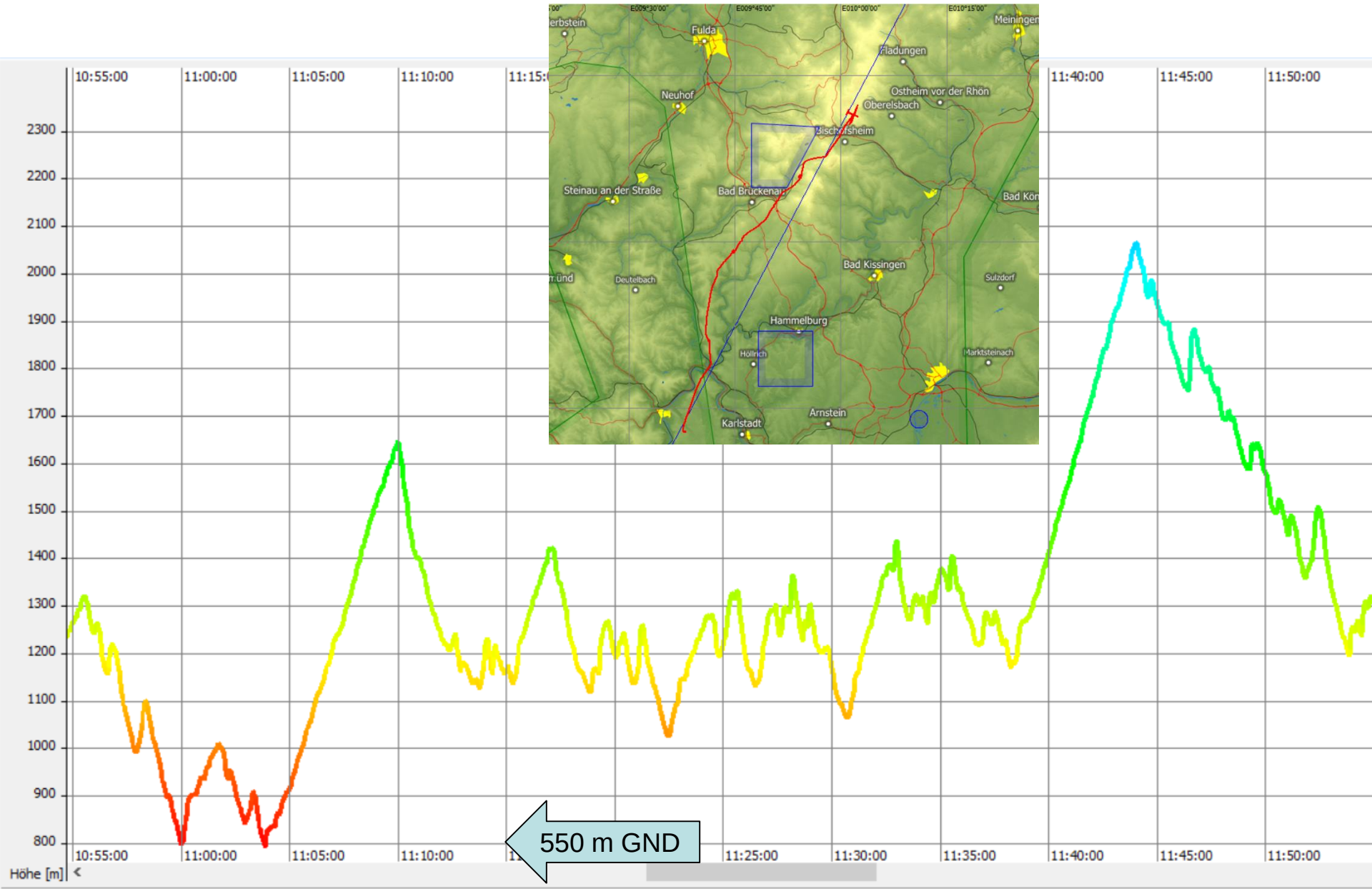
	Lon	Lat	Alt	Time [UTC]
Start	008°45.810E	48°06.838N	1821m	07:50:16
WP1	007°49.932E	47°49.127N	1705m	08:38:52
WP2	010°28.504E	51°01.129N	1388m	12:19:01
WP3	011°55.104E	49°01.437N	1266m	14:23:27
Finish	008°45.520E	48°06.357N	895m	18:12:23



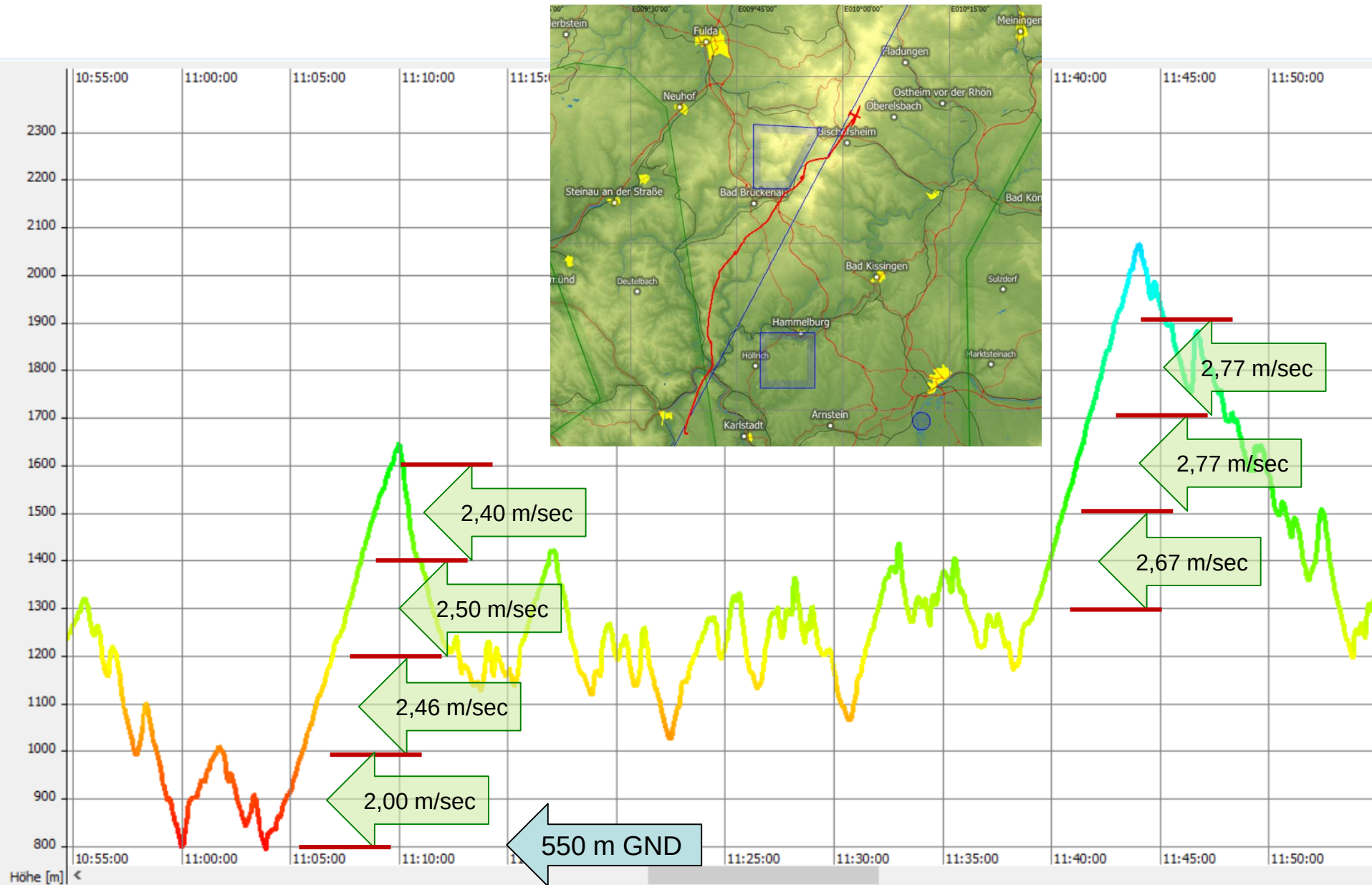


13.07.2013, 12.31 Uhr

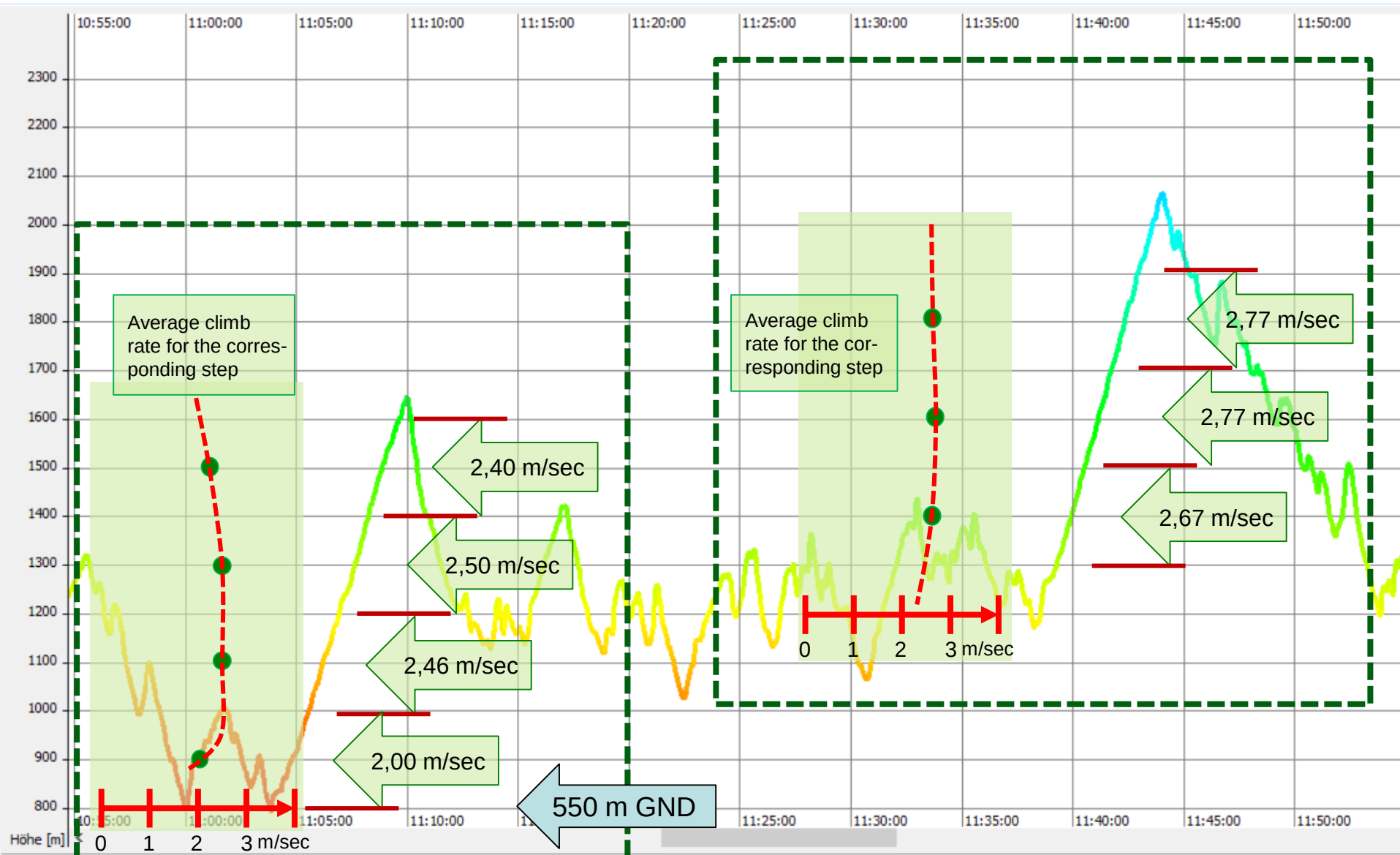
Extract of Ewald Bombelka's Flight



Extract of Ewald Bombelka's Flight

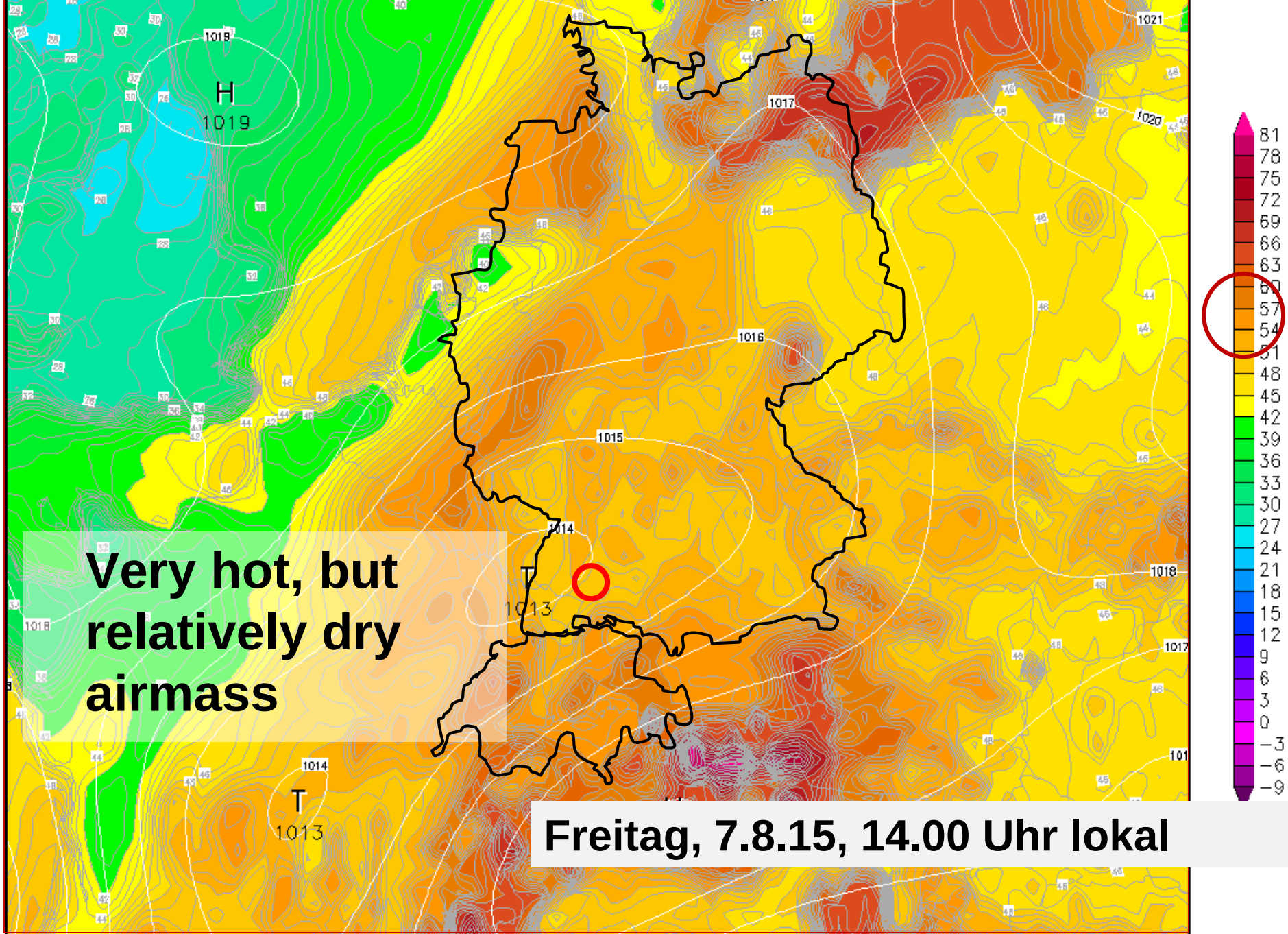


Average climb profile in cold air mass





13.07.2013, 15.18 Uhr



Daten: NCEP GFS (0.25°)

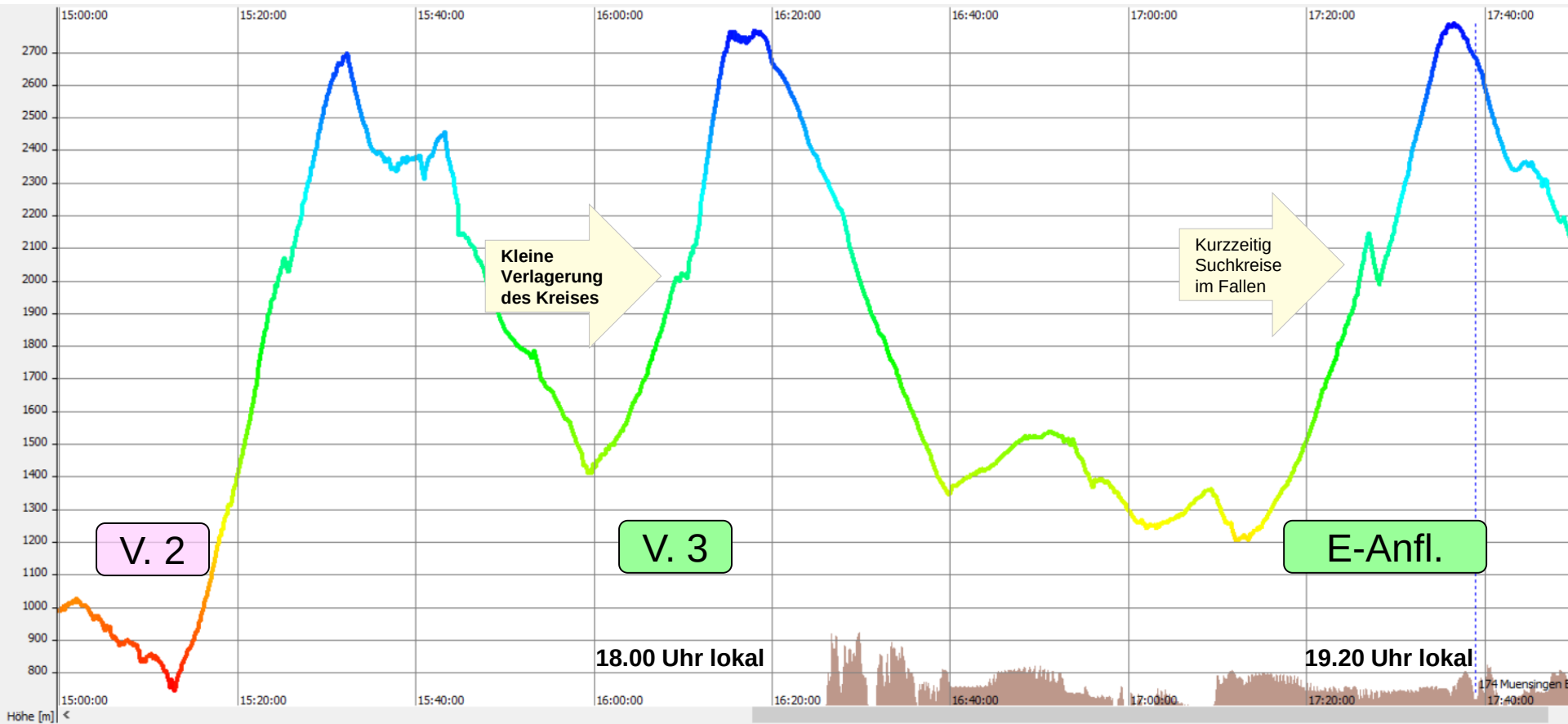


07.08.2015, 11.58 Uhr MESZ



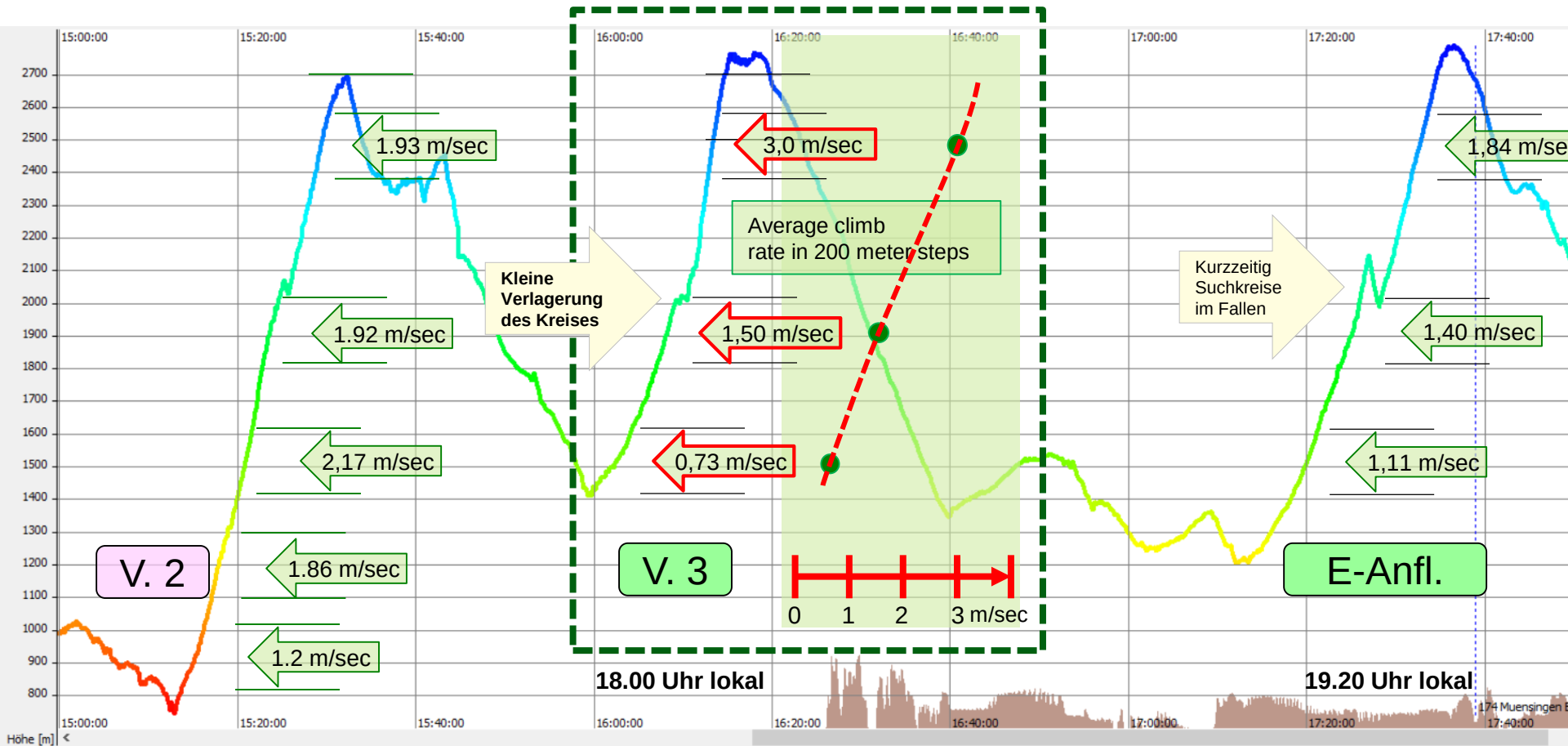
Average climb profile in a warm airmass

Dennis Huybreckx & Jeroen Jennen – CM & LT



Average climb profile in a warm airmass

Dennis Huybreckx & Jeroen Jennen – CM & LT



Important

- In cold air masses, the climb rates are rather stable throughout the entire climb
- You can descend rather low and still expect to find a good thermal
- In warm air masses the climb rates tend to increase with altitude
- One should not descend below half the working height, respectively cannot expect to find a good climb rather low down...

World Gliding Championship, Day 9

14. Aug. 2012

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32nd FAI World Gliding Championships
Uvalde, Texas, United States, 28/07/2012 - 18/08/2012

<< Previous day Task Meteo Daily Total Next day >>

15-meter
Overall results after day 9

#	CN	Pilot	Team	Glider	Total
1.	M6	Matthias Sturm	DEU	ASW-27	8420
2.	RP	Sebastian Kawa	POL	Diana 2	8390
3.	PC	Peter Hartmann	AUT	ASG-29	8014
4.	EI	David Bauder	DEU	Ventus 2ax	7964
5.	AX	Radek Krejcirik	CZE	Ventus 2ax	7949
6.	GA	Michael Rass	AUT	ASG-29	7914
7.	G9	Ed Johnston	GBR	ASG-29	7842
8.	1R	Steven Raimond	NLD	ASW-27	7790
9.	FB	Louis Boudierlique	FRA	ASG-29	7783
10.	EY	Christophe Ruch	FRA	Ventus 2ax	7716
11.	QT	Santiago Berca	ARG	ASW-27	7615
12.	6W	Javier Gaude	ARG	Ventus 2cx	7578
13.	ZJ	Tomasz Rubaj	POL	Diana 2	7555
14.	K1	Mark Leeuwenburgh	NLD	Ventus 2a	7479
15.	GB	Borje Eriksson	SWE	Ventus 2ax	7453
16.	KT	Mark Holliday	RSA	ASW-27	7426
17.	M	Makoto Ichikawa	JPN	Diana 2	7417
18.	SE	Susanne Schoedel	DEU	Ventus 2ax	7367
19.	MR	Richard Swanstrom	SWE	Ventus 2b	7319
20.	KS	Lisa Trotter	AUS	ASW-27	7274
21.	AJ	Alena Netusilova	CZE	ASG-29	7257
22.	AL	Antti Lehto	FIN	Ventus 2cx	7253
23.	M2	Matt Cook	GBR	Ventus 2a	7211
24.	3C	Peter Trotter	AUS	Ventus 2bx	7136
25.	VS	Stefano Giorzo	ITA	Diana 2	6766
26.	MM	Manu Litt	BEL	Ventus 2bx	6577
27.	34	Baudouin Litt	BEL	Ventus 2bx	6443
28.	GT	Thomas Gostner	ITA	Diana 2	6317
29.	ZL	Dave Leonard	USA	ASW-27	6238
30.	TC	Thomas Vestergaard	DNK	Ventus 2c	6235



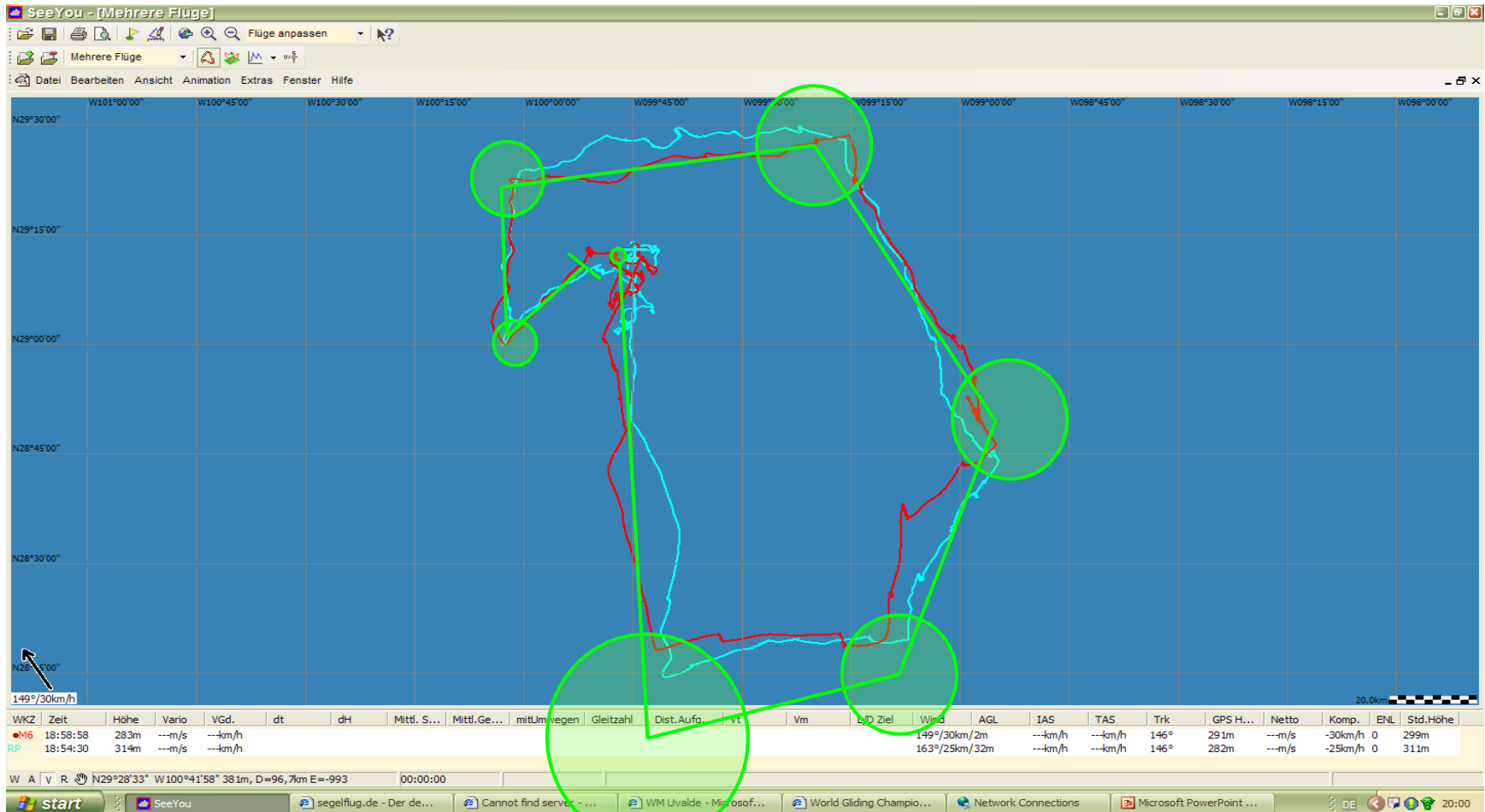
- Matthias Sturm – 4 daily victories
- Sebastian Kawa – 3 daily victories till now
- Matthias leads with 30 points



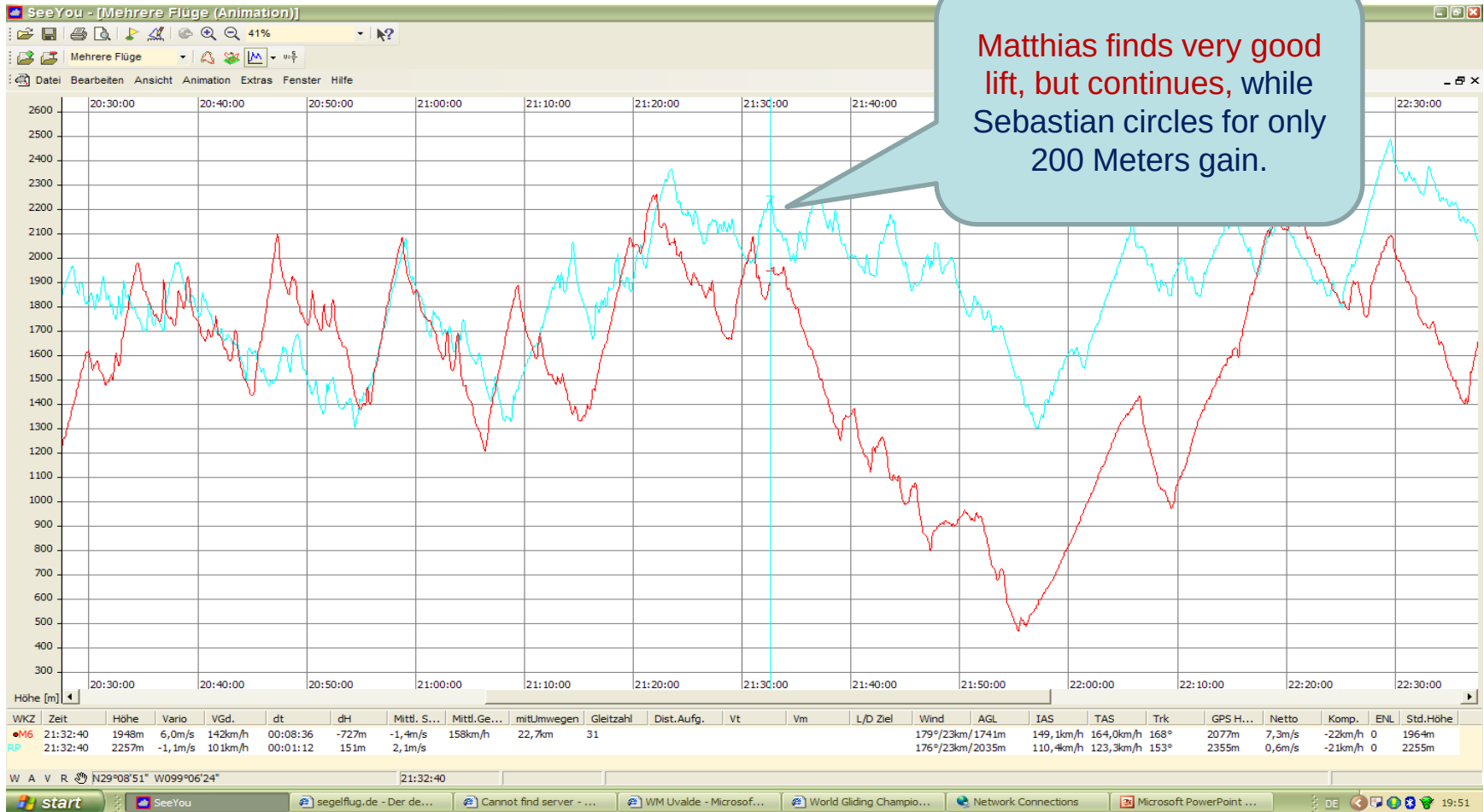
Last few sailplanes in the 15m grid.jpg
Image 12 of 20

View South East before take off

Crossing the line 15.10 Uhr (lokal)

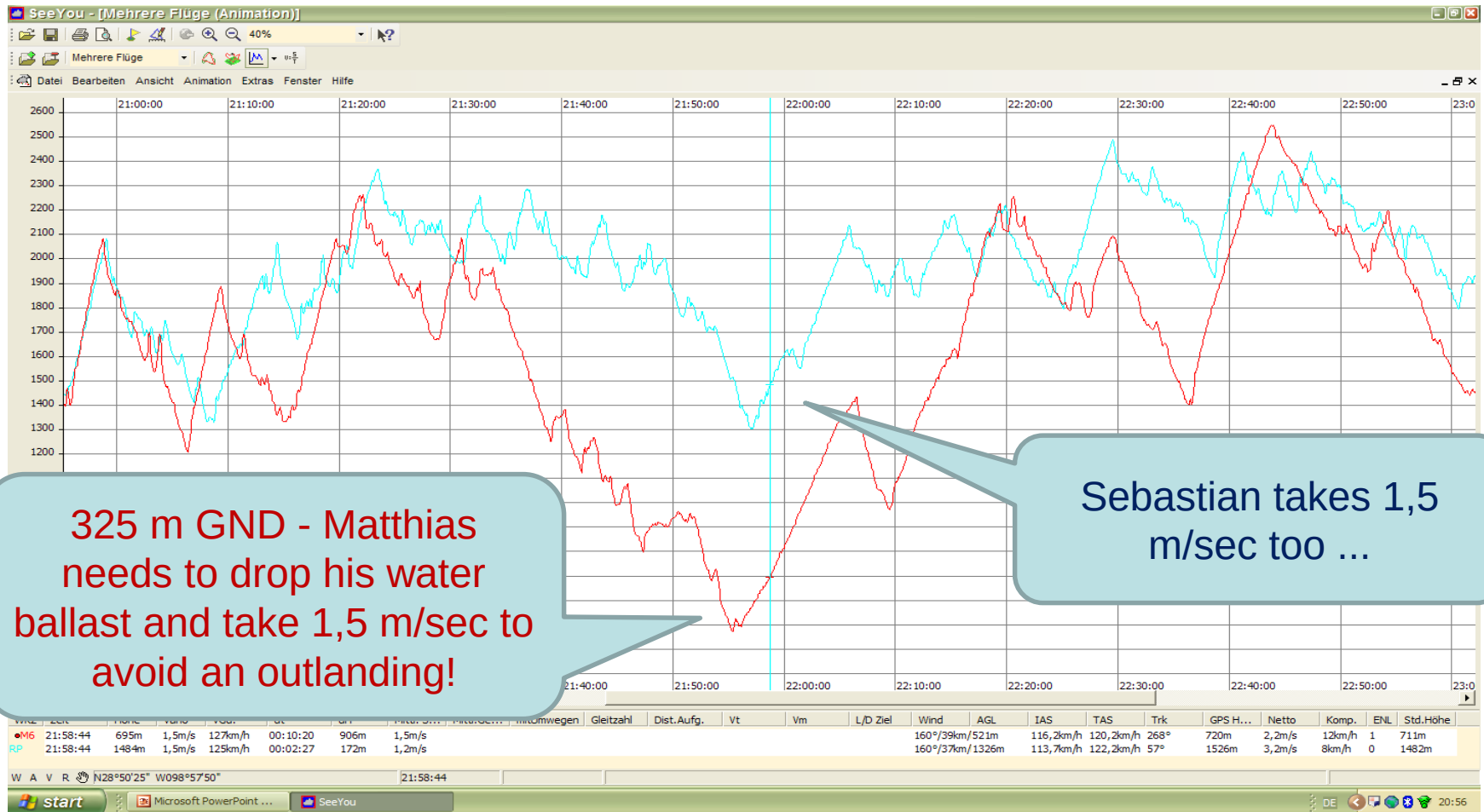


16.32 Uhr – It's turning blue ... !

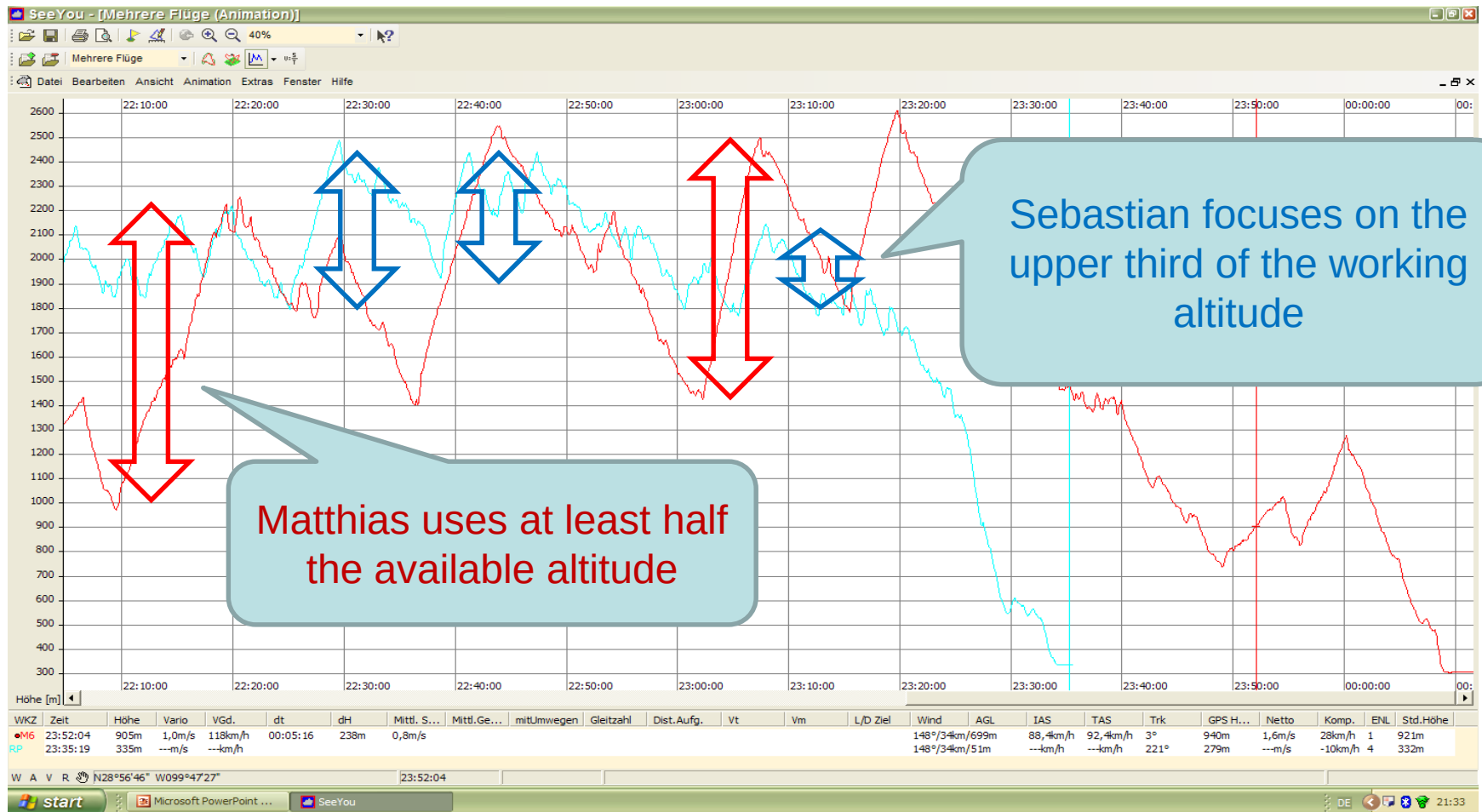


Sebastian Kawa
gegen
Matthias Sturm

16.58 Uhr



Different strategies throughout the race





06 Start E - 20 Javalina - 16 ChalkBliff - 32 Hondo - 66 Hwy 97 - 73 Uno Mas - 71 DosHermns - 01 FINISH

Task length: 373.2km/578.3km (474.0km)

Pmax = 1000 F = 1.000 Pvm = 667 Pdm = 333 N = 37 N1 = 37 N2 = 37 V0 = 133.93 D0 = 455.29

#	CN	Pilot	Country	Glider	Start	Finish	Time	Speed	Dist.	Points	Pen.
1.	RP	Kawa Sebastian	POL	Diana 2	15:10:37	18:29:50	03:19:13	133.9km/h	444.7km	1000	
2.	AX	Krejcirik Radek	CZE	Ventus 2ax	15:11:00	18:40:58	03:29:58	130.1km/h	455.3km	943	



#	CN	Pilot	Country	Glider	Start	Finish	Time	Speed	Dist.	Points	Pen.
1.	RP	Kawa Sebastian	POL	Diana 2	15:10:37	18:29:50	03:19:13	133.9km/h	444.7km	1000	
2.	AX	Krejcirik Radek	CZE	Ventus 2ax	15:11:00	18:40:58	03:29:58	130.1km/h	455.3km	943	



33.	M6	Sturm Matthias	DEU	ASW-27	15:09:10	19:06:20	03:57:10	110.5km/h	436.6km	650	
34.	UH	Ribeiro Julio Cesar	BRA	ASW-27	15:12:10	19:00:35	03:48:25	110.3km/h	419.7km	646	



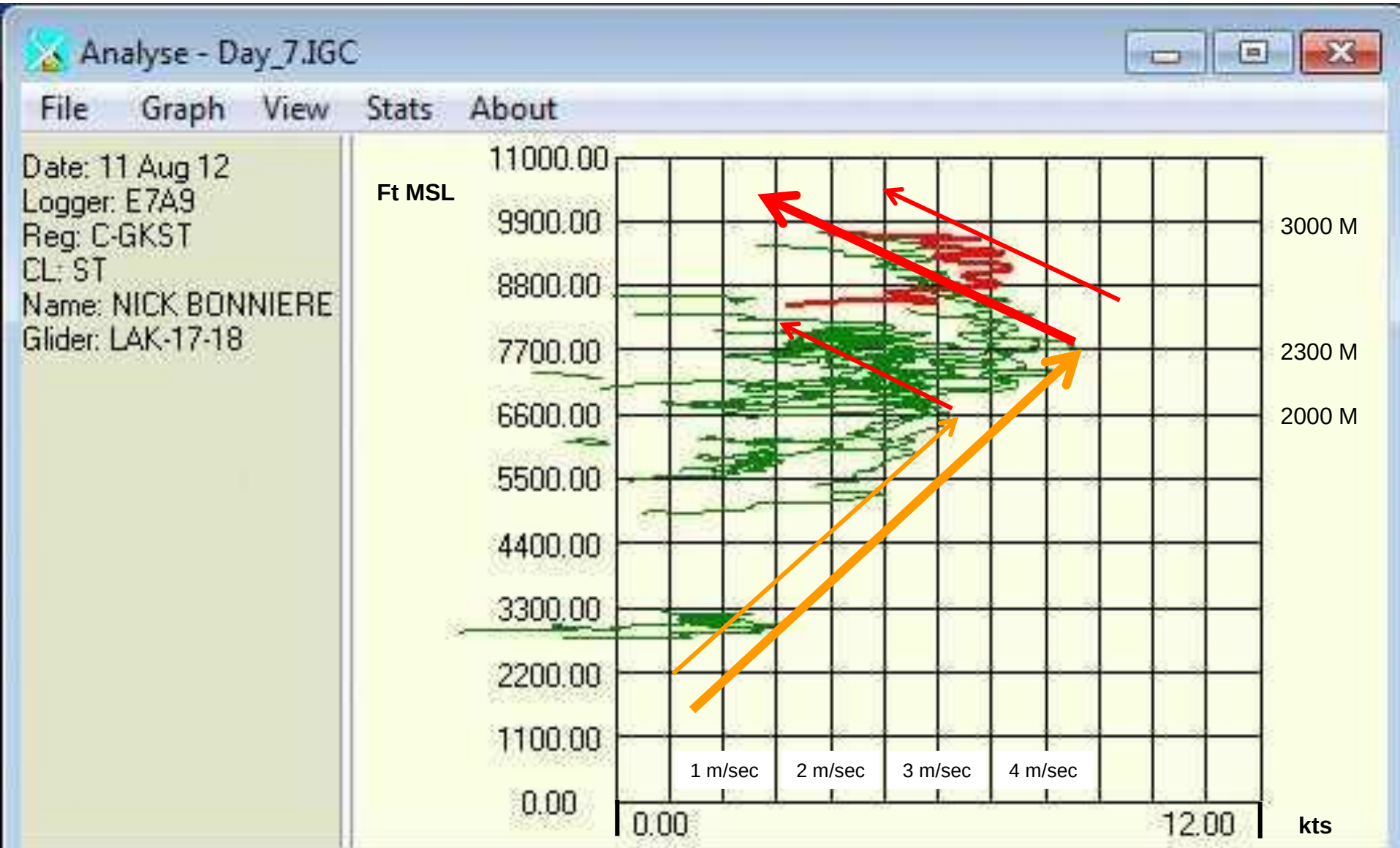
12.	A8	Seaborn John	USA	Ventus 2bx	15:09:33	18:30:47	03:21:14	127.9km/h	429.0km	910	
12.	ZJ	Rubaj Tomasz	POL	Diana 2	15:10:46	18:33:31	03:22:45	127.9km/h	432.2km	910	
14.	AL	Lehto Antti	FIN	Ventus 2cx	15:11:49	18:33:18	03:21:29	127.0km/h	426.6km	897	
15.	FB	Bouderlique Louis	FRA	ASG-29	15:12:04	18:32:22	03:20:18				
16.	G9	Johnston Ed	GBR	ASG-29	15:13:05	18:36:24	03:23:19				
17.	K1	Leeuwenburgh Mark	NLD	Ventus 2a	14:54:41	18:24:26	03:29:45				
18.	011	Bogdanovich Pedja	SRB	Ventus 2ax	14:53:00	18:18:46	03:25:46				
19.	EY	Ruch Christophe	FRA	Ventus 2ax	15:12:01	18:38:48	03:26:47				
20.	KT	Holliday Mark	RSA	ASW-27	15:10:52	18:45:46	03:34:54				
21.	6W	Gaude Javier	ARG	Ventus 2cx	14:58:55	18:23:45	03:24:50				
22.	KS	Trotter Lisa	AUS	ASW-27	14:45:14	18:12:38	03:27:24				
23.	QT	Berca Santiago	ARG	ASW-27	14:58:59	18:25:35	03:26:36				
24.	ZL	Leonard Dave	USA	ASW-27	14:41:36	18:28:02	03:46:26				
25.	3C	Trotter Peter	AUS	Ventus 2bx	14:45:01	18:18:18	03:33:17				
26.	MM	Litt Manu	BEL	Ventus 2bx	15:11:32	19:04:55	03:53:23				
27.	GT	Gostner Thomas	ITA	Diana 2	15:11:52	18:59:42	03:47:50	113.9km/h	432.5km	701	
28.	VS	Ghiorzo Stefano	ITA	Diana 2	15:11:43	18:59:35	03:47:52	113.9km/h	432.4km	700	
29.	34	Litt Baudouin	BEL	Ventus 2bx	15:11:23	19:10:55	03:59:32	112.4km/h	448.6km	678	
30.	EI	Bauder David	DEU	Ventus 2ax	15:13:43	18:59:42	03:45:59	111.7km/h	420.6km	668	
31.	AE	Pavesi Ugo	ITA	Ventus 2c	15:11:36	19:00:02	03:48:26	111.6km/h	425.0km	667	
32.	TC	Vestergaard Thomas	DNK	Ventus 2c	15:12:46	18:59:29	03:46:43	111.5km/h	421.4km	665	
33.	M6	Sturm Matthias	DEU	ASW-27	15:09:10	19:06:20	03:57:10	110.5km/h	436.6km	650	
34.	UH	Ribeiro Julio Cesar	BRA	ASW-27	15:12:10	19:00:35	03:48:25	110.3km/h	419.7km	646	

Tageswertung, 10. W-Tag

Sebastian is 37 Minutes
ahead of Matthias and
gains 350 Points more!

Thermal-Profile Uvalde (Texas), 11.08.12

(Inversion in 2300 m, flat Cumuls, Triggertemp. T. 35°C, Max. Temp. 39°C)



End-Result

15-Meter Klasse



1. Sebastian Kawa – RP
2. Matthias Sturm – M6
3. Radek Krejcirik - AX



Powered by SeeYou

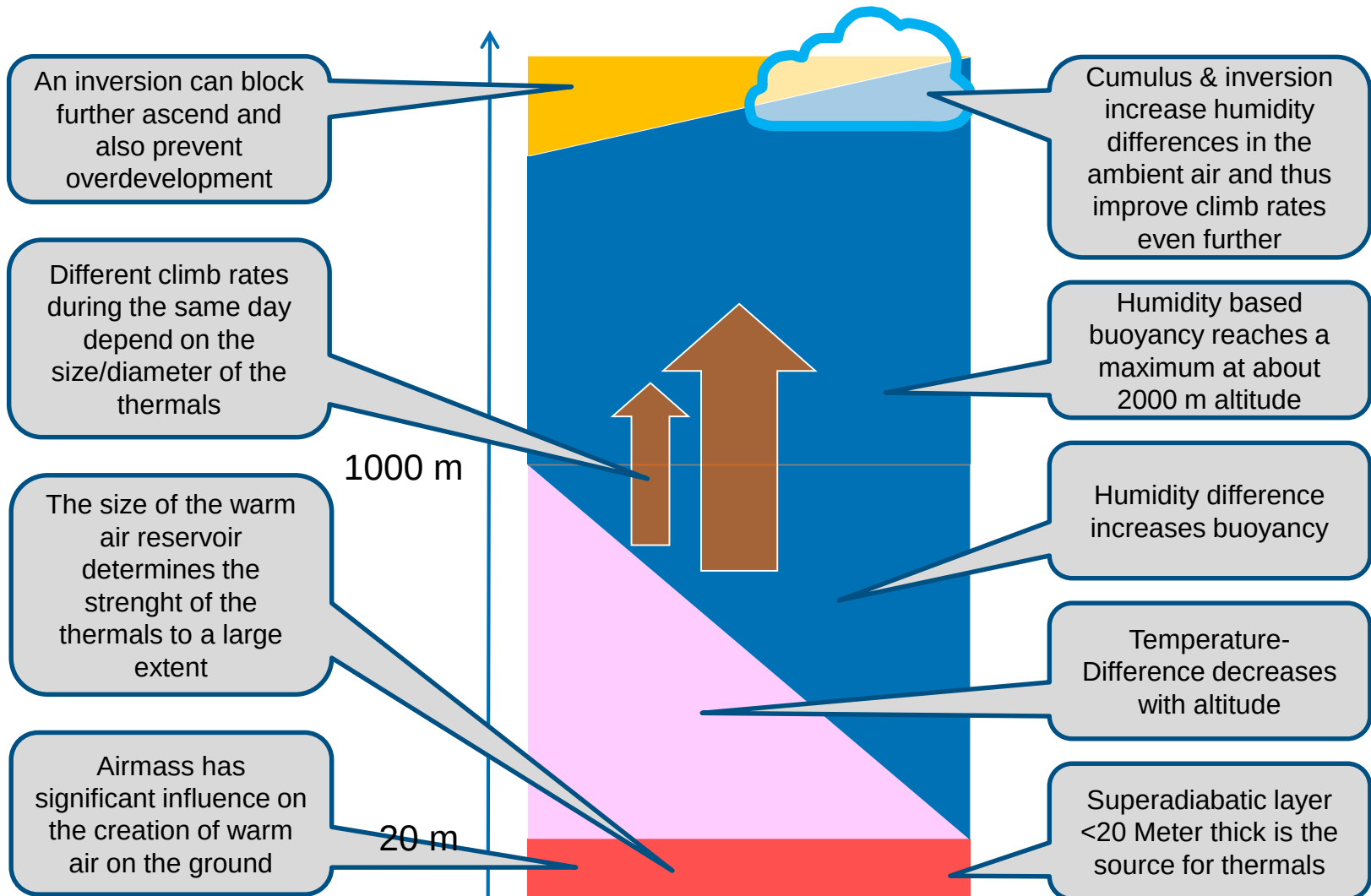
WGC2012 Championships
Uvalde, Texas USA, 28.07.2012 - 18.08.2012

15-meter class - Overall results after 12

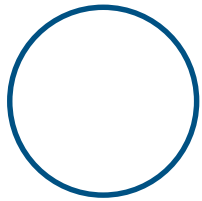
434 P {

#	CN	Pilot	Country	Glider	Total
1.	RP	Kawa Sebastian	POL	Diana 2	11062
2.	M6	Sturm Matthias	DEU	ASW-27	10628
3.	AX	Krejcirik Radek	CZE	Ventus 2ax	10526
4.	1R	Raimond Steven	NLD	ASW-27	10291
5.	GA	Rass Michael	AUT	ASG-29	10242
6.	G9	Johnston Ed	GBR	ASG-29	10225
7.	ZJ	Rubaj Tomasz	POL	Diana 2	10077
8.	EY	Ruch Christophe	FRA	Ventus 2ax	10076
9.	EI	Bauder David	DEU	Ventus 2ax	10036
10.	K1	Leeuwenburgh Mark	NLD	Ventus 2a	9892
11.	PC	Hartmann Peter	AUT	ASG-29	9833
12.	M	Ichikawa Makoto	JPN	Diana 2	9825
13.	MR	Swanstrom Richard	SWE	Ventus 2b	9807
14.	6W	Gaude Javier	ARG	Ventus 2cx	9800
15.	GB	Eriksson Borje	SWE	Ventus 2ax	9755
16.	QT	Berca Santiago	ARG	ASW-27	9754
17.	AL	Lehto Antti	FIN	Ventus 2cx	9684
18.	FB	Bouderlique Louis	FRA	ASG-29	9648
19.	AJ	Netusilova Alena	CZE	ASG-29	9636
20.	KT	Holliday Mark	RSA	ASW-27	9610
21.	SE	Schoedel Susanne	DEU	Ventus 2ax	9583
22.	KS	Trotter Lisa	AUS	ASW-27	9530
23.	M2	Cook Matt	GBR	Ventus 2a	9474
24.	3C	Trotter Peter	AUS	Ventus 2bx	9375
25.	MM	Litt Manu	BEL	Ventus 2bx	8775
26.	VS	Ghiorzo Stefano	ITA	Diana 2	8721
27.	34	Litt Baudouin	BEL	Ventus 2bx	8537
28.	ZL	Leonard Dave	USA	ASW-27	8367
29.	011	Bogdanovich Pedja	SRB	Ventus 2ax	8306
30.	A8	Seaborn John	USA	Ventus 2bx	8294
31.	GT	Gostner Thomas	ITA	Diana 2	8277
32.	TC	Vestergaard Thomas	DNK	Ventus 2c	8149
33.	ST	Bonniere Nick	CAN	LAK-17A	8136
34.	A1	Pedersen Jan Schmeltz	DNK	LS-10	7742
35.	TT	Duarte Claudio Blois	BRA	Ventus 2a	7394
36.	UH	Ribeiro Julio Cesar	BRA	ASW-27	6972
37.	AE	Pavesi Ugo	ITA	Ventus 2c	6636

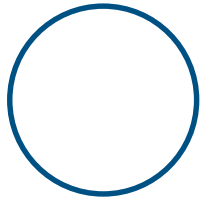
The Standard-Thermal-Model



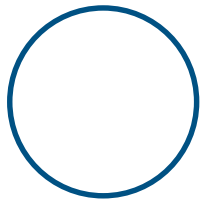
Question to the audience ...



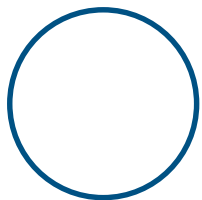
Perfectly understood,
makes sense



Mostly understood,
but questions



Did not understand,
serious doubts



Thinks it's nonsense
or complete bullshit



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